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UMI
A STUDY OF THE ADAPTIVE DECISION MAKING ABILITY OF PHARMACISTS' WHEN PATIENT COUNSELING USING A PROCESS-TRACING TECHNIQUE

DISSERATION

Presented in Partial Fulfillment of the Requirements for the Degree of Philosophy in the Graduate School of The Ohio State University

By

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ABSTRACT

This research studied the adaptive decision making process of pharmacists when deciding to counsel a patient on a prescription. The adaptive decision making model was described in 1993 and illustrates the three classes of factors that are believed to influence the strategy individuals use to problem-solve.

Nominal groups were asked to describe task and context effects that related to drug therapy, the patient, and the prescription process. Once established, an information process-tracing technique called MouseLab was programmed. The first scenario was related to drug attributes. The second scenario was related to patient/product attributes and the third scenario was a mixture. Each scenario contained four schematics. The four schematics were programmed to have low task complexity, low complexity with time pressure, high complexity, and high complexity with time pressure.

Eighty-one Ohio pharmacists participated. The sample was stratified by years of experience and rural versus urban practice. A demographic survey was completed. MouseLab traced the predecisional process. The data was analyzed using three dependent variables. PATTERN looked at alternative versus attribute-based patterns.
The variance (VATT) and the time per acquisition of information (TPERACQ) were indicators of compensatory and noncompensatory processing.

The MouseLab was effective in determining that pharmacists used an attribute-based approach to acquiring information. When task complexity was introduced, the pharmacists changed from compensatory to noncompensatory processes. The levels of professional experience and practice location were not contributing factors. The attributes used in the decision process were indication, patient age, drug interactions, adverse reactions, new versus refill, and the number of medications. This has important implications as it relates to task complexity issues affecting the decision process of the pharmacist.
Dedicated to my family and friends
whose support and encouragement
have allowed me to pursue my aspirations.
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PUBLICATIONS

Textbook Publications


Research Publications


**FIELDS OF STUDY**

**Major Field:** Pharmacy  
Studies in Pharmaceutical Administration

**Minor Field:** Preventive Medicine
# TABLE OF CONTENTS

| Abstract | ii |
| Dedication | iv |
| Acknowledgments | v |
| Vita | vi |
| List of Tables | xi |
| List of Figures | xvi |

**Chapters:**

1. **INTRODUCTION TO THE STUDY**
   - Background | 4
   - Need for the Research | 13
   - Purpose for the Study | 14
   - Significance of the Study | 16
   - Definition of Terms | 18
   - Research Questions and Hypothesis | 21
   - Assumptions | 23
   - Limitations | 24
   - Organization of the Dissertation | 26

2. **REVIEW OF LITERATURE**
   - Adaptive Decision Model | 30
   - Compensatory versus Noncompensatory Research | 30
   - Context Effects | 36
   - Task Complexity Research | 38
   - Time Pressure | 40
   - Decision-Making Research Techniques | 41
   - Comparison Studies of Information Processing Techniques | 50
   - Health Science Literature | 51
   - Pharmacy Literature | 54
Other Implications............................................................................ 176
Other Research Implications............................................................ 177
Study Limitations............................................................................. 179
Conclusions...................................................................................... 180

APPENDICES

A. Nominal Grouping Transcripts..................................................... 181
B. Memo of Approval of Human Subjects....................................... 194
C. Demographic Survey................................................................. 196
D. MouseLab Program................................................................. 198
E. 4 x 8 Matrices for Each Scenario and Schematic........................ 212
F. MouseLab Data Output File....................................................... 220
G. MouseLab Bisect.exe Output File............................................. 233

List of References........................................................................... 238
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Previous Predecisional Research and Sample Sizes of Each Study Listed by Researcher, Year of Publication, Sample Size, Number of Groups Within the Experiment, and the Participants</td>
<td>70</td>
</tr>
<tr>
<td>4.1 Quota Sampling Demographics By Scenario and Displayed By Frequency Number and Percentage</td>
<td>106</td>
</tr>
<tr>
<td>4.2 Demographic Variables of Age, Graduation Year, and Years of Experience Expressed as Mean ± Standard Deviation, Median, Mode, and Range</td>
<td>107</td>
</tr>
<tr>
<td>4.3 Demographic Variables Age, Graduation Date, and Years of Experience For Scenario One</td>
<td>108</td>
</tr>
<tr>
<td>4.4 Demographic Variables Age, Graduation Date, and Years of Experience For Scenario Two</td>
<td>108</td>
</tr>
<tr>
<td>4.5 Demographic Variables Age, Graduation Date, and Years of Experience for Scenario Three</td>
<td>108</td>
</tr>
<tr>
<td>4.6 ANOVA Comparisons of Demographic Data Between Scenarios</td>
<td>109</td>
</tr>
<tr>
<td>4.7 Chi-square Analysis Comparing Demographic Data Between Scenarios</td>
<td>109</td>
</tr>
<tr>
<td>4.8 Demographic Variables Practice Site, Gender, and Urban versus Rural Split by Scenario Displayed as Frequency and Percentages</td>
<td>110</td>
</tr>
<tr>
<td>4.9 Descriptive Statistics Looking Specifically at Kurtosis and Skewness</td>
<td>111</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4.10</td>
<td>Mean and Standard Deviation for MouseLab Variables for Schematic One for The Overall Group and Split By Scenario</td>
</tr>
<tr>
<td>4.11</td>
<td>Mean and Standard Deviation for MouseLab Variables for Schematic One and Three Split by Scenario</td>
</tr>
<tr>
<td>4.12</td>
<td>Repeated-Measures ANOVA for PATTERN For Scenario One within Subject Contrasts</td>
</tr>
<tr>
<td>4.13</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario One between Subject Contrasts</td>
</tr>
<tr>
<td>4.14</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario Two within Subject Contrasts</td>
</tr>
<tr>
<td>4.15</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario Two between Subjects Contrasts</td>
</tr>
<tr>
<td>4.16</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario Three within Subject Contrasts</td>
</tr>
<tr>
<td>4.17</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario Three between Subjects Contrasts</td>
</tr>
<tr>
<td>4.18</td>
<td>Friedman’s Test for VATT and TPERACQ for Scenario One Comparing Schematic One and Schematic Three</td>
</tr>
<tr>
<td>4.19</td>
<td>Friedman’s Test for VATT and TPERACQ for Scenario Two Comparing Schematic One and Schematic Three</td>
</tr>
<tr>
<td>4.20</td>
<td>Friedman’s Test for VATT and TPERACQ for Scenario Three Comparing Schematic One and Schematic Three</td>
</tr>
<tr>
<td>4.21</td>
<td>Mean and Standard Deviation for MouseLab Variables for All Schematic Split by Scenario</td>
</tr>
<tr>
<td>4.22</td>
<td>Repeated-Measures ANOVA for PATTERN for Scenario One between Subject Contrasts</td>
</tr>
</tbody>
</table>
4.23 Repeated-Measures ANOVA for PATTERN for Scenario Two between Subject Contrasts

4.24 Repeated-Measures ANOVA for PATTERN for Scenario Three between Subject Contrasts

4.25 Friedman’s Test for VATT and TPERACQ from Schematic One to Four in Scenario One

4.26 Friedman’s Test for VATT and TPERACQ from Schematic One to Four in Scenario Two

4.27 Friedman’s Test for VATT and TPERACQ from Schematic One to Four in Scenario Three

4.28 Mean and Standard Deviation for MouseLab Variables for Schematic One Split by Scenario and Years of Experience

4.29 Mean and Standard Deviation for MouseLab Variables for Schematic Two Split by Scenario and Years of Experience

4.30 Mean and Standard Deviation for MouseLab Variables for Schematic Three Split by Scenario and Years of Experience

4.31 Mean and Standard Deviation for MouseLab Variables for Schematic Four Split by Scenario and Years of Experience

4.32 Mann Whitney U Test for MouseLab Variables VATT and TPERACQ Split by Years of Experience for Scenario One through Three

4.33 Friedman’s Test Results for VATT with Low Complexity and Added Time Pressure Split by Scenario

4.34 Friedman’s Test Results for VATT with High Complexity and Added Time Pressure Split by Scenario

4.35 Friedman’s Test Results for TPERACQ with Low Complexity and Added Time Pressure Split by Scenario

4.36 Friedman’s Test Results for TPERACQ with High Complexity and Added Time Pressure Split by Scenario
4.37 Total and Unique Boxes Opened for Schematic One Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range.................................................................135

4.38 Total and Unique Boxes Opened for Schematic Two Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range.................................................................136

4.39 Total and Unique Boxes Opened for Schematic Three Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range.................................................................136

4.40 Total and Unique Boxes Opened for Schematic Four Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range.................................................................137

4.41 Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario One.....................................................................................138

4.42 Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario Two....................................................................................139

4.43 Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario Three..................................................................................140

4.44 The Most Common Attribute Acquisitions by Scenario.... 141

4.45 Age and Years of Experience for Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split by Scenarios...................................................................................... 142

4.46 PATTERN, VATT, TPERACQ For Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split By Schematic One and Presented By Scenario...........143

4.47 PATTERN, VATT, TPERACQ For Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split By Schematic Two and Presented By Scenario...........143

xiv
4.48 PATTERN, VATT, TPERACQ For Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split By Schematic Three and Presented By Scenario........143

4.49 PATTERN, VATT, TPERACQ For Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split By Schematic One and Presented By Scenario........144

4.50 Analysis of VATT and TPERACQ Scores of Complexity by Mann Whitney U Analysis Comparing Urban versus Rural Pharmacists between Schematics One and Three Split by Scenario..........................................................145
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Contingent Strategy Selection Model .................. 2</td>
</tr>
<tr>
<td>3.1</td>
<td>Task Complexity and Time Pressure by Schematic within Each Scenario .................. 76</td>
</tr>
<tr>
<td>3.2</td>
<td>Scenario One Schematic One Attributes ............. 77</td>
</tr>
<tr>
<td>3.3</td>
<td>Scenario One Schematic Two Attributes ............. 78</td>
</tr>
<tr>
<td>3.4</td>
<td>Scenario One Schematic Three Attributes ........... 78</td>
</tr>
<tr>
<td>3.5</td>
<td>Scenario One Schematic Four Attributes .......... 79</td>
</tr>
<tr>
<td>3.6</td>
<td>Scenario Two Schematic One Attributes ............ 79</td>
</tr>
<tr>
<td>3.7</td>
<td>Scenario Two Schematic Two Attributes .......... 80</td>
</tr>
<tr>
<td>3.8</td>
<td>Scenario Two Schematic Three Attributes .......... 80</td>
</tr>
<tr>
<td>3.9</td>
<td>Scenario Two Schematic Four Attributes .......... 81</td>
</tr>
<tr>
<td>3.10</td>
<td>Scenario Three Schematic One Attributes .......... 81</td>
</tr>
<tr>
<td>3.11</td>
<td>Scenario Three Schematic Two Attributes .......... 82</td>
</tr>
<tr>
<td>3.12</td>
<td>Scenario Three Schematic Three Attributes .......... 82</td>
</tr>
<tr>
<td>3.13</td>
<td>Scenario Three Schematic Four Attributes .......... 83</td>
</tr>
<tr>
<td>3.14</td>
<td>Example of Box Assignments for Scenario One Schematic One .................. 92</td>
</tr>
</tbody>
</table>

xvi
CHAPTER 1

INTRODUCTION TO THE STUDY

Newell and Simon (1972) identified central principles for information processing that has guided much of the literature and research in the area of cognitive psychology. The first of these processes indicates that most information processing is done in a serial fashion especially with high-level tasks. Serial meaning that memory, attention, and computation occur at the same time. Therefore when presented with multiple things at one time, the individual alternates among tasks. The second principle dealt with memory, which is considered a dual system. This dual system consists of short-term memory with a relatively small capacity but easily accessible information versus long-term memory with a larger capacity but less accessible.

The work of Newell and Simon (1972) established principles that allowed other researchers to explore the issues related to task complexity and levels of information processing. These principles are essential in understanding the predecision process. Since 1972, researchers have tried to identify the factors that influence the predecisional process. One of the more interesting models that have
been developed is the adaptive decision model. Payne, Bettman, and Johnson (1988) designed the model that appears in Figure 1.1.

![Contingent Strategy Selection Model](image)

Figure 1.1
Contingent Strategy Selection Model
As Part of the Adaptive Decision Making Model

In their book titled "The Adaptive Decision Maker", Payne, Bettman, and Johnson (1993) discuss a model which illustrates the three major classes of factors that they believe influence the strategy an individual will use to solve a particular decision problem. They call this contingent strategy selection and the three major classes are person, problem and social context. These same authors have done the most extensive research pertaining to information process tracing techniques that try to explain the predecisional process. A common technique used by this group is called MouseLab.

The adaptive decision model has never been used in pharmacy practice to examine the predecisional behavior of a pharmacist. Therefore, an opportunity is available to determine if certain aspects of this well described model can be applied
to pharmacy. This research tries to understand the predecisional process of the pharmacist providing patient counseling. Issues related to the model such as task complexity and/or time pressure are explored in the area of pharmacy practice. This pre-decision process was assessed using an information process tracing method known as MouseLab. The exciting aspect of this research is the potential to understand the predecisional behavior of the pharmacist. In the early 1990's, Hepler and Strand (1990) developed a model that they defined as pharmaceutical care. In addition, Strand (1988) developed a seven step procedure that pharmacist should perform to achieve optimal patient outcomes. Emphasis has been placed on pharmacists providing pharmaceutical care. Patient counseling is one aspect of providing good pharmaceutical care. To date, no one has studied the issues that surround the decision-making process of the pharmacist and the type of information acquisition that occurs as part of this process. In addition, no studies have been done to determine if work environment issues such as task complexity and/or time pressure change the decision process. An interesting aspect of this research would be to see if practicing pharmacists within the constraints of their daily pharmacy environment are able to assess information and make decisions that optimize patient counseling. Understanding the decision-making process could provide opportunities that may help in the training and education of pharmacists and pharmacy students. In addition, this understanding may help justify changes in the pharmacist’s work environment that could facilitate patient counseling.
Background

Payne, Bettman, and Johnson (1988) indicate that there is flexibility in decision making and many factors can influence contingent decision behavior. As described above, their theory is called contingent strategy selection model and this model defines a framework for decision research. In arriving at a decision, many adaptive forces can change the outcome of the decision. The individual is trying to deal with these forces while trying to balance cognitive effort within an accuracy framework. A study by Bettman (1990) looked at the effort required to execute decision strategies. A set of elementary information processes (EIP) is considered the common language for describing strategies. The EIP method provides good predictions of subject effort and their response time. This is considered a good means to measuring the effort of the choice process. Much of the EIP research as part of the adaptive decision model has focused on consumer choices and decisions when selecting goods.

The adaptive decision model (Payne, Bettman, and Johnson, 1988) was designed to explain the three major classes of factors that the researchers believed influenced what strategy a person will use to solve a particular decision problem. The three major classes are known as the problem, the person, and the social context. The problem is best described as the task and context variables. Task variables are factors associated with the general structural characteristics of the decision. They include such things as the response mode, the number of
alternatives, the number of attributes or outcomes, time pressure, information display mode, and agenda constraints. Context variables refer to the particular values of the objects in the decision problem set. Context variables include the overall similarity and attractiveness of the alternatives. In the adaptive decision model, the person is explained by two factors known as cognitive ability and prior knowledge. The last aspect of the model is the social context. This part involves the person's accountability and group membership.

The adaptive decision model and its components have been extensively studied within the business environment. Studies involving the adaptive decision model in health science have been limited. One of the studies (MacLean, 1987) identified included adaptive decision making as it pertained to physicians' decisions to refer a patient to certain hospitals. A separate physician study (Chinburapa, 1993) dealt with how doctors viewed certain drug attributes as it pertained to prescribing a drug for a urinary tract infection. Another study (Corcoran, 1986) included a model for comparing decisions made by experienced versus novice nurses. These studies are discussed in more detail in chapter 2.

There are two methods used in studying and identifying the cognitive process underlying choices and decisions. One method involves the statistical methods such as regression or analysis of variance testing that looks at choices,
decisions, or rankings have the decision has occurred. The other method is known as information processing or information process tracing (Payne, Bettman and Johnson, 1993). This method evolved from the research done by Newell and Simon (1972). This information processing approach uses various techniques to trace and collect data while the decision process is happening rather than trying to understand the decision after it occurs. Svenson in 1979 pointed out that “the order in which a decision maker seeks and evaluates the information of a decision problem is related to the cognitive process.” The key to this type of research is the emphasis on the predecision period. Predecision information is best when collected by tracing processes during the predecision phase.

Information processing techniques have been developed to overcome the problems identified with input-output relationship studies that make assumptions about the decision process based on choices after the decision (Ford, 1989). Information processing techniques are methods that allow for collection of data that is predecisional in nature. These processes can help to identify what information is attended to and how the information is being processed before the decision is made. Mathematical models are sometimes used to predict these processes. Einhorn (1970) noted the problem with mathematical models by saying that:
"The fitting of any mathematical model to cognitive functioning is at best a "paramorphic" process. That is, even if a model is highly accurate in describing the judgmental process, it does not necessarily mean that the process has actually worked in exactly the way the model has specified. Different models may be equally powerful with respect to describing the process."

Several valid information process-tracing methods have been identified which overcome the problem identified by Einhorn (1970) as described above. MouseLab is one type of information process technique that has been researched and validated as an information processing technique (Ford, 1989). Several studies have been done that look at process tracing methods.

In addition, several studies have been published using MouseLab as a specific process-tracing technique. The business literature dominates most of the research in this area. The health science literature is limited when it comes to investigating predecisional behavior. Chinburapa (1993) and colleagues completed one study that has been cited in the medical literature. This study looked at the importance of drug attributes in determining drug therapy. This study compared
forty-eight physicians who were selecting hypothetical drugs for the management of urinary tract infections by conjoint analysis and the process tracing technique, MouseLab. As with previous research done in the area of conjoint analysis, there was a low level of correlation between the conjoint analysis and the process-tracing method.

Recently, Lohse and Johnson (1996) looked at comparing the MouseLab technique with a computer eye-tracking device. The researchers indicated that eye tracking was slightly more accurate in estimating the amount of time taken to make a decision versus MouseLab. They felt this was due to the fact that MouseLab requires both eye movement and motor movement to record information acquisitions. However, the researchers concluded that the difference was negligible and that MouseLab provided an inexpensive technique to gather information compared to EyeGaze.

Other research (Biggs and Rosman, 1993) has compared the verbal protocol technique with tracing-processes. The Biggs study confirmed other research findings that showed that verbalization as part of the verbal protocol technique affects the time to acquisition. Verbalization did not affect the amount or pattern of the acquisition or accuracy of judgments. The study showed that computer tracing methods like MouseLab provided better acquisition of information than verbal protocol. If retrieval from long-term memory is important to the research, then verbal protocol was the preferred technique. If the predecisional information
were the most important part of the research, then an information processing technique would be the best tool.

When addressing decision theories, research has shown that as decisions become more complex people will tend to use simplifying decision heuristics. Issues that can affect complexity include the number of alternatives available, the number of attributes or dimensions of information, and time pressures. In situations of increased complexity, the individual will shift from a compensatory to a noncompensatory mode for making decisions. There is limited data for health care professions about changes in information processing with increasing complexity. There is no information on whether a pharmacist changes from a compensatory to a noncompensatory decision process when confronted with various issues related to task complexity.

Individuals appear to use a variety of compensatory and noncompensatory processes in making decisions, depending upon the choice environment and other factors (Payne, Bettman and Johnson, 1993). The limited health science literature confirms these findings. Chinburapa (1993) found that physicians did shift from compensatory to noncompensatory decision making processes when the task complexity increased. In addition, nursing research also noted when task complexity changed that noncompensatory actions took place. As the task complexity increased the agreement with the model diminished and noncompensatory processes occurred.
Task complexity research has identified certain issues that alter the decision process. This research has tried to understand why factors like the number of available attributes and alternatives as well as time pressure alter decision heuristics. Chapter 2 reviews studies that have been done in the area of consumer researcher. Data related to task complexity and health care professionals has been primarily done in the area of physician prescribing and nursing patient decisions. No data was found on task complexity as it related to the decision made by pharmacists in their daily routine of patient counseling.

Studies have also documented a change in the quality of the decision under task complexity. Evidence suggests that there appears to be a threshold for complexity and this has been described as information overload. Gaeth (1984) found that expert judgements were adversely influenced by irrelevant factors. In addition, they noted that formal training could reduce the influence of some irrelevant factors. These findings indicated that research could be done to determine models for decision analysis that can be influenced by formal training. This is consistent with Payne, Bettman, and Johnson's theory (1993) that prior knowledge and formal training become important issues for how an individual handles task complexity as part of the decision process.

Time pressure as part of the task effect variables has also been identified as a factor that influences the accuracy-effort framework. As time decreases in the decision process, then there is some evidence to suggest that there are changes in
patterns of decisions. Payne, Bettman, and Johnson (1993) suggest ways that individuals respond to time pressure. These include accelerating the process by utilizing the same information but in a faster time frame, filtration (which is also known as perceptual narrowing) involves using only a subset of known information available, and/or shift decision-processing strategies from an extreme example of random choice or avoidance to a less extreme example of compensatory to noncompensatory decisions.

A study looking at issues related to decision strategies without time pressure showed that a lack of time pressure did not alter the quality of the decision process. Onken (1985) found that when subjects were making choices about selecting apartments, the longer they took to make the decision the less likely they were to change their minds or strategies even with increasing complexity. Without time pressures, individuals that took time and worked through the complex tasks were able to repeat this process and maintain the accuracy-effort framework.

In contrast to the task variables, the context effects are factors associated with the particular values of the objects in the specific decision set under consideration including the similarity and attractiveness of alternatives. These factors are more dependent on the individual’s perception than on the values of task. The person will place value on the objects within the decision set that they feel are the most important. Payne, Bettman, and Johnson (1993) look at context effects from four aspects that included the similarity of alternatives, the nature of
the options, the reference point, and the framing effects. Research has indicated that by changing the difference between options, the more difficult the decision becomes the more adverse consequences to the effort-accuracy framework. When losses loom larger than gains this can also change the accuracy-effort framework. Other research has shown that decisions that involve risk will also affect the decision model.

Payne, Bettman, and Johnson (1993) found in their research that the structure of a particular decision environment could determine the likelihood of various strategies in producing a good solution to the problem. In addition, their research has shown that putting the same individual into different environments can change their decision strategy even when presented with the same problem. The literature also identified some issues for pharmacy as it relates to the practice site. Observational research (Berardo, Kimberlin and Barnett, 1989) indicated that the workload of the pharmacist had no bearing on whether the pharmacist counseled a patient. However, a study done in Northern Ireland (Morrow and Hargie, 1992) found that pharmacists perceived an inadequate amount of time as a barrier to patient counseling. The pharmacy literature contains studies looking at differences in rural and urban pharmacies and pharmacists. Gangeness (1996) presented information at an ASHP Midyear Clinical Meeting about trends in rural pharmacy practice. An interesting finding was that forty percent of rural pharmacists had been in their position for more than 20 years. A study (Bressler,
1995) found that when looking at pharmacists’ attitudes and dispensing patterns for opioids in cancer pain that there was no difference between urban and rural pharmacists. Slack and Dunn (1994) demonstrated some significant differences in the demographics of urban versus rural pharmacy practitioners. The researchers found that rural pharmacists selected their position based on the opportunity to practice independently whereas urban pharmacists were more likely to select their practice site based on financial considerations.

**Need for the Research**

There is a lack of research in the area of predecisional behavior in pharmacy practice. This void, as well as previous health care research in this area, provides a springboard to ask some interesting questions as it pertains to the predecisional processes that pharmacist might undertake. Questions such as: Are task complexity and time important task variables in the decision process? How does a pharmacist adapt their decision making process when deciding to counsel a patient? Based on research that has been done in other health professions, as well as that published in the business literature, information process-tracing methods to evaluate the decision process may prove to be a valid means to determine this for pharmacy. Process-tracing methods research has not been tested in the pharmacy arena especially in the area of patient counseling.
If process-tracing methods can establish a means to understand the pharmacist's decision process, then there is the potential to influence those factors. Other researchers have found that the decision making process can be influenced after components of the contingent strategy selection model have been identified. With research in pharmacy practice, an understanding of the information used in the decision process and factors that influence a pharmacist's decision can be identified. If by understanding the influencing factors, then changes can be implemented that may facilitate better pharmacy practice as it pertains to patient counseling.

