Order Number 9333320

Order effects in auditors' internal control judgments: Belief perseverance versus the contrast effect

Morton, Jane Elizabeth, Ph.D.

The University of Arizona, 1993

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

ORDER EFFECTS IN AUDITORS' INTERNAL CONTROL JUDGMENTS: BELIEF PERSEVERANCE VERSUS THE CONTRAST EFFECT

by

Jane Elizabeth Morton

A Dissertation Submitted to the Faculty of the

COMMITTEE ON BUSINESS ADMINISTRATION

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 9 3

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read the document prepared by Jane Elizabeth Morton

entitled ORDER EFFECTS IN AUDITORS' INTERNAL CONTROL JUDGMENTS: BELIEF PERSEVERANCE VERSUS THE CONTRAST EFFECT

and recommend that it be accepted as fulfilling the requirements for the Degree of Doctor of Philosophy/Business Administration

William L. Felix, Jr.	7/8/93 Date
Andrew D. Bailey, Jr.	7/8/93 Date
Brian P. Shapiro	7/8/93 Date
	Date
	Date

Final approval and acceptance of this document is contingent upon the candidate's submission of the final copy of the document to the Graduate College.

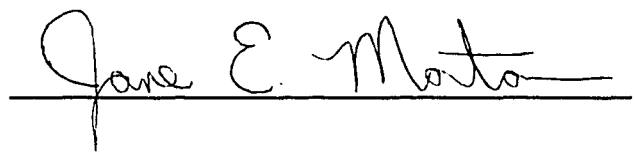
I hereby certify that I have read this document prepared under my direction and recommend that it be accepted as fulfilling the requirement.

Director William L. Felix, Jr.	7/21/93 Date

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the copyright holder.

SIGNED: 

ACKNOWLEDGEMENTS

The successful completion of this project is due in large part to the support and encouragement of a number of special people.

I wish to thank the members of my dissertation committee, William L. Felix, Jr., Andrew D. Bailey, Jr., and Brian P. Shapiro, for giving generously of their time and expertise throughout the course of this project. I owe special thanks to my dissertation director, William L. Felix, Jr., for his patience, understanding, and constant encouragement. Not only is Bill is an insightful and knowledgeable scholar, but he is an outstanding teacher and a genuinely caring and unselfish individual.

I extend special thanks to my parents, James and Audrey Crone, for their love, encouragement, and unwavering confidence in me, and my brothers, David and Michael, for lightening my mood with their exceptionally keen senses of humor just when I needed it most. I especially want to thank my sister, Julie Bailey, for being my confidante and best friend, for being there with a sympathetic ear whenever the going got rough, and for constantly reinforcing in me the motivation to continue.

I am also grateful to the priests of Saints Peter and Paul Church and members of the contemporary choir, especially Chris Yirka, for their friendship and spiritual support throughout the dissertation process. I will miss them all very much.

Finally, but most importantly, I thank God for all of the many blessings in my life and for the strength that comes from knowing all things are possible through Him.

TABLE OF CONTENTS

TABLE OF CONTENTS - *Continued*

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES - *Continued*

ABSTRACT

Prior research suggests that beliefs are affected by the order in which information is processed. However, the empirical evidence with respect to this "order effect" is itself anomalous in that the direction of the bias is inconsistent across studies. This study examines and attempts to reconcile the theory of belief perseverance, which predicts primacy, and the contrast-effect theory, which predicts recency. An "integrated" theory of belief revision is presented which proposes that belief perseverance (the contrast effect) is an increasing (decreasing) function of confidence in beliefs. The theory is formalized by expanding Hogarth and Einhorn's (1992) belief-adjustment model to include the proposed effect of confidence on belief revision.

The model's predictions were tested in a field experiment in which subjects received a series of information regarding a hypothetical audit client's internal controls and were asked to assess the likelihood that controls would prevent or detect material misstatement. Half of the information in each series was "positive" (describing internal control strengths), while the other half was "negative" (describing internal control weaknesses). The order of information presentation

(positive-negative versus negative-positive) was manipulated between subjects.

Confidence was manipulated by varying two factors: task experience and amount of information. The experiment was administered to 50 undergraduate auditing students at The University of Arizona and 85 experienced auditors from two of the Big-Six accounting firms. Half of the subjects in each experience-level group received a "short" series of information, while the other half received a "long" series. Confidence assessments were elicited from subjects in each of the four (experience-level/amount-of-information) subject groups and used to form predictions about order-effect differences between groups.

The model's predictions were supported for inexperienced subjects but not for experienced subjects, suggesting that confidence affects the direction of order effects only when task experience is low. Furthermore, when order effects were present for experienced-subject groups, they were in the direction of recency. This suggests that increased task experience may lead to a decrease in belief-perseverance proneness.

1. INTRODUCTION

Over the past several decades, judgment and decision-making research has provided considerable evidence that human judgment does not always conform to the normative rules of probability theory. One well-documented anomaly is that, contrary to Bayes's theorem, judgment is affected by the order in which information is processed. However, the empirical evidence with respect to this "order effect" is itself anomalous in that the direction of the bias is inconsistent across studies. Whereas in some studies early-presented information has the greater impact on judgment, resulting in a "primacy effect", in other studies later-presented information has the greater impact and a "recency effect" is reported.

A number of theories have been proposed to account for either primacy or recency, but we do not as yet have a cohesive theory which can explain order effects in both directions. The purpose of this study is to develop and test such a theory. Specifically, this study examines and attempts to reconcile two of the more widely-cited theories which predict opposite order effects.

According to one theory, "belief perseverance" decreases the impact of later-presented information that is inconsistent with beliefs, resulting in a primacy effect (Nisbett and Ross 1980; Ross and Lepper 1980). In

direct opposition is the "contrast effect" theory which predicts an increase in the impact of later-presented information that is inconsistent with beliefs, resulting in a recency effect (Einhorn and Hogarth 1985a, 1987; Hogarth and Einhorn 1992).

The "integrated" theory presented in this study proposes that the belief-perseverance and contrast-effect theories can be reconciled by analyzing the effect of second-order uncertainty, or confidence, on belief revision. In particular, the theory maintains that in order for beliefs to persevere, one must have some degree of certainty, or confidence, in one's beliefs. That is, people are not likely to "cling" to a belief about which they are uncertain. As confidence increases, however, people are likely to become increasingly less responsive to information which is contrary to their belief. Conversely, people will be more responsive to contrary information (i.e. more willing to adjust their belief) when confidence in their belief is low.

The theory proposes, therefore, that belief perseverance (the contrast effect) is an increasing (decreasing) function of confidence in beliefs. This further implies that when confidence is low, a recency effect is more likely to occur as a consequence of the contrast effect. As confidence increases, however, the

theory predicts a gradual reduction in recency and an eventual reversal in the direction of the order effect to primacy as a result of belief perseverance.

The primary purpose of this study is to examine the effect of confidence on the direction (and size) of order effects. However, tests of the theory's predictions require some means of manipulating confidence in an experimental setting. Prior research suggests that confidence in beliefs is affected by (1) the amount of experience one has had with the task at hand (Paese and Sniezek 1991; Waller 1993), and (2) the amount of information available for making judgments (Anderson 1981; Paese and Sniezek 1991; Oskamp 1965). A secondary focus of this study, therefore, is to examine the effect of task experience and the amount of information on confidence.

To the extent that the two variables identified above affect confidence, the theory predicts that order effects will differ across subjects with varying amounts of task experience and information. In the prior order-effect literature, relatively few studies have examined the effect of task experience on order effects (e.g. Anderson and Norman 1964; Messier and Tubbs 1992) and none, to my knowledge, have examined the effect of the amount of information on order effects. Thus, in addition to examining the effects of these two variables on the

direction and size of order effects from a theoretical perspective (via an analysis of their contribution to confidence), this study adds to the empirical literature on order effects by manipulating both task experience and the amount of information in an experiment designed to test the theory's predictions.

In audit settings, order effects have potential implications for both audit efficiency and effectiveness (Ashton and Ashton 1988). In an internal control evaluation setting, for example, suppose an auditor encounters relatively more information early in the evaluation which indicates internal control strengths ("positive" information) followed by information which indicates internal control weaknesses ("negative" information). If belief perseverance predominates, the auditor may "underweight" the later-encountered negative information in revising beliefs about the likelihood of error in the client's financial statements (producing a primacy effect). This could lead to an unwarranted reduction in substantive testing and thus may compromise audit effectiveness. If the contrast effect predominates, however, the auditor may "overweight" the later-encountered negative information (producing a recency effect) and consequently do more substantive testing than is necessary, resulting in a decline in audit efficiency.

Conversely, when early-encountered information is negative and is followed by positive information regarding the client's internal controls, the potential consequences of belief perseverance and the contrast effect are reversed. That is, belief perseverance could lead to a decline in audit efficiency as a result of unnecessary expansion of substantive tests, while the contrast effect may compromise audit effectiveness as a result of an unwarranted reduction in substantive testing.

The results of recent studies examining order effects in audit settings indicate that recency predominates and thus tend to support the contrast-effect theory (Asare and Messier 1992). However, all of the auditing studies to date have used a relatively short series of information in their experimental tasks. This study extends prior auditing research by providing empirical evidence on the degree to which belief perseverance (and thus primacy) might be a problem in audit settings where the information series is long. While some audit judgments may be based on a relatively small amount of information, it is likely that the amount of evidence collected would normally exceed the four to ten pieces of information used in prior studies for judgments about internal control strength, fairness of key account balances, and indeed, the audit opinion itself.

In addition, because belief perseverance and the contrast effect have opposite implications for audit efficiency versus effectiveness for a given order of information, it is important to identify the circumstances under which order effects of a given direction are most likely to occur. For example, prescriptive measures designed to mitigate recency in a situation where primacy is more likely to occur might further exacerbate the primacy effect. Finally, because the proposed psychological mechanisms which produce primacy and recency differ, prescriptive measures designed to mitigate primacy might differ from those designed to mitigate recency.

The remainder of this study is organized as follows. The next chapter describes the theories of belief perseverance and the contrast effect and reviews the empirical evidence supporting each. Chapter three presents an integrated theory of order effects based on an analysis of the effect of confidence on belief revision. Hogarth and Einhorn's (1992) belief-adjustment model is expanded to incorporate the effect of confidence as a basis for developing testable hypotheses. Chapter four describes an experiment designed to test the model's predictions in an internal control evaluation setting. Results are presented and discussed in chapter five. The final chapter provides suggestions for future research and concluding comments.

2. BACKGROUND

2.1 Definition of Order Effects

The term "order effect" has been used to describe the general observation that human judgment tends to be affected by the order in which information is processed. Perhaps the most extensively-documented type of order effect, and that which is the focus of this study, can be defined as follows. Suppose there are two information sets which have opposite implications with respect to a given proposition or hypothesis. Set P contains information that supports the hypothesis (i.e. it is "positive" with respect to the hypothesis), and set N contains information that contradicts the hypothesis (i.e. it is "negative" with respect to the hypothesis). The information sets are presented to some subjects in the positive-negative order and to other subjects in the negative-positive order. An order effect occurs when subjects' final beliefs in the hypothesis (given the same initial belief) differ between the two groups.

This definition of an order effect can be distinguished from other types of order effects examined in the literature by the specific way in which information order is manipulated (i.e. positive-negative versus negative-positive). An example of an alternative approach to order manipulation is illustrated by Ricchiute (1992),

who examines differences in going-concern decisions between groups of auditors who processed positive and negative information in working-paper versus causal order.

Another type of order effect may occur when the order in which tasks are performed is manipulated between subjects. For example, Koonce (1992) examines differences in probability assessments for a target event between auditors who were asked to develop an explanation followed by a counterexplanation for the target event and auditors who were asked to develop a counterexplanation followed by an explanation.

Attention is restricted in this study to the analysis of differences in judgments between groups of subjects processing information in a positive-negative versus a negative-positive order for several reasons. First, as noted above, this type of order effect has been examined extensively over the past several decades and has produced an impressive array of mixed evidence with respect to the direction of the order effect (i.e. primacy versus recency). A primary purpose of this study is to propose an explanation for the apparently contradictory results of prior studies examining this type of order effect.

Second, the order-effect implications of the specific theories examined in this study (i.e. belief perseverance and the contrast effect) are relatively unambiguous in the

situation described above. It is less clear, for example, what the order-effect predictions of the two theories might be if individual pieces of positive and negative information were processed in a P-N-P-N-N-P order as opposed to a N-P-N-P-P-N order.

The remainder of this subsection provides a detailed analysis of the difference between primacy and recency in the paradigmatic situation described above.

2.1.1 The Primacy Effect

A primacy effect occurs when subjects' final judgments are biased toward the first information set processed. For example, when subjects processing information in the positive-negative order express a greater final belief in the hypothesis than subjects processing information in the negative-positive order (given the same initial belief), a primacy effect has occurred.

The primacy effect is illustrated in Figure 2.1 below. Let S(0) be the initial belief at time 0 (prior to processing either information set). Let S(1) be the belief in the hypothesis after processing the first information set and S(2) be the final belief after processing both information sets.

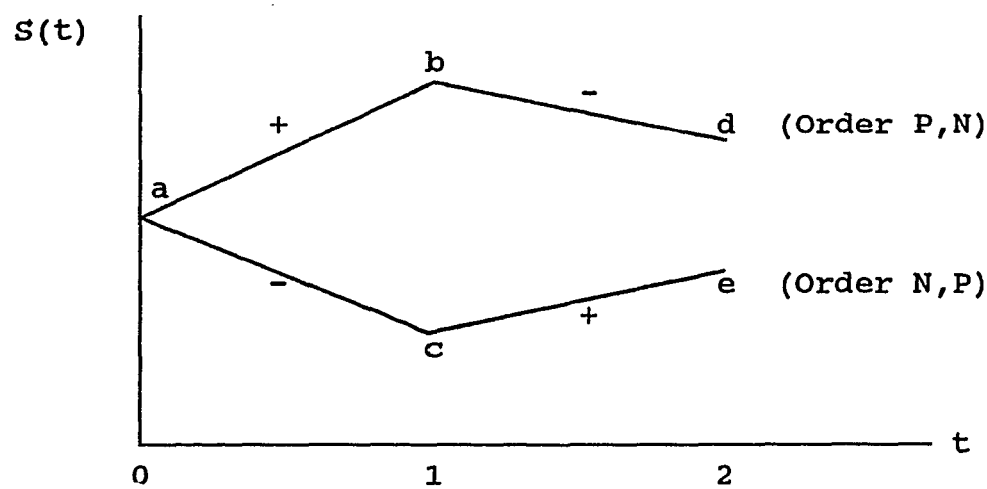
The total order effect can be expressed as:

$$D^t = S(2)^{pn} - S(2)^{np} \qquad (2.1)$$

where the superscripts "pn" and "np" refer to the order in which information is processed. As Figure 2.1 illustrates, a primacy effect occurs when $S(2)^{pn}$ is greater than $S(2)^{np}$ (i.e. when $D^t > 0$).

FIGURE 2.1

The Primacy Effect



S(t) = belief in the hypothesis at time t

At a more detailed level, we can also examine the order effect separately for positive and negative information, respectively. The impact of a given information set on beliefs can be measured by examining the extent to which beliefs are revised in response to the information. For example, the impact of early-presented

positive information in Figure 2.1 can be expressed as the difference between beliefs at point b and point a, or $S(1)^{pn} - S(0)^{pn}$. Likewise, the impact of later-presented positive information can be expressed as the difference between beliefs at point e and point c, or $S(2)^{np} - S(1)^{np}$.

The positive-information order effect can be expressed as:

$$D^{p} = [S(1)^{pn} - S(0)^{pn}] - [S(2)^{np} - S(1)^{np}] \qquad (2.2)$$

A primacy effect occurs in the positive information when the impact of early-presented positive information is greater than the impact of later-presented positive information (i.e. when $D^{p} > 0$). Primacy in the positive information is evident in Figure 2.1 because the slope of the line segment ab is steeper than the slope of the line segment ce (indicating that belief in the hypothesis increases in response to positive information by a greater amount when that information is processed first).

Similarly, the impact of early-presented negative information can be expressed as the difference between beliefs at point c and point a, or $S(1)^{np} - S(0)^{np}$, while the impact of later-presented negative information can be expressed as the difference between beliefs at point d and point b, or $S(2)^{pn} - S(1)^{pn}$.

The negative-information order effect can be expressed as:

$$D^n = [S(2)^{pn} - S(1)^{pn}] - [S(1)^{np} - S(0)^{np}] \qquad (2.3)$$

Note that the order of the terms in equation (2.3) is opposite that for equation (2.2). That is, the negative-information order effect is calculated by subtracting the impact of early-presented negative information from the impact of later-presented negative information. This is done in order to maintain consistency between order-effect measures. Because belief in the hypothesis is revised downward in response to negative information (i.e. $[S(2)^{pn} - S(1)^{pn}] < 0$), the negative-information order effect is calculated as indicated in equation (2.3) so that $D^n > 0$ indicates primacy.

A primacy effect occurs in the negative information when belief in the hypothesis decreases in response to negative information by a greater amount when that information is processed first (i.e. when $D^n > 0$). Primacy in the negative information is evident in Figure 2.1 because the slope of the line segment ac is steeper than the slope of the line segment bd.

In equation (2.1), the total order effect is expressed as the difference in final beliefs between subjects processing information in the positive-negative order versus the negative-positive order (i.e. $S(2)^{pn}$ -

$S(2)^{np}$). The total order effect can be equivalently expressed as the sum of the positive-information and negative-information order effects. That is:

$$D^t = D^p + D^n \tag{2.4}$$

$$= \{[S(1)^{pn} - S(0)^{pn}] - [S(2)^{np} - S(1)^{np}]\}$$

$$+ \{[S(2)^{pn} - S(1)^{pn}] - [S(1)^{np} - S(0)^{np}]\} \tag{2.5}$$

$$= [S(2)^{pn} - S(0)^{pn}] - [S(2)^{np} - S(0)^{np}] \tag{2.6}$$

When $S(0)^{pn} = S(0)^{np}$, then equation (2.6) simplifies to:

$$D^t = S(2)^{pn} - S(2)^{np}$$

which is equivalent to equation (2.1).

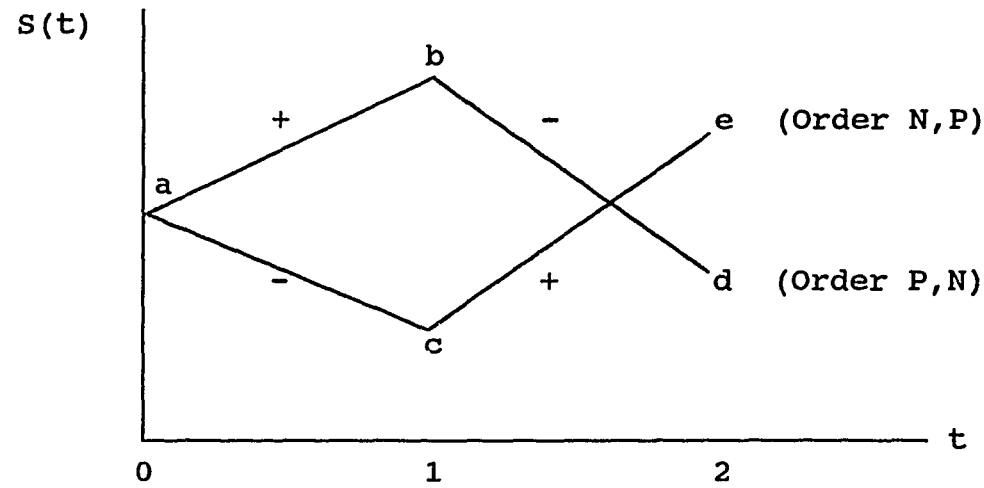
Finally, it should be noted that the total order effect as expressed in equation (2.1) assumes that the initial belief is the same for both information-processing orders (i.e. $S(0)^{pn} = S(0)^{np}$), as illustrated in Figure 2.1. This measure of the total order effect is appropriate to use for within-subjects designs or for between-subjects designs where the initial belief is "set" by the experimenter. However, for between-subjects designs in which subjects are allowed to assess their own initial belief, the appropriate measure for the total order effect is the difference in total belief revision between positive-negative order and negative-positive order subjects, as indicated in equation (2.6).

2.1.2 The Recency Effect

A recency effect occurs when subjects' final judgments are biased toward the last information set processed. For example, when subjects processing information in the positive-negative order express a lower final belief in the hypothesis than subjects processing information in the negative-positive order (given the same initial belief), a recency effect has occurred. The recency effect is illustrated in Figure 2.2 below.

FIGURE 2.2

The Recency Effect



S(t) = belief in the hypothesis at time t

When recency occurs, the total order effect is the reverse of that for primacy. That is, recency implies that $S(2)^{pn} < S(2)^{np}$ and thus $D^t < 0$ (see equation 2.1). Furthermore, recency occurs in the positive information

when later-presented positive information produces a greater increase in beliefs than early-presented positive information (i.e. $[S(1)^{pn} - S(0)^{pn}] < [S(2)^{np} - S(1)^{np}]$) and consequently $D^p < 0$ (see equation 2.2). Positive-information recency is evident in Figure 2.2 because the slope is steeper for line segment ce than line segment ab.

Finally, recency occurs in the negative information when later-presented negative information produces a greater decrease in beliefs than early-presented negative information (i.e. $[S(2)^{pn} - S(1)^{pn}] < [S(1)^{np} - S(0)^{np}]$) and consequently $D^n < 0$ (see equation 2.3). Negative-information recency is evident in Figure 2.2 because the slope is steeper for line segment bd than line segment ac.

Before moving on to the next subsection, one final point is worth noting. Figures 2.1 and 2.2 exhibit primacy and recency, respectively, in all three order-effect measures (i.e. D^t, D^p, and D^n). It is possible, however, that primacy may occur in the positive information while recency occurs in the negative information, or vice versa. When this happens, the total order effect depends on which "component" order effect is greater in absolute value. For example, assume $D^p = .3$ (primacy in the positive information) and $D^n = -.2$ (recency in the negative information). Since $.3 > |-.2|$, the total order effect will exhibit primacy ($D^t = .1$).

2.2 Two Opposing Order-Effect Theories

This subsection describes two of the more widely-cited theories for order effects. The theory of belief perseverance predicts primacy, while the contrast-effect theory predicts recency. The two theories are similar, however, in two respects. First, the two theories do not differ with regard to the impact of early-presented information. Rather, the difference in the predicted direction of order effects between the two theories is the result of differing predictions with regard to the impact of later-presented information. This similarity is exhibited in Figures 2.1 and 2.2. Note that the impact of early-presented information is the same in both figures. The two figures differ only with respect to the impact of later-presented information.

Second, both the belief-perseverance and contrast-effect theories assume that information is processed sequentially rather than simultaneously. When information is processed sequentially, beliefs are updated incrementally by each successive piece of information processed. Simultaneous processing, on the other hand, involves the storage in memory of each successive piece of information with a single overall integration after the last piece of information is received (Anderson 1981).

The assumption of sequential processing is particularly relevant to the study of order effects in audit judgment. Although in specific settings in auditing some evidence may be processed simultaneously, the audit process by nature involves the sequential collection and processing of audit evidence (Ashton and Ashton 1988; Cushing and Loebbecke 1986; Felix and Kinney 1982; Gibbins 1984). Consequently, to the extent that auditors process information sequentially, the two order-effect theories examined here are viable explanations for observed order effects in audit judgment tasks.

2.2.1 The Theory of Belief Perseverance

According to the theory of belief perseverance, early-encountered information serves as the "raw material" from which beliefs are formed (Nisbett and Ross 1980). Once formed, beliefs are resistant to change and thus tend to respond very slowly (or not at all) to later-encountered information which is inconsistent with those beliefs (Nisbett and Ross 1980; Ross and Lepper 1980). Consequently, a given set of information will have a greater impact on beliefs when it is processed first as opposed to last, at which time it would be "contrary" to beliefs and its impact reduced.

In terms of the paradigmatic situation described above, the theory of belief perseverance predicts that the final belief in the hypothesis will be greater for subjects processing information in the positive-negative order than for those processing information in the negative-positive order (i.e. a primacy effect - see Figure 2.1).

Primacy has been extensively documented in a wide variety of settings, including impression formation (Anderson 1965, 1973; Anderson and Barrios 1961; Asch 1946; Bossart and DiVesta 1966; Chalmers 1971; Hendrick et al. 1973; Luchins 1957a, 1957b; Tesser 1968), probability judgments (Dale 1968; Roby 1967), performance attribution (Allen and Feldman 1974; Benassi 1982; Feldman and Bernstein 1977, 1978; Jones et al. 1968; McAndrew 1981; Newtson and Rindner 1979; Pratz 1987), and contingency judgments (Curley et al. 1988; Yates and Curley 1986).

Several theories have been proposed to explain why beliefs persevere. Nisbett and Ross (1980) suggest that emotional commitment may account for the perseverance of some beliefs, particularly those concerning moral or ethical issues. For example, Lord et al. (1979) report a significant degree of belief perseverance among subjects with strong prior beliefs for or against capital punishment. Each subject was asked to read two studies;

one that supported capital punishment and one that opposed it. The results indicated that subjects' beliefs were affected relatively little by the opposing study, while the supporting study strengthened the prior belief. Furthermore, subjects reported that the study which supported their own position was "more convincing" and "better conducted" than the study which opposed their position.

A related explanation for belief perseverance is that certain motivational and cognitive factors may trigger the use of confirmatory processes (see Church 1990 for a comprehensive review of this literature). As a result, people may tend to seek out confirming evidence (either from memory or from external sources) and interpret information in such a way that beliefs are confirmed (Lord et al. 1979; Nisbett and Ross 1980).

A third theory proposes that people readily invent causal explanations for early-presented information and then become so "convinced" by them that the belief perseveres even in light of totally discrediting evidence (Anderson et al. 1980; Ross et al. 1977). These studies report significant belief perseverance for subjects required to provide written causal explanations for an event or theory. It is unclear, however, whether such

causal explanations would be developed in the absence of explicit instructions to do so.

