INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI
University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313-761-4700  800-521-0600
Computer-assisted decision aids in difficult decision environments: Factors which enhance the probability of decision errors and decision error impact on subjective evaluations of the decision aid

Olson, Erik Lee, Ph.D.

Case Western Reserve University, 1992

Copyright ©1992 by Olson, Erik Lee. All rights reserved.
COMPUTER ASSISTED DECISION AIDS IN DIFFICULT DECISION ENVIRONMENTS: FACTORS WHICH ENHANCE THE PROBABILITY OF DECISION ERRORS AND DECISION ERROR IMPACT ON SUBJECTIVE EVALUATIONS OF THE DECISION AID

by

ERIK LEE OLSON

Submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Thesis Advisor: Robert E. Widing II

Department of Marketing and Policy Studies
CASE WESTERN RESERVE UNIVERSITY
August 1992
CASE WESTERN RESERVE UNIVERSITY
GRADUATE STUDIES

We hereby approve the thesis of

Erik Lee Olson

candidate for the Ph.D.

degree.*

Signed: Robert E. Willing II
(Chairman)

[Signatures]

John Wilson

Date 6/29/92

*We also certify that written approval has
been obtained for any proprietary material
contained therein.
I grant to Case Western Reserve University the right to use this work, irrespective of any copyright, for the University's own purposes without cost to the University or to its students, agents and employees. I further agree that the University may reproduce and provide single copies of the work, in any format other than in or from microforms, to the public for the cost of reproduction.

[Signature]

[Name]
Emerging electronic information systems provide the infrastructure for buyers to readily acquire and analyze product information using Computer Assisted Decision Aids (CADA's). The goal of the present research was to study CADA format performances in environments of varying difficulty. This study examined the performance of three different formats; the interactive compensatory weighted average Computer Assisted Linear (CAL), the interactive non-compensatory Computer Assisted Cutoff (CAC), and the non-interactive Equal Weight Rank Order (EWRO).

This research was designed to make three primary contributions. First, it sought to more completely define, relative to past research, what constitutes a "difficult decision environment." Unlike previous research, where negative attribute correlations alone had been used to define a difficult environment, it was
expected that a second factor, the magnitude of the tradeoff between the negatively correlated attributes (not the strength of the correlation alone), would moderate CADA performance. Results supported the new definition, yet strong negative attribute correlations alone, which had not been expected to create a difficult decision environment, were found to create a moderately difficult environment as well.

The second contribution of this research built on the first by seeking to identify which CADA format offered the highest level of decision quality with both "more" and "less" difficult decision environments. The CAL and EWRO formats were expected to, but did not actually provide superior decision quality compared to the CAC format in the "more" difficult decision environment. No between format decision quality differences were expected or found when the environment was "less" difficult.

Finally, this research sought to contribute to an area not explored by previous CADA research, which was the subjective evaluation of a CADA, assessed after decision quality feedback has been given to the CADA user. As expected the CAL format was more favorably evaluated than the other formats, particularly after negative decision quality feedback was received. The CAC
and EWRO formats were similarly evaluated under all feedback conditions. The accomplishment of this final task also required the development of scale items to measure subjective evaluations of the aid. These items displayed outstanding measurement characteristics, making them appropriate for future decision aid research.
ACKNOWLEDGEMENTS

I would like to thank my committee members, Robert Widing, Jan Heide, Richard Boland, John Wilson and W. Wayne Talarzyk, for the many comments and suggestions which proved to be extremely helpful in completing this dissertation. Special mention and thanks goes to W. Wayne Talarzyk for his help in providing the resources which allowed the data to be collected.

In particular I would like to acknowledge the guidance and assistance provided by my chairman, Robert Widing. My interest in the area, and the development of the research topic were both the result of his allowing me to work closely with him on other projects. The trials and tribulations I experienced conceiving, analyzing and writing this dissertation, were always made bearable by his encouragement and direction.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I.</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Importance of the Area</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>II.</td>
<td>LITERATURE REVIEW</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section I: Decision Quality, The Decision Environment and CADA Formats</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Difficult Decision Environments and CADA Formats</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer Assisted Cutoff Format and the Decision Environment</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer Assisted Linear Format and the Decision Environment</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equal Weight Order Format and the Decision Environment</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section II: User Evaluations of CADAs</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceptions of Difficulty and Effort</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceptions of Decision Accuracy</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>III.</td>
<td>HYPOTHESES AND RESEARCH ISSUES</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decision Environment and Decision Quality Hypotheses</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CADA Evaluation Hypotheses</td>
<td>39</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. METHODOLOGY</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiment Overview</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject Selection and</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Background</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formats</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Sets</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Session</td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measures of Training</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choice Task</td>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent Variable: Measure</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of Decision Quality and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative Measures of</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent Variable: Format</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective Evaluation Item</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. PART I: DECISION QUALITY</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESULTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Set Attractiveness</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipulation (H1 to H3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Switching Variable</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative Measures of</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Format Differences</td>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(H4 to H9)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Format Subject Background and Training Similarities</td>
<td>143</td>
</tr>
<tr>
<td>2 Decision Environment Manipulation Effects</td>
<td>144</td>
</tr>
<tr>
<td>3 CAL vs. CAC Formats (Decision Quality)</td>
<td>145</td>
</tr>
<tr>
<td>4 CAL vs. EWRO Formats (Decision Quality)</td>
<td>146</td>
</tr>
<tr>
<td>5 CAC vs. EWRO Formats (Decision Quality)</td>
<td>147</td>
</tr>
<tr>
<td>6 Decision Quality Interaction with Training and Background</td>
<td>148</td>
</tr>
<tr>
<td>7 Weighting Differences</td>
<td>149</td>
</tr>
<tr>
<td>8 Common Factor Analysis Results</td>
<td>150</td>
</tr>
<tr>
<td>9 Confirmatory Factor Analysis Results</td>
<td>151</td>
</tr>
<tr>
<td>10 Discriminant Validity</td>
<td>152</td>
</tr>
<tr>
<td>11 Scale Reliability</td>
<td>153</td>
</tr>
<tr>
<td>12 Decision Environment Manipulation Effects</td>
<td>154</td>
</tr>
<tr>
<td>13 Decision Environment Manipulation Effects at Format Level</td>
<td>155</td>
</tr>
<tr>
<td>14 Brands Seen and Evaluated Across Attractiveness Condition</td>
<td>156</td>
</tr>
<tr>
<td>15 Decision Feedback Manipulation Effects</td>
<td>157</td>
</tr>
<tr>
<td>16 Decision Feedback Manipulation Effects at Format Level</td>
<td>158</td>
</tr>
<tr>
<td>17 Reason for Switch and Subjective Evaluation Interaction</td>
<td>159</td>
</tr>
<tr>
<td>18 CAL vs. CAC Formats (Subjective Evaluations)</td>
<td>160</td>
</tr>
<tr>
<td>19 CAL vs. EWRO Formats (Subjective Evaluations)</td>
<td>161</td>
</tr>
<tr>
<td>20 CAC vs. EWRO Formats (Subjective Evaluations)</td>
<td>162</td>
</tr>
</tbody>
</table>
Chapter I

INTRODUCTION

In 1981, Beales, Mazis, Salop and Staelin called for research on electronic information systems for consumers (EISC). Unfortunately, since that call only a limited amount of research has been conducted. Computer assisted decision aids (CADAs), offered in the larger context of EISC and the subject of this study, represent an important advance because they offer a means of providing vast sums of product information to the user, while harnessing the speed of the computer to provide an individualized analysis of it. Indeed, they promise to lessen or eliminate tradeoffs between decision quality and the costs of information search and analysis, common to unaided decision making.

CADAs could be used to access and analyze product specification data provided by manufacturers and/or government agencies, or product attribute performance ratings from testing organizations like Consumer Reports and Software Digest. The latter type of information is the subject of this research project. While information sources, such as Consumer Reports, provide brand rankings based on the rater's view of attribute importance, CADA systems are capable of customizing the analysis by using the attribute importance inputs of the individual user.
Unfortunately, these important CADA advantages in information acquisition and analysis do not come without some potential risks. Problems could arise in applied settings, such as those a buyer might face in using videotex systems, as empirical research by Widing and Talarzyk (1986, 1992) has found. Certain CADAs, under certain environmental conditions, seem to enhance the probability of making a decision error. Widing and Talarzyk (1992), for example, found that negative correlations among rated product attributes increased the number of decision errors which occurred with a cutoff based decision aid.

This dissertation studies three CADA format performances in two environments which differ in their difficulty. In doing so, this research will contribute to a more precise definition of "difficult decision environments." The two interactive formats studied include the Computer Assisted Cutoff (CAC) and Computer Assisted Linear (CAL) formats, while the non-interactive format (meaning the user cannot input information into the computer for a customized output) is the Equal Weight Rank Order (EWRO).

Issues addressed include identifying which CADA formats are most effective at providing users a satisfying information search and analysis experience,
while also enabling them to improve the quality of their purchase decisions. More specifically, the research will measure decision quality and, for the first time, the user's subjective evaluations after they have been given decision quality feedback. In summary, the key area of interest for this dissertation is the interaction of CADA format with the decision environment in which it is used, from both decision quality outcome and subjective perspectives.

Importance of the Area

While a description of this study's immediate goals are expressed in the previous paragraphs, the results should also be relevant to the study of decision making processes and decision aids in non-computerized contexts. More fully defining what constitutes a difficult decision environment, as well as the impact that environment has on subjective evaluations of an aid, should be useful for information and decision aid providers and public policy makers. The over-riding importance of this research area is centered on getting people to make better decisions by using the information already available on many products and services. More specifically, CADAs which were available on electronic information systems in libraries, retail outlets, work places and homes, could significantly improve the efficiency of the marketplace
by improving the quality of purchase decisions (Widing and Talarzyk 1989). This desirable situation may not be far away, as currently available videotex systems such as Prodigy, do have some CADA capabilities and are growing in popularity (Widing and Talarzyk 1989). The promise and growth of these systems makes research about the potentially troublesome aspects of the systems, as well as effective strategies for dealing with them, an increasingly important topic.

In many product categories there can be hundreds of potential alternatives from which to choose (Widing and Talarzyk 1989). With such a large number of alternatives, the uninformed consumer has a good chance of overlooking a more preferred alternative in the search process. This problem is compounded by a growing body of literature which finds that few consumers actually spend much time collecting and analyzing available product information. This has resulted in billions of dollars of misallocated spending every year by consumers who purchase inefficient brands, which are defined as being lower in quality/performance and higher priced than overlooked competing brands (Ratchford and Gupta 1987; Sproles 1986; Widing and Talarzyk 1989).

Research on brand offerings has found that over 50% of the brands in 100 product categories were inefficient
(Hjorth-Anderson 1984), and that the correlation between quality and price is low (Sproles 1977; Riesz 1978; Dardis and Geiser 1980; Geistfeld 1982; Curry and Riesz 1988). Unfortunately, these under-informed consumers also levy a burden on firms doing a superior job in designing and producing their products, as they can be under-rewarded by a less than efficient marketplace.

CADAs could offer a means of reducing this information collection and analysis problem by reducing the time and effort investment required to be an informed consumer, while also increasing decision quality. To help marketplace enforcers (i.e., informed consumers), however, CADA systems will need to improve decision quality in a variety of decision environments, while also being liked and consequently used by buyers (Russo, Staelin, Nolan, Russell and Metcalf 1986; LaBarbera and Mazursky 1983; Pitz and Sachs 1984). The hope for this study is that its results will contribute to the knowledge base that may enable this desirable outcome to occur.

The following chapter reviews the literature related to the goals of this research. Specifically, it will highlight reasons why current consumer behavior is seemingly less than rational, provide definitions and evidence of more difficult decision environments, and
identify CADA format alternatives and their performance in different environments. It will also review the literature pertaining to how CADAs have been evaluated in the past, both objectively and subjectively.
Chapter II

LITERATURE REVIEW

SECTION I: DECISION QUALITY, THE DECISION ENVIRONMENT AND CADA FORMATS

There are two aspects to decision making in which CADAs can have an impact, including information acquisition and information analysis. In the absence of CADAs, more information by itself will not necessarily improve the purchase decisions of consumers. Past research suggests only a limited number of consumers actually make the effort to carefully collect the often vast amount of information available, carefully analyze that information, and select the best option based on their individual utility function (Claxton, Fry and Portis 1974; Green 1966; Kiel and Layton 1981; Thorelli and Engledow 1980; Newman and Staelin 1972; Westbrook and Fornell 1979; Wilding and Bauer 1968). This evidence indicates this behavior is common even when the purchase is important and/or expensive.

These findings are clearly at odds with the traditional free-market economic assumptions of efficient markets and economic man (consumer). The tenets underlying the economic perspective rest on the assumptions that the consumer has extensively gathered
all the relevant information, has the cognitive capacity to process it, and, therefore, can make a decision which offers the highest utility based on his/her predefined attribute utility functions (Grether and Wilde 1984). Under these conditions, only efficient brands could survive in the marketplace, yet many inefficient brands in many product categories continue to prosper in the marketplace (Hjorth-Andersen 1984). Stigler (1961), Shugan (1980), Payne (1982) and Simon (1955) offered explanations for this "non-rational" behavior.

Stigler (1961) and Payne (1982) noted that information acquisition was not costless. The cost associated with the time and effort needed to acquire it, had to be weighed against the lost utility costs associated with making a suboptimal decision. Information search was hypothesized to increase if the costs of search went down, or the value of search went up. Even if all relevant information was readily available, analysis of that information also had its associated costs in time and effort (Stigler 1961, Shugan 1980). Furthermore, the decision maker who was sufficiently motivated to acquire and analyze the information, may still be limited by his/her available cognitive capacity. Simon (1955) coined the term "bounded rationality" to explain both less than full
information search and less than complete information processing. He noted that there are processing and motivation limitations, and that too much information would lead to processing shortcuts, resulting in satisficing behavior.

This would to seem to support the idea of information overload. Research has provided some evidence that people can experience information overload when faced with an increasing number of brand alternatives and/or the number of product attributes (Malhotra 1982; Keller and Staelin 1989). Jacoby (1984) wrote, however, that while information overload was possible, it was unlikely that most people would allow it to occur. To prevent overload from occurring, people typically resort to non-compensatory behavior, which ignores some of the available information and does not weight the information according to its importance (Johnson and Meyer 1984; Olshavsky 1979; Payne 1976, 1982). Neither of these characteristics of non-compensatory behavior are in keeping with the normative economic man assumptions (Payne, Bettman and Johnson 1988). Should information overload or the adoption of non-compensatory decision strategies occur, the result in either case is the increased likelihood of a decision error.
Research on marketplace performance, which does show a large number of inefficient brands and less than optimal utilization of consumer spending, provides evidence that a large number of consumers are using sub-optimal decision processes. While the costs of search and analysis may make these lower utility choices the optimal ones in some situations, they also tend to be post-hoc rationalizations for poor decisions. To make the decision task less burdensome and increase the chances for high utility decision, consumer advocates have offered some solutions. The first alternative attacks the results of an under-informed consuming public, by regulating product performance and expanding product liability laws (Thorelli and Engledow 1980). Unfortunately there is evidence which suggests that public policy makers are not always sensitive to the needs and desires of the marketplace (Lovelock 1978). This can mean that consumer choice can be reduced as under-informed public policy makers pass regulations which do not discriminate between efficient and inefficient product offerings.

The other alternative, in contrast to the first, attacks the reason for, rather than the results of, marketplace inefficiency, by educating and informing the consumer. In essence, this perspective still places its
faith in the principles of the economic man. By making more information available, proponents of this option believe that the market will reward the producers of the best brands, while punishing the makers of poor ones (Thorelli and Engledow 1980). But providing more information, by itself, will not drastically improve decision making for the majority of consumers (Thorelli and Engledow 1980), unless that information is also readily processible. Seemingly, there is a tradeoff between the amount of information which can be provided and the amount of information which can or will be processed. Both must be accomplished for effective decision making to occur, yet evidence indicates that increasing one will generally decrease the likelihood of the second occurring. The solution requires finding a way to present the often vast amounts of product information that is potentially available, in a manner which makes it possible to more easily and completely analyze it.

CADAs, with their ability to both combine a computer's speed to analyze all available information, with (potentially) customized solutions based on the needs of the user, would appear to offer a solution difficult decision environments created by having too much information on too many alternatives. Indeed,
research on CADAs has shown that people have a great deal of confidence in the aid's ability to both ease the costs of making a decision and increasing the odds in favor of a good decision (Aldag and Power 1986; Bronner and deHoog 1983; Widing and Talarzyk 1992). Much of this past research has also shown that this confidence in the ability of CADA's, in their current state of development, may be misplaced under certain conditions (Widing and Talarzyk 1986, 1992; Aldag and Power 1986). While CADAs may be able to deal with difficulties associated with too much information, they can have problems with difficult decision environments of another sort, where they can create problems by enhancing the opportunity for decision errors to occur.

**Difficult Decision Environments and CADA Formats**

Difficult decision environments for CADAs have been associated with negatively correlated product attributes. These occur often in the real world (Widing, Burnkrant and Talarzyk 1986; Stillwell, Seaver and Edwards 1981). For example, automobile attributes such as miles per gallon and size or acceleration (performance) are commonly negatively correlated, meaning that tradeoffs must be made in making a purchase decision. While they can occur naturally in many decision sets, tradeoffs are always present in efficient decision sets (those without
dominated alternatives, meaning each brand in the efficient set is best or tied for best on at least one attribute), which are also the brands that should be seriously considered by any "rational" consumer.

This study will examine the interaction of three CADA formats with what is expected to be two decision environments of varying difficulty. The first format is the Computer Assisted Linear (CAL) format. As a compensatory format, in which all available information is analyzed and weighted according to its importance, the CAL format follows the decision process traditionally designated as the ideal for selecting the highest utility alternative (Johnson and Meyer 1984; Olshavsky 1979; Payne 1976, 1982).

The second format is the Equal Weight Rank Order (EWRO) format. It is identical to the CAL format with the exception that users cannot input their own attribute importance weights, but are instead forced to choose from a rank order based on equal attribute weights. Because it lacks the importance weighting feature of the CAL format, the EWRO mimics brand rankings (rater orders) found in more traditional information sources like Consumer Reports.

The final format is the Computer Assisted Cutoff (CAC) format, a non-compensatory format. The processes
embodied by the CAC format, despite their non-
compensatory nature, have been advocated by a number of
decision theorists (Huber and Klein 1990, Klein 1983,
Klein and Bither 1989). Other researchers, however, have
identified decision environments in which decision
quality suffers when analyzed in conjunction with cutoff
based aids. The following sections will review the
literature pertaining to their past performance in
negatively correlated environments.

Computer Assisted Cutoff (CAC) Format and the Decision
Environment

Economic man theory assumes a compensatory decision
process. This means that all the available information
is analyzed and weighted according to the decision
maker's importance criteria, to come up with the highest
utility alternative. These are characteristics of a
sound decision process, and hence have been advocated as
the ideal (Beach and Mitchell 1978; Edwards, Guttentag
and Snapper 1975; King and Hill 1989; Payne, Bettman and
Johnson 1988).

Non-compensatory choice processes, like the CAC,
have been criticized because they do not use all
available information and do not explicitly weight the
information according to its importance to the decision
maker. Yet, non-compensatory processes have been shown

Problems can occur with non-compensatory aids, like the CAC format, when there are attribute tradeoffs (negative correlations) which are not apparent to the user nor reflected in their cutoff values. CAC users, as utility maximizers, seek to get the brand with the best performance in the least amount of time. To accomplish this task with the CAC format, users might set all their cutoffs at fairly high levels, so that they would only need to closely evaluate the few remaining high scoring brands. This presents few problems when the attributes are non-negatively correlated with each other, because brands with high scores on one attribute, will tend not to have low scores on the other attributes. When there is a negatively correlated attribute, however, brands with high scores on the other attributes, will tend to have a lower score on the negatively correlated attribute. With the cutoff format, therefore, placing high cutoff values on the attributes can keep overall high scoring brands, including what might have been the most preferred brand, from appearing on the screen because of the relatively low score on the negatively correlated attribute (Widing, Burnkrant and Talarzyk
1986). Indeed, Widing and Talarzyk (1992), using
switching behavior as a measure of decision quality,
found that CAC subjects who switched, did so
overwhelmingly to a brand which had been screened out.

What is necessary for users, and often lacking, is
an understanding of the effect of negative correlations
and knowledge about any negatively correlated attributes,
which are actually present in the product category.
Without such understanding and knowledge, the CAC user is
essentially creating a desired list of minimum attribute
scores without explicitly addressing the tradeoffs in
choice. When given the opportunity, Klein and Yadav
(1989) found that decision makers can and do adapt to the
decision environment by altering their cutoffs to fit the
structure of the environment. This adaptation, however,
is likely to be contingent on their being made aware of
tradeoffs in the decision environment. Unfortunately,
because brands which do not meet or exceed one or more
cutoffs are "screened out" (meaning they do not show up
on the CADA screen for viewing), the CAC user can make a
decision without ever having the opportunity to adapt to
their environment. This lack of knowledge can create the
opportunity for decision errors. For example, subjects
in the Widing and Talarzyk (1992) and Green, Krieger and
Bansal (1988) studies were observed selecting or
switching to brands that did not meet or exceed their initial attribute cutoffs (meaning they selected a brand which had been screened from their view and consideration). The top-down processing of the CAC format is, therefore, problematic, as the interaction of the format with the environment containing negatively correlated attributes enhances the opportunity for screening errors (Widing and Talarzyk 1992).

This problem can be compounded by what Einhorn, Kleinmuntz and Kleinmuntz (1979) termed "vicarious functioning". This means that more important attributes are given higher cutoff values and importance weights, while less important attributes are given lower cutoff values and importance weights, simulating utility maximizing behavior. Widing, Talarzyk and Olson (1990), Klien and Bither (1987), Klein (1983) and Huber and Klein (1990) found evidence of vicarious functioning as cutoffs, which while inherently non-compensatory, were correlated to the importance weights attached to each attribute, resulting in a high quality decision when attributes were non-negatively correlated. With the CAC format, however, an important negatively correlated attribute was found to increase screening errors because few alternatives were able to exceed the high cutoff value on that attribute, while those that did tended to
have low scores on the remaining attributes (Widing, Talarzyk and Olson 1990). While cutoff values can be firm (meaning that the cutoff value is the true minimum acceptable performance or amount), this research found that when offered the opportunity to switch to an eliminated good brand, CAC users often did.

**Computer Assisted Linear (CAL) Format and the Decision Environment**

Going back to Meehl (1954), linear weighted models (LWM) have been noted for their robustness in predicting choice (Dawes and Corrigan 1974; Dawes 1971, 1975; Edwards, Guttentag and Snapper 1975; Goldberg 1965; Meehl 1965; Newman 1977). In decision making research they have commonly been used as the standard by which decision accuracy has been measured; furthermore, they have commonly been used to obtain an overall evaluation of each rated brand for ranking purposes, which have then been published by third party rating organization such as Consumer Reports and Software Digest (Kapalle and Hoffman 1992; Widing, Burnkrant and Talarzyk 1986; Newman 1977).

Lynch (1979 and 1985) noted that while LWM do a good job of predicting choice, they do not necessarily do a good job of describing the decision process used by decision makers. The primary reason for this was attributed to the disproportionately heavy weight given
to low attribute scores (a poor performance rating) by
decision makers (Lynch 1979, 1985). The evidence
indicated that people did not react in an interval
fashion to intervally scaled attribute values.

More recent research has also indicated that LWM
predictions are not necessarily robust when the decision
set contains negatively correlated attributes (Johnson,
Meyer and Ghose 1989; Meyer and Johnson 1989). This
meant that the decision maker was not choosing the
alternative which a LWM indicated had the highest
utility, as calculated by his/her attribute weights.
Widing and Talarzyk (1992) also found the likelihood of
making a decision error (i.e., switching), when aided by
the CAL format, increased when the negatively correlated
attribute was more important than when it is less
important. A finding which was attributed to increased
conflict in choice due to the tougher tradeoff involved
on the negatively correlated attribute. The results
suggest that the top ranked brand, according to the rank
order based on the user's own attribute importance
weights, will often be "irrationally" passed over in
order to improve a low score on one attribute. Given the
fact that ratings/scores on the negatively correlated
attribute have a good probability of being low, the lack
of correspondence between actual choice and LWM predicted
choice is likely caused by disproportionately heavy weight given to the low attribute score.

This suggests that linear models, while often quite good at predicting a person's choice and, perhaps, choice process in non-difficult environments, are not necessarily accurate in describing or predicting choice in negatively correlated environments, where low attribute scores are often also present. Hence, Lynch's (1985) findings help explain not only why linear model do not describe decision processes well, but also why linear models fail to accurately predict choices in negatively correlated environments.

The CAL format, however, has performed better than the CAC format (and unassisted information provision formats) under difficult decision environments (Widing and Talarzyk 1992). With the more important negatively correlated environment, however, even the top performing CAL format experienced a marked increase in switching behavior, as compared to its performance in less important negatively correlated and uncorrelated environments. Even so, when compared to the alternative formats, prior research has supported the CAL format as a good way of presenting information, since the format offers better decision outcomes (Widing and Talarzyk 1992).
Equal Weight Rank Order (EWRO) Format and the Decision Environment

The Equal Weight Rank Order (EWRO) format is much the same as the CAL format, when equal weights are inputted, without the interactive feature of that format. The EWRO format comes closest to simulating the product information currently available in sources such as Consumer Reports and Software Digest. Typically these testing organizations use some form of linear weighted model to provide a summary ranking of the brands they test, based on their total score. Critics of this method of presentation note that consumers will tend to concentrate on the top ranked brands, which could be dangerous in cases where the testing organization's attribute importance weights are different from those of the consumer(s) using the information to make a purchase decision (Beales, Mazis, Salop and Staelin 1981; Day 1975; Wilkie 1974).

In response to these criticisms, Dawes and Corrigan (1974), Einhorn and Hogarth (1975), Newman (1977), and Wainer (1976) tested the sensitivity of rankings to various weighting schemes. They found that rankings were not particularly sensitive, as top ranked brands tended to remain top ranked under a variety of weighting schemes, including the equal weighting of attributes.
Equal weights also had the added advantage of being easy to understand by the typical consumer.

This is a potentially major advantage of the EWRO format, as the head of Consumer's Union, publisher of Consumer Reports, noted that the weighting schemes, used by their testers to form overall ratings, were not publicized because of the inability of the typical reader to understand them (Pittle 1984). Furthermore, he (Pittle) believed that most readers were grateful for the expertise which was used to formulate the weights, and that the weighting task was something not necessarily within the capabilities of even fairly well informed consumers.

The shortcoming of this research stream, however, is the sensitivity to negative attribute correlations typical of difficult decision environments. All the weighting sensitivity research has used product attributes which were not negatively correlated, to test for sensitivity to weighting schemes. With a negative correlation, rankings could shift away from the rater order, if consumer attribute importance weights were far different than the weights specified by the rating organization on the negatively correlated attribute(s). This may work in favor of the EWRO format, however, as equal weight based rankings make it easier for the CADA
user to make the adjustments in their own search patterns, compared to a rater order based on some unspecified attribute weighting scheme.
SECTION II: USER EVALUATIONS OF CADAS

The end result from a CADA experience should ideally be improved decision quality, while simultaneously making it a less burdensome task. If the goals of improved market performance are to be achieved, it is important that users like the systems and find the costs of using the systems, in terms of the time and effort required to make a better decision, to be a worthwhile investment. Consumer information systems which are not evaluated positively will not likely achieve widespread use (Russo, Staelin, Nolan, Russell and Metcalf 1986).

Whether it is because of the successful advertising campaigns by IBM, Apple and others which have emphasized their computer's ability to easily solve problems, or their own experiences with computers at school, work or home, research by Widing and Talarzyk (1992) Aldag and Power (1986) and Bronner and deHoog (1983), indicates that consumers believe CADAs will offer them better decision making with lower effort than would be the case if they used a non-computer information provision format, even though nearly all their subjects had never previously used a CADA. This body of research, however, has not measured subjective evaluations after users have
been exposed to potentially (expectation) disconfirming decision quality feedback.

Without disconfirming feedback, work by Thibaut and Kelly (1959), Woodruff, Cadotte and Jenkins (1983) and LaBarbera and Mazursky (1983) predicts that brand level or product level experience will provide the basis from judging the current performance of a product and subsequent feelings of satisfaction. For first time CADA users, as was the case with the studies cited above, the frame in which they judge their satisfaction with the process will likely be based on their previous non-CADA attempts at finding product information and analyzing it to help in their purchase decisions, as well as their non-CADA computer experiences.

There is reason to believe that these high evaluations might be tempered by negative decision quality feedback, as consumer behavior literature has defined satisfaction as a function of expectation disconfirmation (Brown and Swartz 1989). Satisfaction or dissatisfaction results from either positive or negative disconfirmation of product expectations or predictions of success or failure (Oliver 1980; Olson and Dover 1979). CADAs seem to create an "illusion of control" for users (Aldag and Power 1986), which could be particularly misleading in difficult decision environments where
decision errors are frequently made, but no decision quality performance feedback is given. While a difficult decision environment is likely to create more opportunities for negative decision quality feedback, decision mistakes in any environment should dampen the CADA enthusiasm of any individual who makes the error while using the aid.

Subjective evaluations of decision aids has generally been thought to be multi-dimensional. Two dimensions have been identified in past research as being of key importance in evaluating a decision process. These include (1) the quality or accuracy of the decision and (2) the difficulty expended in making the decision (Bettman and Zins 1979; Keller and Staelin 1987; Klien and Yadav 1989; Russo, Staelin, Nolan, Russell and Metcalf 1986; Widing, Burnkrant and Talarzyk 1986). Indeed, these dimensions are interrelated as a tradeoff has been assumed to exist between them. A third dimension, the mental effort required in making a decision, is also expected to be important in the case of aided decision making. To be effective, decision aids should help reduce the difficulty experienced during choice, thereby reducing the mental effort expended and enhancing decision accuracy; that is, both reducing effort and improving accuracy might be simultaneously
attained through the reduction of difficulty. Hence, this third dimension is particularly important to add in the study of decision aids. The following section details the theoretical underpinnings of the three dimensions by reviewing the literature.

**Perceptions of Difficulty and Effort**

Simon (1955) coined the term "bounded rationality" to describe the processing limitations of decision makers. Unlike the economic man assumptions, where unlimited processing capacity is assumed, people are willing and/or capable of processing only a limited amount of information in a given time span. This presents a serious problem for buyers, as the number of available alternatives in many product categories can number in the hundreds, with raters of product quality frequently evaluating 30 or more brands (Widing and Talarzyk 1989). This is further complicated by the fact that those same products can be judged on numerous attributes, creating a dizzying matrix of information to process (Pittle 1984).

Decision makers might avoid information overload by taking the first acceptable alternative (Simon 1955) or by resorting to non-compensatory heuristics when confronted with difficult and burdensome levels of information (Olshavsky 1979; Payne 1976; Billings and
Marcus 1983; Klein 1983; Jacoby 1984). By using these heuristics (or shortcuts), decision makers can reduce the choice set down to a more manageable level, requiring much less mental effort to fully analyze. Upon reducing the choice set, they have been observed to revert back to compensatory processes to more fully analyze the information on the remaining alternatives. In certain difficult decision environments (e.g., ones with large amounts of information and negative correlations), however, this use of non-compensatory heuristics has resulted in the inadvertent elimination of what would have been more preferred alternatives, resulting in less than optimal decisions (Widing, Burnkrant and Talarzyk, 1986, Widing and Talarzyk 1992). Hence, the potential for a trade-off between effort and accuracy exists, especially with difficult environments. It is of interest, therefore, to measure perceptions of all three dimensions for a decision task.

Widing and Talarzyk (1992) developed a three item scale to measure subjective reactions of the difficulty experienced during choice while using decision aids/formats. The items selected were generated in earlier research on information formats and/or information load (Bettman and Zins 1979; Malhotra 1982; Keller and Staelin 1987; Klien and Yadav 1989; Widing
Burnkrant and Talarzyk 1986). Pre-testing revealed that three items, measuring confusion, frustration, and difficulty experienced during the decision process, adequately measured the "difficulty experienced during choice" dimension. Their study found that the items loaded strongly on the hypothesized factor and were highly reliable. Small cross-loadings on another factor representing accuracy supported the construct validity of the difficulty factor. In addition, the reliability of the scale was high. Widing and Talarzyk, however, did not contend they had confirmed the properties of the scale, but simply reported the results of an exploratory factor analysis along with their substantive results.

A dimension not measured by Widing and Talarzyk (1992) was decision making mental effort. When faced with a difficult task, the decision maker has the choice of either increasing his/her mental effort to overcome the difficulty, or scaling back the effort and being satisfied with a potentially less than optimal outcome. The lower mental effort route appears to be prevalent, as the evidence cited above suggests that many decisions are made with effort reducing or satisficing heuristics. Stigler (1961) explained this apparently "irrational behavior" by noting that the time and effort required to gather and analyze information is not costless. That is,
there are trade-offs between the costs of a more thorough decision process and the benefits of making a better decision. Russo, Staelin, Nolan, Russell and Metcalf (1986) contend that reducing effort is more important in increasing information usage than extolling the accuracy benefits and exhorting consumers to engage in greater amounts of information search and analysis. Mental effort expended/required during decision making, therefore, would appear to be an important dimension in which to have users evaluate decision aids. This is different from the difficulty dimension, since people may or may not increase effort in response to their experiencing difficulty during the choice task. A decision aid that reduced the effort required to deal with a difficult decision environment would seemingly be better liked and, consequently, more likely to be used.

**Perceptions of Decision Accuracy**

Several research efforts have attempted to measure user perceptions of a decision aid's ability to help them make a better decision (Aldag and Power 1986; Widing, Burnkrant and Talarzyk 1986; Widing and Talarzyk 1992). Widing and Talarzyk (1992), in attempting to measure decision quality, reviewed items developed in earlier work by Klein and Yadav (1989), Keller and Staelin (1987), Malhotra (1982), Bettman and Zins (1979), as well
as their own earlier work, to come up with a three item decision quality scale. The three items, which measured perceptions of choice accuracy, confidence the best choice was made, and certainty of choice, were studied along with the difficulty dimension noted above. Support for construct validity was provided as the items loaded heavily on one factor, with small cross-loading on the previously described difficulty dimension. The items also proved to be reliable.

Past research has shown that computerized decision aid users have a great deal of confidence in the ability of the aid to provide them with a highly accurate decision. Unfortunately, this faith in the decision aid has not always been justified, as decision making performance has not been helped and sometimes been hurt with an aid, relative to when subjects made unaided decisions (Aldag and Power 1986; Widing, Burnkrant and Talarzyk 1986; Widing and Talarzyk 1992).