Purpose of the Study

The primary purpose of this study is to understand the predecisional behavior of the pharmacist prior to counseling a patient and to see if the adaptive decision model can be used to describe this process. The purpose of the research was specifically designed to address two aspects of the adaptive decision model. The two specific aspects were the problem and the person. The person is described based on cognitive ability and prior knowledge. The cognitive ability was held constant by looking at registered pharmacists. The prior knowledge was examined by studying novice versus expert pharmacists. After an extensive search of the literature, no justification could be found for looking at the social context. After discussion with the nominal groups, they concurred that the social context was not
the most important aspect of this research. Therefore, the purpose is to identify the important issues in pharmacy that relate to the problem and the person.

Valuable information could be obtained if we better understand the decision process that a pharmacist undertakes prior to patient counseling. Current information only provides us with an understanding of barriers to counseling or task variables that affect the willingness to counsel. A better understanding of what attributes and alternatives affect counseling could lead to techniques to improve the counseling environment. In addition, understanding predecisional behavior may help pharmacy educators in the development of curriculum and academic material that may help pharmacy students adapt to the patient counseling environment more efficiently. We may be able to better explain the effect that task complexity and time pressure has on counseling decisions by the pharmacist. In understanding these issues for pharmacy patient counseling, we may be able to make recommendations that could change task complexity or time pressure issues that may adversely affect patient counseling. This information could be utilized to develop models that could facilitate better decisions in the presence of task complexity.

This study attempts to determine how pharmacists adapt their decision making processes when counseling patients. The contingent strategy selection model (as part of the adaptive decision model) would be used as a base for determining the tradeoffs that a pharmacist makes between effectiveness (accuracy)
and efficiency (effort). Time pressure constraints were added to the research to see if pharmacists would adapt their decisions similar to what has been seen in the nursing and physician research. This type of information could also be valuable in academic curriculums as well as providing a foundation to alter practice environments to improve patient counseling. To date, no specific research has been done to explore what influences a pharmacist’s decision process when patient counseling. Does a pharmacist make a tradeoff between the effectiveness of the decision and the efficiency of the decision process?

Another purpose is to evaluate if differences in practice settings such as urban versus rural practice sites make a difference in the predecisional behavior of pharmacists. Some pharmacy research indicates that there may be identifiable differences between pharmacists who practice in urban versus rural settings.

**Significance of the Study**

The significance of this study would be to have a better understanding of how the pharmacist adapts their decision making process when they counsel a patient on their medication. In addition, a better understanding of the influences of task complexity and/or time pressure on the accuracy versus effort framework for the pharmacist. A significant contribution would be if we could learn enough about the process that would improve patient counseling and decrease barriers to patient counseling.
An understanding of the adaptive decision making model can have implications in not only improving the practice of patient counseling in pharmacy but can also be used to improve pharmacy education in the area of patient counseling. Based on previous research in business, there is evidence to suggest that formal training can reduce some of the effort involved in complex decision making and improve the accuracy of the decision. This type of information combined with a potential model for pharmacy patient counseling could have a significant impact in realizing the need for formal training for the pharmacist as it pertains to patient counseling. Irrelevant factors (attributes) could be recognized and excluded while important factors could be handled more efficiently with better accuracy in providing information to the patient.

Prior research in the area of patient counseling has never focused on the decision making process that precedes the action of the pharmacist. The utilization of an information processing technique like MouseLab could provide some unique perspective on the pharmacist's thought process. Therefore, this research may potentially contribute to a better understanding of the factors that affect patient counseling and could result in ways to change pharmacy education and pharmacy systems to enhance patient counseling.
**Definition of Terms**

General definitions of terminology are discussed in this section. The independent and dependent variables are discussed briefly with a more thorough discussion is presented in chapter 3.

*Alternative*: Represents the different products from which one must choose based on their decision.

*Attribute*: A characteristic, quality, consequence, or outcome possessed by or associated with a product.

*Compensatory Process*: The decision-making process in which all relevant drug attributes are considered, tradeoffs among attribute values are made, and an overall evaluation is formed independently on each alternative. The alternative with the highest overall evaluation is chosen.

*Context Effects*: The context effects are factors associated with the particular values of the objects in the specific decision set under consideration including the similarity and attractiveness of alternatives. These factors are more dependent on the individual’s perception than on the values of task.
**Decision Strategy:** The set of procedures that the decision-maker engages in when attempting to select among alternative courses of action; and a decision rule that dictates how the results of the engaged-in procedures will be used to make actual decisions.

**Noncompensatory Process:** The decision-making process in which a subset of the available information is considered. There are no tradeoffs among the attribute values. A favorable level on other attributes may not compensate for the unfavorable level on one attribute.

**Overall Task Complexity:** Characteristics of the task that affect information processing demands of individuals such as the number of alternatives in the choice set, the number of attributes per alternative, and the amount of time available for making a decision. Time pressure is a component of overall task complexity.

**Patient Counseling:** The process a pharmacists goes through to provide verbal and/or written communication to a patient about their prescription medication.

**Process Tracing:** A method that traces the decision process while the individual is engaged in the decision.
Task Complexity: Characteristics of the task that affect information processing demands of individuals such as the number of alternatives in the choice set, the number of attributes per alternative, the manipulation of the context effects values, and the amount of time available for making a decision.

Time Pressure: A method of shortening the time frame available for individuals to analyze and process necessary data to make a decision. Time pressure is considered a subset of task complexity.

The three dependent variables measured related to choice processes. These variables have been referred to in prior predecision research to be PATTERN, VATT, and TPERACQ. These dependent variables are all measured using the MouseLab information processing technique.

The independent variables measured included pharmacist's age, years of professional pharmacy experience, year of graduation from pharmacy school, practice site as it relates to independent or chain pharmacy, and urban versus rural practice. Time pressure and task complexity are additional independent variables. The years of professional pharmacy experience variable was also used to stratify groups to identify, if pharmacists with more experience or more maturity make decisions differently. This differs from the actual self-reported age of the pharmacist since age does not always correlate with years of professional
experience. Practice sites for this study are defined as a community-based pharmacy practice that includes either independent or chain pharmacy experience. Chain pharmacy is defined as a pharmacy organization with more than four stores under the same incorporation papers. An independent pharmacy experience would be any pharmacist practicing in a pharmacy organization with less than or equal to four stores under the same incorporation papers. Urban versus rural are defined using The Office of Management and Budget metropolitan statistical areas (MSAs). An urban area is defined as having a population of greater than 100,000. A rural area is defined as a county or a group of counties that make up an integrated area of 50,000 or less.

**RESEARCH QUESTIONS AND HYPOTHESES**

**RQ1:** Do pharmacists use compensatory or noncompensatory processes when deciding to provide patient counseling when not under task complexity or time constraints?

**H1:** Pharmacists use compensatory processes when deciding to provide patient counseling without the presence of task complexity or time pressure.

**RQ2:** Does the compensatory or noncompensatory processes change in the pharmacist with increasing task complexity excluding time pressure?
H2: Pharmacists change to noncompensatory processes with increasing complexity excluding time pressure.

RQ3: Does overall task complexity alter the predecision process behavior of the pharmacist when considering patient counseling?

H3: Task complexity issues alter the predecision process of a pharmacist when deciding to counsel a patient.

RQ4: Does the extent of pharmacy experience alter the decision process for patient counseling with task complexity?

H4: The more experienced pharmacist displays a higher selective (compensatory) process with task complexity than a less experienced (5 years or less) pharmacist when deciding to counsel a patient.

RQ5: Does time pressure as an element of task complexity affect the pharmacist’s decision to counsel?

H5: Time pressure influences a noncompensatory change in the predecision behavior of the pharmacist when deciding to counsel a patient.

RQ6: When a pharmacist makes a decision to counsel a patient, what context effects impact their decision?
H6: The context effects (attributes) are identified that have the greatest impact on the pharmacist's decision.

RQ7: Does an urban versus rural practice setting make a difference in the decision making of the pharmacist when counseling a patient?

H7: Rural versus urban settings do not make a difference in how a pharmacist decides to counsel a patient.

ASSUMPTIONS

There are five theoretical assumptions of the effort-accuracy framework that underlie the theory by Payne, Bettman, and Johnson (1993). The first of these assumptions is that individuals have a repertoire of strategies for solving problems regardless of complexity. These strategies can be gained through natural acquisition, experience or formal training. The second and third assumptions deal with the decision environment. One is that the structure of the particular decision environment can determine the likelihood of various strategies and the other is that changes in decision environments can result in different decision strategies. The fourth assumption is that a person will select the strategy that they perceive as the best for the task. Research done by Hayes-Roth and Hayes-Roth in 1979 indicated that people make decisions with only a priori notions (refer to as the bottom up theory). Payne, Bettman, and Johnson explore the possibility of individuals
making decisions based on information that they attain or are exposed to while the
decision process is occurring. Payne, Bettman, and Johnson describe this as
developing strategies “on the fly”.

Other assumptions made by the researchers include that the hypothetical
case scenarios with well-structured decision tasks are generalizable to patients and
the pharmacy environment. Another assumption is based on the literature as it
pertains to time pressure using the MouseLab technique. The business literature
has demonstrated that time pressure can be adequately measured using the
MouseLab technique. An assumption was make that the time clock time pressure
used by MouseLab simulates the real time pressure that a pharmacist would feel
when making a decision about a prescription.

LIMITATIONS

This study explores the task complexity and time pressure issues that may
affect a pharmacist’s predecisional behavior for patient counseling. This research
does not address the third component of the adaptive decision making model. The
third component relates to social pressure. After an exhaustive search of the
literature, no information could be identified that would indicate that pharmacists
feel social pressure or professional peer pressure when involved in practicing
pharmacy. The nature of the profession is that the pharmacist is ultimately
responsible for the dispensing of the prescription without double-checking by any
other source. A limitation would be the assumption that social pressure does not influence a pharmacist's decision to counsel.

This study explored the relationship between age and years of professional experience as it may apply to compensatory versus noncompensatory decision making. The underlying assumption would be that an inexperienced pharmacist would be one who has only been in practice a few years. Pharmacy students are required to do internship and externship experiences prior to graduation from an accredited college of pharmacy. A limitation would be whether this training provides enough experience to make the issue of years of professional experience mute. Further research may include pharmacy students at different points in their training as it relates to compensatory versus noncompensatory decision making.

Another limitation would be that MouseLab is limited in the number of attributes that can be tested at one time. Eight attributes are the maximum number that could be studied for each alternative. A limitation would be if more than eight attributes was necessary to determine a difference between compensatory versus noncompensatory processing.

Since this study involved pharmacists in who reside and practice in Ohio, the conclusions of this study are limited to this study group. In addition, the study only involved community-based pharmacists and conclusions can not be drawn about other pharmacy practice sites.

25
Another limitation is the use of quota sampling. Some researchers have concerns about potential researcher bias when quota sampling is used. Consideration has to be given to whether the advantage of using quota sampling to obtain necessary demographic variables outweighs the potential for researcher bias. Sudman (1976) in the textbook of *Applied Sampling* has demonstrated that quota sampling is quite close to traditional probability sampling under certain conditions.

**ORGANIZATION OF THE DISSERTATION**

The dissertation consists of five chapters, appendices, and a selected reference list. The organization of these chapters is described below.

Chapter I contains background information on adaptive decision making, task complexity, time pressure, context effects and information processing techniques. In addition, the chapter also contains the statement of the problem, the significance of the study, the purpose of the study, a list of the research questions with appropriate hypotheses, assumptions, limitations, and an outline of the organization.

Chapter II includes a review of the relevant literature. The literature review includes the adaptive decision making model, task complexity, time pressure, compensatory versus noncompensatory decision making, information processing techniques, pharmacy research as it relates to decisions to counsel patients, pharmacy research as it pertains to differences between urban versus rural
pharmacists, and other health professions research involving information processing strategies.

Chapter III describes the materials and methods used in the study design. It includes descriptions of sample size and representation, the development of the research questions and hypotheses, descriptions of the nominal grouping technique, methods designed to assure validity of the design, the design of the specific MouseLab program, the programming of the MouseLab to incorporate the nominal group findings, data collection, and data analysis techniques used for the research questions.

Chapter IV presents and describes the results of the study.

Chapter V summarizes the findings of the study. Conclusions of the study are described including meaning for pharmacy and implications for future research.
CHAPTER 2

REVIEW OF LITERATURE

A fair amount of research in decision making has focused attention on understanding the cognitive processes underlying choice. (Payne, 1976; Payne, Braunstein, and Carroll, 1978; Slovic, Fischhoff and Lichtenstein, 1977)

The framework of this research on decision processes and choice is based on the central principles outlined in the field of cognitive psychology. In this information processing theory (Newell and Simon, 1972), the human decision maker acts as an information processor. This process involves the mechanisms for information input and output, capabilities for interpreting and processing information, and storing and retrieving information from memory. The individual acquires information from memory and/or the external environment. The acquired information serves as input to an internal representation while the cognitive representation serves as an input to the choice. The processing of information is considered to be sequential. Therefore, it is limited in attention, duration, and capacity. The individual decision maker uses decision making strategies (known as heuristics) in order to keep the processing demand of the task within limited cognitive capacities (Bettman, 1979; Payne, 1980).
The central principles identified by Newell and Simon (1972) have been the basis for much of the research in decision processing. Information processing is done in a serial fashion especially with high-level tasks. When presented with multiple attributes or alternatives, the individual alternates among tasks. In addition, memory acts as a dual system involving short-term and long-term capabilities. These central principles led to further research in the area of predecisional behavior by consumers.

Payne, Bettman, and Johnson (1988, 1993) have been major contributors to the literature on predecision behavior. They have placed three major factors into a decision model that involves contingent strategy selection. They refer to this model involving contingent strategy selection as the adaptive decision model or adaptive decision making model. The three major classes are person, problem and social context. In exploring this decision making process, research has focused on some key areas. These areas include task complexity and its effect on the accuracy-effort framework. In addition, studies have been done that try to determine the influencing factors for why subjects change from compensatory to noncompensatory decision processing. Payne, Bettman, Johnson (1993) have done research involving testing some of these key areas by using predecision process tracing techniques. Johnson and colleagues have developed a computer-based program that utilizes a computer with a pointing device (computer mouse) to track the process.

This chapter is organized to review the literature for the following topics including: adaptive decision model, compensatory versus noncompensatory research, context effects, task complexity research, time pressure research, verbal protocol research, process tracing technique research, comparison studies of information
processing techniques, relevant health science literature, and relevant pharmacy literature.

**Adaptive Decision Model**

Payne, Bettman, and Johnson (1988) indicate that there is flexibility in the decision process. The decision strategy is defined as a "sequence of mental and effector (actions on the environment) operations used to transform an initial state of knowledge into a final goal state of knowledge where the decision maker views the particular decision problem solved." Adaptive forces can change the outcome of a decision and these forces will cause a balance of cognitive effort within an accuracy framework. Most of the literature pertaining to the adaptive decision model as well as task complexity has been done in the area of consumer research. This research has included preference judgements by consumers, assessments of choice with uncertainty, assessments of choice with risk or loss aversion, and selection alternative choices. Studies looking at the adaptive decision model in the health sciences are limited.

**Compensatory versus Noncompensatory Research**

A number of strategies describing the process individuals use to make decisions has been identified in the literature. The decision making processes differ in two ways. This includes whether the decision process is compensatory or noncompensatory and whether the information is organized by alternative-based or
attribute-based processing (Payne, 1982). Compensatory processes such as additive and additive-difference models consider all relevant attribute information and the tradeoffs that occur with the attribute values. A low value on one attribute can be compensated for by a high value on another attribute. Noncompensatory processes described such as conjunctive, disjunctive, lexicographic, and elimination by aspects models, do not look at tradeoffs of the attribute values but consider a subset of the information in making decisions (Bettman, 1979; Svenson, 1979). This attribute-based processing involves a comparison of attributes across alternatives. The alternative-based processing evaluates an alternative across the many attributes.

With increasing complexity, decision research shows that people will use heuristics to simplify the process. They will change from a compensatory to a noncompensatory mode. Studies report that an interaction between cognitive capabilities, decision importance and the effects of the number of alternatives can change the decision process. Extensive research has been done in the area of task complexity as it relates to consumers and business. Biggs (1985) studied the effects of task size and similarity on the decision behavior of bank loan officers. As the task size increased, the researchers noted a change in the decision making process among the loan officers. Officers varied widely in their decisions to grant loans when the case became complex in nature. The loan officers showed consistent decisions with the relatively simple cases. Shields (1980) documented very similar results in a study looking at managers evaluating the performance reports for several manufacturing companies. The research showed that as the information load increased a shift
occurred to a noncompensatory model. Likewise with increasing complexity, the shift was made from compensatory to noncompensatory models. Within the health care professions, similar results have been reported for both nurses and physicians as it pertains to converting to noncompensatory models when dealing with increased task complexity. A search of the relevant pharmacy and medical literature did not find any information on whether a pharmacist changes from a compensatory to a noncompensatory decision process when confronted with various issues related to task complexity.

There is evidence in the literature that there is not a single, context-free decision making process (Payne, Bettman and Johnson, 1988). A gambit of compensatory and noncompensatory processes is used in making decisions. Research has focused on when individuals will evoke certain compensatory or noncompensatory processes. Different models have been developed to try and study the changes that occur in the decision process. Models such as the additive difference model consider all relevant attribute information and tradeoff the high and low values of attributes in making the decision involving the alternatives. Compensatory processes are considered more complex and require greater cognitive effort. Previous studies indicate that individuals use compensatory process when choosing among few alternatives. However, noncompensatory processes come in to play when an individual is faced with many alternatives or there is an increase in task complexity. Individuals faced with multiple alternatives will try to simplify or eliminate alternatives (heuristics) so that they can arrive at a decision.
The decision making strategies also differ in the cognitive effort required to use the various strategies. There are differences in their ability to arrive at an optimal decision. Compensatory decision making processes are considered more complex. They require greater cognitive effort and are more difficult to apply than the simplifying heuristics of a noncompensatory process (Einhorn, 1970). Compensatory processes are more likely to result in an optimal decision than noncompensatory processes. This is believed to be a result of only examining a smaller subset of available information which is more likely to result in inconsistency in preferences (Abelson and Levi, 1985; Johnson and Payne, 1985; Tversky, 1972).

Based on these compensatory and noncompensatory processes, several models have evolved to explain the change in the decision process. The following models will be discussed: the additive model, additive-difference model, conjunctive model, disjunctive model, lexicographic model, and elimination by aspects model. Although other researchers have proposed differing decision strategies, the six methods described are the ones most commonly recognized in the decision making literature.

The Additive Model

The additive model is a linear compensatory model. An individual acquires all attribute information regarding the alternative. They then develop an evaluation independently for each alternative before going to the next alternative. The alternative with the highest overall evaluation value is selected. This assumes that: 1) the attribute and alternative can be searched in any order; 2) there are no ties
between the alternatives, and 3) all attributes and alternatives are looked at due to the fact that a low value on one attribute can be compensated for by a high values on other attributes (Klayman, 1983).

The Additive-Difference Model

This model is a linear compensatory model. The additive-difference model requires the individual to contrast a pair of alternatives on each attribute. The difference between each attribute is weighed and summed across the attributes. The alternative with the highest sum value of the differences is the one that is chosen. The selected alternative is then compared to the next alternative and the process continues until all alternatives have been compared. The selection is the choice between the last two alternatives compared (Tversky, 1969; Payne, 1976). The assumptions for this model are similar to those described for the additive model. The difference between the two models is based on the additive model using alternative-based processing and the additive-difference using attribute-based processing.

The Conjunctive Model

This model is a noncompensatory decision process. The conjunctive model also uses an alternative-based process. In this model, the decision maker establishes a minimum cutoff value for each attribute. An alternative that does not exceed the value as set by the decision maker is discarded (Einhorn, 1970). With this model, the individual puts more weight on negative attribute information. This results because a
low value on one attribute can not compensate for a high value on another attribute (Wright, 1974).

This model is based on the principle described in 1955 (Simon) where an individual try's to satisfy the decision process rather than maximize the process. The individual develops a heuristic that looks at one alternative across the attributes and stops when the first acceptable alternative has been located (Klayman, 1983).

**The Disjunctive Model**

The disjunctive model is an alternative-based process that establishes an acceptable standard for each attribute. If an alternative exceeds the set standard for any of the attributes, it is selected. This model is a noncompensatory process that puts more weight on positive information (Wright, 1974). This is a result of the individual being able to chose an alternative based on a high value on one attribute despite looking at the values of the other attributes (Einhorn, 1970).

**The Lexicographic Model**

The lexicographic model is also a noncompensatory process. The model differs from the disjunctive model in that it follows an attribute-based process. A decision maker must rank order the attributes based on the relative importance to the individual. The alternatives are then compared on the most important attribute by rankings. The alternative with the highest value on that attribute is chosen. This model also disregards the values on the other attributes once the alternative has been chosen. If a tie occurs on the highest ranked attribute, the next attribute on the
relative importance scale is then taken into consideration (Einhorn, 1970) and the process continues until a final selection has been made.

*Elimination by Aspect*

The elimination by aspect model is attribute-based. This model is also considered a noncompensatory process (Tversky, 1972). An individual decision maker establishes an acceptable level for any attribute to be considered as part of the process. They then assign a weight to each attribute that pertains to its relative importance. The attributes are evaluated based on the assigned weights. Alternatives are eliminated if they do not meet the acceptable level established for that attribute. The process continues by looking at each relative attribute until only one alternative is left. Some decision making research does not consider this model to be representative of a rational process (Tversky, 1972). This is based on the theory that once an alternative is eliminated then no further attribute information is evaluated. This may not always lead to the best decision outcome.

*Context Effects*

The context effects are factors associated with the particular values of the objects in the specific decision set under consideration including the similarity and attractiveness of alternatives. These factors are more dependent on the individual's perception than on the values of task. The person will place value on the objects within the decision set that they feel are the most important. Payne, Bettman, and Johnson (1988; 1993) looked at context effects from four aspects that include the
similarity of alternatives, the nature of the options, the reference point, and the framing effects. Research has indicated that the larger the difference between the options on the attributes the more difficult the decision. Likewise, there is a higher chance of adverse consequences to the effort-accuracy framework. Reference point effects deal with the concept of loss aversion such that if losses loom larger than gains, this can change the accuracy-effort framework. Other research has shown that decisions that involve risk will also affect the decision process.

Is time and workload an important task variable in the decision process? How does a pharmacist adapt their decision making process when deciding to counsel a patient? Process tracing methods to evaluate the decision process may prove to be a valid means to determine this for pharmacy. Process tracing methods research has not been tested in the pharmacy arena especially in the area of patient counseling. If process tracing methods can establish a means to understand the pharmacist's decision process, then there is the potential to influence those factors to improve patient counseling. Other researchers have found that the decision making process can be influenced after components of the contingent strategy selection model have been identified. With research in the pharmacy practice arena, information can be utilized to understand the decision process and factors that influence pharmacists' decisions. Specifically factors that are defined in the contingent strategy selection model as task and context variables that effect how a pharmacist decides to counsel a patient.
Task Complexity Research

Studies in decision research report that as decisions become more complex people will tend to use simplifying heuristics. Studies report that an interaction between cognitive capabilities, decision importance and the effects of the number of alternatives can change the decision process. Studies demonstrate that both alternative and attribute quantities affect the decision process. Extensive research has been done in the area of task complexity as it relates to consumers, business, and health care.