While the theories described above attempt to explain why beliefs persevere and consequently, why later-presented information has a reduced impact, two additional theories have been proposed to explain how the impact of later-presented information is reduced. According to the "change-in-meaning" hypothesis (Asch 1946), impressions formed on the basis of early-presented information bias the interpretation of subsequent information such that later-presented information is encoded, or classified, to be more consistent with the initial impression (see also Anderson 1981; Church 1990; Hamilton and Zanna 1974; Higgins and Rholes 1976; Rokeach and Rothman 1965; Wyer and Watson 1969). Alternatively, the "discounting" hypothesis suggests that later-presented information has a lower impact via a reduction in the weight parameters assigned to individual pieces of contrary information (Anderson 1981; Nisbett and Ross 1980).

Although the two theories ("change-in-meaning" and "discounting") were proposed as distinct explanations for primacy, Nisbett and Ross (1980) point out that both are consistent with the theory of belief perseverance. To illustrate, suppose that in evaluating a client's internal controls, the auditor encounters relatively more

information early in the process which indicates that controls are strong and thus forms a belief that the likelihood of error getting through the client's controls is relatively low.

Later in the process, the auditor receives information which suggests that there may be a significant weakness in the client's internal control structure. Perseverance in the belief that controls are strong may lead to the auditor failing to recognize the significance of the weakness, i.e. the auditor may classify the weakness as "less weak" than (s)he would have had the weakness been discovered early in the evaluation process.

Alternatively, the auditor may recognize that the weakness is significant, but choose not to "count it against" the client to the same extent that (s)he would have had the information been received earlier. Either action (or a combination of both) would result in the reduced impact of the later-presented negative information and thus, both are consistent with the theory of belief perseverance.

2.2.2 The Contrast-Effect Theory

According to this theory, the greater the contrast between current beliefs and the "sign" (i.e. positive or negative) of the next piece of information to be

processed, the greater will be the subsequent impact of that information on beliefs (Einhorn and Hogarth 1985a, 1987; Hogarth and Einhorn 1992). This means, for example, that the greater the belief in the hypothesis, the greater will be the subsequent impact of negative information. Since belief in the hypothesis is greatest immediately after processing the positive information, then negative information will have its greatest impact on beliefs when it is processed after the positive information.

Likewise, positive information will have its greatest impact on beliefs when it is processed after the negative information. Thus, the contrast-effect theory predicts that belief in the hypothesis will be greater after processing information in the negative-positive order as opposed to the positive-negative order (i.e a recency effect - see Figure 2.2).

Recency has been documented in impression formation (Anderson 1968; Levin and Schmidt 1969, 1970; Luchins 1958; Luchins and Luchins 1970, 1984;), probability judgments (Pitz and Reinhold 1968; Shanteau 1970, 1972), and number averaging (Anderson 1964; Levin 1976). For a comprehensive review of the order-effect literature, see Hogarth and Einhorn (1992).

In addition to examining the order-effect prediction of the contrast theory, a number of studies have

explicitly tested the contrast assumption by comparing the reactions to identical pieces of positive (negative) information across subjects with different initial beliefs (e.g. Ashton and Ashton 1988; Dillard et al. 1991; Hogarth and Einhorn 1992). Consistent with the contrast-effect theory, these studies report that positive (negative) information has a greater impact when the initial belief is low (high).

2.3 Alternative Explanations for Order Effects

The theories of belief perseverance and the contrast effect provide potential explanations for primacy and recency, respectively. However, other theories have also been proposed to account for order effects of a given direction. In this subsection, these alternative order-effect theories are examined. In order to distinguish between competing theories for order effects of a given direction, however, it is first necessary to distinguish between alternative "response modes" employed in prior empirical order-effect studies.

Response mode refers to the way that judgments are elicited. Two approaches have been commonly employed in the order-effect literature which Hogarth and Einhorn (1992) refer to as the "Step-by-Step" (SbS) and "End-of-Sequence" (EoS) response modes. When an SbS response mode

is employed, subjects are presented with information sequentially and asked to express their beliefs after each piece of information in the series is evaluated. An EoS response mode requires that subjects express their beliefs only once after evaluating all the information.

It is important to note that the externally-imposed response mode may differ from the internal processing mode, which may be either sequential or simultaneous (or a hybrid of both). Hogarth and Einhorn (1992) point out that when an EoS response mode is employed, subjects may use either a sequential or simultaneous information-processing strategy. When an SbS response mode is employed, however, the internal process must also be sequential.

As noted earlier, the theories of belief perseverance and the contrast effect both assume information is processed sequentially as opposed to simultaneously. This is clear since both assume an interaction between beliefs based on early-presented information and the impact of later-presented information. Consequently, belief perseverance and the contrast effect are viable explanations for order effects when an SbS response mode is employed. This distinguishes belief perseverance and the contrast effect from the other proposed explanations for order effects which, as described below, are only predicted in conjunction with an EoS response mode.

2.3.1 The Attention-Decrement Hypothesis

According to the "attention decrement" hypothesis (Anderson 1981), primacy occurs because weight parameters assigned to later-presented information are reduced as the result of a progressive decrease in attention. Attention decrement differs from the discounting theory discussed earlier, however, in that the reduction in weight parameters does not depend on any relationship between later and earlier information.

Attention decrement is proposed to result in primacy only when an EoS response mode is employed. An SbS response mode requires that subjects express their beliefs after each piece of information is evaluated, thereby "forcing" subjects to give full attention to each piece of information (Anderson 1981). Thus, if primacy is the result of attention decrement with an EoS response mode, then it should be eliminated when an SbS response mode is employed.

Several studies examined differences in order effects between subjects using an EoS versus an SbS response mode (e.g. Dreben et al. 1979; Stewart 1965). These studies report primacy with the EoS response mode and recency with the SbS response mode. In other studies, primacy was eliminated in tasks employing an EoS response mode by adding an attention manipulation to the experimental task

(e.g. Anderson and Hubert 1963; Hendrick and Constantini 1970).

While the results reported above support the attention-decrement hypothesis, they do not necessarily contradict the theory of belief perseverance. As noted above, when an EoS response mode is employed, subjects may use either a sequential or simultaneous information-processing strategy. When information is processed simultaneously, beliefs are not formed until the end of the entire information series. Since a belief cannot "persevere" until it exists, it follows that belief perseverance cannot occur when information is processed simultaneously. Thus, if attention decrement occurs in conjunction with simultaneous processing, as argued below, then the results of the studies cited above do not refute the theory of belief perseverance, but rather reflect the elimination of a bias associated with simultaneous processing via an induced change in information-processing strategies.

Hogarth and Einhorn (1992) suggest that people will generally try to match cognitive processes with response mode but will shift processes if memory and information-processing demands are too great. Consequently, when an EoS response mode is employed and the task involves a short series of information, people will generally use a

simultaneous information-processing strategy. For longer series', however, people will use a sequential process to cope with the cognitive demands of the task. Note that a sequential process reduces memory and information-processing load relative to a simultaneous process since, as each additional piece of evidence is processed, one need only "remember" the preceding belief which already reflects the impact of all earlier information.

The studies reported above all used a short series of information in their experimental tasks. In this situation, Hogarth and Einhorn (1992) suggest that people will generally use a simultaneous-processing strategy. Thus, the change in the direction of the order effect (i.e. from primacy to recency) when an EoS response mode is replaced with an SbS response mode is consistent with a change in information-processing strategies. (Recall that when an SbS response mode is employed, the internal process must be sequential.)

However, if people switch to a sequential process when the information series is long, as Hogarth and Einhorn (1992) suggest, then the direction of the order effect should not differ between response modes. Indeed, Hogarth and Einhorn (1992) report that primacy persists regardless of the response mode in studies using a long series of information. This suggests that subjects used a

sequential information-processing strategy even though the response mode may not have required it. Consequently, if attention decrement occurs only in conjunction with simultaneous processing, then it should not occur when the information series is long (i.e. when the cognitive demands of the task require a sequential-processing strategy).

In a series of experiments using a long series of information and an EoS response mode, Jones et al. (1968) explicitly manipulated attention for some subjects by requiring additional judgments after each piece of information was processed. Contrary to the attention-decrement hypothesis, the attention manipulation did not reduce primacy. Their results suggest that when the information series is long, primacy is the result of something other than attention decrement. Furthermore, it suggests that attention decrement is a bias associated with simultaneous processing.

2.3.2 Biased Recall

Another explanation suggested for the occurrence of recency is that memory constraints favor recall of later-presented information (Anderson 1981; Nisbett and Ross 1980). According to this hypothesis, subjects form beliefs based on those items that they are able to recall.

Implicit in this hypothesis is the assumption that people process information simultaneously and thus is only a viable explanation for recency when an EoS response mode is employed.

Numerous experiments on verbal learning report that recall is significantly greater for information items appearing at the end of a series (Anderson 1981). However, Anderson and Hubert (1963) find that although recall of information items exhibits a significant recency effect, impression judgments requested at the end of the series exhibit a substantial primacy effect. These results suggest that biased recall may be an inadequate explanation for recency in judgment, at least in some tasks.

To explain their results, Anderson (1981, 250) suggests that "impressions and attitudes are stored in a memory system different from the verbal materials from which they originate" and as a result, "once the meaning has been extracted, the word is a verbal husk, no longer needed, that may be stored in verbal memory or simply forgotten". Implicit in this argument is that people process information sequentially. That is, people extract meaning from words "as they go along" and store them in the form of impressions and attitudes. Thus, at the end of the series, early-received "words" which are no longer

remembered are nevertheless already incorporated into the impression or attitude.

This "two-memory" hypothesis (Anderson 1981, 250) is consistent with a sequential model of belief updating. Recall that to update beliefs sequentially, all an individual needs to "remember" is the current belief, which already reflects the impact of all previous information, even if that information can no longer be recalled. If a simultaneous information-processing strategy is used, however, "meaning" would be extracted from information at the end of the series, but only for those items that the subject remembers. Thus, biased recall may still be a viable explanation for recency in situations where information is processed simultaneously.

As discussed above, Hogarth and Einhorn (1992) suggest that information is processed simultaneously only when the information series is short and an EoS response mode is employed. However, the results of prior order-effect studies suggest that primacy is overwhelmingly more common in short-series tasks employing an EoS response mode (Hogarth and Einhorn 1992). Thus, there appears to be limited empirical support for the biased-recall explanation of recency.

In summary, the discussion in this subsection suggests that attention decrement and biased recall,

unlike belief perseverance and the contrast effect, are not viable explanations for order effects when information is processed sequentially. Table 2.1 summarizes the conditions under which each of the alternative order-effect theories are viable explanations for an order effect of a given direction.

TABLE 2.1

Alternative Explanations for Order Effects

Direction of Order Effect	Response Mode	
	EoS	SbS
Primacy	Belief Perseverance Attention Decrement	Belief Perseverance -
Recency	The Contrast Effect Biased Recall	The Contrast Effect -

Note that when an EoS response mode is employed, any of the alternative theories may account for an order effect depending on the internal information-processing strategy used (i.e. sequential versus simultaneous). However, since information must be processed sequentially when an SbS response mode is employed, attention decrement and biased recall are eliminated as potential explanations for an order effect.

The experiment conducted in this study utilizes an SbS response mode in order to focus on the belief-perseverance and contrast-effect explanations for order effects. Note, however, that "forcing" a sequential information-processing strategy in an experimental task is appropriate when the task would normally require a sequential process. As discussed earlier, while some audit judgments may involve a limited amount of evidence which is processed simultaneously, most (including an evaluation of internal controls) involve a considerable amount of information which would require a sequential information-processing strategy.

2.4 Order-Effect Studies in Accounting

Order effects have been examined extensively in the psychology literature over the past several decades. However, the examination of order effects in accounting contexts has begun only recently. In the first of these studies, Ashton and Ashton (1988) investigate order effects in an internal control evaluation setting. In one set of experiments, Ashton and Ashton (1988) provided auditor-subjects with two pieces of information indicative of internal control strengths (positive information) and two pieces of information indicative of internal control weaknesses (negative information). Half of their subjects

received the information in the positive-negative order while the other half received the information in the negative-positive order. Subjects were required to assess the likelihood that the control system would prevent or detect material error after each piece of information was processed (i.e. an SbS response mode was employed).

Ashton and Ashton's (1988) results show a significant recency effect in mean belief revision. Thus, the results are consistent with the contrast-effect theory. Furthermore, since an SbS response mode was employed in the experiments described above, the biased-recall explanation for the order effect is not viable, as discussed above.

Since the Ashton and Ashton (1988) study, order effects have been examined by other researchers in a variety of accounting and auditing settings, including internal control evaluation (Butt and Campbell 1989), going-concern evaluation (Asare 1992), performance auditing (Pei at al. 1992), management accounting (Dillard at al. 1991), and a variety of other auditing tasks (Bamber et al. 1992; Messier 1992; Messier and Tubbs 1992; Tubbs et al. 1990). A detailed review of these studies is provided in Asare and Messier (1992).

The results of these studies generally support a recency effect in accounting and auditing settings.

Furthermore, since an SbS response mode was employed in all but one study, the finding of recency is consistent with the contrast-effect theory. While these results might suggest that accountants and auditors are not prone to belief perseverance, it should be noted that all of the accounting studies to date used a relatively short series of information in their experimental tasks. As discussed in the following chapter, however, belief perseverance may be more likely to occur when the information series is long.

In addition to testing for order effects, several of the above studies also performed separate analyses designed to test for the presence of "confirmation bias" (Asare 1992; Ashton and Ashton 1988; Pei et al. 1992). In these studies, subjects were considered "confirmation prone" if positive information (i.e. information which supports a given hypothesis) had a greater impact on beliefs than negative information (i.e. information which contradicts the hypothesis) and "disconfirmation prone" if negative information had the greater impact.

For example, in Ashton and Ashton (1988) subjects were asked to express their beliefs about the likelihood that internal controls will prevent or detect material error. Positive information which pointed out control system strengths (supporting the hypothesis that "internal

controls will prevent or detect material error") was classified as "confirming" while negative information which pointed out system weaknesses (contradicting the hypothesis) was classified as "disconfirming". Ashton and Ashton (1988) concluded that auditors are "disconfirmation prone" because negative information had a greater impact on beliefs than positive information. In a performance auditing setting, Pei et al. (1992) concluded that subjects were "confirmation prone" because positive information had a greater impact on beliefs.

This "confirmation bias" differs from belief perseverance, however, in that while positive information may confirm a given hypothesis, it is disconfirming with respect to beliefs if belief in the hypothesis is low. Likewise, while negative information is disconfirming with respect to the hypothesis, it is confirming with respect to beliefs if belief in the hypothesis is low. Thus, while the studies cited above might imply a link between confirmation bias and belief perseverance, their definition of "confirmation bias" is more closely related to the literature on framing effects (see Kida 1984).

Of the three studies cited, only Asare (1992) manipulated the hypothesis frame (such that confirming evidence in one frame was disconfirming for the opposite frame). His results indicate that confirming evidence

under one frame had the same impact as disconfirming evidence in the opposite frame, suggesting the absence of confirmation bias. Since the other two studies did not present the alternative frame, their conclusions with respect to confirmation bias are questionable.

In the following chapter, a theory is proposed which attempts to reconcile the apparently contradictory theories of belief perseverance and the contrast effect and which may, consequently, provide a potential explanation for the inconsistent results (with respect to order effect direction) of prior empirical studies.

3. THEORY AND HYPOTHESES DEVELOPMENT

3.1 An Integrated Theory of Order Effects

In the previous chapter, it was noted that the belief-perseverance and contrast-effect theories do not differ with respect to the proposed impact of early-presented information on beliefs. Rather, the difference in the predicted direction of order effects between the two theories is the result of differing predictions with respect to the impact of later-presented information. This implies that there is some variable that has not been taken into account, operating at time 1 (i.e. after the first information set is processed), that affects responses to subsequent information (i.e. whether it will be "underweighted" or "overweighted" relative to early-presented information).

In this subsection, an "integrated" theory of order effects is presented which proposes that the missing variable is second-order uncertainty, or confidence in beliefs after processing early-presented information.

3.1.1 The Role of Confidence

A key assumption of traditional subjectivist theory is that all aspects of a person's belief can be represented by a single measure, or "first-order" degree of belief. A consequence of this assumption is that

behavior should be invariant between situations in which the first-order degrees of belief (and utilities of outcomes) are equal (Gardenfors and Sahlin 1982). This assumption has been challenged, however, on the basis that it may be rational to adopt different behaviors even if first-order degrees of belief are the same.

Gardenfors and Sahlin (1982) explain it this way. Suppose that "Miss Julie" is invited to bet on the outcome of three different tennis matches. Miss Julie is well-informed about the abilities and past performance of the players in the first match and believes that each has an equal 50 percent chance of winning. With regard to the second match, Miss Julie knows nothing about the players or their abilities. In the absence of any relevant information, Miss Julie assesses the chance of each player winning at 50 percent. For the third match, Miss Julie also knows nothing about the players but overhears someone say that one of the contestants (she doesn't know which one) is an excellent tennis player while the other is an amateur who has no chance of winning. Without knowing which of the players is the expert and which is the amateur, Miss Julie assesses the chance of each player winning at 50 percent (i.e. there's a 50 percent chance that each player is the expert).

Since the first-order degree of belief is the same for all three matches, the traditional (Bayesian) theory would predict that Miss Julie's betting behavior should be the same for all three matches. However, it would be quite rational for Miss Julie to choose to bet on the first match but not on the second and third matches on the basis that the first-order belief for the first match is more "reliable" than the others (Gardenfors and Sahlin 1982).

The example above illustrates that first-order degrees of belief may not reflect all of the relevant aspects of belief which influence behavior. Rather, an individual may have "second-order" uncertainty about their first-order degree of belief which affects subsequent behavior. This concept of second-order uncertainty, or "confidence" (Bar-Hillel 1982; Ellsberg 1961) has received considerable theoretical support (e.g. Bar-Hillel 1982; Einhorn and Hogarth 1985b; Ellsberg 1961; Frisch and Baron 1988; Gardenfors and Sahlin 1982, 1983; Skyrms 1980; Waller and Felix 1984) as well as empirical support (e.g. Becker and Brownson 1964; Curley et al. 1986; Goldsmith and Sahlin 1982; Yates and Zukowski 1976).

In terms of the order-effect dilemma described in the previous chapter, it is proposed that differences in responses to later-presented information are a function of differing degrees of confidence in beliefs after

processing early-presented information. Specifically, it is proposed that higher confidence in beliefs based on early-presented information is associated with belief perseverance (and thus primacy) while low confidence is associated with the contrast effect (and thus recency).

The basis for this proposition lies in the following intuitive argument. In order for beliefs to persevere, one must have some degree of certainty, or confidence, in one's beliefs. That is, people are not likely to "cling" to a belief about which they are uncertain. As confidence increases, however, people are likely to become increasingly less responsive to information which is contrary to their belief. Conversely, people will be more responsive to contrary information (i.e. more willing to adjust their belief) when confidence in their belief is low.

By way of analogy, we can think of a current belief as an anchor and confidence in the belief as the weight of the anchor. When the weight of the anchor is low, it is more likely to shift positions in response to movements of the water around it. Conversely, the heavier the anchor, the more resistant it will be to movement. In other words, as confidence in beliefs increases, the belief will become increasingly more resistant to change. The theory proposes, therefore, that belief perseverance (the

contrast effect) is an increasing (decreasing) function of confidence in beliefs. This further implies that when confidence is low, recency is more likely to occur as a consequence of the contrast effect. As confidence increases, however, the theory predicts a gradual reduction in recency and an eventual reversal in the direction of the order effect to primacy as a result of belief perseverance.

In a sense, belief perseverance can be thought of as a consequence of overconfidence in beliefs. That is, the primacy effect associated with belief perseverance is the result of maintaining an inappropriately high level of confidence in prior beliefs when faced with "contrary" information. This is consistent with Einhorn and Hogarth's (1978, 402) observation that:

> ...once confidence in judgment is learned, even negative evidence will not quickly extinguish the concept.

Prior studies have empirically examined the overconfidence phenomenon in a variety of judgment settings. A common methodology for examining overconfidence involves eliciting a series of judgments from subjects for which the correct answers are known to the experimenters. Subjects are then asked to express their degree of confidence that their answers are correct. Subjects are overconfident if the proportion of correct

answers is less than the assessed level of confidence. The empirical evidence suggests that overconfidence in judgment is a fairly widespread phenomenon (see Keren 1991 and Lichtenstein et al. 1982 for reviews of this literature).

Note that in order to directly test for the presence of overconfidence, prior studies focus on judgments for which there are objectively "correct" answers. Consequently, many of the studies in this area define confidence as the stated probability that a judgment is "accurate" (c.f. Arkes et al. 1987; Block and Harper 1991; Lichtenstein and Fischhoff 1977; Paese and Sniezek 1991; Selling 1993). In many judgment situations, however, there is either not an objectively correct response or the correct response cannot be observed. This does not mean that confidence is undefined or irrelevant. In the tennis match illustration described above, for example, it is doubtful whether there is an "objectively" correct probability of a given player winning a match. As illustrated, however, the concept of confidence is easily demonstrated in that situation.

In this study, confidence is viewed in a less restrictive sense. Specifically, confidence is viewed as the degree of certainty that a first-order belief is appropriate. To illustrate what is meant by the term

"appropriate", consider the situation in which an auditor is evaluating a client's internal control structure. The auditor assesses a first-order degree of belief about the likelihood that material error will get through the client's controls undetected. In this situation, it is questionable whether there is an "objective" probability that errors will not be prevented or detected. Even if there is, however, this "true" probability would likely never be known.

However, the auditor's assessment should nevertheless have some basis in "reality". That is, the auditor's assessment should be a reasonable reflection of the strength of the client's internal control structure. To deny this would be to suggest that control risk assessments are meaningless. A low assessment of control risk, for example, would not be "appropriate" if there are significant weaknesses in the client's internal control structure.

Thus, we can think of the "appropriateness" of the first-order belief about control risk in terms of the degree to which it is a reasonable reflection of the strength of the client's internal control structure. Consequently, a high (low) level of confidence implies that the auditor is fairly certain (uncertain) that his first-order belief about control risk is appropriate (i.e.

that it is a reasonable reflection of the strength of the client's control structure). Furthermore, overconfidence in this situation would occur when the auditor has a high degree of confidence in an inappropriate first-order belief.

Just as belief perseverance can be thought of as a consequence of overconfidence in beliefs, the contrast effect can be similarly thought of as a consequence of underconfidence. When one's confidence in a first-order belief is low, this implies that the person is uncertain as to whether the belief is appropriate. Consequently, one may overreact to subsequent contrary information since it confirms, in a sense, that the prior uncertain belief was indeed inappropriate. While the empirical evidence suggests that people tend to be overconfident in judgment, underconfidence has also been shown to occur (e.g. Tomassini et al. 1982).

3.1.2 Factors Affecting Confidence

The primary focus of this study is to examine the relationship between confidence and order effects. Empirical tests of the proposed relationship in an experimental setting, however, require some means of manipulating confidence among participating subjects. This subsection provides a brief description of two factors

which have been linked to confidence in prior studies and which are easily manipulated in an experimental setting.

Prior research suggests that confidence is affected by the amount of predictive or diagnostic information available for making judgments (Anderson 1981; Ellsberg 1961; Paese and Sniezek 1991; Oskamp 1965). According to Paese and Sniezek (1991, 103):

> The strength of the belief that one has made an "informed" prediction is likely to increase with the number of available predictors, and this belief may then serve as evidence that predictions are accurate. This line of reasoning suggests that as information increases, confidence in judgment should increase as well.

In a similar vein, Frisch and Baron (1988) suggest that confidence is a function of the perception of missing information relevant to the judgment. This proposition also implies that as the amount of relevant information increases, confidence should increase. Ellsberg (1961) takes a somewhat different view in that he suggests confidence is likely to be low, even where there is a large amount of information, if the information is conflicting. Consistent with this proposition, Kahneman and Tversky (1973) show that people are most confident when information is consistent.

For the purposes of this study, however, it does not matter which of these views is correct since it is proposed that confidence at time 1 (i.e. immediately after

the first information set has been processed) affects responses to subsequent information. In the paradigmatic situation examined here, all information received up to time 1 is consistent in direction (i.e. all positive or all negative).

Another factor which has been linked to confidence is task experience. Paese and Sniezek (1991) argue that as task experience increases, individuals perceive themselves as being more accurate and thus will be more confident in their judgments. In the auditing arena, prior studies have argued that differences in first-order judgments between inexperienced and experienced auditors can be explained by differences in knowledge structures (e.g. Bonner 1990; Choo and Trotman 1991; Tubbs 1992). Waller (1993) extends this argument to the case of second-order beliefs, which he proposes (consistent with Frisch and Baron 1988) to be a function of the perceived completeness of the information set.

Specifically, Waller (1993) proposes that when the information set is relatively complete, inexperienced auditors will perceive their lack of prior knowledge and thus have greater second-order uncertainty (lower confidence) than experienced auditors. However, when relevant information is missing, Waller (1993) suggests that inexperienced auditors will be more confident than

experienced auditors because the knowledge structures of inexperienced auditors may not be sufficiently developed to enable them to recognize when relevant information is missing. Thus, contrary to Paese and Sniezek (1991), Waller (1993) suggests that increased task experience does not always lead to higher confidence. Furthermore, Waller's (1993) theory implies that an increase in relevant information will increase confidence for experienced auditors but not for inexperienced auditors. Waller's (1993) empirical results are consistent with these predictions.

In the experiment described in the next chapter, the two factors discussed above (amount of information and task experience) are used to manipulate confidence in order to test the integrated order-effect theory proposed in this study. Since the primary purpose of manipulating these factors is to induce a difference in confidence between subjects rather than to test the comparative validity of the specific theories outlined above, no predictions are made with respect to the nature of the relationship between amount of information, task experience, and confidence. It should be noted, however, that knowledge of the factors affecting confidence is an important topic and one which is in need of further theoretical development and empirical examination.