The following chapter presents and explains the hypotheses of this dissertation. The first part deals with the decision quality interests of this study, including the impact of decision environment difficulty and the impact of CADA formats on decision quality. The second part deals with the impact of feedback on subjective evaluations of each CADA format.
Chapter III

HYPOTHESES AND RESEARCH ISSUES

The current research is designed to answer three main questions related to the use of CADAs:

1. What is required to make a decision environment more difficult?

2. Which of three CADA formats offers the best decision making quality in a difficult decision environment?

3. Will subjective evaluations of a CADA format change after choice quality feedback is received by the CADA user?

The first question deals with the nature of the decision set to be evaluated by the CADA. The current research will determine whether negative correlations alone, or such correlations coupled with low attribute performance ratings, create a difficult decision environment. The second question deals with how well three formats: a compensatory Computer Assisted Linear (CAL), a non-compensatory Computer Assisted Cutoff (CAC), and a non-interactive Equal Weight Rank Order (EWRO), can cope with the difficult decision environment prescribed by question 1. The third research question deals with the user evaluations of CADAs, even in cases where they have made decision errors. Decision errors will be determined by post-choice (using the CADA format) switching behavior to another brand. This research will
look at the impact of feedback about decision errors on subsequent subjective evaluations of the CADA format. The following sections outline the relevant research and hypothesized relationships of these three areas of interest.

**Decision Environment and Decision Quality Hypotheses**

Widing and Talarzyk (1992) evaluated the performance of the CAC and CAL, as well as a non-interactive Random Order format under conditions when there was a naturally occurring negatively correlated product attribute in a product/attribute matrix. To provide an even more difficult decision environment, they modified the actual decision set by switching the negatively correlated attribute scores with another more important attribute (determined by the attribute weights assigned by subjects in pre-testing). A third decision set had randomly assigned scores replacing the scores of the original negatively correlated attribute, which had the effect of washing out the negative correlation, and making the decision set the theoretically least difficult of the three. All three decision sets were identical, except for the modifications just described.

Decision quality performance (determined by the frequency of brand switching behavior) for all three formats was equal and highest in the non-negatively
correlated environment, but deteriorated unequally in the negatively correlated environments. When the scores on the negatively correlated attribute were randomly reassigned the overall attribute negative correlation disappeared, while also reducing the number of non-dominated brands from fifteen in the negatively correlated decision set, to the nine brands in the non-negatively correlated set. While negative correlations disappeared in the overall decision set, the negative correlation (tradeoffs) remained the same or higher among the nine non-dominated brands in the decision set. In this now uncorrelated decision set, however, eight of the nine efficient brands experienced an average increase of 2.7 points (on a 10 point scale) on the negatively correlated attribute.

As was previously noted, Widing and Talarzyk (1992) found that users of the CAL format were largely unaffected by all but the most severe changes in decision set difficulty, when using switching behavior as the measure of decision quality. Furthermore, for those subjects who did switch, the overwhelming reason given was that they had changed their minds, something which no format is likely to ever fully eliminate. This was not the case with the CAC format, however, as switching behavior was both much higher and overwhelmingly caused
by a subject not seeing the final choice in the original choice process. This was due to the cutoff on the negatively correlated attribute, which caused the final choice to be screened out during the initial choice process. In the "uncorrelated set", in which the efficient brands had their scores increased on the negatively correlated attribute, screening errors were greatly reduced. The reason seems to be that the new higher scores on that attribute now cleared the cutoffs. The authors suggested, however, that alternative explanations existed for this result.

From this evidence it would appear that negative attribute correlations, cited as the source of "difficult" decision environments, may not be sufficient in themselves to explain the decision "errors" found in the negatively correlated environments. In order to more fully define a "difficult decision environment", therefore, an additional question needs to be answered: Is the presence of a negatively correlated attribute alone sufficient to create a difficult decision environment for the CAL, CAC and EWRO formats, or is the presence of low scores on the negatively correlated attribute also required? Two decision sets were used to answer the question. The first was the less attractive (more difficult) decision set, in which there was both a
negatively correlated attribute and low scores on that attribute for the highest scoring brands overall. The other more attractive (less difficult) decision set was identical to the first, with one exception, the low attribute scores was made more attractive by adding a constant to each brand's score on the negatively correlated attribute. Both sets had the same number of brands, the same correlation structure, and the same attribute scores, with the exception of the scores on the negatively correlated attribute.

In general, subjects using their CADA on the less attractive (LA) decision set were expected to make more decision errors (i.e. switching to a brand not originally chosen using their CADA) than subjects assigned to the more attraction (MA) decision set. The following hypotheses reflect the expected differences in decision making quality between the two decision sets:

H1: Switching behavior will be reduced with the CAL format in a negatively correlated environment, when there is an absence of low scores (MA decision set), versus the same correlation structure with the presence of low scores (LA decision set).

H2: Switching behavior will be reduced with the CAC format in a negatively correlated environment, when there is an absence of low scores (MA decision set), versus the same correlation structure with the presence of low scores (LA decision set).
H3: Switching behavior will be reduced with the EWRO format in a negatively correlated environment, when there is an absence of low scores (MA decision set), versus the same correlation structure with low scores (LA decision set).

The literature already cited has also indicated that the CADA formats have varying inherent capabilities when it comes to dealing with difficult decision environments. Widing and Talarzyk (1992) found that the decision quality was lower for the CAC format than it was for the CAL format in difficult decision environments, when lessened brand switching behavior was used as the indicator of superior choice quality. Since Widing and Talarzyk (1992) found that the CAL and CAC formats performed equally well in their "uncorrelated" less difficult environment, it was expected that there would be no significant difference between the formats in this study's less difficult (MA) environment.

Dawes and Corrigan (1974), Einhorn and Hogarth (1975), Newman (1977), and Wainer (1976) have indicated that weighting does not have a major impact on linear weighted model rankings. This is reinforced in the decision set used by Widing and Talarzyk (1992), as the ranking for the top 9 brands (the only ones chosen by subjects as their final choice) remained the same, when group mean importance weights were used as opposed to equal weights, with one exception,. The exception was
the order reversal of the 6th and 7th ranked brands, indicating that only a major deviation from the group mean weights would likely create a major shift in the rankings. Because of this, the EWRO format was expected to perform similarly to the top performing CAL format in the difficult decision environment. These relationships are reflected in the following hypotheses.

**H4:** The switching behavior in the CAL format will be lower than the CAC format when the correlation structure has low scores (LA decision set).

**H5:** The switching behavior in the CAL format will be the same as that for the EWRO format when the correlation structure has low scores (LA decision set).

**H6:** The switching behavior in the EWRO format will be lower than the CAC format when the correlation structure has low scores (LA decision set).

Widing and Talarzyk (1992) found the CAC, CAL and the non-interactive Random order formats performed equally well in the less difficult non-negatively correlated environment. While the negative correlation remains in this study's MA (less difficult) environment, the higher attribute scores are expected to equalize format decision quality performance.

**H7:** The switching behavior in the CAC format will be the same as that of the CAL format in a negatively correlated environment when there is an absence of low scores (MA decision set).
H8: The switching behavior in the EWRO format will be the same as that of the CAL format in a negatively correlated environment when there is an absence of low scores (MA decision set).

H9: The switching behavior in the CAC format will be the same as that of the EWRO format in a negatively correlated environment, when there is an absence of low scores (MA decision set).

CADA Evaluation Hypotheses

Widing and Talarzyk (1992) found that subjects who used either the CAL or CAC formats liked using it and felt it enabled them to make a more accurate decision with less difficulty than if they were to receive the same brand information in unranked form on a sheet of paper. They also found no significant difference in the subjective evaluation of CADA accuracy and difficulty between users of the CAL and CAC formats. This and other research which measured subjective impressions of CADA use (Aldag and Power 1986; and Bronner and deHoog 1983), however, failed to allow subjects to evaluate the format after objectively receiving feedback about their choice. Satisfaction was based on impressions before exposure to possible expectation disconfirming decision mistakes.

While it was hypothesized that the LA environment would lead to more switching behavior (negative decision quality feedback), it is also important to understand how a more difficult environment impacts user perceptions of
the CADA. Formats which are better able to deal with the increased difficulty, while also keeping effort requirements low and accuracy (choice quality) levels high, should be more favorably evaluated and more frequently used.

The greater difficulty of the LA decision set should be reflected in the subjective evaluations of the CADA formats. With more attractive attribute scores there should be less severe attribute score tradeoffs and less choice conflict in the MA choice environment, reflected by the prediction of less switching behavior. All subjects in the LA environment, whether they switch or not, are likely to experience greater levels of choice conflict, as the tradeoffs they are forced to make, create a more tormenting final decision. Because of this, subjective evaluations were expected to be generally less favorable in the more difficult choice environment.

This should be particularly true for the mental effort and difficulty dimensions, as a less difficult environment should have a direct link to lower choice difficulty and mental effort requirements. With a less difficult environment, less mental effort should be required to make a good choice, as compromises among the
attribute scores will be less severe. This is reflected in the following hypotheses:

H10: Difficulty evaluations will be more favorable with the MA decision set than with the LA decision set.

H11: Mental effort evaluations will be more favorable with the MA decision set than with the LA decision set.

Accuracy perceptions should also be somewhat more favorable in the less difficult (MA) environment as the less severe attribute score tradeoffs create less frequent brand switching behavior, and greater confidence in the choice. The lower difficulty, effort and greater accuracy perceptions in the MA environment should also be reflected in higher levels of overall satisfaction for subjects in the MA environment.

H12: Accuracy evaluations will be more favorable with the MA decision set than with the LA decision set.

H13: Overall satisfaction evaluations will be more favorable with the MA decision set than with the LA decision set.

Disconfirming feedback (switching), whether it occurs in the MA or LA environments or in any of the three CADA formats, is unlikely to equally effect evaluations on all the subjective dimensions. The difficulty and mental effort evaluations are unlikely to
change a great deal after feedback, because they are directly linked to the decision process and only indirectly linked to the decision outcome (quality). Hence negative feedback is not predicted to make any difference in the perceptions of CADA mental effort and difficulty.

**H14a:** Pre-feedback difficulty evaluations will be the same as post-feedback difficulty evaluations for CADA users who switch.

**H14b:** Pre-feedback mental effort evaluations will be the same as post-feedback mental effort evaluations for CADA users who switch.

Negative decision feedback should play a major role in evaluations of accuracy and satisfaction. Previous research has shown that CADA users have a great deal of faith in the aid's ability to increase the quality of their decision, and have been extremely satisfied with their CADA experience (Aldag and Power 1986; and Bronner and deHoog 1983; Widing and Talarzyk 1992). Since decision quality is directly linked to the accuracy dimension, switching will most likely have a greater influence on user accuracy evaluations. In addition, since negative disconfirming evidence has been theorized to have a direct negative impact on satisfaction (Brown and Swartz 1989; Oliver 1981; Olson and Dover 1979), a
further consequence should also be a less favorable overall satisfaction rating of the CADA.

H14c: Pre-feedback accuracy evaluations will be the more favorable than post-feedback accuracy evaluations for CADA users who switch.

H14d: Pre-feedback overall satisfaction effort evaluations will be the more favorable than post-feedback overall satisfaction evaluations for CADA users who switch.

The negative feedback inspired drop-off in accuracy and overall satisfaction evaluations should not hit all formats equally. Widing and Talarzyk (1992) found that of the CAL format users who did switch, 79% reported that their switching occurred due to "simply changing their minds", while only 21% switched due to not seeing their final choice. Conversely, 67% of CAC switching occurred because of users "not seeing" their final choice, while only 33% switched because they "simply changed their minds." With the CAL and EWRO formats, it is impossible for the user to manipulate the format to eliminate brands from appearing on the screen. This is not the case with the CAC format, where brands can be screened out from view by setting cutoffs too high on one or more the attributes. It seems likely, therefore, that CAC users will more severely blame their format for their switching
behavior than would CAL and EWRO users who switch. This is reflected by the following hypotheses:

**H15a:** CAL users who switch will have the more favorable post-feedback accuracy evaluations than CAC users who switch.

**H15b:** EWRO users who switch will have the more favorable post-feedback accuracy evaluations than CAC users who switch.

**H16a:** CAL users who switch will have the more favorable post-feedback overall satisfaction evaluations than CAC users who switch.

**H16b:** EWRO users who switch will have the more favorable post-feedback overall satisfaction evaluations than CAC users who switch.

When no feedback is encountered (no switch occurs) the results of Widing and Talarzyk (1992) suggest that the CAL and CAC formats will be equally evaluated on the accuracy and overall satisfaction dimensions. For the current study this means the pre-feedback measures for the two dimensions should be equal, while post-feedback measures should be equal for non-switchers only.

**H17a:** CAL users who do not switch will have the same post-feedback accuracy evaluations as CAC users who do not switch.

**H17b:** CAL users will have the same pre-feedback accuracy evaluations as CAC users.
H18b: CAL users who do not switch will have the same post-feedback overall satisfaction evaluations as CAC users who do not switch.

H18b: CAL users will have the same pre-feedback overall satisfaction evaluations as CAC users.

Furthermore, since the Widing and Talarzyk (1992) study found the CAL and CAC were equally well liked on the difficulty dimension, no between format differences are expected on the difficulty or closely related effort dimensions.

H19a: CAL users will have the same difficulty evaluations as CAC users.

H19b: CAL users will have the same mental effort evaluations as CAC users.

Widing and Talarzyk (1992) found that both the CAL and CAC format received significantly more favorable subjective evaluations on both the difficulty and accuracy dimensions, than was the case for the non-interactive Random format (brands in random (alphabetical) order on the computer screen). Behavioral measures of decision quality (switching behavior), however, were more favorable or at least equal to those of CAC users. Since all three formats were presented on the computer screen, a prime suspect for explaining this difference in subjective evaluations, was the Random format's non-interactive nature. Subjects seemingly
liked having the option to customize the results, by inputting their own weights or cutoffs, something not available to the Random format users in that study, or the EWRO users of this study. The rating disparities might be explained by "illusion of control" feelings which led to perceptions of increased choice quality and lower decision difficulty (Aldag and Power 1986). Since the EWRO and CAL formats were predicted to perform equally on decision quality, in all environments it was expected that the CAL format, with its interactive feature, would also have more favorable subjective ratings than the EWRO format. These differences are reflected in the following hypotheses:

H20a: The CAL format will have a more favorable difficulty ratings than the EWRO format.

H20b: The CAL format will have a more favorable mental effort ratings than the EWRO format.

H20c: The CAL format will have a more favorable accuracy ratings than the EWRO format.

H20d: The CAL format will have a more favorable overall satisfaction ratings than the EWRO format.

As with the CAL format, the interactive CAC format is expected to receive more favorable subjective evaluations than the non-interactive EWRO format on all dimensions when no negative feedback is encountered, as
with the pre-feedback measures, and/or with the post-feedback measures of non-switchers.

**H21a:** EWRO users who do not switch will have a less favorable post-feedback accuracy evaluation than CAC users who do not switch.

**H21b:** EWRO users will have a less favorable pre-feedback accuracy evaluation than CAC users.

**H22a:** EWRO users who do not switch will have a less favorable post-feedback overall satisfaction evaluation than CAC users who do not switch.

**H22b:** EWRO users will have a less favorable pre-feedback overall satisfaction evaluation than CAC users.

Furthermore, since negative feedback is not expected to have an impact on the difficulty and effort dimensions, the more favorable subjective ratings given to the CAC format should remain intact, even after negative feedback is received.

**H23a:** EWRO users will have a less favorable difficulty evaluation than CAC users.

**H23b:** EWRO users will have a less favorable mental effort evaluation than CAC users.

This concludes the hypotheses presentation section of this study. The next chapter discusses the methodology which was employed to test the hypothesized relationships. Details on the decision sets and CADA
formats, experimental and training procedures and dependent variable operationalization are presented.
Chapter IV

METHODOLOGY

This chapter will report on the following areas: (1) the decision sets; (2) the experimental and training procedures; (3) the three formats; (4) the dependent variables; (5) and the subjects. The general flow of the experiment had subjects randomly assigned to sessions where they were trained on their CADA format, told to use the format to choose a brand of word processing software, questioned on their use of the format, given an opportunity to switch to another brand in paired comparisons, and then told to give a final evaluation of the format. The discussion in this chapter follows the flow of the experimental procedures. The first section will deal with the decision task to be completed by the subjects.

Experiment Overview

The design of this study consisted of three formats by two decision sets, for a total of six cells. Approximately 35 subjects were used for each cell. Subjects were junior and senior level college business students, randomly assigned to one of the six cells. Subjects were given class credit for participating.

This study closely followed the procedure developed by Widing and Talarzyk (1992). The experiment was
divided into three parts. The first was the training session, followed by the choice task, and finally the brand comparison task and format evaluation. The training required about 30 minutes, the choice task about 20 minutes, and the brand comparison session and format evaluation about 20 minutes. Subjects received a 10 minute break between the training session and choice task so that the computers could be switched from the Database Management programs used during training, to the Word Processing programs used during the choice task. During the break, subjects were given a reading which described the upcoming choice task. All sessions were led by the author to maintain consistency from group to group.

Remaining sections in the chapter will give more detailed descriptions of the training session, choice task, and the format evaluation and paired comparisons. The next three sections, however, will set up that discussion by first going into detail on the subjects, CADA formats and data sets which were used in this study.

**Subject Selection and Backgrounds**

After the format evaluation, subjects were asked about their computer and word processing experience and other demographic information so that background differences could be assessed. Table 1 presents the
findings of the background questions. Prior to training, subjects, who were randomly assigned to each format, had no significant (p > .1) between format differences in their computer (FIII1) or word processing familiarity (FIII2). Mean scores on the two measures revealed a high level of familiarity for all of the formats, with a range of 3.14 to 3.26 on computer familiarity and 3.36 and 3.61 on word processing familiarity. Word processing use (FIII3) was also similar as subjects reported a range of 2.63 to 2.77. While it is not reported on table 1, there were also no significant differences in familiarity between the multiple sessions required to collect each format's total sample.

Subjects also had similar age, gender and class rank makeups. Mean age for subjects ranged from a high of 23.3 for the EWRO to a low of 22.5 for the CAC format. Mean class rank for all three formats was between 3.45 for the EWRO format and 3.84 for the CAC format (with 3 equaling a Junior rank and 4 equaling a Senior class rank). Class rank differences were statistically significant in two of the three comparisons, but were not judged to be substantively meaningful. Gender difference between cells or formats were not significant (p > .1), with slightly more than half of the subjects, overall, being male. These findings indicate that the random
assignment was successful in equalizing the backgrounds of subjects in each format.

Subjects were processed in groups of approximately 25. The additional subjects required because of shortfalls on the initial session were supplemented by later small sessions ranging in size from 12 to 21 subjects. Due to differences in the training required for each format, only one format was handled in each session. The two decision sets (MA and LA), which were common to all the formats, were assigned to every other computer during each session, and subjects in each session were randomly assigned across the two decision sets. Format sessions were rotated, to avoid time of day and sequencing effects.

**Formats**

The formats were designed to appear when the subjects turned on their computer's display monitor (see appendices Xa and Xb for samples of the screens which subjects saw). For the CAL and CAC formats, the cursor was automatically positioned to allow the subjects to input their own weights or cutoffs. Following the subjects' inputs, the computerized processing was initiated by pushing two keys on the computer keyboard. Processing was almost instantaneous, as the brands (in a brand/attribute matrix) which met or exceeded the cutoffs
for CAC users, or the ranked brands, based on user inputted attribute weights, for CAL users were shown on the screen within 1 second (see appendices Xa and Xb for examples of CAL and CAC format screens).

CAC users also saw the number of brands which exceed their cutoffs, along with the actual brands and their attribute scores in random order on the screen. CAC users were trained in how to change their cutoffs to initiate additional searches, as well as how to get all 30 brands on the screen if they desired either. An important instruction that all CAC users received twice during their training was designed to help users understand the interactive nature of their cutoffs (see appendix Va). They will be told that a brand that did not at least match their cutoff on even one attribute, would eliminate that brand from appearing on their screen, both during their initial instructions on filling out the DBase Minimum Score questionnaire (appendix VIIb) and prior to their choice task using the following example used by Widing and Talarzyk (1992):

A brand with perfect 10's on five attributes and a 6.9 on the sixth attribute, would be eliminated if you put a cutoff of 7.0 on that sixth attribute. This is fine providing you would not have preferred the eliminated brand had you evaluated it, but please understand the effect that even one cutoff can have on the brands which you will be shown to evaluate.
This example followed the suggestion of Green and Srinivasan (1990), in making sure that subjects understood the impact that each cutoff can have in eliminating brands which they might have preferred had they had the opportunity to evaluate it.

The CAL format was operationalized by giving subjects instructions on importance weights. Subjects were told that attributes more important to their brand decision, should be given higher (larger) weights, than those which were less important. Because a review by Wilkie and Pessemier (1973) found that eliciting importance weights through a constant sum method produced more accurate results than categorical methods, subjects were asked to allocate their six attribute weights, so that they summed to 100. This meant that a higher weight on one attribute, had to be compensated for by reducing the weight on another. The CAL program was designed not to proceed if the weights did not sum to 100, as subjects were given a beep to remind them of their error. CAL subjects were also instructed on how to conduct additional searches if they so desired, but to do so only if they were not sure of their best brand (see appendix IVa). Each search presented the brand/attribute matrix with all 30 brands in ranked order based on the inputted weights for that search.
The non-interactive EWRO format, presented the 30 brands in ranked order, based on equal attribute weights. The brand/attribute matrix presented on the EWRO screen, was identical to the screen shown on the CAL format, when CAL subjects inputted equal importance weights for each of the six attributes (appendix VIA presents the script used to inform EWRO subjects of the process).

**Decision Sets**

A real decision set of word processing programs rated by *Computer Software* magazine was used in this study. Thirty brands were rated on a ten point scale on six attributes (Ease of Startup, Ease of Learning, Ease of Use, Error Handling, Performance, Versatility). Versatility was negatively correlated (range of -.27 to -.47) with the other five attributes. All other attributes were positively correlated with each other, with a range of .28 to .88. This decision set was chosen because subjects were found to be familiar with both word processing programs and the attribute descriptions, and it offered the desired correlation structure. One modification was done to both the MA and LA decision sets. This involved switching the negatively correlated Versatility attribute scores with the Ease of Learning scores because of the latter attribute's higher importance (Widing and Talarzyk 1992). This modification
was done to provide a stronger effect and test of the hypotheses, as Widing and Talarzyk found the more important negatively correlated environment yielded the greatest number of decision errors. To avoid a recognition bias, software brand names were replaced by randomly assigned three digit numbers.

The original decision set, with the switched scores previously described, was the less attractive (LA) decision set. The more attractive (MA) decision set was identical to the LA decision set, with one exception. In order to increase the decision set attractiveness, 1.5 points were added to each of the 30 brand's Ease of Learning (formerly Versatility) score. Labels used to describe the attribute scores, were taken directly from the *Software Digest* brand summary ratings. The range descriptions were Outstanding (9.0 to 10.0), Excellent (8.0 to 8.9), Very Good (7.0 to 7.9), Good (6.0 to 6.9), Fair (5.0 to 5.9), and Poor to Extremely Poor (4.9 and below) (see appendix III for the range label descriptions which were given to the test subjects prior to their choice task). With the addition of the 1.5 points to the Ease of Learning scores in the MA decision set, all fifteen of the non-dominated brands had a score of 5.0 or above on that attribute. Correlations among the 6
attributes and the number of efficient brands remained the same for both decision sets.

Training Session

A key issue in developing a CADA is how easy it is to use and the amount of training required to use the system. There are two aspects of this training. The first is related to the amount of training required to make the user comfortable using the system itself, which means knowing which buttons to push and what to do if something unexpected happens. The second is the training required to give the user the minimum expertise required on the product category they will be using the CADA to analyze and help them decide, or what Russo, Staelin, Nolan, Russell and Metcalf (1986) called comprehension effort.

If subjects are capable of understanding the product attributes and assigning importance weights, the next CADA decision making step is the actual manipulation of the CADA controls. This requires an ability to interact with the compensatory aid so that weights can be inputted and the rank orders calculated from internally stored brand information. CADA competence also requires knowledge as to the calculations performed to arrive at the rank order and the ability to read and understand the brand information presented on the CADA screen.
The training portion of each session was designed to produce highly competent users of each format, even in cases where the subject had no previous computer or word processing experience. Subjects were trained in understanding and using each format, how to handle potential "problems" (such as when no brands appeared on the screen in the CAC format or when their importance weights did not sum to 100 in the CAL format), and how to input their weights or cutoffs (see the scripts used in appendices IVa to VIb).

They were also trained on the meaning of cutoffs and weights, and attribute range labels and definitions so that they could input the required material into the computer (see appendices I to III). To help in their understanding of these labels and definitions, Database Management Importance Weights (for the CAL and EWRO) and a Database Minimum Value questionnaires were employed (see appendices VIIa and VIIb). CAL and EWRO subjects were told to allocate 100 points among the six attributes based on their importance in evaluating DBase programs. CAC subjects were told to put in their minimum acceptable scores on each of the six attributes, while an example which illustrated how even one cutoff value could eliminate a brand with very high scores on the remaining attributes was presented to them (see appendices Va to
Subjects were also told to feel free to refer back to the Attribute and Scale Description readings for help at any time during this task or any later choice task.

To make sure the subjects understood all instructions, examples and a hands-on practice session, where subjects were allowed to input their own values and conduct their own search, were employed using database management software programs as the decision set (see appendix Va). Widing and Talarzyk (1992) found this procedure, using subjects similar in background to those used in this study, resulted in well trained subjects based on the results of a post-experiment training survey of their subjects (see appendices IVb, Vb, VIb and VIII for the instrument used to measure training session effectiveness and the accompanying verbal instructions).

Once the subjects were satisfied with their search(s), they were trained to select the brand which was best for them. In the case of the CAL and EWRO formats, they were be told the following: (see appendices IVa and VIa)

Feel free to pick any brand from the top of the screen, bottom of the screen, or any place in between as your best brand. Base your decision on the attribute scores that brand received.

CAC users were reminded that they were free to conduct as many searches as they wished and that they could end up with 1 brand on the screen, all 30 brands on
the screen or any number in between. They were also reminded that the brands which met or exceeded all their cutoffs would appear in random order and that they should base their decision on the attribute scores the brand received.

Departing from the procedure used earlier by Widing and Talarzyk on the CAC format training, subjects were given a stronger warning, in an effort to reduce the number of empty searches (where no brands appeared due to high cutoff values), as they were told:

Even your preferred brand is likely to have low scores on one or more attributes. As you can see most brands do not have universally high scores on all six attributes, so do keep that in mind when you set your own cutoff values.

Stronger information in the form of attribute score means and ranges were not given to subjects. Widing and Talarzyk (1992) pre-tested subjects who in addition to the training just described, also received attribute score means and ranges. Their findings revealed that this additional information interfered with the decision process of CAC format users. Due to the negative attribute correlations, using the mean values or higher as cutoffs (as many subjects tended to do) prevented any brands from appearing on the screen. The blank screen which resulted, tended to increase the confusion, frustration, and search time for subjects using the CAC
format. For this reason, this additional information was not incorporated into the present study.

Measures of Training Effectiveness

To assess the level of competence and comfort felt by users after their training, six measures were developed. The measures were related to two key training goals, comfort level with the CADA itself and with the product category (see appendix VIII). Questions 1, 2, 3 and 4 were related to the subject's understanding of the CADA operating instructions, format (including the order in which the brands are presented on the screen) and the actual decision task. To assess each subject's understanding of abstract attributes and the attribute range descriptions, questions 5 and 6 were developed.

Subjects were asked to fill out their responses to these training questions, immediately after the training session (see appendices IVb, Vb and VIb). Table 1 presents the results for each format. Some statistically significant differences were found in the training session question responses. In general, subjects assigned to the CAC format had the highest level of understanding, while the EWRO subjects reported the lowest levels. While there were some significant differences between the two formats (only one moderately significant difference between the CAL and CAC formats),
even the EWRO subjects reported very high levels of understanding, with all response means falling below 2.5 on a 9 point scale. The differences appear to be the result of the extremely high levels of understanding reported by the CAC subjects (worst mean was 2.09 on 1 to 9 scale with 1 being best), rather than poor understanding of the other two formats.

Overall differences were fairly small among the formats and cells. Subjects appeared to be well trained, and all successfully completed the subsequent choice task. A bigger issue involves this study's attempt at giving subjects a complete understanding of their format and, to a lesser extent, their decision set, which led to the extremely high training evaluations presented in table 1. The extensive oral and written explanations given to subjects in this study would be difficult to impossible to duplicate under real world conditions. This training implementation problem could be compounded by the fact that many consumers would only use such systems occasionally for major purchases. Anecdotal evidence (Keyes 1989) indicates that even people who have helped design a CADA often have difficulty using it, if they have not had continued exposure to the system. The time and expense of providing help on demand and/or training for all CADA users may make such systems less
attractive for both potential providers and users. It was felt that for current purposes, however, this study should attempt to use a "best case" training procedure, in order to give subjects their best shot at dealing with the difficult decision set and completing the choice task.

Choice Task

Appendices IXa to IXc contain the handouts that the subjects were instructed to carefully read while they waited outside the computer lab during their break prior to the choice task. This handout instructed them on the process they would be going through in evaluating and choosing a best brand from among 30 brands of Word Processing software. Appendix IXa contains the CAL instructions, IXb contains the CAC instructions, and IXc contains the EWRO format instructions. Appendices IVC, Vc and VIC contain the orally read script which accompanied the written instructions contained in Appendix IX. It contained the specific instructions on the choice task as well as the procedure they would follow in filling out the post-choice format evaluation questionnaire they would receive upon making their best choice. Once these instructions had been given to the subjects they were told to turn on their monitors and conduct their own search (see appendices Xa and Xb for
sample screens seen by subjects using the CAL and CAC formats).

One departure from the earlier Widing and Talarzyk study was the deletion of the Word Processing Importance Weights and Minimum Score questionnaire prior to the choice task. Since these figures would be collected during the search process of the choice task, it was felt that this questionnaire could be deleted to reduce subject fatigue during the latter portions of each experimental session. All subjects did, however, fill out an importance weight and cutoff questionnaire after the choice task (see appendix XIII).

After the choice task, subjects were asked to evaluate their format, compare their brand to several other brands and switch if they so desired, and finally to re-evaluate their format. The next two sections will detail these post-choice activities, while also describing the procedure used to develop and operationalize the dependent variables of this study.

Dependent Variable: Measure of Decision Quality and Decision Environment Difficulty

Testing the hypotheses related to the difficulty of the decision environment and each format's ability to deal with that difficulty, required the development of a measure of decision quality. Switching behavior was used
as the measure for decision quality, following the methodology used by Widing and Talarzyk (1990, 1992). This switching measure contrasts with the linear combinations (linear predictability) measures of decision quality used by Klein and Yadav (1989), Keller and Staelin (1987), Malhotra (1982), and Jacoby, Speller, and Kohn (1974) among others. In those studies, a choice other than the linear determined best choice, was considered a decision error. Use of this measure of decision quality, however, has recently been called into question (Meyer and Johnson 1989; and Johnson, Meyer and Ghose 1989). Furthermore, since a linear format (CAL) is to be tested in this study, the use of linear determined quality measure would also be tautological (Widing and Talarzyk 1992). For these reasons, it was felt the switching measure was a better indicator of decision quality and decision environment difficulty for the present study.

The switching measure was operationalized by giving subjects an opportunity to switch to any of seven top ranked efficient brands (chosen by subjects during pre-testing) during paired comparisons between these six brands and the brand they chose during the choice segment. The paired comparisons followed the decision task session and format evaluation, using a specially
designed comparison questionnaire, which varied depending on the brand chosen by the subject so that they would not be making a paired comparison with the same brand (see appendices XIA and XIB for examples). Multiple switches were allowed, but after making all seven paired comparisons, subjects were asked to indicate their top choice among the seven comparison brands and the brand they chose during the decision making session. Subjects were instructed both verbally (appendices IVd, Vd and VId) and in written form to feel free to either switch or stay, based on their evaluation of the attribute scores each brand received.

A switch was used as an indicator of a decision mistake, while not switching indicated a more certain and high quality choice. The frequency of switching by subjects was also used as an indicator of the level of difficulty of the environment, with less switching indicating lower difficulty.

Subjects who switched were also asked why they switched. This process measure asked them if they switched because (1) They had not seen the switched to brand while using their CADA format. (2) They simply changed their mind and now preferred the alternative brand. (3) For some other reason they had switched. This measure was developed to determine the impact of
overlooking a preferred brand in situations where: (1) brands could not be screened out because all brands appeared on the screen, as with the CAL and EWRO formats, (2) the final brand chosen had not been screened out because of severe cutoffs, (3) as well as where the final brand had been screened out because of its failure to meet one or more cutoffs.

**Alternative Measures of Decision Environment Difficulty**

While linear based measures have been shown to be inappropriate as measures of decision quality in difficult decision environments, such as those in this study, they are appropriate as indicators of decision environment difficulty. Since linear based measures have been shown to be excellent predictors of choice in non-difficult environments, the degree in which they break down as choice predictors is an appropriate way to compare the difficulty levels of multiple decision environments like this study's MA and LA data sets. Including these alternative measures also allows comparisons with earlier studies.

In order to calculate a linear based measure, however, subjects need to weight the decision set attributes in accordance to their importance. While CAC and EWRO users did not input attribute weights into the computer, and did not see a ranked order of brands based
on their own importance weights, they were asked to fill out their own importance weights while answering a questionnaire after the choice task. This was done so that the screen they would have seen, had they used the CAL format and inputted their weights into the computer, could be created and the alternative measures calculated for all three formats.

The first alternative measure was the mean rank (AVGRNK) of each subject's initial choice (prior to being given the opportunity to switch), where the subject's own attribute importance weights were used to calculate a rank order, which was then used to determine the rank of their choice. A slightly different version of this measure of decision quality was also calculated. This measure used the percentage of subjects who chose the top ranked brand (TOP%) based on the same weighted rank order used for AVGRNK.