Several studies have looked at the effects of task size and the affect of changing the complexity of the alternatives. Such studies include the ones done by Biggs (1985) and Shield (1980) which were reported earlier in this chapter. Biggs found that as task size became larger and more complex, the decision process pattern of the bank loan officers changed. Large variations existed when the loan officers were exposed to task complexity. Shields (1980) addressed similar issues with business executives. When analyzing performance reports of fictitious companies, experts responded to the task complexity by using noncompensatory processing.

Klayman (1985) did some of the first studies with children and how they make decisions. The research showed that children as young as 12 years old understood the basic concepts of the decision making process. He demonstrated that children had already developed concepts related to compensation and elimination as part of the decision process. This research also determined that when children are exposed to increasing levels of task complexity, they would also use simplifying decision strategies.
Other researchers have shown the quality of the decision decreased with increasing numbers of attributes. There appears to be a threshold for complexity for individuals and this has been described as information overload. Most research looking at the number of attributes or the dimension of information on decisions has found that increasing the number of attributes may decrease the decision quality. The quality of the decision appears to be inversely related to task complexity. (Shields, 1983; Sundstrom, 1987; Keller and Staelin, 1987) Several researchers have termed this increasing task complexity with increasing number of attributes as "information overload". The idea of information overload has been questioned in other research. (Johnson, Meyer, and Ghose, 1989) Additional research has tried to explore whether people respond to task complexity by focusing on either the important aspects or by allowing extra information to become a distracter in the decision process. Another study (Nisbett, Zukier and Lemley, 1981) looking at the influence of useless information did find that these distracters did affect the judgement of the participants. Useless nondiagnostic information prevented the study group from focusing on the important diagnostic information provided. Another study (Gaeth, 1984) found that expert judgements were adversely influenced by irrelevant factors. In addition, they noted that formal training could reduce the influence of some of these irrelevant factors. These findings indicated that research could be done to determine models for decision analysis that can be influenced by formal training. This is consistent with Payne, Bettman, and Johnson's theory that prior knowledge and formal training are important issues when an individual is balancing effort and accuracy. Research in
this area could provide some insight as to task complexity factors and their relationship to patient counseling.

Data related to task complexity and health care professionals has been primarily done in the area of physician prescribing and nursing patient decisions. No data was found on task complexity as it related to the decision made by pharmacists in their daily routine of patient counseling. The health profession research will be discussed in further detail at the end of this chapter.

**Time Pressure**

Time pressure is another factor that can contribute to the issue of task complexity. Time pressure is a part of the overall task complexity issue. Time pressure has also been identified as a factor that influences the accuracy-effort framework. As time pressure increases, task complexity increases. There is some evidence to suggest that there are changes in decision patterns with increasing time pressure. Within the decision process research, time pressure is one of the least studied task complexity issues.

Payne, Bettman, and Johnson (1988) suggest ways that individuals respond to time pressure. These include accelerating the process by utilizing the same information but in a faster time frame, filtration (which is also known as perceptual narrowing) involves using only a subset of known information available, and/or shift decision-processing strategies from an extreme example of random choice or avoidance to a less extreme example of compensatory to noncompensatory decisions.
In contrast when no time constraints are placed on the individuals, the results are quite different from the time pressure studies. A study that documented that effect was one done by Onken (1985). The research found that when subjects were making choices and decisions about selecting apartments, the longer they took to make the decision the less likely they were to change their minds or strategies even with increasing complexity. Without time constraints or pressures, individuals that really take their time and worked through complex tasks were able to repeat this process and maintain the accuracy-effort framework.

Hwang (1985) has done research looking at time pressure as it relates to the type or format in which the information is presented to the participants. The research looked at time pressure and task complexity and found that with an increase in time pressure, subjects were more likely to utilize information presented in a graphic format rather than that presented in tables. This information could also be helpful in trying to identify ways to simplify information provided to improve the accuracy-effort framework with time pressure and complexity issues.

**Decision making Research Techniques**

**Verbal Protocols**

Verbal protocols are done by asking the individuals to "think aloud" their thoughts while performing the decision process. A verbal protocol is "a record of the subject's ongoing behavior, and an utterance at time t is taken to indicate knowledge
of operation at time t" (Newell and Simon, 1972). The transcripts are divided into simple assertions. The material is then analyzed to infer and test the decision process.

When referring to process tracing techniques, verbal protocols need to be distinguished from introspection (Payne, Braunstein and Carroll, 1978). Introspection involves highly trained subjects or experts in the generation of data while verbal protocols involve subjects who are novice or naïve to the study. Verbal protocols used to trace information processes should be collected concurrent to the decision process rather than asking the subject to retrospectively remember what they did during the process (Payne, 1976).

Verbal protocols do provide for a detailed analysis of the strategy used by the individual during the process. The process can be time consuming and some literature has identified that it disrupts the decision making process (Greenwood and King, 1986). Russo (1978) has suggested that verbal protocols can be difficult to analyze. Concern has been raised as to the effect of verbal protocols on the cognitive processes required of the individual at the time of the decision process (Bettman, 1979; Russo, 1978). Others have noted that attempts may be made to present the decision in a manner which would be deemed socially desirable (Biehal and Chakravarti, 1989). Other researchers have not demonstrated this interference with the decision making process (Payne, Braunstein and Carroll, 1978; Payne, 1980).
In one study looking at the effects of collecting concurrent verbal protocols on information processing, the researchers found that verbalization affected the extent of brand-processing (Biehal and Chakravarti, 1989). However, there did not appear to be any significant differences in the frequency distributions of choice outcomes between those who verbalized the results and the nonverbalized results. The authors recommended that attempts be made to minimize any reactive effects.

Concern has also been expressed about whether subjects can verbally report their mental operations. Nisbett and Wilson (1977) concluded with their review that verbal reports are not very useful as indicators. Verbal protocols can be useful and informative when collected concurrently with decision task and when the decision making process does not rely on stored rules in memory (Johnson and Puto, 1987).

**Process Tracing Technique Research**

There are two approaches that are well described to study the cognitive process underlying judgement and choice. One method involves the structural analysis of the decision process by looking at choices, rankings, or ratings after the decision is completed. This method often relies on statistical models such as
multiple regression or analysis of variance to study the relationship between attributes and choices. The second method is known as information processing of behavior or information process tracing. This process started with the central principles of Newell and Simon and was published in 1972. This information processing approach used various techniques to trace and collect data while the decision process was happening rather than trying to understand the decision after it occurs. "The order in which a decision maker seeks and evaluates the information of a decision problem is related to the cognitive process leading to the final decision." (Svenson, 1979) This information is best when collected by tracing processes during the predecision phase.

Information processing techniques have been developed to overcome the limitations found with other models that make assumptions about the decision process based on choices after the decision was made by the individual. Process tracing techniques have been introduced as an another method to evaluate the decision making process (Payne, Braunstein and Carroll, 1978). Process tracing techniques are data collection methods that trace the information acquisition and provide the data on predecisional behavior to identify what information is attended to and how the information is being processed before the decision is made. The literature reports the use of several types of information process tracing techniques. These types include:
1) verbal protocol, and 2) information acquisition behavior using eye movement recording (Russo, 1978), information display board (Payne, 1976), or pointing-device information acquisition programs (Payne, Bettman and Johnson, 1993).

The process tracing techniques use methods that involve presenting the decision to the individuals in the form of an alternative by attribute matrix (Payne, Bettman and Johnson, 1993; Jacoby, Chestnut and Fisher, 1978). Various attributes are used to describe each alternative. The number of attributes and alternatives can be increased in this matrix to increase or represent task complexity. The alternatives can be listed across the top of the matrix depending on the display created in the specific technique. Likewise, the attributes can be displayed as either columns or rows depending on the best representation of the material. These techniques hid the attribute values and require individuals to open information relevant to their final decision. The technique traces the amount of information acquired, the content of information acquired, and the order with duration of each attribute searched. These measures are then used to determine the decision making processes used by the individuals. This information can be used to determine compensatory versus noncompensatory processes as well as attribute-based and alternative-based processing.

Several authors have discussed assumptions associated with these techniques. It is assumed that individuals cognitively process the information acquired and that a longer period of attention to information is thought to involve a more complex cognitive process (Svenson, 1979). Brucks and Schurr (1990) also stated several assumptions. These assumptions included alternatives in a choice set are comparable
as well as the individual knows the number of attributes and alternatives. In addition, the attribute values are fixed and are assumed to be the only form of information.

Several methods have been described that are used to assess information acquisition and the predecisional process. These methods included eye movement recording, information display board, and the MouseLab program. These different techniques are described below.

Eye Movement Recordings

Sensing apparatus is used to record the sequence of eye movements as subjects look at the available alternatives. Participants’ heads are immobilized to prevent large head movements and assure accurate recordings. In order to prevent subjects from using peripheral eye processing, the display must have adequate separation for the display material. Russo (1978) has stated that eye movement recordings provide the most detailed information of the process tracing methods. He also believes that the eye movement techniques are the best for acquiring information that is processed in a rapid fashion. Disadvantages associated with this method include the cost of the equipment, the cost of training personnel, and the time required for data collection and analysis (Bettman, 1979; Payne, Braunstein and Carroll, 1978; Just and Carpenter, 1984). Svenson (1979) believed that eye movements may be less than accurate if asking the participants to choose between a large number of attributes and alternatives.

Information Display Boards
Payne was one of the first researchers to use an information display board. The board contained a matrix of envelopes attached to a display board. The envelopes contained cards that have the necessary attribute information. The subject pulled the card out of the envelope and turned it over to read the information provided. The order in which the participant gathered information was recorded. Information display boards were described as easy to use for research and less expensive than other alternatives. In addition, they had an ability to be used in many different types of settings (Russo, 1978). The disadvantages of this method include the time and the effort necessary to acquire the information. Researchers have commented that this time may affect the acquisition behavior (Arch, Bettman and Kakkar, 1978; Bettman 1979). In a review of information display board studies, Russo (1978) reported that the reacquisition rate for the information display boards was considerably lower when compared to the eye movement technique. This raises a question as to the accuracy of the observations provided by the information display boards.

Some limitations of the information display boards have also been discussed in the literature. These include the use of a defined matrix format that provides a decision structure. In addition, concerned has been raised about the inability to directly measure internal processing with this method (Brucks, 1985). The validity of information display boards has been studied by several researchers and has been found to provide valid results with appropriate study designs (Holbrook and Maier, 1978; Sheluga, Jaccard and Jacoby, 1979; Lehmann and Moore, 1980). In the study
done by Jacoby, Chestnut, and Fisher (1978), they found that when brand names of cereals were made available to the participants, they spent less time searching for information and tended to focus on the brand name. Participants considered more information when the brand names were not provided. Lehmann and Moore (1980) found that the search decreased when individuals became more familiar with the product as well as when the brand name was provided to them.

*MouseLab*

Johnson and colleagues developed an MS-DOS computer program that incorporated the information display board technique into a program that allowed the mouse to be a pointing device. This program is known as MouseLab. MouseLab monitors information acquisition behavior and was developed to minimize efforts required to acquire information from the traditional information display boards. The MouseLab program uses computer graphics to display information about the attributes and the alternatives. The information is accessed using a pointing device, which is the computer mouse. "The methodology comes close to the recording of eye movements in terms of speed and ease of acquisitions, while minimizing instrumentation cost and difficulty of use for both subject and experimenter." (Johnson, 1989)
There are several advantages of using a pointing device such as a computer mouse. These include the relative ease in learning how to use a mouse and the ability to rapidly access data. Another advantage is the consideration that a mouse device may reduce the error rate in gathering information and it reduces the time taken to access information from envelopes on a display board (Payne, Bettman and Johnson, 1993). Some of the disadvantages of the MouseLab program are similar to those described with information display boards.

In order to validate this procedure, several researchers have compared MouseLab to other previously studied techniques. In previous research, participants using the MouseLab program were able to replicate the results obtained with other process tracing techniques. (Johnson, Meyer, and Ghose 1989; Johnson, Payne and Bettman 1988; Schkade and Johnson 1989; Payne, Bettman and Johnson 1988) This provides some assurance to the validity of this method to accurately trace the predecisional process.

Although several studies have been done in the business environment, studies using MouseLab are small in number. MouseLab is an information process technique that overcomes some of the problems identified by other researchers and it provides an inexpensive means to study the decision making process. The studies are limited when using MouseLab as a specific technique of process tracing.
Comparison Studies of Information Processing Techniques

Lohse and Johnson (1996) compared MouseLab technique with a computer eye-tracking device. The eye tracking (EyeGaze) was a slightly more accurate reflection of the amount of time taken to make a decision versus MouseLab. This is due to the fact that MouseLab requires both eye movement and motor movement. MouseLab subjects tended to have a more systematic information acquisition behavior than the EyeGaze subjects. However, the researchers concluded that the two techniques were equally effective in their ability to determine predecision behavior. In addition, MouseLab provided an inexpensive technique to gather information compared to EyeGaze which was expensive ($20,000-$100,000, respectively).

Other research (Biggs and Rosman, 1993) has compared the verbal protocol technique with tracing processes. The Biggs study confirmed other research that shows that verbalization affects time. Verbalization did not affect the amount or pattern of the acquisition or accuracy of judgments. The study showed that computer tracing methods provided better acquisition of information than verbal protocol. If retrieval from long-term memory is important to the research, then verbal protocol was the preferred technique.

Health Science Literature
Although the health science literature does not have many published reports relating to the adaptive decision model, the studies that have been done are very meaningful. Chinburapa (1993) and colleagues evaluated the task complexity and situational involvement of physicians in their prescribing decisions. The researchers used conjoint analysis and analysis of information acquisition to determine task complexity among the choices that physicians made relating to drug therapy for patients. The researchers used various drug alternatives and asked physicians to justify their choice of drug therapy. Informing the physicians that peers would review their drug choice altered situational involvement. The study demonstrated that physicians did change from a compensatory to a noncompensatory process with task complexity. Situational involvement appeared to be unaffected in the study.

Hughes and Young (1990) studied a study evaluating nurse expertise as it relates to the decision process. This study used an instrument that the researchers designed and called the Decision Analytic Questionnaire (DAQ). The DAQ was based on similar instruments that had been used in other decision process research. The difference in the DAQ to other instruments previously used was the introduction of models of uncertainty. In addition, the three-part, 95-item written instrument also assessed the decision makers' clinical knowledge base. The development of the DAQ started with three patient situations that were developed with expert nurse input and information from standard medical-surgical nursing textbooks. The researchers changed task complexity and tried to determine the nurse's ability to make decisions in a consistent manner. Nurses were found to make clinical decisions that agreed with normative decision models when the task complexity was simple in nature or
routine. As the task complexity increased the agreement with the model diminished and noncompensatory actions took place.

In another study (Corcoran, 1986) involving nurse's ability to make decisions, the researchers found that task complexity and nursing expertise were factors. The nurses' study involved six expert nurses and five novice nurses to determine what factors influenced their decision making processes with increasing task complexity. The study used both an information process approach as well as a verbal protocol method. The nurses were given three cases of varying complexity. The results support the cognitive model proposed by Hayes-Roth (1979). The expert nurses used a consistent pattern in developing their decisions while the novice nurses did not have a set pattern. The experts varied their approach to arriving at the decision with increased task complexity. In the more complex cases, the experts used a more opportunistic approach to the planning process. The novice nurses used this approach for all cases regardless of the complexity. This study showed that experience or knowledge allows expert nurses to balance effort with accuracy for less complex tasks but as the complexity increases the experience factor seems to play a diminishing role.

Greenwood and King (1986) evaluated nine pairs of orthopedic nurse practitioners in two metropolitan hospitals in South Australia. The pairs consisted of one expert nurse and one novice nurse. The study involved seven patients who had undergone total hip replacement surgery. This study assessed the nurses using only a verbal protocol technique. The transcripts were then evaluated looking at the decision processes. The study found that expert and novice nurse practitioners shared many basic concepts. The experts were noted to use more basic concepts in their clinical
reasoning than the novices. The experts used more strategies to manipulate the information they possessed. The novices collected more information and appeared to be unable to discriminate between salient and non-salient cues. The researchers pointed out that both the novice and expert nurses did follow reasoning patterns consistent with a "medical model" of health care. This study also noted that the verbal protocol approach did interfere with the attentional capacity of the nurse while involved in clinical reasoning activities.

Another health care study performed by MacLean (1987) and colleagues researched the adaptive decisions that were involved in using hospital beds. This study evaluated how physicians adapted their decisions to refer patients to certain hospitals and any pressures that they may have felt which could have affected length of hospital stay.

Butcher and Scofield (1984) did a research project looking at the use of a standardized simulation for studying clinical problem-solving competence in mental health professionals. The study involved fifteen clinicians that were required to solve a typical client management problem. No time pressures were applied. A standardized work sample was used for data collection and was in a written response format. Then they required the clinicians to "think aloud" while selecting and reviewing the reports as part of the case. The authors concluded that clinical problem solving still remains a difficult yet significant area of inquiry for mental health professionals.
Pharmacy Literature

Adaptive Decision Theory

Studies looking at the adaptive decision model in the health sciences are limited and there are no studies looking at the model in pharmacy.

Compensatory and Task Complexity

The pharmacy literature contains very limited information as it pertains to whether pharmacists use compensatory or noncompensatory processes when making professional decisions. A study done by Bajpai and Pathak (1998) used the contingency decision making model to guide an evaluation of eighty predictive decision making models in predicting formulary decisions within health maintenance organizations (HMO). This research involved predicting decisions about formulary inclusion or exclusion of nonsteroidal anti-inflammatory drugs (NSAIDs) with the HMOs. Respondents were asked to evaluate four NSAID alternatives. Two hundred and seventy-eight HMOs responded to the mailed survey. The results of this study demonstrated that some criteria showed a good ability to predict NSAIDs selection. These included past NSAIDs prescribing patterns by the physicians as well as noncompensatory choice heuristics. Another unpublished study done by George, Pathak, Pleil, and Sherrin (1981), looked at information processing models to predict hospital administrators' decisions to implement clinical pharmacy programs. The study attempted to identify information administrators used in deciding approval of clinical pharmacy services. An identical questionnaire was mailed to hospital administrators as well as directors of pharmacy. Based on results of this study, it was
determined that if the director of pharmacy understood the decision process of their administrator, they could accurately predict the approval of clinical pharmacy programs.

Literature could not be found that documented pharmacists decision processes at it related to patient counseling. In addition, no data were available on changes in decision processes with changing task complexity. Considering the information that is available for nurses and physicians, it poses some interesting research questions for pharmacists.

*Time Pressure*

An extensive review of the pharmacy literature did not provide any insight into the influence that time pressure has on the pharmacist’s decision to counsel patients. Survey literature exists that cites that pharmacists consider time as a barrier to providing pharmaceutical care. Survey research done by Bell (1998) highlights the issue of time as reported by community pharmacists. The survey research validates that time pressure is an important consideration. These surveys did not explore the role that time pressure actually has on the decision process of the pharmacist. Observational research by Berardo, Kimberlin, and Barnett (1989) indicated that the workload of the pharmacist had no bearing on whether the pharmacist counseled a patient. However, a study by Morrow and Hargie (1992) found that pharmacists in Ireland perceived an inadequate amount of time as a barrier to patient counseling.
Pharmaceutical Care

In 1988, Strand et al. developed a procedure that directs the pharmacist’s decisions about the use of drugs for any patient in any practice setting. This procedure was called the Pharmacist’s Workup of Drug Therapy (PWDT). This involved the following seven steps:

1) collect and interpret relevant patient information
2) identify drug-related problems
3) describe the desired therapeutic goals
4) describe feasible therapeutic alternatives
5) select and individualize the most appropriate treatment regimen
6) implement the decision made about drug use
7) design a monitoring plan to achieve desired therapeutic goals.

Many of these seven steps involve the decision making ability of the pharmacist in order to be successful. Hepler and Strand further described the application of this procedure in a 1990 article as a means to demonstrate how pharmacists could provide pharmaceutical care. They define pharmaceutical care as “the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life.” They go on to suggest that the fundamental processes of pharmaceutical care can exist in any practice setting. Unfortunately, no mention is made about how pharmacists make these decision and how work-related factors such as task complexity and time pressures could alter this procedure.
Urban versus Rural Practice Settings

Differences have been noted between rural and urban pharmacies and pharmacists. Gangeness (1996) presented information at an ASHP Midyear Clinical Meeting about trends in rural pharmacy practice. These same findings were published in 1997. An interesting finding was that forty percent of rural pharmacists had been in their position for more than twenty years. The study showed that only six percent of the pharmacists had begun their current position within the past five years. The researchers felt that fewer pharmacists were entering rural practice. Fincham and Gottlob (1997) did a study of rural and urban community pharmacists looking at pharmacy interventions. The study estimated that pharmacists’ interventions saved an estimated twelve million dollars per year. However, the study did not stratify the data in the final analysis to determine potential differences by rural or urban pharmacists. A study done by Bressler (1995) found that when looking at pharmacists’ attitudes and dispensing patterns for opioids in cancer pain that there was no difference between urban and rural pharmacists. A study done by Slack and Dunn (1994) demonstrated some significant differences in the demographics of urban versus rural pharmacy practitioners. The study found that rural pharmacists were more likely to come from a rural upbringing, more likely to be married, and also more likely to have a higher income. Rural pharmacists selected their position based on the opportunity to practice independently whereas urban pharmacists were more likely to select their practice site based on financial considerations. This data would suggest that there is justification to evaluate if a difference exists between urban and rural pharmacists.
CHAPTER 3

METHODOLOGY

Prior to developing the methodology for the MouseLab study, an exploratory phase involving nominal groups had to be completed to identify task and context variables necessary in programming the information process-tracing technique. Therefore, this chapter is divided into two distinct sections. The first section is the methodology and results from the nominal group technique and the second section discusses the research design for the information process-tracing technique study.

The methodology used in this information process-tracing technique study was divided into eight board categories: 1) research design, 2) sampling procedures, 3) data collection, 4) definition and measurement of variables, 5) pilot study results, 7) sources of error and bias, and 8) data analysis with the research questions and hypotheses.

Nominal Group Technique

The purpose of the nominal groups was to gather information as it pertained to task and context variables that may be applicable to patient counseling in pharmacy. This phase of the study used a nominal group technique described by Delbecq (1975). The results from nominal groups were used to design the collection instruments for the information processing technique.
Sample Selection

A judgment sample was the specific type of nonprobability sampling technique that was used for the nominal group technique. As noted by Pathak and colleagues (1980), the use of judgement sampling is based upon the assumption that a researcher can identify the sampling units that best serve the research purposes. In addition, the article points out that when used appropriately, judgement samples can provide results that are reliable and useful.

A sample of pharmacists was recruited for the part of the methodology that involved a nominal group technique of pharmacists who practiced in a community setting and who were enrolled in a nontraditional Doctor of Pharmacy program. The pharmacists were asked to voluntarily participate via bulletin board postings on the program’s administrative web page as well as a general email that went out to all program participants. Seventy-four pharmacists were enrolled in the program with thirty-two being identified as having a community based practice site. The pharmacists enrolled in the program represented the following states: Alaska, Arizona, Arkansas, Connecticut, Illinois, Maryland, Michigan, Nevada, New Mexico, New York, North Dakota, Ohio, Pennsylvania, and Texas. The age range of the pharmacists was 28 to 62 years. The goal was to recruit between six and eight pharmacists for the nominal groups. The information provided in the nominal groups determined the direction for the research involving the adaptive decision model and the MouseLab program.
Data Collection and Instrumentation

Identifying the Task and Context Variables (Nominal Group)

A nominal group technique was used to determine the task complexity issues as well as the context variables. The nominal group technique was selected because of its ability to use a group for developing a list of clearly expressed ideas with agreed upon priorities (Tully and Cantrill, 1997). Nominal group technique is best applied for problem solving or idea generation. This technique splits the problem solving into two distinct phases. The first being the creative phase where balanced participation is encouraged. This phase prevents dominance of one individual or faction within the group. The second part involves the evaluative phase. This phase allows for iteration and priority voting such that the idealist has final consensus vote from the group.

For the nominal group, open-ended questions were developed a priori in an attempt to get the pharmacists to discuss task and context variables. Pharmacists within the nominal group were asked to give an indication of the relative importance of each factor. The nominal group had a minimum of four pharmacists practicing in the retail/ambulatory setting.