3.2 Model Development

In this subsection, the theory proposed above is formalized by expanding Hogarth and Einhorn's (1992) belief-adjustment model to include the proposed effect of confidence on belief revision. This discussion begins below with a description of Hogarth and Einhorn's (1992) model.

3.2.1 The Hogarth and Einhorn Model

Hogarth and Einhorn's (1992) belief-adjustment model is represented by the following algebraic equation:

$$S_k = S_{k-1} + w_k[s(x_k) - R] \qquad (3.1)$$

where

S_k = degree of belief in some hypothesis, impression, or attitude after evaluating k pieces of evidence ($0 \leq S_k \leq 1$).

S_{k-1} = anchor or prior opinion (the initial belief is denoted S_0).

$s(x_k)$ = subjective evaluation of the kth piece of evidence.

R = the reference point against which the sign of the kth piece of evidence is evaluated.

w_k = the adjustment weight for the kth piece of evidence ($0 \leq w_k \leq 1$).

Hogarth and Einhorn distinguish between evaluation and estimation forms of the model. In evaluation tasks,

evidence is encoded as positive or negative relative to the hypothesis under consideration, such that $-1 \leq s(x_k) \leq +1$ and $R = 0$. In such tasks, positive information increases belief in the hypothesis and negative information decreases belief in the hypothesis irrespective of the current belief. In contrast, estimation tasks involve a "moving average" process in which information is encoded as positive or negative relative to the current belief. (In this case, $0 \leq s(x_k) \leq 1$ and $R = S_{k-1}$.)

Prior research suggests that audit tasks involve evaluation rather than estimation (Asare and Messier 1992). In an internal control evaluation setting, for example, information which suggests a weakness in the client's internal control structure is recognized as a weakness regardless of the current belief about the strength of the client's controls. When the classification of information as "positive" or "negative" does not depend on the current belief, the task involves evaluation.

Furthermore, the estimation form of the model predicts recency for a series of consistent information (i.e. all positive or all negative) while the evaluation form of the model predicts no order effect for consistent information. Ashton and Ashton (1988) and Tubbs et al. (1990) explicitly test these conflicting predictions using

a series of consistent information in an internal control evaluation setting. Their results indicate that no order effect was present, suggesting that internal control evaluation is more appropriately classified as an evaluation task. Consequently, attention is restricted in this paper to the evaluation form of the model.

In this case, equation (3.1) can be written more simply as:

$$S_k = S_{k-1} + w_k s(x_k) \qquad (3.2)$$

The model predicts recency for a mixed series of evidence (i.e. positive and negative evidence) based on the contrast assumption. This contrast effect is captured in the model's specification of the adjustment weights for negative and positive evidence:

$$w_k = \alpha S_{k-1}, \text{ when } s(x_k) \leq 0 \qquad (3.3)$$

$$\text{and } w_k = \beta(1 - S_{k-1}), \text{ when } s(x_k) > 0 \qquad (3.4)$$

where α and β are constants which reflect an individual's sensitivity toward negative and positive evidence, respectively, ($0 \leq \alpha \leq 1$ and $0 \leq \beta \leq 1$).

Equations (3.3) and (3.4) suggest that the amount of belief revision for negative information is proportional to the size of the anchor. That is, the higher the anchor, the greater will be the downward revision in belief for a given piece of negative evidence. Likewise, the amount of belief revision for positive information is inversely

proportional to the size of the anchor such that the lower the anchor, the greater will be the upward revision in belief for a given piece of positive evidence.

To see how the contrast effect results in recency, assume we have two pieces of information; one positive and one negative. Let S_1^{np} and S_1^{pn} be the belief after evaluating the first piece of information in the negative-positive and positive-negative order, respectively. Let S_2^{np} and S_2^{pn} be the belief after evaluating both pieces of information in the negative-positive and positive-negative order, respectively. Finally, let s(x-) and s(x+) be the subjective evaluations of the negative and positive information. Let the total order effect be defined as:

$$D^t = S_2^{pn} - S_2^{np} \tag{3.5}$$

Equation (3.5) can be written as:

$$D^t = [S_0 + \beta(1-S_0)s(x+) + \alpha S_1^{pn} s(x-)] - [S_0 + \alpha S_0 s(x-) + \beta(1-S_1^{np})s(x+)] \tag{3.6}$$

In Hogarth and Einhorn's model, the values of s(x-), s(x+), α, and β are assumed to be temporally constant. Thus, equation (3.6) can be written as:

$$D^t = s(x+)[\beta(1-S_0) - \beta(1-S_1^{np})] + s(x-)[\alpha S_1^{pn} - \alpha S_0] \tag{3.7}$$

Since S_1^{np} must be less than S_0 (because beliefs are revised downward in response to negative information), it follows that:

$$ß(1-S_0) - ß(1-S_1^{np}) < 0 \qquad (3.8)$$

Equation (3.8) implies that positive information has a greater impact on beliefs when it is processed last as opposed to first (consistent with the contrast assumption). Similarly, since S_1^{pn} must be greater than S_0, it follows that:

$$\alpha S_1^{pn} - \alpha S_0 > 0 \qquad (3.9)$$

Equation (3.9) implies that negative information has a greater impact on beliefs when it is processed last as opposed to first. Finally, since s(x-) is, by definition, less than zero, then $D^t < 0$ (indicating a recency effect).

Note that as long as s(x-), s(x+), α, and ß are temporally constant, this model will always predict recency. The size of the recency effect is a function of the values of α and ß (the lower the values, the smaller the recency effect) and s(x) (the closer to zero, the smaller the recency effect).

3.2.2 An Extension of the Model

In order to adjust the model to accommodate the predictions of belief perseverance, the assumption that s(x-), s(x+), α, and ß are temporally constant must be

relaxed. Recall from the discussion in the previous chapter that later-presented information can have a reduced impact on judgment either because later-presented information is classified to be more consistent with beliefs or because of a reduction in the weight parameters assigned to later-presented information.

Let $s_1(x-)$ and $s_2(x-)$ be the subjective evaluations of the negative information when it is processed first versus last, respectively. Likewise, let $s_1(x+)$ and $s_2(x+)$ be the subjective evaluations of the positive information when it processed first versus last, respectively. Finally, let α_1, α_2, β_1, and β_2 reflect an individual's sensitivity toward negative and positive information when it is processed first versus last, respectively. The theory of belief perseverance predicts that:

$$s_1(x-) < s_2(x-) \tag{3.10}$$

$$s_1(x+) > s_2(x+) \tag{3.11}$$

$$\alpha_1 > \alpha_2 \tag{3.12}$$

$$\beta_1 > \beta_2 \tag{3.13}$$

Thus, equation (3.6) can be rewritten as:

$$D^t = [S_0 + \beta_1(1-S_0)s_1(x+) + \alpha_2 S_1^{pn} s_2(x-)] - [S_0 + \alpha_1 S_0 s_1(x-) + \beta_2(1-S_1^{np})s_2(x+)] \tag{3.14}$$

$$= [\beta_1(1-S_0)s_1(x+) - \beta_2(1-S_1^{np})s_2(x+)] + [\alpha_2 S_1^{pn} s_2(x-) - \alpha_1 S_0 s_1(x-)] \tag{3.15}$$

The first bracketed term in equation (3.15) measures the difference between the impact of early-presented positive information and later-presented positive information. Note that this term is equivalent to D^p in equation (2.2), since it can be shown that:

$$\beta_1(1-S_0)s_1(x+) = S(1)^{pn} - S(0)^{pn} \qquad (3.16)$$

and $$\beta_2(1-S_1^{np})s_2(x+) = S(2)^{np} - S(1)^{np} \qquad (3.17)$$

Thus:

$$D^p = \beta_1(1-S_0)s_1(x+) - \beta_2(1-S_1^{np})s_2(x+) \qquad (3.18)$$

As equation (2.2) indicates, a negative value for D^p (indicating recency) occurs when later-presented positive information has a greater impact on beliefs than early-presented positive information. However, if belief perseverance leads to a decrease in either the subjective evaluations or the adjustment weights assigned to later-presented positive information as indicated in equations (3.11) and (3.13), then it is clear to see by equation (3.18) that D^p will increase. In other words, as $s_2(x+)$ and β_2 decrease, the positive-information order effect will increase.

Furthermore, it will be become positive (indicating primacy) when:

$$\beta_1(1-S_0)s_1(x+) > \beta_2(1-S_1^{np})s_2(x+) \qquad (3.19)$$

Rearranging (3.19), it can be shown that early-presented positive information will have a greater impact on beliefs than later-presented positive information when:

$$\frac{\beta_2 s_2(x+)}{\beta_1 s_1(x+)} < \frac{1-S_0}{1-S_1^{np}} \qquad (3.20)$$

Note that, since S_1^{np} is less than S_0 (because beliefs are revised downward in response to negative information), the RHS of (3.20) will always be less than 1. The LHS of (3.20) provides a measure of the decrease in the impact of later-presented positive information relative to early-presented positive information as a result of belief perseverance. If there is no belief perseverance (i.e. if $s_1(x+) = s_2(x+)$ and $\beta_1 = \beta_2$), then the LHS of (3.20) will be equal to one. In this case, the sign of the inequality will be reversed, indicating that later-presented positive information has the greater impact on beliefs.

It is important to note that $\beta_1 > \beta_2$ and $s_1(x+) > s_2(x+)$ are not sufficient to ensure that early-presented positive information has a greater impact (i.e. that the LHS of (3.20) will be less than the RHS). Rather, the reduction in $s(x+)$ and β must be large enough to outweigh the contrast effect in order for (3.20) to hold.

Since S_1^{np} can be written as:

$$S_0 + \alpha_1 S_0 s_1(x-) \qquad (3.21)$$

it can be shown that the size of the RHS of (3.20) is a decreasing function of S_0 and α_1 and an increasing function of $s_1(x-)$. Thus, the higher S_0 and α_1 and the lower $s_1(x-)$, the greater must be the decrease in ß and s(x+) for belief perseverance to "overcome" the contrast effect. Note, finally, that when the LHS equals the RHS, the effects of belief perseverance exactly equal the opposing contrast effect such that the impact of positive information is the same regardless of the order in which it is presented.

The second bracketed term in (3.15) measures the difference between the impact of later-presented negative information and early-presented negative information. This term is equivalent to D^n in equation (2.3), since it can be shown that:

$$\alpha_2 S_1^{pn} s_2(x-) = S(2)^{pn} - S(1)^{pn} \qquad (3.22)$$

$$\text{and} \quad \alpha_1 S_0 s_1(x-) = S(1)^{np} - S(0)^{np} \qquad (3.23)$$

Thus:

$$D^n = \alpha_2 S_1^{pn} s_2(x-) - \alpha_1 S_0 s_1(x-) \qquad (3.24)$$

As equation (2.3) indicates, the difference between later-presented and early-presented negative information is negative (indicating recency) when later-presented information has a greater impact on beliefs. However, as the subjective evaluations and adjustment weights assigned to later-presented negative information decrease (in absolute value) as indicated in equations (3.10) and

(3.12), then it is clear to see by equation (3.24) that D^n will increase. That is, as $s_2(x-)$ increases (becomes less negative) and α_2 decreases, the negative-information order effect will increase.

Furthermore, it will become positive (indicating primacy) when:

$$\frac{\alpha_2 s_2(x-)}{\alpha_1 s_1(x-)} < \frac{S_0}{S_1{}^{pn}} \qquad (3.25)$$

In this case, since $S_1{}^{pn}$ can be written:

$$S_0 + \beta_1(1-S_0)s_1(x+) \qquad (3.26)$$

the RHS of (3.25) is an increasing function of S_0 and a decreasing function of β_1 and $s_1(x+)$. Consequently, the lower S_0 and the higher β_1 and $s_1(x+)$, the greater must be the decrease in α and the increase in $s(x-)$ for belief perseverance to "overcome" the contrast effect.

It is clear to see that when both (3.20) and (3.25) hold, the total order effect will exhibit primacy. When this occurs, D^p and D^n (see equations (3.18) and (3.24)) will be greater than zero and consequently, $D^t > 0$ (indicating primacy). Likewise, if both inequalities are reversed (indicating that later-presented information has the greater impact), recency will result. As noted earlier, however, the bias need not be in the same direction for both positive and negative information. That is, there may be primacy in the positive information and

recency in the negative information. The total order effect will depend on which "component" order effect is greater (in absolute value).

The theory presented at the beginning of this chapter proposes that belief perseverance (the contrast effect) is an increasing (decreasing) function of confidence in beliefs at time 1 (i.e. after processing the first information set). This proposition is captured by the following:

$$\beta_2 = \beta_1\{1-\tau C[S(1)^{np}]\} \tag{3.27}$$

$$\alpha_2 = \alpha_1\{1-\tau C[S(1)^{pn}]\} \tag{3.28}$$

$$s_2(x+) = s_1(x+)\{1-\delta C[S(1)^{np}]\} \tag{3.29}$$

$$s_2(x-) = s_1(x-)\{1-\delta C[S(1)^{pn}]\} \tag{3.30}$$

where

τ = a constant representing an individual's propensity to underweight contrary information, $0 \leq \tau \leq 1$.

δ = a constant representing an individual's propensity to classify contrary information to be more consistent with beliefs, $0 \leq \delta \leq 1$.

$C[S(1)^{np}]$ = confidence in one's belief after processing initial negative information, $0 \leq C \leq 1$.

$C[S(1)^{pn}]$ = confidence in one's belief after processing initial positive information, $0 \leq C \leq 1$.

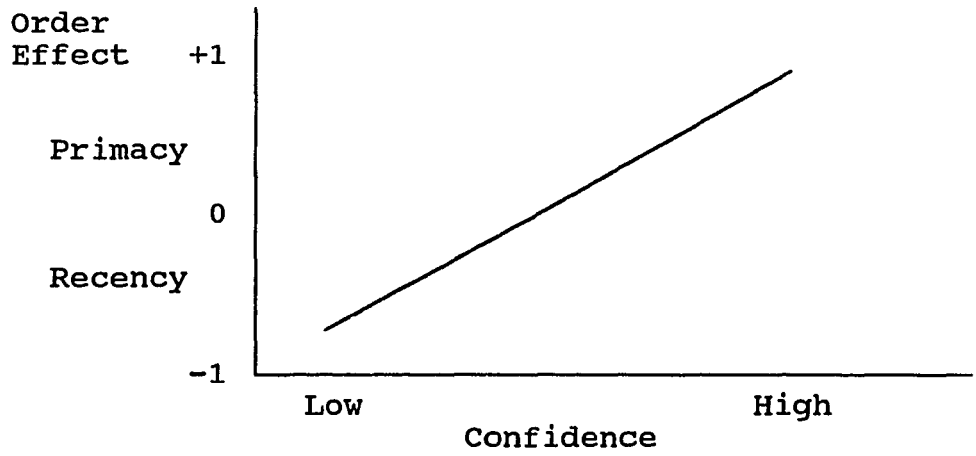
The τ and δ parameters measure an individual's propensity to persevere in their beliefs. While the theory of belief perseverance assumes that these parameters are greater than zero, it is unlikely that they would be constant across individuals. For example, even if one is confident in his or her beliefs, (s)he may nevertheless respond in an unbiased (or nearly unbiased) fashion to information which is contrary to beliefs. On the other hand, another individual may dramatically discount contrary information.

Equations (3.27) and (3.28) indicate that as confidence increases, the weight parameters assigned to later-presented information will decrease. Equations (3.29) and (3.30) indicate that as confidence increases, subjective evaluations of later-presented positive (negative) information will decrease (increase). As demonstrated earlier in equations (3.18) and (3.24), when weight parameters and (absolute) subjective evaluations decrease for later-presented information, order effects increase. Note that the term "order effect" here applies to the positive-information order effect, negative-information order effect, and total order effect. The theory proposes that an increase in confidence will increase each of the component order effects as well as the total order effect.

The proposed relationship between confidence and order effects is illustrated in Figure 3.1.

FIGURE 3.1

The Relationship Between Confidence and Order Effects



3.3 Hypotheses Development

The theory described above proposes that belief perseverance (the contrast effect) is an increasing (decreasing) function of confidence in beliefs after processing the initial information set. Thus, the theory implies that when confidence is low, a recency effect is more likely to occur as a consequence of the contrast effect. As confidence increases, however, the theory predicts a gradual reduction in recency and an eventual reversal in the direction of the order effect to primacy as a result of belief perseverance (see Figure 3.1).

This proposition was formalized in the previous subsection by expanding Hogarth and Einhorn's (1992) belief-adjustment model to include the proposed effect of confidence on belief revision. The model predicts that, as confidence increases, (1) the weight parameters assigned to later-presented information will decrease (see equations (3.27) and (3.28)), and (2) subjective evaluations of later-presented positive (negative) information will decrease (increase). (See equations (3.29) and (3.30).) When this occurs, it was demonstrated that positive-information and negative-information order effects will increase (see equations (3.18) and (3.24)).

The proposed relationship between confidence and component order effects is reflected in the first hypothesis:

> H1:As confidence increases, positive-information and negative-information order effects will increase.

Since the total order effect can be expressed as the sum of the positive-information and negative-information order effects (see equations (2.4) to (2.6) and equation (3.15)), then as these component order effects increase, so must the total order effect. The theory proposes that:

> H2: As confidence increases, the total order effect will increase.

The first two hypotheses reflect the theory's primary proposition that increased confidence results in increased order effects. As noted above, however, the model demonstrates that the increase in order effects is the ultimate result of the effect of confidence on weight parameters and subjective evaluations of later-presented information. The final two hypotheses focus on these more detailed propositions.

With respect to subjective evaluations, the specific propositions represented in equations (3.29) and (3.30) are reflected in the third hypothesis:

> H3: As confidence increases, subjective evaluations of later-presented positive (negative) information will decrease (increase) relative to early-presented positive (negative) information.

Finally, with respect to weight parameters, the specific propositions represented in equations (3.27) and (3.28) are reflected in the fourth hypothesis:

> H4: As confidence increases, the weight parameters assigned to later-presented positive (negative) information will decrease relative to early-presented positive (negative) information.

The next chapter describes an experiment designed to test the theory's predictions in an internal control evaluation setting.

4. RESEARCH DESIGN

4.1 Overview of the Experiment

In order to test the hypotheses described in the previous chapter, an audit case was developed which involved the evaluation of the internal control structure of a hypothetical audit client. As discussed in the previous chapter, two factors are employed to manipulate confidence between subjects in order to test the predictions of proposed model: (1) task experience, and (2) amount of information.

Task experience was manipulated by selecting subjects for participation in the experiment from two experience levels. The inexperienced-subject group (INEXP) consisted of 50 undergraduate auditing students at The University of Arizona who were nearing completion of the auditing course. The experienced-subject group (EXP) consisted of 85 practicing auditors at the experienced-senior or manager level with two Big-Six accounting firms.

The amount of information was manipulated between subjects by providing half of the subjects in each experience-level group with a series of six positive and six negative information items regarding the hypothetical audit client's internal controls (the SHORT series). The remaining subjects received 12 positive and 12 negative information items (the LONG series). Tables 4.1 and 4.2

list the positive and negative information items, respectively.

The short series consisted of the first six positive items and the first six negative items in Tables 4.1 and 4.2, respectively. Each set of six items was presented in the order shown in the tables for all subjects (i.e. the order of information within each set was constant across all subjects). The long series consisted of all 12 positive and all 12 negative information items. Again, the order of the information within each set (as listed in Tables 4.1 and 4.2) was constant across all subjects.

The choice of length for the two information series (i.e. 6 positive and 6 negative items versus 12 positive and 12 negative items) was somewhat arbitrary. The goal was for the long series to be long enough to allow subjects' confidence to increase, but not so long that the case would be overly time-consuming. During the pre-testing phase, it took subjects 30 to 40 minutes to complete the long-series version of the case. The short-series length was chosen to be half the length of the long series.

TABLE 4.1
Positive Information

1. Prior to shipment of an order, the shipping and purchasing manager verifies that the products assembled on the wooden pallet match the information on the shipping document. After verification, the shipping and purchasing manager initials each copy of the shipping document.
2. Shipping documents for orders shipped are forwarded to Accounts Receivable promptly to ensure that the transaction is recorded on the day the order is shipped.
3. The employee turnover for each of the firm's three departments is quite low.
4. Prior to invoicing the customer for an order, accounts receivable clerks verify that the products and quantities on the sales order match those on the shipping document.
5. On a weekly basis, the treasurer's office compares a list of the payments posted by Accounts Receivable to their listing of checks received to ensure that payments were posted to the correct accounts.
6. When new employees are hired, they undergo a two-week training period during which they are paired with experienced employees who instruct them in their duties and provide continuous supervision.
7. The computer software was installed and is maintained by an independent software support firm specializing in accounting applications. Employees of Home Electronics Distributors, Inc. responsible for data input have no access to system programs and documentation.
8. On a monthly basis, the controller's office investigates unpaid invoices which are more than thirty days overdue. When it is determined that an account is uncollectible, an uncollectible account authorization form is filled out and approved by the controller.
9. Accounts receivable clerks monitor the numerical sequence of invoices on a monthly basis to ensure that all are accounted for.
10. The firm maintains the practice of rotating the duties of accounting personnel at appropriate intervals in order to minimize the potential for collusion and to prevent employee burnout. Cross-training also provides protection when illness or turnover occurs.
11. Computer access to the firm's sales, shipping, and accounting functions is password restricted. Sales and shipping personnel have no access to the firm's accounting records. Accounting personnel have read-only access to sales and shipping department records.
12. Before a sales order is approved, Credit conducts an investigation into the customer's credit history. In addition, they check to see that the new order is within the customer's allowable credit limit. If the results of this investigation are satisfactory, the controller approves the sale by initialling the top copy of the sales order.

TABLE 4.2
Negative Information

1. Accounts Receivable does not send out monthly statements to customers.
2. The three department managers are solely responsible for supervising their respective departments. Consequently, the employee to manager ratio is quite high, particularly in the accounting department.
3. When customers are invoiced for orders, the supporting documents are not stamped or marked in any way that would prevent re-use or double entry.
4. A large audit adjustment was required on last year's audit which affected accounts in the sales and collections cycle.
5. There is no independent verification that unit prices on the sales order are as authorized.
6. The firm does not have an internal audit department.
7. There is no independent verification by Shipping that an order has been approved. The approved copy of the sales order is filed in the Accounts Receivable unmatched order file. Shipping's copy of the sales order bears no indication of its approval.
8. When merchandise is returned by a customer, shipping clerks fill out a receiving form and forward it to Accounts Receivable. Accounts receivable clerks fill out a credit memo and post the credit to the customer's account. There are no procedures for appropriate authorization of credit memos.
9. When new employees are hired by the firm, no inquiry is made into their backgrounds and references are not checked.
10. There are no procedures to account for the numerical sequence of sales orders and shipping documents. In addition, there are no procedures for investigating the status of sales orders in the Accounts Receivable unmatched order file.
11. There is no independent verification that the products and quantities on the sales order match those on the customer's order form.
12. The firm does not maintain any personnel policies and procedures manuals.

In order to decide which items to place in the short series, subjective evaluations for each information item were obtained during the pre-testing phase of the study. These subjective evaluations were averaged for each information item. The short series was constructed by

selecting the three highest-rated and three lowest-rated items from each list. The logic behind this approach was that each set of 12 information items should be divided in such a way that each subset of six items was rated approximately the same. This was done to ensure that the additional six information items provided to the long-series group would be viewed as adding relevant information without containing a disproportionate share of the highest-rated items.

The two confidence manipulations (experience level and amount of information) resulted in four groups of subjects: INEXP/SHORT, INEXP/LONG, EXP/SHORT, and EXP/LONG. In order to test the hypotheses developed in the previous chapter, confidence assessments at time 1 (after processing the first information set) were obtained from each subject. The mean confidence assessments for each of the four groups were then used as a basis for forming predictions about order-effect differences between groups.

Finally, in order to calculate the order effect for each of the four subject groups, the order of presentation of information sets was manipulated, where half of the subjects in each group received the information sets in the positive-negative order (P,N) and the remaining subjects received the information sets in the negative-positive order (N,P).

4.2 Task and Materials

Each subject received a questionnaire which consisted of three separate booklets. Booklet I began with an introduction which emphasized that the case should be completed independently and in the order given without looking ahead or going back to alter previous responses. This was followed by specific instructions for completing the case. In particular, subjects were provided with instructions for making two types of judgments.

The first judgment required that they express their belief about "how likely it is that the client's internal control structure for the sales and collection cycle will prevent or detect and correct material misstatement." Subjects were asked to consider this judgment a joint assessment for the existence or occurrence, completeness, and valuation assertions. A brief illustration was provided to demonstrate how responses were to be recorded. The response scale ranged from zero to 100 and displayed the words "controls are very weak" at the low end of the scale and the words "controls are very strong" at the high end. This was done to reduce the potential for subjects to revise their beliefs in the wrong direction as a result of confusion about the response scale.

Finally, it was emphasized that their judgment should correspond to their belief regardless of whether or not

they felt their belief could be justified according to the requirements of professional standards. This point was emphasized to ensure that judgments would be a reflection of beliefs rather than "justified judgments" which Morton and Felix (1990, 1991) argue do not always reflect actual beliefs.

The second judgment required that they record their degree of confidence, or uncertainty, about their likelihood judgment. Again, a brief illustration of the response scale was provided. The response scale ranged from zero to 100 with the words "not at all confident" displayed at the low end of the scale and the words "completely confident" displayed at the high end.

Following the instructions, subjects were provided with background information regarding the internal control structure for the sales and collection cycle of a hypothetical audit client. This information included general information about the firm as well as a description of the accounting system for sales and collections. In addition, Booklet I provided an organizational-structure chart and a flowchart of the client's accounting system for the sales and collections cycle. Subjects were told that they could refer back to any of the information in Booklet I at any time during the experiment.