Another alternative way to look at decision quality is to look at the value (utility) of the choice made, compared to either the value of a random choice, or the value of the top ranked brand. If differences in utility among the brands were very small, then any measure of decision quality could lead to misleading conclusions since choice errors would be so small as to become largely irrelevant.
The value of a random choice was offered as a benchmark because it represented the utility of a choice that would on average be made by a purchaser with no prior information. This condition was something much closer to typical consumer behavior than the economic man requirements, which required that the highest value alternative always be chosen. To check the viability of this explanation, each subject's chosen brand's utility was compared with the value (utility) of a random choice. This was done by multiplying each brand's score on each attribute (as received from Software Digest) by that attribute's subject specified importance weight, and then adding the weighted attribute scores for a total brand utility score. The value of a random choice was arrived at by adding the total utility scores for each of the 30 brands and dividing by 30 (see Klein and Yadav 1988). The quality of the each subject's choice was assessed by dividing that choice's total utility score by the value of a random choice.

A second variable (%TRB), compared the subject's choice to the utility of the top ranked brand (TRB), using the subjects own attribute importance weights to calculate the utilities. %TRB was calculated using the formula (see Klein and Yadav 1989):

\[
\frac{\text{Util. of Subject's Choice} - \text{Util. of a Random Choice}}{\text{Utility of TRB} - \text{Utility of a Random Choice}}
\]
The resulting number offered the percentage of the TRB's total utility represented by the subject's brand, after standardizing each for the value of a random choice.

One additional measure was also calculated which did not have the decision quality disadvantages of linear weighted models. This alternative measure (VALG) relied on each subject's own perceptions as to the value of their switch to another brand. A brand switch which did not result in a large amount of perceived additional utility, would lead to the conclusion that the original choice was at least pretty good, since a switch to the best comparative brand resulted in only a small gain in utility.

**Dependent Variable: Format Evaluation Measures**

No validated and reliable measures of decision maker evaluations of information formats and/or decision aids have been reported in the literature. Instead, single items or scales that have not been subjected to psychometric analyses have been used in previous research (Widing, Burnkrant and Talarzyk 1986, Widing and Talarzyk 1992, Russo, Staelin, Nolan, Russell and Metcalf 1986, Bettman and Zins 1979). Adequate testing of the previously discussed hypotheses requires the development of valid and reliable scales for this purpose.
Two dimensions have been identified in past research as being of key importance in evaluating a decision process. These include the quality or accuracy of the decision and the effort expended in making the decision (Bettman and Zins 1979; Keller and Staelin 1987; Klein and Yadav 1989; Russo, Staelin, Nolan, Russell and Metcalf 1986; Widing, Burnkrant and Talarzyk 1986). Indeed, these dimensions are interrelated as a tradeoff has been assumed to exist between them. A third dimension, the difficulty encountered in making a decision is also key, especially in the case of aided decision making. To be effective, decision aids should help reduce the difficulty experienced during choice, thereby reducing the effort expanded and enhancing decision accuracy; that is, both reducing effort and improving accuracy might be simultaneously attained through the reduction of difficulty. Hence, this third dimension is particularly important to add in the study of decision aids. This dissertation, in developing measures for these three dimensions, will largely follow the scale development paradigm of Gerbing and Anderson (1988).

Widing, Burnkrant and Talarzyk (1986) found in a pilot study that the context in which subjective reactions were assessed, was an important aspect in
developing sensitive measures. When no basis for comparison was provided, the measures of difficulty and accuracy did not discriminate among different decision aids on subjective evaluations. When the questions were framed in the context of comparing the computer assisted format to having the same brand information presented in alphabetical order on a sheet of paper (e.g., a magazine page), decision aid format differences were found. Therefore, a common benchmark for subjects to compare their formats against was important in attaining sensitive measures. Further, an alphabetical ordering is a standard non-assisted method of presenting information. This study used this framing of the items for all three dimensions.

In summary, unidimensionality of the difficulty and accuracy dimensions were not studied in a confirmatory manner by Widing and Talarzyk (1992). Further, the "mental effort" dimension was not used at all. The next section will attempt to shore up these deficiencies.

Subjective Evaluation Item Development

The items developed in the exploratory study by Widing and Talarzyk (1992) were used to assess the difficulty (Items # 1, 4, and 8 in appendix XI section IV and appendix XII section I) and accuracy (Items # 3, 7, and 9 in appendix XI section IV and appendix XII section
I) dimensions. Three items were also developed here, using the same literature cited earlier for the difficulty and accuracy dimensions, to measure the effort dimension. The three items measured the amount of "thinking", "mental effort" and "thought" required to complete the decision task, (Items # 5, 6 and 10, in appendix XII section IV and appendix XIII section I). After using the CADA to complete the word processing choice task, subjects were asked to assess the decision aid's ability to reduce the difficulty of the task, the effort required to complete the task, the (perceived) time of the task, the accuracy of the decision, and their overall satisfaction with the format. The frame of reference used was "in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper" (random order was used instead of alphabetical order since randomly generated three digit numbers were used to identify brands).

In order to provide the subjects feedback about any decision errors they may have made, they were asked, following the choice task, to compare their chosen brand in a paired fashion with up to 7 other top brands. After the paired comparison, in which subjects were given the opportunity to switch to another brand, subjects once again rated their CADA format on the three dimensions and
overall satisfaction using the same questions as before (see appendix XII for the pre-comparison instrument and appendix XIII for the post-comparison instrument). Verbal instructions were given to subjects prior the final format evaluation questionnaire which explained that some of the questions would seem redundant with questions on earlier questionnaires (see appendices IVd, Vd and VIId). They were told that the questions were important and that they should treat each as if it were the first time they had seen the question, answering it in the way that best reflected their current feelings on the subject. The final questionnaire also contained a attribute importance weight and minimum score questionnaire for Word Processing programs. This was included to compare the importance of the attributes across three formats, as only CAL subjects actually inputted weights during their task.

The next chapter presents the results of the experimental sessions. The first part discusses the decision quality results of H1 to H9. The final part discusses the subjective evaluation results of H10 to H23b.
Chapter V

PART I: DECISION QUALITY RESULTS

Decision Set Attractiveness Manipulation (H1 to H3)

One of the primary areas of interest for this study was the development of a more precise definition of a difficult decision environment. Previous research had detected a reduction in decision quality when negatively correlated attribute scores were present. Two decision sets were created to see if negative correlations alone were sufficient to create a difficult environment (more attractive environment), or whether the addition of low (unattractive) attribute scores on the negatively correlated attribute were also required (less attractive environment).

Hypotheses 1 to 3 predicted that the less attractive decision environment (LA) would lead to a greater amount of switching behavior than the more attractive environment (MA) for the CAL, CAC and EWRO formats respectively. Using switching behavior as the measure of decision quality, the results presented on table 2 (Match variable) offer weak mixed support for the hypotheses, as the only (moderately) significant (p < .1) result was in the wrong direction for the EWRO format, as the LA cell had 63% who stayed with their original choice (Match

75
variable), while the MA cell had 46%. With that one counter hypothesis (H3) exception, the switching behavior was in the expected direction, offering weak support for H1 and H2. For the CAL format the LA and MA results were 51% vs. 61% respectively. Similarly for the CAC format, the difference was 50.0% vs. 57.9%, both non-significant.

**Modified Switching Variable Results**

From the perspective of the information provider, switching behavior attributed to subject's changing their mind on a brand should probably not be blamed on the decision tool to the same extent. Decision makers can change their minds after further deliberations on their choice without it being the fault of the decision aid, as long as the information was presented in an understandable and accessible manner. Hence an argument can be made that switchers who merely changed their minds should not be grouped with switchers who changed brands for some other reason.

Modifying the switching dependent variable, by classifying switchers who "changed their mind" (rather than made a decision mistake) as non-switchers, resulted in two changes to the previously described relationships (see table 2). First, the previously non-significant difference between the less attractive set CAL cell and
the more attractive set CAL cell predicted by H1, became moderately significant (p < .1). Second, the counter H3 difference between the less attractive and more attractive set EWRO cells, turned non-significant with the modification of the switching variable. The other hypotheses predicting differences, remained non-significant.

**Alternative Measures of Decision Environment Difficulty**

**Results**

Unlike the switching measure, which did not show a great deal of significant differences between the two decision sets, the linear based alternative measures of decision environment difficulty did provide support for hypotheses H1 to H3 (see table 2).

TOP% and AVGRNK results indicated that the linear predictability was most severely effected in the LA cells, indicating a more difficult environment than MA cells for all three formats as predicted by H1 to H3 (p < .05 with the exception of EWRO TOP% which was moderately significant p < .1). For the CAL users, the results for the TOP% measure showed that 28.6% of LA subjects chose the top ranked brand, while 38.9% did in the MA cell. AVGRNK means reflected the lower level of predictability as the mean rank of the brand chosen by LA subjects was 4.29 for the LA cell and 2.47 for the MA cell. The CAC
results mirrored the CAL cells as the LA/MA means for the AVGRNK measure were 3.61 and 2.58 respectively, and for the TOP% 13.9% and 22.9%. Results for the EWRO cells on these two measures present an interesting contrast to the switching measure, where the LA cell mean was unexpectedly better than the MA cell mean. For the AVGRNK measure, the overall LA/MA results were 3.67 and 2.68 respectively. For the TOP% measure the results were 22.9% and 40.0%.

A potential weakness of the TOP% and AVGRNK measures involves their inability to indicate the amount of utility lost by not choosing the linear determined top ranked brand. If differences in utility among the top ranked brands were very small, the significant differences found between the MA and LA cells using the TOP% and AVGRNK measures would be largely irrelevant. The %RAND and %TRB measures, while also linear based (see the calculations in the methodology section), do allow the assessment of the utility losses associated with the choices made by subjects in different decision environments.

As table 2 shows, the two variables provide mixed support for H1 to H3. There were no significant differences across the attractiveness manipulation for the %RAND measure, as all cells had a mean value
(utility) enhancement of 21 to 24% for the subject's choice over the utility of a random choice. Using %TRB as the criteria for determining decision environment difficulty, however, offered support for H1 to H3. The MA cell means for the %TRB variable were all significantly higher (p < .05) than the comparison LA cells as expected, with a range of 75 to 82% for the LA side and 85 to 90% on the MA side. The results of this measure do not support the conclusion that there were no meaningful differences in utility between the top ranked brand and the subject's own choice. They do seem to indicate, however, that MA subjects came significantly closer to achieving TRB utility with their choice, than their LA counterparts, indicating greater decision environment difficulty in the LA cells.

The final measure of decision environment difficulty, the non-linear based VALG, showed no significant differences between the LA/MA cells on any of the three formats, with only H1 receiving weak directional support. This would indicate that LA subjects did not find their switch to another brand brought them higher perceived utility enhancement over their MA counterparts, indicating similar levels of difficulty.
These alternative measures of decision environment difficulty offered mixed support for H1 to H3. The non-linear based VALG measure did not reveal any significant differences between the LA and MA cells for any of the formats. This was not the case with the linear based measures, with the exception of %RAND, which indicated that the LA cells was significantly more difficult than comparable MA cells. For MA EWRO subjects, this was a striking contrast to the switching measure results, as they unexplainably switched to other brands significantly (p < .1) more frequently than their LA counterparts when given the opportunity.

The overall evidence, using the multiple measures of decision quality, seemed to indicate that the LA environment is somewhat more difficult than the MA environment. Yet the TOP% measure results show that linear predictability is fairly low (23% for CAC to 40% EWRO) even in the less difficulty MA cells, indicating a still fairly high level of difficulty. This is further reinforced by the switching measure in the MA cells, as the negative correlation alone continued to result in a fairly substantial amount of switching behavior (54% in the EWRO to 39% in the CAL).
Between Format Differences (H4 to H9)

For the less attractive environment (LA) cells, the CAL and EWRO formats were predicted to show significantly less switching behavior than the CAC format (H4 and H6). The CAL and EWRO were predicted to have similar levels of switching behavior (H5). While the CAL and EWRO format did show more non-switching behavior than the CAC format (51%, 63% vs. 50.0% respectively) they were not significantly different (see tables 3, 4, and 5).

The lack of significance, can in part be linked to the unexpectedly good performance of LA CAC subjects in this study (see table 5). For no apparent reason, CAC subjects in the current study switched far less (50.0%) than similar subjects, using the same format and brand set, in an earlier study by Widing and Talarzyk (1992) where 75.9% switched. Seemingly subjects in the current study made fewer screening errors, as they made only half as many switches, as subjects in the earlier study.

The first suspicion as to the cause of this between study difference centered on a slight difference in the training procedure used during the studies. An additional warning, inadvertently dropped from the script used in the earlier study, was given to CAC subjects during the current study. Subject were told, after they
had found their favorite database brand in the training
exercise, to notice:

Even your preferred brand is likely to have low
scores on one or more attributes. As you can
see most brands do not have universally high
scores on all six attributes, so do keep that
in mind when you set your own cutoff values.

This instruction was followed with a warning about
setting cutoffs which might eliminate a very good brand
from appearing on their screen, even if it missed only
one cutoff by one tenth of a point. This added
instruction does not appear to have been the culprit, as
subjects in the current group actually set slightly more
restrictive cutoffs, and the importance of the negatively
correlated Ease of Learning attribute did not
significantly change over the 3 year period since the
previous data collection. The attribute received the
third highest (restrictive) cutoff, while in the earlier
study it was fifth. The slightly higher cutoff on the
negatively correlated attribute in the current study,
also decreased the maximum number of brands (mean value
for the cell) which appeared on any screen was 10.3
brands for the earlier study, to 8.83. The earlier
study's lower cutoffs and consequent higher number of
visible brands, would indicate that it was not screening
errors which caused the higher number of switchers in the
erlier study. It would appear that the extra warning
during training was totally ineffective at lowering cutoffs so that screening errors would be reduced.

Other training procedures were identical and the self-reported training measures for both groups were not significantly different. Another possible explanation was a difference in the computer or word processing experience of current users, versus those of 3 years ago. More experienced users might be more sure of their choice, and hence less likely to switch. The results do not support this explanation, however, as there were no significant differences between the CAC, CAL and EWRO subjects on computer or word processing familiarity in the current study (see table 1), nor was there any difference between the self-reported CAC subject familiarity between the current study and the previous study.

The unexpectedly good performance of LA CAC subjects, when using switching behavior as the measure of decision quality, is reinforced by the results of the alternative measures of decision environment difficulty. While these other measures, with one exception, are based on linear weighted models, which makes their use as measures of decision quality questionable in difficult decision environments (see the discussion in the methodology section), the results are presented to show a
more complete picture of the between format differences in decision quality.

Unlike the results of the attractiveness manipulation, these alternative measures did not offer any supporting evidence for either of the hypotheses predicting between format differences (H4 and H6). The decision quality of all three formats were virtually identical (providing additional support for H5), as the CAC format performed well, with scores on the AVGRNK, %RAND, and %TRB that were actually nominally better than either the CAL or EWRO formats (see tables 3, 4 and 5).

On the MA side, there was a similar result. Unlike the LA side, however, H7, H8 and H9 predicted no differences among the three formats. The hypotheses were supported by the results, as no significant differences were found on any of the alternative measures (see tables 3, 4 and 5). While not significant, the EWRO format had a nominally lower level of non-switching than either the CAL or CAC formats (46% vs 61% and 58% respectively).
PART II: SUBJECTIVE EVALUATION RESULTS

The final main area of interest for this research deals with how well people like CADAs. If decision makers are to reap the benefits of CADA usage, they will need to use the systems repeatedly in many purchase decisions. Repeated usage is unlikely to occur, however, unless they evaluate their experience with the aid favorably. In order to find out how well people like CADAs after using them in either a more or less difficult decision environment, and after receiving choice quality feedback, subjects were asked to rate their decision aid format on four dimensions: perceived difficulty, mental effort, accuracy and overall satisfaction. This was done immediately after they had completed their choice task, using the CADA, and also after they had an opportunity to switch during paired comparisons and receive feedback about their decision accuracy. Results from both sets of measures are discussed. Before presenting the subjective evaluation results, however, the adequacy of the measures must first be established.

Measurement Characteristics of Subjective Items

Reliable and valid measures were required to test the subjective evaluation hypotheses of this study. Gerbing and Anderson (1988) cite establishment of
unidimensionality as key area of concern before reliability can be assessed. To establish unidimensionality, the individual items, which measure the dimensions of interest, should load together on factors which represent the dimension, while not loading heavily on other dimensions.

Although unidimensionality cannot be established with an exploratory factor analysis alone (Gerbing and Anderson 1988), the results of this analysis are presented on table 8 for comparison purposes with the results of Widing and Talarzyk (1992). The items were first subjected to a common factor analysis, using a maximum likelihood extraction with an oblique rotation (oblimin). The pattern matrix indicated that the items for each factor loaded strongly on the hypothesized dimensions, with the lowest loading being .656 (see tables 9 and 10 for all unidimensionality results). The cross loadings were also reasonably low, with the highest load being .253, and 15 of 18 cross loadings being .10 or below. These results are consistent with those of Widing and Talarzyk (1992) on the difficulty and accuracy dimensions.

The eigenvalues (accuracy = 4.65; effort = 1.96) and variance explained (accuracy = 51.6%; effort = 21.7%) were high for two factors, but somewhat lower for the
difficulty dimension (eigenvalue = .70; variance explained= 7.7%). This differs from Widing and Talarzyk's results, in which the difficulty dimension had an eigenvalue of greater than one. Nevertheless, the scree plot showed a drop-off and flattening after the third factor. Since no items were found to be deficient using the common factor analysis, all were retained for the confirmatory analysis.

The results of the 3 factor restricted (confirmatory) analysis are presented on table 9. The analysis was performed using the EQS statistical package. The covariance matrix was analyzed using a maximum likelihood solution. Each item was set to load only on its own factor and the factors were allowed to correlate. The overall chi-square was significant at $p < .05$ (chi square = 41.0, 24 degrees of freedom, $p = .016$). Due to the fairly large sample size ($n = 215$), however, this was not unexpected; further, the moderate chi-square relative to the degrees of freedom suggest an acceptable fit to the data. High scores on three goodness of fit indices suggest that the 3 factor model fits the data well, as the Bentler-Bonett (B-B) non-normed fit index was .97, the B-B normed fit was .98, and the Comparative Fit Index (CFI) was .99. Error was also low, as indicated by the average absolute standardized residuals (ASR) of .028 and
the average off-diagonal ASR of .033. The loadings for each item ranged from .75 to .87, with all T values exceeding 12 (p < .001). These results exceed those required for establishing that the constructs were well measured and achieved unidimensionality (Bagozzi and Yi 1988).

Finally to establish with even greater certainty the discriminant validity of the three dimensions, two additional steps were undertaken. First the three factor model was tested on the pre-feedback measures of the same dimensions. Because subjects did not have the opportunity to receive feedback on their choice behavior, these measures are perhaps not as true as those which were gathered after feedback, none the less the model still showed very good levels of fit with the data (see table 9). The Bentler-Bonett (B-B) non-normed fit index was .92, the B-B normed fit was .91, and the Comparative Fit Index (CFI) was .94. Error was also low, as indicated by the average absolute standardized residuals (ASR) of .038 and the average off-diagonal ASR of .048. The loadings for each item ranged from .65 to .87, with all T values exceeding 9 (p < .001). These results also exceed those required for establishing that the constructs were well measured and achieved unidimensionality (Bagozzi and Yi 1988), while also
supporting the retention of a unique difficulty dimension.

The second confirmation of the unidimensionality of the three dimensions was undertaken by conducting a chi-square test of differences. This was accomplished by running three models, the first model set difficulty and accuracy to one, the second model set difficulty and effort to one, and the third set accuracy and effort to one. A non-significant difference in chi-square between the base line three factor model and the three alternative two factor models, in which the possible combinations of two dimensions were forced to load together, would have indicated that a two factor model would more efficiently fit the data. As table 10 indicates, however, the difference between the base line three factor model and each of the three alternative models were highly significant for both the pre and post-feedback measures of the scale items (p < .05). While the factor correlation matrix indicated that the three dimensions were related to each other, as was expected, this analysis of discriminate validity supported the retention of all three dimensions.

**Scale Reliability**

Following the scale development paradigm of Gerbing and Anderson (1988), reliability was assessed after
unidimensionality was established (see table 11). The reliability of the scales, assessed using Cronbach's Alpha, was .898 for mental effort, .846 for difficulty, and .890 for accuracy. Reliability levels were consistent at the individual format level as well, as the mental effort, difficulty and accuracy alphas for the CAL format were .884, .844 and .899, the CAC format .937, .823 and .874, and for the EWRO format .847, .856, and .893 respectively.

The reliability of the measures was further reinforced by the similarly high alphas for the pre-feedback measures of the same dimensions. The reliability of the scales was .818 for mental effort, .801 for difficulty, and .798 for accuracy. Reliability levels were also consistent at the individual format level as well, with the mental effort, difficulty and accuracy alphas for the CAL format at .844, .847 and .782, the CAC format .823, .746 and .780, and the EWRO format .856, .811, and .804 respectively. These reliabilities are considered to be quite adequate (Nunnally 1978).
Decision Environment Attractiveness and Subjective Evaluations (H10 to H14)

The decision environment was predicted to have an impact on subjective evaluations of the decision aid. Because choice conflict was predicted to be greater in the less attractive (LA) environment, subjective evaluations on all four subjective criteria were predicted to be less favorable than for the more attractive (MA) choice environment. The results are presented on table 12. It should be noted that because of the way the subjective evaluation items were framed, a lower mean on the results indicated that the CADA was more favorably evaluated.

H10 predicted that the less attractive (LA) environment would have less favorable evaluations of decision difficulty than the more attractive (MA) environment. H10 was supported by the results, as the means in the MA environment, for both the pre and post-feedback measures, were significantly more favorable. MA environment pre and post-feedback means were 3.49 and 3.52 respectively, while they were 3.20 and 3.05 on the less attractive side. The slight widening of the gap after the paired comparisons increased the significance level of the post difference to $p < .05$. 
H11 predicted the mental effort evaluations would be less favorable in the less attractive environment. Results supported the hypothesis, as both the pre and post-feedback measures of mental effort were significantly more favorable on the MA side. Mean scores for the pre and post-feedback measures of effort were 3.64 and 3.57 for the MA environment respectively, while they were 3.26 and 3.28 on the LA side. The slight narrowing of the gap between the post measures dropped the significance level to \( p < .1 \).

H12 predicted that the general level of decreased confidence in choice followed by more switching behavior would make accuracy perceptions less favorable in the LA environment. Results offered weak support for this hypothesis, as the across environment differences were in the predicted direction for both the pre and post-feedback measures of accuracy, but only in the case of pre-feedback measure did the gap achieve significance \( (p < .1) \), with LA/MA means of 3.67 and 3.40 respectively.

H13 predicted that the greater levels of difficulty, effort, and inaccuracy found in the LA environment, would result in less favorable overall satisfaction evaluations as well. The results did not support this hypothesis, however, as there were no significant differences between the LA and MA environments on this variable. Directional
support was modest, as the more attractive side had a
nominally more favorable overall satisfaction rating
(2.98 vs 2.75 pre measure, 3.26 vs 3.02 post measure).

These overall differences, however, were not
consistent at the individual format level (see table 13).
The CAL format, and to a lesser extent, the EWRO format
results supported H10 and H11, as difficulty and effort
ratings were more favorable in the MA environment than
they were in the LA environment. For the CAL format, the
significance of the differences were identical to the
overall results, with the exceptions of the post-feedback
effort and pre-feedback accuracy dimension differences
(which were significant at p < .05 rather than at p < .1). The post-feedback measure of accuracy and all
measures of overall satisfaction remained non-
significant.

For the EWRO format, the difficulty dimension
measures remained significantly more favorable on the MA
side, just as they were with the overall results. Effort
dimension measures, however, were not significantly
different, although they were nominally in the
hypothesized direction. All measures of accuracy and
satisfaction remained non-significantly different.
In contrast, the CAC format had no significant differences on any of the four subjective evaluation categories. Directional support was also mixed, as the MA side pre-feedback difficulty measure and post-feedback effort measure were actually less favorable than on the LA side. It would appear that the attractiveness manipulation did not have an impact on the CAC difficulty and effort dimension evaluations, as it did with the CAL and (to a lesser extent) the EWRO formats.

A possible explanation for this between format difference was that CAL and EWRO subjects had all 30 brands appear on the screen and therefore searched and evaluated more brands than CAC subjects. CAC subjects were able to reduce the number of brands on the screen through the process of setting restrictive attribute cutoffs, and could consequently reduce the difficulty and effort of the task. The attractiveness manipulation would only multiply this difference, as the less attractive condition could make the decision task more stressful for the CAL and EWRO subjects by forcing them to expand their search across a larger number of brands, because of their uneasiness with the fairly low scores on the negatively correlated attribute. For the CAC subjects, the situation could be somewhat different, as the same level of cutoffs on the less attractive side
would actually lead to fewer brands appearing on the screen than on the more attractive side.

As table 14 shows, the results seem to offer some support for this scenario. While there were no significant differences across the LA/MA manipulation, CAL and EWRO format subjects on the LA side evaluated and considered a nominally larger number of brands than their MA counterparts. The exact opposite was true for the CAC subjects, as LA subjects saw, evaluated and considered nominally fewer brands than their MA counterparts. If lower levels of difficulty and effort are associated with having to study fewer brands, failure of the attractiveness manipulation to achieve the hypothesized effect on CAC subjects, could be at least partially explained by these results. Furthermore, because only brands exceeding the cutoffs appeared on the screen, CAC users never had the opportunity to analyze the severe attribute score tradeoffs present on the CAL and EWRO screens.

The results also indicate that accuracy and overall satisfaction evaluations are not effected by the difficulty level of the environment. Difficulty and effort evaluations, did seem to be responsive to the environment, as they were significantly lower on the less attractive side. These results, however, are driven by
the reactions of CAL and EWRO users, giving the CAC format an advantage over its rivals on these dimensions (if the reduction does not also screen out a preferred brand(s)), as its users seem to be unaffected by the difficulty of the environment.

**Impact of Negative Feedback on Subjective Evaluations**

(H14a to H14d)

While H10 to H13 dealt with how a more difficult decision environment influenced subjective evaluations of a CADA, this section looks at how negative decision quality feedback impacted those evaluations. After receiving feedback on their brand decision (giving each subject an opportunity to switch during the paired comparisons), H14a to H14b predicted that switchers would not shift their pre-feedback evaluations of difficulty and mental effort respectively. H14c and H14d predicted that negative decision quality feedback would result in less favorable post-feedback evaluations of accuracy and overall satisfaction, respectively, than their pre-feedback counterparts.

The results, presented on table 15, supported the hypotheses. Difficulty and mental effort evaluations were not significantly (p < .1) effected by negative decision quality feedback. Accuracy was effected, as it
went from 3.52 on the pre-feedback measure, to a less favorable 3.89 on the post measure (p < .05). Results were similar for overall satisfaction, as the pre-feedback rating was 2.78, while the post measure was a significantly less favorable 3.35 (p < .05). Unlike the accuracy and overall satisfaction evaluations, which were directly linked to negative choice quality feedback, it would appear that the indirect link that difficulty and effort had on decision quality, kept them from being blamed for the decision errors subjects were exposed to during the switching opportunity.

Individual format reactions to feedback did not completely conform to the overall results (see tables 15 and 16). While pre/post-feedback evaluations of difficulty and mental effort were not significantly different (p < .05) on any of the formats, as expected, the blame for the inaccuracy of the format was not equally distributed among the three formats. Unlike the overall across format results, where a switch did result in a significant decrease on the post-feedback accuracy evaluations, the CAL format did not experience a significant decrease (3.37 pre-feedback vs. 3.39 post). Both the CAC and the EWRO formats did mirror the overall results, as they became significantly less favorably evaluated on the accuracy dimension after negative
feedback (3.75 to 4.28, p < .05 for the CAC and 3.41 to 3.93, p < .05 for the EWRO format). While it was expected that the CAC format would be blamed more for decision errors than the CAL and EWRO formats, it appears that the EWRO format was not spared the wraith of its users any less than the CAC format.

Individual format results for the overall satisfaction dimension were more consistent with the overall across formats results (see table 16). The CAL format did experience a moderate (p < .1) drop-off in its satisfaction evaluation after negative feedback (2.53 to 2.93 pre/post respectively). A similar decrease was also found on the EWRO format (2.71 to 3.19, p < .1). The CAC format, however, took a bigger blow on its satisfaction evaluation, as it dropped significantly from 3.06 to 3.86 (p < .05).

The reason for the switch had a great deal of impact on the subjective evaluation of the format after feedback. Table 17 shows the evaluations of three groups of subjects within each format. Those in column one were subjects who did not switch from their original choice, and hence did not receive any negative feedback. Subjects in column two switched to another brand, but reported that they had seen and evaluated (during the choice task) the brand they switched to. Subjects in
column three reported never before seeing the brand they switched to during the paired comparison session, even though all brands were displayed in the EWRO and CAL formats nor were necessarily screened out in the case of the CAC format. Having claimed to have not seen the brand they ultimately switched to, subjects in column three would be expected to place the greatest blame on the format for their negative decision quality feedback, while those in column one would be expected to place the least blame on the format.

As table 17 indicates, feedback played only a limited role in the evaluations of CAL subjects. Only on the difficulty and mental effort dimensions were there significant differences between those who switched and those who did not. Feedback did not appear to be the reason for this differences, as the pre-feedback measures were also significantly different for both dimensions. Furthermore, feedback did not cause evaluations to become less favorable, even for the switcher groups (columns 2 and 3). On the accuracy and satisfaction dimensions, there were no significant differences across any of the columns or across the pre or post-feedback measures.

For the CAC format, feedback made an important contribution to the subjective evaluations given to the format. As table 17 indicates, post-feedback evaluations
of the accuracy and satisfaction dimensions for switchers who claimed to have not seen the brand, were significantly less favorable than their pre-feedback evaluations \((p < .05)\), and post-feedback evaluations of subjects who did not switch. Subjects in column two, who presumably switched because they changed their minds on a brand they had previously seen, were not significantly more severe in their evaluations than subjects who did not switch, indicating perhaps a lower level of blame being placed on the format. While not significant, the post-feedback satisfaction measure for column two subjects actually became more favorable after the switching occurred \((3.45 \text{ to } 3.36)\).

For the EWRO format, table 17 indicates some differences in evaluations which also appear to be related to the context of the feedback. Subjects in column two, who switched but reported to have previously seen the final brand chosen, actually had more favorable evaluations on all but one of the measures for all the dimensions \(\text{(the exception being the post-feedback difficulty measure)}\). While these differences were not significant, they do indicate that switching alone cannot be claimed as the reason for less favorable format evaluations. Only in the cases of the difficulty dimension in column two and the accuracy dimension in
column three, does feedback appear to have created a significantly less favorable post-feedback evaluation.

The next three sections will review the results from the between format comparisons of each format's subjective evaluations (see table 18 for CAL vs. CAC, table 19 for CAL vs EWRO, and table 20 for CAC vs EWRO results). With their nearly equal decision quality performances, subjective evaluations might prove to be the most important criteria used by information providers to select the CADA format they offer to the public.

**CAL vs. CAC Hypotheses (H15a to 19b)**

The CAL format was predicted to be evaluated at the same level as the CAC format, except in cases where switching behavior occurred. CAL subjects who switched were predicted by H15a to have more favorable post-feedback accuracy ratings than equivalent CAC subjects, because of the greater blame placed on the format by CAC users. This proved to be the case, as the post-feedback measures were significantly different from each other (CAL mean 3.39 vs. 4.28 for CAC, p < .05). This perceived drop in accuracy, was also expected to create a difference in the post-feedback overall satisfaction evaluations for the CAL and CAC formats. H16a was supported as the post-feedback measure was significantly
(p < .05) more favorable for the CAL format (2.93) than for the CAC format (3.85).

This result is further reinforced by the pre/post-feedback comparisons. For the CAL format the pre-feedback accuracy mean was 3.37, virtually the same as the post-feedback measure of 3.39 (t = .07, p > .1). The CAC format pre-feedback accuracy mean was 3.75, which was significantly more favorable than the post-feedback mean of 4.28 (t = 2.66, p < .05). While the pre-feedback accuracy measure was nominally more favorable for the CAL format, the difference was not significant (t = 1.02, p > .1). Results were similar for the satisfaction measure. The CAL pre-feedback satisfaction mean was 2.53, nominally more favorable than the post measure of 2.93 (t = 1.40, p > .1). The CAC pre-feedback measure mean was 3.11, significantly more favorable than the post-measure of 3.75 (t = 2.34, p < .05). The CAL was also nominally more favorably evaluated on the pre-feedback measure, but the difference was not significant (t = 1.41, p > .1).

While the negative feedback was hypothesized to create a between format difference between the CAL and CAC formats on the accuracy and overall satisfaction, subjects who received no negative feedback (because they did not switch), were not expected to create a between format difference on either the accuracy or overall
satisfaction dimensions (H17a to H18b). As predicted, there was no significant difference between the CAL and CAC formats on the post-feedback accuracy dimension, for subjects who did not switch (3.29 for the CAL vs. 3.57 for the CAC). Similarly, the overall satisfaction evaluations between the two formats, for those who did not switch, were not significantly different on the post-feedback measure, supporting H18a (2.67 for CAL vs. 2.98 for CAC). For non-switchers, there were also no significant (p < .1) differences between the pre and post measures for either the CAC or CAL formats on either the accuracy or satisfaction dimensions. The across format differences on the pre-feedback measures were also not significant, although the CAL format was nominally more favorably evaluated. This lack of significant differences, provided additional support for H17a and H18a.

H17b and H18b predicted that CAL pre-feedback measures of accuracy and overall satisfaction, would not be significantly different from equivalent CAC measures. Results were mixed, as the pre-feedback accuracy measures were not significantly different (3.28 for CAL vs. 3.63 for CAC), although the CAL format was nominally preferred. The strength of that preference was strong enough to be significant on the overall satisfaction
measure, as the CAL format mean was 2.52, while it was 3.09 for the CAC (p < .05), not supporting H18b. Unlike the Widing and Talarzyk (1992) results, it appears that the CAL format was at least nominally preferred on both dimensions, even when no negative feedback was encountered. It also appears that CAC subjects reacted to negative feedback by much more severely down grading their accuracy and overall satisfaction evaluations than CAL subjects. This result supports the proposition that CAC subjects blame the format more than CAL subjects for their decision errors.

Primarily because negative feedback was not expected to make a difference in evaluations on difficulty and mental effort, evaluations were hypothesized to not be significantly different between CAL and CAC users on those dimensions (H19a and H19b). The results supported both hypotheses, as there were no significant differences on the dimensions between the two formats. Pre-feedback scores for the difficulty and effort dimensions were 3.18 on both for the CAL format, and 3.35 and 3.26 respectively for the CAC format. The post-feedback measures were 2.99 and 3.18 for the CAL format and 3.26 and 3.31 for the CAC format.