The questions were prepared in advance to be precise and clearly stated. Questions included factors such as time, drug attributes, patient attributes, and other professional pressures. These factors were considered the best way to help identify context and task variables that affect patient counseling. In addition, the studies done by Schommer and Wiederholt (1994; 1997) were consulted for further information when constructing the questions related to the task variables. The
nominal group questions were developed by the researcher and reviewed by two experts in this particular area.

The nominal group technique (Delbecq, 1975) was used to determine consensus among the four pharmacists within each nominal group. The nominal group was used to further define and prioritize the variables. The technique involved the six stages outlined by Delbecq (1975). These stages were as follows:

- **Stage 1: Idea generation**
- **Stage 2: Round-robin feedback**
- **Stage 3: Discussion**
- **Stage 4: Initial voting on priority items**
- **Stage 5: Discussion of voting**
- **Stage 6: Final voting**

The facilitator identified the purpose of the meeting and the intended outcome.

The nominal group meeting was transcribed. The voting in all stages was considered in the final review of the material. However, more weight was assigned to the final priority voting done by the group of pharmacists in Stage 6.

**Phase I: Nominal Group Technique**

Three questions were formulated to assess context and task variables. The following are the questions that were developed and reviewed by the experts.
Professional Issues

Stage I: Idea generation

Question: What professional issues or counseling issues do you feel impact your decision to counsel a patient on their prescription?

Stage II: Round-robin feedback

Stage III: Discussion

Stage IV: Initial voting on priority items

(Prioritize the items based on those with that you feel would have the greatest impact on your decision to counsel?)

Stage V: Discussion of voting

Stage VI: Final vote

(After listening to all of the discussions, please rank those items that you feel would have the greatest impact on patient counseling?)

Product Attributes

Stage I: Idea generation

Question: What characteristics of the drug product impact on your decision to counsel a patient about their medication?

Stage II: Round-robin feedback

Stage III: Discussion

Stage IV: Initial voting on priority items

(Prioritize the items based on those with that you feel would have the greatest impact on your decision to counsel?)
Stage V: Discussion of voting

Stage VI: Final vote

(After listening to all of the discussions, please rank those items that you feel would have the greatest impact on patient counseling?)

Patient Attributes

Stage I: Idea generation

Question: What are the characteristics that a customer/patient may have that would affect your decision to counsel the patient?

Stage II: Round-robin feedback

Stage III: Discussion

Stage IV: Initial voting on priority items

(Prioritize the items based on those with that you feel would have the greatest impact on your decision to counsel?)

Stage V: Discussion of voting

Stage VI: Final vote

(After listening to all of the discussions, please rank those items that you feel would have the greatest impact on patient counseling?)
Nominal Group Results

Eight pharmacists volunteered to participate in the Internet based nominal groups. Two separate Internet chat rooms were done each involving four pharmacists per nominal group session. The pharmacists were assigned codes by the researcher to maintain anonymity within the nominal group. Each pharmacist then logged into the system by this code. The eight pharmacists represented an age range of 29 to 47. They represented the states of Ohio, Alaska, Connecticut, Michigan, New Mexico, Arizona, and New York. All eight pharmacists worked in an ambulatory setting. Three worked in a pharmacy ambulatory clinic that involved dispensing. Three worked for chain retail pharmacies. Two worked for independent retail pharmacies. The participants were informed that their comments would be recorded but that no identification of the individual would be made when reporting the transcripts.

The three nominal grouping questions resulted in valuable insight into the context and task variables. Exclusively, the researcher upheld the final voting in programming the MouseLab. The final voting followed many aspects already seen in the literature (Schommer and Wiederholt, 1994; 1997)) as well as some new variables. Complete transcripts can be found in Appendix A. The following votes were recorded from highest priority to lowest priority for each of the three questions:
Question #1: What professional issues or counseling issues do you feel impact your decision to counsel a patient on their prescription?

1. Cost of medication
2. New Prescription versus Refill
3. Insurance Coverage
4. Known Allergies
5. Drug Interactions
6. Time Constraints

Question #2: What characteristics of the drug product impact on your decision to counsel a patient about their medication?

1. Drug Interactions
2. Prescribed Use
3. Adverse Reactions Serious
4. Adverse Reactions Common
5. Length of Therapy
6. Monitoring Issues
7. Likelihood of Adverse Reactions Occurring
Question #3: What are the characteristics that a customer/patient may have that would affect your decision to counsel the patient?

1. Number of Profile Medications
2. Age
3. Patient Waiting
4. Person Who Is Picking Up Prescription
5. Known Allergies
6. Language Spoken
7. Insurance Coverage

With this information from the nominal group technique, the research project was developed. Section B discusses the MouseLab development and study design.

**Research Design**

This research was designed for the purpose of studying how task complexity affects the predecisional behavior of a pharmacist when making decisions about patient counseling. The research design was an explanatory study using observational techniques. The study was based on observing predecision factors which influence patient counseling behavior of the pharmacist. In addition, part of establishing the research design was the use of nominal groups to determine the task and context variables for counseling decisions. An information tracing technique called MouseLab was used to study the predecision process. This process collected
measurements related to the amount of time spent per item of information acquired, the variability in the proportion of information acquired, the variability in the proportion of information searched across both attributes and alternatives, and the direction of the search.

**Sampling Procedures**

**Target Population**

The target population was urban and rural community based practicing pharmacists who vary in levels of professional experience. The accessible population was urban and rural community practicing pharmacists with varying levels of professional experience in the State of Ohio. The sample was limited to Ohio practicing pharmacists due to financial constraints of the researcher and the opportunity for increasing response rate.

**Sample Selection**

Once a MouseLab program was designed, samples of practicing retail pharmacists were recruited to participate in the study. A nonprobability sampling procedure was employed. The quota sampling technique was used to assure that the sample contained a similar proportion of pharmacists based on the variables defined as professional experience and urban versus rural practice settings. A pattern was developed to visit Ohio pharmacists in both rural and urban practice settings. The pattern started with community pharmacies in Ada, Ohio and ended with a pharmacy in Cridersville, Ohio. Pharmacists who volunteered and meet the quotas
for the two variables were invited to participate. The sample was divided into urban versus rural pharmacists as part of the quota sampling technique. Likewise, the sample was divided to assure equal representation from pharmacists with minimal practice experience (less than five years) versus practitioners with years of experience. A list was obtained from the Ohio State Board of Pharmacy of terminal distributor providers in the selected eight county area.

The quota sample was considered the optimum way to assure that these study variables could be used in the analysis. Consideration has to be given to whether the advantage of using quota sampling to obtain necessary demographic variables outweighs the potential for researcher bias. Sudman (1976) in the textbook of *Applied Sampling* has demonstrated that quota sampling is quite close to traditional probability sampling under certain conditions. Quota sampling was found to be close to probability sampling when “travel patterns” were controlled. This travel pattern indicated that the interviewer did not miss or ignore houses that were set in a predetermined pattern. In previous research if interviewers skipped certain houses, they found that this had a tendency to bias the sample.

Based on the research described by Sudman (1976), the researcher developed a travel pattern for interviewing (MouseLab) pharmacies and pharmacists. There were two distinct patterns that were developed. One pattern was for urban pharmacists and the other was for rural pharmacists. A pharmacy or pharmacist was skipped only if they refused to participate in the study or if the quota had been met for the specified variables.
Sample Size

The sample size goal for each scenario was 25 pharmacists for a total of 75 study subjects. This number was based on the MouseLab and information processing literature as well as sample size calculation techniques. The information processing literature demonstrated that between six and eighteen participants was usually all that was necessary to find valid results as it related to the decision process. Some studies used subject numbers as low as one to six per experiment. These studies are listed in Table 3.1. The Hwang (1995) study was an exception to the general sample sizes of the other studies because of a requirement that all students enrolled in a particular campus computer course had to participate.
<table>
<thead>
<tr>
<th>Researchers and Year of Publication</th>
<th>Sample Size</th>
<th># of Groups</th>
<th>Participants</th>
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<tr>
<td>Hansen and Helgeson (1996)</td>
<td>72</td>
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<td>Students</td>
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<td>Lohse and Johnson (1996)</td>
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<td>Students</td>
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<tr>
<td>Chinburapa and Larson (1993)</td>
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<td>2</td>
<td>Physicians</td>
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<tr>
<td>Greenwood and King (1986)</td>
<td>18</td>
<td>1</td>
<td>Nurses</td>
</tr>
<tr>
<td>Payne, Bettman, and Johnson (1986)</td>
<td>10</td>
<td>1</td>
<td>Students</td>
</tr>
<tr>
<td>Biggs (1985)</td>
<td>11</td>
<td>1</td>
<td>Loan officers</td>
</tr>
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<td>Johnson (1985)</td>
<td>4</td>
<td>1</td>
<td>Physician and Students</td>
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<tr>
<td>Butcher and Scofield (1984)</td>
<td>15</td>
<td>1</td>
<td>Mental health professionals</td>
</tr>
<tr>
<td>Johnson and Meyer (1984)</td>
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<tr>
<td>Shields (1980)</td>
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<td>1</td>
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<td>Payne (1974)</td>
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<td>Students</td>
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<tr>
<td>Svenson (1974)</td>
<td>6</td>
<td>1</td>
<td>Students and home buyers</td>
</tr>
</tbody>
</table>

Table 3.1

Previous Predecisional Research and Sample Sizes of Each Study Listed by Researcher, Year of Publication, Sample Size, Number of Groups Within the Experiment, and the Participants
Sample size calculations were based on the method described by Pathak, Meinhold, and Fisher (1980), from the equation:

\[ n = \left( Z_\alpha \times \sigma/e \right)^2 \]

Where

- \( n \) = sample size
- \( Z_\alpha \) = standard normal distribution
- \( \sigma \) = population standard deviation
- \( e \) = acceptable limit of error

Research in the area of information processing using MouseLab has described standard deviation ranges from 0.12 to 0.51 (Lohse and Johnson, 1996; Chinburapa, 1993; Hansen and Helgeson, 1996). Therefore if this range is used in the equation described by Pathak (1980), the following sample size calculations are predicted.

\[ n = (1.96 \times 0.12/0.20)^2 = 2 \text{ per group} \]
\[ n = (1.96\times0.51/0.20)^2 = 25 \text{ per group} \]

Based on these calculations and the MouseLab literature, a sample size of 25 per group was used.
Human Subjects

The study involved human subjects to the extent that the subject agreed to and completed the nominal grouping, the MouseLab, and/or the demographic survey. Subjects were assured that all responses remained completely confidential and anonymous. The information collected was used for the sole purpose of completing this research. Pharmacists who indicated a willingness to participate were contacted to establish a time for the researchers to come to their pharmacy. Participation was completely voluntary and no payment was made to the participants. The study was submitted and approved by the Institutional Review Board at Ohio Northern University. The approval of the proposal and a copy of the Institutional Review Board memo are found in Appendix B.

Data Collection and Collection Instruments

Experimental Design

The information process-tracing study was an exploratory design that determined the predecision aspects of pharmacy patient counseling. This design of the study involved parallel study groups. Eighty-one pharmacists completed one of three designed scenarios. The scenarios paralleled each other as it pertained to the task complexity and time pressure. This section describes the steps involved in designing the MouseLab study.
Data Collection and Instrumentation

Demographic Survey

The participating pharmacists were asked to fill out a survey prior to performing the information processing technique (MouseLab) to determine demographic characteristics and practice site information. Demographic information included age, gender, pharmacy graduation date, years of experience as a registered pharmacist, practice site, and urban versus rural practice site. The complete survey is found in Appendix C.

Developing the Model/Information Process Tracing Technique

MouseLab is a mouse-based software system that Eric J. Johnson, John W. Payne, David A. Schkade, and James R. Bettman designed for doing consumer behavior and decision making research. The software is available for non-profit research and educational purposes from Eric J. Johnson at the University of Pennsylvania. The website at www-marketing.wharton.upenn.edu/~mouselab/ contains the software required to program MouseLab. The 69-page MouseLab instruction manual is also available from this web-site as either an Adobe Acrobat file or a PostScript file. MouseLab runs in an MS-DOS format using Pascal® programming language. The MouseLab software requires that each user must develop their own command lines to run the program.

MouseLab is one of the computerized software systems developed for decision researchers primarily to understand acquisition behavior. MouseLab is named for the computerized method of using the computer mouse for tracing
information processes. The mouse enables the subject to move a pointer displayed on the computer screen to open covered boxes of information in a generated display matrix. This information matrix displays is fashioned after the brand-attribute matrix used previously in consumer research. The computer records every move made by the person operating the mouse pointer including information boxes opened, the sequence, and the time.

The software monitors information related to acquisition behaviors such as the sequence in which information is acquired, the amount of information acquired and the duration that the information is examined. The use of this information can be helpful in gaining insight into role of attention and memory in the decision making process as well as being able to design decision aids. MouseLab has the capability to support four different types of schemas that include text, matrix, gamble, and multiple risky choice as well as three different types of response modes that include boxes, scales, and keyboard input. Another feature of the MouseLab is the ability to add time pressure to the situation by depicting an analog clock that counts down a specified number of seconds. The program can be modified to stop acquisition of any additional information after the time clock has stopped.

MouseLab also allows the researcher to put figures or graphics from external PCX format files as “call in” graphics for subjects to include with other decisions.

Once the variables were established from the nominal group exercise, the MouseLab program was developed. The MouseLab program was written in the MS-DOS environment. A different program had to be written for each of the three scenarios. Within each scenario, four schematics had to be programmed. In
addition, the time clock had to be programmed for schematics 2 and 4. The final programs are contained in Appendix D.

There were three scenarios created with each one containing four schematics. Each schematic was designed to be a 4 x 8 matrix. Each matrix contained four alternatives and eight attributes per alternative. The four schematics in each scenario varied in task complexity and time pressure. The first scenario evaluated drug-related attributes. The second scenario examined patient and product attributes. The third scenario combined four attributes each from scenarios one and two. Each participant was asked to complete the four schematics within one of the three scenarios. The scenarios were developed to follow these patterns:

First Scenario: Drug-related Attributes

Schematic 1: Drug-related attributes with low task complexity and no time pressure

Schematic 2: Drug-related attributes with low task complexity and time pressure

Schematic 3: Drug-related attributes with high task complexity and no time pressure

Schematic 4: Drug-related attributes with high task complexity and time pressure

Second Scenario: Patient/Product Attributes

Schematic 1: Patient/Product attributes with low task complexity and no time pressure
Schematic 2: Patient/Product attributes with low task complexity and time pressure

Schematic 3: Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Patient/Product attributes with high task complexity and time pressure

Third Scenario: Drug/Patient/Product Attributes

Schematic 1: Drug-related/Patient/Product attributes with low task complexity and no time pressure

Schematic 2: Drug-related/Patient/Product attributes with low task complexity and time pressure

Schematic 3: Drug-related/Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Drug-related/Patient/Product attributes with high task complexity and time pressure

Figure 3.1 illustrates this pattern of alternating task complexity with and without time pressure.

<table>
<thead>
<tr>
<th>Schematic One</th>
<th>Schematic Two</th>
<th>Schematic Three</th>
<th>Schematic Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low task</td>
<td>Low task</td>
<td>High task</td>
<td>High task</td>
</tr>
<tr>
<td>complexity</td>
<td>complexity</td>
<td>complexity</td>
<td>complexity</td>
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<tr>
<td>No time pressure</td>
<td>Time pressure</td>
<td>No time pressure</td>
<td>Time Pressure</td>
</tr>
</tbody>
</table>

Figure 3.1
Task Complexity and Time Pressure by Schematic within Each Scenario

76
This allowed for a comparison of scenarios involving decisions with time pressure and decisions without time pressure as well as comparing low to high task complexity issues. The MouseLab recorded the type of information the pharmacist used to make their decisions. Each study schematic is presented in Figures 3.2 to 3.13 and in Appendix E for each scenario.

<table>
<thead>
<tr>
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<th>Prescription B</th>
<th>Prescription C</th>
<th>Prescription D</th>
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<tbody>
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<td>$35.00</td>
<td>$21.00</td>
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<tr>
<td>Use</td>
<td>Antibiotic</td>
<td>Hypertension</td>
<td>Inflammation</td>
<td>Arrhythmia</td>
</tr>
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<td>Therapy Length</td>
<td>3 days</td>
<td>Maintenance</td>
<td>PRN</td>
<td>Maintenance</td>
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<tr>
<td>Common ADR</td>
<td>Nausea</td>
<td>Dizziness</td>
<td>Blurred vision</td>
<td>GI upset</td>
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<tr>
<td>Severe ADR</td>
<td>Allergy</td>
<td>Decrease platelets</td>
<td>GI bleed</td>
<td>Liver failure</td>
</tr>
<tr>
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<td>0.01%</td>
<td>0.025%</td>
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<tr>
<td>Drug Interactions</td>
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<td>Minor</td>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td>Monitoring Parameters</td>
<td>None</td>
<td>Blood pressure</td>
<td>None</td>
<td>Blood levels</td>
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Figure 3.2
Scenario One Schematic One Attributes
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<th>Prescription D</th>
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<td>$60.00</td>
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<td>Hypertension</td>
<td>Antibiotics</td>
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<tr>
<td>Therapy Length</td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>10 days</td>
</tr>
<tr>
<td>Common ADR</td>
<td>Gas</td>
<td>Nausea</td>
<td>Constipation</td>
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<tr>
<td>Severe ADR</td>
<td>Nausea</td>
<td>Decreased WBC</td>
<td>Liver failure</td>
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<td>0.001%</td>
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<td>Drug Interactions</td>
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<td>None</td>
</tr>
<tr>
<td>Monitoring Parameters</td>
<td>Blood levels</td>
<td>Blood pressure</td>
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</table>

**Figure 3.3**
Scenario One Schematic Two Attributes

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<td>Seizures</td>
<td>Antifungal</td>
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<td>Maintenance</td>
<td>Maintenance</td>
<td>20 days</td>
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<tr>
<td>Common ADR</td>
<td>Nausea</td>
<td>GI upset</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Severe ADR</td>
<td>Liver failure</td>
<td>Decreased WBC</td>
<td>Renal failure</td>
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<td>0.007%</td>
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<td>Major</td>
<td>Major</td>
<td>Major</td>
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<tr>
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<td>CBC</td>
<td>SCr, K+</td>
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**Figure 3.4**
Scenario One Schematic Three Attributes

78
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<th>Prescription C</th>
<th>Prescription D</th>
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<td>$60.00</td>
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<td>Hypertension</td>
<td>Diabetes</td>
<td>Thyroid</td>
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<tr>
<td><strong>Therapy Length</strong></td>
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<td>45 days</td>
<td>Maintenance</td>
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<td><strong>Common ADR</strong></td>
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<td>GI upset</td>
<td>Diarrhea</td>
<td>Gas</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
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<td>Decreased platelets</td>
<td>Liver failure</td>
<td>GI bleed</td>
</tr>
<tr>
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<td>0.002%</td>
<td>0.025%</td>
<td>0.0002</td>
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<td>Minor</td>
<td>Major</td>
<td>Minor</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
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**Figure 3.5**
Scenario One Schematic Four

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<td><strong>Patient's Age</strong></td>
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<td><strong>Spoken Language</strong></td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>Spanish</td>
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<td><strong># Profile Medications</strong></td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>2</td>
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<td><strong>Allergies</strong></td>
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<td>Potential</td>
<td>None</td>
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<tr>
<td><strong>Person Picking Up Script</strong></td>
<td>Spouse</td>
<td>Mother</td>
<td>Patient</td>
<td>Daughter</td>
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<td><strong>Patient Waiting</strong></td>
<td>No</td>
<td>No</td>
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<td>Yes</td>
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**Figure 3.6**
Scenario Two Schematic One Attributes
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<td>Patient's Age</td>
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<td>8</td>
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<td>Spoken Language</td>
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<td>English</td>
<td>English</td>
<td>English</td>
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<tr>
<td># Profile Medications</td>
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<td>6</td>
<td>2</td>
</tr>
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<td>$5.00 copay</td>
<td>Welfare</td>
<td>Welfare</td>
<td>Cash</td>
</tr>
<tr>
<td>Allergies</td>
<td>Potential</td>
<td>None</td>
<td>Potential</td>
<td>None</td>
</tr>
<tr>
<td>Person Picking Up Script</td>
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<td>Friend</td>
<td>Patient</td>
<td>Father</td>
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<td>Patient Waiting</td>
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Figure 3.7
Scenario Two Schematic Two Attributes

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<td>Patient's Age</td>
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<td>87</td>
<td>80</td>
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<td>Spoken Language</td>
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<td>Spanish</td>
<td>English</td>
<td>Spanish</td>
</tr>
<tr>
<td># Profile Medications</td>
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<td>10</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
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<td>Cash</td>
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<td>Potential</td>
<td>Potential</td>
<td>None</td>
</tr>
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<td>Person Picking Up Script</td>
<td>Spouse</td>
<td>Patient</td>
<td>Patient</td>
<td>Daughter</td>
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<tr>
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Figure 3.8
Scenario Two Schematic Three Attributes
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<td>English</td>
<td>Spanish</td>
<td>English</td>
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<tr>
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<td>Potential</td>
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<td>Patient</td>
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Figure 3.9
Scenario Two Schematic Four Attributes

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<td>Maintenance</td>
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<td>Decreased platelets</td>
<td>GI bleed</td>
<td>Liver failure</td>
</tr>
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<td># Profile Medications</td>
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<td>9</td>
<td>2</td>
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<td>Minor</td>
<td>Major</td>
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Figure 3.10
Scenario Three Schematic One Attributes
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<td>Hypertension</td>
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<td>2</td>
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<td>None</td>
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Figure 3.11  
Scenario Three Schematic Two Attributes

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<td>Antifungal</td>
<td>Diabetes</td>
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<td>80</td>
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<td>Liver failure</td>
<td>Decreased WBC</td>
<td>Renal failure</td>
<td>Decreased platelets</td>
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<tr>
<td># Profile Medications</td>
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<td>9</td>
<td>8</td>
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<td>Drug Interactions</td>
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Figure 3.12  
Scenario Three Schematic Three Attributes
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<td>84</td>
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<tr>
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<td>Allergy</td>
<td>Decreased platelets</td>
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</tr>
<tr>
<td># Profile Medications</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Drug Interactions</td>
<td>Major</td>
<td>Minor</td>
<td>Major</td>
<td>Minor</td>
</tr>
<tr>
<td>Customer Waiting</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Figure 3.13**  
**Scenario Three Schematic Four Attributes**

At the completion of each schematic, the pharmacist was required to select one of the four alternatives that were labeled as Prescription A, Prescription B, Prescription C, and Prescription D. Specific drug names were not used in this study. This was based on the information provided in the research performed by Lehmann and Moore (1980) and Jacoby (1978). In their consumer research, they found that the appearance of brand names limited the extent of information processing. The researchers felt that this same bias may occur when a pharmacist was familiar with a brand name prescription drug.
The basic design of the MouseLab was to present the subjects with an "information board" for one scenario at a time. The rows of the matrix represented different choice alternatives (Prescription A through D) and the columns were the attributes of the alternatives (drug, prescription, and/or patient). For example, the rows represented different prescriptions that a pharmacist may be asked to fill with the columns representing the attributes such as age of patient, cost of medication, risk versus benefit profile, drug interaction problems, refill/new prescriptions and customer time issues. These values were covered when initially presented to the pharmacist. The pharmacist participant used the mouse-pointer to move to any cell to reveal its value. The cell remained open with the information presented as long as the participant held the mouse over that cell. Once the participant released the mouse, the cell value was covered again. The participants looked at as many values as they wanted, as often as they wanted and made their the final choices based on the information they acquired. This process was repeated for all four schematics within one scenario.

Time pressure was also programmed into the MouseLab design for schematics 2 and 4 within each scenario. The time frame was piloted tested to determine if it was appropriate. The pilot testing of the schematics indicated that the time clock for schematic 2 should be 30 seconds and schematic 4 should be 45 seconds for each scenario.
Validity of Case Scenarios and Schematics

Four pharmacists (two practicing pharmacists and two pharmacy faculty members) reviewed the scenarios for face validity. Their suggestions were used to revise the wording and the appropriateness of the cases. They were asked to verify that the drug, prescription, and patient attributes actually reflected the current practice of pharmacy. In addition, they were asked for their opinion on whether the scenarios would be encountered by a pharmacist as part of their daily practice.