In Booklet II, subjects were asked to record their initial judgments (described above) based on the background information provided in Booklet I. This measure provided the initial belief S(0). After recording their initial judgments, subjects were told that they would be provided with additional information regarding the client's internal control structure and that after each piece of information was evaluated, they would have the opportunity to revise their initial judgments. Each piece of information was presented on a separate page along with response lines for recording judgments.

In Booklet III, subjects were asked to "rate" each of the information items. Their rating for each item could range from -100 to +100. Subjects were instructed that a positive rating would indicate that the information conveys a strength of the client's internal control structure with higher numbers corresponding to increased importance. Likewise, a negative rating would indicate that the information conveys an internal control weakness with lower numbers corresponding to more critical weaknesses. A brief illustration of the response scale was provided which displayed the words "critical weakness" at the low end of the scale and the words "critical strength" at the high end.

The information items for the short and long information series were arranged in random order for the evaluation task, with the order held constant across all subjects for a given information-series length. This was done to minimize the possibility of an order effect in the evaluation task. Finally, subjects answered a few brief questions concerning their auditing background and experience.

The experimental instrument took subjects approximately 20 to 30 minutes to complete, depending on whether they had the "short" or the "long" version. The long version of the experimental instrument (order P,N) is reproduced in Appendix A.

4.3 Description of Subjects

As noted earlier, the inexperienced-subject group consisted of 50 undergraduate auditing students at The University of Arizona nearing completion of the auditing course. The experienced-subject group consisted of 85 practicing auditors with two Big-Six accounting firms (36 managers and 49 experienced seniors). The debriefing questionnaire asked auditor-subjects to respond to a series of questions regarding their background and experience. Descriptive statistics for this data are presented in Table 4.3.

TABLE 4.3

Descriptive Statistics for Auditor-Subject Data

Item	Mean (std. deviation)
1. Months of Auditing Experience	68.3 (30.5)
2. Number of Audits Worked on	37.1 (35.8)
3. Number of Audits Involved in Internal Control Evaluation	19.6 (20.5)
4. Nature of Internal Control Involvement (Number of Audits)	
a) Documenting Internal Controls	11.7 (12.0)
b) Testing Internal Controls	15.4 (18.2)
c) Assessing Control Risk	16.4 (20.2)
d) Planning and/or Reviewing	13.9 (16.7)
5. Number of Statistics Courses Taken in College	1.6 (0.8)
6. Number of Hours of Professional Training in Statistics	12.7 (28.7)

The researcher was present for the administration of the experiment to the undergraduate auditing students. In addition, the researcher was present for one Big-Six firm's regional meeting during which the experiment was administered to 21 practicing auditors. The experiment was

administered to an additional 20 auditor-subjects by a firm representative at a regional meeting in another location. The remaining 44 auditor-subjects completed their questionnaires without supervision, although the office partner included a memo with each questionnaire emphasizing that it should be filled out independently and in accordance with the instructions.

The next chapter presents the results of the experiment described above.

5. RESULTS

5.1 Confidence Assessments

The theory presented in chapter three proposes that order effects are a function of confidence in beliefs after processing the first information set. As discussed in the previous chapter, this study employs two factors in order to manipulate confidence across subjects: (1) task experience, and (2) amount of information. In this subsection, assessments of confidence at time 1 (i.e. after the first information set is processed) for each of the four (experience-level/amount-of-information) subject groups are examined to determine whether the manipulation was successful and to form the basis for testing the four hypotheses developed in chapter three.

As illustrated in the experimental instrument in Appendix A, subjects recorded their confidence assessments by marking an "X" on a response line. These responses could range from zero to 100, where higher assessments correspond to greater confidence. Subjects' responses were measured by ruler to the nearest one unit and then converted to a zero-to-one scale by dividing each response by 100.

Before proceeding with the analysis, recall that the impact of later-presented positive (negative) information is proposed to be a decreasing function of confidence in

beliefs after processing early-presented negative (positive) information. This proposition is captured in equations (3.27) to (3.30) in chapter three. Note, for example, that the subjective evaluations and weight parameters assigned to later-presented positive information are proposed to decrease as confidence after processing initial negative information increases (see equations 3.27 and 3.29). Consequently, in order to form predictions about differences in positive-information and negative-information order effects (hypothesis H1), subjective evaluations (hypothesis H3), and weight parameters (hypothesis H4) between subject groups, it is necessary to perform separate analyses of confidence assessments when early-presented information is negative versus positive, respectively.

Table 5.1 presents descriptive statistics for time 1 confidence assessments when initial information is negative. In addition, the results of paired-comparison tests between subject groups are reported. In order to keep the analysis simple, these tests are restricted to comparisons between subject groups which differ by one "confidence" factor. For example, comparison 1 tests whether confidence differs as a function of the amount of information received when subjects are inexperienced.

Finally, conclusions with respect to differences in confidence assessments between groups are reported as a basis for testing the theory's predictions. Differences are assumed to be significant when the two-sided p-value is .05 or less, and marginally significant when the p-value lies between .05 and .10. Differences are assumed to be insignificant when the p-value is greater than .10.

TABLE 5.1

Descriptive Statistics and Paired-Comparison Tests for Mean Time 1 Confidence Assessments - Subjects Receiving Negative Initial Information

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/SHORT (n=12)	[B] INEXP/LONG (n=13)	[C] EXP/SHORT (n=21)	[D] EXP/LONG (n=23)
Mean Confidence Assessment	0.7608	0.5731	0.6200	0.6926
Standard Deviation	0.1447	0.2012	0.2321	0.2070

Panel B: Paired-Comparison Tests

Comparison	t-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	2.66	0.0140	A > B
2. Column C vs. D	-1.10	0.2789	C = D
3. Column A vs. C	1.89	0.0675	A > C*
4. Column B vs. D	-1.68	0.1019	B = D

* Marginally significant.

Table 5.1 indicates that inexperienced subjects are more confident on average when the initial (negative) information set is short than when it is long (comparison 1). In addition, when the information set is short, inexperienced subjects are marginally more confident than experienced subjects (comparison 3). Table 5.2 presents a similar analysis when initial information is positive.

TABLE 5.2

Descriptive Statistics and Paired-Comparison Tests for Mean Time 1 Confidence Assessments - Subjects Receiving Positive Initial Information

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/SHORT (n=12)	[B] INEXP/LONG (n=13)	[C] EXP/SHORT (n=22)	[D] EXP/LONG (n=19)
Mean Confidence Assessment	0.7025	0.7338	0.6700	0.8242
Standard Deviation	0.1332	0.1087	0.1260	0.1344

Panel B: Paired-Comparison Tests

Comparison	t-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	-0.65	0.5241	A = B
2. Column C vs. D	-3.79	0.0005	C < D
3. Column A vs. C	0.70	0.4861	A = C
4. Column B vs. D	-2.01	0.0533	B < D*

* Marginally significant.

As Table 5.2 indicates, experienced subjects are more confident on average when the initial (positive) information set is long than when it is short (comparison 2). Also, when the information set is long, experienced subjects are marginally more confident than inexperienced subjects (comparison 4).

Tables 5.1 and 5.2 provide separate analyses of confidence assessments for subjects receiving initial negative information (i.e. order N,P) and subjects receiving initial positive information (i.e. order P,N), respectively. In order to form predictions about differences in the total order effect (hypothesis H2), a final analysis is performed combining both order conditions. Table 5.3 presents descriptive statistics for the time 1 confidence assessments of all subjects in each of the four (experience-level/amount-of-information) subject groups.

Table 5.3 indicates that inexperienced subjects are marginally more confident when the information series is short than when it is long (comparison 1). Conversely, experienced subjects are more confident on average when the information series is long than when it is short (comparison 2). In addition, inexperienced subjects are marginally more confident than experienced subjects when the information series is short (comparison 3), while

experienced subjects are more confident on average than inexperienced subjects when the information series is long.

TABLE 5.3

Descriptive Statistics and Paired-Comparison Tests for Mean Time 1 Confidence Assessments - All Subjects

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/SHORT (n=24)	[B] INEXP/LONG (n=26)	[C] EXP/SHORT (n=43)	[D] EXP/LONG (n=42)
Mean Confidence Assessment	0.7317	0.6535	0.6456	0.7521
Standard Deviation	0.1392	0.1784	0.1850	0.1879

Panel B: Paired-Comparison Tests

Comparison	t-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	1.72	0.0922	A > B*
2. Column C vs. D	-2.63	0.0101	C < D
3. Column A vs. C	1.98	0.0514	A > C*
4. Column B vs. D	-2.15	0.0356	B < D

* Marginally significant.

As discussed earlier, the primary purpose of manipulating task experience and the amount of information in the experiment was to induce differences in confidence

between subject groups. The foregoing analysis indicates that the two confidence manipulations appear to have been successful in that there are statistically significant differences in mean confidence assessments between pairs of subject groups. However, the analysis presented above also provides an empirical basis for assessing the validity of the alternative theories described in chapter three which focus on the relationships between task experience, amount of information, and confidence.

Table 5.3 suggests that an increase in the amount of information leads to higher confidence on average only when task experience is high. Note that for inexperienced subjects, confidence decreases on average as the amount of information increases (Table 5.3, comparison 1). Thus, there appears to be limited support for the proposition that more information leads to higher confidence. The pattern of results in Table 5.3 is consistent, however, with Waller's (1993) proposition that confidence will increase for experienced subjects, but not for inexperienced subjects, as the information set becomes more complete (i.e. as the amount of relevant information increases).

Similarly, Table 5.3 suggests that increased task experience leads to higher confidence only when the information series is long. Note that when the information

series is short, inexperienced subjects are more confident on average than experienced subjects (Table 5.3, comparison 3). Thus, there appears to be limited support for the proposition that confidence increases with task experience. Again, however, the pattern of results in Table 5.3 is consistent with Waller's (1993) theory that inexperienced subjects will be more confident than experienced subjects when the information set is incomplete (short), while experienced subjects will be more confident than inexperienced subjects when the information set is relatively complete (long).

As a final note, the results in Tables 5.1 and 5.2 suggest that confidence may also be affected by the direction of the initial information set (i.e. positive versus negative). While prior research has demonstrated that positive and negative information appears to have an "asymmetric" effect on "first-order" judgments (e.g. Ashton and Ashton 1990), the results of the analysis conducted here suggest that this asymmetry may also occur in "second-order" judgments. Thus, an interesting avenue for future research would be to examine, both theoretically and empirically, the relationship between confidence and the direction of the information.

5.2 Tests of Hypotheses

The hypotheses developed in chapter three express the predictions of the proposed relationship between confidence and order effects. In this subsection, these hypotheses are tested using the results of the analysis of confidence assessments described above to form predictions for order-effect differences between the four (experience-level/amount-of-information) subject groups.

5.2.1 H1: Component Order Effects

The first hypothesis predicts that as confidence in beliefs at time 1 increases, the positive-information and negative-information order effects will increase. Recall that the positive-information and negative-information order effects can be expressed as:

$$D^p = [S(1)^{pn} - S(0)^{pn}] - [S(2)^{np} - S(1)^{np}] \quad (5.1)$$

$$D^n = [S(2)^{pn} - S(1)^{pn}] - [S(1)^{np} - S(0)^{np}] \quad (5.2)$$

The positive-information order effect is the difference between belief revision in response to the positive information set when it is processed first and belief revision in response to the (same) positive information set when it is processed last. The negative-information order effect is the difference between belief revision in response to the negative information set when it is processed last and belief revision in response to the (same) negative information set when it is processed

first. As discussed in chapter two, the order of the terms are reversed for the negative-information order effect because beliefs are revised downward in response to negative information (i.e. belief revisions are negative).

Recall that $D^p < 0$ and $D^n < 0$ indicate recency while $D^p > 0$ and $D^n > 0$ indicate primacy. The theory presented in chapter three predicts that as confidence increases, D^p and D^n will increase (i.e. they will move from recency toward primacy). More specifically, the theory predicts that the positive-information (negative-information) order effect will increase as confidence in beliefs after processing initial negative (positive) information increases.

In other words, the theory proposes that confidence in beliefs at time 1 (after processing the initial information set) will affect whether later-presented information is "overweighted" or "underweighted" relative to early-presented information. Thus, when confidence after processing initial negative information increases, the theory predicts that the impact of later-presented positive information will decrease relative to early-presented positive information. As equation (5.1) indicates, a decrease in the relative impact of later-presented positive information will increase the positive-information order effect.

Likewise, when confidence after processing initial positive information increases, the theory predicts that the impact of later-presented negative information will decrease (i.e. belief revisions will be less negative) relative to early-presented negative information. As equation (5.2) indicates, a decrease in the relative impact of later-presented negative information will increase the negative-information order effect.

Thus, observed differences in confidence assessments when initial information is negative (see Table 5.1) form the basis for predicted differences in positive-information order effects between groups. Likewise, observed differences in confidence assessments when initial information is positive (see Table 5.2) form the basis for predicted differences in negative-information order effects. Table 5.4 provides a summary of predicted differences in positive-information and negative-information order effects between subject groups, based on the results in Tables 5.1 and 5.2, respectively.

As Table 5.4 indicates, the positive-information order effect for inexperienced subjects is predicted to be greater when the information series is short than when it is long. In addition, the positive-information order effect is predicted to be marginally greater for inexperienced subjects than experienced subjects when the

information series is short. Finally, there should be no difference in positive-information order effects between experienced subjects in the short and long series conditions or between inexperienced and experienced subjects when the information series is long.

TABLE 5.4

Summary of Predicted Differences in Component Order Effects

Component Order Effect	Comparison	Predicted Differences
Positive-Information Order Effect: (From Table 5.1)	1	INEXP/SHORT > INEXP/LONG
	2	EXP/SHORT = EXP/LONG
	3	INEXP/SHORT >* EXP/SHORT
	4	INEXP/LONG = EXP/LONG
Negative-Information Order Effect: (From Table 5.2)	1	INEXP/SHORT = INEXP/LONG
	2	EXP/SHORT < EXP/LONG
	3	INEXP/SHORT = EXP/SHORT
	4	INEXP/LONG <* EXP/LONG

* Marginally significant difference predicted.

Similarly, Table 5.4 indicates that the negative-information order effect for experienced subjects should be greater when the information series is long than when it is short. The negative-information order effect is predicted to be marginally greater for experienced subjects than inexperienced subjects when the information series is long. Furthermore, there should be no difference

in negative-information order effects between inexperienced subjects in the short versus long series conditions, or between experienced and inexperienced subjects when the information series is short.

Subjects' beliefs about the likelihood that internal controls will prevent or detect material misstatement (the "likelihood judgment") were recorded by marking an "X" on a response line that ranged from zero to 100. Responses were measured by ruler to the nearest one unit then divided by 100 in order to convert to a zero-to-one scale.

For each subject, the positive-information belief revision was calculated by subtracting the (converted) likelihood judgment immediately prior to processing the first positive information item from the (converted) likelihood judgment after processing the last positive information item. Likewise, the negative-information belief revision for each subject was calculated by subtracting the (converted) likelihood judgment immediately prior to processing the first negative information item from the (converted) likelihood judgment after processing the last negative information item.

Panel A of Table 5.5 presents descriptive statistics for positive-information belief revisions and reports the positive-information order effect for each of the four subject groups.

TABLE 5.5

Descriptive Statistics and Paired-Comparison Tests for Mean Positive-Information Belief Revisions

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Belief Revision for Early-Presented Positive Info. (Std Dev)	(n=12) 0.1733 (0.1618)	(n=13) 0.1569 (0.1311)	(n=22) 0.0782 (0.0745)	(n=19) 0.1289 (0.1534)
[2] Mean Belief Revision for Later-Presented Positive Info. (Std Dev)	(n=12) 0.1567 (0.1013)	(n=13) 0.3538 (0.1902)	(n=21) 0.1876 (0.1783)	(n=23) 0.2613 (0.2405)
Positive-Information Order Effect [1] - [2]	0.0166	-0.1969	-0.1094	-0.1324

Panel B: Paired-Comparison Tests

Comparison	F-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	6.29	0.0157	A > B
2. Column C vs. D	0.09	0.7626	C = D
3. Column A vs. C	3.34	0.0722	A > C*
4. Column B vs. D	0.46	0.5015	B = D

* Marginally significant.

As Table 5.5 indicates, the positive-information order effect exhibits recency for three of the four

subject groups. Moreover, the recency effect for each of these groups is significant at the .05 level or less. Only the INEXP/SHORT group exhibits primacy in the positive information, although this effect is not significant.

Panel B of Table 5.5 presents the results of paired-comparison tests of differences in the positive-information order effect between groups. These tests were carried out by estimating four separate ANOVAs with subjects' positive-information belief revisions as the dependent variable. Two ANOVAs were estimated with experience and order as the independent variables; one for each length condition. The remaining two ANOVAs were estimated with length and order as the independent variables; one for each experience level. In each of these ANOVAs, the effect of interest is the interaction between the two independent variables.

For example, testing whether the positive-information order effect differs between inexperienced and experienced subjects when the information series is short (comparison 3) is equivalent to testing whether the difference between belief revisions for early-presented and later-presented positive information is the same for each group. This is accomplished by examining the interaction between experience and order in an ANOVA for positive-information belief revisions of short-series subjects only.

The F-statistics and p-values for the interaction effects from each of the four ANOVAs are displayed in Panel B of Table 5.5. The results indicate that the positive-information order effect for inexperienced subjects is greater when the information series is short than when it is long. In addition, the positive-information order effect is marginally greater for inexperienced subjects than experienced subjects when the information series is short. Furthermore, positive-information order effects do not differ between the EXP/SHORT and EXP/LONG groups, or between the INEXP/LONG and EXP/LONG groups. The results in Table 5.5 are all consistent with the predicted differences in positive-information order effects displayed in Table 5.4.

A similar analysis of differences in negative-information order effects between subject groups is presented in Table 5.6. The results indicate that three of the four negative-information order effects reported in Panel A are positive (indicating primacy). However, only the negative-information order effect for the INEXP/LONG group is significant (p-value = .0719). Panel B of Table 5.6 presents the results of paired-comparison tests of differences in negative-information order effects between subject groups.

TABLE 5.6

Descriptive Statistics and Paired-Comparison Tests for Mean Negative-Information Belief Revisions

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Belief Revision for Later-Presented Negative Info. (Std Dev)	(n=12) -0.2150 (0.1673)	(n=13) -0.2769 (0.1654)	(n=22) -0.2114 (0.1622)	(n=19) -0.3095 (0.1535)
[2] Mean Belief Revision for Early-Presented Negative Info. (Std Dev)	(n=12) -0.2883 (0.2192)	(n=13) -0.3815 (0.1130)	(n=21) -0.2462 (0.1700)	(n=23) -0.3061 (0.1606)
Negative-Information Order Effect [1] - [2]	0.0733	0.1046	0.0348	-0.0034

Panel B: Paired-Comparison Tests

Comparison	F-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	0.11	0.7455	A = B
2. Column C vs. D	0.29	0.5888	C = D
3. Column A vs. C	0.18	0.6704	A = C
4. Column B vs. D	2.03	0.1593	B = D

The test results indicate that negative-information order effects do not differ between subject groups. However, Table 5.4 indicates that negative-information

order effects were expected to differ between experienced subjects in the short versus long series conditions and between inexperienced and experienced subjects when the information series is long. Thus, the results of comparisons 2 and 4 in Table 5.6 are not consistent with the theory's predictions. However, the results of the remaining two paired-comparisons (1 and 3) are consistent with the predictions in Table 5.4 as no differences in negative-information order effects were predicted for these groups.

Overall, the theory's predictions with respect to the relationship between confidence and component order effects are supported. Of the eight paired-comparison tests conducted, six are consistent with the predictions displayed in Table 5.4. Potential explanations for the two comparisons which are inconsistent with the theory's predictions are considered in the discussion section at the end of this chapter.

5.2.2. H2: Total Order Effects

Hypothesis H2 proposes that, as confidence increases, the total order effect will increase. Recall that the total order effect can be expressed as:

$$D^t = [S(2)^{pn} - S(0)^{pn}] - [S(2)^{np} - S(0)^{np}] \qquad (5.3)$$

The total order effect is the difference between the total belief revision for subjects processing information in the P,N order and the total belief revision for subjects processing information in the N,P order. As discussed in chapter two, this measure is appropriate for between-subjects designs in which the subject may arrive at his or her own initial belief. In the experimental instrument, the initial belief was elicited from subjects immediately prior to presenting them with the series of individual information items. Note, too, that while this approach will yield the same result as adding the component order effects, calculating the total order effect as the difference between total belief revisions is more tractable for testing purposes.

In Table 5.3, differences in mean confidence assessments were examined in order to form the basis for predicting differences in the total order effect between subject groups. Table 5.7 summarizes the predicted differences in total order effects based on the Table 5.3 analysis.

TABLE 5.7

Summary of Predicted Differences
in Total Order Effects

	Comparison	Predicted Differences
Total Order Effect: (From Table 5.3)	1	INEXP/SHORT >* INEXP/LONG
	2	EXP/SHORT < EXP/LONG
	3	INEXP/SHORT >* EXP/SHORT
	4	INEXP/LONG < EXP/LONG

* Marginally significant difference predicted.

Table 5.7 indicates that the total order effect for inexperienced subjects is predicted to be marginally greater when the information series is short than when it is long. Conversely, the total order effect for experienced subjects should be greater for the long series than for the short series. In addition, when the information series is short, the theory predicts that the total order effect will be marginally greater for inexperienced subjects than experienced subjects, while the reverse is predicted when the information series is long.

For each subject, total belief revision was calculated by subtracting the initial (converted) likelihood judgment from the final (converted) likelihood judgment. Panel A of Table 5.8 presents descriptive

statistics for total belief revisions and reports the total order effect for each subject group.

TABLE 5.8

Descriptive Statistics and Paired-Comparison Tests for Mean Total Belief Revisions

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Belief Revision for Order P,N	(n=12)	(n=13)	(n=22)	(n=19)
Subjects (Std Dev)	-0.0417 (0.2438)	-0.1200 (0.1937)	-0.1332 (0.2049)	-0.1805 (0.1730)
[2] Mean Belief Revision for Order N,P	(n=12)	(n=13)	(n=21)	(n=23)
Subjects (Std Dev)	-0.1316 (0.1963)	-0.0277 (0.1233)	-0.0586 (0.1310)	-0.0447 (0.1846)
Total Order Effect [1] - [2]	0.0899	-0.0923	-0.0746	-0.1358

Panel B: Paired-Comparison Tests

Comparison	F-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	2.79	0.1017	A = B
2. Column C vs. D	0.64	0.4272	C = D
3. Column A vs. C	2.85	0.0960	A > C*
4. Column B vs. D	0.25	0.6178	B = D

* Marginally significant.

Panel A of Table 5.8 indicates that three of the four total order effects exhibit recency. However, only the total order effect for the EXP/LONG group is significant (p-value = .0192). Panel B reports the results of paired comparison tests of differences in total order effects between subject groups. These tests were conducted in the same manner as described earlier for positive-information and negative-information order effects (i.e. by estimating four separate ANOVAs). The F-statistics and p-values for the interaction effects of each of the four ANOVAs are presented in Panel B of Table 5.8.

The results indicate that the only (marginally) significant difference in total order effects between groups is for comparison 3. This difference is consistent with the predicted difference between inexperienced and experienced subjects when the information series is short (see Table 5.7). In addition, however, Table 5.7 predicted that the total order effect for inexperienced subjects would be marginally greater when the information series is short than when it is long (comparison 1). Note in Panel A of Table 5.8 that the difference between the total order effects for these two groups is in the predicted direction. Moreover, the p-value for this difference is very close to .10 (see comparison 1 in Panel B).

Of the remaining comparisons (2 and 4), the results presented in Panel B of Table 5.8 are not consistent with the predicted differences displayed in Table 5.7. Thus, hypothesis H2 appears to be supported for inexperienced subjects and the short information series, but not for experienced subjects and the long information series. This pattern is consistent with the results for differences in negative-information order effects in the previous subsection.

The tests in this subsection and the previous subsection focused on the order-effect predictions of the theory proposed in chapter three. In the following two subsections, the details of the model with respect to subjective evaluations and weight parameters are examined.

5.2.3 H3: Subjective Evaluations

The third hypothesis is a test of the proposition that, as confidence at time 1 increases, subjective evaluations of later-presented positive (negative) information will decrease (increase) relative to subjective evaluations of early-presented positive (negative) information. In other words, later-presented information will be rated as increasingly "less important" as confidence at time 1 increases. For positive information, this suggests that subjective evaluations for

later-presented information will decrease, while for negative information they will increase (i.e. become less negative).

In order to test this hypothesis, let the "relative" subjective evaluations for positive and negative information, respectively, be defined as:

$$RSE^p = s2(x+) - s1(x+) \quad (5.4)$$

$$RSE^n = s2(x-) - s1(x-) \quad (5.5)$$

where s2(x+) and s2(x-) are the average subjective evaluations of later-presented positive and negative information, respectively, while s1(x+) and s1(x-) are the average subjective evaluations of early-presented positive and negative information. When initial information is negative, equation (3.29) predicts that RSE^p will decrease as confidence at time 1 increases. This occurs because s2(x+) decreases relative to s1(x+) as confidence increases. When initial information is positive, equation (3.30) predicts that RSE^n will increase as confidence at time 1 increases, because s2(x-) increases (becomes less negative) relative to s1(x-) as confidence increases.

Tables 5.1 and 5.2 report mean confidence assessments when initial information is negative versus positive, respectively. Observed differences in confidence between subject groups receiving initial negative (positive) information are used to form predictions of differences in

positive-information (negative-information) relative subjective evaluations. Table 5.9 summarizes the predicted differences in RSE^p and RSE^n between subject groups based on the results in Tables 5.1 and 5.2, respectively.