While switching did create the gap which made the CAL format more favorably evaluated than the CAC format
on accuracy and overall satisfaction as expected, the CAL format was at least nominally preferred on all the remaining dimensions and measures as well. This is particularly interesting for the difficulty and effort dimensions, because the slightly less favorable scores that the CAL format received on pre-choice training measure (see table 4 TS2) might have translated into less favorable evaluations of difficulty and effort, than those received by the CAC format. Clearly this was not the case, as subjects nominally preferred the CAL format on all measures of both dimensions.

**CAL vs. EWRO Hypotheses (H20a to H20d)**

The lack of the user interaction with the format, and the consequent lack of customized feedback on the screen, led to the hypotheses that the CAL format would be more favorably evaluated on the difficulty (H20a) and mental effort (H20b) dimensions. These hypotheses were supported by the results, as all pre and post-feedback measures for both dimensions were significantly different at the $p < .05$ level, with the exception of the non-significant pre-feedback difficulty measure (see table 19). Pre/post-feedback means for the effort dimension on the CAL format were 3.18 on each, while for the EWRO format they were 3.68 and 3.78. The means on the
difficulty dimension for the CAL format were 3.18 and 2.99, and 3.50 and 3.60 respectively for the EWRO format.

H19c predicted that the CAL format would have a more favorable accuracy evaluation than the EWRO format. This proved to be the case as both the pre and post-feedback measures were significantly more favorable for the CAL format (p < .05). The pre/post-feedback means for the CAL format were 3.28 and 3.33 respectively, while they were 3.70 and 3.89 for the EWRO format. H19d predicted that the CAL format would have a more favorable overall satisfaction evaluation than the EWRO format. The results provided moderate support for the hypothesis, as both the pre and post-feedback measures were significantly more favorable for the CAL format (p < .1). The pre/post means for the CAL format were 2.52 and 2.78 respectively, while they were 2.96 and 3.23 for the EWRO format.

As predicted, the CAL format generally received more favorable evaluations than the EWRO format, repeating the results of the Widing and Talarzyk (1992) study in which they compared a non-interactive Random Order format with the CAL format. These universally less favorably evaluations, as well as the lack of major differences among the three EWRO groups (columns) presented in table 17, indicate a general lack of enthusiasm for users of
the EWRO format, even in cases where the subject received no negative choice feedback.

**CAC vs. EWRO Hypotheses (H15b to H23b)**

As with the CAL/CAC comparison, CAC and EWRO evaluations were hypothesized to be dependent on decision quality feedback. In general, the interactive feature of the CAC format was predicted to make that format more favorably evaluated than the EWRO format, when subjects received no negative feedback (they did not choose to switch). The opposite was expected for the accuracy and overall satisfaction dimensions when switching occurred, because of the screening error induced blame placed on the CAC format. Feedback was not expected to have a significant impact on EWRO evaluations, as all the brands were always available on the screen.

H15a predicted that for subjects who switched, the EWRO format would receive more favorable accuracy ratings than the CAC format. The hypothesis was only weakly supported, as the post-feedback measures were not significantly more favorable for the EWRO format. The relationship was in the expected direction, however, as the post-feedback mean for the EWRO format was 3.94 versus a less favorable 4.28 for the CAC format (see table 20).
H16b predicted that the negative feedback switchers received would result in the EWRO format being more favorably evaluated on the overall satisfaction dimension, over CAC format. The hypothesis received moderate support, as the post-feedback difference was moderately significant (p < .1) in favor of the EWRO format (3.22 for EWRO and 3.85 for CAC).

These modest differences were more fully explained by looking at the results of pre-feedback measures. For those who switched, the pre-feedback accuracy measure for CAC users was 3.75 versus 4.28 on the post-feedback measure (t = 2.66, p < .05). The results on the same measures for the EWRO format were 3.41 (pre) versus 3.94 (t = 2.69, p < .05). The pre measure for the EWRO format was nominally, although not significantly, more favorable than the CAC format pre measure (t = 1.21, p > .1), mirroring the post-feedback difference.

The results are nearly the same on the satisfaction measure. There the CAC switchers significantly downgraded their evaluation after feedback, from 3.11 (pre) to 3.85 (t = 2.34, p < .05). EWRO switchers also downgraded their evaluations, but only nominally from 2.71 (pre) to 3.22 (t = 1.48, p > .1). As with the pre-feedback accuracy measures, the pre-feedback satisfaction evaluations only nominally favored the EWRO format (t =
1.05, p > .1). It would appear that EWRO subjects who switched, were more favorable to their format than CAC subjects, but that they also put some blame on their format for their decision errors, particularly on the accuracy dimension. While this is understandable in the case of the CAC users, where screening errors were possible and frequent, the reason for the blame which was assigned to EWRO format is not clear, as all 30 brands always appeared on the screen.

The CAC format, largely because of its interaction feature, was predicted to be more favorably evaluated in all other situations. H21a and H21b predicted that non-switching CAC format subjects would give their format more favorable evaluations, than non-switching EWRO subjects, on accuracy and overall satisfaction. H21a was only directionally supported by the results, as the CAC accuracy mean was 3.57, while the EWRO was a slightly less favorable 3.86. Results were similar for the overall satisfaction measure, which while in the predicted direction, were not significantly different on the post-feedback measures (2.98 for CAC and 3.24 for the EWRO). For non-switchers, there were also no significant (p < .1) differences between the pre and post measures for either the CAC or EWRO formats on either the accuracy or satisfaction dimensions. The across format
differences on the pre-feedback measures were also not significant, although the CAC format was nominally more favorably evaluated. These results indicate that the interactive feature of the CAC did not create a significant improvement over the EWRO format.

Pre-feedback measures of accuracy and overall satisfaction were predicted, by H21b and H22b respectively, to favor the CAC format, whether the subject would later switch or not. Results gave neither hypothesis much support, as the CAC format was only nominally superior to the EWRO format on the pre-feedback accuracy measure, 3.63 to 3.70 respectively. On the pre-feedback overall satisfaction measure, the EWRO format was nominally preferred to the CAC format, 2.96 to 3.09 respectively.

Since negative feedback was not predicted to significantly effect evaluations on the difficulty and mental effort dimensions, H23a and H23b predicted that the CAC format would be more favorably evaluated on both dimensions, over the EWRO format, whether or not the subject received negative feedback (switched). H23a was moderately supported, as CAC subjects were significantly (p < .1) more favorable on their post-feedback evaluations of the difficulty dimension (3.26 vs 3.60). The pre-feedback measure was not significantly different
(3.35 vs 3.50), although the difference was in the predicted direction. Results were similar for H22b, as the post-feedback measures on the effort dimension were significantly different in favor of the CAC format (3.31 vs. 3.78, p < .05). The pre-feedback measures, however, were not significantly different, although they nominally favored the CAC format (3.48 vs. 3.68).

Results of the CAC and EWRO subjective evaluations do not support either as being clearly superior to the other on the four dimensions. When subjects received negative decision feedback, the EWRO format received nominally more favorable ratings than those given by CAC subjects, yet the differences were typically quite small. When subjects received no negative feedback, the CAC format received more favorable evaluations on the accuracy dimension, but only nominally so. No negative feedback also resulted in the CAC format being nominally more favored on overall satisfaction, although neither the pre nor post-feedback measures were significantly more favorable than the EWRO format. Overall, the CAC format was more favorably evaluated on the difficulty and effort dimensions, but only significantly on the post-feedback measures. Decision quality feedback seemed to play only a modest role at creating rating differences between each format.
CHAPTER VI

DISCUSSION OF RESULTS

This study set out answer three main questions. First, it sought a more complete definition of a difficult decision environment. Second, it sought to determine which of three CADA formats offered the highest level of decision quality in both a less attractive (more difficult) and more attractive (less difficult) environment. Finally, it sought to discover the link between decision quality / environmental difficulty and CADA evaluations on four dimensions. So now that the study is completed, what can be concluded on these issues?

Decision Environment Difficulty Results Summary

1. What is required to make a decision environment difficult?

The results of the decision set attractiveness manipulation make answers related to the first question uncertain. While all but one of the predicted relationships were in the correct direction, the differences were not significant when switching behavior was used as the measure of decision environment difficulty (the results that were in the wrong direction for the EWRO format being significant at p < .1). The
failure of the attractiveness manipulation to achieve significant differences, in the case of H1, H2 and H3, appears to be the result of two unexpected performances.

In the less attractive (LA) decision set cell, CAC subjects experienced 34% less switching behavior than similar subjects did in a study by Widing and Talarzyk (1992), which used a nearly identical training procedure and decision set (75.9% vs. 50.0%, switching behavior). In addition, subjects on the MA side had more switching behavior than anticipated. Widing, Olson and Talarzyk (unpublished working paper) collected data for another project at the same time as the current study, which duplicated this study's CAL cells. While the LA CAL switching behavior was identical at 49% (51% non-switching) for both studies, their MA CAL cell had only 20% switching, nearly 20 points less than the identical cell in the current study. The failure to achieve switching behavior levels similar to other studies, which cannot be explained by subject background or experimental procedure differences and which would have provided support for the hypotheses (H1 to H3), indicates some level of inconsistency in the switching measure.

While the switching measure only provided directional evidence of a LA/MA manipulation effect (CAL and CAC formats only), most of the alternative measures
did show significant support for H1 to H3. Decision environment difficulty measures, particularly the linear based alternatives to the switching measure (TOP%, AVGRNK, %TRB), indicated that subjects in the more attractive decision set condition made nominally to significantly better brand decisions than their less attractive environment counterparts, suggesting a less difficult environment. Yet, these hypotheses confirming results are not supported by the results of the primary measure, switching behavior.

While there is some reason to believe that the MA side switching behavior of this study is abnormally high, the decision quality results and the low linear predictability levels (TOP%) do not rule out the conclusion that negative attribute conditions alone (the MA side) are sufficient to create at least a somewhat difficult decision environment. Because switching behavior was not significantly different between the less attractive and more attractive sets for either the CAC or EWRO formats, however, it appears that less attractive set subjects were just as satisfied with their lower ranked brand, as MA set subjects were with their higher ranked brand. Lynch (1979, 1985) noted that behavior such as this was likely caused by subject's attempts to avoid negative information, which in this case was more
severe with the lower scores on the LA side (which is the reason caution must exercised when using linear based decision quality measures).

The effectiveness of the difficulty manipulation, however, was provided some additional support by the subjective evaluation results. Subjects assigned to the less attractive environment gave their formats significantly less favorable evaluations than subjects in the more attractive conditions on the difficulty (H10) and mental effort dimensions (H11), offering support for the LA side being a more difficult environment. Accuracy and overall satisfaction differences across the two environments, however, were only nominally in favor of the MA environment, perhaps reflecting the only nominal differences in choice quality found using the switching measure. Overall, these results seem to indicate that negative correlations alone create a difficult environment, but that negative correlations along with low attribute scores create a somewhat more difficult decision environment.

**Decision Quality Results Summary**

2. Which of three CADA formats offers the best decision making quality in a difficult decision environment?
With regards to the second research question, the findings are mixed. All three CADA formats; the Computer Assisted Linear (CAL), the Computer Assisted Cutoff (CAC) and the Equal Weight Rank Order (EWRO) performed in a nearly equal manner in both decision environments, supporting H5, H7 and H9. While the CAL was for the most part nominally superior, using the switching measure of decision quality, the differences were small and non-significant.

The lack of between format differences stands in contrast with the results of Widing and Talarzyk (1992), who found the CAL format to be significantly superior to the CAC format in a difficult decision environment which was virtually identical to the LA environment used in the current study. H4 and H6, which were based heavily on the earlier results of the Widing and Talarzyk study (1992), predicted significantly better decision quality for the CAL and EWRO formats over the CAC format in the less attractive environment.

The lack of difference actually found among the formats also appears to have resulted from the unexpectedly high performance of the LA CAC subjects. Achievement of the Widing and Talarzyk results on that same cell, would have resulted in the significant differences predicted. Unlike the LA/MA manipulation,
however, the alternative measures (TOP%, AVGRNK, %RAND, %TRB) also indicated that the LA CAC subjects did as well as LA subjects using the other two formats.

**Alternative Explanations**

The apparent instability of the switching measure of decision quality, across the different studies, might be explained by differences in background not exposed in the earlier analysis of between cell and format differences. As table 6 shows, however, backgrounds of subjects who switched (MATCH = 0) and did not switch (MATCH = 1), were nearly identical. Only on training question 5 (understanding of attribute meanings) was there a significant difference between the two groups, and it was opposite the expected direction, as those that switched claimed to have had a better understanding.

One additional concern, presented in table 6, is the amount of time subjects took to make their decision. When completed with their decision task, subjects were asked to raise their hand so that a questionnaire could be handed to them (and so that their finishing time could be recorded, even though they were not told about the timing). This led to a concern that the raising of hands might have hurried subjects not yet completed with their decision task, creating a greater opportunity for a decision error. The mean time, however, is nearly
identical at just over three minutes, indicating that switchers were not overly represented in the slower group.

Another alternative to the apparent instability might be weighting differences between cells and formats. If subjects in one cell or format had used a substantially different weighting scheme, either internally with the CAC and EWRO formats, or externally as with the inputted weights of the CAL format, there may have been some major shifts in the brands that were seen and chosen, which could subsequently had led to either more or less switching behavior.

All subjects were asked to allocate 100 points to the 6 attributes and this allocation process revealed few differences in weighting or attribute importance rankings among the formats or cells. With the exception of the fifth and sixth most important attribute switching places across the two CAL cells, there were no across LA/MA differences in rankings or weightings on any of the three formats (see table 7). Ease of Use was the most important attribute in every cell, while Performance was second most important for the CAL, and third most important for the CAC and EWRO formats. Ease of Learning was second most important for the CAC and EWRO formats, while it was third for the CAL format. For the
negatively correlated Ease of Learning attribute, however, there were no significant \( p < .1 \) differences in the actual weights assigned across the format. Because the weighting was nearly identical on the negatively correlated attribute (Ease of Learning), the top scoring brands should have been the same for all cells. These results do not suggest that weighting differences could be a explanatory factor in the switching behavior instability.

The unexplainable contrast in results from other studies in which there were duplicate cells and similar conditions, leads to the conclusion that the switching measure of decision quality may be inherently unstable, and should perhaps be used in conjunction with other measures of decision quality. By doing so, the results suggest, on an overall basis, that CADA format has little to do with decision quality, as there were no significant between format differences \( p < .05 \) on any of the measures of decision quality (see tables 3, 4 and 5). It would appear that all three formats do a good and equal job in a combination of less attractive and more attractive decision environments, that are likely to be typical of the overall environment that any CADA system will be used.
The primary caveat in making that statement, however, involves the performance of the CAC format in the more difficult environment. Because its performance was so much better than the Widing and Talarzyk results, from which the less attractive side between format hypotheses were heavily based, it is unclear which performance is more representative of the actual performance which could be expected in the millions of trials that a real world CAC CADA system would be put through. If the lower levels of decision quality found by Widing and Talarzyk are the more realistic performance, then the use of the CAC format would have to be questioned in more difficult environments. With that warning in mind, the current results make the following section even more important, as subjective perceptions of the aids may be the criteria by which they and information providers select a CADA format.

Subjective Evaluation Summary

3. Will subjective evaluations of a CADA format change after choice quality feedback is received by the CADA user?

The final question of interest offers the clearest answer, as the CAL format was more favorably evaluated than either of the other two formats in the presence of negative decision quality feedback (results presented on
tables 18, 19 and 20). While the decision quality performance of the CAL format was not significantly different than that of the other two formats, it was more favorably evaluated than the CAC and EWRO on the subjective criteria. The differences were expected between the CAL and EWRO formats (H20a to H20d), but were not expected to the same degree between the CAL and CAC formats (H17a to H19b), particularly prior to the negative decision quality feedback.

Differences between the CAL and CAC formats were only nominally in favor of the CAL format for the most part, until negative decision quality feedback was introduced. When switching occurred, CAC subjects who reported not seeing the brand on the screen, reacted much more negatively, by significantly downgrading their accuracy and overall satisfaction evaluations. These decreases, which were much less severe for the CAL format (even when the subject reported not having seen the brand on the screen), made CAL post-switching evaluations on the two dimensions significantly more favorable than CAC evaluations on the same measures.

The overall comparisons, where both switchers and non-switchers (in both the more attractive and less attractive cells) were combined, however, offered stronger evidence of the CAL's superiority on all
dimensions than previous comparisons between the two formats. The CAL was nominally to significantly more favorably evaluated on both pre and post-feedback measures of all four dimensions. This is a somewhat different from Widing and Talarzyk (1992), who found that subjects rated the two formats equally on their pre-feedback measures of difficulty, accuracy, and overall satisfaction (no post-feedback measures were taken). In that study the difficulty dimension mean for the CAC format was 2.42, while it was 2.36 for the CAL format (p > .1). On the accuracy dimension the difference was 3.62 (CAC) versus a slightly more favorable 3.47 for the CAL (p > .1). On the satisfaction dimension, the CAC was slightly more favorably evaluated, with a mean of 2.95 versus 3.03 for the CAL (p > .1). Overall these nominal differences were smaller than for the present study, and mixed in direction.

For the current study, the differences were greatest on the accuracy and overall satisfaction dimensions, where the CAL subjects were significantly more favorably impressed with their format, while CAC subjects actually rated their format nominally lower than EWRO subjects on the post-feedback measure of overall satisfaction. These overall results are particularly relevant, because in normal usage situations, CADA users are going to
occasionally (at least) make decision mistakes and perhaps subsequently be given negative feedback on their decision. When this happens, CAC users seem to put far greater blame on the format than CAL users, perhaps because most of CAC users who switched made screening errors. This combined with the at least nominally lower evaluations prior to any negative feedback, may decrease the probability that CAC users will see the value of continued usage of the format in future purchase decisions.

The EWRO format, while seemingly simple to use, did not appear to offer any relevant advantages over the CAC or CAL formats. It was, at least nominally, the least liked format of the three, with the exception of the overall satisfaction dimension, where it was liked nominally more than the CAC, but significantly less than the CAL (p < .1). It also appeared to be blamed for negative feedback more than the CAL format on the accuracy dimension, although not as severely as the CAC format on overall satisfaction. It's supposed simplicity advantages were also not apparent in the training measures, as it appeared to be somewhat more difficult to learn than the other two formats, although the scores still indicated a high level of understanding.
Evaluations of the CAC and EWRO formats were virtually identical, as differences were typically only nominal and not significant. Negative decision quality feedback unfavorably effected the evaluations of both accuracy and overall satisfaction for both formats, but made the EWRO nominally more favorably evaluated. While the high level of screening errors (among those who switched), is the likely reason for the less favorable evaluations on the CAC post-feedback accuracy and satisfaction dimensions, there does not appear to be any clear explanation for the similar drop-off among EWRO switchers. Neither format, however, was ever even nominally more favorably evaluated than the CAL format on any of the measures.

The overall differences among the three formats suggests that more than screening errors and the interactiveness associated with each format is driving the evaluations. Since the CAC and EWRO formats had very similar evaluations on both the pre and post-feedback measures it would appear that the interactive feature of the CAC format did not provide it with a major advantage over its non-interactive rival. Furthermore, decision errors, whether caused by screening out brands with the CAC format, or for some other reason with the EWRO format, caused both formats to be significantly
downgraded on the accuracy and overall satisfaction dimensions.

This was not true for the more favorably evaluated CAL format, which did not suffer from post-negative feedback downgrading to the same degree. These findings, taken together, would appear to suggest that the task inputting importance weights, something only done by CAL users, explains part of that format's higher subjective evaluations, rather than or in addition to its interactive nature and lack of screening errors.

This negative decision quality feedback, however, did not have an equal effect on all the evaluative dimensions. On an overall basis, pre and post-feedback means were not significantly different from one another on either the difficulty or mental effort dimensions. This was not the case, however, on either the accuracy or overall satisfaction dimensions, where post measures were significantly (p < .05) less favorable than the pre-feedback measures (tables 15 and 16).

While the CAL format did seem to be more favorably received, all the formats were rated superior to a more conventional information source (the same information in random order on a sheet of paper), on all four subjective dimensions. Subjects appear to clearly see the advantages that a CADA offers in making choice tasks both
less burdensome and more accurate and satisfying, even after receiving negative decision quality feedback. This offers hope that they might be used in some decision situations and provide the benefits to both individuals and the overall economy that better decision making should result in.

**Additional Contributions**

This study also makes an additional, non-hypothesized contribution to the decision aid literature by its development of scale items measuring difficulty, mental effort and accuracy which displayed outstanding measurement characteristics. While the items were developed after reviewing the decision aid literature, no previous research effort has developed items measuring all three dimensions and tested them in a confirmatory manner.

Exploratory and confirmatory factor analysis showed that the three dimensions to be distinct and separate constructs. The items also displayed high levels of reliability. Furthermore, these characteristics remained intact and consistent in both the pre and post-feedback administrations of the scales.

While the measures were consistent in their qualities, they also displayed the desired sensitivity to
the environmental manipulations of this study. The
difficulty and mental effort items were less favorable in
the more difficult decision environment as expected,
while the accuracy and overall satisfaction items became
less favorable when negative decision quality feedback
was encountered, also as expected.

These favorable measurement characteristics suggest
that the items can be used with confidence in decision
aid research where evaluations of the aid are required.
Although the items were tested and used in the context of
a computerized decision aid in the current study, they
should also be of value in non-computerized contexts as
well.
Chapter VII

CONCLUSION

The primary contribution of this dissertation comes from the results which show that negative choice feedback has an impact on subjective evaluations of the decision aid. Without decision quality feedback, the results of this study suggest that subjects are unlikely to be able to make a precise evaluation of the aid on either the accuracy or overall satisfaction dimensions. This is particularly important in situations where choice errors are likely to be present, or where comparisons are being made among decision aid formats which are likely to have unequal capabilities in reducing or eliminating those errors.

Previous decision aid research has not made this distinction. This, together with confirmation of the measurement characteristics of the scale items, will allow future research to be much more precise and accurate in determining optimal decision aid configurations. Yet as with any good research project, the questions which this dissertation has tried to answer and the contributions it has made, have also revealed limitations which have led to the formation of additional questions requiring more research.
Limitations and Future Research

In general, additional research on CADA use in other contexts, including group decision processes in a family or managerial setting, would be helpful in defining the areas where the potential benefits of information systems/decision aids might be greatest.

More specifically, a key area in which additional research is needed involves a within subjects design, in which subjects would be trained on multiple CADA formats and asked which they would prefer to use in a choice task. Related aspects of such a study might include:
(1) Looking at the impact on subjective evaluations that an individual's predisposition towards using a compensatory or noncompensatory decision process has on evaluations. (2) Which format would be preferred in a high or low information load context, with the low load context perhaps being limited to just the efficient brands. (3) And the impact a two stage decision process (the first using a non-compensatory aid to reduce the number of alternatives or define the product class, followed by a compensatory aid to rank them) might have on choice quality and subjective evaluations of the CADA.

While none of this study's subjects used multiple formats, several CAL subjects did comment that they would have liked fewer brands to look at, while several CAC
subjects said they would have liked the brands in some kind of rank order. A CAC format might be an effective way for the CADA user to select a more tightly defined product category by setting cutoff values on certain key attributes, in which to subsequently use a CAL format for ranking purposes. Exposure to multiple CADA formats would also provide stronger evidence of subjective preference, which is particularly important as the result of the virtually equal decision quality performance of the three formats in this study.

In addition more work needs to be done on explaining the instability of the switching measure of decision quality across studies. Future decision aid research requires a good measure of decision quality. Previously used linear based measures have been shown to have their faults as measures of decision quality in difficult decision environments. The lack of stability of the switching measure, however, also calls into question its overall strength as a decision quality measure. These limitation also weaken the ability of researchers to make strong conclusions about which format is best and what constitutes a difficult decision environment. Research using verbal protocols may allow a better understanding of why there are varying frequencies of switching
behavior in what are otherwise similar decision environments.

With the development of a more stable measure of decision quality, more research needs to be done in the area of difficult decision environments. Two related aspects of this definition should be explored in light of this study's relatively weak reaction to the difficulty manipulation. First, is more than the addition of 1.5 points to the negatively correlated attribute scores required to achieve a non-difficult decision environment? Second, do subjects react to numeric attribute scores from the perspective of their own internal attribute score descriptions, or to the provided descriptions which accompany the numeric scores? Although the addition of 1.5 points brought all the top brands score on the negatively correlated attribute to at least the "Fair" range on the accompanying attribute score description, it is not clear that new higher score registered as at least a "Fair" score on the subject's internal numeric score definition.

This is an important issue for information providers as they develop value descriptions of numeric test values. Externally generated score definitions may need to be at least somewhat in accordance with internal descriptions. For example, the range descriptions used
in the study, and borrowed from *Software Digest*, defined a score of 5 (out of 10) as "Fair", which might contrast quite sharply with internal definitions developed in school (where 70 out of 100 is the last C grade), at work (where a tolerance rate might be less than 1% deviation from specification) or from other sources and experiences.

In addition, more research on other facets of decision environment difficulty should be conducted to determine their impact on CADA decision quality and subjective evaluations. While this study and others have examined decision quality using a data set with one negatively correlated attribute, little is known about the impact of having multiple negatively correlated attributes, and/or attributes which are only negatively correlated with some of the other attributes. A more complete definition of a difficult decision environment will also need to include the impact of varying numbers of total brands, efficient brands and product attributes.

Furthermore, little is known about the impact that extremely unfavorable attribute scores (on the negatively correlated attribute) will have on decision quality. The possibility exists that subtracting a constant from the negatively correlated attribute scores (instead of adding a constant as in the current study) might actually create
an easier choice environment, because the extremely unfavorable scores would make brand elimination easier and more sure. If this proved to be the case, a "U" shaped decision difficulty curve would be supported.

Finally, there are other aspects of decision environment difficulty which require further exploration. The subjects in this study were all college students, meaning that they were likely above average in intelligence and ability to learn. While they showed a reasonably high level of ability in using the system, would less intelligent and/or different aged subjects be able to use the systems just as well?

In addition, subjects in this study were trained for 30 minutes on how to use the system to select of brand from a product class that most had some previous familiarity with. Even with this intense training, it is not known how long subjects might maintain their new skills. Even experts who design decision support systems find it difficult to use their own systems if they don't continue to use them regularly (Keyes 1989). Since it may be impossible to duplicate this high level of competence in commercially available information systems/decision aids subject to time and cost pressures, research needs to be conducted which will determine the impact of only moderate levels of training (or time
deteriorated skills resulting from intense training) on choice quality, effort, difficulty, accuracy and satisfaction with the system.

These and other research projects are logical steps which build off the findings of earlier research, including those of this dissertation. With the development of this body of knowledge, the ability to intervene into the decision process could be more effectively implemented. In situations where the likelihood of a choice errors is high and that the error is likely to be blamed on the format (such as with a subject using the CAC format who misses their preferred brand because of a screening error), special warnings and additional instructions might be installed into the system to reduce the opportunity for error and increase satisfaction with the decision process. The results of this study indicate that if an intervention were effective in eliminating format blame, even if it does not eliminate a brand switch, it will also keep users from becoming disenchanted with the aid, thereby increasing the probability of their using it again in the future.
BIBLIOGRAPHY


-------- (1975), "Graduate Admission Variables and Future Success," Science, 187 (February), 721-723.


Einhorn, Hillel and Robin Hogarth (1975), "Unit Weighting Schemes for Decision Making," Organizational Behavior and Human Performance, 31 (April), 171-192.


--------- and V. Srinivasan (1990), "Conjoint Analysis in Marketing Research: New Developments and Directions," Journal of Marketing Research, 25 (March), 293-300.


Kopalle Praveen and Donna Hoffman (1992), "Generalizing the Sensitivity Conditions in an Overall Index of Product Quality," Journal of Consumer Research, 18 (March), 530-35.\ldots


Malhotra, Naresh (1982), "Information Load and Consumer Decision Making", Journal of Consumer Research, 8 (March), 419-430.


Table 1
FORMAT SUBJECT BACKGROUND AND TRAINING SIMILARITIES
The Effects of Random Assignment

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAL (n = 71)</th>
<th>CAC (n = 74)</th>
<th>EWRO (n = 70)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>FIII1</td>
<td>3.14</td>
<td>3.18</td>
<td>3.26</td>
<td>.066</td>
</tr>
<tr>
<td>FIII2</td>
<td>3.36</td>
<td>3.61</td>
<td>3.43</td>
<td>.223</td>
</tr>
<tr>
<td>FIII3</td>
<td>2.64</td>
<td>2.63</td>
<td>2.77</td>
<td>.377</td>
</tr>
<tr>
<td>CLASS</td>
<td>3.65 ±</td>
<td>3.84 ±</td>
<td>3.46</td>
<td>5.526</td>
</tr>
<tr>
<td>AGE</td>
<td>22.7</td>
<td>22.5</td>
<td>23.3</td>
<td>.643</td>
</tr>
<tr>
<td>TS1</td>
<td>1.71</td>
<td>1.45 ±</td>
<td>1.87</td>
<td>2.681</td>
</tr>
<tr>
<td>TS2</td>
<td>2.08 ±</td>
<td>1.70 ±</td>
<td>2.19</td>
<td>3.294</td>
</tr>
<tr>
<td>TS3</td>
<td>2.01</td>
<td>1.72 ±</td>
<td>2.43</td>
<td>3.633</td>
</tr>
<tr>
<td>TS4</td>
<td>1.95 ±</td>
<td>2.03 ±</td>
<td>2.49</td>
<td>3.540</td>
</tr>
<tr>
<td>TS5</td>
<td>2.00</td>
<td>2.09</td>
<td>1.86</td>
<td>.767</td>
</tr>
<tr>
<td>TS6</td>
<td>1.89</td>
<td>2.07</td>
<td>1.79</td>
<td>.836</td>
</tr>
</tbody>
</table>

Key:
Test of significant is LSD post hoc, 2 tail (s = difference from mean value in column 2 was significant p < .1; bold = p < .05), (s = difference from mean value in column 3 was significant at p < .1; bold = p < .05)
FIII1 = COMPUTER FAMILIARITY;
FIII2 = WP FAMILIARITY;
FIII3 = WP USE;
CLASS = SCHOOL RANK;
AGE = YEARS OLD
TS1 = UNDERSTOOD COMPUTER OPERATING INSTRUCTIONS;
TS2 = UNDERSTOOD DESCRIPTION OF COMPUTER FORMAT;
TS3 = UNDERSTOOD BRAND ORDER;
TS4 = UNDERSTOOD FORMAT TO COMPLETE TASK;
TS5 = UNDERSTOOD ATTRIBUTES;
TS6 = UNDERSTOOD ATTRIBUTE RANGE DESCRIPTIONS;

NOTE: there were no significant format/cell gender differences.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Less Attractive Mean (n = 106)</th>
<th>More Attractive Mean (n = 109)</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>.51</td>
<td>.61</td>
<td>.82</td>
<td>H1: directional</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.60</td>
<td>.75</td>
<td>1.35</td>
<td>H1: moderate</td>
</tr>
<tr>
<td>TOP%</td>
<td>.20</td>
<td>.39</td>
<td>1.74</td>
<td>H1: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>4.29</td>
<td>2.47</td>
<td>2.39</td>
<td>H1: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.22</td>
<td>1.24</td>
<td>.98</td>
<td>H1: directional</td>
</tr>
<tr>
<td>%TRB</td>
<td>.77</td>
<td>.90</td>
<td>2.46</td>
<td>H1: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>3.10</td>
<td>2.97</td>
<td>.18</td>
<td>H1: directional</td>
</tr>
</tbody>
</table>

**CAC Format: (n = 74)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Less Attractive Mean (n = 106)</th>
<th>More Attractive Mean (n = 109)</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>.50</td>
<td>.58</td>
<td>.68</td>
<td>H2: directional</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.56</td>
<td>.63</td>
<td>.67</td>
<td>H2: directional</td>
</tr>
<tr>
<td>TOP%</td>
<td>.14</td>
<td>.23</td>
<td>2.48</td>
<td>H2: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>3.61</td>
<td>2.58</td>
<td>2.31</td>
<td>H2: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.23</td>
<td>.56</td>
<td>H2: no</td>
</tr>
<tr>
<td>%TRB</td>
<td>.82</td>
<td>.89</td>
<td>1.87</td>
<td>H2: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>3.27</td>
<td>3.35</td>
<td>.11</td>
<td>H2: no</td>
</tr>
</tbody>
</table>

**EWRO Format: (n = 70)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Less Attractive Mean (n = 106)</th>
<th>More Attractive Mean (n = 109)</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>.63</td>
<td>.46</td>
<td>1.44</td>
<td>H3: no</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.66</td>
<td>.63</td>
<td>.24</td>
<td>H3: no</td>
</tr>
<tr>
<td>TOP%</td>
<td>.23</td>
<td>.40</td>
<td>1.54</td>
<td>H3: moderate</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>4.46</td>
<td>3.03</td>
<td>1.83</td>
<td>H3: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.21</td>
<td>1.23</td>
<td>1.22</td>
<td>H3: directional</td>
</tr>
<tr>
<td>%TRB</td>
<td>.75</td>
<td>.85</td>
<td>1.84</td>
<td>H3: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>3.03</td>
<td>3.85</td>
<td>1.10</td>
<td>H3: no</td>
</tr>
</tbody>
</table>

**Key:**
- **bold italic:** (p < .1); **bold italic + underline:** (p < .05): (z or t, 1 tail)
- Match = % yes (did not switch)
- Modified Match = % yes after those that changed mind are changed to didn't switch
- TOP% = % who initially picked top ranked brand using post weights for ranking
- AVGRNK = mean rank of initial choice using post weights to rank
- %RAND = % increase in utility of initial choice over value of random choice
- %TRB = (utility of initial choice/ utility of random)/(0 utility/util of random)
- VALG = perceived value of switching; 1 = no switch/no value ... 9 = much value