Pilot Study

After the four pharmacists had reviewed the scenarios for face validity and the nominal group pharmacists' information on task complexity issues had been incorporated, the MouseLab program was ready for the final pilot test. Six pharmacists participated in the pilot study. The pilot group was asked about the clarity of the surveys and the ease of the directions for using the MouseLab program. At the end of the pilot study, necessary changes to the research instrument or to the instruction component were completed as suggested. The pilot study was also used to gauge the normal time to complete an open timed session and also provided an idea for the length of time to impose for the time pressure component.
Pilot Study Results

Face Validity Results

Four pharmacists reviewed the scenarios for face validity. They were asked to determine if the cases were appropriate for ambulatory/retail pharmacists. They were asked to assess if the drug, prescription, and patient attributes actually reflect a realistic scenario in pharmacy practice. The pharmacists were also asked to provide insight into wording revisions that may improve the quality of the schematics.

Two retail pharmacists from Canton, Ohio and two clinical pharmacy faculty from Ohio Northern University reviewed the material. The two retail pharmacists work in an environment that dispenses medication but their primary focus is patient counseling. Within their practice, they make appointments to go to customers' homes to provide necessary counseling. The two clinical pharmacy faculty members were also registered pharmacists and both practiced part-time in independent retail pharmacy.

No suggestions were made for content changes for any of the scenarios. The four pharmacists felt that the scenarios were reflective of current practice and retail pharmacists would see the schematics on a daily basis. All four pharmacists felt the directions to the MouseLab needed to be refined. Similar results were identified in the first pilot study. The researcher made the suggested changes that appear in the final program. All four pharmacists were then asked to review the final text and direction changes to affirm that it meet their expectations. All four pharmacists then approved the final program.
**Pilot Study Results**

The first pilot study of two pharmacists revealed that more in-depth instructions needed to be provided to the participants as well as a sample matrix to attempt prior to starting the actual study scenarios. These suggestions were followed explicitly and incorporated into the final MouseLab programming.

The first pilot study also identified that the time pressure should be shortened to 30 seconds for the first schematic in each scenario and that the second time pressure schematic should stay at 45 seconds.

After these changes were incorporated, a second pilot study of four new pharmacists and the two pharmacists who participated in the first pilot study was conducted using the final draft of the MouseLab program. The six pharmacists ranged in age from 24 to 52 years and all practiced in the retail environment. The second pilot study did not reveal any necessary changes to the text or the schematic format. All of the pharmacists were in agreement that the instructions were easy to understand and the scenarios and schematics were appropriate for a retail pharmacy environment.
Definition and Measurement of Variables

Independent Variables

1) Years of Pharmacy Experience

Years of pharmacy experience were used as an independent variable. This variable was defined based on total years as a practicing pharmacist. The years of experience variable was also used to stratify age groups to identify, if pharmacists with more experience make decisions differently. Nursing research indicated that more experienced nurses make better clinical decisions compared to less experienced nurses when decisions are rather simple in nature (Hughes and Young, 1990; Greenwood and King, 1995; Corcoran, 1986).

2) Year of Graduation from College of Pharmacy

Pharmacists were asked to indicate what year they graduated from an accredited College of Pharmacy.

3) Pharmacy Practice Site Type

Payne, Bettman, and Johnson (1993) have find in their research that the structure of a particular decision environment can determine the likelihood of various strategies to producing a good solution to the problem. In addition, their research has shown that putting the same individual into different environments can changed their decision strategy even when presented with the same problem. Based on this research, an attempt was made to control for potential environment differences by only testing pharmacists who practiced in a community setting.
Pharmacy practice site was defined as a community based and/or ambulatory clinic pharmacy whose primary function is to fill prescriptions. This practice setting was further defined as chain retail pharmacy and independent retail pharmacy. Chain pharmacy is defined as a pharmacy organization with more than four stores under the same incorporation papers. An independent pharmacy experience would be any pharmacist practicing in a pharmacy organization with less than or equal to four stores under the same incorporation papers.

4) Urban versus Rural Practice Settings

Another demographic variable used was whether the pharmacist practiced in an urban or rural environment. The practice setting was determined by the workplace for the pharmacist rather than the town or city that the pharmacist lived in. Based on several studies within the pharmacy literature, it appeared to be a valid variable to consider in the project (Slack and Dunn, 1994; Gangeness, 1996). Considering that environmental factors have been documented to change the decision process, urban versus rural practices settings were defined and analyzed as part of the research (Payne, Bettman, and Johnson, 1993).

Urban versus rural was defined using The Office of Management and Budget Metropolitan Statistical Areas (MSAs). An urban area was defined as having a population of greater than 100,000. A rural area was defined as a county or a group of counties that make up an integrated area of 50,000 or less.
5) Time Pressure/Task Complexity

Studies have shown that an increase in time pressure as part of overall task complexity changes the accuracy-effort framework (Payne, Bettman, and Johnson, 1988; Onken 1985; Hwang 1985). The studies frequently reveal that individuals may change from a compensatory to a noncompensatory process while others may give up the process and make random choices. Time pressure was applied using a time clock (as part of MouseLab) to count down on the schematic screen. Task complexity was changed using different values for the context variables.

Adaptive Decision Model Variables

1) Context variables

The context effects are factors associated with the particular values of the objects in the specific decision set under consideration including the similarity and attractiveness of alternatives. These factors are more dependent on the individual’s perception than on the values of task. The person will place value on the objects within the decision set that they feel are the most important (Payne, Bettman, and Johnson, 1993).

2) Task variables

Task effects describe those factors associated with the general structural characteristics of the decision problem. These include response mode, number of alternatives, number of attributes, time pressure, information display mode, and agenda constraints. (Payne, Bettman, and Johnson, 1993)
Dependent Variables

MouseLab Variables

1) PATTERN

Sequence of acquisition of information—degree of attribute processing

2) VATT

Variance in the type of attribute information acquired

3) TPERACQ

Time spent per information acquisition

These three dependent variables are described in more detail in the data analysis section of this chapter.

Explanation of MouseLab Variables and Their Calculation

Within this section, information is provided on the definitions of the MouseLab variables including how they appear in the information process-tracing technique, and how they are calculated from the data output files. Appendix F and Appendix G have a copy of a MouseLab output and a bisect.exe file for subject #11 for scenario one, respectively. With the discussion of each MouseLab variable, the calculations for that variable are discussed as it pertains to these appendices. MouseLab assigns each box within the schematic a unique box number. This box number is then referred to in the data printouts and the bisect.exe printouts. Figure 3.14 is a key to the schematic box assignments and uses scenario one schematic one as an example. This is consistent from scenario to scenario and schematic to schematic.
<table>
<thead>
<tr>
<th></th>
<th>Prescription A</th>
<th>Prescription B</th>
<th>Prescription C</th>
<th>Prescription D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>$7.50</td>
<td>$35.00</td>
<td>$21.00</td>
<td>$60.00</td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>Antibiotic</td>
<td>Hypertension</td>
<td>Inflammation</td>
<td>Arrhythmia</td>
</tr>
<tr>
<td><strong>Therapy Length</strong></td>
<td>3 days</td>
<td>Maintenance</td>
<td>PRN</td>
<td>Maintenance</td>
</tr>
<tr>
<td><strong>Common ADR</strong></td>
<td>Nausea</td>
<td>Dizziness</td>
<td>Blurred vision</td>
<td>GI upset</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
<td>Allergy</td>
<td>Decrease platelets</td>
<td>GI bleed</td>
<td>Liver failure</td>
</tr>
<tr>
<td><strong>ADR Probability</strong></td>
<td>0.001%</td>
<td>0.01%</td>
<td>0.025%</td>
<td>0.0002%</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>None</td>
<td>Minor</td>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
<td>None</td>
<td>Blood pressure</td>
<td>None</td>
<td>Blood levels</td>
</tr>
</tbody>
</table>

**Figure 3.14**
Example of Box Assignments for Scenario One Schematic One

Some additional information about the printout in Appendix F that helps in the interpretation of the data includes the following:

- **99 scr #**: indicates a new screen of information
- **100**: indicates the start of the experiment within that screen
- **Text Screen**: indicates that a text screen was available and read
- **Matrix Screen**: indicates that a matrix screen was entered
- **ALTs**: indicates the number of alternatives available in the matrix
- **ATTs**: indicates the number of attributes available in the matrix
Column Descriptions
First column to the left describes the box entered (the number always appears twice)

The middle column is the time clock.

The last column indicates when and what choice the subject gave.

Based on this information, the printout in Appendix F gives us the following information:

There were 5 text screens;
The subject took 6.148 seconds to read the first screen;
The subject took 5.051 seconds to do the sample 2 x 2 scenario;
The subject entered box 1 first in the first 4 x 8-matrix screen;
The subject entered box 1 at 1.051 seconds and left at 1.43 seconds;
The last box entered prior to making their choice was 32;
The subject selected choice 4 at 70.859 seconds.

PATTERN is the dependent variable that was used to measure the degree of attribute processing. It is helpful in identifying the type of choice heuristic being used. PATTERN compares attribute versus alternative-based processing of the data. PATTERN ranges from a +1 indicating alternative-based process to −1 that indicates an attribute-based processing. The PATTERN variable was also abbreviated in this chapter as PATT for tabular display of the data. PATTERN was
calculated by taking the alternatives minus the attributes and dividing this by the alternatives plus the attributes. So in the example printout of MouseLab data found in Appendix F, the number of alternative transformations to attributes would be recorded. The attribute-based processing involves a comparison of attributes across alternatives, while the alternate-based processing evaluates an alternative across attributes. In this printout, the subject started in box 1 and then went to box 9. This would be considered an attribute-based change. The subject was comparing the cost of Prescription A to Prescription B (box 1 to box 9). In comparison, the subject switched from box 25 to 26 (10 lines down in the schematic). This is an alternative-based change. The subject was comparing the cost of Prescription D to the use of Prescription D. For this subject, they made 70 alternative-based switches and 35 attribute-based changes. This would translate into a PATTERN variable of 0.33. This would be a more alternative-based process due to the positive number.

VATT is the dependent variable that determines the level of variance in the type of attribute acquisition. A low variance value indicates a compensatory process while a larger variance indicates a noncompensatory process. There is no set standard for the value that VATT must have to be in order to be considered a low or high value. This value is determined within each research project as the different scenarios are compared. For example in the research done by Hansen and Helgesen (1996), they determined their compensatory process to be at a VATT of 0.2 and their noncompensatory process to be at a VATT of 0.3. This was solely based on the research findings and not on a predetermined value. The VATT is a
strong indicator of a change in the predecisional process. The variance was calculated based on the number of changes made in the attribute and alternative patterns. The subject made 14 pattern changes out of 110 boxes accessed during the schematic. This would give a VATT value of 0.127.

TPERACQ is another dependent variable that helps to determine the level of compensatory and noncompensatory processing. A higher TPERACQ indicates compensatory processes while a lower TPERACQ displays noncompensatory processing. TPERACQ is used in conjunction with VATT to indicate the degree of compensatory processing. Like the VATT variable, there is no preset value for TPERACQ. It is used as a comparative variable between scenarios to help determine when compensatory and noncompensatory changes have occurred. The TPERACQ variable was also abbreviated in this chapter as TPER for tabular display of the data. Based on Appendix F, the TPERACQ is 0.64 seconds for subject #11. The total time was 70.85 seconds which is divided by the 110 boxes that were accessed. So the TPERACQ would be 0.64 seconds.

The bisect.exe program that is found in Appendix G for subject #11 also provides information that was useful in determining the answers found in research question six. This data can be looked at to determine the number of unique boxes accessed, the final choice, and a summary of the time spent in each box which helps explore the boxes that provided the subject with the most information for their decision.
When looking at the bisect program, the first column is the subject #, the second and third columns are the screen numbers (how many screens before getting to this screen), the fourth column is the box entered, the fifth column is the time in the box, and the sixth column is the time spent going from one box to the next.

From Appendix G, the following information can be obtained:

The subject went to 31 unique boxes.

The subject spent the most time with boxes 22, 30, and 25 with times of 4.685, 3.786, and 3.07 seconds, respectively.

These boxes translated to ADR probability (Prescription C), ADR probability (Prescription D), and cost (Prescription D).

Sources of Error and Bias

With any study there are potential sources of error that need to be considered. Within this study, error could have involved the researcher, the participants, and/or the nominal group and/or MouseLab instruments. The most common sources of error identified in the literature include sampling error, subject consistency, data processing errors, and instrument design errors. Each of these types of errors cited is discussed in relationship to this study and the processes taken by the researcher to control for errors.

Sampling Error

The nominal group technique involved pharmacists who were part of a nontraditional Pharm.D. program and were scattered across the United States.
There is a potential that this group of pharmacists may not be representative of all practicing pharmacists in the community setting in Ohio. However in conducting the MouseLab design, none of the pharmacists questioned the selected attributes as not being representative of their practice. The study involved only pharmacists from the state of Ohio located in one urban area with the surrounding rural communities. All pharmacists were considered in the traffic pattern design to minimize errors with quota sampling.

Subject Consistency

The mood, attitude, and/or motivation of the respondent may change during the course of completing the MouseLab. The literature also suggests that a situation factor such as interruptions could affect the research. The researcher was able to arrange times when pharmacists felt they were free from interruptions for a 15-minute time frame to avoid interruptions. The researcher also set up the MouseLab and left the area so that the pharmacist did not feel like the researcher was looking over their shoulder.

Data Processing Errors

Date processing errors are also cited in the literature and are considered to be associated with transcribing responses from the data. The researcher checked the transcribing on three separate occasions to prevent errors. Descriptive data was also run on the data using SPSS 8.0 For Windows software to determine if any data fell outside of the normal range for that value.
Instrument Design Errors

Misleading or unclear instructions and questions can lead to inappropriate responses. Two individuals who were knowledgeable about nominal group technique checked the questions asked of the nominal groups. The MouseLab data was constructed from the nominal grouping data and pilot tested prior to presenting the final product. Any potential problems or questions identified during the pilot study were changed for the final product. All pilot study suggestions were incorporated.

Data Analysis

Demographic data are analyzed using descriptive measures. Number and frequency describe the overall study population. In addition, frequency data are also used to describe subgroups based on the independent variables. The demographic data was be used to place pharmacists in categories for comparisons between groups as it pertains to the dependent variables.

MouseLab records data and provides three variables, which can be used to test acquisition behavior. One variable is the PATTERN method described by Payne, Bettman, and Johnson (1993). In addition, the VATT and TPERACQ dependent variables are analyzed using the method described by Hansen and Helgeson (1996). The PATTERN method is a gross index of the relative amount of alternative-based transitions and attribute-based transitions. The PATTERN measure is:
Alternative - Attribute Pattern = Alternative + Attribute

Counting the frequencies of alternative-based and attribute-based transitions in each condition, and calculating the ratio described in the formula above determine the PATTERN index. This PATTERN index ranges between –1 and +1. The larger the PATTERN ratio value, the more alternative-based transitions have been made in the scenario. A positive value means that a more alternative-based process is occurring and a negative value means that the process is more attribute-based. If the value is zero, the alternative-based and attribute-based transitions are considered equal. The use of this index indicates if there is a dominant type of process in a certain scenario.

The VATT method is also taken from the MouseLab data and is the variable that is analyzed to determine compensatory processing. This compensatory processing is determined based on the variance in the type of attribute information acquired. This is a measure of process by comparing low variance choices (consistency) versus high variance choices (selectivity). High variance or selectivity has been considered a measure of noncompensatory processing.

The TPERACQ dependent variable is a method of gathering information on the time spent per information acquisition. It takes the total time spent on the decision and divides it by the number of acquisitions of information. This variable can also be used as an indicator of complexity in choice.
The data on the choice processes was tested using the process tracing (MouseLab) measures PATTERN, VATT, TPERACQ as dependent variables. Repeated-measures analysis of variance (ANOVA) and Friedman's Tests were utilized to compare the various groups using SPSS 8.0 for Windows software. When two independent samples were being evaluated, a nonparametric equivalent to the t-test was used. When variables did not meet the necessary assumptions for parametric tests then nonparametric equivalents were utilized. A Friedman's Test was the nonparametric equivalent test used for repeated-measures ANOVA. The nonparametric equivalent to a 2 sample independent t-test was the Mann Whitney U test. Urban versus rural setting, time pressure, task complexity, years of experience, and practice site are independent variables. This analysis is similar to Hansen and Helgeson's (1996) analysis when studying comparisons between scenarios using MouseLab and paper and pencil tests.

Data Analysis by Research Questions

RQ1: Do pharmacists use compensatory or noncompensatory processes when deciding to provide patient counseling when not under task complexity or time constraints?

H1: Pharmacists use compensatory processes when deciding to provide patient counseling without the presence of task complexity or time pressure.

An analysis of the dependent variables PATTERN, TPERACQ and VATT was analyzed to see if pharmacists are following compensatory or noncompensatory
patterns in schematic 1 of each scenario. All three scenarios were analyzed as one large group as well as being analyzed by individual groups. This data was analyzed using descriptive statistics within the SPSS 8.0 For Windows software.

RQ2: Does the compensatory or noncompensatory processes change in the pharmacist with increasing task complexity excluding time pressure?

H2: Pharmacists change to noncompensatory processes with increasing complexity excluding time pressure.

An analysis of the dependent variables PATTERN, VATT, and TPERACQ was tested to see if there was a change in the decision process of the pharmacist with task complexity. Schematic 1 was compared with schematic 3 for each of the three scenarios. A repeated-measures ANOVA or a Friedman’s Test were run to compare the variables between schematic 1 and 3. This process was repeated for each of the three scenarios.

RQ3: Does overall task complexity alter the predecision behavior of the pharmacist when considering patient counseling?

H3: Task complexity issues alter the predecision behavior of the pharmacist when considering patient counseling.
A similar analysis to research question two was used to determine outcome. However for research question 3, the overall change in the VATT and TPERACQ were analyzed for changes noted across all 4 schematics. This analysis looked at changes occurring due to task complexity from the simplest schematic to the most complex schematic. A repeated-measures ANOVA or Friedman’s Test were used to determine a shift in decision processes.

RQ4: Does the extent of pharmacy experience alter the decision process for patient counseling with task complexity?

H4: The more experienced pharmacist displays a higher selective (compensatory) process with task complexity than a less experienced (5 years or less) pharmacist when deciding to counsel a patient.

A similar analysis was run to determine if more experienced pharmacists change their decision process compared to less experienced pharmacists. The VATT and TPERACQ analysis was run for each scenario comparing schematic 1 and 3 as well as comparing all four schematics. This data was split by the amount of pharmacy experience prior to comparing the dependent variables. A Mann Whitney U test was performed to compare these two groups.
RQ5: Does time pressure as an element of task complexity affect the pharmacist’s decision to counsel?

H5: Time pressure influences a noncompensatory change in the predecision behavior of the pharmacist when deciding to counsel a patient.

This analysis compared the VATT and TPERACQ changes that occurred between schematic 1 and schematic 2 as well as between schematic 3 and 4. A Friedman’s Test was used in the analysis.

RQ6: When a pharmacist makes a decision to counsel a patient, what context effects impact their decision?

H6: The context effects (attributes) are identified that have the greatest impact on the pharmacist’s decision.

An analysis was done that looked at three different types of acquisitions as it related to the context variables. These included looking at the total and unique boxes within each schematic and also a summarization of the boxes that had the highest frequency of use. The MouseLab software contains a program called bisect.exe and this program was used to summarize the context effects that pharmacists spent the most time observing. This information was analyzed using descriptive statistics for each schematic and scenario.
RQ7: Does an urban versus rural practice setting make a difference in the decision making of the pharmacist to counsel a patient?

H7: Rural versus urban settings do not make a difference in how a pharmacist decides to counsel a patient.

The VATT and TPERACQ variables were analyzed by sorting the data by urban versus rural settings for each scenario for changes in complex schematics and across all schematics. A Mann Whitney U test was utilized to examine this data.
CHAPTER 4

RESULTS

This chapter describes the results of the analyses of the data. The data analysis and a short discussion for each research question and hypothesis are addressed.

Sampling Results

A traffic pattern as described in chapter 3 was developed for use in this study. The traffic pattern covered eight counties in Ohio. These counties included Hancock, Hardin, Allen, Auglaize, Shelby, Van Wert, Logan, and Putnam. One urban and sixteen rural communities were identified as part of the pattern. Twenty-three rural pharmacies were in the traffic pattern that encompassed thirty-seven pharmacists. Eighteen urban pharmacies were included in the pattern and this included forty-four pharmacists.

Traveling to the pharmacies for data collection started on November 5, 1999 and continued until December 23, 1999. Upon completion of the traffic pattern, eighty-one pharmacists were visited. All eighty-one pharmacists agreed to participate in the process for a response rate of 100 percent. The only pharmacists
that were skipped in the process were those who worked at more than one pharmacy. No pharmacist participated more than one time in the project. All of the pharmacists were included in the sample due to a fairly good balance of the two quota sampling variables. Table 4.1 displays the quota sampling variables within each of the three scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Urban (%)</th>
<th>Rural (%)</th>
<th>Novice* (%)</th>
<th>Expert** (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>15 (53.6)</td>
<td>13 (46.4)</td>
<td>11 (39.3)</td>
<td>17 (60.7)</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>17 (60.7)</td>
<td>11 (39.3)</td>
<td>11 (39.3)</td>
<td>17 (60.7)</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>12 (48)</td>
<td>13 (52)</td>
<td>10 (40)</td>
<td>15 (60)</td>
</tr>
</tbody>
</table>

*Novice refers to a pharmacist with five years of experience or less  
**Expert refers to a pharmacist with more than five years experience

Table 4.1
Quota Sampling Demographics By Scenario and Displayed By Frequency of Number and Percentage

Demographics

The demographics are presented in two ways. The first is the demographics for the total sample (n = 81) and the second is the demographics split by scenario. Table 4.2 represents some of the demographic variables for the entire sample of 81 pharmacists.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Mode</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>37.64 ± 11.51</td>
<td>38</td>
<td>22, 23, 58</td>
<td>22-58</td>
</tr>
<tr>
<td>Experience (years)</td>
<td>13.7 ± 12.01</td>
<td>10</td>
<td>1</td>
<td>1-37</td>
</tr>
</tbody>
</table>

Table 4.2
Demographic Variables of Age, Graduation Year, and Years of Experience
Expressed as Mean ± Standard Deviation, Median, Mode, and Range

Of the eighty-one pharmacists, forty-eight (59.3%) practiced in independent pharmacies while thirty-three (40.7%) had practice sites in chain pharmacies. Thirty-eight of the pharmacists were male (46.9%) compared to forty-three females (53.1%) in the total sample. Within the sample, thirty-two pharmacists (39.5%) were considered novice (≤ 5 years of experience) and forty-nine (60.5%) had more than five years of experience. Forty-four (54.3%) pharmacists practiced in an urban environment while thirty-seven (45.7%) worked in a rural setting.