TABLE 5.9

Summary of Predicted Differences
in Relative Subjective Evaluations

Relative Subjective Evaluation	Comparison	Predicted Differences
Positive Information: (From Table 5.1)	1	INEXP/SHORT < INEXP/LONG
	2	EXP/SHORT = EXP/LONG
	3	INEXP/SHORT <* EXP/SHORT
	4	INEXP/LONG = EXP/LONG
Negative Information: (From Table 5.2)	1	INEXP/SHORT = INEXP/LONG
	2	EXP/SHORT < EXP/LONG
	3	INEXP/SHORT = EXP/SHORT
	4	INEXP/LONG <* EXP/LONG

* Marginally significant difference predicted.

As described in chapter four, subjects recorded their evaluations of individual information items on a response scale with a range from -100 to +100. Responses were measured by ruler to the nearest one unit and divided by 100 in order to convert to a zero-to-one scale. In addition to providing the data necessary to test hypothesis H3, the subjective evaluation task also serves as a manipulation check on the direction of evidence.

Table 5.10 provides descriptive statistics for the (converted) evaluations of each of the positive information items.

TABLE 5.10

Descriptive Statistics for
Positive-Information Subjective Evaluations

Item	Mean	St Dev	N	# > 0	# < 0	# = 0
P1	0.5261	0.2273	135	134	1	0
P2	0.3618	0.2532	135	129	2	4
P3	0.2340	0.2038	135	111	8	16
P4	0.5188	0.2504	135	132	2	1
P5	0.4535	0.2542	135	129	5	1
P6	0.3189	0.2384	135	122	8	5
P7	0.5238	0.2732	68	66	1	1
P8	0.4576	0.2234	68	67	1	0
P9	0.5196	0.2335	68	68	0	0
P10	0.3143	0.3260	68	58	8	2
P11	0.5026	0.3005	68	66	2	0
P12	0.5893	0.2121	68	67	0	1
Total			1,218	1,149	38	31
(%)			(100)	(94.3)	(3.1)	(2.6)

As Table 5.10 indicates, 94.4 percent of the 1,218 subjective evaluations for positive information items are greater than zero which indicates that the positive information was viewed as positive by participating subjects. In addition, the mean rating for each information item is significantly greater than zero at the .0001 level of significance.

Note that 38 out of 1,218 evaluations (approximately 3 percent) were negative. An examination of the belief revisions corresponding to these items reveals that beliefs were adjusted upward (suggesting an error in recording the evaluation) for 28.9 percent, beliefs did not change at all for 23.7 percent and beliefs were adjusted downward for 47.4 percent. In order to test the relationship between confidence and subjective evaluations for positive information, the sample was restricted to non-negative observations.

After deleting negative evaluations from the sample, the mean subjective evaluation for positive information was calculated for each subject. Panel A of Table 5.11 presents descriptive statistics for positive-information subjective evaluations and reports the relative (positive-information) subjective evaluation for each subject group.

A relative subjective evaluation greater than zero indicates that positive information is rated higher when it is processed last as opposed to first. As Table 5.11 indicates, the relative subjective evaluations are greater than zero for three of the four subject groups. However, only the relative subjective evaluations for the INEXP/LONG and EXP/LONG groups are (marginally) significant (p-values = .0936 and .0766, respectively).

TABLE 5.11

Descriptive Statistics and Paired-Comparison Tests for Positive-Information Subjective Evaluations

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Subjective Evaluation for Later-Presented Positive Info. (Std Dev)	(n=12) 0.5143 (0.1772)	(n=13) 0.5162 (0.1282)	(n=21) 0.3865 (0.1078)	(n=23) 0.4180 (0.1450)
[2] Mean Subjective Evaluation for Early-Presented Positive Info. (Std Dev)	(n=12) 0.4947 (0.1103)	(n=13) 0.4315 (0.1188)	(n=22) 0.3795 (0.1480)	(n=19) 0.5033 (0.1590)
Relative Subjective Evaluation [1] - [2]	0.0196	0.0847	0.0070	-0.0853

Panel B: Paired-Comparison Tests

Comparison	F-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	0.72	0.7455	A = B
2. Column C vs. D	2.27	0.1361	C = D
3. Column A vs. C	0.03	0.8563	A = C
4. Column B vs. D	5.76	0.0193	B > D

Panel B of Table 5.11 presents the results of paired-comparison tests of differences in relative (positive-information) subjective evaluations between subject

groups. Again, these tests were conducted by estimating four ANOVAs in the same manner as described earlier for order-effect tests. The results indicate that the relative subjective evaluation is greater for inexperienced subjects than experienced subjects when the information series is long (comparison 4). For all remaining pairs of subject groups, relative subjective evaluations do not differ. These results are inconsistent with the predictions presented in Table 5.9.

Table 5.12 provides descriptive statistics for the evaluations of each of the negative information items.

TABLE 5.12

Descriptive Statistics for
Negative-Information Subjective Evaluations

Item	Mean	St Dev	N	# < 0	# > 0	# = 0
N1	-0.4542	0.2771	135	122	5	8
N2	-0.1103	0.2783	135	93	25	17
N3	-0.4996	0.2955	135	131	3	1
N4	-0.3447	0.3450	135	112	12	11
N5	-0.4139	0.2733	135	123	7	5
N6	-0.1745	0.2760	135	104	22	9
N7	-0.4625	0.3555	68	62	5	1
N8	-0.3847	0.3246	68	60	8	0
N9	-0.2985	0.2268	68	63	1	4
N10	-0.5057	0.3119	68	64	3	1
N11	-0.4435	0.2255	68	64	2	2
N12	-0.2354	0.2355	68	58	5	5
Total			1,218	1,056	98	64
(%)			(100)	(86.7)	(8.0)	(5.3)

Table 5.12 indicates that approximately 87 percent of the 1,218 subjective evaluations are less than zero which indicates that the negative information was, for the most part, viewed as negative by participating subjects. In addition, the mean rating for each information item is significantly less than zero at the .0001 level of significance.

As noted in Table 5.12, 98 out of 1,218 evaluations (approximately 8 percent) were positive. An examination of the belief revisions associated with each of these items indicated that beliefs were revised downward (suggesting a recording error) for 32.7 percent, beliefs did not change for 25.5 percent, and beliefs were revised upward for 41.8 percent. Again, for the purposes of the tests conducted here, the sample was restricted to non-positive observations.

After removing positive evaluations from the sample, the mean subjective evaluation for negative information was calculated for each subject. Panel A of Table 5.13 presents descriptive statistics and reports the relative (negative-information) subjective evaluation for each subject group. Panel B reports the results of paired-comparison tests for negative-information subjective evaluations.

TABLE 5.13

Descriptive Statistics and Paired-Comparison Tests for Negative-Information Subjective Evaluations

Panel A: Descriptive Statistics

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Subjective Evaluation for Later-Presented Negative Info. (Std Dev)	(n=12) -0.4632 (0.1330)	(n=13) -0.3654 (0.1263)	(n=22) -0.4186 (0.1950)	(n=19) -0.3951 (0.1419)
[2] Mean Subjective Evaluation for Early-Presented Negative Info. (Std Dev)	(n=12) -0.5145 (0.1565)	(n=13) -0.4295 (0.0894)	(n=21) -0.3599 (0.1209)	(n=23) -0.3837 (0.1522)
Relative Subjective Evaluation [1] - [2]	0.0513	0.0641	-0.0587	-0.0114

Panel B: Paired-Comparison Tests

Comparison	F-statistic	Probability (two-tailed)	Conclusion
1. Column A vs. B	0.03	0.8602	A = B
2. Column C vs. D	0.49	0.4871	C = D
3. Column A vs. C	1.89	0.1745	A = C
4. Column B vs. D	1.26	0.2661	B = D

None of the relative subjective evaluations reported in Panel A of Table 5.13 are significant, indicating that the ratings for negative information are constant across

orders. In addition, Panel B indicates that relative subjective evaluations did not differ between subject groups, thus the theory's predictions (see Table 5.9) are not supported.

In conclusion, the results of this subsection indicate that hypothesis H3 is not supported. This suggests that subjective evaluations are not affected by changes in confidence. However, it is also possible that measurement error in subjects' subjective evaluations may have resulted in insignificant differences. This possibility is discussed in the final subsection at the end of this chapter.

5.2.4 H4: Weight Parameters

The final hypothesis reflects the theory's proposition that as confidence at time 1 increases, the weight parameters assigned to later-presented information will decrease relative to those assigned to the same information when it is presented first.

In order to test this hypothesis, let the "relative" weight parameters for positive and negative information, respectively, be defined as:

$$RWP^{p} = \beta 2 - \beta 1 \qquad (5.6)$$

$$RWP^{n} = \alpha 2 - \alpha 1 \qquad (5.7)$$

The theory presented in chapter three proposes that as confidence at time 1 increases, ß2 and α2 will decrease relative to ß1 and α1. This proposition is reflected in equations (3.27) and (3.28). Thus, as confidence increases, the theory predicts that RWP^p and RWP^n will decrease. Furthermore, the decrease in RWP^p is a function of confidence in beliefs after processing initial negative information, while the decrease in RWP^n is a function of confidence in beliefs after processing initial positive information.

Tables 5.1 and 5.2 provide the relevant information for forming predictions about differences in relative weight parameters for positive information and negative information, respectively. Table 5.14 summarizes the predicted differences in relative weight parameters based on the results presented in Tables 5.1 and 5.2.

Table 5.14 indicates that relative weight parameters for positive information should differ between inexperienced subjects in the short versus long series conditions. In addition, a marginally significant difference in the positive-information relative weight parameters is predicted between inexperienced and experienced subjects when the information series is short. For negative information, relative weight parameters are expected to differ between experienced subjects in the

short versus long series conditions and between inexperienced and experienced subjects when the information series is long.

TABLE 5.14

Summary of Predicted Differences in Relative Weight Parameters

Relative Weight Parameter	Comparison	Predicted Differences
Positive Information: (From Table 5.1)	1	INEXP/SHORT < INEXP/LONG
	2	EXP/SHORT = EXP/LONG
	3	INEXP/SHORT <* EXP/SHORT
	4	INEXP/LONG = EXP/LONG
Negative Information: (From Table 5.2)	1	INEXP/SHORT = INEXP/LONG
	2	EXP/SHORT > EXP/LONG
	3	INEXP/SHORT = EXP/SHORT
	4	INEXP/LONG >* EXP/LONG

* Marginally significant difference predicted.

In order to test the predictions displayed in Table 5.14, it was first necessary to obtain an estimate of the weight parameters assigned to each piece of information. Recall from equation (3.2) that the belief after processing k pieces of information can be expressed as:

$$S_k = S_{k-1} + w_k s(x_k) \qquad (5.8)$$

where $w_k = \alpha S_{k-1}$, when $s(x_k) \leq 0$

$w_k = \beta(1 - S_{k-1})$, when $s(x_k) > 0$.

When positive information is received, the revision in beliefs can thus be expressed as:

$$S_k - S_{k-1} = \beta(1 - S_{k-1})s(x_k) \tag{5.9}$$

Solving equation (5.9) for β yields the following expression for the positive-information weight parameter:

$$\beta = \frac{S_k - S_{k-1}}{(1 - S_{k-1})s(x_k)} \tag{5.10}$$

Likewise, when negative information is received, the revision in beliefs can be expressed as:

$$S_k - S_{k-1} = \alpha S_{k-1}s(x_k) \tag{5.11}$$

Solving equation (5.11) for α yields the following expression for the negative-information weight parameter:

$$\alpha = \frac{S_k - S_{k-1}}{S_{k-1}s(x_k)} \tag{5.12}$$

For each subject, equations (5.10) and (5.12) were used to calculate the weight parameters for each piece of positive and negative information, respectively. Note that both equations, however, are undefined if the subjective evaluation equals zero. Consequently, a weight parameter for a given piece of positive information was calculated if the subjective evaluation was greater than zero. Likewise, a weight parameter for a given piece of negative information was calculated if the subjective evaluation was less than zero.

After calculating weight parameters for individual pieces of information for each subject, the mean positive-information weight parameter and mean negative-information weight parameter was calculated for each subject. Table 5.15 presents descriptive statistics for the positive-information weight parameters and reports the relative (positive-information) weight parameter for each subject group.

TABLE 5.15

Descriptive Statistics
for Positive-Information Weight Parameters

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Weight Parameter for Later-Presented Positive Info. (Std Dev)	(n=12) 0.0775 (0.1500)	(n=13) 0.0291 (0.2551)	(n=21) 0.0903 (0.1613)	(n=23) -0.0673 (0.5299)
[2] Mean Weight Parameter for Early-Presented Positive Info. (Std Dev)	(n=12) 0.0357 (0.6063)	(n=13) 0.1233 (0.2176)	(n=22) 0.0346 (0.5772)	(n=19) 0.1016 (0.1337)
Relative Weight Parameter [1] - [2]	0.0418	-0.0942	0.0557	-0.1689

None of the relative weight parameters reported in Table 5.15 are significant. Note, however, that several of the standard deviations are quite high. When this occurs, it is difficult to achieve reasonable significance levels in tests of differences between means without increasing the sample size. Paired-comparison tests of differences in relative weight parameters between subject groups are all insignificant and consequently are not reported in Table 5.15. These results suggest that hypothesis H4 is not supported for positive-information weight parameters.

Table 5.16 presents descriptive statistics for the negative-information weight parameters and reports the relative (negative-information) weight parameter for each subject group. Again, none of the relative (negative-information) weight parameters are significant. Note, however, that the standard deviations are quite high, making it difficult to detect any differences in means which might exist between groups.

Paired-comparison tests of differences in relative (negative-information) weight parameters across subject groups were all insignificant and consequently are not reported in Table 5.16. These results suggest that hypothesis H4 is also not supported for negative-information weight parameters.

TABLE 5.16

Descriptive Statistics
for Negative-Information Weight Parameters

	Subject Group			
	[A] INEXP/ SHORT	[B] INEXP/ LONG	[C] EXP/ SHORT	[D] EXP/ LONG
[1] Mean Weight Parameter for Later-Presented Negative Info. (Std Dev)	(n=12) 0.3323 (0.6678)	(n=13) 0.1286 (0.8837)	(n=22) 0.3640 (0.7486)	(n=19) 0.1250 (0.3230)
[2] Mean Weight Parameter for Early-Presented Negative Info. (Std Dev)	(n=12) 0.2044 (0.2402)	(n=13) 0.0574 (0.2541)	(n=21) 0.0112 (0.7916)	(n=23) 0.0253 (0.5117)
Relative Weight Parameter [1] - [2]	0.1279	0.0712	0.3528	0.0997

In conclusion, the results of this subsection suggest that weight parameters, like subjective evaluations, are not affected by changes in confidence. Recall, however, that the earlier tests of hypotheses H1 and H2 indicated that order effects differ significantly between some subject groups. According to the model presented in chapter three, this should indicate that either relative subjective evaluations or relative weight parameters

differ between the groups, contrary to the results presented above for tests of hypotheses H3 and H4.

There may be a number of potential explanations for these apparently anomalous results. One possibility is that there may be measurement error in subjects' subjective evaluations and consequently, in the estimates of weight parameters. Alternatively, the model may be misspecified. These alternative explanations are explored further in the next subsection.

5.3 Summary and Discussion

This chapter described the detailed tests of the four hypotheses developed in the third chapter. The first two hypotheses focus on the primary proposition that when confidence increases, both component order effects and the total order effect will increase. The results of tests of these hypotheses suggest that the theory is supported for inexperienced subjects but not for experienced subjects.

In particular, when confidence assessments differed between the short and long series' groups of inexperienced subjects (as they did when initial information was negative) order effects also differed in the direction predicted by the model. Furthermore, when the confidence assessments of inexperienced subjects did not differ (e.g. when initial information was positive), the order effect

also did not differ, as predicted. For experienced subjects, however, increased confidence did not result in a higher order effect. When initial information was positive, for example, experienced subjects were more confident when they received a long series of information than a short series. However, there was no difference in order effects between the two groups, contrary to the model's predictions.

This pattern of results is further evidenced in tests of the differences in order effects between inexperienced and experienced subjects. Specifically, confidence was higher for inexperienced subjects than experienced subjects when the information series was short. The results indicate that the short-series order effects were higher for inexperienced subjects than experienced subjects. Conversely, when the information series was long, confidence was higher for experienced subjects than inexperienced subjects. However, the higher level of confidence for experienced subjects did not lead to a higher order effect. These results also suggest that confidence is related to order effects for inexperienced subjects, but not for experienced subjects.

Furthermore, the direction of order effects for both inexperienced and experienced subjects was consistent with the theory when confidence was relatively low. That is,

the order effects of both groups exhibited recency, as the theory would predict. However, when confidence was higher, the order effect for inexperienced subjects exhibited primacy, while the order effect for experienced subjects continued to exhibit the same degree of recency despite the increase in confidence. This implies that increased task experience may lead to a decrease in belief perseverance "proneness".

The discussion above implies that experienced auditors, in spite of being more confident in their beliefs, do not "persevere" in those beliefs. In terms of equations (3.27) to (3.30), this suggests that auditors have very low τ and δ parameters. That is, they have a low propensity for underweighting or misclassifying contrary information, particularly when the contrary information is negative. This is consistent with Ashton and Ashton's (1988, 1990) proposition that auditors are particularly sensitive to negative information as a consequence of professional training and awareness of the legal and professional risk associated with failing to detect material misstatements.

Moreover, if belief perseverance can be thought of as a consequence of overconfidence (and the contrast effect a consequence of underconfidence), as proposed in the third chapter, the results imply that auditors may be more

susceptible to "underconfidence" than "overconfidence" in judgment. This is consistent with prior research which suggests that, unlike the "general population", auditors tend to be underconfident rather than overconfident (e.g. Solomon 1982; Tomassini et al. 1982).

The final two hypotheses focus on the more detailed propositions of the theory which suggest that higher confidence reduces the impact of later-presented information relative to early-presented information via a reduction in subjective evaluations and weight parameters assigned to later-presented information. The results of these tests indicate, however, that neither reductions in subjective evaluations nor reductions in weight parameters are sufficient to explain reductions in the impact of later-presented information.

In addition, the mean subjective evaluations and weight parameters for later-presented information in many cases were higher than those for early-presented information. This possibility is not considered by either of the order-effect theories examined in this study. The theory of belief perseverance predicts only that subjective evaluations and weight parameters for later-presented information will be lower than those for early-presented information. Furthermore, the contrast-effect theory maintains that the greater impact of later-

presented information is the result of differences in anchors and not differences in subjective evaluations or weight parameters.

One possible explanation for these apparently anomalous results is that subjective evaluations are measured with error. As noted in chapter four, the evaluation task was performed by subjects as a separate task after the belief-revision task was complete. This raises the possibility that subjects' evaluations of information "after the fact" do not correspond to their evaluations of the information at the time it was processed. An alternative approach might have been to have subjects rate each item as they were proceeding through the belief-revision task. However, this may have changed the nature of the belief-revision process and thus introduced a source of noise into subjects' likelihood judgments.

In addition, even if (implicit) evaluations don't change between the belief-revision task and the evaluation task, subjects' explicit evaluations may differ from the implicit evaluation used in the revision process. That is, their self-insight may be low (Ashton 1983). To the extent that this is true, subjective evaluations may be subject to measurement error. Furthermore, the degree of measurement error in subjective evaluations may differ

across subject groups. For example, Hamilton and Wright (1982) report a positive association between self-insight and experience. Consequently, inexperienced subjects' evaluations may differ from those of experienced subjects due solely to differences in self-insight.

These problems are unavoidable, however, since the separate effects of subjective evaluations and weight parameters cannot be ascertained simply by examining belief revisions. In order to isolate the effects of each factor, an attempt must be made to "identify" one of the unknown factors. Consequently, to the extent that there is measurement error in the "identified" factor, there will also be measurement error in the remaining factor.

For example, recall from chapter three that belief revision is proposed to be a function of the subjective evaluation of the information, the weight parameters α and β, and the previous anchor (see equations (3.2), (3.3), and (3.4)). By using an SbS response mode (described in chapter two), the anchor can be identified. The rating task included in the experimental instrument was intended to provide an estimate of the subjective evaluation. Finally, the weight parameter is derived by solving the equations for α and β.

To the extent, then, that there is measurement error in subjects' subjective evaluations, there will also be an

(opposite) error in the derived values of the weight parameters. Thus, while this approach does provide a rough attempt at examining each factor independently, it is not possible to draw unequivocal conclusions about the relative effect of confidence on each factor. For example, an observed decrease in subjective evaluations may actually be reflecting a decrease in the weight parameter whose effect is "absorbed" into the subjective evaluation as a result of measurement error.

An alternative explanation for the apparently anomalous results for subjective evaluations and weight parameters is that the model may be misspecified. An examination of subjects' belief revisions revealed that many of the belief revisions were in the opposite direction from the model's predictions. That is, information which subjects rated as "positive" ("negative") resulted in a downward (upward) revision in beliefs.

One possible explanation for belief revisions in the "wrong direction" is that beliefs are not "exact", i.e. they cannot be described by a deterministic relationship between subjective evaluations, anchors, and weight parameters as the model proposes. Rather, there may be some chance element, or error, inherent in the belief

revision process. This suggests that a more appropriate specification of the model may be:

$$S_k = S_{k-1} + w_k s(x_k) + e$$

where e might represent a normally distributed error term with a mean of zero. Furthermore, even if beliefs are exact, the outward expression of the belief may not be. In other words, when people are asked to express their beliefs in the form of likelihood judgments, there may not be a direct mapping between the inward belief and the outward expression of that belief. Again, this suggests that the descriptive model of outward expressions of belief should include a term reflecting the error inherent in this process.

Particularly puzzling, however, is the fact that one of the mean weight parameters for experienced subjects was negative (indicating that subjects in that group revised beliefs in the opposite direction, on average, for all of the information in the set). In terms of the discussion above, even if there is a random element in the belief-revision process, it would be expected to "average out" across belief revisions such that the mean revision would be in the "appropriate" direction. This suggests that there may be something besides random error that resulted in the negative weight parameter.

One possible explanation is that experienced subjects may take interactions between individual pieces of information into account when revising their beliefs. The model, however, assumes that each piece of information is processed independently. That is, the model does not allow for interactions or "causal connections" between different pieces of information. Rather, the revision in beliefs for a given piece of information is assumed to be a function of the subjective evaluation of that piece of information times an adjustment weight, both of which are independent of any other piece of information.

However, an alternative model of the belief-forming process proposed in the literature suggests that belief-formation is guided by constructing or invoking "mental representations" (or "schemata") in memory of the causal connections between different pieces of evidence (Pennington and Hastie 1986, 1992; Waller and Felix 1984). Consequently, as each new piece of information is processed, it is evaluated not independently but in terms of its causal connection to the other pieces of information received.

Ricchiute (1992) tests the validity of the "causal" model of belief formation by examining whether auditors' going-concern decisions differ when information is presented in a working-paper versus causal order. The idea

is that, if auditors invoke causal schemata to organize information relevant to the going-concern decision, then this organization should be facilitated when information is presented in a causal order. Ricchiute's (1992) results support this proposition.

In terms of the apparently anomalous finding of a negative weight parameter for experienced subjects in this study, if the experienced subjects were using a causal model to interpret information, then a new piece of information may have lead to a reevaluation of the relationships between previously-processed information. Thus, the "wrong direction" belief revisions may reflect not only the new information contained in the evidence, but the effect of that new information on existing information.

Thus, in spite of the fact that reliable conclusions cannot be drawn based on tests of the final two hypotheses, the attempt to separate the effects of subjective evaluations and weight parameters on belief revision was nevertheless beneficial in highlighting potential weaknesses in the model which future research might address.

6. CONCLUDING REMARKS

Prior research examining order effects in judgment has produced an impressive array of mixed results with respect to the direction of the order effect (i.e. primacy versus recency). This study proposed a potential explanation for the apparently contradictory results of prior studies.

Specifically, an "integrated" theory of order effects was presented in an attempt to reconcile two of the more widely-cited theories which predict opposite order effects. The theory of belief perseverance proposes that later-presented information which is inconsistent with beliefs is "discounted", resulting in primacy. The contrast-effect theory, on the other hand, proposes that later-presented information will have a greater impact when it is inconsistent with beliefs, resulting in recency. The theory presented in this study proposes that the two theories can be reconciled by examining the effect of confidence on belief revision.

In particular, the integrated theory proposes that in order for beliefs to persevere, one must have some degree of confidence in beliefs. Consequently, the theory suggests that belief perseverance (the contrast effect) is an increasing (decreasing) function of confidence in beliefs. This further implies that as confidence

increases, order effects will also increase (i.e. from recency toward primacy). The theory was formalized by expanding Hogarth and Einhorn's (1992) belief-adjustment model to incorporate the proposed effect of confidence on belief revision.

The integrated theory was tested in a field setting involving an internal control evaluation task. Confidence in beliefs was manipulated by varying two factors: (1) the amount of information, and (2) task experience. The confidence assessments for subject-groups with differing amounts of information and task experience were used as a basis for testing the theory's predictions. The primary hypotheses which were tested corresponded to the theory's prediction that as confidence increases, order effects will also increase.

The experimental results suggest that increased confidence leads to an increase in order effects only when task experience is low, thus the theory proposed in this study is partially supported by the empirical results. The study's results, however, suggest a number of avenues where future research may be beneficial.

First, one potential explanation offered for the lack of a significant relationship between confidence and order effects for experienced subjects is that auditors are more sensitive to the professional and legal consequences of

failing to detect material misstatement in an audit client's financial statements and therefore do not "discount" later-presented negative information even when confidence is high. If this is true, then it might be expected that increased confidence would lead to an increase in order effects for experienced subjects in tasks where the cost of "making an error" is low.

This suggests that the relationship between confidence and order effects may be a decreasing function of the perceived cost of making an "inappropriate" judgment rather than a decreasing function of task experience per se. Consequently, replication of the order-effect tests conducted here in other auditing and non-auditing settings where the decision consequences differ would help to clarify the reason for the lack of a significant relationship between confidence and order effects for experienced subjects.