144
### Table 3
**CAL vs. CAC FORMATS**
**Decision Quality Hypotheses**

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAL Mean</th>
<th>CAC Mean</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LA Brand Set:</strong></td>
<td>(n = 35)</td>
<td>(n = 36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.51</td>
<td>.50</td>
<td>.12 z</td>
<td>H4: directional</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.60</td>
<td>.56</td>
<td>.38 z</td>
<td>H4: directional</td>
</tr>
<tr>
<td>TOP%</td>
<td>.20</td>
<td>.14</td>
<td>.69 z</td>
<td>H4: directional</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>4.29</td>
<td>3.61</td>
<td>.89 t</td>
<td>H4: no</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.22</td>
<td>1.23</td>
<td>.30 t</td>
<td>H4: no</td>
</tr>
<tr>
<td>%TRB</td>
<td>.77</td>
<td>.82</td>
<td>1.07 t</td>
<td>H4: no</td>
</tr>
<tr>
<td>VALG</td>
<td>3.10</td>
<td>3.27</td>
<td>.23 t</td>
<td>H4: directional</td>
</tr>
<tr>
<td><strong>MA Brand Set:</strong></td>
<td>(n = 36)</td>
<td>(n = 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.61</td>
<td>.58</td>
<td>.28 z*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.75</td>
<td>.63</td>
<td>1.10 z*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>TOP%</td>
<td>.39</td>
<td>.23</td>
<td>.05 z*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>2.47</td>
<td>2.58</td>
<td>.24 t*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.24</td>
<td>1.23</td>
<td>.49 t*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>%TRB</td>
<td>.90</td>
<td>.89</td>
<td>.32 t*</td>
<td>H7: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>2.97</td>
<td>3.35</td>
<td>.55 t*</td>
<td>H7: yes</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>(n = 71)</td>
<td>(n = 74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.57</td>
<td>.54</td>
<td>.31 z*</td>
<td></td>
</tr>
<tr>
<td>Modified Match</td>
<td>.68</td>
<td>.59</td>
<td>1.11 z*</td>
<td></td>
</tr>
<tr>
<td>TOP%</td>
<td>.33</td>
<td>.19</td>
<td>2.04 z*</td>
<td></td>
</tr>
<tr>
<td>AVGRNK</td>
<td>3.39</td>
<td>3.06</td>
<td>.71 t*</td>
<td></td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.23</td>
<td>.05 t*</td>
<td></td>
</tr>
<tr>
<td>%TRB</td>
<td>.83</td>
<td>.86</td>
<td>.88 t*</td>
<td></td>
</tr>
<tr>
<td>VALG</td>
<td>3.06</td>
<td>3.28</td>
<td>.43 t*</td>
<td></td>
</tr>
</tbody>
</table>

**Key:**
- **bold italic:** (p < .1);  **bold italic + underline:** (p < .05); (z or t, 1 tail, * = 2 tail)
- Match = % yes (did not switch)
- Modified Match = % yes after those that changed mind are changed to didn’t switch
- TOP% = % who initially picked top ranked brand using post weights for ranking
- AVGRNK = mean rank of initial choice using post weights to rank
- %RAND = % increase in utility of initial choice over value of random choice
- %TRB = (utility of initial choice/ utility of random)/(trb utility/util of random)
- VALG = perceived value of switching; 1 = no switch/no value ... 9 = much value
### Table 4

**CAL vs. EWRO FORMATS**

**Decision Quality Hypotheses**

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAL Mean</th>
<th>EWRO Mean</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LA Brand Set:</strong> (n = 35)</td>
<td>(n = 35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.51</td>
<td>.63</td>
<td>.97 z</td>
<td>H5: yes</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.60</td>
<td>.66</td>
<td>.49 z</td>
<td>H5: yes</td>
</tr>
<tr>
<td>TOP%</td>
<td>.20</td>
<td>.23</td>
<td>.30 z</td>
<td>H5: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>4.29</td>
<td>4.46</td>
<td>.18 t</td>
<td>H5: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.22</td>
<td>1.21</td>
<td>.72 t</td>
<td>H5: yes</td>
</tr>
<tr>
<td>%TRB</td>
<td>.77</td>
<td>.75</td>
<td>.25 t</td>
<td>H5: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>3.10</td>
<td>3.03</td>
<td>.09 t</td>
<td>H5: yes</td>
</tr>
<tr>
<td><strong>MA Brand Set:</strong> (n = 36)</td>
<td>(n = 35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.61</td>
<td>.46</td>
<td>1.30 z</td>
<td>H8: yes</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.75</td>
<td>.63</td>
<td>1.10 z</td>
<td>H8: yes</td>
</tr>
<tr>
<td>TOP%</td>
<td>.39</td>
<td>.40</td>
<td>.09 z</td>
<td>H8: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>2.47</td>
<td>3.03</td>
<td>1.07 t</td>
<td>H8: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.24</td>
<td>1.23</td>
<td>.69 t</td>
<td>H8: yes</td>
</tr>
<tr>
<td>%TRB</td>
<td>.90</td>
<td>.85</td>
<td>1.11 t</td>
<td>H8: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>2.97</td>
<td>3.85</td>
<td>1.21 t</td>
<td>H8: yes</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>(n = 71)</td>
<td>(n = 70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.57</td>
<td>.54</td>
<td>.26 z</td>
<td></td>
</tr>
<tr>
<td>Modified Match</td>
<td>.68</td>
<td>.64</td>
<td>.47 z</td>
<td></td>
</tr>
<tr>
<td>TOP%</td>
<td>.33</td>
<td>.23</td>
<td>1.37 z</td>
<td></td>
</tr>
<tr>
<td>AVGRNK</td>
<td>3.39</td>
<td>3.74</td>
<td>.62 t</td>
<td></td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.22</td>
<td>.95 t</td>
<td></td>
</tr>
<tr>
<td>%TRB</td>
<td>.83</td>
<td>.80</td>
<td>.69 t</td>
<td></td>
</tr>
<tr>
<td>VALG</td>
<td>3.06</td>
<td>3.44</td>
<td>.73 t</td>
<td></td>
</tr>
</tbody>
</table>

**Key:**

- *bold italic:* (p < .1);  *bold italic + underline:* (p < .05);  (z or t, 2 tail)
- Match = % yes (did not switch)
- Modified Match = % yes after those that changed mind are changed to didn’t switch
- TOP% = % who initially picked top ranked brand using post weights for ranking
- AVGRNK = mean rank of initial choice using post weights to rank
- %RAND = % increase in utility of initial choice over value of random choice
- %TRB = (utility of initial choice/ utility of random)/(trb utility/util of random)
- VALG = perceived value of switching; 1 = no switch/no value ... 9 = much value
Table 5
CAC vs. EWRO FORMATS
Decision Quality Hypotheses

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAC Mean</th>
<th>EWRO Mean</th>
<th>z/t value</th>
<th>Hypothesis: Supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA Brand Set: (n = 36)</td>
<td>(n = 35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.50</td>
<td>.63</td>
<td>1.10 z</td>
<td>H6: directional</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.56</td>
<td>.66</td>
<td>.87 z</td>
<td>H6: directional</td>
</tr>
<tr>
<td>TOP%</td>
<td>.14</td>
<td>.23</td>
<td>.98 z</td>
<td>H6: directional</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>3.61</td>
<td>4.46</td>
<td>1.13 t</td>
<td>H6: no</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.21</td>
<td>1.25 t</td>
<td>H6: no</td>
</tr>
<tr>
<td>%TRB</td>
<td>.82</td>
<td>.75</td>
<td>.37 t</td>
<td>H6: no</td>
</tr>
<tr>
<td>VALG</td>
<td>3.27</td>
<td>3.03</td>
<td>.31 t</td>
<td>H6: directional</td>
</tr>
<tr>
<td>MA Brand Set: (n = 38)</td>
<td>(n = 35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.58</td>
<td>.46</td>
<td>1.04 z*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>Modified Match</td>
<td>.63</td>
<td>.63</td>
<td>.03 z*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>TOP%</td>
<td>.23</td>
<td>.40</td>
<td>.04 z*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>AVGRNK</td>
<td>2.58</td>
<td>3.03</td>
<td>.90 t*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.23</td>
<td>.30 t*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>%TRB</td>
<td>.89</td>
<td>.85</td>
<td>.86 t*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>VALG</td>
<td>3.35</td>
<td>3.85</td>
<td>.69 t*</td>
<td>H9: yes</td>
</tr>
<tr>
<td>Overall (n = 74)</td>
<td>(n = 70)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>.54</td>
<td>.54</td>
<td>.05 z*</td>
<td></td>
</tr>
<tr>
<td>Modified Match</td>
<td>.59</td>
<td>.64</td>
<td>.63 z*</td>
<td></td>
</tr>
<tr>
<td>TOP%</td>
<td>.19</td>
<td>.23</td>
<td>.65 z*</td>
<td></td>
</tr>
<tr>
<td>AVGRNK</td>
<td>3.06</td>
<td>3.74</td>
<td>1.48 t*</td>
<td></td>
</tr>
<tr>
<td>%RAND</td>
<td>1.23</td>
<td>1.22</td>
<td>1.20 t*</td>
<td></td>
</tr>
<tr>
<td>%TRB</td>
<td>.86</td>
<td>.80</td>
<td>1.70 t*</td>
<td></td>
</tr>
<tr>
<td>VALG</td>
<td>3.28</td>
<td>3.44</td>
<td>.31 t*</td>
<td></td>
</tr>
</tbody>
</table>

Key:
*bold italic: (p < .1);  *bold italic + underline: (p < .05): (z or t, 1 tail, * = 2 tail)*

Match = % yes (did not switch)
Modified Match = % yes after those that changed mind are changed to didn’t switch
TOP% = % who initially picked top ranked brand using post weights for ranking
AVGRNK = mean rank of initial choice using post weights to rank
%RAND = % increase in utility of initial choice over value of random choice
%TRB = (utility of initial choice/ utility of random)/(trb utility/unit of random)
VALG = perceived value of switching; 1 = no switch/no value ... 9 = much value
Table 6
DECISION QUALITY INTERACTION
WITH TRAINING AND BACKGROUND

<table>
<thead>
<tr>
<th></th>
<th>switch mean</th>
<th>no switch mean</th>
<th>F p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 97)</td>
<td>(n = 118)</td>
<td></td>
</tr>
<tr>
<td>FIII1</td>
<td>3.15</td>
<td>3.23</td>
<td>.782</td>
</tr>
<tr>
<td>FIII2</td>
<td>3.36</td>
<td>3.56</td>
<td>.530</td>
</tr>
<tr>
<td>FIII3</td>
<td>2.75</td>
<td>2.61</td>
<td>.364</td>
</tr>
<tr>
<td>CLASS</td>
<td>3.60</td>
<td>3.70</td>
<td>.303</td>
</tr>
<tr>
<td>AGE</td>
<td>22.7</td>
<td>22.9</td>
<td>.640</td>
</tr>
<tr>
<td>TS1</td>
<td>1.77</td>
<td>1.59</td>
<td>.228</td>
</tr>
<tr>
<td>TS2</td>
<td>1.93</td>
<td>2.02</td>
<td>.642</td>
</tr>
<tr>
<td>TS3</td>
<td>1.87</td>
<td>2.19</td>
<td>.158</td>
</tr>
<tr>
<td>TS4</td>
<td>2.14</td>
<td>2.16</td>
<td>.926</td>
</tr>
<tr>
<td>TS5</td>
<td>1.81</td>
<td>2.13</td>
<td>.047</td>
</tr>
<tr>
<td>TS6</td>
<td>1.81</td>
<td>2.01</td>
<td>.284</td>
</tr>
<tr>
<td>TIME*</td>
<td>182.0</td>
<td>180.7</td>
<td>.909</td>
</tr>
</tbody>
</table>

Key:

*bold italic* = .1; *bold italic* + *underline* = .05 (LSD post hoc, 2 tail)
FIII1 = COMPUTER FAMILIARITY;
FIII2 = WP FAMILIARITY;
FIII3 = WP USE:
CLASS = SCHOOL RANK:
AGE = YEARS OLD
TS1 = UNDERSTOOD COMPUTER OPERATING INSTRUCTIONS;
TS2 = UNDERSTOOD DESCRIPTION OF COMPUTER FORMAT;
TS3 = UNDERSTOOD BRAND ORDER;
TS4 = UNDERSTOOD FORMAT TO COMPLETE TASK;
TS5 = UNDERSTOOD ATTRIBUTES;
TS6 = UNDERSTOOD ATTRIBUTE RANGE DESCRIPTIONS;

* = decision making time in seconds, remains non-significant at format and cell levels.
Table 7
WEIGHTING DIFFERENCES

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Format Means</th>
<th>Overall F</th>
<th>Comparison sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAL</td>
<td>CAC</td>
<td>EWRO</td>
</tr>
<tr>
<td>Startup</td>
<td>.131</td>
<td>.139</td>
<td>.140</td>
</tr>
<tr>
<td>Learning</td>
<td>.182</td>
<td>.187</td>
<td>.190</td>
</tr>
<tr>
<td>Ease/Use</td>
<td>.201</td>
<td>.228</td>
<td>.241</td>
</tr>
<tr>
<td>Error Handle</td>
<td>.146</td>
<td>.152</td>
<td>.143</td>
</tr>
<tr>
<td>Performance</td>
<td>.196</td>
<td>.173</td>
<td>.164</td>
</tr>
<tr>
<td>Versatility</td>
<td>.134</td>
<td>.123</td>
<td>.125</td>
</tr>
</tbody>
</table>

Key:
- test of significance is LSD post hoc, 2 tailed (no = not significant at p < .1)

NOTE: Weights were not significantly different (p < .1) for any between cell comparison. Weight rank orders at the cell level remained the same as the format level rank order, with the exception of the CAL format, where the 5th and 6th most important switched places on the MA side.
Table 8
COMMON FACTOR ANALYSIS RESULTS

Post-Feedback Measures
Common Factor Analysis Pattern Matrix
(Maximum Likelihood, Oblique Rotation)

<table>
<thead>
<tr>
<th></th>
<th>FACTOR 1</th>
<th>FACTOR 2</th>
<th>FACTOR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accuracy</td>
<td>Effort</td>
<td>Difficulty</td>
</tr>
<tr>
<td>V1: frustration experienced</td>
<td>-.206</td>
<td>.103</td>
<td>.713</td>
</tr>
<tr>
<td>V2: accuracy of your choice</td>
<td>.656</td>
<td>-.003</td>
<td>.253</td>
</tr>
<tr>
<td>V3: difficulty experienced</td>
<td>.077</td>
<td>.030</td>
<td>.753</td>
</tr>
<tr>
<td>V4: thinking required</td>
<td>.052</td>
<td>.876</td>
<td>-.040</td>
</tr>
<tr>
<td>V5: thought you put into</td>
<td>-.031</td>
<td>.901</td>
<td>-.021</td>
</tr>
<tr>
<td>V6: confidence you had</td>
<td>.829</td>
<td>-.011</td>
<td>.008</td>
</tr>
<tr>
<td>V7: confusion you experienced</td>
<td>.008</td>
<td>-.063</td>
<td>.873</td>
</tr>
<tr>
<td>V8: certainty of your decision</td>
<td>.949</td>
<td>.025</td>
<td>-.072</td>
</tr>
<tr>
<td>V9: mental effort you expended</td>
<td>-.015</td>
<td>.793</td>
<td>.101</td>
</tr>
</tbody>
</table>

FACTOR EIGEN VALUE: 4.65  1.96  .696
VARIANCE %: 51.6%  21.7%  7.7%

(n = 215)
Table 9
CONFIRMATORY FACTOR ANALYSIS

Post-Feedback Measures
Confirmatory Factor Analysis
(Covariance Matrix, Maximum Likelihood)

V1: frustration experienced .754
V2: accuracy of your choice .864
V3: difficulty experienced .832
V4: thinking required .364
V5: thought you put into .871
V6: confidence you had .824
V7: confusion you experienced .847
V8: certainty of your decision .870
V9: mental effort you expended .855

Chi-square = 41.0, 24 df, p = .016
Bentler-Bonett Normed Fit Index = .97
Bentler-Bonett Nonnormed Fit Index = .98
Comparative Fit Index = .99

Average Absolute Standardized Residuals = .028
Average Off-Diagonal Absolute Standardized Residuals = .035
t-value for All Factor Loadings > 12, p < .001

Pre-Feedback Measures
Confirmatory Factor Analysis
(Covariance Matrix, Maximum Likelihood)

V1: frustration experienced .641
V2: accuracy of your choice .647
V3: difficulty experienced .872
V4: thinking required .793
V5: thought you put into .755
V6: confidence you had .797
V7: confusion you experienced .843
V8: certainty of your decision .771
V9: mental effort you expended .784

Chi-square = 78.1, 24 df, p < .001
Bentler-Bonett Normed Fit Index = .92
Bentler-Bonett Nonnormed Fit Index = .91
Comparative Fit Index = .94

Average Absolute Standardized Residuals = .038
Average Off-Diagonal Absolute Standardized Residuals = .048
t-value for All Factor Loadings > 9, p < .001

151
Table 10
DISCRIMINANT VALIDITY
Comparison of Two versus Three Factor Models

Post-Feedback Measures
(Covariance Matrix, Maximum Likelihood)

<table>
<thead>
<tr>
<th></th>
<th>chi-</th>
<th>change</th>
<th>from</th>
<th>base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>square</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Three Factor Model:</td>
<td>41.0 @ 24 df</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 1 (Difficulty combined with Accuracy):</td>
<td>165.1 @ 25 df</td>
<td>124.1**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 2 (Difficulty combined with Effort):</td>
<td>320.6 @ 25 df</td>
<td>279.6**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 3 (Effort combined with Accuracy):</td>
<td>432.7 @ 25 df</td>
<td>391.7**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factor Correlation Matrix:

<table>
<thead>
<tr>
<th></th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 (Difficulty):</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2 (Accuracy):</td>
<td>.648</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>F3 (Mental Effort):</td>
<td>.494</td>
<td>.234</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Pre-Feedback Measures
(Covariance Matrix, Maximum Likelihood)

<table>
<thead>
<tr>
<th></th>
<th>chi-</th>
<th>change</th>
<th>from</th>
<th>base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>square</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Three Factor Model:</td>
<td>78.1 @ 24 df</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 1 (Difficulty combined with Accuracy):</td>
<td>127.8 @ 25 df</td>
<td>60.3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 2 (Difficulty combined with Effort):</td>
<td>198.4 @ 25 df</td>
<td>120.3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Factor 3 (Effort combined with Accuracy):</td>
<td>251.5 @ 25 df</td>
<td>173.4**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factor Correlation Matrix:

<table>
<thead>
<tr>
<th></th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 (Difficulty):</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2 (Accuracy):</td>
<td>.645</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>F3 (Mental Effort):</td>
<td>.511</td>
<td>.326</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Key:

** = significant at (p < .05, 1 degree of freedom difference from base)
Table 11
SCALE RELIABILITY

Cronbach Alpha

<table>
<thead>
<tr>
<th></th>
<th>OVERALL (n = 215)</th>
<th>CAC (n = 74)</th>
<th>EWRO (n = 70)</th>
<th>CAL (n = 71)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Feedback Measures:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFFORT</td>
<td>.818</td>
<td>.823</td>
<td>.856</td>
<td>.844</td>
</tr>
<tr>
<td>DIFFICULTY</td>
<td>.801</td>
<td>.746</td>
<td>.811</td>
<td>.847</td>
</tr>
<tr>
<td>ACCURACY</td>
<td>.789</td>
<td>.780</td>
<td>.804</td>
<td>.782</td>
</tr>
</tbody>
</table>

Post-Feedback Measures:

<table>
<thead>
<tr>
<th></th>
<th>OVERALL</th>
<th>CAC</th>
<th>EWRO</th>
<th>CAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFFORT</td>
<td>.898</td>
<td>.937</td>
<td>.847</td>
<td>.884</td>
</tr>
<tr>
<td>DIFFICULTY</td>
<td>.846</td>
<td>.823</td>
<td>.856</td>
<td>.844</td>
</tr>
<tr>
<td>ACCURACY</td>
<td>.890</td>
<td>.874</td>
<td>.893</td>
<td>.900</td>
</tr>
</tbody>
</table>
Table 12
DECISION ENVIRONMENT MANIPULATION EFFECTS
Subjective Evaluation Hypotheses

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Less Attractive (n=106) Mean</th>
<th>More Attractive (n=109) Mean</th>
<th>t value</th>
<th>Hypothesis: supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty:</td>
<td>Pre: 3.49</td>
<td>3.20</td>
<td>1.57</td>
<td>H10: moderate</td>
</tr>
<tr>
<td></td>
<td>Post: 3.52</td>
<td>3.05</td>
<td>2.66</td>
<td>H10: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>Pre: 3.64</td>
<td>3.26</td>
<td>1.96</td>
<td>H11: yes</td>
</tr>
<tr>
<td></td>
<td>Post: 3.57</td>
<td>3.28</td>
<td>1.52</td>
<td>H11: moderate</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Pre: 3.67</td>
<td>3.40</td>
<td>1.44</td>
<td>H12: moderate</td>
</tr>
<tr>
<td></td>
<td>Post: 3.77</td>
<td>3.66</td>
<td>.54</td>
<td>H12: directional</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Pre: 2.98</td>
<td>2.75</td>
<td>1.04</td>
<td>H13: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.26</td>
<td>3.02</td>
<td>.98</td>
<td>H13: directional</td>
</tr>
</tbody>
</table>

Key:
*bold italic*: (p < .1); *bold italic + underline*: (p < .05): (t, 1 tail)
Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
### Table 13

**DECISION ENVIRONMENT MANIPULATION EFFECTS**

Subjective Evaluation Hypotheses at Format Level

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Less Attractive Mean (n = 35)</th>
<th>More Attractive Mean (n = 36)</th>
<th>t value</th>
<th>Hypothesis: supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAL Format:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>Pre: 3.45</td>
<td>2.85</td>
<td>1.59</td>
<td>H10: moderate</td>
</tr>
<tr>
<td></td>
<td>Post: 3.36</td>
<td>2.56</td>
<td>2.61</td>
<td>H10: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>Pre: 3.59</td>
<td>2.68</td>
<td>2.84</td>
<td>H11: yes</td>
</tr>
<tr>
<td></td>
<td>Post: 3.49</td>
<td>2.81</td>
<td>2.36</td>
<td>H11: yes</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Pre: 3.60</td>
<td>2.97</td>
<td>1.74</td>
<td>H12: yes</td>
</tr>
<tr>
<td></td>
<td>Post: 3.51</td>
<td>3.20</td>
<td>.89</td>
<td>H12: directional</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Pre: 2.74</td>
<td>2.31</td>
<td>1.17</td>
<td>H13: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.02</td>
<td>2.50</td>
<td>1.26</td>
<td>H13: directional</td>
</tr>
<tr>
<td>CAC Format:</td>
<td>(n = 36)</td>
<td>(n = 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>Pre: 3.33</td>
<td>3.45</td>
<td>.39</td>
<td>H10: no</td>
</tr>
<tr>
<td></td>
<td>Post: 3.31</td>
<td>3.29</td>
<td>.09</td>
<td>H10: directional</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>Pre: 3.56</td>
<td>3.50</td>
<td>.17</td>
<td>H11: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.33</td>
<td>3.37</td>
<td>.10</td>
<td>H11: no</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Pre: 3.69</td>
<td>3.58</td>
<td>.38</td>
<td>H12: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.97</td>
<td>3.81</td>
<td>.44</td>
<td>H12: directional</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Pre: 3.11</td>
<td>3.11</td>
<td>1.04</td>
<td>H13: no</td>
</tr>
<tr>
<td></td>
<td>Post: 3.49</td>
<td>3.34</td>
<td>.98</td>
<td>H13: directional</td>
</tr>
<tr>
<td>EWRO Format:</td>
<td>(n = 35)</td>
<td>(n = 35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>Pre: 3.71</td>
<td>3.28</td>
<td>1.32</td>
<td>H10: moderate</td>
</tr>
<tr>
<td></td>
<td>Post: 3.91</td>
<td>3.29</td>
<td>1.92</td>
<td>H10: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>Pre: 3.77</td>
<td>3.58</td>
<td>.56</td>
<td>H11: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.89</td>
<td>3.68</td>
<td>.65</td>
<td>H11: directional</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Pre: 3.73</td>
<td>3.67</td>
<td>.22</td>
<td>H12: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.82</td>
<td>3.97</td>
<td>.43</td>
<td>H12: no</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Pre: 3.09</td>
<td>2.82</td>
<td>.68</td>
<td>H13: directional</td>
</tr>
<tr>
<td></td>
<td>Post: 3.26</td>
<td>3.20</td>
<td>.14</td>
<td>H13: directional</td>
</tr>
</tbody>
</table>

**Key:**

*bold italic* (p < .1); *bold italic + underline* (p < .05); (t, 1 tail)

Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase

Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease

155
Table 14
BRANDS SEEN AND EVALUATED ACROSS ATTRACTIVENESS CONDITIONS

<table>
<thead>
<tr>
<th></th>
<th>LA mean</th>
<th>MA mean</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAL Format: (n = 71)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Number of Brands on Screen:</td>
<td>30.00</td>
<td>30.00</td>
<td>na</td>
</tr>
<tr>
<td>Number of Brands Evaluated:</td>
<td>11.71</td>
<td>10.31</td>
<td>.65</td>
</tr>
<tr>
<td>Number of Brands Considered:</td>
<td>2.86</td>
<td>2.58</td>
<td>.89</td>
</tr>
<tr>
<td><strong>CAC Format: (n = 74)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Number of Brands on Screen:</td>
<td>8.83</td>
<td>9.58</td>
<td>.34</td>
</tr>
<tr>
<td>Number of Brands Evaluated:</td>
<td>4.50</td>
<td>4.53</td>
<td>.02</td>
</tr>
<tr>
<td>Number of Brands Considered:</td>
<td>4.36</td>
<td>4.79</td>
<td>.54</td>
</tr>
<tr>
<td><strong>EWRO Format: (n = 70)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Number of Brands on Screen:</td>
<td>30.00</td>
<td>30.00</td>
<td>na</td>
</tr>
<tr>
<td>Number of Brands Evaluated:</td>
<td>14.09</td>
<td>12.31</td>
<td>.75</td>
</tr>
<tr>
<td>Number of Brands Considered:</td>
<td>3.23</td>
<td>3.11</td>
<td>.24</td>
</tr>
</tbody>
</table>

**Key:**
- *bold italic*, p < .1; *bold italic + underline*, p < .05 (2 tail)

**Note:** Maximum number of brands which could appear could not be altered with CAL and EWRO formats
Table 15
Decision Feedback Manipulation Effects
Subjective Evaluation Hypotheses

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pre Feedback Mean</th>
<th>Post Feedback Mean</th>
<th>t value</th>
<th>Hypothesis: supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Formats Switchers only: (n = 97)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>3.43</td>
<td>3.47</td>
<td>.39 *</td>
<td>H14a: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>3.47</td>
<td>3.32</td>
<td>1.25 *</td>
<td>H14b: yes</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>3.52</td>
<td>3.89</td>
<td>2.65</td>
<td>H14c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>2.78</td>
<td>3.35</td>
<td>1.08</td>
<td>H14d: yes</td>
</tr>
</tbody>
</table>

*bold italic: (p < .1);  *bold italic + underline: (p < .05): (t, 1 tail, * = 2 tail)*
Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
Table 16
DECISION FEEDBACK MANIPULATION EFFECTS
Subjective Evaluation Hypotheses at Format Level

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pre Feedback Mean</th>
<th>Post Feedback Mean</th>
<th>t value</th>
<th>Hypothesis supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAL Formats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switchers only:</td>
<td>(n = 31)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>3.66</td>
<td>3.48</td>
<td>.61</td>
<td>H14a: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>3.53</td>
<td>3.44</td>
<td>.38</td>
<td>H14b: yes</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>3.37</td>
<td>3.39</td>
<td>.07</td>
<td>H14c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>2.53</td>
<td>2.93</td>
<td>1.40</td>
<td>H14d: yes</td>
</tr>
<tr>
<td><strong>CAC Formats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switchers only:</td>
<td>(n = 34)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>3.28</td>
<td>3.30</td>
<td>.20</td>
<td>H14a: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>3.50</td>
<td>3.15</td>
<td>1.92</td>
<td>H14b: no</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>3.75</td>
<td>4.28</td>
<td>2.66</td>
<td>H14c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>3.06</td>
<td>3.85</td>
<td>2.34</td>
<td>H14d: yes</td>
</tr>
<tr>
<td><strong>EWRO Formats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switchers only:</td>
<td>(n = 32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td>3.39</td>
<td>3.67</td>
<td>1.85</td>
<td>H14a: no</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>3.39</td>
<td>3.41</td>
<td>.11</td>
<td>H14b: yes</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>3.41</td>
<td>3.93</td>
<td>2.69</td>
<td>H14c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>2.71</td>
<td>3.19</td>
<td>1.48</td>
<td>H14d: yes</td>
</tr>
</tbody>
</table>

Key:

*bold italic*: (p < .1);  *bold italic + underline*: (p < .05);  (t, 1 tail, * = 2 tail)

Difficulty and Effort:  1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
Table 17
REASON FOR SWITCH AND SUBJECTIVE EVALUATION INTERACTION

<table>
<thead>
<tr>
<th>CAL Format:</th>
<th>Didn't Switch</th>
<th>Switched But Saw</th>
<th>Switched Didn't See</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 39)</td>
<td>(n = 17)</td>
<td>(n = 13)</td>
</tr>
<tr>
<td>Difficulty:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>2.83,</td>
<td>3.43</td>
<td>3.95</td>
</tr>
<tr>
<td>Post:</td>
<td>2.61,</td>
<td>3.25</td>
<td>3.77</td>
</tr>
<tr>
<td>Effort:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>2.91,</td>
<td>3.14</td>
<td>4.08</td>
</tr>
<tr>
<td>Post:</td>
<td>3.01</td>
<td>3.27</td>
<td>3.59</td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.21</td>
<td>3.51</td>
<td>3.18</td>
</tr>
<tr>
<td>Post:</td>
<td>3.29</td>
<td>3.67</td>
<td>3.03</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>2.51</td>
<td>2.41</td>
<td>2.69</td>
</tr>
<tr>
<td>Post:</td>
<td>2.67</td>
<td>2.88</td>
<td>3.00</td>
</tr>
<tr>
<td>CAC Format:</td>
<td>(n = 41)</td>
<td>(n = 11)</td>
<td>(n = 23)</td>
</tr>
<tr>
<td>Difficulty:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.41</td>
<td>3.21</td>
<td>3.41</td>
</tr>
<tr>
<td>Post:</td>
<td>3.23</td>
<td>3.39</td>
<td>3.36</td>
</tr>
<tr>
<td>Effort:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.47</td>
<td>3.48</td>
<td>3.61</td>
</tr>
<tr>
<td>Post:</td>
<td>3.45</td>
<td>3.12</td>
<td>3.26</td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.52</td>
<td>3.64</td>
<td>3.87</td>
</tr>
<tr>
<td>Post:</td>
<td>3.57,</td>
<td>4.18</td>
<td>4.46</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.07</td>
<td>3.45</td>
<td>3.04</td>
</tr>
<tr>
<td>Post:</td>
<td>2.97,</td>
<td>3.36</td>
<td>4.13</td>
</tr>
<tr>
<td>EWRO Format</td>
<td>(n = 38)</td>
<td>(n = 14)</td>
<td>(n = 18)</td>
</tr>
<tr>
<td>Difficulty:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.60</td>
<td>3.33</td>
<td>3.43</td>
</tr>
<tr>
<td>Post:</td>
<td>3.56</td>
<td>3.86</td>
<td>3.48</td>
</tr>
<tr>
<td>Effort:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.91,</td>
<td>3.57</td>
<td>3.24</td>
</tr>
<tr>
<td>Post:</td>
<td>4.11,</td>
<td>3.86,</td>
<td>3.04</td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.96,</td>
<td>3.40</td>
<td>3.37</td>
</tr>
<tr>
<td>Post:</td>
<td>3.86</td>
<td>3.74</td>
<td>4.07</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.16</td>
<td>2.64</td>
<td>2.76</td>
</tr>
<tr>
<td>Post:</td>
<td>3.24</td>
<td>2.86</td>
<td>3.50</td>
</tr>
</tbody>
</table>

Key: (all p value are two tailed)
1 = difference from mean value in column 2 has significant t-test (p < .1; bold = p < .05)
1 = difference from mean value in column 3 has significant t-test (p < .1; bold = p < .05)
Pre/Post mean values which are bold indicate a significant t-test (p < .05)
Table 18
CAL vs. CAC FORMAT COMPARISONS
Subjective Evaluation Hypotheses

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAL Mean</th>
<th>CAC Mean</th>
<th>t value</th>
<th>Hypothesis: supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 31)</td>
<td>(n = 34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switchers only:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Post:</td>
<td>3.39</td>
<td>4.28</td>
<td>2.21*</td>
</tr>
<tr>
<td></td>
<td>Pre:</td>
<td>3.37 (1)</td>
<td>3.75 (2)</td>
<td>1.02*</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Post:</td>
<td>2.93</td>
<td>3.85</td>
<td>1.94*</td>
</tr>
<tr>
<td></td>
<td>Pre:</td>
<td>2.53 (3)</td>
<td>3.11 (4)</td>
<td>1.41*</td>
</tr>
<tr>
<td>Non-Switchers only:</td>
<td>(n = 40)</td>
<td>(n = 40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Post:</td>
<td>3.29</td>
<td>3.57</td>
<td>.87*</td>
</tr>
<tr>
<td></td>
<td>Pre:</td>
<td>3.21 (5)</td>
<td>3.52 (6)</td>
<td>1.00*</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Post:</td>
<td>2.67</td>
<td>2.98</td>
<td>.81*</td>
</tr>
<tr>
<td></td>
<td>Pre:</td>
<td>2.51 (7)</td>
<td>3.07 (8)</td>
<td>1.55*</td>
</tr>
<tr>
<td>All Format Subjects:</td>
<td>(n = 71)</td>
<td>(n = 75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td>Pre:</td>
<td>3.28</td>
<td>3.63</td>
<td>1.45*</td>
</tr>
<tr>
<td></td>
<td>Post:</td>
<td>3.33</td>
<td>3.89</td>
<td>2.20*</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td>Pre:</td>
<td>2.52</td>
<td>3.09</td>
<td>2.10*</td>
</tr>
<tr>
<td></td>
<td>Post:</td>
<td>2.78</td>
<td>3.37</td>
<td>1.97*</td>
</tr>
<tr>
<td>Difficulty:</td>
<td>Pre:</td>
<td>3.18</td>
<td>3.35</td>
<td>.66*</td>
</tr>
<tr>
<td></td>
<td>Post:</td>
<td>2.99</td>
<td>3.26</td>
<td>1.27*</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td>Pre:</td>
<td>3.18</td>
<td>3.48</td>
<td>1.30*</td>
</tr>
<tr>
<td></td>
<td>Post:</td>
<td>3.18</td>
<td>3.31</td>
<td>.56*</td>
</tr>
</tbody>
</table>

Key:
*bold italic* (p < .1); *bold italic + underline* (p < .05): (t, 1 tail, * = 2 tail)
Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
(1) = pre vs. post-feedback difference t value = .07, p > .1
(2) = pre vs. post-feedback difference t value = 2.66, p < .05
(3) = pre vs. post-feedback difference t value = 1.40, p > .1
(4) = pre vs. post-feedback difference t value = 2.34, p < .05
(5) = pre vs. post-feedback difference t value = .59, p > .1
(6) = pre vs. post-feedback difference t value = .27, p > .1
(7) = pre vs. post-feedback difference t value = 1.23, p > .1
(8) = pre vs. post-feedback difference t value = .52, p > .1