Table 4.3, 4.4, and 4.5 show the demographics of the subjects split by the three scenarios. The demographic information is presented as mean with standard deviation, median, mode, and the range of minimum to maximum values.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Mode</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>38.04 ± 12.14</td>
<td>38</td>
<td>23</td>
<td>22-58</td>
</tr>
<tr>
<td>Experience (years)</td>
<td>14.39 ± 12.77</td>
<td>10.5</td>
<td>1</td>
<td>1-37</td>
</tr>
</tbody>
</table>

Table 4.3
Demographic Variables Age, Graduation Date, and Years of Experience For Scenario One (n = 28)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Mode</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>37.82 ± 11.06</td>
<td>38</td>
<td>22</td>
<td>22-58</td>
</tr>
<tr>
<td>Experience (years)</td>
<td>13.43 ± 11.42</td>
<td>10.5</td>
<td>1</td>
<td>1-37</td>
</tr>
</tbody>
</table>

Table 4.4
Demographic Variables Age, Graduation Date, and Years of Experience For Scenario Two (n = 28)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Mode</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>37 ± 11.71</td>
<td>37</td>
<td>22</td>
<td>22-58</td>
</tr>
<tr>
<td>Graduation Date (year)</td>
<td>1986 ± 12</td>
<td>1989</td>
<td>1999</td>
<td>1963-1999</td>
</tr>
<tr>
<td>Experience (years)</td>
<td>13.24 ± 12.23</td>
<td>10</td>
<td>1</td>
<td>1-37</td>
</tr>
</tbody>
</table>

Table 4.5
Demographic Variables Age, Graduation Date, and Years of Experience For Scenario Three (n = 25)

108
An ANOVA was used to analyze the interval level data between the three scenario groups to determine if they were statistically similar. A chi-square analysis was used for the categorical data. All comparisons between the groups based on experience, age, graduation year, gender, practice site, and location were found to be statistically non-significant. Table 4.6 and Table 4.7 displays the data.

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Experience</td>
<td>Between 20.79</td>
<td>2</td>
<td>10.397</td>
<td>.070</td>
<td>.932</td>
</tr>
<tr>
<td></td>
<td>Within 11520.10</td>
<td>78</td>
<td>147.694</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Between 15.546</td>
<td>2</td>
<td>7.773</td>
<td>.057</td>
<td>.944</td>
</tr>
<tr>
<td></td>
<td>Within 10575.07</td>
<td>78</td>
<td>135.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grad</td>
<td>Between 16.163</td>
<td>2</td>
<td>8.082</td>
<td>.055</td>
<td>.946</td>
</tr>
<tr>
<td></td>
<td>Within 11430.03</td>
<td>78</td>
<td>146.332</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.6
ANOVA Comparisons of Demographic Data between Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Variable</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Gender</td>
<td>.195</td>
<td>2</td>
<td>.907</td>
</tr>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>Practice Site</td>
<td>.082</td>
<td>2</td>
<td>.960</td>
</tr>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>Urban/Rural</td>
<td>.870</td>
<td>2</td>
<td>.647</td>
</tr>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.7
Chi-square Analysis Comparing Demographic Data between Scenarios
All the pharmacists were under the age of fifty-eight and a large number of new graduates practiced in the eight counties.

Other demographic variables such as practice site, gender and location of practice site are displayed in Table 4.8 by specific scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Chain (%)</th>
<th>Independent (%)</th>
<th>Male (%)</th>
<th>Female (%)</th>
<th>Urban (%)</th>
<th>Rural (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (n = 28)</td>
<td>11 (39.3)</td>
<td>17 (60.7)</td>
<td>14 (50)</td>
<td>14 (50)</td>
<td>15 (53.6)</td>
<td>13 (46.4)</td>
</tr>
<tr>
<td>Two (n = 28)</td>
<td>12 (42.9)</td>
<td>16 (57.1)</td>
<td>13 (46.4)</td>
<td>15 (53.6)</td>
<td>17 (60.7)</td>
<td>11 (39.3)</td>
</tr>
<tr>
<td>Three (n = 25)</td>
<td>10 (40)</td>
<td>15 (60)</td>
<td>11 (44)</td>
<td>14 (56)</td>
<td>12 (48)</td>
<td>13 (52)</td>
</tr>
</tbody>
</table>

Table 4.8
Demographic Variables Practice Site, Gender, and Urban versus Rural Split by Scenario Displayed as Frequency and Percentages

Assumptions for Statistical Tests Used in the Data Analysis

There are certain assumptions that must be meet in order to run an analysis of variance (ANOVA) statistical test. According to the SPSS Guide to Windows 8.0, the following assumptions apply:

1) the $k$ populations are normally distributed
2) the variances of the $k$ populations are equal

Table 4.9 provides descriptive statistics for skewness and kurtosis of the variables for the data used in the ANOVA analysis. If the statistic is between $-2$ and $+2$, then
the assumption of normality is meet. As part of this process, each variable was examined for gross outliers or anomalies in the data.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.265</td>
<td>-.968</td>
</tr>
<tr>
<td>Years</td>
<td>.629</td>
<td>-.858</td>
</tr>
<tr>
<td>PATT1</td>
<td>-.338</td>
<td>-.691</td>
</tr>
<tr>
<td>VATT1</td>
<td>4.898</td>
<td>29.856</td>
</tr>
<tr>
<td>TPER1</td>
<td>3.875</td>
<td>19.681</td>
</tr>
<tr>
<td>PATT2</td>
<td>-.562</td>
<td>-.506</td>
</tr>
<tr>
<td>VATT2</td>
<td>4.068</td>
<td>19.147</td>
</tr>
<tr>
<td>TPER2</td>
<td>1.262</td>
<td>2.220</td>
</tr>
<tr>
<td>PATT3</td>
<td>-.414</td>
<td>-.700</td>
</tr>
<tr>
<td>VATT3</td>
<td>2.788</td>
<td>8.609</td>
</tr>
<tr>
<td>TPER3</td>
<td>1.93</td>
<td>4.774</td>
</tr>
<tr>
<td>PATT4</td>
<td>-.529</td>
<td>-.502</td>
</tr>
<tr>
<td>VATT4</td>
<td>3.877</td>
<td>17.452</td>
</tr>
<tr>
<td>TPER4</td>
<td>1.191</td>
<td>2.479</td>
</tr>
</tbody>
</table>

Table 4.9
Descriptive Statistics Looking Specifically at Kurtosis and Skewness
(n= 81)

The variables that did not meet the assumption of normality were VATT1, TPER1, VATT2, TPER2, VATT3, TPER3, and VATT4. This data was analyzed using the nonparametric equivalent tests including Friedman’s Test, chi-square, and Mann Whitney U. The Friedman’s Test was used as the nonparametric equivalent to repeated-measures ANOVA while Mann Whitney U was used when a two independent sample t-test would have been appropriate. A chi-square test was used with the demographic data to determine similarities between scenario groups for variables that were categorical in nature.
**Dependent Variables**

**PATTERN**

PATTERN is the dependent variable that is used to measure the degree of attribute processing. It is helpful in identifying the type of choice heuristic being used. PATTERN compares attribute versus alternative-based processing of the data. PATTERN ranges from a +1 indicating alternative-based processing to −1 that indicates an attribute-based processing. The PATTERN variable was also abbreviated in this chapter as PATT for tabular display of the data.

**VATT**

VATT is the dependent variable that determines the level of variance in the type of attribute acquisition. A low variance value indicates a compensatory process while a larger variance indicates a noncompensatory process. There is no set standard for the value that VATT must have to be considered a low or high value. This value is determined within each research project as the different scenarios are compared.

For example in the research done by Hansen and Helgesen (1996), they determined their compensatory process to be at a VATT of 0.2 and their noncompensatory process to be at a VATT of 0.3. This was solely based on the research findings and not on a predetermined value. The VATT is a strong indicator of a change in the predecisional process.
TPERACQ

TPERACQ is another dependent variable that helps to determine the level of compensatory and noncompensatory processing. A higher TPERACQ indicates compensatory processes while a lower TPERACQ displays noncompensatory processing. TPERACQ is used in conjunction with VATT to indicate the degree of compensatory processing. Like the VATT variable, there is no preset value for TPERACQ. It is used as a comparative variable between scenarios to help determine when compensatory and noncompensatory changes have occurred. The TPERACQ variable was also abbreviated in this chapter as TPER for tabular display of the data.

The three variables are useful for assessing the degree of compensatory processing and the type of choice heuristic being used.
Scenario and Schematic Displays in MouseLab

First Scenario: Drug-related Attributes

Schematic 1: Drug-related attributes with low task complexity and no time pressure

Schematic 2: Drug-related attributes with low task complexity and time pressure

Schematic 3: Drug-related attributes with high task complexity and no time pressure

Schematic 4: Drug-related attributes with high task complexity and time pressure

Second Scenario: Patient/Product Attributes

Schematic 1: Patient/Product attributes with low task complexity and no time pressure

Schematic 2: Patient/Product attributes with low task complexity and time pressure

Schematic 3: Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Patient/Product attributes with high task complexity and time pressure

Third Scenario: Drug/Patient/Product Attributes

Schematic 1: Drug-related/Patient/Product attributes with low task complexity and no time pressure

Schematic 2: Drug-related/Patient/Product attributes with low task complexity and time pressure

Schematic 3: Drug-related/Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Drug-related/Patient/Product attributes with high task complexity and time pressure
Within each scenario, each attribute model was tested for the influence of both task complexity and time pressure. So low and high task complexity was assessed for each scenario as well as the presence and absence of time pressure. This testing was based on the decision making literature and previous research designs in this area.

Research Questions and Analyses

Research Question One

RQ1: Do pharmacists use compensatory or noncompensatory processes when deciding to provide patient counseling when not under task complexity or time constraints?

H1: Pharmacists use compensatory processes when deciding to provide patient counseling without the presence of task complexity or time pressure.

An analysis of the dependent variables PATTERN, TPERACQ and VATT was performed to determine if pharmacists follow a compensatory or noncompensatory pattern in schematic one of each scenario. Descriptive statistics were used to analyze whether the pharmacist displayed compensatory decision processes when task complexity was absent. The lowest task complexity was represented in schematic one for each scenario. Schematic one did not have time pressure applied. In analyzing these schematics, a low variance (VATT) suggests a compensatory process and a high variance suggests a noncompensatory process. Likewise, a higher time per acquisition (TPERACQ) number indicates a
compensatory process while a smaller TPERACQ shows a noncompensatory process. A positive PATTERN number identifies an alternative-based decision while a negative number suggests an attribute-based process. Since the scenarios were considered parallel in the task complexity issues including time pressure, all three scenarios were analyzed as one large group as well as analyzed by individual groups. Table 4.10 shows the mean, standard deviations for the overall group and each scenario for the MouseLab variables PATTERN, VATT, and TPERACQ.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n = 81)</td>
<td>-.27 ± .5</td>
<td>.065 ± .14</td>
<td>2.11 ± 2.33</td>
</tr>
<tr>
<td>One (n = 28)</td>
<td>-.34 ± .5</td>
<td>.087 ± .2</td>
<td>3.01 ± 3.41</td>
</tr>
<tr>
<td>Two (n = 28)</td>
<td>-.24 ± .54</td>
<td>.047 ± .06</td>
<td>1.82 ± 1.53</td>
</tr>
<tr>
<td>Three (n = 25)</td>
<td>-.22 ± .46</td>
<td>.062 ± .12</td>
<td>1.45 ± .89</td>
</tr>
</tbody>
</table>

Table 4.10
Mean and Standard Deviation for MouseLab Variables
For Schematic One for the Overall Group and Split by Scenario

Scenario one contained eight different drug-related attributes across four available alternatives. A positive PATTERN value indicates a more alternative-based pattern of selection while a negative value indicates an attribute-based pattern. It appears as if the pharmacists used more of an attribute-based selection pattern when analyzing the information in scenario one than in the other two scenarios. In scenario two and three, the PATTERN value is lower than the value in scenario one. This would indicate that some pharmacists used more of an alternative-based
selection pattern as it pertained to patient and prescription attributes versus drug-related attributes. However, the overall PATTERN was still negative.

The pharmacists had a low VATT score and a high TPERACQ for scenario one, which are both indicators of a compensatory process. In scenario two and three, the pharmacists demonstrated a compensatory decision process as well indicated by the low variance value (VATT) and a higher TPERACQ value for these groups. In scenarios 2 and 3, the pharmacists used a consistent pattern rather than a selective pattern, which indicates compensatory processes

Research Question Two

RQ2: Does the compensatory or noncompensatory processes change in the pharmacist with increasing task complexity excluding time pressure?

H2: Pharmacists change to noncompensatory processes with increasing complexity excluding time pressure.

Table 4.11 shows the mean and standard deviations for the three MouseLab variables.
In scenario one the mean value for PATTERN and TPERACQ are becoming smaller. For the PATTERN variable, this indicates a more attribute-based process. The variability in this data could also suggest that pharmacists may differ on whether they gather information by alternatives or by attributes. However, the negative value still is an indicator of an attribute-based processes being the dominant factor. The mean of third variable, VATT, increased slightly from schematic one to schematic three indicating a change from a compensatory to a noncompensatory process for all three scenarios. There is a larger change in the means from schematic one to schematic three for scenario two and three compared to scenario one. The small TPERACQ in schematic three from schematic one indicates a more selective use of the information that explains a more noncompensatory process.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Schematic</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (n = 28)</td>
<td>One</td>
<td>-.34 ± .5</td>
<td>.087 ± .2</td>
<td>3.01 ± 3.41</td>
</tr>
<tr>
<td>One</td>
<td>Three</td>
<td>-.22 ± .49</td>
<td>.096 ± .12</td>
<td>1.45 ± .9</td>
</tr>
<tr>
<td>Two (n = 28)</td>
<td>One</td>
<td>-.24 ± .54</td>
<td>.047 ± .06</td>
<td>1.82 ± 1.53</td>
</tr>
<tr>
<td>Two</td>
<td>Three</td>
<td>-.43 ± .51</td>
<td>.086 ± .14</td>
<td>1.14 ± .73</td>
</tr>
<tr>
<td>Three (n = 25)</td>
<td>One</td>
<td>-.22 ± .46</td>
<td>.062 ± .12</td>
<td>1.45 ± .89</td>
</tr>
<tr>
<td>Three</td>
<td>Three</td>
<td>-.30 ± .44</td>
<td>.085 ± .11</td>
<td>.90 ± .33</td>
</tr>
</tbody>
</table>

Table 4.11
Mean and Standard Deviation for MouseLab Variables for Schematic One and Three Split by Scenario
The MouseLab variables PATTERN, VATT, and TPERACQ were tested between schematic one and schematic three and are presented in Tables 4.12 through 4.17 for each scenario. An analysis using repeated-measures ANOVA was run to look at the dependent variable PATTERN for each scenario. A Friedman’s Test was performed to analyze VATT and TPERACQ from schematic one to schematic three for each scenario. The analysis was used for each scenario to determine if there was a change to noncompensatory processing with increased task complexity excluding the time pressure component.

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>.186</td>
<td>1</td>
<td>.186</td>
<td>2.248</td>
<td>.145 NS</td>
</tr>
<tr>
<td>Error</td>
<td>2.237</td>
<td>27</td>
<td>.0829</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.12
Repeated-Measures ANOVA for PATTERN
For Scenario One within Subjects Contrasts

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>4.407</td>
<td>1</td>
<td>4.407</td>
<td>10.901</td>
<td>.003 **</td>
</tr>
<tr>
<td>Error</td>
<td>10.916</td>
<td>27</td>
<td>.404</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.13
Repeated-Measures ANOVA for PATTERN
for Scenario One between Subjects Contrasts

119
<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>Df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>.507</td>
<td>1</td>
<td>.507</td>
<td>16.77</td>
<td>.000 **</td>
</tr>
<tr>
<td>Error</td>
<td>.817</td>
<td>27</td>
<td>.0303</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.14
Repeated-Measures ANOVA for PATTERN for Scenario Two within Subjects Contrasts

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error</td>
<td>14.025</td>
<td>27</td>
<td>.519</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.15
Repeated-Measures ANOVA for PATTERN for Scenario Two between Subjects Contrasts

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>.0808</td>
<td>1</td>
<td>.0808</td>
<td>1.322</td>
<td>.262 NS</td>
</tr>
<tr>
<td>Error</td>
<td>1.467</td>
<td>24</td>
<td>.0611</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.16
Repeated-Measures ANOVA for PATTERN for Scenario Three within Subjects Contrasts

120
The Levine test for homogeneity of variance was not statistically significant for PATTERN with the ANOVA test. The ANOVA results indicate a statistically significant difference between subjects from schematic one to schematic three for the PATTERN MouseLab variable. The PATTERN variable continued to be a negative number and showed a more attribute-based process.

Tables 4.18 to 4.20 contain the data for the Friedman's Test for VATT and TPERACQ.

Table 4.17
Repeated-Measures ANOVA for PATTERN for Scenario Three between Subjects Contrasts

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>3.396</td>
<td>1</td>
<td>3.396</td>
<td>9.857</td>
<td>.004 **</td>
</tr>
<tr>
<td>Error</td>
<td>8.267</td>
<td>24</td>
<td>.344</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.18
Friedman's Test for VATT and TPERACQ for Scenario One Comparing Schematic One and Schematic Three

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.38</td>
<td>28</td>
<td>1</td>
<td>4.457</td>
<td>.035 **</td>
</tr>
<tr>
<td>VATT3</td>
<td>1.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>1.93</td>
<td>28</td>
<td>1</td>
<td>20.571</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER3</td>
<td>1.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**statistically significant at an alpha level of 0.5
NS not statistically significant
Table 4.19
Friedman’s Test for VATT and TPERACQ for Scenario Two Comparing Schematic One and Schematic Three

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.32</td>
<td>28</td>
<td>1</td>
<td>4.762</td>
<td>.031 **</td>
</tr>
<tr>
<td>VATT3</td>
<td>1.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>1.96</td>
<td>28</td>
<td>1</td>
<td>24.143</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER3</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.20
Friedman’s Test for VATT and TPERACQ for Scenario Three Comparing Schematic One and Schematic Three

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.75</td>
<td>25</td>
<td>1</td>
<td>7.00</td>
<td>.008 **</td>
</tr>
<tr>
<td>VATT3</td>
<td>1.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>1.96</td>
<td>25</td>
<td>1</td>
<td>21.160</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER3</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

The Friedman’s Test showed statistically significant differences between the TPERACQ and the VATT variables for schematic one and schematic three. This would support the concept that with increasing task complexity excluding time pressure, the pharmacists changed to a more noncompensatory process. The TPERACQ was statistically significantly different for each scenario from schematic one to schematic three. The acquisition time decreased with increasing task complexity, which is consistent with a noncompensatory process. The VATT variable showed an increase variance from schematic one to schematic three across all three scenarios. This supports the concept of changing from compensatory to noncompensatory processing.
Research Question Three

RQ3: Does overall task complexity alter the predecision behavior of the pharmacist when considering patient counseling?

H3: Task complexity issues alter the predecision process of a pharmacist when deciding to counsel patients.

The analysis of question three looked at changes in the predecision process with task complexity including time pressure for all pharmacists. This analysis was designed to look at the overall task complexity that was defined as it related to difficult decisions or time pressure issues or both. Table 4.21 shows the means and standard deviations for all four schematics.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Schematic</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (n = 28)</td>
<td>One</td>
<td>-.34 ± .5</td>
<td>.087 ± .2</td>
<td>3.01 ± 3.41</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>-.20 ± .51</td>
<td>.124 ± .21</td>
<td>1.31 ± .7</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>-.22 ± .49</td>
<td>.096 ± .12</td>
<td>1.45 ± .9</td>
</tr>
<tr>
<td></td>
<td>Four</td>
<td>-.24 ± .41</td>
<td>.092 ± .14</td>
<td>1.10 ± .61</td>
</tr>
<tr>
<td>Two (n = 28)</td>
<td>One</td>
<td>-.24 ± .54</td>
<td>.047 ± .06</td>
<td>1.82 ± 1.53</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>-.32 ± .48</td>
<td>.074 ± .11</td>
<td>1.08 ± .47</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>-.43 ± .51</td>
<td>.086 ± .14</td>
<td>1.14 ± .73</td>
</tr>
<tr>
<td></td>
<td>Four</td>
<td>-.38 ± .43</td>
<td>.083 ± .19</td>
<td>.90 ± .31</td>
</tr>
<tr>
<td>Three (n = 25)</td>
<td>One</td>
<td>-.22 ± .46</td>
<td>.062 ± .12</td>
<td>1.45 ± .89</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>-.24 ± .5</td>
<td>.084 ± .22</td>
<td>1.00 ± .63</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>-.30 ± .44</td>
<td>.085 ± .11</td>
<td>.90 ± .33</td>
</tr>
<tr>
<td></td>
<td>Four</td>
<td>-.38 ± .37</td>
<td>.114 ± .06</td>
<td>.84 ± .09</td>
</tr>
</tbody>
</table>

Table 4.21
Mean and Standard Deviation for MouseLab Variables for All Schematics Split by Scenario
A repeated-measures ANOVA was done to analyze PATTERN while a Friedman’s Test was done to analyze VATT and TPERACQ. The test of homogeneity of variances indicated that the assumption of equal variances could be assumed for the ANOVA results found in Tables 4.22 through 4.24.

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>6.925</td>
<td>1</td>
<td>6.925</td>
<td>11.006</td>
<td>.003 **</td>
</tr>
<tr>
<td>Error</td>
<td>16.989</td>
<td>27</td>
<td>.629</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.22
Repeated-Measures ANOVA for PATTERN for Scenario One between Subjects Contrasts

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>13.225</td>
<td>1</td>
<td>13.225</td>
<td>18.486</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>19.360</td>
<td>27</td>
<td>.717</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.23
Repeated-Measures ANOVA for PATTERN for Scenario Two between Subjects Contrasts

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATTERN</td>
<td>8.094</td>
<td>1</td>
<td>8.094</td>
<td>14.271</td>
<td>.001 **</td>
</tr>
<tr>
<td>Error</td>
<td>13.61</td>
<td>24</td>
<td>.567</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.24
Repeated-Measures ANOVA for PATTERN for Scenario Three between Subjects Contrasts

124
The ANOVA shows statistically significant results (p < .05) for PATTERN across the four schematics. The PATTERN appears to be indicating an increase in attribute-based patterns with increasing task complexity.

Tables 4.25 through 4.27 contain the results for the VATT and TPERACQ variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.70</td>
<td>28</td>
<td>1</td>
<td>4.481</td>
<td>.034 **</td>
</tr>
<tr>
<td>VATT4</td>
<td>1.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>2.00</td>
<td>28</td>
<td>1</td>
<td>28.0</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER4</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.25
Friedman’s Test for VATT and TPERACQ from Schematic One to Four in Scenario One

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.96</td>
<td>28</td>
<td>1</td>
<td>24.143</td>
<td>.000 **</td>
</tr>
<tr>
<td>VATT4</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>1.96</td>
<td>28</td>
<td>1</td>
<td>24.143</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER4</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.26
Friedman’s Test for VATT and TPERACQ from Schematic One to Four in Scenario Two
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>VATT1</td>
<td>1.98</td>
<td>25</td>
<td>1</td>
<td>18.630</td>
<td>.000 **</td>
</tr>
<tr>
<td>VATT4</td>
<td>1.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPER1</td>
<td>1.92</td>
<td>25</td>
<td>1</td>
<td>17.640</td>
<td>.000 **</td>
</tr>
<tr>
<td>TPER4</td>
<td>1.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.05  
NS not statistically significant

Table 4.27  
Friedman’s Test for VATT and TPERACQ from  
Schematic One to Four in Scenario Three

When looking at the mean VATT scores from Table 4.21, the VATT is higher in schematic four than it is in schematic two for both scenarios two and three indicating that combined task complexity and time pressure cause an increase in noncompensatory processing. In scenario one, the variance is greater for time pressure alone (schematic two) than it is for time pressure with task complexity (schematic four). However, both variances are high indicating a noncompensatory process with complexity. The Friedman’s Test is showing that the variance (VATT) is increasing with task complexity and time pressure for scenario one, two and three indicating a more selective (noncompensatory) predecision process. Likewise, the TPERACQ variable is also statistically significant across all three scenarios. This significance is indicating a difference in time of acquisition of information from a simple schematic with no time pressure to the most complex schematic with both task complexity as well as time pressure added to it. In combination, these variables are indicating a significant change in predecisional behavior to a more selective pattern when both task complexity and time pressure are present. This data
supports that a compensatory process in schematic one changed to a noncompensatory process in schematic four.

**Research Question Four**

RQ4: Does the extent of pharmacy experience alter the decision process for patient counseling with task complexity?

**H4:** The more experienced pharmacist displays a higher selective (compensatory) process with task complexity than a less experienced (5 years or less) pharmacist when deciding to counsel a patient.