Furthermore, if the perceived consequences of making inappropriate judgments mediates the relationship between confidence and order effects, the study's results with respect to inexperienced subjects (i.e. undergraduate auditing students) suggest that they don't yet have an "internal" appreciation of the potential professional and legal costs of biased judgment in auditing, in spite of their exposure to course material which emphasizes these

costs. This further suggests that auditors don't enter the profession with an attitude of "professional skepticism", but rather develop or acquire this attitude through experience or firm training. An interesting issue which this raises is the manner in which auditors "learn" to be skeptical or to "internalize" an awareness of the potential costs of judgmental error.

Finally, the results of the tests conducted in this study to examine differences in confidence assessments suggest that people are generally more confident in beliefs when the information they receive is positive in direction rather than negative. While prior research has demonstrated that positive and negative information appears to have an "asymmetric" effect on "first-order" judgments (e.g. Ashton and Ashton 1990), the results of this study suggest that this asymmetry also occurs in "second-order" judgments. Thus, an additional avenue for future research would be to examine, both theoretically and empirically, the relationship between confidence and the direction of the information.

In conclusion, although the literature on order effects is larger than most, in any avenue of academic inquiry an attempt to answer one question often leaves us confronted with three more questions that we hadn't even thought to ask.

APPENDIX A:

EXPERIMENTAL INSTRUMENT

A CASE STUDY OF AUDITORS' INTERNAL CONTROL JUDGMENTS

Prepared by:

Jane E. Morton, Ph.D. Candidate
University of Arizona
Dept. of Accounting
McClelland Hall 301
Tucson, AZ 85721

BOOKLET I

PLEASE READ THIS BOOKLET FIRST.

INTRODUCTION

Thank you for agreeing to participate in this project. The objective of the project is to add to our understanding of how auditors' internal control judgments change in response to new information.

It is important that you complete this questionnaire independently. Please do not discuss or compare your answers with other participating members of your firm.

All responses that you provide will be held in strict confidence. Your responses will be combined with those of other participants and evaluated as a group. Your responses will not be reviewed in isolation.

It is very important for the interpretation of the research results that you proceed through this questionnaire in the order given. Please do not skim through the booklets or otherwise look at any page until you have completed all prior pages. Also, once you have recorded your responses and moved on to the next page, please do not look backward or alter previous responses.

Thank you for your cooperation and close attention.

INSTRUCTIONS

This questionnaire asks you to make judgments based on your experience as an auditor. The questionnaire is divided into three booklets. Please go through these booklets in the order given.

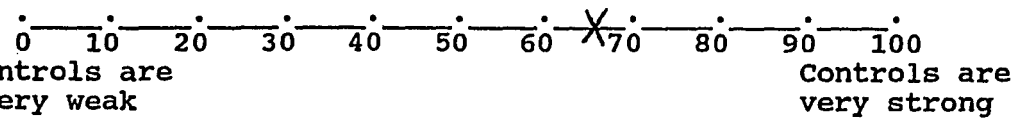
Booklet I

In this booklet, you will be provided with background information regarding a hypothetical audit client. The information includes a brief description of the client and its sales and collections operations, an organizational chart, and flowcharts of the client's accounting system for sales and collections. The information presented should be treated as statements of fact (i.e. the information has been verified and is reliable). After reading this information in its entirety, you may proceed to Booklet II. You may refer back to the instructions and client information in Booklet I at any time.

Booklet II

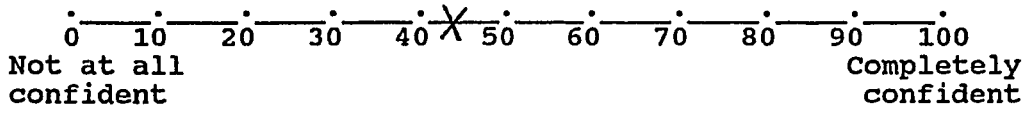
In Booklet II, you will be asked to provide two initial judgments based on the client information presented in Booklet I. For the first judgment, you will be asked to express your belief about how likely it is that the client's internal control structure for the sales and collection cycle **will prevent or detect and correct material misstatement.** You should consider this judgment a joint assessment for the existence or occurrence, completeness, and valuation assertions. Existence or occurrence means that all recorded transactions actually took place. Completeness means that all transactions which occurred have been recorded. Valuation means that transactions have been recorded at appropriate amounts.

The judgment is to be made on a 100-point scale. A high assessment would indicate a high likelihood that material misstatement would be prevented or detected and corrected, and correspond to a belief that controls are relatively strong. A low assessment, on the other hand, would indicate a low likelihood that material misstatement would be prevented or detected and corrected, and correspond to a belief that controls are relatively weak. To record your judgment, please mark an "X" at that point on the response line that corresponds to your belief (as illustrated below).



Although this judgment is similar to an assessment of "control risk" as described in the professional standards, there are important differences. First, SAS 55 defines control risk as the likelihood that a material misstatement *will not* be prevented or detected and corrected by a client's internal control structure instead of the likelihood that internal controls *will* prevent or detect and correct material misstatement. Second, SAS 55 requires sufficient competent evidential matter in order to justify a control risk assessment below the maximum level. Such justification issues are not of concern in this project. Rather, we are interested in what you actually *believe* is the likelihood that internal controls will prevent or detect and correct material misstatement, regardless of whether or not you feel that your belief is justifiable according to the requirements of professional standards.

For the second judgment, you will be asked to record your degree of confidence, or uncertainty, about your likelihood judgment. This judgment is also to be made on a 100-point scale. A high assessment would indicate that you have a high degree of confidence in your belief. At the other extreme, a very low assessment would indicate that your belief is little more than a random guess. To record your judgment, please mark an "X" at that point on the response line that corresponds to your degree of confidence (as illustrated below).



After recording your initial judgments, you will be provided with additional information regarding the hypothetical audit client. At this time, you will be given the opportunity to revise your judgments. When asked to provide a judgment, please do so before proceeding to the next page. Also, once you have recorded your response and moved on, please do not look backward or alter previous responses.

Booklet III

Booklet III of the questionnaire asks several questions about your perceptions of the case materials and your experience as an auditor. Again, all information that you provide will be kept confidential.

CLIENT INFORMATION

Description of Client

Home Electronics Distributors, Inc. is a medium-sized firm which operates in a large midwestern city. The firm purchases home electronic equipment (such as televisions, VCRs, camcorders, stereo equipment, and home computers) in large quantities directly from the manufacturers and resells the equipment to smaller home electronics retailers in a four state area.

The firm has been in operation for the past twenty years. Its stockholder base consists of approximately 300 individuals, none of whom have a controlling interest in the firm. The president of the firm holds approximately 20% of the firm's outstanding shares. Each of the other stockholders holds less than 5% of the shares outstanding.

The firm employs approximately 100 individuals who work in one of three main departments: Sales, Shipping and Purchasing, and Accounting. These departments are overseen by the sales manager, shipping and purchasing manager, and controller, respectively, each of whom reports directly to the firm's president. The accounting department is the largest department and is further divided by function: Credit, Accounts Receivable, Accounts Payable, and Payroll. The firm also has a treasurer who reports directly to the president. A chart of the firm's organizational structure is presented in Figure 1.

The Board of Directors is comprised of the president, treasurer, and five prominent members of the community, one of whom is a retired CPA.

Sales and Collections

All sales are made on credit. The firm provides each of their customers with a supply of preprinted order forms. Sales are initiated upon receipt of customers' order forms. Sales clerks transfer the information from the customer's order form onto computer terminals. This information includes the customer's name and address, product identification, order quantity, and unit prices. The computer automatically enters the date, calculates sales tax and shipping fees, and totals the order. This information is then printed out on a prenumbered, three-part sales order form. The sales department keeps one copy of the sales order along with the order form. The remaining copies are sent to Credit for approval.

After approval, Credit forwards one copy of the sales order to Accounts Receivable where it is kept in an unmatched order file and sends the remaining copy to Shipping for processing. Shipping clerks work from the sales order copy to gather the merchandise requested. Each order is stacked on a separate wooden pallet and wrapped with clear plastic wrap to keep it separate from other orders.

After an order is filled, the shipping clerk enters the customer's name and address, products, quantities, and sales order number onto a computer terminal in the warehouse. This information is then printed out on a prenumbered, four-part shipping document. One copy of the shipping document is filed in the warehouse along with Shipping's copy of the sales order, and another copy is forwarded to Accounts Receivable. The remaining two copies of the shipping document accompany the order which is sent FOB shipping point. The freight company which delivers merchandise for the firm keeps one copy of the shipping document and gives the remaining copy to the customer upon delivery.

Upon receipt of the shipping document, accounts receivable clerks pull the accounting department's copy of the sales order which matches the sales order number on the shipping document. They enter the customer's name and the order date from the sales order. The computer automatically transfers the sales order information, enters the current date, posts the receivable and the sale, and prints out a prenumbered, three-part invoice. The original copy of the invoice and a remittance copy are mailed to the customer along with a payment envelope. The remaining copy is filed with the sales order and shipping document by invoice number pending receipt of payment.

When payment envelopes arrive, they are forwarded unopened to the treasurer's office. The treasurer's secretary prepares a listing of the checks received which includes the invoice number, customer name, and amount received. The remittance advices are separated from the checks and forwarded to Accounts Receivable for posting. The treasurer's secretary prepares the bank deposit for delivery to the bank by the firm's courier. Upon receipt of the remittance advices, accounts receivable clerks enter a payment code into the computer by invoice number. The computer automatically removes the receivable and updates the cash account.

Flowcharts of the client's accounting system for sales and collections are presented in Figures 2 and 3.

FIGURE 1

ORGANIZATIONAL STRUCTURE

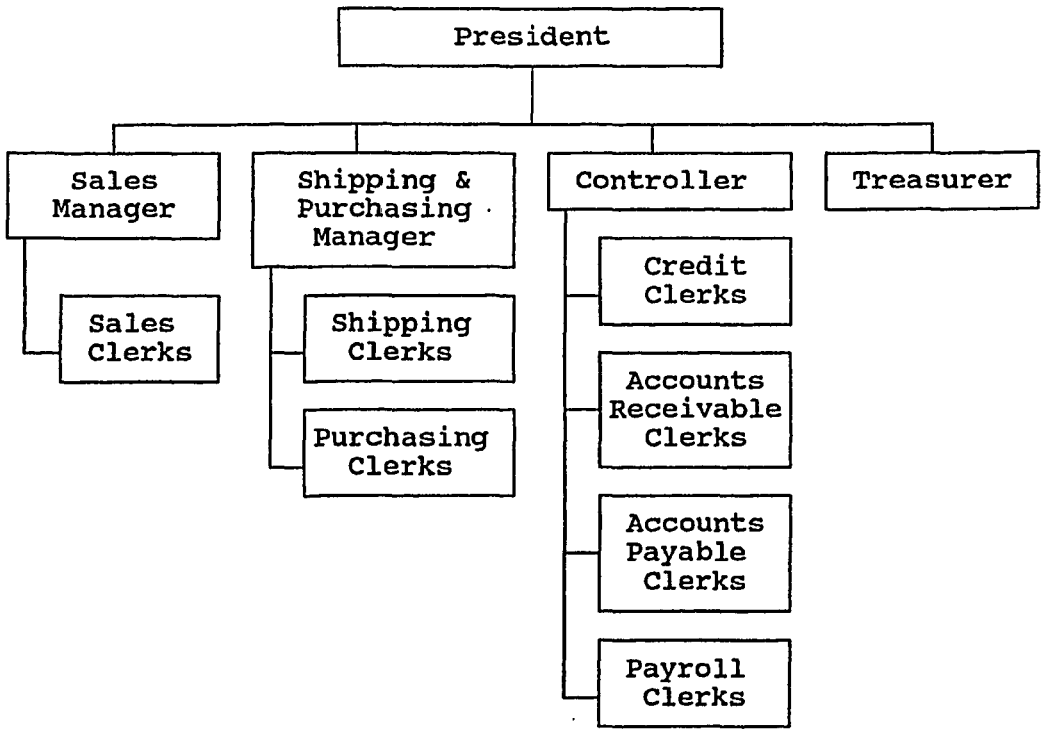
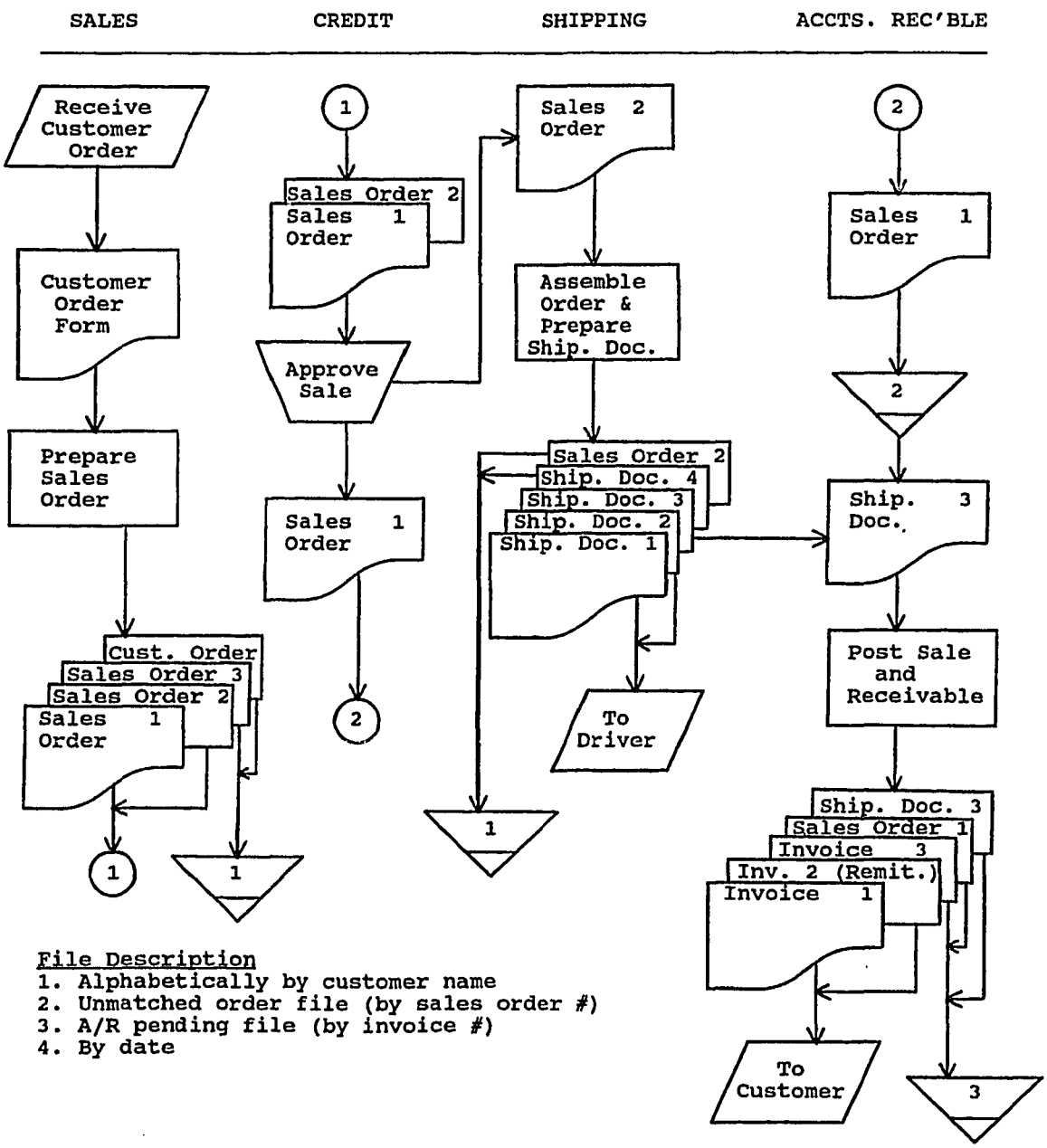


FIGURE 2

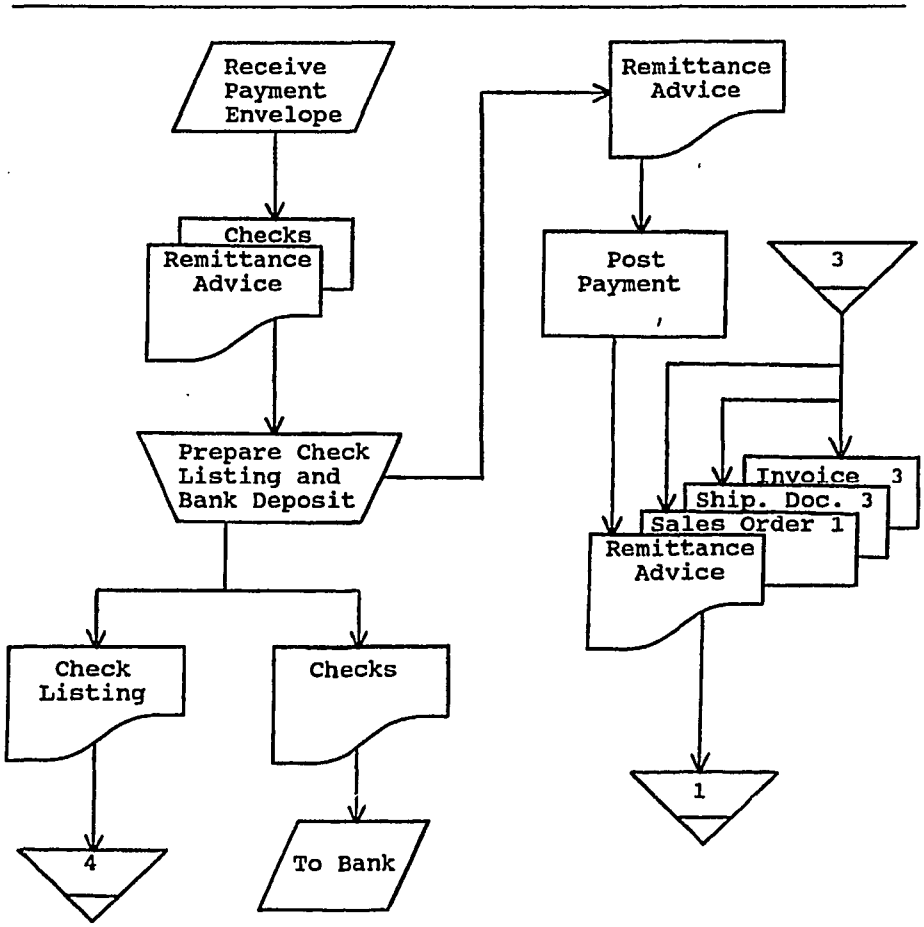
FLOWCHART FOR SALES



File Description
1. Alphabetically by customer name
2. Unmatched order file (by sales order #)
3. A/R pending file (by invoice #)
4. By date

FIGURE 3

FLOWCHART FOR COLLECTIONS



File Description
1. Alphabetically by customer name
2. Unmatched order file (by sales order #)
3. A/R pending file (by invoice #)
4. By date

THIS CONCLUDES BOOKLET I.

PLEASE PROCEED TO BOOKLET II.

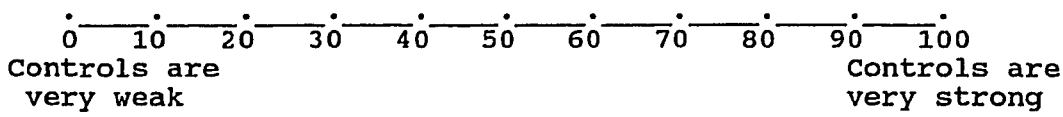
YOU MAY REFER BACK TO ANY OF THE INFORMATION IN THIS BOOKLET AT ANY TIME.

A CASE STUDY OF AUDITORS' INTERNAL CONTROL JUDGMENTS

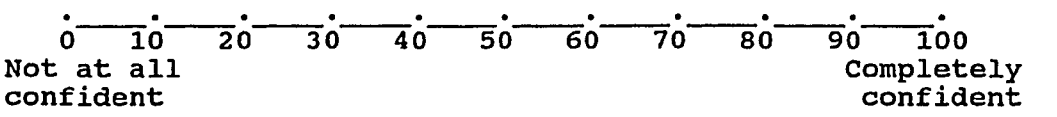
BOOKLET II

DO NOT OPEN THIS BOOKLET UNTIL YOU HAVE READ BOOKLET I.

Based on your analysis of the client information presented in Booklet I (with respect to the existence or occurrence, completeness, and valuation assertions), what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



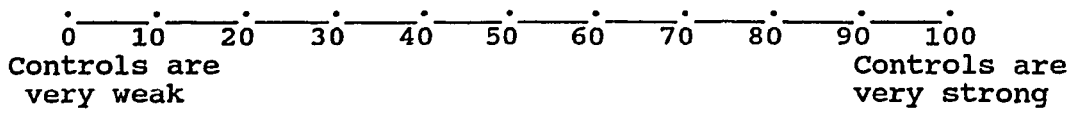
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

On the following pages, you will be provided with additional information regarding the sales and collections operations of Home Electronics Distributors, Inc. Again, this information should be treated as statements of fact (i.e. the information has been verified and is reliable).

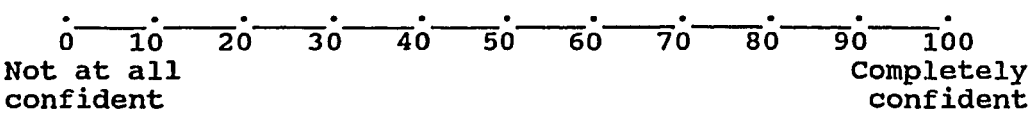
After each piece of information, you will be given the opportunity to revise your judgments. Your judgments should reflect the cumulative effect of all information received up to that point. Please proceed one page at a time.

[Prior to shipment of an order, the shipping and purchasing manager verifies that the products assembled on the wooden pallet match the information on the shipping document. After verification, the shipping and purchasing manager initials each copy of the shipping document.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



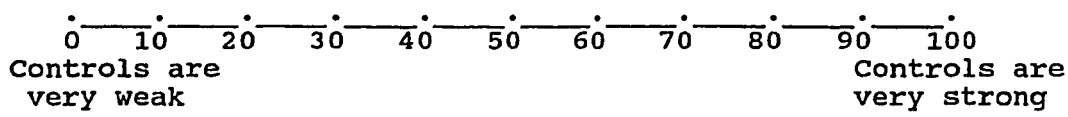
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



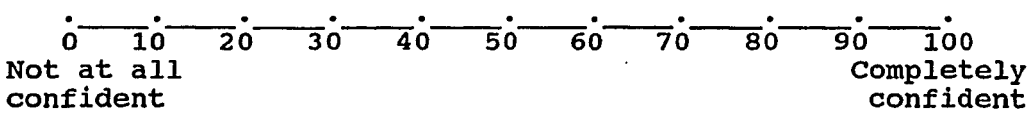
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Shipping documents for orders shipped are forwarded to Accounts Receivable promptly to ensure that the transaction is recorded on the day the order is shipped.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



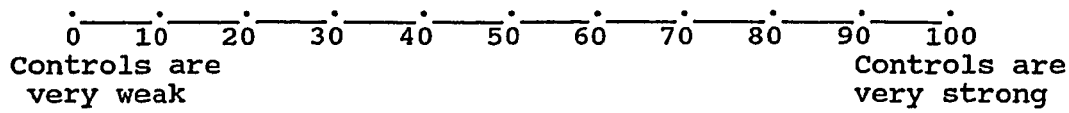
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



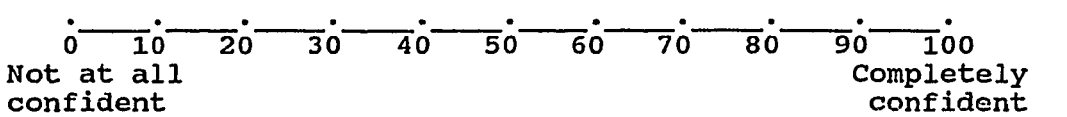
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The employee turnover for each of the firm's three departments is quite low.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



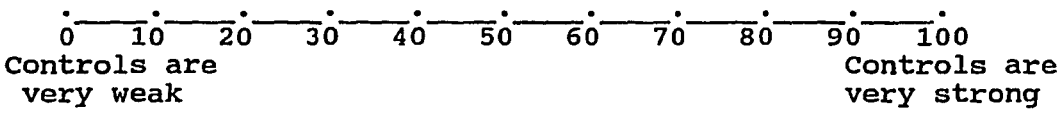
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



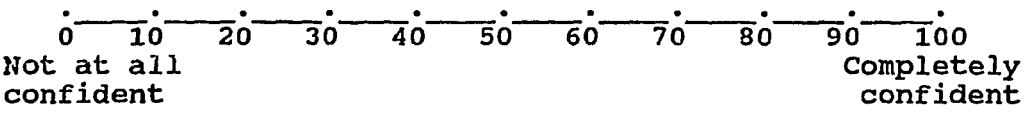
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Prior to invoicing the customer for an order, accounts receivable clerks verify that the products and quantities on the sales order match those on the shipping document.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



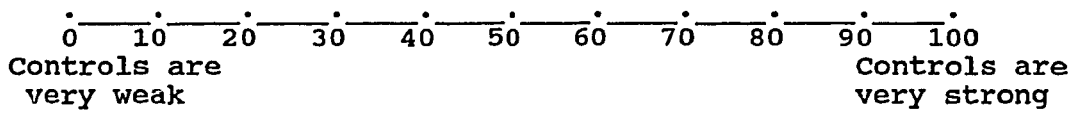
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



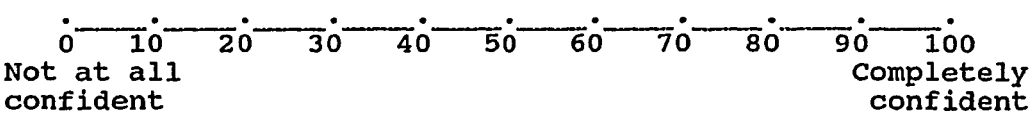
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[On a weekly basis, the treasurer's office compares a list of the payments posted by Accounts Receivable to their listing of checks received to ensure that payments were posted to the correct accounts.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