160
Table 19
CAL vs. EWRO FORMAT COMPARISONS
Subjective Evaluation Hypotheses

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAL Mean</th>
<th>EWRO Mean</th>
<th>t value</th>
<th>Hypothesis supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchers only:</td>
<td>(n = 31)</td>
<td>(n = 32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>3.39</td>
<td>3.94</td>
<td>1.40</td>
<td>H20c: moderate</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.37</td>
<td>3.39</td>
<td>.06</td>
<td>H20c: directional</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>2.93</td>
<td>3.22</td>
<td>.60</td>
<td>H20d: directional</td>
</tr>
<tr>
<td>Pre:</td>
<td>2.53</td>
<td>2.71</td>
<td>.47</td>
<td>H20d: directional</td>
</tr>
<tr>
<td>Non-Switchers only:</td>
<td>(n = 40)</td>
<td>(n = 37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>3.29</td>
<td>3.86</td>
<td>1.73</td>
<td>H20c: yes</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.21</td>
<td>3.96</td>
<td>2.17</td>
<td>H20c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>2.67</td>
<td>3.24</td>
<td>1.50</td>
<td>H20d: moderate</td>
</tr>
<tr>
<td>Pre:</td>
<td>2.51</td>
<td>3.24</td>
<td>1.67</td>
<td>H20d: yes</td>
</tr>
<tr>
<td>All Format Subjects:</td>
<td>(n = 71)</td>
<td>(n = 70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.18</td>
<td>3.50</td>
<td>1.25</td>
<td>H20a: directional</td>
</tr>
<tr>
<td>Post:</td>
<td>2.99</td>
<td>3.60</td>
<td>2.63</td>
<td>H20a: yes</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.18</td>
<td>3.68</td>
<td>2.07</td>
<td>H20b: yes</td>
</tr>
<tr>
<td>Post:</td>
<td>3.18</td>
<td>3.78</td>
<td>2.70</td>
<td>H20b: yes</td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.28</td>
<td>3.70</td>
<td>1.73</td>
<td>H20c: yes</td>
</tr>
<tr>
<td>Post:</td>
<td>3.33</td>
<td>3.89</td>
<td>2.24</td>
<td>H20c: yes</td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>2.52</td>
<td>2.96</td>
<td>1.60</td>
<td>H20d: moderate</td>
</tr>
<tr>
<td>Post:</td>
<td>2.78</td>
<td>3.23</td>
<td>1.50</td>
<td>H20d: moderate</td>
</tr>
</tbody>
</table>

Key:
*bold italic: (p < .1); bold italic + underline: (p < .05): (t, 1 tail)*
Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
Table 20
CAC vs. EWRO FORMAT COMPARISONS
Subjective Evaluation Hypotheses

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAC Mean</th>
<th>EWRO Mean</th>
<th>t value</th>
<th>Hypothesis: supported?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switchers only:</strong></td>
<td>(n = 34)</td>
<td>(n = 32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>4.28</td>
<td>3.94</td>
<td>.85</td>
<td>H15b: directional</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.75 (1)</td>
<td>3.41 (2)</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>3.85</td>
<td>3.22</td>
<td>1.42</td>
<td>H16b: moderate</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.11 (3)</td>
<td>2.71 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Non-Switchers only:</strong></td>
<td>(n = 40)</td>
<td>(n = 37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>3.57</td>
<td>3.86</td>
<td>.93</td>
<td>H21a: directional</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.52 (5)</td>
<td>3.96 (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post:</td>
<td>2.98</td>
<td>3.24</td>
<td>.69</td>
<td>H22a: directional</td>
</tr>
<tr>
<td>Pre:</td>
<td>3.07 (7)</td>
<td>3.16 (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Format Subjects:</strong></td>
<td>(n = 74)</td>
<td>(n = 70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.63</td>
<td>3.70</td>
<td>.34</td>
<td>H21b: directional</td>
</tr>
<tr>
<td>Post:</td>
<td>3.33</td>
<td>3.89</td>
<td><strong>1.72</strong></td>
<td></td>
</tr>
<tr>
<td>Satisfaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.09</td>
<td>2.96</td>
<td>.50</td>
<td>H22b: no</td>
</tr>
<tr>
<td>Post:</td>
<td>2.78</td>
<td>3.23</td>
<td><strong>1.50</strong></td>
<td></td>
</tr>
<tr>
<td>Difficulty:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.35</td>
<td>3.50</td>
<td>.72</td>
<td>H23a: directional</td>
</tr>
<tr>
<td>Post:</td>
<td>3.26</td>
<td>3.60</td>
<td><strong>1.54</strong></td>
<td>H23a: moderate</td>
</tr>
<tr>
<td>Mental Effort:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre:</td>
<td>3.48</td>
<td>3.68</td>
<td>.82</td>
<td>H23b: directional</td>
</tr>
<tr>
<td>Post:</td>
<td>3.31</td>
<td>3.78</td>
<td><strong>2.00</strong></td>
<td>H23b: yes</td>
</tr>
</tbody>
</table>

Key:
*bold italic: (p < .1);  bold italic + underline: (p < .05): (t, t test)*
Difficulty and Effort: 1 = CADA greatly decrease ... 9 = CADA greatly increase
Accuracy and Satisfaction 1 = CADA greatly increase ... 9 = CADA greatly decrease
(1) = pre vs. post-feedback difference t value = 2.66, p < .05
(2) = pre vs. post-feedback difference t value = 2.69, p < .05
(3) = pre vs. post-feedback difference t value = 2.34, p < .05
(4) = pre vs. post-feedback difference t value = 1.48, p > .1
(5) = pre vs. post-feedback difference t value = .27, p > .1
(6) = pre vs. post-feedback difference t value = 1.15, p > .1
(7) = pre vs. post-feedback difference t value = .52, p > .1
(8) = pre vs. post-feedback difference t value = .44, p > .1
Appendix I

Experiment Overview Reading

Given to subjects at beginning of experimental session.
INTRODUCTION

Experiment Overview

The purpose of this experiment is to examine the impact of information presented in a computer format on decision making. You will be asked to analyze quality and performance ratings for two different types of computer programs, Database Management and Word Processing Software. The brands you will review for each type of software were evaluated on six attributes by Software Digest, the "Consumer Reports" of the software industry. Your task will be to choose the best brand for you for each type of software program. Provided below is a brief overview of the experiment.

The training session is the first portion of the experiment. In this session you will learn the computer operations and procedures necessary to carry out the choice task. When the training session has been completed you will leave the room for 10 minutes and, during this short break, you will read the instructions you will need to follow during the actual experiment. You will then return and engage in the actual experiment. After you have made your best choice from the brands presented on the computer, you will fill out a questionnaire.

When the experimental session has been completed you will take another short break. The final portion of the experiment will then take place. During this final session you will fill out the final questionnaire. We thank you very much for being willing to participate in this experiment.

Database Management Software

The following section contains a brief description of Database Management software. This will be the program examined in the training session. Database Management programs allow for the entry and manipulation of information such as mailing lists, telephone numbers, checks, salesperson performance, and any other type of information that is in a list type format. This type of software allows the user to sort information into desired categories, and to ask a database for only that portion of all available information that is wanted by the user.

For example, for a database containing the names and addresses of a company’s customers, a Database Management program could be used to sort all customers into groups according to their zip codes. In this way, mailing labels could be made up that take advantage of special bulk mailing rates for sorted mail. In a similar manner, variations of brochures, product offers, political fund raisers, and so on, could be developed so that they are written to appeal to the differing needs or wants of different parts of the country. A zip code sort using a Database Management program could then be used to send the specialized message to the appropriate area.
Appendix II

Software Attribute Information

Given to subjects at beginning of experimental sessions.
SOFTWARE ATTRIBUTE INFORMATION

This handout provides you with information that can be used in conjunction with the experimental task of choosing the best software program for you. Each brand has been rated by *Software Digest* on six attributes. Listed below are definitions of each attribute and, on the next page, a description of the scale used by *Software Digest* that translates the numeric ratings into six verbal categories that range from *Extremely Poor* to *Outstanding*. The actual attribute evaluations for each brand of software will be provided during the experiment.

Attribute Descriptions

Each brand of software has been evaluated on six attributes by *Software Digest*, a highly respected organization that rates personal computer programs. Each program's attributes were evaluated by expert product raters and in laboratory tests. An overall score was assigned to each attribute based on the evaluations. The six attributes and their descriptions follow.

1. **Ease of Start-up**: A measure of how difficult or simple it is to get the program "up and running" the first time you try to use it. Elements that go into determining a brand's score on this attribute include: the clarity and thoroughness of the start-up instructions and the overall ease-of-installation of a program onto a personal computer.

2. **Ease of Learning**: A measure of how simple or difficult it is to learn how to use a program and its features. Elements that go into determining a brand's score on this attribute include: the clarity and thoroughness of instructions and commands; the value of tutorials, help screens and examples of how to use a program's features; and an overall evaluation of how easy it is to learn how to use a program.

3. **Ease of Use**: A measure of how simple or difficult it is to use a program after it has been learned. Elements that go into determining a brand's score on this attribute include: the ease with which information can be entered and manipulated; how easy it is to print a report; how easy it is to reference forgotten commands; and an overall evaluation on how easy it is to use a program.

4. **Error Handling**: A measure of how well the program handled incorrect commands and other mistakes made by the user. Elements that go into determining a brand's score on this attribute include: the detection of errors; the clarity of messages that describe any error made and how to correct it; the success of the program in avoiding data loss due to user errors; and an overall evaluation on error handling.

5. **Performance**: A measure of the speed that computer operations are performed and the efficiency with which the program operates. Elements that go into determining a brand's score on this attribute include: the speed in which functions can be performed; the absence of "bugs" which may hinder or prevent the execution of a function; the amount of space required to hold a program and your data in the computer memory; and an overall evaluation of performance.

6. **Versatility**: A measure of the program's power and capabilities above and beyond the standard functions performed by all programs. Elements that go into determining a brand's score on this attribute include: comparing the type and number of each program's features against a checklist of advanced features and an overall evaluation of the program's versatility.
Appendix III

Rating Scale Descriptions

Given to subjects at beginning of experimental sessions.
RATING SCALE DESCRIPTIONS

Each brand's attributes were evaluated on a 0 to 10 point scale. This scale was divided into six categories by Software Digest to describe a brand's performance on each attribute. Provided below are the six categories and their corresponding performance descriptions.

<table>
<thead>
<tr>
<th>Scale Range</th>
<th>Performance Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0 to 10.0</td>
<td>Outstanding</td>
</tr>
<tr>
<td>8.0 to 8.9</td>
<td>Excellent</td>
</tr>
<tr>
<td>7.0 to 7.9</td>
<td>Very Good</td>
</tr>
<tr>
<td>6.0 to 6.9</td>
<td>Good</td>
</tr>
<tr>
<td>5.0 to 5.9</td>
<td>Fair</td>
</tr>
<tr>
<td>0.0 to 4.9</td>
<td>Extremely Poor to Poor</td>
</tr>
</tbody>
</table>
Appendix IVa

Script for CAL Subjects

Verbal instructions given to CAL subjects prior to and during the training session.
THANK YOU FOR COMING

THIS IS AN EXPERIMENTAL SESSION SO PLEASE:

- PLEASE DO NOT START READING HANDOUTS AND QUESTIONNAIRES UNTIL I INSTRUCT YOU TO. I WOULD LIKE TO MAKE SURE YOU HEAR ANY VERBAL INSTRUCTION AS WELL AS HAVING YOU ALL START EACH SECTION TOGETHER.

- DO NOT TALK WITH EACH OTHER, IF YOU HAVE A PROBLEM RAISE YOUR HAND, AND ONE OF US WILL COME AND HELP YOU.

- BECAUSE THE COMPUTER IS TURNED ON AND SET UP SPECIALLY FOR THIS SESSION, PLEASE DO NOT TOUCH THE KEYBOARD OR MONITOR UNTIL INSTRUCTED TO DO SO.

- IF YOU DON'T HEAR AN INSTRUCTION, OR DON'T UNDERSTAND AN INSTRUCTION, RAISE YOUR HAND AND LET ME KNOW IMMEDIATELY.

- YOU WILL BE GETTING A NUMBER OF HANDOUTS TO READ AND FILL OUT. PLEASE TAKE THE TIME TO READ THEM CAREFULLY.

- DO NOT SKIP THE "NOTES" BECAUSE THEY WILL HELP YOU understand THE QUESTIONNAIRES.

- PLEASE MAKE SURE TO PUT THE SESSION NUMBER AND YOUR SEAT IDENTIFICATION NUMBER ON TOP OF ALL QUESTIONNAIRES.

- PLEASE DO NOT WRITE ON THE READING HANDOUTS

- AFTER FINISHING EACH QUESTIONNAIRE, TURN IT OVER AND DO NOT GO BACK TO IT.

PLEASE TAKE A FEW MOMENTS TO READ THE THREE PAGES GIVEN TO YOU WHEN YOU CAME IN.

- PLEASE DO NOT WRITE ON THESE READINGS DURING THIS EXPERIMENT.

YOU WILL BE USING THE COMPUTER TO HELP YOU SELECT A BRAND OF COMPUTER SOFTWARE. WE WILL FIRST TRAIN YOU ON HOW TO USE THE COMPUTER SO THAT YOU CAN USE IT ON YOUR OWN TO MAKE THE SELECTION FROM A GROUP OF WORD PROCESSING PROGRAMS. WE WILL TRAIN YOU USING THE DATABASE SOFTWARE PROGRAMS.

- PLEASE TAKE A FEW MOMENTS TO READ THE HANDOUT MARKED "IMPORTANCE WEIGHTS QUESTIONNAIRE FOR DATABASE MANAGEMENT PROGRAMS".
- PUT YOUR ID NUMBER AND DATE ON TOP PLEASE
- ON THE TOP PORTION IS THE SIX ATTRIBUTES FROM WHICH YOU WILL JUDGE
  BOTH THE CURRENT DATABASE PROGRAMS AND LATER THE WORD
  PROCESSING PROGRAMS.
- I WOULD LIKE YOU TO PUT YOUR IMPORTANCE WEIGHTS ON THOSE
  ATTRIBUTES, BASED ON THE DESCRIPTIONS OF THOSE ATTRIBUTES AND
  THE DATABASE PROGRAMS YOU JUST FINISHED READING.
- PLEASE FEEL FREE TO REFER BACK TO THOSE DESCRIPTIONS.
- REMEMBER THAT THE IMPORTANCE WEIGHTS NEED TO ADD UP TO 100
  PERCENT, MEANING THAT A HIGHER IMPORTANCE WEIGHT ON ONE
  ATTRIBUTE WILL REQUIRE YOU TO LOWER THE WEIGHT ON ANOTHER.
- WHEN DONE RAISE YOUR HAND AND TURN THE SHEET OVER. PLEASE DO NOT
  LOOK BACK AT IT.

THE COMPUTER FORMAT YOU WILL BE LEARNING IS THE WEIGHTED AVERAGE
FORMAT. I WILL ILLUSTRATE WHAT THE COMPUTER WILL DO WHEN YOU INPUT
YOUR OWN IMPORTANCE WEIGHTS INTO THE COMPUTER.
- AFTER YOU INPUT YOUR OWN IMPORTANCE WEIGHTS, THE COMPUTER WILL
  MULTIPLY YOUR WEIGHTS BY THE ATTRIBUTE SCORE EACH BRAND
  RECEIVED FROM SOFTWARE DIGEST. PLEASE GIVE ME YOUR ATTENTION AS
  I ILLUSTRATE THIS PROCESS WITH A SIMPLIFIED EXAMPLE ON THE BOARD.
- TWO DATABASE PROGRAMS, BRAND A AND BRAND B, WERE EVALUATED BY
  SOFTWARE DIGEST ON TWO ATTRIBUTES, ERROR HANDLING AND
  PERFORMANCE.
- BRAND A RECEIVED A SCORE OF 5 ON EH, AND A 9 ON PERFORMANCE.
- BRAND B RECEIVED A SCORE OF 10 ON EH, AND A 4 ON PERFORMANCE.
- IF YOU FELT EH WAS MORE IMPORTANT YOU MIGHT GIVE AN IMPORTANCE
  WEIGHT OF .8 ON EH AND .2 ON PERFORMANCE. THE COMPUTER WOULD
  THEN MULTIPLY THOSE WEIGHTS BY THE BRAND'S SCORES ON THOSE
  ATTRIBUTES AND SUM THE PRODUCTS FOR A TOTAL WEIGHTED SCORE.
- WITH THOSE WEIGHTS BRAND A WOULD HAVE A LARGER TOTAL WEIGHTED
  SCORE THAN BRAND B, AND HENCE WOULD APPEAR ABOVE BRAND B ON
  THE SCREEN.
- IF YOU FELT PERFORMANCE WAS MORE IMPORTANT, AND GAVE A WEIGHT OF .8
  TO PERFORMANCE AND .2 TO EH, THE PROCESS WOULD BE REPEATED,
ONLY THIS TIME BRAND B WOULD HAVE THE LARGEST TOTAL WEIGHTED SCORE AND WOULD ApPEAR ABOVE BRAND A ON THE SCREEN.
DO YOU UNDERSTAND THE EFFECT THAT YOUR IMPORTANCE WEIGHTS CAN HAVE ON THE WAY THE COMPUTER WILL RANK THE BRANDS ON THE SCREEN?
- REMEMBER THAT YOUR IMPORTANCE WEIGHTS FOR THE SIX ATTRIBUTES MUST ADD UP TO 100%.
WE WILL NOW INPUT SOME IMPORTANCE WEIGHTS ON THE COMPUTER. PLEASE TURN ON YOUR MONITOR NOW.
- YOU WILL INPUT THE WEIGHTS WITH THE NUMBERS AT THE TOP OF THE KEYBOARD, NOT THOSE ON THE KEYPAD ON THE RIGHT SIDE OF THE KEYBOARD.
- AS YOU TYPE THE NUMBERS, THEY WILL APPEAR ON THE UPPER LEFT OF THE SCREEN UNTIL YOU INPUT THEM WITH THE DOWN ARROW KEY OR THE ENTER KEY.
- THE DOWN ARROW KEY MOVES THE CURSOR TO THE NEXT ATTRIBUTE SPACE SO YOU CAN INPUT THE NEXT IMPORTANCE WEIGHT.
- IF YOU MAKE A MISTAKE TYPING, ERASE THE MISTAKE USING THE BACKSPACE KEY AND RETYPE YOUR IMPORTANCE WEIGHT.
NOW EVERYONE TYPE IN .20 AND PUSH THE DOWN ARROW KEY TO INPUT THE VALUE. NOTICE THAT THE COMPUTER CHANGES YOUR WEIGHT INTO PERCENTAGES AS YOU INPUT THEM.
- DOES EVERYONE HAVE 20% ACROSS FROM EASE OF START-UP?
- NOW TYPE IN .10 FOR EASE OF LEARNING AND PUSH THE DOWN ARROW KEY
- NOW TYPE IN .25 AND PUSH THE DOWN ARROW KEY
- NOW TYPE IN .10 AND PUSH THE DOWN ARROW KEY
- NOW TYPE IN .15 AND PUSH THE DOWN ARROW KEY
- NOW TYPE IN .20 AND PUSH THE ENTER KEY
- DOES EVERYONE HAVE 100% AT THE BOTTOM OF THE WEIGHT COLUMN?
REMEMBER YOUR WEIGHTS MUST ADD UP TO 100%
TO INSTIGATE A SEARCH I WANT YOU ALL TO PUSH DOWN THE ALT KEY
- HAS EVERYONE FOUND THE ALT KEY?
- AS YOU HOLD DOWN THAT KEY QUICKLY TAP THE "S" KEY AND THEN LET GO OF BOTH KEYS. PLEASE DO THIS NOW.
- REMEMBER TO NOT HOLD DOWN THE "S" KEY BECAUSE IT WILL CAUSE THE
  COMPUTER TO CONDUCT MULTIPLE SEARCHES BECAUSE OF ITS
  AUTOMATIC REPEAT FUNCTION.

THE 20 DATABASE BRANDS NOW APPEAR AT THE BOTTOM OF YOUR SCREEN WITH
THEIR ACTUAL ATTRIBUTE RATINGS FROM SOFTWARE DIGEST.
  - REMEMBER THEY ARE RANKED FROM BEST TO WORST ACCORDING THEIR
    TOTAL WEIGHTED SCORES, WHICH YOU WILL NOT SEE, AS WAS DONE WITH
    THE EXAMPLE A FEW MINUTES AGO.
  - YOU CAN VIEW THE BRANDS BY USING THE DOWN ARROW. BECAUSE ONLY SIX
    BRANDS APPEAR ON THE SCREEN OF THE TWENTY AVAILABLE, TO SEE ALL
    THE BRANDS YOU WILL NEED MOVE DOWN
  - DO NOT USE ANY KEYS BUT THE DOWN OR UP KEYS TO MOVE AROUND.
  - DO NOT USE THE "HOME" KEY OR "END" TO MOVE AROUND, AS THEY WILL
    MOVE YOU OFF THE AREA YOU NEED TO BE IN TO VIEW THE BRANDS.
  - IF YOU MAKE A MISTAKE AND GET LOST, PLEASE RAISE YOUR HAND AND ONE
    OF US WILL PUT YOU BACK IN THE PROPER PLACE ON THE SPREADSHEET.

NOW USE THE UP ARROW KEY TO PUT THE CURSOR BACK IN THE WEIGHT
COLUMN ACROSS FROM THE EASE OF STARTUP ATTRIBUTE AT THE TOP OF THE
SCREEN.
  - INPUT .30 AND PUSH THE ENTER KEY
  - NOW, WHILE HOLDING DOWN THE ALT KEY, TAP THE "S" QUICKLY AND LET GO
    OF BOTH KEYS.
  - NOTICE THAT YOUR MACHINE "BEEPED" MEANING YOUR IMPORTANCE
    WEIGHTS DID NOT SUM TO 100%. THE COMPUTER WILL NOT INSTIGATE A
    SEARCH UNLESS THE COLUMN TOTAL EQUALS 100%.
  - THIS MEANS THAT IN ORDER FOR YOU TO RAISE THE IMPORTANCE WEIGHT OF
    ONE ATTRIBUTE, YOU WILL HAVE TO LOWER THE WEIGHT OF ANOTHER.

NOW GO AHEAD AND PUT IN YOUR OWN IMPORTANCE WEIGHTS AND CONDUCT A
SEARCH HOLDING DOWN THE ALT KEY WHILE QUICKLY TAPPING THE "S" KEY.
  - REMEMBER ALL TWENTY BRANDS WILL APPEAR IN RANKED ORDER FROM BEST
    TO WORST ACCORDING TO THE WEIGHTS YOU SPECIFY.
  - ONCE YOU HAVE CONDUCTED A SEARCH, GO AHEAD AND PICK A BRAND YOU
    LIKE BY USING THE DOWN ARROW KEY TO VIEW THEM.
- Pick any brand which you think is best for you based on the attribute scores it received from Software Digest.

- Don't feel like you must pick the top ranked brand, as your favorite could come from the bottom, top or middle, so take a look at all of them.

- Raise your hand when you have found your favorite brand.

** Go over attribute scores of someone's favorite brand

- You will see that most brands do not have high scores on all the attributes.

Do you all feel like you have a good understanding of how the computer uses your importance weights to calculate the brand rankings?

If I asked you to answer a question on how the brands are ranked after you conduct a search, could you answer it?

- I would hope that you would answer that the brands are ranked from best to worst according their total weighted average scores.

Would you feel comfortable conducting your own search without my instructions?
Appendix IVb

Training Questionnaire Script

Verbal instructions given to subjects just prior to filling out the training sessions questionnaire.
TRAINING QUESTIONNAIRE

- PLEASE PLACE YOUR ID NUMBER AND DATE AT THE TOP
- PLEASE READ THE QUESTIONS AND NOTES CAREFULLY
- WHEN DONE, PLEASE TURN THE SHEET OVER AND PLACE IT ON TOP OF THE DATABASE WEIGHT SHEET YOU COMPLETED EARLIER. DO NOT GO BACK TO YOUR TRAINING SHEET ONCE YOU HAVE COMPLETED IT.

PLEASE HIT THE ALT AND "O" KEYS TOGETHER TO HELP US RESET THE COMPUTER FOR YOUR NEXT TASK

READ TASK INSTRUCTIONS HANDOUT DURING BREAK
- PLEASE READ CAREFULLY AND DO NOT TALK TO EACH OTHER ABOUT THE EXPERIMENT DURING YOUR 10 MINUTE BREAK.
Appendix IVc

Word Processing Brand Choice Task Instructions Script

Verbal instructions given to CAL subjects after returning from break and just prior to choice task.
YOU WILL NOW CONDUCT YOUR OWN SEARCH USING YOUR OWN IMPORTANCE WEIGHTS.

- YOU WILL HAVE 30 BRANDS OF WORD PROCESSING SOFTWARE TO CHOOSE FROM
- ALL BRANDS WERE RATED BY SOFTWARE DIGEST ON THE SAME SIX ATTRIBUTES AS THE DATABASE MANAGEMENT PROGRAMS YOU LOOKED AT DURING TRAINING
- REMEMBER YOUR WEIGHTS MUST TOTAL TO 100% FOR THE COMPUTER TO CONDUCT A SEARCH, IF THEY DO NOT YOU MUST CHANGE YOUR IMPORTANCE WEIGHTS SO THAT THEY DO.
- AFTER YOU CONDUCT A SEARCH BY HOLDING DOWN THE ALT KEY AND QUICKLY TAPPING THE "S" KEY, THE BRANDS WILL APPEAR IN RANKED ORDER FROM BEST TO WORST ACCORDING THE THEIR TOTAL WEIGHTED SCORES WHICH YOU WILL NOT SEE.
- BRAND NAMES WILL NOT APPEAR SO THAT YOUR PREVIOUS EXPERIENCE WITH ANY PARTICULAR BRANDS WILL NOT INFLUENCE YOUR DECISION.
- RANDOM NUMBERS WERE GENERATED TO IDENTIFY THE BRANDS.
- REMEMBER YOU CAN PICK ANY BRAND FROM THE BOTTOM, TOP OR MIDDLE OF THE LISTING. JUST REMEMBER TO PICK THE BRAND WITH THE ATTRIBUTE SCORES YOU THINK ARE BEST FOR YOU.
- PLEASE DO NOT CONDUCT MULTIPLE SEARCHES, UNLESS YOU HAVE CHANGED YOUR MIND ON WHAT IMPORTANCE WEIGHT YOU WISH TO GIVE TO SOME OF THE ATTRIBUTES.
- YOU HAVE TEN MINUTES TO COMPLETE THIS TASK, WHICH IS PLENTY OF TIME, SO DON'T FEEL RUSHED.
- AFTER LOOKING AT THE BRANDS USING THE DOWN AND UP ARROW KEYS, AND PICKING YOUR FAVORITE BRAND, RAISE YOUR HAND AND SOMEONE WILL GIVE YOU A QUESTIONNAIRE TO FILL OUT.

COMPUTER FORMAT QUESTIONNAIRE

PLEASE READ THE QUESTIONS CAREFULLY

- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.
- Remember they apply only towards the word processing choice task and not the training task.

- Each question is important, so please answer each one carefully and fully.

- When finished put the turn the questionnaire over and put it on top or your database weights and training session questionnaires. Do not go back to it.

- Any questions?

Turn your monitor on and conduct your search.
Appendix IVd

Paired Comparisons Questionnaire Script

Verbal instructions given to CAL subjects after their choice task.
PAIRED COMPARISONS QUESTIONNAIRE

- DOES EVERYONE HAVE THEIR CORRECT BRAND AT THE TOP?
- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.
- PLEASE READ EACH QUESTION CAREFULLY
- FEEL FREE TO EITHER SWITCH OR STAY
- DO NOT FEEL LIKE YOU SHOULD BE CONSISTENT
- IF YOU LIKE ONE OR MORE OF THE COMPARISON BRANDS BETTER, FEEL FREE TO SWITCH.
- IF YOU ARE HAPPY WITH YOUR ORIGINAL BEST CHOICE, DO NOT FEEL LIKE YOU NEED TO SWITCH, BUT CAREFULLY EVALUATE THE COMPARISON BRANDS.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR COMPUTER FORMAT QUESTIONNAIRE. DO NOT GO BACK TO IT.
- ON THE LAST PAGE, PLEASE PICK YOU FINAL BEST CHOICE FROM ALL THE COMPARISON BRANDS ON THE LAST PAGE

FINAL QUESTIONNAIRE

- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.

PLEASE READ THE QUESTIONS CAREFULLY

- REMEMBER THEY APPLY ONLY TOWARDS THE WORD PROCESSING CHOICE TASK AND NOT THE TRAINING TASK
- EACH QUESTION IS IMPORTANT, SO PLEASE ANSWER EACH ONE CAREFULLY AND FULLY
- SOME QUESTIONS MAY APPEAR TO BE REDUNDANT, BUT THEY ARE IMPORTANT FOR THIS RESEARCH, SO PLEASE TRY TO ANSWER THEM AS IF IT WAS THE FIRST TIME YOU HAVE SEEN THE QUESTION, ANSWERING IT IN A WAY WHICH BEST REFLECTS YOUR FEELING RIGHT NOW.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR DATABASE WEIGHTS AND TRAINING SESSION QUESTIONNAIRES. DO NOT GO BACK TO IT.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR PAIRED COMPARISON QUESTIONNAIRE. DO NOT GO BACK TO IT.
- WHEN YOU ARE FINISHED PUT THE LARGE PAPER CLIP ON ALL YOUR QUESTIONNAIRES IN THE ORDER IN WHICH YOU FINISHED THEM.
- PLEASE DO NOT TAKE ANY PENCILS YOU BORROWED OR ANY OF THE READINGS OR QUESTIONNAIRES OUT OF THE ROOM WHEN YOU LEAVE
- THANK YOU FOR PARTICIPATING THE THIS EXPERIMENT
Appendix Va

Cutoff Script

Verbal instructions given to CAC subjects prior to and during training session.
THANK YOU FOR COMING

THIS IS AN EXPERIMENTAL SESSION SO PLEASE:

- PLEASE DO NOT START READING HANDOUTS AND QUESTIONNAIRES UNTIL I
  INSTRUCT YOU TO. I WOULD LIKE TO MAKE SURE YOU HEAR ANY VERBAL
  INSTRUCTION AS WELL AS HAVING YOU ALL START EACH SECTION
  TOGETHER.

- DO NOT TALK WITH EACH OTHER, IF YOU HAVE A PROBLEM RAISE YOUR HAND,
  AND ONE OF US WILL COME AND HELP YOU.

- BECAUSE THE COMPUTER IS TURNED ON AND SET UP SPECIALLY FOR THIS
  SESSION, PLEASE DO NOT TOUCH THE KEYBOARD OR MONITOR UNTIL
  INSTRUCTED TO DO SO.

- IF YOU DON'T HEAR AN INSTRUCTION, OR DON'T UNDERSTAND AN
  INSTRUCTION, RAISE YOUR HAND AND LET ME KNOW IMMEDIATELY.

- YOU WILL BE GETTING A NUMBER OF HANDOUTS TO READ AND FILL OUT.
  PLEASE TAKE THE TIME TO READ THEM CAREFULLY.

- DO NOT SKIP THE "NOTES" BECAUSE THEY WILL HELP YOU UNDERSTAND THE
  QUESTIONNAIRES.

- PLEASE MAKE SURE TO PUT THE SESSION NUMBER AND YOUR SEAT
  IDENTIFICATION NUMBER ON TOP OF ALL QUESTIONNAIRES.

- PLEASE DO NOT WRITE ON THE READING HANDOUTS

- AFTER FINISHING EACH QUESTIONNAIRE, TURN IT OVER AND DO NOT GO BACK
  TO IT.

PLEASE TAKE A FEW MOMENTS TO READ THE THREE PAGES GIVEN TO YOU
WHEN YOU CAME IN.

- PLEASE DO NOT WRITE ON THESE READINGS DURING THIS EXPERIMENT

YOU WILL BE USING THE COMPUTER TO HELP YOU SELECT A BRAND OF
COMPUTER SOFTWARE. WE WILL FIRST TRAIN YOU ON HOW TO USE THE
COMPUTER SO THAT YOU CAN USE IT ON YOUR OWN TO MAKE THE SELECTION
FROM A GROUP OF WORD PROCESSING PROGRAMS. WE WILL TRAIN YOU USING
THE DATABASE SOFTWARE PROGRAMS.

- PLEASE TAKE A FEW MOMENTS TO READ THE HANDOUT MARKED "MINIMUM
  VALUES QUESTIONNAIRE FOR DATABASE MANAGEMENT PROGRAMS".

- PUT YOUR ID NUMBER AND DATE ON TOP PLEASE
- On the top portion is the six attributes from which you will judge both the current database programs and later the word processing programs.

- I will be asking you to place the minimum performance value you would accept for a database program brand you would consider. For example, if you put a minimum score of 7.0 on all six attributes, and a brand had a rating from Software Digest of 6.9 on ease of start-up and perfect 10's on the other five attributes, it would be rejected.

- This is fine as long as you feel you absolutely need a 7.0 on ease of start-up.

- If you would have liked to at least have seen this brand, keep in mind the effect even one cutoff can have, as brands with very high scores on the other attributes can be rejected.

- Please put your own minimum values for any or all the six attributes now. Remember they can be any value from 0.00 to 10.00.

- When done raise your hand and turn the sheet over. Please do not look back at it.

The computer format you will be learning is the cutoff format. I will illustrate what the computer will do when you input your own minimum attribute scores or cutoffs into the computer.

- Brands which meet all your cutoffs will appear on your screen in random order.

Do you understand the effect that your minimum attribute values can have on the way the computer search for brands which will appear on your screen?

- Remember that your minimum scores must be between 0.0 and 10.0 for any or all the six attributes.

Now turn on your monitor, we will now input some cutoff values into the computer.

- You will input the cutoffs with the numbers at the top of the keyboard, not those on the keypad on the right side of the keyboard.
- As you type the numbers, they will appear on the upper left of the screen until you input them with the down arrow key or the enter key.
- The down arrow key moves the cursor to the next attribute space so you can input the next importance weight.
- If you make a mistake typing, erase the mistake using the backspace key and retype your importance weight.

We will first conduct a search using a value of zero for all six attributes.