Tables 4.28 through 4.31 provide the means and standard deviations for the PATTERN, VATT, and TPERACQ variables for each scenario and schematic split by novice (5 years of less experience) and expert (> 5 years experience). Novice is displayed in the tables as an “N” and expert is displayed as an “E”.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Novice vs. Expert</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>N</td>
<td>-.22 ± .42</td>
<td>.053 ± .05</td>
<td>2.21 ± 2.73</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.42 ± .54</td>
<td>.109 ± .25</td>
<td>3.53 ± 3.78</td>
</tr>
<tr>
<td>Two</td>
<td>N</td>
<td>-.30 ± .45</td>
<td>.053 ± .76</td>
<td>1.43 ± 1.24</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.21 ± .51</td>
<td>.043 ± .06</td>
<td>2.07 ± 1.69</td>
</tr>
<tr>
<td>Three</td>
<td>N</td>
<td>-.30 ± .35</td>
<td>.028 ± .03</td>
<td>1.08 ± .55</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.17 ± .53</td>
<td>.085 ± .12</td>
<td>1.69 ± 1.00</td>
</tr>
</tbody>
</table>

**Table 4.28**

Mean and Standard Deviation for MouseLab Variables for Schematic One Split by Scenario and Years of Experience
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Novice vs. Expert</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>N</td>
<td>-.21 ± .38</td>
<td>.12 ± .11</td>
<td>1.18 ± .61</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.19 ± .59</td>
<td>.127 ± .26</td>
<td>1.40 ± .76</td>
</tr>
<tr>
<td>Two</td>
<td>N</td>
<td>-.22 ± .5</td>
<td>.113 ± .16</td>
<td>1.03 ± .63</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.39 ± .47</td>
<td>.043 ± .06</td>
<td>1.11 ± .35</td>
</tr>
<tr>
<td>Three</td>
<td>N</td>
<td>-.15 ± .57</td>
<td>.045 ± .05</td>
<td>.81 ± .45</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.30 ± .46</td>
<td>.109 ± .28</td>
<td>1.12 ± .7</td>
</tr>
</tbody>
</table>

Table 4.29
Mean and Standard Deviation for MouseLab Variables for Schematic Two Split by Scenario and Years of Experience

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Novice vs. Expert</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>N</td>
<td>-.12 ± .40</td>
<td>.080 ± .05</td>
<td>1.03 ± .66</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.29 ± .54</td>
<td>.106 ± .15</td>
<td>1.73 ± .94</td>
</tr>
<tr>
<td>Two</td>
<td>N</td>
<td>-.53 ± .36</td>
<td>.077 ± .10</td>
<td>.85 ± .39</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.37 ± .59</td>
<td>.092 ± .16</td>
<td>1.32 ± .85</td>
</tr>
<tr>
<td>Three</td>
<td>N</td>
<td>-.25 ± .37</td>
<td>.043 ± .27</td>
<td>.80 ± .37</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>-.33 ± .49</td>
<td>.112 ± .14</td>
<td>.97 ± .29</td>
</tr>
</tbody>
</table>

Table 4.30
Mean and Standard Deviation for MouseLab Variables for Schematic Three Split by Scenario and Years of Experience
Table 4.31
Mean and Standard Deviation for MouseLab Variables for Schematic Four Split by Scenario and Years of Experience

A Mann Whitney U nonparametric test was run to compare the VATT and TPERACQ variables across schematic one to four as well as comparing complexity issues between schematic one and three split by experience levels of the pharmacists. The results are displayed in Table 4.32.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Experience</th>
<th>Variable</th>
<th>Mean</th>
<th>N</th>
<th>Mann Whitney</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Novice</td>
<td>VATT1-3</td>
<td>15.64</td>
<td>11</td>
<td>81.0</td>
<td>.578 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>13.76</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>Novice</td>
<td>VATT1-3</td>
<td>14.32</td>
<td>11</td>
<td>91.5</td>
<td>.926 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>14.62</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>Novice</td>
<td>VATT1-3</td>
<td>11.95</td>
<td>11</td>
<td>64.5</td>
<td>.567 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>13.70</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>Novice</td>
<td>VATT1-4</td>
<td>14.09</td>
<td>11</td>
<td>89.0</td>
<td>.853 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>14.76</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>Novice</td>
<td>VATT1-4</td>
<td>14.86</td>
<td>11</td>
<td>89.5</td>
<td>.853 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>14.26</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>Novice</td>
<td>VATT1-4</td>
<td>11.20</td>
<td>11</td>
<td>57.0</td>
<td>.338 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>14.20</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>Novice</td>
<td>TPER1</td>
<td>11.14</td>
<td>11</td>
<td>56.5</td>
<td>.082 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>16.68</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>Novice</td>
<td>TPER3</td>
<td>10.45</td>
<td>11</td>
<td>49.0</td>
<td>.037 **</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>17.12</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>Novice</td>
<td>TPER1</td>
<td>9.90</td>
<td>11</td>
<td>44.0</td>
<td>.091 NS</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td></td>
<td>15.07</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novice</td>
<td>TPER1</td>
<td>10.15</td>
<td>11</td>
<td>57.0</td>
<td>.115 NS</td>
<td></td>
</tr>
<tr>
<td>Expert</td>
<td></td>
<td>14.90</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5
NS not statistically significant

Table 4.32
Mann Whitney U Test for MouseLab Variables
VATT and TPERACQ Split by Years of Experience for Scenario One through Three

Scenario three experts appear to have a more selective (noncompensatory process) when it comes to VATT across all four schematics. However, the novices have a smaller TPERACQ for scenario three across of four schematics. Depending
on the scenario and the schematic, variations existed between the expert and novice pharmacists. In general, the differences did not appear to be statistically significant. The Mann Whitney U analysis revealed no statistically significant differences between the two groups except for scenario one TPERACQ (TPER3) as part of schematic three. The overall trend of the data is that there does not appear to be one clear-cut pattern of the experts exceeding the novices in the development of compensatory processes. They appear to be fairly equal in their change from compensatory to noncompensatory processes.

Research Question Five

RQ5: Does time pressure as an element of task complexity affect the pharmacist’s decision to counsel?

H5: Time pressure influences a noncompensatory change in the predecision behavior of the pharmacist when deciding to counsel a patient.

Refer to Table 4.21 for the reported mean and standard deviation values. A Friedman’s Test was run to analyze the VATT and TPERACQ for the two schematics that introduced time pressure. These schematics were two and four for each scenario. The analysis looked at differences between simple tasks with time pressure as well as complex tasks with time pressure. The results are displayed in Tables 4.33 through 4.36.
### Table 4.33
Friedman’s Test Results for VATT with Low Complexity and Added Time Pressure Split by Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>VATT1</td>
<td>1.93</td>
<td>28</td>
<td>1</td>
<td>20.571</td>
<td>.000 **</td>
</tr>
<tr>
<td></td>
<td>VATT2</td>
<td>1.07</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>VATT1</td>
<td>2.00</td>
<td>28</td>
<td>1</td>
<td>28.000</td>
<td>.000 **</td>
</tr>
<tr>
<td></td>
<td>VATT2</td>
<td>1.00</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>VATT1</td>
<td>1.88</td>
<td>25</td>
<td>1</td>
<td>14.44</td>
<td>.000 **</td>
</tr>
<tr>
<td></td>
<td>VATT2</td>
<td>1.12</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**statistically significant at an alpha level of 0.05**
NS not statistically significant

### Table 4.34
Friedman’s Test Results for VATT with High Complexity and Added Time Pressure Split by Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>VATT3</td>
<td>1.55</td>
<td>28</td>
<td>1</td>
<td>.360</td>
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**statistically significant at an alpha level of 0.05**
NS not statistically significant
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<th>df</th>
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<th>Sign</th>
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<td>.000 **</td>
</tr>
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<td>11.571</td>
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<td>.003 **</td>
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</table>

** statistically significant at an alpha level of 0.5

Table 4.35
Friedman's Results for TPERACQ with Low Complexity and Added Time Pressure Split by Scenario

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<th>df</th>
<th>Chi-square</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
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<td>28</td>
<td>1</td>
<td>10.704</td>
<td>.001 **</td>
</tr>
<tr>
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<td>TPER4</td>
<td>1.80</td>
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</tr>
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<td>28</td>
<td>1</td>
<td>1.286</td>
<td>.257 NS</td>
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<tr>
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<td>TPER4</td>
<td>1.61</td>
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<td>25</td>
<td>1</td>
<td>1.000</td>
<td>.003 **</td>
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<td>TPER4</td>
<td>1.20</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5  
NS not statistically significant

Table 4.36
Friedman's Test Results for TPERACQ with High Complexity and Added Time Pressure Split by Scenario

The VATT is decreasing from schematic one to schematic two and the analysis shows statistically significant differences. The VATT shows a change in compensatory to noncompensatory processes with the introduction of just time pressure without changing the other complexity issues. The VATT value does not
significantly change from schematic three to schematic four indicating that once task complexity is introduced it causes noncompensatory processing. It appears to suggest that task complexity in any form (difficult decisions or time pressure) can change the decision process. The TPERACQ consistently decreased from schematic one to schematic two across all scenarios. Supporting the evidence that task complexity with added time pressure increases the likelihood of noncompensatory processing. Likewise, TPERACQ showed statistically significant results from schematic one to schematic two. The time pressure variable did not seem to make significant changes in the TPERACQ from schematic three to schematic four. Interestingly, scenario one showed a statistically significant result but the other two did not.

Research Question Six

RQ6: When a pharmacist makes a decision to counsel a patient, what context effects impact their decision?

H7: The context effects (attributes) are identified that have the greatest impact on the pharmacist’s decision.

An analysis was done of four MouseLab box-related measures. These included three acquisition measures which were total boxes chosen and unique boxes chosen as well as a summarization of the most frequently visited boxes in both time and number. The total number of boxes describes all boxes opened with the mouse-pointing device and can include the same box more than once. Whereas,
the unique boxes show how many boxes of the total available thirty-two (4 x 8 matrix) were opened to display information. For this variable, a box was counted only once regardless of the number of times it was opened. Tables 4.37 through 4.40 provide the information pertaining to total boxes and unique boxes opened.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Variable</th>
<th>Total Boxes</th>
<th>Unique Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Mean ± St. Dev.</td>
<td>38.32 ± 30.64</td>
<td>19.79 ± 9.26</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>27</td>
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<tr>
<td></td>
<td>Range</td>
<td>5-110</td>
<td>4-32</td>
</tr>
<tr>
<td>Two</td>
<td>Mean ± St. Dev.</td>
<td>36.61 ± 26.27</td>
<td>19.46 ± 8.49</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>30.5</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td>12</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>6-111</td>
<td>4-32</td>
</tr>
<tr>
<td>Three</td>
<td>Mean ± St. Dev.</td>
<td>44.28 ± 28.41</td>
<td>22.67 ± 7.46</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>37</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>9-129</td>
<td>8-32</td>
</tr>
</tbody>
</table>

Table 4.37
Total and Unique Boxes Opened for Schematic One Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Variable</th>
<th>Total Boxes</th>
<th>Unique Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Mean ± St. Dev.</td>
<td>20.5 ± 10.74</td>
<td>16.39 ± 6.82</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>19.5</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
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<td>22</td>
</tr>
<tr>
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<td>Range</td>
<td>4-50</td>
<td>4-32</td>
</tr>
<tr>
<td>Two</td>
<td>Mean ± St. Dev.</td>
<td>27.82 ± 13.35</td>
<td>18.46 ± 6.36</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>10-57</td>
<td>9-30</td>
</tr>
<tr>
<td>Three</td>
<td>Mean ± St. Dev.</td>
<td>28.40 ± 14.16</td>
<td>18.16 ± 6.96</td>
</tr>
<tr>
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<td>Median</td>
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<td>17</td>
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<tr>
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<td>Mode</td>
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<td>Range</td>
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<td>6-32</td>
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</table>

Table 4.38
Total and Unique Boxes Opened for Schematic
Two Split by Scenario and Represented by
Mean ± Standard Deviations, Median, Mode, and Range

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<th>Scenario</th>
<th>Variable</th>
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<th>Unique Boxes</th>
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</thead>
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<tr>
<td></td>
<td>Mode</td>
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<td>23</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>7-106</td>
<td>5-32</td>
</tr>
<tr>
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<td>Mean ± St. Dev.</td>
<td>39.86 ± 25.36</td>
<td>20.75 ± 5.18</td>
</tr>
<tr>
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<td>Median</td>
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<td>20</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>12-129</td>
<td>12-32</td>
</tr>
<tr>
<td>Three</td>
<td>Mean ± St. Dev.</td>
<td>44.36 ± 22.17</td>
<td>23.12 ± 5.53</td>
</tr>
<tr>
<td></td>
<td>Median</td>
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<td>22</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
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<td>Range</td>
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Table 4.39
Total and Unique Boxes Opened for Schematic Three Split by Scenario
and Represented by Mean ± Standard Deviations, Median, Mode, and Range
<table>
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<th>Scenario</th>
<th>Variable</th>
<th>Total Boxes</th>
<th>Unique Boxes</th>
</tr>
</thead>
<tbody>
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<td>Mean + St. Dev.</td>
<td>35.21 ± 19.22</td>
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</tr>
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<td>Median</td>
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<td>19.5</td>
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<tr>
<td></td>
<td>Mode</td>
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<td></td>
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<td>9-81</td>
<td>5-29</td>
</tr>
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<td>Two</td>
<td>Mean ± St. Dev.</td>
<td>36.18 ± 25.36</td>
<td>20.32 ± 5.00</td>
</tr>
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<td>Median</td>
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<tr>
<td></td>
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<td>9-32</td>
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Table 4.40
Total and Unique Boxes Opened for Schematic Four Split by Scenario and Represented by Mean ± Standard Deviations, Median, Mode, and Range

The pharmacist opened slightly more total boxes and unique boxes with increasing task complexity from schematic one to schematic three. Whereas, time pressure as noted in schematic two and four resulted in lower number of acquisitions related to total and unique boxes compared to complexity equivalents. Even in the presence of time pressure and task complexity in schematic four, the pharmacists opened more boxes than with time pressure alone.

The last box-related measure is that of final choice for each scenario and schematic. Choice is the variable name for the final decision the pharmacist made in selecting which prescription they would give the highest priority for counseling.

This information is displayed as frequency and percentage in Tables 4.41 through 4.43.
<table>
<thead>
<tr>
<th>Scenario</th>
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<th>Alternative Prescription Selection</th>
<th>Frequency</th>
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<td>3.6</td>
</tr>
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</tr>
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</tr>
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<td>D</td>
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<td>A</td>
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</table>

Table 4.41
Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario One
<table>
<thead>
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<th>Alternative Prescription Selection</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
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<td>3.6</td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
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<td>7.1</td>
</tr>
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<td>67.9</td>
<td></td>
</tr>
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<td></td>
<td>B</td>
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<td>10.7</td>
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</tr>
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</tr>
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</tr>
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<td>C</td>
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</tr>
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</tr>
<tr>
<td>Four</td>
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<td>10.7</td>
<td></td>
</tr>
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<td></td>
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<td>D</td>
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</tr>
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</table>

Table 4.42
Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario Two
<table>
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<th>Scenario</th>
<th>Schematic</th>
<th>Alternative Prescription Selection</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td></td>
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<td></td>
<td>D</td>
<td>11</td>
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<td>B</td>
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<td>4.0</td>
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</table>

Table 4.43
Choice Selection of Alternative Prescriptions A, B, C, and D After Attribute Information Acquisition Represented by Frequency and Percentage Split by Scenario for Scenario Three

The consistent choice for scenario one and two were in the first schematic with the lowest task complexity. In both of these scenarios as task complexity and time pressure were added, there appeared to be a less consistent selection of one alternative over another. The exception is in scenario three where the accuracy-effort framework may have been demonstrated as reported in the literature. Some consumer behavior literature supports that an increase in the accuracy-effort framework can be seen with increasing task complexity.
Table 4.44 shows the most common attribute acquisitions that were made by the pharmacists in making their decisions. These attribute acquisitions were analyzed by scenario and were calculated by the bisect.exe program in MouseLab. This program provides the listing of each box the pharmacist selected and how much time they spent acquiring that information. The most common acquisitions were based on the total time spent in that box during the schematic and scenario.

**Scenario One: Drug-related Attributes**
1. Use in therapy (Indication)
2. Monitoring Parameters
3. Drug Interactions
4. Severe Adverse Drug Reactions

**Scenario Two: Product/Patient-related Attributes**
1. New/Refill Prescription
2. Age of Patient
3. Number of Medications on Patient Profile
4. Patient’s Allergies

**Scenario Three: Mixed Product/Patient/Drug-related Attributes**
1. New/Refill Prescription
2. Age of Patient
3. Use in therapy
4. Number of Medications on Patient Profile

Table 4.44
The Most Common Attribute Acquisitions by Scenario

The selection of attribute information is very consistent with pharmacy practice. The four attributes selected for scenario one are commonly known by the pharmacist or the information is readily available to them. In scenario two and
three, these attributes are often part of the patient profile and are readily available for the pharmacists’ use.

**Research Question Seven**

RQ7: Does an urban versus rural practice setting make a difference in the decision making of the pharmacist to counsel a patient?

H7: Rural versus urban settings do not make a difference in how a pharmacist decides to counsel a patient.

Descriptive data are presented in terms of age and years of experience for rural versus urban pharmacists within the sample in Table 4.45.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Urban vs. Rural</th>
<th>Age in years</th>
<th>Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Urban</td>
<td>37.2 ± 12.39</td>
<td>13.8 ± 12.89</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>39.0 ± 12.27</td>
<td>15.08 ± 13.3</td>
</tr>
<tr>
<td>Two</td>
<td>Urban</td>
<td>38.18 ± 11.36</td>
<td>14.18 ± 11.39</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>37.27 ± 11.11</td>
<td>12.27 ± 11.93</td>
</tr>
<tr>
<td>Three</td>
<td>Urban</td>
<td>37.33 ± 12.67</td>
<td>14.08 ± 13.24</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>36.69 ± 11.26</td>
<td>12.46 ± 11.72</td>
</tr>
</tbody>
</table>

Table 4.45

Age and Years of Experience for Rural versus Urban Pharmacists
Presented As Means and Standard Deviations Split by Scenarios

The VATT, PATTERN, and TPERACQ variables are described by their means and standard deviations split by urban versus rural pharmacists across scenarios and schematics in Tables 4.46 through 4.49.

142
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Urban vs. Rural</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Urban</td>
<td>-.11 ± .47</td>
<td>.059 ± .08</td>
<td>2.01 ± 1.80</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.60 ± .41</td>
<td>.119 ± .28</td>
<td>4.42 ± 4.44</td>
</tr>
<tr>
<td>Two</td>
<td>Urban</td>
<td>-.16 ± .49</td>
<td>.061 ± .07</td>
<td>1.73 ± 1.75</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.38 ± .60</td>
<td>.026 ± .04</td>
<td>1.95 ± 1.19</td>
</tr>
<tr>
<td>Three</td>
<td>Urban</td>
<td>-.21 ± .41</td>
<td>.054 ± .15</td>
<td>1.20 ± .94</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.22 ± .52</td>
<td>.069 ± .08</td>
<td>1.67 ± .81</td>
</tr>
</tbody>
</table>

Table 4.46
PATTERN, VATT, TPERACQ For Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split By Schematic One and Presented By Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Urban vs. Rural</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Urban</td>
<td>-.043 ± .53</td>
<td>.118 ± .27</td>
<td>1.02 ± .52</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.372 ± .44</td>
<td>.131 ± .12</td>
<td>1.66 ± .74</td>
</tr>
<tr>
<td>Two</td>
<td>Urban</td>
<td>-.187 ± .47</td>
<td>.088 ± .13</td>
<td>.97 ± .42</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.534 ± .43</td>
<td>.057 ± .07</td>
<td>1.25 ± .51</td>
</tr>
<tr>
<td>Three</td>
<td>Urban</td>
<td>-.068 ± .46</td>
<td>.054 ± .15</td>
<td>1.20 ± .94</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.400 ± .50</td>
<td>.112 ± .298</td>
<td>.99 ± .37</td>
</tr>
</tbody>
</table>

Table 4.47
PATTERN, VATT, TPERACQ for Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split by Schematic Two and Presented by Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Urban vs. Rural</th>
<th>PATTERN</th>
<th>VATT</th>
<th>TPERACQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Urban</td>
<td>-.083 ± .37</td>
<td>.07 ± .12</td>
<td>1.27 ± .8</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.384 ± .57</td>
<td>.119 ± .12</td>
<td>1.65 ± .99</td>
</tr>
<tr>
<td>Two</td>
<td>Urban</td>
<td>-.359 ± .44</td>
<td>.082 ± .09</td>
<td>.96 ± .52</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.546 ± .61</td>
<td>.093 ± .19</td>
<td>1.40 ± .95</td>
</tr>
<tr>
<td>Three</td>
<td>Urban</td>
<td>-.306 ± .46</td>
<td>.079 ± .06</td>
<td>.85 ± .36</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-.296 ± .44</td>
<td>.090 ± .15</td>
<td>.95 ± .30</td>
</tr>
</tbody>
</table>

Table 4.48
PATTERN, VATT, TPERACQ for Rural vs. Urban Pharmacists As Means and Standard Deviations Split by Schematic Three and Presented by Scenario
Table 4.49
PATTERN, VATT, TPERACQ for Rural Versus Urban Pharmacists Presented As Means and Standard Deviations Split by Schematic Four and Presented by Scenario

The results from a nonparametric Mann Whitney U test are presented for VATT and TPERACQ Table 4.50.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Rural/Urban</th>
<th>Variable</th>
<th>Mean Rank</th>
<th>N</th>
<th>Mann Whitney</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Urban</td>
<td>VATT1-3</td>
<td>15.60</td>
<td>15</td>
<td>81.0</td>
<td>.467</td>
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<tr>
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<td>13.23</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Urban</td>
<td>VATT1-3</td>
<td>15.97</td>
<td>17</td>
<td>68.5</td>
<td>.224</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>12.23</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Urban</td>
<td>VATT1-3</td>
<td>9.00</td>
<td>12</td>
<td>30.0</td>
<td>.008</td>
<td>**</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>16.69</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Urban</td>
<td>VATT1-4</td>
<td>13.97</td>
<td>15</td>
<td>89.5</td>
<td>.717</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>15.12</td>
<td>13</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Two Urban</td>
<td>VATT1-4</td>
<td>15.68</td>
<td>17</td>
<td>73.5</td>
<td>.353</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>12.68</td>
<td>11</td>
<td></td>
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</tr>
<tr>
<td>Three Urban</td>
<td>VATT1-4</td>
<td>13.42</td>
<td>12</td>
<td>73.0</td>
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<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>12.62</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Urban</td>
<td>TPER1</td>
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<td>57.5</td>
<td>.065</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
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<td>17.58</td>
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<td></td>
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<tr>
<td>Urban</td>
<td>TPER3</td>
<td>13.00</td>
<td>15</td>
<td>75.0</td>
<td>.316</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
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<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Urban</td>
<td>TPER1</td>
<td>13.18</td>
<td>17</td>
<td>71.0</td>
<td>.306</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
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<td>16.55</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>TPER3</td>
<td>12.74</td>
<td>17</td>
<td>63.5</td>
<td>.161</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>17.23</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Urban</td>
<td>TPER1</td>
<td>10.17</td>
<td>12</td>
<td>44.0</td>
<td>.068</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
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<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>TPER3</td>
<td>11.67</td>
<td>12</td>
<td>62.0</td>
<td>.406</td>
<td>NS</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td>14.23</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** statistically significant at an alpha level of 0.5  
NS not statistically significant

Table 4.50  
Analysis of VATT and TPERACQ Scores of Complexity by  
Mann Whitney U Analysis Comparing Urban versus Rural  
Pharmacists between Schematics One and Three Split by Scenario
There did not appear to be a statistically significant difference between the pharmacists who practiced in urban or rural setting in regards to compensatory and noncompensatory changes except for a lower variance on the VATT score from schematic one to schematic three for urban pharmacists. In general, it appears as if the compensatory and noncompensatory processes were fairly consistent from rural to urban practice sites.