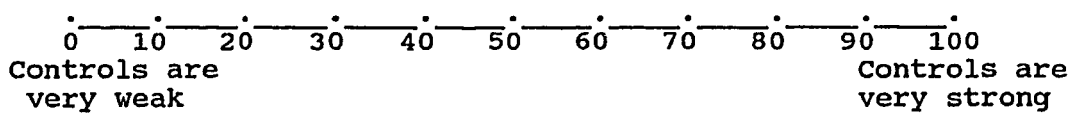
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



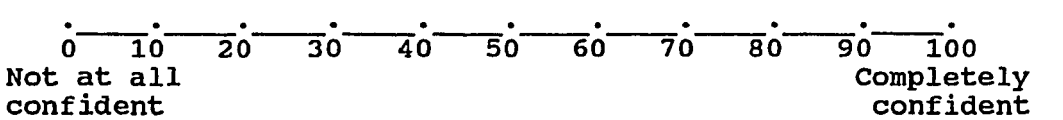
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[When new employees are hired, they undergo a two-week training period during which they are paired with experienced employees who instruct them in their duties and provide continuous supervision.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



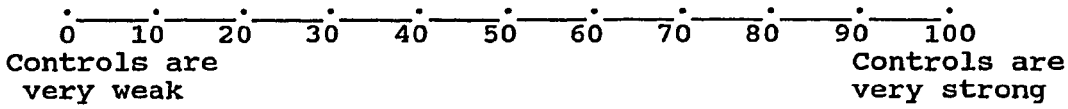
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



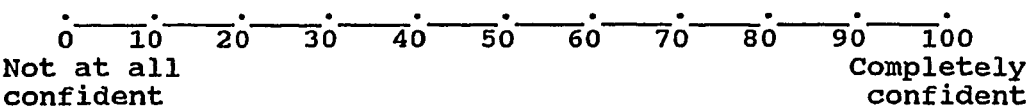
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The computer software was installed and is maintained by an independent software support firm specializing in accounting applications. Employees of Home Electronics Distributors, Inc. responsible for data input have no access to system programs and documentation.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



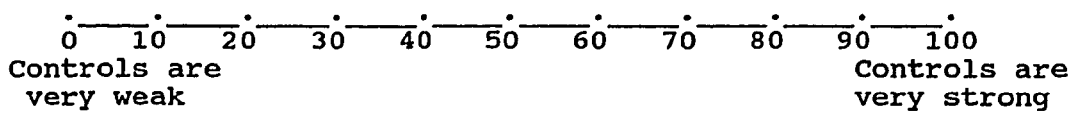
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



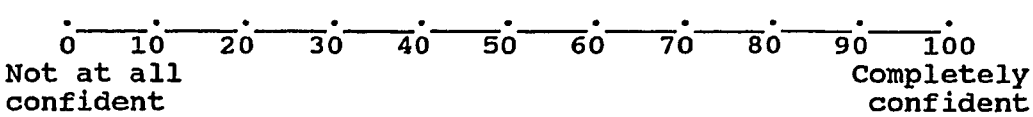
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[On a monthly basis, the controller's office investigates unpaid invoices which are more than thirty days overdue. When it is determined that an account is uncollectible, an uncollectible account authorization form is filled out and approved by the controller.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



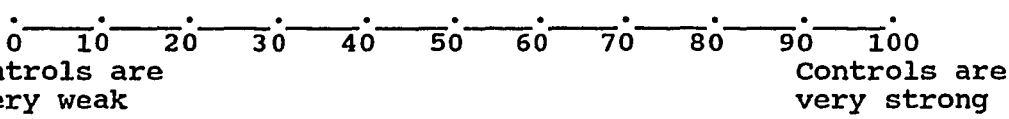
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



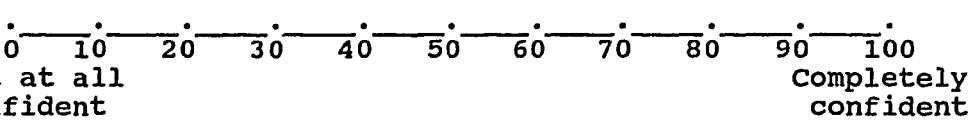
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Accounts receivable clerks monitor the numerical sequence of invoices on a monthly basis to ensure that all are accounted for.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



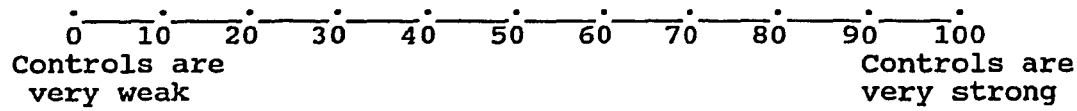
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



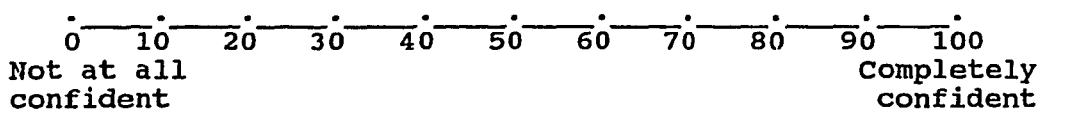
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The firm maintains the practice of rotating the duties of accounting personnel at appropriate intervals in order to minimize the potential for collusion and to prevent employee burnout. Cross-training also provides protection when illness or turnover occurs.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



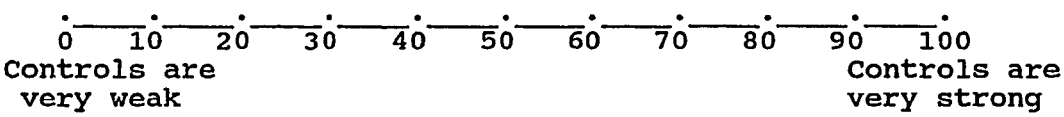
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



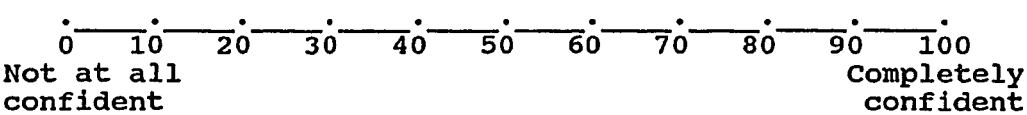
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Computer access to the firm's sales, shipping, and accounting functions is password restricted. Sales and shipping personnel have no access to the firm's accounting records. Accounting personnel have read-only access to sales and shipping department records.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



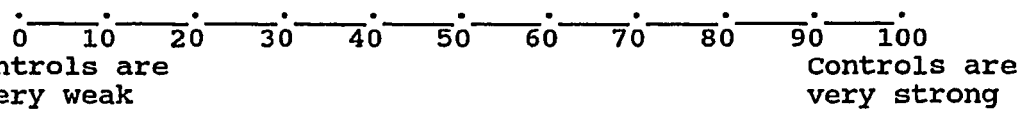
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



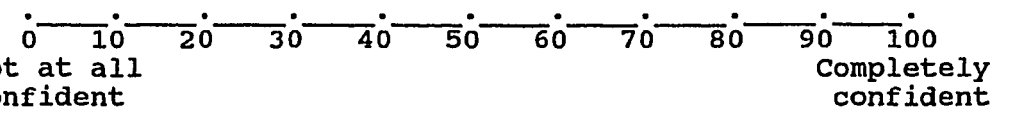
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Before a sales order is approved, Credit conducts an investigation into the customer's credit history. In addition, they check to see that the new order is within the customer's allowable credit limit. If the results of this investigation are satisfactory, the controller approves the sale by initialling the top copy of the sales order.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[Accounts Receivable does not send out monthly statements to customers.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.

```
0   10   20   30   40   50   60   70   80   90   100
Controls are                                  Controls are
very weak                                     very strong
```

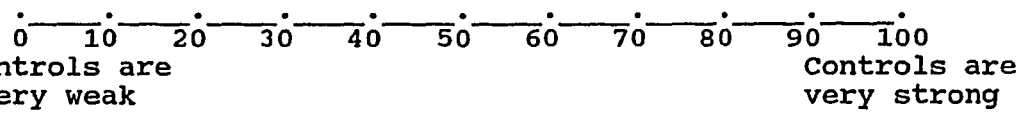
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.

```
0   10   20   30   40   50   60   70   80   90   100
Not at all                                    Completely
confident                                     confident
```

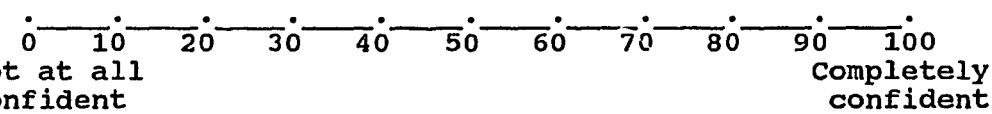
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The three department managers are solely responsible for supervising their respective departments. Consequently, the employee to manager ratio is quite high, particularly in the accounting department.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



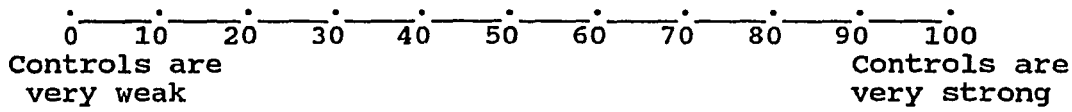
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



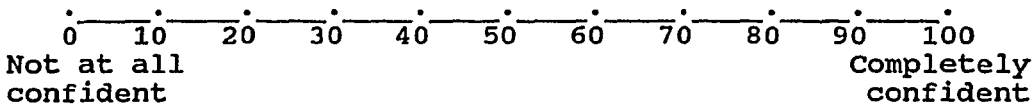
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[When customers are invoiced for orders, the supporting documents are not stamped or marked in any way that would prevent re-use or double entry.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



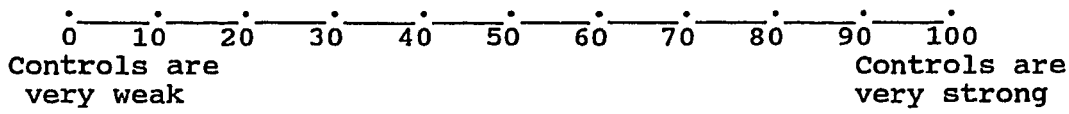
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



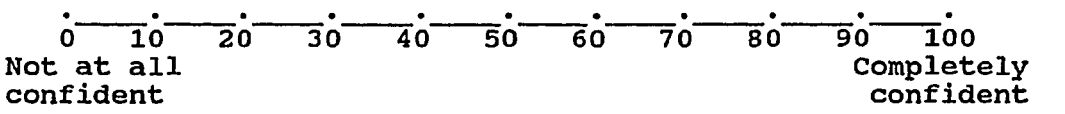
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[A large audit adjustment was required on last year's audit which affected accounts in the sales and collections cycle.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



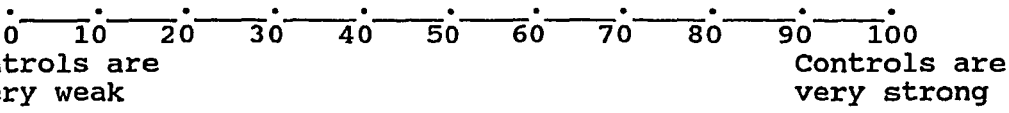
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



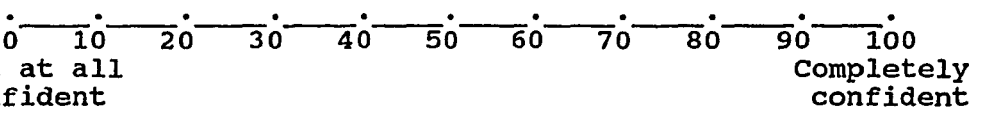
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[There is no independent verification that unit prices on the sales order are as authorized.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



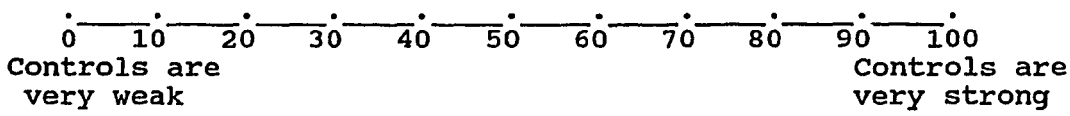
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



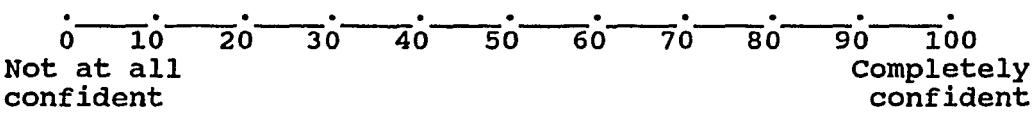
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The firm does not have an internal audit department.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



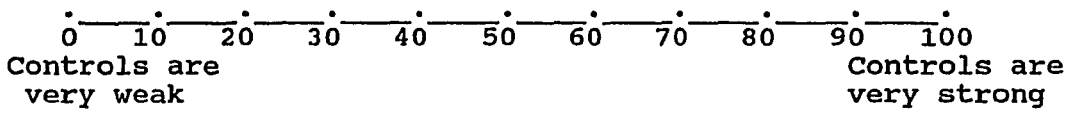
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



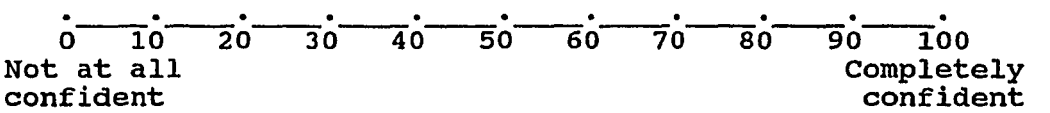
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[There is no independent verification by Shipping that an order has been approved. The approved copy of the sales order is filed in the Accounts Receivable unmatched order file. Shipping's copy of the sales order bears no indication of its approval.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



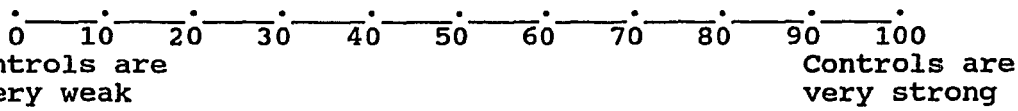
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



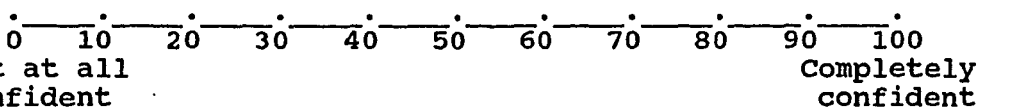
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[When merchandise is returned by a customer, shipping clerks fill out a receiving form and forward it to Accounts Receivable. Accounts receivable clerks fill out a credit memo and post the credit to the customer's account. There are no procedures for appropriate authorization of credit memos.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



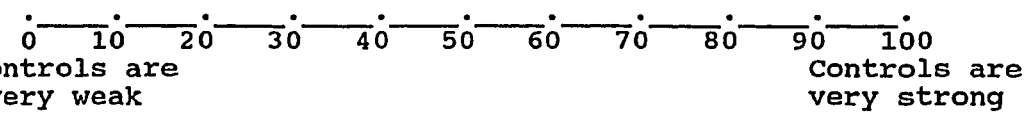
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



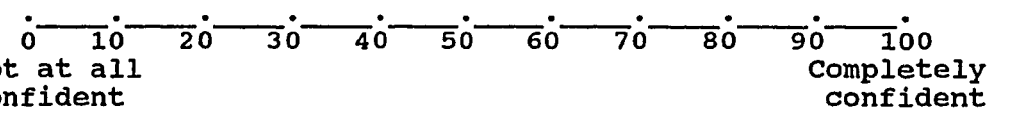
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[When new employees are hired by the firm, no inquiry is made into their backgrounds and references are not checked.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[There are no procedures to account for the numerical sequence of sales orders and shipping documents. In addition, there are no procedures for investigating the status of sales orders in the Accounts Receivable unmatched order file.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.

```
0   10   20   30   40   50   60   70   80   90   100
Controls are                                  Controls are
very weak                                     very strong
```

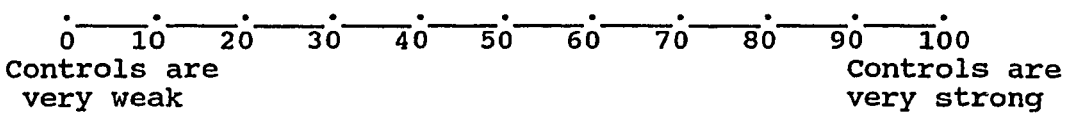
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.

```
0   10   20   30   40   50   60   70   80   90   100
Not at all                                    Completely
confident                                     confident
```

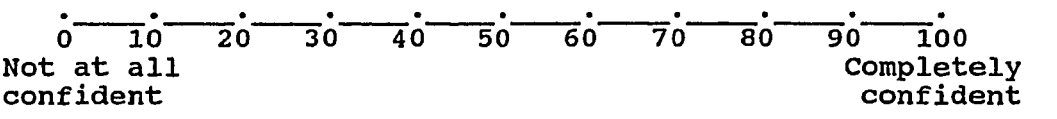
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[There is no independent verification that the products and quantities on the sales order match those on the customer's order form.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



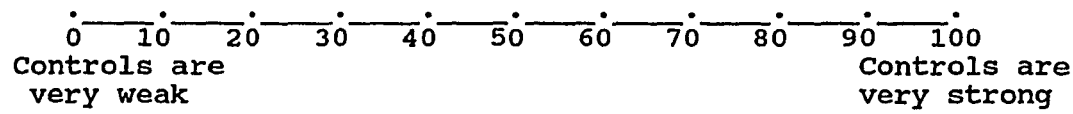
What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



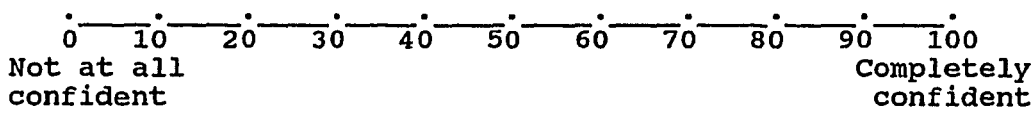
Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

[The firm does not maintain any personnel policies and procedures manuals.]

Based on your analysis of the additional information presented above (with respect to the existence or occurrence, completeness, and valuation assertions), now what do you believe is the likelihood that the client's internal control structure for the sales and collections cycle **will prevent or detect and correct material misstatement**? Indicate your assessment by marking an "X" at the appropriate point on the 100-point scale below.



What is your degree of confidence, or uncertainty, about this assessment? Indicate your response by marking an "X" at the appropriate point on the 100-point scale below.



Do not proceed further until you have completed this page. Once you have recorded your responses, do not refer back to this page or alter the above responses.

THIS CONCLUDES BOOKLET II.

PLEASE PROCEED TO BOOKLET III.

PLEASE DO NOT REFER BACK TO BOOKLET II

FOR ANY REASON.

A CASE STUDY OF AUDITORS' INTERNAL CONTROL JUDGMENTS

BOOKLET III

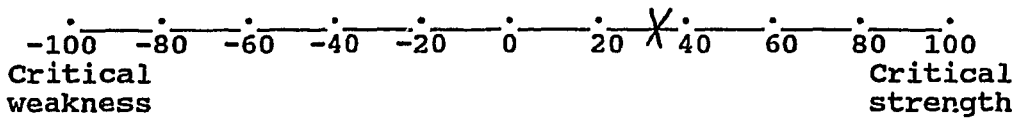
DO NOT OPEN THIS BOOKLET

UNTIL YOU HAVE COMPLETED BOOKLET II.

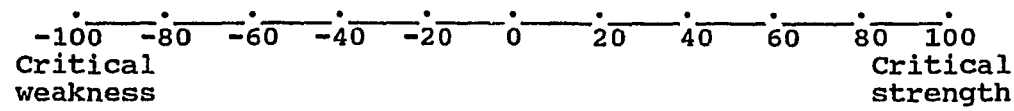
In Booklet II, you were provided with additional information which described specific attributes of the client's internal control structure. On the following pages, you are asked to rate the strength of each of these attributes individually. In other words, you should consider each attribute independently, without regard to any other information.

Your rating for each attribute is to be made on a scale of -100 to +100. A positive rating would indicate that the information conveys a strength of the client's internal control structure with higher numbers corresponding to increased importance. A negative rating would indicate that the information conveys a weakness of the client's internal control structure with lower numbers (i.e. higher negative numbers) corresponding to more critical weaknesses. A rating of zero would indicate that the attribute is irrelevant.

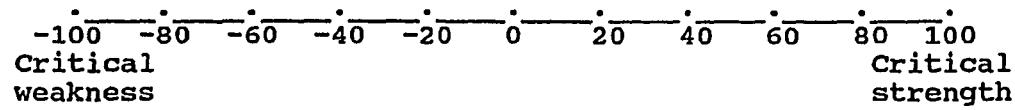
Please consider each piece of information individually and record your responses by marking an "X" at the appropriate place on the response lines provided (as illustrated below).



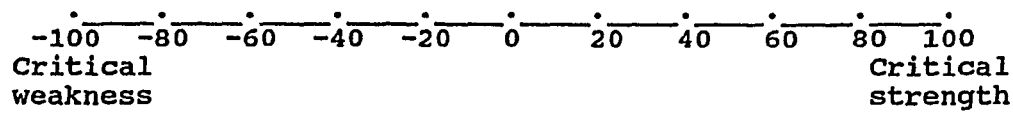
[There is no independent verification that unit prices on the sales order are as authorized.]



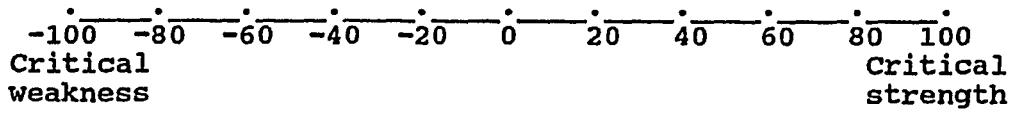
[On a monthly basis, the controller's office investigates unpaid invoices which are more than thirty days overdue. When it is determined that an account is uncollectible, an uncollectible account authorization form is filled out and approved by the controller.]



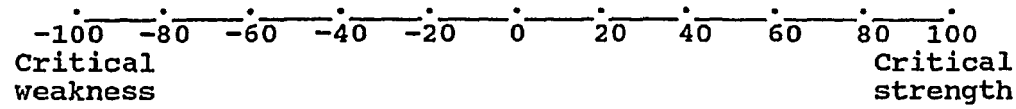
[The three department managers are solely responsible for supervising their respective departments. Consequently, the employee to manager ratio is quite high, particularly in the accounting department.]



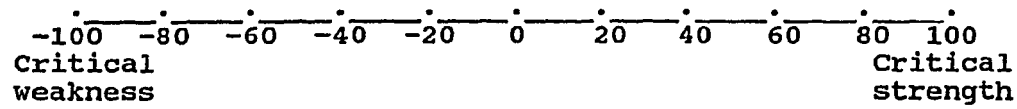
[There is no independent verification that the products and quantities on the sales order match those on the customer's order form.]



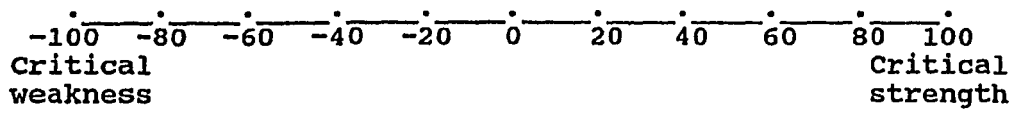
[Before a sales order is approved, Credit conducts an investigation into the customer's credit history. In addition, they check to see that the new order is within the customer's allowable credit limit. If the results of this investigation are satisfactory, the controller approves the sale by initialling the top copy of the sales order.]



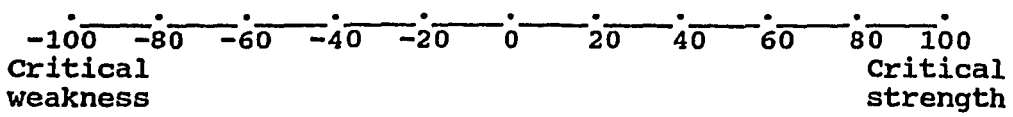
[The computer software was installed and is maintained by an independent software support firm specializing in accounting applications. Employees of Home Electronics Distributors, Inc. responsible for data input have no access to system programs and documentation.]



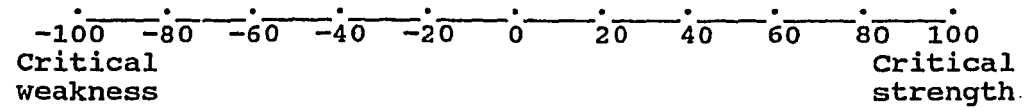
[There are no procedures to account for the numerical sequence of sales orders and shipping documents. In addition, there are no procedures for investigating the status of sales orders in the Accounts Receivable unmatched order file.]



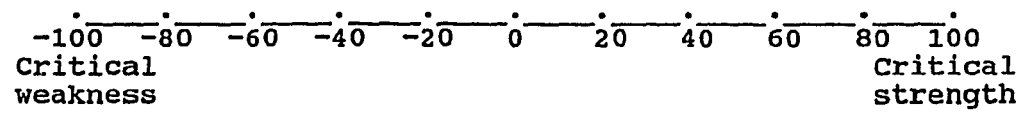
[The firm does not maintain any personnel policies and procedures manuals.]