To instigate a search I want you all to push down the alt key
- Has everyone found the alt key?
- As you hold down that key quickly tap the "s" key and then let go of both keys. Please do this now.
- Remember to not hold down the "s" key because it will cause the computer to conduct multiple searches because of its automatic repeat function.

Notice that in the upper right part of your screen it says "number of brands meeting minimum requirements". You should have a number 20 under that heading.
- The 20 database brands now appear at the bottom of your screen with their attribute ratings from Software Digest.
- Since the cutoff values are zero, none of the brands are rejected and all are presented on the screen.
- You can do this any time you would like to see all available brands.
- Remember the brands are in random order
- You can view the brands by using the down arrow. Because only six brands appear on the screen of the twenty available, to see all the brands you will need move down
- You can view the brands by using the down arrow. Because only six brands appear on the screen of the twenty available, to see all the brands you will need move down
- Do not use any keys but the down or up keys to move around.
- Do not use the "Home" key or "End" to move around, as they will move you off the area you need to be in to view the brands.
- If you make a mistake and get lost, please raise your hand and one of us will put you back in the proper place on the spreadsheet.
- Now use the up arrow key to put the cursor back in the weight column across from the ease of startup attribute at the top of the screen.

We will now conduct a search after inputting some cutoff values which I will give you. Now everyone type in 7.1 and push the down arrow key to input the value.
- Does everyone have 7.1 across from ease of start-up?
- Now type in 5.4 and push the down arrow key to allow it to appear across from ease of learning.
- Now type in 8.3 and push the down arrow key
- Now type in 3.8 and push the down arrow key
- Now type in 6.5 and push the down arrow key
- Now type in 8.8 and push the enter key
- Does everyone have their the cutoffs for all six attributes?

Now everyone hold the Alt key while quickly tapping the "S" key.

Notice that no brand appear on the screen.
- No brands met or exceeded all the cutoffs we inputted.
- If this happens, you must go back and lower your cutoffs.
- For our final example, use the up arrow key to put the cursor back in the weight column across from the ease of startup attribute at the top of the screen.
- Input 5.2 and push the down arrow key
- Now type in 6.5 and push the down arrow key to allow it to appear across from ease of learning.
- Now type in 0.0 and push the down arrow key
- Now type in 4.1 and push the down arrow key
- Now type in 3.8 and push the down arrow key
- Now type in 3.5 and push the enter key
- Now, while holding down the Alt key, tap the "S" quickly and let go of both keys.
- NOTICE THAT YOUR MONITOR NOW SHOWS THAT 6 BRANDS EXCEED YOUR CUTOFFS IN THE UPPER RIGHT CORNER AND THAT THOSE BRANDS AND THEIR ATTRIBUTE SCORES APPEAR AT THE LOWER PART OF THE SCREEN IN RANDOM ORDER.
- ONCE YOU HAVE CONDUCTED A SEARCH, GO AHEAD AND PICK A BRAND YOU LIKE BY USING THE DOWN ARROW KEY TO VIEW THEM.
- PICK ANY BRAND WHICH YOU THINK IS BEST FOR YOU BASED ON THE ATTRIBUTE SCORES IT RECEIVED FROM SOFTWARE DIGEST.
- RAISE YOUR HAND WHEN YOU HAVE FOUND YOUR FAVORITE BRAND.

**** GO OVER ATTRIBUTE SCORES OF SOMEONE'S FAVORITE BRAND
- NOTICE THAT EVEN A PREFERRED BRAND DOES NOT HAVE HIGH SCORES ON EVERY ATTRIBUTE.
- THIS IS TYPICAL AS MOST BRANDS DO NOT HAVE HIGH SCORES ON ALL SIX ATTRIBUTES, KEEP THIS IN MIND AS YOU SET YOUR OWN CUTOFF VALUES.

NOW GO AHEAD AND PUT IN YOUR CUTOFFS OR MINIMUM SCORES AND CONDUCT A SEARCH HOLDING DOWN THE ALT KEY WHILE QUICKLY TAPPING THE "S" KEY.

DO YOU ALL FEEL LIKE YOU HAVE A GOOD UNDERSTANDING OF HOW THE COMPUTER USES YOUR CUTOFF VALUES TO SEARCH FOR BRANDS?

IF I ASKED YOU WHAT ORDER THE BRANDS ARE IN AFTER YOU CONDUCT A SEARCH, COULD YOU ANSWER ME? I WOULD HOPE YOU WOULD SAY THAT BRANDS WHICH MEET OR EXCEED ALL MY CUTOFF VALUES ARE DISPLAYED IN RANDOM ORDER.

WOULD YOU FEEL COMFORTABLE CONDUCTING YOUR OWN SEARCH WITHOUT MY INSTRUCTIONS?
Appendix Vb

Training Questionnaire Script

Verbal instructions given to subjects prior to filling out training questionnaire and just after completing the training session.
TRAINING QUESTIONNAIRE

- PLEASE PLACE YOUR ID NUMBER AND DATE AT THE TOP
- PLEASE READ THE QUESTIONS AND NOTES CAREFULLY
- WHEN DONE, PLEASE TURN THE SHEET OVER AND PLACE IT ON TOP OF THE DATABASE WEIGHT SHEET YOU COMPLETED EARLIER. DO NOT GO BACK TO YOUR TRAINING SHEET ONCE YOU HAVE COMPLETED IT.

PLEASE HIT THE ALT AND "O" KEYS TOGETHER TO HELP US RESET THE COMPUTER FOR YOUR NEXT TASK

READ TASK INSTRUCTIONS HANDOUT DURING BREAK
- PLEASE READ CAREFULLY AND DO NOT TALK TO EACH OTHER ABOUT THE EXPERIMENT DURING YOUR 10 MINUTE BREAK.
Appendix Vc

Experimental Task Script for CAC Subjects

Verbal instructions given to CAL subjects after returning from break and just prior to choice task.
YOU WILL NOW CONDUCT YOUR OWN SEARCH USING YOUR OWN IMPORTANCE WEIGHTS.

- YOU WILL HAVE 30 BRANDS OF WORD PROCESSING SOFTWARE TO CHOOSE FROM

- ALL BRANDS WERE RATED BY SOFTWARE DIGEST ON THE SAME SIX ATTRIBUTES AS THE DATABASE MANAGEMENT PROGRAMS YOU LOOKED AT DURING TRAINING

- BRAND NAMES WILL NOT APPEAR SO THAT YOUR PREVIOUS EXPERIENCE WITH ANY PARTICULAR BRANDS WILL NOT INFLUENCE YOUR DECISION. RANDOM NUMBERS WERE GENERATED TO IDENTIFY THE BRANDS.

- REMEMBER YOUR CUTOFFS CAN BE ANY VALUE FROM 0.0 TO 10.0. YOU CAN PUT IN CUTOFFS ON NONE, A FEW, OR ALL SIX ATTRIBUTES IF YOU WISH.

- ALSO REMEMBER THAT HIGHER CUTOFFS WILL ELIMINATE MORE BRANDS. IF NO BRANDS APPEAR AFTER YOU CONDUCT A SEARCH, SOME OR ALL OF YOUR CUTOFFS ARE TOO HIGH AND MUST BE LOWERED FOR BRANDS TO APPEAR.

- BE CAREFUL IN SETTING YOUR CUTOFFS, FOR EXAMPLE IF YOU PUT ALL 7.0 CUTOFF ON EASE OF START-UP, A BRAND WITH PERFECT 10'S ON THE OTHER FIVE ATTRIBUTES WOULD BE ELIMINATED IF IT HAD A 6.9 RATING ON EASE OF START-UP.

- THIS IS FINE IF YOU FEEL YOU REALLY NEED A MINIMUM SCORE OF 7.0, BUT JUST UNDERSTAND THE EFFECT THAT EVEN ONE CUTOFF CAN HAVE ON THE BRANDS WHICH APPEAR ON THE SCREEN.

- AFTER YOU CONDUCT A SEARCH BY HOLDING DOWN THE ALT KEY AND QUICKLY TAPPING THE "S" KEY, THE BRANDS WILL APPEAR IN RANDOM ORDER

- CONDUCT AS MANY SEARCHES AS YOU NEED TO FIND THE BRAND WHICH IS BEST FOR YOU BASED ON ITS ATTRIBUTE SCORES.

- AFTER LOOKING AT THE BRANDS USING THE DOWN AND UP ARROW KEYS, AND PICKING YOUR FAVORITE BRAND, RAISE YOUR HAND AND SOMEONE WILL GIVE YOU A QUESTIONNAIRE TO FILL OUT.

- YOU HAVE TEN MINUTES TO COMPLETE THIS TASK, WHICH IS PLENTY OF TIME, SO DON'T FEEL RUSHED.
- After looking at the brands using the down and up arrow keys, and picking your favorite brand, raise your hand and someone will give you a questionnaire to fill out.

**Computer Format Questionnaire**

**Please read the questions carefully**

- Please put your ID number and date on top of the first page.
- Remember they apply only towards the word processing choice task and not the training task.
- Each question is important, so please answer each one carefully and fully.
- When finished put the turn the questionnaire over and put it on top or your database weights and training session questionnaires. Do not go back to it.

- Any questions?

**Turn your monitor on and conduct your search.**
Appendix Vd

Paired Comparisons Questionnaire Script

Verbal instructions given to CAC subjects after their choice task.
PAIRED COMPARISONS QUESTIONNAIRE

- DOES EVERYONE HAVE THEIR CORRECT BRAND AT THE TOP?
- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.
- PLEASE READ EACH QUESTION CAREFULLY
- FEEL FREE TO EITHER SWITCH OR STAY
- DO NOT FEEL LIKE YOU SHOULD BE CONSISTENT
- IF YOU LIKE ONE OR MORE OF THE COMPARISON BRANDS BETTER, FEEL FREE TO SWITCH.
- IF YOU ARE HAPPY WITH YOUR ORIGINAL BEST CHOICE, DO NOT FEEL LIKE YOU NEED TO SWITCH, BUT CAREFULLY EVALUATE THE COMPARISON BRANDS.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR COMPUTER FORMAT QUESTIONNAIRE. DO NOT GO BACK TO IT.
- ON THE LAST PAGE, PLEASE PICK YOU FINAL BEST CHOICE FROM ALL THE COMPARISON BRANDS ON THE LAST PAGE

FINAL QUESTIONNAIRE

- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.

PLEASE READ THE QUESTIONS CAREFULLY

- REMEMBER THEY APPLY ONLY TOWARDS THE WORD PROCESSING CHOICE TASK AND NOT THE TRAINING TASK
- EACH QUESTION IS IMPORTANT, SO PLEASE ANSWER EACH ONE CAREFULLY AND FULLY
- SOME QUESTIONS MAY APPEAR TO BE REDUNDANT, BUT THEY ARE IMPORTANT FOR THIS RESEARCH, SO PLEASE TRY TO ANSWER THEM AS IF IT WAS THE FIRST TIME YOU HAVE SEEN THE QUESTION, ANSWERING IT IN A WAY WHICH BEST REFLECTS YOUR FEELING RIGHT NOW.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR DATABASE WEIGHTS AND TRAINING SESSION QUESTIONNAIRES. DO NOT GO BACK TO IT.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR PAIRED COMPARISON QUESTIONNAIRE. DO NOT GO BACK TO IT.
- WHEN YOU ARE FINISHED PUT THE LARGE PAPER CLIP ON ALL YOUR QUESTIONNAIRES IN THE ORDER IN WHICH YOU FINISHED THEM.
- PLEASE DO NOT TAKE ANY PENCILS YOU BORROWED OR ANY OF THE READINGS OR QUESTIONNAIRES OUT OF THE ROOM WHEN YOU LEAVE
- THANK YOU FOR PARTICIPATING THE THIS EXPERIMENT
Appendix VIa

Script for EWRO Subjects

Verbal instructions given to EWRO subjects prior to and during training session.
THANK YOU FOR COMING

THIS IS AN EXPERIMENTAL SESSION SO PLEASE:

- PLEASE DO NOT START READING HANDOUTS AND QUESTIONNAIRES UNTIL I INSTRUCT YOU TO. I WOULD LIKE TO MAKE SURE YOU HEAR ANY VERBAL INSTRUCTION AS WELL AS HAVING YOU ALL START EACH SECTION TOGETHER.
- DO NOT TALK WITH EACH OTHER, IF YOU HAVE A PROBLEM RAISE YOUR HAND, AND ONE OF US WILL COME AND HELP YOU.
- BECAUSE THE COMPUTER IS TURNED ON AND SET UP SPECIALLY FOR THIS SESSION, PLEASE DO NOT TOUCH THE KEYBOARD OR MONITOR UNTIL INSTRUCTED TO DO SO.
- IF YOU DON'T HEAR AN INSTRUCTION, OR DON'T UNDERSTAND AN INSTRUCTION, RAISE YOUR HAND AND LET ME KNOW IMMEDIATELY.
- YOU WILL BE GETTING A NUMBER OF HANDOUTS TO READ AND FILL OUT. PLEASE TAKE THE TIME TO READ THEM CAREFULLY.
- DO NOT SKIP THE "NOTES" BECAUSE THEY WILL HELP YOU UNDERSTAND THE QUESTIONNAIRES.
- PLEASE MAKE SURE TO PUT THE SESSION NUMBER AND YOUR SEAT IDENTIFICATION NUMBER ON TOP OF ALL QUESTIONNAIRES.
- PLEASE DO NOT WRITE ON THE READING HANDOUTS
- AFTER FINISHING EACH QUESTIONNAIRE, TURN IT OVER AND DO NOT GO BACK TO IT.

PLEASE TAKE A FEW MOMENTS TO READ THE THREE PAGES GIVEN TO YOU WHEN YOU CAME IN.

- PLEASE DO NOT WRITE ON THESE READINGS DURING THIS EXPERIMENT YOU WILL BE USING THE COMPUTER TO HELP YOU SELECT A BRAND OF COMPUTER SOFTWARE. WE WILL FIRST TRAIN YOU ON HOW TO USE THE COMPUTER SO THAT YOU CAN USE IT ON YOUR OWN TO MAKE THE SELECTION FROM A GROUP OF WORD PROCESSING PROGRAMS. WE WILL TRAIN YOU USING THE DATABASE SOFTWARE PROGRAMS.
- PLEASE TAKE A FEW MOMENTS TO READ THE HANDOUT MARKED "IMPORTANCE WEIGHTS QUESTIONNAIRE FOR DATABASE MANAGEMENT PROGRAMS".
- PUT YOUR ID NUMBER AND DATE ON TOP PLEASE
- On the top portion is the six attributes from which you will judge both the current database programs and later the word processing programs.
- I would like you to put your importance weights on those attributes, based on the descriptions of those attributes and the database programs you just finished reading.
- Please feel free to refer back to those descriptions.
- Remember that the importance weights need to add up to 100 percent, meaning that a higher importance weight on one attribute will require you to lower the weight on another.
- When done raise your hand and turn the sheet over. Please do not look back at it.

The computer format you will be learning is the equal weighted format. It will present information to you in a manner which is similar to how it might be presented in a magazine like Software Digest or Consumer Reports. I will illustrate what the computer does with the equal attribute importance weights that are in the computer.

- The computer will sum the attribute score each brand received from Software Digest. Please give me your attention as I illustrate this process with an example using automobiles on the board.
- After you input your own importance weights, the computer will multiply your weights by the attribute score each brand received from Software Digest. Please give me your attention as I illustrate this process with a simplified example on the board.
- Two database programs, brand A and brand B, were evaluated by Software Digest on two attributes, error handling and performance.
- Brand A received a score of 5 on EH, and a 9 on performance.
- Brand B received a score of 9 on EH, and a 4 on performance.
- The computer would then sum those scores on those attributes for a total summed score.
- BRAND A WOULD HAVE A LARGER TOTAL SUMMED SCORE THAN BRAND B, AND HENCE WOULD APPEAR ABOVE BRAND B ON THE SCREEN.
- IF YOU FELT THAT THE TWO ATTRIBUTES WERE NOT EQUALLY IMPORTANT, THE RANKINGS COULD CHANGE AND BRAND B COULD HAVE THE LARGEST SUMMED SCORE AND APPEAR ABOVE BRAND A ON THE SCREEN.

DO YOU UNDERSTAND HOW THE COMPUTER WILL RANK THE BRANDS ON THE SCREEN?

PLEASE TURN ON YOUR MONITOR, THE 20 DATABASE BRANDS NOW APPEAR AT THE BOTTOM OF YOUR SCREEN WITH THEIR ACTUAL ATTRIBUTE RATINGS FROM SOFTWARE DIGEST.

- REMEMBER THEY ARE RANKED FROM BEST TO WORST ACCORDING TO THEIR TOTAL SUMMED SCORES, WHICH YOU WILL NOT SEE, AS WAS DONE WITH THE AUTOMOBILE EXAMPLE A FEW MINUTES AGO.
- YOU CAN VIEW THE BRANDS BY USING THE DOWN ARROW. BECAUSE ONLY SIX BRANDS APPEAR ON THE SCREEN OF THE TWENTY AVAILABLE, TO SEE ALL THE BRANDS YOU WILL NEED MOVE DOWN
- DO NOT USE ANY KEYS BUT THE DOWN OR UP KEYS TO MOVE AROUND.
- DO NOT USE THE "HOME" KEY OR "END" TO MOVE AROUND, AS THEY WILL MOVE YOU OFF THE AREA YOU NEED TO BE IN TO VIEW THE BRANDS.
- IF YOU MAKE A MISTAKE AND GET LOST, PLEASE RAISE YOUR HAND AND ONE OF US WILL PUT YOU BACK IN THE PROPER PLACE ON THE SPREADSHEET.

GO AHEAD A SEARCH AND FIND YOUR FAVORITE BRAND

- REMEMBER ALL TWENTY BRANDS WILL APPEAR IN RANKED ORDER FROM BEST TO WORST ACCORDING TO THE SUMMED TOTAL SCORE OF THEIR RATINGS.
- PICK ANY BRAND WHICH YOU THINK IS BEST FOR YOU BASED ON THE ATTRIBUTE SCORES IT RECEIVED FROM SOFTWARE DIGEST.
- DON'T FEEL LIKE YOU MUST PICK THE TOP RANKED BRAND, AS YOUR FAVORITE COULD COME FROM THE BOTTOM, TOP OR MIDDLE, SO TAKE A LOOK AT ALL OF THEM.
- RAISE YOUR HAND WHEN YOU HAVE FOUND YOUR FAVORITE BRAND.

**** GO OVER ATTRIBUTE SCORES OF SOMEONE'S FAVORITE BRAND
- NOTICE EVEN SOMEONE'S PREFERRED BRAND DOES NOT HAVE HIGH SCORES ON ALL THE ATTRIBUTES. AS YOU CAN SEE THIS IS TYPICAL OF MOST BRANDS AS THEY TEND TO NOT HAVE HIGH SCORES ON ALL THE ATTRIBUTES.
DO YOU ALL FEEL LIKE YOU HAVE A GOOD UNDERSTANDING OF HOW THE
COMPUTER USES THE ATTRIBUTE SCORES TO CALCULATE THE BRAND RANKINGS?
IF I ASKED YOU HOW THE BRANDS ARE RANKED AFTER YOU CONDUCT A
SEARCH? COULD YOU ANSWER ME? I WOULD HOPE YOU WOULD SAY THAT THE
BRANDS ARE RANKED BEST TO WORST BASED ON THE SUMMED TOTAL OF THEIR SIX
ATTRIBUTE SCORES.
WOULD YOU FEEL COMFORTABLE CONDUCTING YOUR OWN SEARCH
WITHOUT MY INSTRUCTIONS?
Appendix VIb

Training Questionnaire Script

Verbal instructions given to subjects prior to filling out training questionnaire and just after completing the training session.
TRAINING QUESTIONNAIRE

- PLEASE PLACE YOUR ID NUMBER AND DATE AT THE TOP
- PLEASE READ THE QUESTIONS AND NOTES CAREFULLY
- WHEN DONE, PLEASE TURN THE SHEET OVER AND PLACE IT ON TOP OF THE DATABASE WEIGHT SHEET YOU COMPLETED EARLIER. DO NOT GO BACK TO YOUR TRAINING SHEET ONCE YOU HAVE COMPLETED IT.

PLEASE HIT THE ALT AND "O" KEYS TOGETHER TO HELP US RESET THE COMPUTER FOR YOUR NEXT TASK

READ TASK INSTRUCTIONS HANDOUT DURING BREAK
- PLEASE READ CAREFULLY AND DO NOT TALK TO EACH OTHER ABOUT THE EXPERIMENT DURING YOUR 10 MINUTE BREAK.
Appendix V1c

Experimental Task Script for EWRO Subjects

Verbal instructions given to EWRO subjects prior to the word processing choice task.
YOU WILL NOW CONDUCT YOUR OWN SEARCH USING YOUR OWN IMPORTANCE WEIGHTS.

- YOU WILL HAVE 30 BRANDS OF WORD PROCESSING SOFTWARE TO CHOOSE FROM
- ALL BRANDS WERE RATED BY SOFTWARE DIGEST ON THE SAME SIX ATTRIBUTES AS THE DATABASE MANAGEMENT PROGRAMS YOU LOOKED AT DURING TRAINING
- THE BRANDS WILL APPEAR IN RANKED ORDER FROM BEST TO WORST ACCORDING THE THEIR TOTAL SUMMED SCORES WHICH YOU WILL NOT SEE.
- BRAND NAMES WILL NOT APPEAR SO THAT YOUR PREVIOUS EXPERIENCE WITH ANY PARTICULAR BRANDS WILL NOT INFLUENCE YOUR DECISION. RANDOM NUMBERS WERE GENERATED TO IDENTIFY THE BRANDS.
- REMEMBER YOU CAN PICK ANY BRAND FROM THE BOTTOM, TOP OR MIDDLE OF THE LISTING. JUST REMEMBER TO PICK THE BRAND WITH THE ATTRIBUTE SCORES YOU THINK ARE BEST FOR YOU.
- YOU HAVE TEN MINUTES TO COMPLETE THIS TASK, WHICH IS PLENTY OF TIME, SO DON'T FEEL RUSHED.
- AFTER LOOKING AT THE BRANDS USING THE DOWN AND UP ARROW KEYS, AND PICKING YOUR FAVORITE BRAND, RAISE YOUR HAND AND SOMEONE WILL GIVE YOU A QUESTIONNAIRE TO FILL OUT.

COMPUTER FORMAT QUESTIONNAIRE

PLEASE READ THE QUESTIONS CAREFULLY

- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.
- REMEMBER THEY APPLY ONLY TOWARDS THE WORD PROCESSING CHOICE TASK AND NOT THE TRAINING TASK
- EACH QUESTION IS IMPORTANT, SO PLEASE ANSWER EACH ONE CAREFULLY AND FULLY
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR DATABASE WEIGHTS AND TRAINING SESSION QUESTIONNAIRES. DO NOT GO BACK TO IT.
- ANY QUESTIONS?

TURN YOUR MONITOR ON AND CONDUCT YOUR SEARCH.
Appendix VIId

Paired Comparisons Questionnaire Script

Verbal instructions given to EWRO subjects after their choice task.
PAIRED COMPARISONS QUESTIONNAIRE

- DOES EVERYONE HAVE THEIR CORRECT BRAND AT THE TOP?
- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.
- PLEASE READ EACH QUESTION CAREFULLY
- FEEL FREE TO EITHER SWITCH OR STAY
- DO NOT FEEL LIKE YOU SHOULD BE CONSISTENT
- IF YOU LIKE ONE OR MORE OF THE COMPARISON BRANDS BETTER, FEEL FREE TO SWITCH.
- IF YOU ARE HAPPY WITH YOUR ORIGINAL BEST CHOICE, DO NOT FEEL LIKE YOU NEED TO SWITCH, BUT CAREFULLY EVALUATE THE COMPARISON BRANDS.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR COMPUTER FORMAT QUESTIONNAIRE. DO NOT GO BACK TO IT.
- ON THE LAST PAGE, PLEASE PICK YOU FINAL BEST CHOICE FROM ALL THE COMPARISON BRANDS ON THE LAST PAGE

FINAL QUESTIONNAIRE

- PLEASE PUT YOUR ID NUMBER AND DATE ON TOP OF THE FIRST PAGE.

PLEASE READ THE QUESTIONS CAREFULLY

- REMEMBER THEY APPLY ONLY TOWARDS THE WORD PROCESSING CHOICE TASK AND NOT THE TRAINING TASK
- EACH QUESTION IS IMPORTANT, SO PLEASE ANSWER EACH ONE CAREFULLY AND FULLY
- SOME QUESTIONS MAY APPEAR TO BE REDUNDANT, BUT THEY ARE IMPORTANT FOR THIS RESEARCH, SO PLEASE TRY TO ANSWER THEM AS IF IT WAS THE FIRST TIME YOU HAVE SEEN THE QUESTION, ANSWERING IT IN A WAY WHICH BEST REFLECTS YOUR FEELING RIGHT NOW.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR DATABASE WEIGHTS AND TRAINING SESSION QUESTIONNAIRES. DO NOT GO BACK TO IT.
- WHEN FINISHED PUT THE TURN THE QUESTIONNAIRE OVER AND PUT IT ON TOP OR YOUR PAIRED COMPARISON QUESTIONNAIRE. DO NOT GO BACK TO IT.
- WHEN YOU ARE FINISHED PUT THE LARGE PAPER CLIP ON ALL YOUR QUESTIONAIRES IN THE ORDER IN WHICH YOU FINISHED THEM.
- PLEASE DO NOT TAKE ANY PENCILS YOU BORROWED OR ANY OF THE READINGS OR QUESTIONNAIRES OUT OF THE ROOM WHEN YOU LEAVE
- THANK YOU FOR PARTICIPATING IN THIS EXPERIMENT
Appendix VIIa

Importance Weights Questionnaire for CAL and EWRO Formats

Given to CAL and EWRO subjects prior to the practice session during training, using DBase Software.
Importance Weights Questionnaire
for
DATABASE MANAGEMENT PROGRAMS

Please carefully read, consider, and complete the following two questions. You will find it most worthwhile to refer to the "Attribute and Scale Information" handouts while completing the questionnaire. Please take your time in completing the questionnaire.

1. Please evaluate the following attributes in terms of their relative importance to you. Please do this by allocating to each attribute a value from 0 to 100 points from a total of 100 points. NOTE: The sum of the points assigned to the attributes should equal 100 points.

<table>
<thead>
<tr>
<th>ATTRIBUTE</th>
<th>IMPORTANCE POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ease of Start-up</td>
<td></td>
</tr>
<tr>
<td>2. Ease of Learning</td>
<td></td>
</tr>
<tr>
<td>3. Ease of Use</td>
<td></td>
</tr>
<tr>
<td>4. Error Handling</td>
<td></td>
</tr>
<tr>
<td>5. Performance</td>
<td></td>
</tr>
<tr>
<td>6. Versatility</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL POINTS = 100

(Please check to verify that total points sum to 100)
Appendix VIIb

Attribute Cutoff Questionnaire for CAC Format

Given to CAC subjects prior to the practice session during training, using DBase Software.
Minimum Values Questionnaire
for
DATABASE MANAGEMENT PROGRAMS

Please carefully read, consider, and complete the following two questions. You will find it most worthwhile to refer to the "Attribute and Scale Information" handouts while completing the questionnaire. Please take your time in completing the questionnaire.

1. Please specify the minimum value (score) for each attribute that must be attained for a brand to be considered acceptable to you. That is, determine the score for each attribute that, if not met or exceeded, would result in a brand being rejected from best choice consideration, regardless of how well the brand might score on the other attributes. NOTE: Each minimum acceptable value should be assigned a value between 0 to 10 points.

<table>
<thead>
<tr>
<th>ATTRIBUTE</th>
<th>MINIMUM SCORE POINTS (maximum score is 10.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ease of Start-up</td>
<td></td>
</tr>
<tr>
<td>2. Ease of Learning</td>
<td></td>
</tr>
<tr>
<td>3. Ease of Use</td>
<td></td>
</tr>
<tr>
<td>4. Error Handling</td>
<td></td>
</tr>
<tr>
<td>5. Performance</td>
<td></td>
</tr>
<tr>
<td>6. Versatility</td>
<td></td>
</tr>
</tbody>
</table>
Appendix VIII

Training Session Questionnaire

Given to subjects after completion of the training session.
TRAINING SESSION QUESTIONNAIRE

Answer the following questions by circling the number that best describes your position on the scale provided below each question. Please read each question and the endpoint descriptions of each scale carefully.

1. How well did you understand the computer operating instructions provided in the training session?

   Fully      <---:---:---:---:---:---:---:---:---:---:---:>  Did Not At All
   Understood 1 2 3 4 5 6 7 8 9                       Understand

2. How well did you understand the description of the "computer format" in which the brand information was presented?

   Fully      <---:---:---:---:---:---:---:---:---:---:---:>  Did Not At All
   Understood 1 2 3 4 5 6 7 8 9                       Understand

3. How certain are you that you understood the order in which the brands were presented?

   Fully      <---:---:---:---:---:---:---:---:---:---:---:>  Did Not At All
   Understood 1 2 3 4 5 6 7 8 9                       Understand

4. How certain are you that you understand the "computer format" well enough to complete the task of making a best choice?

   Extremely <---:---:---:---:---:---:---:---:---:---:---:>  Not At All
   Certain    1 2 3 4 5 6 7 8 9                       Certain

5. How certain are you that you understand what the attributes mean (for example what "Ease of Use" means)?

   Extremely <---:---:---:---:---:---:---:---:---:---:---:>  Not At All
   Certain    1 2 3 4 5 6 7 8 9                       Certain

6. How certain are you that you understand what the range descriptions means (for example what "Outstanding" means)?

   Extremely <---:---:---:---:---:---:---:---:---:---:---:>  Not At All
   Certain    1 2 3 4 5 6 7 8 9                       Certain

7. Please write down anything that you were confused about, had problems with, or would like to comment on in regard to the training session (use the space below and, if necessary, the back of the questionnaire).
Appendix IXa

Pre-Choice Task Reading for CAL Subjects

Given to CAL subjects to read during the break between training and the choice task.
WORD PROCESSING SOFTWARE READING

Word Processing programs enable people to use their personal computers as sophisticated typewriters. These programs allow the user to experience an ease of use and flexibility in creating, editing, and storing their documents not possible with conventional or electronic typewriters. Any typed document such as memos, reports, letters, business proposals, term papers, and so on, can be prepared with a Word Processor. They are also very useful for preparing repetitive materials (e.g., form letters) and for keeping up with constantly changing documents by enabling updates or changes to be made without retyping the entire document.

NOTE: Please read the following section very carefully

CHOICE TASK INSTRUCTIONS

Provided on the computer are attribute evaluations for Thirty (30) brands of Word Processing programs. Instead of using the actual brand names, however, a random number has been assigned to each brand to prevent past knowledge from influencing your decision.

You are asked to choose the best brand from the thirty brands that have been rated by Software Digest. Since prices are about the same for all brands, price information is not provided. Simply base your decision on the attribute scores received by each brand to make your decision. Your task, then, is to pick the best brand for you based on the attribute scores provided by Software Digest.

Please remember that the 30 brands will appear in best to worst order, based on the weighted average score of each brand generated from the importance weights you specified. You may use as many searches as you need to arrive at your decision. Once you reach a decision you are comfortable with, do not go back and respecify weights. For example, if your most preferred brand is not the top ranked one, there is no need to respecify weights in order to try and make it the top one.

You may select the first brand, last brand, or any brand in between. Do not in any way feel you must select the first brand, although you certainly may choose it. You should choose the brand which you feel is best for you based on the attribute scores it received. This may or may not be the brand with the highest weighted average. Simply choose the best brand for you.

You will be allowed up to 10 minutes to complete the task. This is quite a bit of time so do not feel rushed. Take all the time you need, but please be goal directed and do not simply play with the computer or dawdle.

Upon selecting your best brand, immediately raise your hand and a questionnaire will be given to you. Please answer all questions as thoughtfully and honestly as you can. If you do not understand a question, please answer it to the best of your ability.

When you have completed the questionnaire please raise your hand again and then wait quietly until the other participants have also finished. You may begin the search for your best brand after the experimenter instructs you to turn on the video display.
Appendix IXb

Pre-Choice Task Reading for CAC Subjects

Given to CAC subjects to read during the break between training and the choice task.
WORD PROCESSING SOFTWARE READING

Word Processing programs enable people to use their personal computers as sophisticated typewriters. These programs allow the user to experience an ease of use and flexibility in creating, editing, and storing their documents not possible with conventional or electronic typewriters. Any typed document such as memos, reports, letters, business proposals, term papers, and so on, can be prepared with a Word Processor. They are also very useful for preparing repetitive materials (e.g., form letters) and for keeping up with constantly changing documents by enabling updates or changes to be made without retyping the entire document.

NOTE: Please read the following section very carefully

CHOICE TASK INSTRUCTIONS

Provided on the computer are attribute evaluations for Thirty (30) brands of Word Processing programs. Instead of using the actual brand names, however, a random number has been assigned to each brand to prevent past knowledge from influencing your decision.

You are asked to choose the best brand from the thirty brands that have been rated by Software Digest. Since prices are about the same for all brands, price information is not provided. Simply base your decision on the attribute scores received by each brand to make your decision. Your task, then, is to pick the best brand for you based on the attribute scores provided by Software Digest.

Please remember that there are 30 brands available and that you are viewing only those brands that meet or exceed the minimum scores you specified. These brands are placed in random order. Remember that the scores are not necessarily high on all attributes for even the higher scoring brands.

For the best choice search you will be engaging in, please remember that you may conduct as many or as few searches as you wish. The searches might be for the purpose of either adding more brands to be viewed (by lowering the values of one or more attributes) or narrowing down the number to be visually evaluated further (by raising the minimum values of one or more attributes). You may visually examine all brands, one brand, or any number in between. The search process will be in your hands entirely. Please simply choose the best brand for you.

You will be allowed up to 10 minutes to complete the task. This is quite a bit of time so do not feel rushed. Take all the time you need, but please be goal directed and do not simply play with the computer or dawdle.

Upon selecting your best brand, immediately raise your hand and a questionnaire will be given to you. Please answer all questions as thoughtfully and honestly as you can. If you do not understand a question, please answer it to the best of your ability.

When you have completed the questionnaire please raise your hand again and then wait quietly until the other participants have also finished. You may begin the search for your best brand after the experimenter instructs you to turn on the video display.
Appendix IXc

Pre-Choice Task Reading for EWRO Subjects

Given to EWRO subjects to read during the break between training and the choice task.
WORD PROCESSING SOFTWARE READING

Word Processing programs enable people to use their personal computers as sophisticated typewriters. These programs allow the user to experience an ease of use and flexibility in creating, editing, and storing their documents not possible with conventional or electronic typewriters. Any typed document such as memos, reports, letters, business proposals, term papers, and so on, can be prepared with a Word Processor. They are also very useful for preparing repetitive materials (e.g., form letters) and for keeping up with constantly changing documents by enabling updates or changes to be made without retyping the entire document.

NOTE: Please read the following very carefully

CHOICE TASK INSTRUCTIONS

Provided on the computer are attribute evaluations for Thirty (30) brands of Word Processing programs. Instead of using the actual brand names, however, a random number has been assigned to each brand to prevent past knowledge from influencing your decision.

You are asked to choose the best brand from the thirty brands that have been rated by Software Digest. Since prices are about the same for all brands, price information is not provided. Simply base your decision on the attribute scores received by each brand to make your decision. Your task, then, is to pick the best brand for you based on the attribute scores provided by Software Digest.

Please remember that the 30 brands will appear in best to worst order, based on the sum of their attribute scores on the six attributes (the six scores are added together for a total score). This means each attribute is of equal importance in determining the brand rankings.

You may select the first brand, last brand, or any brand in between. Do not in any way feel you must select the first brand, although you certainly may choose it. You should choose the brand which you feel is best for you based on the attribute scores it received. This may or may not be the brand with the highest summed score. Simply choose the best brand for you.

You will be allowed up to 10 minutes to complete the task. This is quite a bit of time so do not feel rushed. Take all the time you need, but please be goal directed and do not simply play with the computer or dawdle.

Upon selecting your best brand, immediately raise your hand and a questionnaire will be given to you. Please answer all questions as thoughtfully and honestly as you can. If you do not understand a question, please answer it to the best of your ability.

When you have completed the questionnaire please raise your hand again and then wait quietly until the other participants have also finished. You may begin the search for your best brand after the experimenter instructs you to turn on the video display.
Appendix Xa

Sample Screen for CAL Format

An example of a screen seen by CAL format users. EWRO format screen was similar with the exception that no weights could be inputted into the top portion of the screen.
## Example of the LINEAR Format

### Requirement Specification

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Importance Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>EASE OF START-UP</td>
<td>16.70%</td>
</tr>
<tr>
<td>EASE OF LEARNING</td>
<td>16.70%</td>
</tr>
<tr>
<td>EASE OF USE</td>
<td>16.70%</td>
</tr>
<tr>
<td>ERROR HANDLING</td>
<td>16.70%</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>16.60%</td>
</tr>
<tr>
<td>VERSATILITY</td>
<td>16.60%</td>
</tr>
</tbody>
</table>

**SOFTWARE REVIEW RATINGS**

Press 'Alt' and 'S' to Search
Press Down Cursor to View Entire List

MAKE SURE THAT THIS EQUALS 100%

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Ease Start</th>
<th>Ease Learn</th>
<th>Ease Use</th>
<th>Error Hand</th>
<th>Perf</th>
<th>Versa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand 971</td>
<td>8.5</td>
<td>9.0</td>
<td>9.1</td>
<td>7.5</td>
<td>8.6</td>
<td>7.5</td>
</tr>
<tr>
<td>Brand 774</td>
<td>8.9</td>
<td>9.3</td>
<td>8.5</td>
<td>7.6</td>
<td>6.8</td>
<td>6.5</td>
</tr>
<tr>
<td>Brand 049</td>
<td>8.9</td>
<td>9.0</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 953</td>
<td>9.0</td>
<td>9.0</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Brand 528</td>
<td>8.0</td>
<td>7.3</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Brand 850</td>
<td>6.3</td>
<td>7.0</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>8.0</td>
</tr>
<tr>
<td>Brand 836</td>
<td>6.9</td>
<td>7.7</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.5</td>
</tr>
<tr>
<td>Brand 340</td>
<td>5.9</td>
<td>6.7</td>
<td>7.7</td>
<td>7.5</td>
<td>7.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 759</td>
<td>7.2</td>
<td>5.7</td>
<td>6.9</td>
<td>8.0</td>
<td>6.6</td>
<td>7.0</td>
</tr>
<tr>
<td>Brand 922</td>
<td>8.3</td>
<td>5.0</td>
<td>6.8</td>
<td>7.5</td>
<td>7.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 861</td>
<td>7.1</td>
<td>5.7</td>
<td>6.8</td>
<td>7.5</td>
<td>7.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 806</td>
<td>6.6</td>
<td>5.7</td>
<td>6.6</td>
<td>7.2</td>
<td>6.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 694</td>
<td>9.3</td>
<td>4.3</td>
<td>5.3</td>
<td>5.3</td>
<td>5.2</td>
<td>9.0</td>
</tr>
<tr>
<td>Brand 448</td>
<td>6.1</td>
<td>5.0</td>
<td>6.8</td>
<td>8.1</td>
<td>7.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Brand 864</td>
<td>8.0</td>
<td>6.0</td>
<td>6.2</td>
<td>7.0</td>
<td>6.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Brand 359</td>
<td>7.3</td>
<td>6.0</td>
<td>5.4</td>
<td>7.6</td>
<td>5.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 041</td>
<td>7.2</td>
<td>5.3</td>
<td>5.9</td>
<td>6.5</td>
<td>6.6</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 539</td>
<td>5.0</td>
<td>4.3</td>
<td>6.6</td>
<td>7.4</td>
<td>7.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 428</td>
<td>7.0</td>
<td>5.3</td>
<td>5.2</td>
<td>7.0</td>
<td>5.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 736</td>
<td>4.2</td>
<td>5.7</td>
<td>6.4</td>
<td>5.5</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 256</td>
<td>7.2</td>
<td>4.7</td>
<td>5.7</td>
<td>6.7</td>
<td>6.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Brand 373</td>
<td>6.5</td>
<td>2.7</td>
<td>4.9</td>
<td>5.7</td>
<td>5.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 107</td>
<td>6.7</td>
<td>5.0</td>
<td>3.8</td>
<td>5.4</td>
<td>5.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 071</td>
<td>5.5</td>
<td>2.7</td>
<td>5.7</td>
<td>6.9</td>
<td>7.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Brand 032</td>
<td>4.8</td>
<td>3.7</td>
<td>5.9</td>
<td>5.7</td>
<td>5.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Brand 457</td>
<td>2.3</td>
<td>3.7</td>
<td>5.2</td>
<td>6.2</td>
<td>6.2</td>
<td>5.5</td>
</tr>
<tr>
<td>Brand 089</td>
<td>5.5</td>
<td>3.0</td>
<td>4.5</td>
<td>5.6</td>
<td>4.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Brand 038</td>
<td>4.3</td>
<td>2.3</td>
<td>4.9</td>
<td>5.2</td>
<td>6.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 564</td>
<td>5.1</td>
<td>1.5</td>
<td>3.4</td>
<td>5.7</td>
<td>5.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 386</td>
<td>5.6</td>
<td>1.7</td>
<td>2.8</td>
<td>5.1</td>
<td>3.3</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Appendix Xb

Sample Screen for CAC Format

An example of a screen seen by CAC format users. Depending on the severity of the attribute cutoffs inputted on the upper portion of the screen, zero to all 30 brands would appear in random order on the screen.
Example of CUTOFF Format

Requirement Specification

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Minimum Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>EASE OF START-UP</td>
<td>6.00</td>
</tr>
<tr>
<td>EASE OF LEARNING</td>
<td>5.00</td>
</tr>
<tr>
<td>EASE OF USE</td>
<td>7.00</td>
</tr>
<tr>
<td>ERROR HANDLING</td>
<td>3.00</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>2.00</td>
</tr>
<tr>
<td>VERSATILITY</td>
<td>5.00</td>
</tr>
</tbody>
</table>

SOFTWARE REVIEW RATINGS

Press 'Alt' and 'S' to Search

Number of Programs Meeting Requirements 6

Press Down Cursor to View Entire List

Brands That Meet or Exceed Your Requirements

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Ease Start</th>
<th>Ease Learn</th>
<th>Ease Use</th>
<th>Error Hand</th>
<th>Perf</th>
<th>Versa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand 528</td>
<td>8.0</td>
<td>7.3</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 836</td>
<td>6.9</td>
<td>7.7</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>6.5</td>
</tr>
<tr>
<td>Brand 049</td>
<td>8.9</td>
<td>9.0</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Brand 850</td>
<td>6.3</td>
<td>7.0</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>6.5</td>
</tr>
<tr>
<td>Brand 774</td>
<td>8.9</td>
<td>9.3</td>
<td>8.5</td>
<td>7.6</td>
<td>6.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Brand 953</td>
<td>9.0</td>
<td>9.0</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
<td>5.5</td>
</tr>
</tbody>
</table>
Appendix XIa

Brand Comparison Questionnaire
(MA decision set)

An example of the questionnaire given to subjects upon completion of the choice task and initial format evaluation. Subject in this example would have used MA decision set and chosen brand 336.
BRAND COMPARISON SESSION

PLEASE READ CAREFULLY

In the following and last session of the experiment you will be asked to compare the brand you chose with up to six other brands. Please very carefully compare the brand you selected with each of the comparison brands.

After making the comparison for each pair of brands (your original choice and the comparison brand), you will be asked to indicate if you wish to stay with your original choice or switch to the comparison brand.

Please feel free to either stay with your original choice or switch to one or more of the comparison brands. The choice is entirely up to you. Do not feel you should stay or switch, simply select the brand you currently prefer without any other considerations.

Comparison I

Attribute Scores

<table>
<thead>
<tr>
<th>START</th>
<th>EASE</th>
<th>EASE</th>
<th>ERROR</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP</td>
<td>LEARN</td>
<td>USE</td>
<td>HANDLING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 528</td>
<td>8.0</td>
<td>6.5</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 528

2. If you switched from your original choice to comparison Brand 528, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 528 during the original choice task.
   b. I recall having evaluated Brand 528 in the original choice task, but changed my mind after comparing it against my original choice during in this session.
   c. Other (please explain) ____________________________________________

3. If you switched to Brand 528, how much value do you feel you gained by switching from your original choice?

   Gain a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison II

Attribute Scores

<table>
<thead>
<tr>
<th>START</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 049</td>
<td>8.9</td>
<td>6.5</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 049

2. If you switched from your original choice to comparison Brand 049, please circle the reason why.
   (if you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 049 during the original choice task.
   b. I recall having evaluated Brand 049 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ____________________________________________

3. If you switched to Brand 049, how much value do you feel you gained by switching from your original choice?
   Gained a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison III

Attribute Scores

<table>
<thead>
<tr>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 971</td>
<td>8.5</td>
<td>5.0</td>
<td>9.1</td>
<td>7.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 971

2. If you switched from your original choice to comparison Brand 971, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 971 during the original choice task.
   b. I recall having evaluated Brand 971 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ______________________________________________________

3. If you switched to Brand 971, how much value do you feel you gained by switching from your original choice?

   Gained a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison IV

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 850</td>
<td>6.3</td>
<td>8.0</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>7.0</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 850

2. **If you switched** from your original choice to comparison Brand 850, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 850 during the original choice task.
   b. I recall having evaluated Brand 850 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) __________________________________________

3. **If you switched to Brand 850,** how much value do you feel you gained by switching from your original choice?
   - Gained a Great Deal of Value | 1 2 3 4 5 6 7 8 9 | Gained Very Little Value
Comparison V

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 774</td>
<td>8.9</td>
<td>7.5</td>
<td>8.5</td>
<td>7.6</td>
<td>6.8</td>
<td>9.3</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 774

2. If you switched from your original choice to comparison Brand 774, please circle the reason why.
   (if you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 774 during the original choice task.
   b. I recall having evaluated Brand 774 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) __________________________________________

3. If you switched to Brand 774, how much value do you feel you gained by switching from your original choice?

   Gained a Great <---:------:------:------:------:------:------:------:------:
   Deal of Value 1  2  3  4  5  6  7  8  9  Little Value
   Gained Very
Comparison VI

Attribute Scores

<table>
<thead>
<tr>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 953</td>
<td>9.0</td>
<td>7.0</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 953

2. If you switched from your original choice to comparison Brand 953, please circle the reason why.
   (if you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 953 during the original choice task.
   b. I recall having evaluated Brand 953 in the original choice task, but simply changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ________________________________

3. If you switched to Brand 953, how much value do you feel you gained by switching from your original choice?

<table>
<thead>
<tr>
<th>Gained a Great Deal of Value</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Gained Very Little Value</th>
</tr>
</thead>
</table>
BEST CHOICE QUESTIONNAIRE

Listed below are your original best choice and the comparison brands. Please indicate which of the seven brands you would now choose as your best choice. Do not feel that you should switch or that you should remain consistent with your previous decisions. Simply choose the brand you feel is best for you at this time.

Please circle your final best choice brand

<table>
<thead>
<tr>
<th>Attribute Scores</th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand 528</td>
<td>8.0</td>
<td>6.5</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Brand 836</td>
<td>6.9</td>
<td>8.0</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Brand 049</td>
<td>8.9</td>
<td>6.5</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
<td>9.0</td>
</tr>
<tr>
<td>Brand 971</td>
<td>8.5</td>
<td>5.0</td>
<td>9.1</td>
<td>7.5</td>
<td>8.6</td>
<td>9.0</td>
</tr>
<tr>
<td>Brand 850</td>
<td>6.3</td>
<td>8.0</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>7.0</td>
</tr>
<tr>
<td>Brand 774</td>
<td>8.9</td>
<td>7.5</td>
<td>8.5</td>
<td>7.6</td>
<td>6.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Brand 953</td>
<td>9.0</td>
<td>7.0</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
<td>9.0</td>
</tr>
</tbody>
</table>
Appendix XIb

Brand Comparison Questionnaire
(LA decision set)

An example of the questionnaire given to subjects upon completion of the choice task and initial format evaluation. Subject in this example would have used LA decision set and chosen brand 836.
BRAND COMPARISON SESSION

PLEASE READ CAREFULLY

In the following and last session of the experiment you will be asked to compare the brand you chose with up to six other brands. Please very carefully compare the brand you selected with each of the comparison brands.

After making the comparison for each pair of brands (your original choice and the comparison brand), you will be asked to indicate if you wish to stay with your original choice or switch to the comparison brand.

Please feel free to either stay with your original choice or switch to one or more of the comparison brands. The choice is entirely up to you. Do not feel you should stay or switch, simply select the brand you currently prefer without any other considerations.

Comparison I

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 528</td>
<td>8.0</td>
<td>5.0</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
<td>7.3</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 528

2. If you switched from your original choice to comparison Brand 528, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 528 during the original choice task.
   b. I recall having evaluated Brand 528 in the original choice task, but changed my mind after comparing it against my original choice during in this session.
   c. Other (please explain) __________________________________________

3. If you switched to Brand 528, how much value do you feel you gained by switching from your original choice?

   Gained a Great <---:---:---:---:---:---:---:---:---:---:---:---:---:---:---:---:
   Gained Very Deal of Value 1 2 3 4 5 6 7 8 9 Little Value
Comparison II

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 049</td>
<td>8.9</td>
<td>5.0</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
<td>9.0</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 049

2. If you switched from your original choice to comparison Brand 049, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 049 during the original choice task.
   b. I recall having evaluated Brand 049 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ____________________________________________

3. If you switched to Brand 049, how much value do you feel you gained by switching from your original choice?
   Gained a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison III

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 971</td>
<td>8.5</td>
<td>3.5</td>
<td>9.1</td>
<td>7.5</td>
<td>8.6</td>
<td>9.0</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 971

2. If you switched from your original choice to comparison Brand 971, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 971 during the original choice task.
   b. I recall having evaluated Brand 971 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) .................................................................

3. If you switched to Brand 971, how much value do you feel you gained by switching from your original choice?
   - Gained a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison IV

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 850</td>
<td>6.3</td>
<td>6.5</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>7.0</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 850

2. If you switched from your original choice to comparison Brand 850, please circle the reason why.
   (if you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 850 during the original choice task.
   b. I recall having evaluated Brand 850 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ________________________________________________

3. If you switched to Brand 850, how much value do you feel you gained by switching from your original choice?

   Gained a Great Deal of Value 1 2 3 4 5 6 7 8 9 Gained Very Little Value
Comparison V

Attribute Scores

<table>
<thead>
<tr>
<th>START</th>
<th>EASE LEARN USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Comparison Brand is 774</td>
<td>8.9</td>
<td>6.0</td>
<td>8.5</td>
<td>7.6</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 774

2. If you switched from your original choice to comparison Brand 774, please circle the reason why.
   (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 774 during the original choice task.
   b. I recall having evaluated Brand 774 in the original choice task, but changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) __________________________________________________________________

3. If you switched to Brand 774, how much value do you feel you gained by switching from your original choice?

<table>
<thead>
<tr>
<th>Gained a Great Deal of Value</th>
<th>Gained Very Little Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>
Comparison VI

Attribute Scores

<table>
<thead>
<tr>
<th></th>
<th>START UP</th>
<th>EASE LERN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Original Choice is Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Comparison Brand is 953</td>
<td>9.0</td>
<td>5.5</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
<td>9.0</td>
</tr>
</tbody>
</table>

1. Which brand do you currently prefer? (please circle your choice)
   a. Original Choice Brand 836
   b. Comparison Brand 953

2. If you switched from your original choice to comparison Brand 953, please circle the reason why. (If you did not switch, please go on to the next page).
   a. I do not recall having evaluated Brand 953 during the original choice task.
   b. I recall having evaluated Brand 953 in the original choice task, but simply changed my mind after comparing it against my original choice during this session.
   c. Other (please explain) ____________________________

3. If you switched to Brand 953, how much value do you feel you gained by switching from your original choice?
   Gained a Great --------------- Gained Very
   Gained a Deal of Value 1 2 3 4 5 6 7 8 9 Little Value
BEST CHOICE QUESTIONNAIRE

Listed below are your original best choice and the comparison brands. Please indicate which of the seven brands you would now choose as your best choice. Do not feel that you should switch or that you should remain consistent with your previous decisions. Simply choose the brand you feel is best for you at this time.

Please circle your final best choice brand

<table>
<thead>
<tr>
<th>Attribute Scores</th>
<th>START UP</th>
<th>EASE LEARN</th>
<th>EASE USE</th>
<th>ERROR HANDLING</th>
<th>PERF</th>
<th>VERSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand 528</td>
<td>8.0</td>
<td>5.0</td>
<td>8.2</td>
<td>8.0</td>
<td>7.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Brand 836</td>
<td>6.9</td>
<td>6.5</td>
<td>8.0</td>
<td>6.1</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Brand 049</td>
<td>8.9</td>
<td>5.0</td>
<td>8.7</td>
<td>8.1</td>
<td>6.8</td>
<td>9.0</td>
</tr>
<tr>
<td>Brand 971</td>
<td>8.5</td>
<td>3.5</td>
<td>9.1</td>
<td>7.5</td>
<td>8.6</td>
<td>9.0</td>
</tr>
<tr>
<td>Brand 850</td>
<td>6.3</td>
<td>6.5</td>
<td>8.6</td>
<td>7.8</td>
<td>7.6</td>
<td>7.0</td>
</tr>
<tr>
<td>Brand 774</td>
<td>8.9</td>
<td>6.0</td>
<td>8.5</td>
<td>7.6</td>
<td>6.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Brand 953</td>
<td>9.0</td>
<td>5.5</td>
<td>8.5</td>
<td>7.8</td>
<td>8.2</td>
<td>9.0</td>
</tr>
</tbody>
</table>
Appendix XII

Post-Choice Format Evaluation Questionnaire

Given to subjects upon completion of their choice task.
COMPUTER FORMAT QUESTIONNAIRE

After Completing Each Page, Please Do Not Return to That Page

1. What brand did you select as your best choice? (Please write down the brand’s number in the space provided below).

My best choice is brand #__________________.

PLEASE TURN OFF THE MONITOR
Section II

NOTE: For the following two questions it is not necessary to try to remain consistent with the weights and values you placed on these attributes during earlier sessions. They may or may not have changed for any number of good reasons. Please simply enter the weights and values you feel are most accurate at this time.

1. Please evaluate the following attributes in terms of their relative importance to you in evaluating word processing software. Please do this by allocating to each attribute a value from 0 to 100 points from a total of 100 points. NOTE: The sum of the points assigned to the attributes should equal 100 points.

<table>
<thead>
<tr>
<th>ATTRIBUTE</th>
<th>IMPORTANCE POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ease of Start-up</td>
<td></td>
</tr>
<tr>
<td>2. Ease of Learning</td>
<td></td>
</tr>
<tr>
<td>3. Ease of Use</td>
<td></td>
</tr>
<tr>
<td>4. Error Handling</td>
<td></td>
</tr>
<tr>
<td>5. Performance</td>
<td></td>
</tr>
<tr>
<td>6. Versatility</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL POINTS = 100
(Please check to verify that total points sum to 100)

2. Please specify the minimum value (score) for each attribute that must be attained for a brand to be considered acceptable to you. That is, determine the score for each attribute that, if not met or exceeded, would result in a brand being rejected from best choice consideration, regardless of how well the brand might score on the other attributes. NOTE: Each minimum acceptable value should be assigned on or between 0 to 10 points.

<table>
<thead>
<tr>
<th>ATTRIBUTE</th>
<th>MINIMUM SCORE POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ease of Start-up</td>
<td></td>
</tr>
<tr>
<td>2. Ease of Learning</td>
<td></td>
</tr>
<tr>
<td>3. Ease of Use</td>
<td></td>
</tr>
<tr>
<td>4. Error Handling</td>
<td></td>
</tr>
<tr>
<td>5. Performance</td>
<td></td>
</tr>
<tr>
<td>6. Versatility</td>
<td></td>
</tr>
</tbody>
</table>

When completed with this page, please turn the page.
NOTE: The remaining questions refer only to the choice task just completed and not to the earlier training session.

Section III

1. How many brands did you thoroughly evaluate?

I thoroughly evaluated _________ brands. (Please fill in the appropriate number)

2. How many of the available brands, including the one you chose, would be acceptable to you?

_______ brands would be acceptable. (Please fill in the appropriate number)

3. How many brands did you seriously consider, including the one you chose, as candidate for being best choice?

I seriously considered _________ brands. (Please fill in the appropriate number)

NOTE: These questions refer only to the choice task just completed and not to the earlier training session.

Section IV

NOTE: Please answer all questions, in this section, about the "Computer Format" you used in comparison to a format presenting the same information, but with the brands listed in random order on a sheet of paper (e.g., on a magazine page). Remember to read the question scale endpoints carefully and that they apply towards the computer format.

Please circle the number which best expresses your feeling on the following questions.

1. How do you feel the use of the computer format affected any frustration you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper.

   Greatly Decreased  <---:---------:---------:---------:---------:---------:---------:---------:
   Decision Frustration  1  2  3  4  5  6  7  8  9  Greatly Increased

2. How do you feel the use of the computer format affected the accuracy with which you made your best choice decision, in comparison to a format presenting the same information but with brands listed in random order on a sheet of paper?

   Greatly Increased  <---:---------:---------:---------:---------:---------:---------:---------:
   Decision Accuracy  1  2  3  4  5  6  7  8  9  Greatly Decreased

When completed with this page, please turn the page.
3. How do you feel the use of the computer format affected any difficulty you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper?

Greatly Decreased
Decision Difficulty 1 2 3 4 5 6 7 8 9
Greatly Increased
Decision Difficulty

4. How do you feel the use of the computer format affected the amount of thinking required to make your best choice, in comparison to a format presenting the same information, but with the brands listed in random order on a sheet of paper?

Greatly Decreased
Thinking Required 1 2 3 4 5 6 7 8 9
Greatly Increased
Thinking Required

5. How did the use of the computer format affect the amount of thought you put into making your best choice, in comparison to a format presenting the same information but with the brands listed in random order on a sheet of paper?

Greatly Decreased
Thought Required 1 2 3 4 5 6 7 8 9
Greatly Increased
Thought Required

6. How did the use of the computer format affect the amount of confidence you had that you made the best choice for you, in comparison to a format presenting the same information but with brands listed in random order on a sheet of paper?

Greatly Increased
Decision Confidence 1 2 3 4 5 6 7 8 9
Greatly Decreased
Decision Confidence

7. How did the use of the computer format affect any confusion you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper?

Greatly Decreased
Decision Confusion 1 2 3 4 5 6 7 8 9
Greatly Increased
Decision Confusion

8. How do you feel the use of the computer format affected the degree of certainty you have that you made the best choice for you, in comparison to a format presenting the same information in random order on a sheet of paper?

Greatly Increased
Decision Certainty 1 2 3 4 5 6 7 8 9
Greatly Decreased
Decision Certainty

When completed with this page, please turn the page.
9. How do you feel the use of the computer format affected the amount of mental effort you expended in making your best choice, in comparison to a format presenting the same information in random order on a sheet of paper?

<table>
<thead>
<tr>
<th>Greatly Decreased</th>
<th>Greatly Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Effort</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

10. Overall, how satisfied are you with the computer format, compared to a format presenting the same information, but with brands listed in random order on a sheet of paper?

<table>
<thead>
<tr>
<th>Greatly Increased</th>
<th>Greatly Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Satisfaction</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>
Appendix XIII

Post-Comparison Format Evaluation Questionnaire

Given to subjects upon completion of the paired comparisons.
FINAL QUESTIONNAIRE

NOTE: The remaining questions refer only to the choice tasks just completed using the word processing software and not to the earlier training sessions.

NOTE: Please answer all questions, in this section, about the "Computer Format" you used in comparison to a format presenting the same information, but with the brands listed in random order on a sheet of paper (e.g., on a magazine page). Remember to read the question scale endpoints carefully.

Section I

Please circle the number which best expresses your feeling on the following questions.

1. How do you feel the use of the computer format affected any frustration you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper.

   Greatly Decreased  <--------------------------->  Greatly Increased
   Decision Frustration  1 2 3 4 5 6 7 8 9  Decision Frustration

2. How do you feel the use of the computer format affected the accuracy with which you made your best choice decision, in comparison to a format presenting the same information but with brands listed in random order on a sheet of paper?

   Greatly Increased  <--------------------------->  Greatly Decreased
   Decision Accuracy  1 2 3 4 5 6 7 8 9  Decision Accuracy

3. How do you feel the use of the computer format affected any difficulty you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper?

   Greatly Decreased  <--------------------------->  Greatly Increased
   Decision Difficulty  1 2 3 4 5 6 7 8 9  Decision Difficulty

4. How do you feel the use of the computer format affected the amount of thinking required to make your best choice, in comparison to a format presenting the same information, but with the brands listed in random order on a sheet of paper?

   Greatly Decreased  <--------------------------->  Greatly Increased
   Thinking Required  1 2 3 4 5 6 7 8 9  Thinking Required

When completed with this page, please turn the page.
5. How did the use of the computer format affect the amount of thought you put into making your best choice, in comparison to a format presenting the same information but with the brands listed in random order on a sheet of paper?

Greatly Decreased  <---:----:----:----:----:----:----:----:---:-->  Greatly Increased  
Thought Required  1  2  3  4  5  6  7  8  9  
Thought Required

6. How did the use of the computer format affect the amount of confidence you had that you made the best choice for you, in comparison to a format presenting the same information but with brands listed in random order on a sheet of paper?

Greatly Increased  <---:----:----:----:----:----:----:----:---:-->  Greatly Decreased  
Decision Confidence  1  2  3  4  5  6  7  8  9  
Decision Confidence

7. How did the use of the computer format affect any confusion you may have experienced in decision making, in comparison to a format presenting the same information, but with brands listed in random order on a sheet of paper?

Greatly Decreased  <---:----:----:----:----:----:----:----:---:-->  Greatly Increased  
Decision Confusion  1  2  3  4  5  6  7  8  9  
Decision Confusion

8. How do you feel the use of the computer format affected the degree of certainty you have that you made the best choice for you, in comparison to a format presenting the same information in random order on a sheet of paper?

Greatly Increased  <---:----:----:----:----:----:----:----:---:-->  Greatly Decreased  
Decision Certainty  1  2  3  4  5  6  7  8  9  
Decision Certainty

9. How do you feel the use of the computer format affected the amount of mental effort you expended in making your best choice, in comparison to a format presenting the same information in random order on a sheet of paper?

Greatly Decreased  <---:----:----:----:----:----:----:----:---:-->  Greatly Increased  
Mental Effort  1  2  3  4  5  6  7  8  9  
Mental Effort

10. Overall, how satisfied are you with the computer format, compared to a format presenting the same information, but with brands listed in random order on a sheet of paper?

Greatly Increased  <---:----:----:----:----:----:----:----:---:-->  Greatly Decreased  
Decision Satisfaction  1  2  3  4  5  6  7  8  9  
Decision Satisfaction

When completed with this page, please turn the page.
Section II Please circle the correct answer or fill in the blank where appropriate

1. How familiar did you feel you were with using computers of any type before the experiment?
   
   Extremely <--------:--------:--------:--------:--------:--------:--------:--------:--------:--------:
   Not at all
   Familiar 1 2 3 4 5 6 7 8 9
   
2. How familiar did you feel you were with Word Processing software before the experiment?
   
   Extremely <--------:--------:--------:--------:--------:--------:--------:--------:--------:--------:
   Not at all
   Familiar 1 2 3 4 5 6 7 8 9
   
3. How frequently, on average, do you use a Word Processing software program?
   
   a. daily
   b. more than once a week, but not every day
   c. less than once a week, but more than once a month
   d. less than once a month
   e. I have never used a word processing program

4. Have you ever purchased a word processing program? Yes No

5. How motivated were you to do the best job you could of choosing your best brand? (Please be honest as we can modify the findings depending upon your response)
   
   Extremely <--------:--------:--------:--------:--------:--------:--------:--------:--------:--------:
   Not at all
   Motivated 1 2 3 4 5 6 7 8 9
   
6. How motivated were you to do the best job you could of answering the questions? (Again, please be honest)
   
   Extremely <--------:--------:--------:--------:--------:--------:--------:--------:--------:--------:
   Not at all
   Motivated 1 2 3 4 5 6 7 8 9

7. What is your class rank?
   
   Freshman    Sophomore    Junior    Senior    Graduate

8. What is your major area? (fill in blank) ____________________________

9. Sex: Male Female

10. Age: ______ years

11. Are you a full-time student? Yes No

12. How much full-time work experience do you have? _______ years and _______ months
### Appendix XIV

Variable Means and Standard Deviations  
(n = 215)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Feedback Measures:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1 (frustration):</td>
<td>3.16</td>
<td>1.60</td>
</tr>
<tr>
<td>V3 (difficulty):</td>
<td>3.24</td>
<td>1.51</td>
</tr>
<tr>
<td>V7 (confusion):</td>
<td>3.43</td>
<td>1.48</td>
</tr>
<tr>
<td>V2 (accuracy):</td>
<td>3.62</td>
<td>1.75</td>
</tr>
<tr>
<td>V6 (confidence):</td>
<td>3.70</td>
<td>1.60</td>
</tr>
<tr>
<td>V8 (certainty):</td>
<td>3.78</td>
<td>1.66</td>
</tr>
<tr>
<td>V4 (thinking):</td>
<td>3.29</td>
<td>1.50</td>
</tr>
<tr>
<td>V5 (thought):</td>
<td>3.67</td>
<td>1.65</td>
</tr>
<tr>
<td>V9 (m. effort):</td>
<td>3.32</td>
<td>1.52</td>
</tr>
<tr>
<td>V10 (satisfaction):</td>
<td>3.15</td>
<td>1.78</td>
</tr>
</tbody>
</table>

| **Pre-Feedback Measures:** |      |           |
| V1 (frustration):         | 3.33 | 1.85      |
| V3 (difficulty):         | 3.22 | 1.53      |
| V7 (confusion):           | 3.48 | 1.58      |
| V2 (accuracy):           | 3.26 | 1.68      |
| V6 (confidence):         | 3.76 | 1.71      |
| V8 (certainty):          | 3.63 | 1.56      |
| V4 (thinking):           | 3.37 | 1.77      |
| V5 (thought):            | 3.70 | 1.65      |
| V9 (m. effort):          | 3.28 | 1.55      |
| V10 (satisfaction):      | 2.87 | 1.63      |
Appendix XV
Variable Correlations

Post-Feedback Measures Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>v1</th>
<th>v3</th>
<th>v7</th>
<th>v2</th>
<th>v6</th>
<th>v8</th>
<th>v4</th>
<th>v5</th>
<th>v9</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1  (frustration):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3  (difficulty):</td>
<td>.612</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V7  (confusion):</td>
<td>.652</td>
<td>.705</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2  (accuracy):</td>
<td>.510</td>
<td>.623</td>
<td>.603</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V6  (confidence):</td>
<td>.380</td>
<td>.487</td>
<td>.545</td>
<td>.689</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V8  (certainty):</td>
<td>.441</td>
<td>.514</td>
<td>.533</td>
<td>.742</td>
<td>.749</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4  (thinking):</td>
<td>.422</td>
<td>.410</td>
<td>.346</td>
<td>.265</td>
<td>.162</td>
<td>.203</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5  (thought):</td>
<td>.425</td>
<td>.367</td>
<td>.325</td>
<td>.203</td>
<td>.143</td>
<td>.125</td>
<td>.762</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V9  (m. effort):</td>
<td>.426</td>
<td>.441</td>
<td>.410</td>
<td>.273</td>
<td>.179</td>
<td>.203</td>
<td>.732</td>
<td>.742</td>
<td></td>
</tr>
<tr>
<td>V10 (satisfaction):</td>
<td>.526</td>
<td>.536</td>
<td>.605</td>
<td>.708</td>
<td>.552</td>
<td>.673</td>
<td>.223</td>
<td>.184</td>
<td>.239</td>
</tr>
</tbody>
</table>

Pre-Feedback Measure Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>v1</th>
<th>v3</th>
<th>v7</th>
<th>v2</th>
<th>v6</th>
<th>v8</th>
<th>v4</th>
<th>v5</th>
<th>v9</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1  (frustration):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3  (difficulty):</td>
<td>.583</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V7  (confusion):</td>
<td>.520</td>
<td>.653</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2  (accuracy):</td>
<td>.401</td>
<td>.636</td>
<td>.480</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V6  (confidence):</td>
<td>.329</td>
<td>.484</td>
<td>.476</td>
<td>.453</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V8  (certainty):</td>
<td>.329</td>
<td>.502</td>
<td>.536</td>
<td>.507</td>
<td>.714</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5  (thought):</td>
<td>.231</td>
<td>.417</td>
<td>.329</td>
<td>.254</td>
<td>.189</td>
<td>.140</td>
<td>.599</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V9  (m. effort):</td>
<td>.251</td>
<td>.465</td>
<td>.399</td>
<td>.211</td>
<td>.217</td>
<td>.252</td>
<td>.607</td>
<td>.610</td>
<td></td>
</tr>
</tbody>
</table>

252