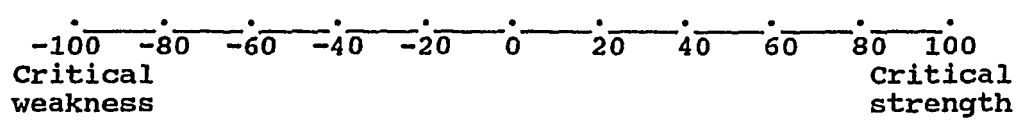
[Shipping documents for orders shipped are forwarded to Accounts Receivable promptly to ensure that the transaction is recorded on the day the order is shipped.]



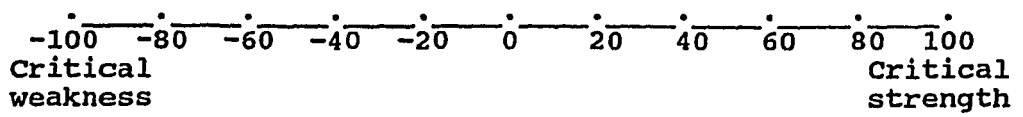
[When merchandise is returned by a customer, shipping clerks fill out a receiving form and forward it to Accounts Receivable. Accounts receivable clerks fill out a credit memo and post the credit to the customer's account. There are no procedures for appropriate authorization of credit memos.]



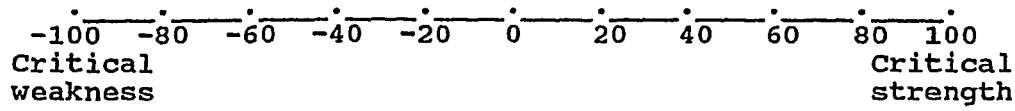
[The firm maintains the practice of rotating the duties of accounting personnel at appropriate intervals in order to minimize the potential for collusion and to prevent employee burnout. Cross-training also provides protection when illness or turnover occurs.]



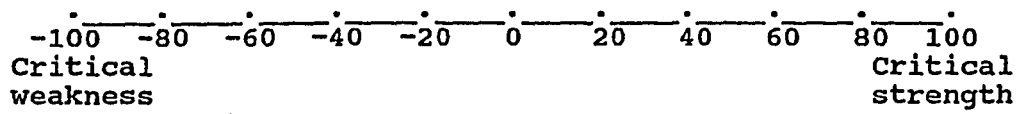
[Prior to invoicing the customer for an order, accounts receivable clerks verify that the products and quantities on the sales order match those on the shipping document.]



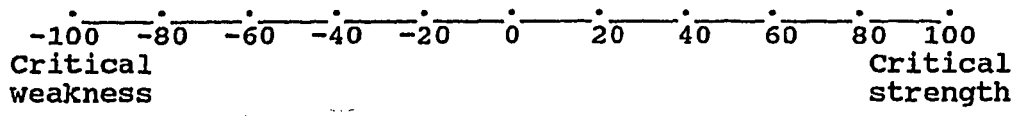
[When new employees are hired by the firm, no inquiry is made into their backgrounds and references are not checked.]



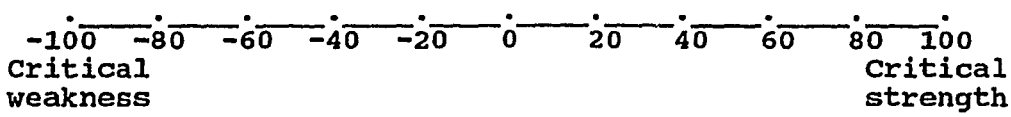
[Accounts Receivable does not send out monthly statements to customers.]



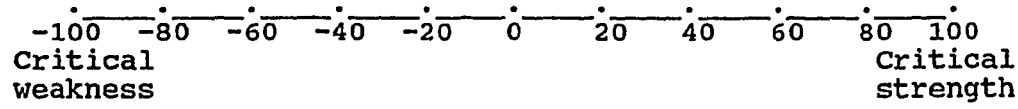
[On a weekly basis, the treasurer's office compares a list of the payments posted by Accounts Receivable to their listing of checks received to ensure that payments were posted to the correct accounts.]



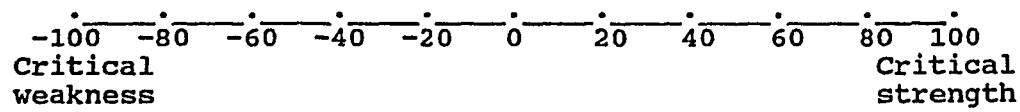
[Accounts receivable clerks monitor the numerical sequence of invoices on a monthly basis to ensure that all are accounted for.]



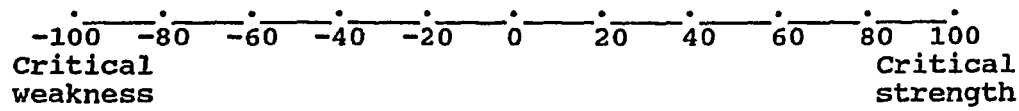
[The firm does not have an internal audit department.]



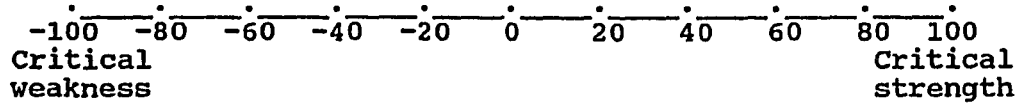
[The employee turnover for each of the firm's three departments is quite low.]



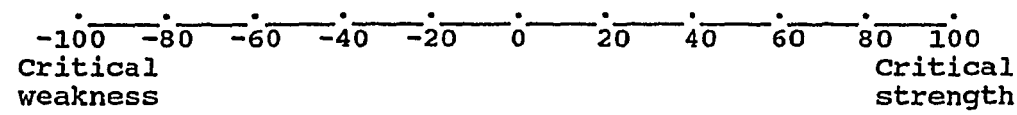
[There is no independent verification by Shipping that an order has been approved. The approved copy of the sales order is filed in the Accounts Receivable unmatched order file. Shipping's copy of the sales order bears no indication of its approval.]



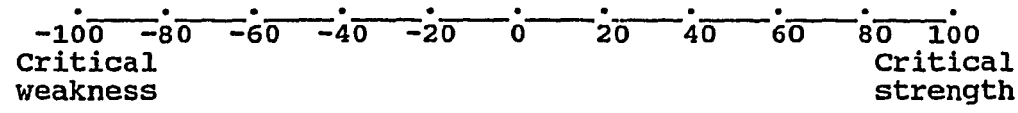
[When customers are invoiced for orders, the supporting documents are not stamped or marked in any way that would prevent re-use or double entry.]



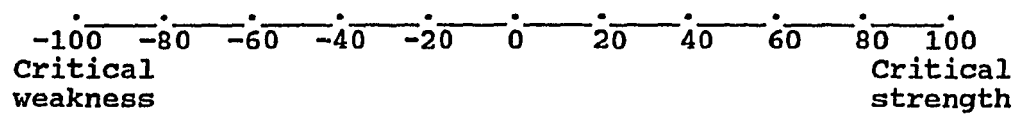
[When new employees are hired, they undergo a two-week training period during which they are paired with experienced employees who instruct them in their duties and provide continuous supervision.]



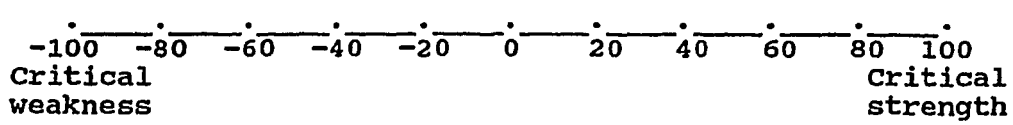
[A large audit adjustment was required on last year's audit which affected accounts in the sales and collections cycle.]



[Computer access to the firm's sales, shipping, and accounting functions is password restricted. Sales and shipping personnel have no access to the firm's accounting records. Accounting personnel have read-only access to sales and shipping department records.]



[Prior to shipment of an order, the shipping and purchasing manager verifies that the products assembled on the wooden pallet match the information on the shipping document. After verification, the shipping and purchasing manager initials each copy of the shipping document.]



In this final section, you are asked to answer a few brief questions regarding your auditing background and education. Please provide your answers in the spaces provided. (NOTE: All responses will be held in strict confidence. They will be used to analyze the implications of background and experience on the experimental results.)

1. Name of firm _____

2. City in which your office is located _____

3. What is your level of responsibility in the firm (partner, manager, senior, etc.) _____

4. Approximately how many months of auditing experience do you have? _____ months

5. On approximately how many audits have you worked? (Note: If you have worked on the audit of the same company for, say, three years, then count this as three audits, not just one.) _____ audits

6. In how many of the above audits was your participation in internal control work significant? _____ audits

7. For those audits in which you participated in internal control work, in how many did this participation include:

   *Documenting the client's internal control structure (preparing flowcharts, internal control questionnaires, etc.) _____ audits

   *Performing tests of controls _____ audits

   *Assessing control risk _____ audits

   *Planning and/or reviewing the work of others _____ audits

8. Has a significant portion of your audit experience involved clients in a specific industry or industries?
   If so, what industries? _____

9. Please check the appropriate answer (only one).

*I took no statistics course in college. _____

*I took one statistics course in college. _____

*I took two statistics courses in college. _____

*I took three or more statistics courses in college. _____

10. Please check the appropriate answer (only one).

*Excluding college, I have taken no statistics courses as part of my training as an auditor. _____

*Excluding college, I have taken one statistics course as part of my training as an auditor. _____

*Excluding college, I have taken two statistics courses as part of my training as an auditor. _____

*Excluding college, I have taken three or more statistics courses as part of my training as an auditor. _____

11. For your answer to Question #10 above, please indicate the approximate number of hours spent on training in statistics. _____

THIS CONCLUDES THE QUESTIONNAIRE.

THANK YOU FOR YOUR PARTICIPATION AND COOPERATION.

REFERENCES

Allen, V.L., and R.S. Feldman. 1974. Tutor attributions and attitudes as a function of tutee performance. *Journal of Applied Social Psychology* 4: 311-20.

Anderson, N.H. 1964. Test of a model for number-averaging behavior. *Psychonomic Science* 1: 191-2.

_____. 1965. Primacy effects in personality impression formation using a generalized order effect paradigm. *Journal of Personality and Social Psychology* 2: 1-9.

_____. 1968. Application of a linear-serial model to a personality-impression task using serial presentation. *Journal of Personality and Social Psychology* 10: 354-62.

_____. 1973. Serial position curves in impression formation. *Journal of Experimental Psychology* 97: 8-12.

_____. 1981. *Foundations of Information Integration Theory*. New York: Academic Press.

_____, and A.A. Barrios. 1961. Primacy effects in personality impression formation. *Journal of Abnormal and Social Psychology* 63: 346-50.

_____, and S. Hubert. 1963. Effects of concomitant verbal recall on order effects in personality impression formation. *Journal of Verbal Learning and Verbal Behavior* 2: 379-91.

_____, M. Lepper, and L. Ross. 1980. Perseverance of social theories: The role of explanation in the persistence of discredited information. *Journal of Personality and Social Psychology* 39: 1037-49.

_____, and A. Norman. 1964. Order effects in impression formation in four classes of stimuli. *Journal of Abnormal and Social Psychology* 69: 467-71.

Arkes, H.R., C. Christensen, C. Lai, and C. Blumer. 1987. Two methods of reducing overconfidence. *Organizational Behavior and Human Decision Processes* 39: 133-44.

Asare, S.K. 1992. The auditor's going-concern decision: Interaction of task variables and the sequential processing of evidence. *The Accounting Review* 67 (April): 379-93.

_____, and W.F. Messier, Jr. 1992. A review of audit research using the belief-adjustment model. In L.A. Ponemon and D.R.L. Gabhart (Eds.), *Auditing: Advances in Behavioral Research*: Springer-Verlag.

Asch, S. 1946. Forming impressions of personality. *Journal of Abnormal and Social Psychology* 41: 258-90.

Ashton, A.H., and R.H. Ashton. 1988. Sequential belief revision in auditing. *The Accounting Review* 63 (October): 623-41.

Ashton, R.H. 1983. *Research in Audit Decision Making: Rationale, Evidence, and Implications*. Research Monograph Number 6. The Canadian Certified General Accountants' Research Foundation.

_____, and A.H. Ashton. 1990. Evidence-responsiveness in professional judgment: Effects of positive versus negative evidence and presentation mode. *Organizational Behavior and Human Decision Processes* 46: 1-19.

Bamber, E.M., R.M. Tubbs, G. Gaeth, and R.J. Ramsey. 1992. An examination of professional skepticism and alternative attitudes to evidence in auditing. Working Paper. University of Georgia, Athens, GA.

Bar-Hillel, M. 1982. Ideal evidence, relevance and second-order probabilities. *Erkenntnis* 17: 273-90.

Becker, S.W., and F.O. Brownson. 1964. What price ambiguity? Or the role of ambiguity in decision making. *Journal of Political Economy* 72 (February): 62-73.

Benassi, M. 1982. Effects of order presentation, primacy, and physical attractiveness on attributions of ability. *Journal of Personality and Social Psychology* 43: 48-58.

Block, R.A., and D.R. Harper. 1991. Overconfidence in estimation: Testing the anchoring-and-adjustment hypothesis. *Organizational Behavior and Human Decision Processes* 49: 188-207.

Bonner, S.E. 1990. Experience effects in auditing: The role of task-specific knowledge. *The Accounting Review* 65 (January): 72-92.

Bossart, P., and F.J. DiVesta. 1966. Effects of context, frequency, and order of presentation of evaluative assertions on impression formation. *Journal of Personality and Social Psychology* 4: 538-44.

Butt, J.L., and T.L. Campbell. 1989. The effects of information order and hypothesis-testing strategies on auditors' judgments. *Accounting, Organizations and Society* 14 (5/6): 471-9.

Chalmers, D.K. 1971. Repetition and order effects in attitude formation. *Journal of Personality and Social Psychology* 17: 219-28.

Choo, F., and K.T. Trotman. 1991. The relationship between knowledge structure and judgments for experienced and inexperienced auditors. *The Accounting Review* 66 (July): 464-85.

Church, B.K. 1990. Auditors' use of confirmatory processes. *Journal of Accounting Literature* 9: 81-112.

Curley, S.P., J.F. Yates, and R.A. Abrams. 1986. Psychological sources of ambiguity avoidance. *Organizational Behavior and Human Decision Processes* 38: 230-56.

_____, M.J. Young, M.J. Kingry, and J.F. Yates. 1988. Primacy effects in clinical judgments of contingency. *Medical Decision Making* 8: 216-22.

Cushing, B.E., and J.K. Loebbecke. 1986. *Comparison of Audit Methodologies of Large Accounting Firms.* American Accounting Association.

Dale, H.C.A. 1968. Weighing evidence: An attempt to assess the efficiency of the human operator. *Ergonomics* 11: 215-30.

Dillard, J.F., H.L. Kauffman, and E.E. Spires. 1991. Evidence order and belief revision in management accounting decisions. *Accounting, Organizations and Society* 16 (7): 619-33.

Dreben, E.K., S.T. Fiske, and R. Hastie. 1979. The independence of evaluative and item information: Impression and recall order effects in behavior-based impression formation. *Journal of Personality and Social Psychology* 37: 1758-68.

Ellsberg, D. 1961. Risk, ambiguity and the Savage axioms. *Quarterly Journal of Economics* 75: 643-69.

Einhorn, H.J., and R.M. Hogarth. 1978. Confidence in judgment: Persistence of the illusion of validity. *Psychological Review* 85 (5): 395-416.

_____. 1985a. A contrast/surprise model for updating beliefs. Working Paper, University of Chicago, Chicago, IL.

_____. 1985b. Ambiguity and uncertainty in probabilistic inference. *Psychological Review* 92 (October): 433-61.

_____. 1987. Adaption and inertia in belief updating: The contrast/inertia model. Working Paper, University of Chicago, Chicago, IL.

Feldman, R.S., and A.G. Bernstein. 1977. Degree and sequence of success as determinants of self-attribution of ability. *The Journal of Social Psychology* 102: 223-31.

_____. 1978. Primacy effects in self-attribution of ability. *Journal of Personality* 46: 732-42.

Felix, W.L., Jr., and W.R. Kinney, Jr. 1982. Research in the auditor's opinion formulation process: State of the art. *The Accounting Review* 57 (April): 245-71.

Frisch, D. and J. Baron. 1988. Ambiguity and rationality. *Journal of Behavioral Decision Making* 1: 149-57.

Gardenfors, P., and N.E. Sahlin. 1982. Unreliable probabilities, risk taking, and decision making. *Synthese* 53: 361-86.

_____. 1983. Decision making with unreliable probabilities. *British Journal of Mathematical and Statistical Psychology* 36: 240-51.

Gibbins, M. 1984. Propositions about the psychology of professional judgment in public accounting. *Journal of Accounting Research* 22 (Spring): 103-25.

Goldsmith. R.W., and N.E. Sahlin. 1982. The role of second-order probabilities in decision making. In P. Humphreys, O. Svenson, and A. Vari (Eds.), *Analyzing and Aiding Decision Processes*. Amsterdam, Holland: North Holland.

Hamilton, D.L., and M.P. Zanna. 1974. Context effects in impression formation: Changes in connotative meaning. *Journal of Personality and Social Psychology* 29: 649-54.

Hamilton, R.E. and W.F. Wright. 1982. Internal control judgments and effects of experience: Replications and extensions. *Journal of Accounting Research* (Autumn, Part II): 756-65.

Hendrick, C., and A.F. Constantini. 1970. Effects of varying trait inconsistency and response requirements on the primacy effect in impression formation. *Journal of Personality and Social Psychology* 15: 158-64.

_____, A.F. Constantini, J. McGarry, and K. McBride. 1973. Attention decrement, temporal variation, and the primacy effect in impression formation. *Memory and Cognition* 1: 193-5.

Higgins, E.T., and W.S. Rholes. 1976. Impression formation and role fulfillment: A "holistic reference" approach. *Journal of Experimental Social Psychology* 12: 422-35.

Hogarth, R.M., and H.J. Einhorn. 1992. Order effects in belief updating: The belief-adjustment model. *Cognitive Psychology* 24: 1-55.

Jones, E.E., L. Rock, K.G. Shaver, G.R. Goethals, and L.M. Ward. 1968. Pattern of performance and ability attribution: An unexpected primacy effect. *Journal of Personality and Social Psychology* 10: 317-40.

Kahneman, D., and A. Tversky. 1973. On the psychology of prediction. *Psychological Review* 80: 251-73.

Keren, G. 1991. Calibration and probability judgments: Conceptual and methodological issues. *Acta Psychologica* 77: 217-73.

Kida, T. 1984. The impact of hypothesis-testing strategies on auditors' use of judgment data. *Journal of Accounting Research* 22 (Spring): 332-40.

Koonce, L. 1992. Explanation and counterexplanation during audit analytical review. *The Accounting Review* 67 (January): 59-76.

Levin, I.P. 1976. Processing of deviant information in inference and descriptive tasks with simultaneous and serial presentation. *Organizational Behavior and Human Performance* 15: 195-211.

_____, and C.F. Schmidt. 1969. Sequential effects in impression formation with binary intermittent responding. *Journal of Experimental Psychology* 79: 283-7.

_____. 1970. Differential influence of information in an impression-formation task with binary intermittent responding. *Journal of Experimental Psychology* 84: 374-6.

Lichtenstein, S., and B. Fischhoff. 1977. Do those who know more also know more about how much they know? *Organizational Behavior and Human Performance* 20: 159-83.

_____, B. Fischhoff, and L.D. Phillips. 1982. Calibration of probabilities: The state of the art to 1980. In D. Kahneman, P. Slovic, and A. Tversky (Eds.), *Judgment Under Uncertainty: Heuristics and Biases*. New York: Cambridge University Press.

Lord, C., L. Ross, and M. Lepper. 1979. Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology* (November): 2098-109.

Luchins, A.S. 1957a. Primacy-recency in impression formation. In C.I. Hovland (Ed.), *The Order of Presentation in Persuasion*. New Haven: Yale University Press.

_____. 1957b. Experimental attempts to minimize the impact of first impressions. In C.I. Hovland (Ed.), *The Order of Presentation in Persuasion*. New Haven: Yale University Press.

_____. 1958. Definitiveness of impression and primacy-recency in communications. *The Journal of Social Psychology* 48: 275-90.

_____, and E.H. Luchins. 1970. The effects of order of presentation of information and explanatory models. *The Journal of Social Psychology* 80: 63-70.

_____. 1984. Conceptions of personality and order effects in forming impressions. *The Journal of General Psychology* 110: 165-96.

McAndrew, F.T. 1981. Pattern of performance and attributions of ability and gender. *Personality and Social Psychology Bulletin* 7: 583-7.

Messier, W.F., Jr. 1992. The Sequencing of audit evidence: Its impact on the extent of audit testing and report formulation. *Accounting and Business Research* 22 (86): 143-50.

_____, and R.M. Tubbs. 1992. Mitigating recency effects in belief revision: The impact of experience and review. Working Paper, University of Florida, Gainesville, FL.

Morton, J.E., and W.L. Felix. 1990. Assessing control risk: Effects of procedural differences on auditor consensus. In R.P. Srivastava (Ed.), *Auditing Symposium X*. Lawrence, Kansas: University of Kansas.

_____. 1991. A critique of Statement on Auditing Standards No. 55. *Accounting Horizons* 5 (March): 1-10.

Newtson, D., and R.J. Rindner. 1979. Variation in behavior perception and ability attribution. *Journal of Personality and Social Psychology* 37: 1847-58.

Nisbett, R., and L. Ross. 1980. *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, N.J.: Prentice-Hall.

Oskamp, S. 1965. Overconfidence in case-study judgments. *Journal of Consulting Psychology* 29: 261-5.

Paese, P.W., and J.A. Sniezek. 1991. Influences on the appropriateness of confidence in judgment: Practice, effort, information, and decision-making. *Organizational Behavior and Human Decision Processes* 48: 100-30.

Pei, B.K.W., S.A. Reed, and B.S. Koch. 1992. Auditor belief revisions in a performance auditing setting: An application of the belief-adjustment model. *Accounting, Organizations and Society* 17 (2): 169-83.

Pennington, N., and R. Hastie. 1986. Evidence evaluation in complex decision making. *Journal of Personality and Social Psychology* 51 (2): 242-58.

_____. 1992. Explaining the evidence: Tests of the story model for juror decision making. *Journal of Personality and Social Psychology* 62 (2): 189-206.

Pitz, G.F. and H. Reinhold. 1968. Payoff effects in sequential decision-making. *Journal of Experimental Psychology* 77: 249-57.

Pratz, O. 1987. Computer presentation of pattern-of-success: A primacy effect verified. *Perceptual and Motor Skills* 65: 379-87.

Ricchiute, D.N. 1992. Working-paper order effects and auditors' going-concern decisions. *The Accounting Review* 67 (January): 46-58.

Roby, T.B. 1967. Belief states and sequential evidence. *Journal of Experimental Psychology* 75: 236-45.

Rokeach, M., and G. Rothman. 1965. The principle of belief congruence and the congruity principle as models of cognitive interaction. *Psychological Review* 72: 128-42.

Ross, L., and M.R. Lepper. 1980. The perseverance of beliefs: Empirical and normative considerations. In R.A. Shweder (Ed.), *New Directions for Methodology of Behavioral Sciences: Fallible Judgment in Behavioral Research*. San Francisco: Jossey-Bass.

_____, F. Strack, and J.L. Steinmetz. 1977. Social explanation and social expectation: The effects of real and hypothetical explanations upon subjective likelihood. *Journal of Personality and Social Psychology* 35: 817-29.

Selling, T.I. 1993. Confidence and information usage: Evidence from a bankruptcy prediction task. *Behavioral Research in Accounting* 5: 237-64.

Shanteau, J.C. 1970. An additive model for sequential decision making. *Journal of Experimental Psychology* 85: 181-91.

_____. 1972. Descriptive versus normative models of sequential inference judgment. *Journal of Experimental Psychology* 93: 63-8.

Skyrms, B. 1980. Higher order degrees of belief. In D.H. Mellor (Ed.), *Prospects for Pragmatism: Essays in Memory of F.P. Ramsey*. Cambridge, MA: Cambridge University Press: 109-37.

Solomon, I. 1982. Probability assessment by individual auditors and audit teams: An empirical investigation. *Journal of Accounting Research* (Autumn, Part II): 689-710.

Stewart, R.H. 1965. Effect of continuous responding on the order effect in personality impression formation. *Journal of Personality and Social Psychology* 1: 161-5.

Tesser, A. 1968. Differential weighting and directed meaning as explanations of primacy in impression formation. *Psychonomic Science* 11: 299-300.

Tomassini, L.A., I. Solomon, M.B. Romney, and J.L. Krogstad. 1982. Calibration of auditors' probabilistic judgments: Some empirical evidence. *Organizational Behavior and Human Performance* (December): 391-406.

Tubbs, R.M. 1992. The effect of experience on the auditor's organization and amount of knowledge. *The Accounting Review* 67 (October): 783-801.

_____, W.F. Messier, Jr., and W.R. Knechel. 1990. Recency effects in the auditor's belief-revision process. *The Accounting Review* 65 (April): 452-60.

Waller, W.S. 1993. Auditors' risk assessments: Effects of experience-based knowledge on second-order uncertainty. Working Paper, University of Arizona, Tucson, AZ.

_____, and W.L. Felix. 1984. Cognition and the auditor's opinion formulation process: A schematic model of interactions between memory and current audit evidence. In S. Moriarity and E. Joyce (Eds.), *Decision Making and Accounting: Current Research*. Norman, OK: University of Oklahoma.

Wyer, R.S., Jr., and S.F. Watson. 1969. Context effects in impression formation. *Journal of Personality and Social Psychology* 12: 22-33.

Yates, J.F., and S.P. Curley. 1986. Contingency judgment: Primacy effects and attention decrement. *Acta Psychologica* 62: 293-302.

_____, and L.G. Zukowski. 1976. Characterization of ambiguity in decision making. *Behavioral Science* 21: 19-25.