Conclusion

Chapter five provides discussion and conclusions for each research question. However, some general observations from the data include that pharmacists use attribute-based processes and they switch from a compensatory to a noncompensatory process with time pressure or increased task complexity. In addition, the most common attributes they consider include new versus refill status, use or indication, patient's age, number of medications on the profile, and monitoring parameters.
CHAPTER 5

FINDINGS, CONCLUSIONS, RECOMMENDATIONS

This chapter provides a discussion of each research question including recommendations and future areas of research. For each research question, three aspects are discussed. The aspects provided include information on the results, the meaning for pharmacy, and future research implications. The implications of this research project are discussed in a general fashion at the end as it pertains to pharmacy practice and other health care professions.

Prior to the discussion of the results, it may be helpful to review the various measures of the dependent variables including PATTERN, VATT and TPERACQ. The frequencies of alternative-based and attribute-based transitions in each condition are called PATTERN and it is a calculated ratio that ranges between −1 and +1. A positive number indicates an alternative-based process and a negative value means the process is more attribute-based. If the value is zero, the alternative-based and attribute-based transitions are considered equal. The use of this index indicates if there is a dominant type of process occurring with each schematic and scenario. The VATT method is also taken from the MouseLab data and is the variable that is analyzed to determine compensatory and
noncompensatory processing. This compensatory processing is determined based on the variance in the type of attribute information acquired. This is a measure of process by comparing low variance choices (consistency) versus high variance choices (selectivity). High variance or selectivity has been considered a measure of noncompensatory processing while low variance is consistent with a compensatory process. This measure is done by comparison of variances across scenarios and schematics. Another variable that is helpful in determining the level of compensatory or noncompensatory processing is TPERACQ. The TPERACQ dependent variable is a method of gathering information on the time spent per information acquisition. It takes the total time spent on the decision and divides it by the number of acquisitions of information. This variable can also be used as an indicator of complexity in choice. When TPERACQ is high, it is reflective of a compensatory process. Likewise when it is a smaller value, it demonstrates noncompensatory processing. As with VATT, TPERACQ is a variable that is based on comparative data. There is no one set value but rather a comparison of data suggests if it is a high versus low value. In addition, a review of the scenarios and each schematic is provided on the next page.
First Scenario: Drug-related Attributes

Schematic 1: Drug-related attributes with low task complexity and no time pressure

Schematic 2: Drug-related attributes with low task complexity and time pressure

Schematic 3: Drug-related attributes with high task complexity and no time pressure

Schematic 4: Drug-related attributes with high task complexity and time pressure

Second Scenario: Patient/Product Attributes

Schematic 1: Patient/Product attributes with low task complexity and no time pressure

Schematic 2: Patient/Product attributes with low task complexity and time pressure

Schematic 3: Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Patient/Product attributes with high task complexity and time pressure

Third Scenario: Drug/Patient/Product Attributes

Schematic 1: Drug-related/Patient/Product attributes with low task complexity and no time pressure

Schematic 2: Drug-related/Patient/Product attributes with low task complexity and time pressure

Schematic 3: Drug-related/Patient/Product attributes with high task complexity and no time pressure

Schematic 4: Drug-related/Patient/Product attributes with high task complexity and time pressure
Research Question One

RQ1: Do pharmacists use compensatory or noncompensatory processes when deciding to provide patient counseling when not under task complexity or time constraints?

H1: Pharmacists use compensatory processes when deciding to provide patient counseling without the presence of task complexity or time pressure.

Results

This research question was exploring what type of decision making behavior a pharmacist uses when they decide to counsel patients for their prescriptions. This research question explores the decision process during the absence of task complexity including the absence of time pressure. The consumer behavior literature as well as the health science literature shows that most individuals will use a compensatory process with the absence of complexity. Increasing task complexity usually results in a change from a compensatory to a noncompensatory process. This is specifically explored in other research questions within this chapter.

Based on this previous literature, it would be anticipated that pharmacists would use compensatory processes without task complexity. The two important dependent variables that help determine this process are VATT and TPERACQ. A low variance (VATT score) compared to a VATT score during task complexity would indicate a compensatory process. In contrast, a higher time per acquisition score (TPERACQ) would indicate a compensatory process as well. The third dependent variable is PATTERN and it explains whether the individual is
performing the decision process as an alternative-based process or as an attribute-based process.

The results of the statistical analysis study show VATT scores for schematic one show a low overall variance for each scenario. The value for scenario one (drug-related attributes) is the highest VATT score of the three scenarios. Scenario two (patient/product attributes) had the lowest VATT score. The VATT score for scenario three (mixed attributes from one and two) was in between the other two. All three VATT scores show a low level of variance compared to the VATT scores seen in schematic three (see Table 4.21). As Table 4.21 shows, the VATT mean scores change from 0.87 to 0.96, 0.47 to 0.86, and 0.062 to 0.085 for scenarios one, two, and three, respectively. The change from a lower VATT score to a higher VATT score in each scenario is what indicates a compensatory process in schematic one. This low VATT score would be indicative of compensatory decision behavior.

The scores for TPERACQ were quite high. The average acquisition time for scenario one was approximately 3 seconds per information acquisition. Scenario two and scenario three were 1.82 seconds and 1.45 seconds, respectively. These high numbers compared to schematic three numbers are also indicative of a compensatory model for the decision process. As Table 4.21 displays, the TPERACQ mean scored changed from 3.01 to 1.45, 1.82 to 1.14, and 1.45 to 0.90 for scenarios one, two and three, respectively. The change from a higher TPERACQ score to a lower one for each scenario indicates a compensatory process in schematic one. These values are consistent with the VATT scores in determining a compensatory process.
An analysis of the PATTERN variable also suggests that pharmacists use an attribute-based process in acquiring information in making decisions. The PATTERN variable was negative for all three scenarios for schematic one. It is interesting to note when looking at the raw data that many pharmacists also use an alternative-based process as well. Future research may try to explore why some pharmacists develop an alternative-based pattern while others use an attribute-based pattern. None of the demographic variables explored in this research seemed to answer that particular question.

Therefore, hypothesis one would be accepted for all three scenarios based on schematic one. Pharmacists use compensatory processes in the absence of task complexity and time pressure.

Meaning for Pharmacy

The resulting low VATT and high TPERACQ indicate compensatory processing by pharmacists when deciding to counsel patients. This result is consistent with the health science and consumer behavior literature.

According to the PATTERN variable, pharmacists were more inclined to use an attribute-based process. This would indicate that if a pharmacists is presented with more than one prescription at a time and had to make a decision about the prescriptions, they would take into consideration all prescriptions. The pharmacist does not take one prescription and look at all of the attributes first before going to the next prescription. The pharmacist weighs the attribute values between the alternatives. One prescription compared with another prescription. This would
suggest that pharmacists are capable of comparing attributes across the alternatives and can deal with more than one prescription at a time. Within the work environment, pharmacists are often working on several prescriptions at one time.

The VATT and TPERACQ tell us that pharmacists in the absence of any form of task complexity use compensatory processing. In compensatory processing, the individual takes into consideration the total number of advantages for an alternative and determines a resolution to the trade-offs (also known as conflict). Therefore, an individual will often avoid trade-offs (conflict) and develop simplifying heuristic patterns. In schematic one for each scenario, the pharmacists considered the total number of advantages and were able to form solutions between the alternatives. The pharmacist could gather the necessary information and determine an answer without developing heuristics. In an ideal world with no task complexity including no time pressure, a pharmacist would take the time to consider all of the advantages prior to formulating a decision. In schematic one, the pharmacists took an average of 53.17 seconds to make a decision which included 64.1 seconds for scenario one, 42.7 seconds for scenario two, and 52.7 seconds for scenario three. In general, the pharmacists were able to consider the advantages and compare the alternatives using compensatory processing in around one minute.
Future Research Implications

Scenario one dealt with specifically drug-related attributes. Whereas, scenario two described patient and product-related variables and three was a mix of drug-related and patient/product-related variables. This raises some interesting questions as it pertains to task complexity as well as some issues that may be considered as future research areas. Did the pharmacists consider the drug-related attributes to be more complex than patient and product attributes? Many pharmacists who graduated prior to the early 1980's had very little therapeutic or clinical course work. Is there a difference in the comfort level with this type of material depending on their curriculum at the time of graduation?

An additional research area would be to see if a difference exists between pharmacists and pharmacy students in the type of information processing. This would include analyzing the various effects that pharmacy training may have in changing or modifying the process. It would be interesting to explore the predecisional behavior of pharmacists in different practice settings as well as different degrees and non-degree training programs such as residencies, certificate programs, and continuing education.
Research Question Two

RQ2: Does the compensatory or noncompensatory processes change in the pharmacist with increasing task complexity excluding time pressure?

H2: Pharmacists change to noncompensatory processes with increasing complexity excluding time pressure.

Results

As was seen in research question one, pharmacists still used an attribute-based approach to decision making when task complexity increased from schematic one to schematic three. This was evidenced by the negative value for the PATTERN variable in each scenario across the two schematics.

In this analysis, the TPERACQ variable decreased from schematic one to schematic three. This decrease was analyzed using the Friedman's nonparametric test. The data suggests a statistically significant difference in the time per acquisition with increasing task complexity in the absence of time pressure. This difference was statistically significant across all three scenarios. This finding shows that the pharmacist changed from compensatory to noncompensatory processing in the presence of task complexity without time pressure as a component.

Likewise, the analysis of the VATT variable also demonstrated a noncompensatory processing by an increase in its value across all three scenarios. There was a consistent pattern of increasing variance with increasing task complexity without time pressure from schematic one to schematic three. The
VATT values were statistically significant across all three scenarios as measured by the nonparametric Friedman's Test.

Based on these results, hypothesis H2 would be accepted for all three scenarios. Pharmacists do display a noncompensatory change in the decision process in the presence of task complexity excluding time pressure. This information is consistent with studies done in the area of consumer behavior and nursing research.

So regardless of the type of information presented in the scenarios such as drug-related attributes or patient/product-related attributes, pharmacists still made the change from compensatory to noncompensatory processing. The implication being that task complexity can be introduced at many different points in the prescription process. It appears, as information about the drug itself possesses complexity issues. Likewise, information about the patient and the prescription also can present task complexity issues.

Meaning for Pharmacy

The important aspect of this finding is that pharmacists do respond to task complexity issues and form noncompensatory patterns. Pharmacists changed from a compensatory to a noncompensatory processing when task complexity excluding time pressure was introduced. This would indicate that pharmacists develop simplifying heuristics to solve problems. As cited in the literature, individuals may use various strategies in response to different decision tasks. As described by Payne, Bettman, and Johnson (1993), "each strategy can be thought of as a method
(a sequence of operations) for searching through the decision problem space.” In addition, strategies can be constructed on the spot or they could be planned ahead of time. This would indicate that pharmacists develop a method or a sequence of operations that help them through the decision problem. The part that is not completely identified with this research is if they develop these strategies “on the fly” or if they have developed an *a priori* plan. Knowing that pharmacists use simplifying heuristics allows for an opportunity to influence the decision process. Within pharmacy, the opportunity exists to develop training programs or models designed to facilitate the information processing strategies.

In understanding the predecisional process better, there is the ability to impact on training. Evidence from the business literature, shows that it is possible to improve decisions and make more accurate choices with training. Payne, Bettman, and Johnson (1993) suggest in their book that complex decisions can be restructured to make them easier for the decision maker. Beyond the training issue, this could also suggest that work place or workflow changes might also be able to be changed to facilitate better decision making. In addition, they discuss the use of external aids such as models or formulas to improve decisions.

*Future Research Implications*

The interesting question is how this change affects their ability to handle the accuracy-effort framework. Future research could present scenarios and schematics that have more of a correct choice versus an incorrect choice which might allow a look at how task complexity may alter the pharmacist’s ability to make “good”
choices or select correct information. Likewise, MouseLab allows you to enter risk in choice and gamble schematics. Future research could involve implementing risks with certain selections. In addition, one could explore these issues as it pertains to pharmacy education and training.

**Research Question Three**

RQ3: Does overall task complexity alter the predecision process behavior of the pharmacist when considering patient counseling?

H3: Task complexity issues do alter the predecision process of a pharmacist when deciding to counsel a patient.

**Results**

This research question addresses the issue of overall task complexity that includes task variables and time pressure as a combined entity. Task complexity is explained by the characteristics of the task that affects the information processing demands of individual. Within the research, the task complexity issues relating to the number of alternatives in the choice set and the number of attributes per alternative were held constant. Time pressure is a component of overall task complexity. In this research four alternatives were given in the choice set with eight attributes per alternative. Changing the values on the context variables within the schematics altered the task complexity. The ability to differentiate between the schematics became more complex with schematics three and four compared to
schematics one and two. In general, schematics one and two had some fairly simple differentiating factors in making judgements about the alternatives. As an aside during the MouseLab part of the research, many pharmacists commented to the researcher on the difficulty in making a decision within schematics three and four. The last task complexity component to be introduced was that of time pressure in schematic four. Time pressure, as a separate subset of task complexity is addressed in research question five.

This hypothesis is a slightly different question than the one posed in research question two. This question explores more about the changes that occur in the predecision process. The analysis on both research question two and question three showed that pharmacists do make changes from compensatory to noncompensatory processes. This research question asks how this alters the predecisional process of the pharmacist. Consistently across all three scenarios, the PATTERN variable remained a negative value indicating a continued use of an attribute-based process. The ANOVA demonstrates that the PATTERN value changed (statistically significant) between the scenarios. This would indicate that some variations exist in the pattern of information acquisition from scenario to scenario. Likewise, the VATT variable change from the simplest schematic to the most complex schematic (one to four) also showed a statistically significant difference. The Friedman’s Test demonstrates that the VATT is increasing with overall task complexity for scenario one, two, and three. Similarly, the TPERACQ variable was statistically significantly different from schematic one to schematic four across all three scenarios. This data strongly supports a change to noncompensatory processes
using an attribute-based approach. The interesting aspect to note in this research is that the decision process was altered as task complexity was increased.

Consistently across the scenarios and the schematics, there was a decrease in the uniformity of the answers given in the cases (as can be seen in Tables 4.41 to 4.43 in chapter 4). This demonstrates that different attributes on different alternatives drove the decision process for each pharmacist in the presence of both time pressure and task complexity.

This increase in overall task complexity did alter the predecisional process. Therefore, the research hypothesis for this question would be accepted for all three scenarios.

**Meaning for Pharmacy**

With increasing overall task complexity, pharmacists alter their predecisional behavior. They develop a more selective pattern and leave the consistent pattern that was identified in research question one. The implication to pharmacy is that simplifying heuristics are developed. This provides the same opportunity that was discussed in research question two. By understanding this change, the idea of developing strategies that can increase the accuracy-effort framework and simplify the complex task becomes appealing. Companies or managers may be able to develop models that could help the pharmacist decide which patients are at high risk for medication-related problems and suggest these patients receive priority in counseling. This potential could be applied to pharmacy practice areas besides just patient counseling as future research is completed.
Future Research Implications

Future implications for research follow the same pattern as seen with research question one and research question two. In addition, future research could further try to delineate the time pressure issues. Since time issues appeared to be a substantial factor in the nominal group results, it would be an important factor to consider how to change time pressures as part of the pharmacists' environment. Likewise, additional research could explore if time pressure with task complexity adversely affects a good decision.

Research Question Four

RQ4: Does the extent of pharmacy experience alter the decision process for patient counseling with task complexity?

H4: The more experienced pharmacist displays a higher selective (compensatory) process with task complexity than a less experienced (5 years or less) pharmacist when deciding to counsel a patient.

Results

This research question drives at an important issue as it relates to pharmacy experience. The research divided pharmacists into two categories. Those categories were an expert pharmacist who has been working for more than five years in
practice versus the novice pharmacist who has been working five years or less. The
data for this research project had a higher percentage of the novice pharmacists
graduating within the last three years (range 25.1 to 28.6 percent of the sample). Of
the novice pharmacists, 56.3 percent were 25 years of age or less. This was
compared to the lowest age of the expert pharmacy category which was 34 years.
In the expert category, 65.1 percent were forty years of age or older.

The data would suggest that novice pharmacists and expert pharmacists
perform in a noncompensatory process with task complexity. The VATT variable
across scenarios and schematics showed no difference in the selectivity of the expert
pharmacist versus the novice pharmacist. The variance (VATT) between these two
groups was not statistically different regardless of the scenario or the schematic.
However in looking at the mean values and standard deviations, there was
variability in the data indicating that experience may not be the explaining variable
but rather some other aspect about the pharmacist or their training which was not
measured in the study.

Interestingly, the TPERACQ variable did show one significant difference
with scenario one and schematic three. The Mann Whitney U test did not find
statistically significant differences between expert and novice pharmacists for the
other TPERACQ variables. The novice pharmacists consistently had lower mean
TPERACQ times, which indicated a noncompensatory process.

The overwhelming evidence for this particular research question supports
that there is no difference between the expert and novice pharmacist. The VATT
data suggests no difference between the expert and novice pharmacists as it
pertained to task complexity. In addition, the TPERACQ is fairly consistent with this finding except for one scenario with one schematic. Based on this evidence, one would reject the research hypothesis for all three scenarios.

Meaning for Pharmacy

The data suggests that as pharmacists enter the profession they have already developed the ability to produce simplifying heuristics or these heuristics may develop quickly over the short six-month period of time after they graduated prior to completing the research. This data is in contrast to the two nursing studies comparing experts to novices. The nursing research was able to identify differences in the simplifying heuristics between novices and experts.

Pharmacy training prior to work as a pharmacist may be preparing the students to develop this heuristics early in their careers. Many colleges of pharmacy have implemented critical thinking and problem solving based curriculums evidenced by the 162 abstract citations on International Pharmaceutical Abstracts (IPA) from the American Association of Colleges of Pharmacy (AACP) annual meetings over the last ten years.

Future Research Implications

The TPERACQ is revealing in that the novice pharmacists developed a heuristic that took less time then the expert pharmacist. This may also suggest that the expert pharmacist actually had a more selective plan and would be
demonstrating less noncompensatory processing than the novices do. This facet would be interesting to explore further.

Implications for future research would include trying to identify what characteristics about the pharmacist explain the variation in how they handle task complexity. Other implications of the research findings relate to the age or experience level at which a pharmacist develops the ability to handle complex tasks with simplifying heuristics. Does this process begin during their pharmacy education? Does the process begin with their internships, externships, clerkships, or didactic course work?

**Research Question Five**

RQ5: Does time pressure as an element of task complexity affect the pharmacist’s decision to counsel?

H5: Time pressure influences a noncompensatory change in the predecision behavior of the pharmacist when deciding to counsel a patient.

**Results**

The VATT variable demonstrated consistent increases from schematic one to schematic two across all three scenarios. Both schematic one and schematic two were designed for simple differences trying to mimic no task complexity. So the only variable introduced between these schematics was the independent variable, time pressure. Across the scenarios, statistically significant differences were found in the VATT variable. This would indicate a change from a compensatory to a
noncompensatory process with the introduction of time pressure (as a component of task complexity) holding other task complexity issues constant. So pharmacists do respond to time pressure with a change to noncompensatory processing. The VATT variable did not change significantly from schematic three to schematic four across the three scenarios. Also interesting to note is that once task complexity was introduced in schematic three, there was not a statistically significant difference when adding time pressure. This would suggest that time pressure independently produces a change in compensatory processing but in the presence of other task complexities does not change the process further. Time pressure is a component of task complexity and as long as some form of task complexity is present, then the pharmacists changed to a noncompensatory process.

The TPERACQ variable showed slightly different results. The TPERACQ was consistently lower with added time pressure with the exception in scenario three schematic four. The TPERACQ showed statistically significant results across all three scenarios when comparing schematic one to schematic two. Time pressure in the absence of other task complexity issues demonstrated an impact in changing the predecision process from compensatory to noncompensatory. In addition, TPERACQ for scenario one showed statistically significant results from schematic three to schematic four. The scenario showed that time pressure added to the other task complexity issues did affect the noncompensatory process. However, scenario two and three did not show a statistically significant difference between schematic three and four. This raises an interesting question as to why the scenario with
drug-related attributes would change the compensatory process more than the scenarios that focused on patient and product (prescription) attributes.

The evidence suggests that time pressure by itself and as a component of task complexity does change the compensatory process to a noncompensatory process for all three scenarios. Therefore, the hypothesis for this research question would be accepted. Since the pharmacists displayed a noncompensatory process rather than a compensatory one, a change is demonstrated but from a compensatory to a noncompensatory process with added time pressure.

Meaning for Pharmacy

Time is an important issue. It was evident in the nominal group results and in the MouseLab data. Time pressure as a component of task complexity influences the predecisional process. Time pressure by itself causes the pharmacists to change to a noncompensatory process. However in the presence of other forms of task complexity unrelated to time pressure, time did not change the process. Time is an influencing factor that managers and businesses need to consider if they are trying to influence the predecisional behavior. However, just changing time pressure did not cause the pharmacist to go back to compensatory processing.

Future Research Implications

Future research could continue to define how time pressure changes the accuracy-effort framework. Likewise, the development of training programs which allow pharmacists to develop "good" strategies for making decisions under time
pressure could be considered. Another study could explore how time pressures may affect the provision of pharmaceutical care with other areas of pharmacy practice. In addition, research could be developed that looked at workload indices as it relates to time pressure and task complexity and further explore compensatory to noncompensatory processing.

**Research Question Six**

RQ6: When a pharmacist makes a decision to counsel a patient, what context effects impact their decision?

H6: The context effects (attributes) are identified that have the greatest impact on the pharmacist's decision.

**Results**

This analysis was driven by descriptive statistical information that was provided as part of the MouseLab program. The MouseLab program allows the researcher to summarize boxed selections and determine which factors involved the most time by the pharmacist or were most frequently opened by the pharmacist. Several different variables related to the opening of boxes were presented in chapter 4. Likewise, the choices that pharmacists made at the end of the schematics were analyzed using descriptive statistics.

The analysis reveals that pharmacists were likely to open more boxes including total and unique boxes when no time pressure was being exerted.
time pressure constraints, less total boxes were opened but a similar number of unique boxes were opened. This would suggest that under time pressure the pharmacist went for unique information and were less likely to go back and review information from a previously opened box. Whereas without time pressure, the pharmacist visited more total boxes and reviewed information more than once from a single box. Under time pressure, the average number of unique boxes opened ranged from 16.4 to 19 boxes. Without time pressure, the average number of unique boxes opened ranged from 19.79 to 20.75. This reveals a difference of two or three boxes. In contrast, the average total number of boxes opened with time pressure ranged from 20.5 to 35.21. Without time pressure, the average number of total boxes opened ranged from 38.32 to 47.21. This indicates a difference of fifteen to nineteen boxes. In addition, the number of total boxes opened with increasing task complexity without time pressure averaged nine more boxes opened. However, the number of unique boxes opened with increasing task complexity without time pressure only averaged an increase of one box. This would indicate that with task complexity more information is obtained albeit not necessarily unique information until time pressure is added as a component.

MouseLab allows the summarization of boxes visited, as previously mentioned, as part of the bisect.exe program. This analysis revealed which attributes by rank order had the most open boxed time by the pharmacists. For scenario one involving the drug attributes, the use in therapy or indication was by far the most visited box in both number and time. This does not appear to be a surprising finding in that often times to counsel a patient it is important to know
their disease state or problem. This information was also revealed in the transcripts of the nominal groups. The one pharmacist noted their embarrassment when they were counseling a mother about their child’s acid reflux when in fact; the doctor was treating the child’s warts. The rank order after use was for monitoring parameters, drug interactions, and severe adverse reactions. This is also consistent with the message from the nominal group. The only difference that it may point out is the fact that the pharmacists did consider the serious adverse reactions. Based on the logs from the nominal groups, many pharmacists suggested the most common side effects were the predominant issue. The MouseLab research demonstrates something different. The difference may be explained by the fact that the pharmacists in the nominal group indicated that they counseled the patient about the common adverse events and were not as concerned about counseling on the serious events. However in the predecision process that the pharmacist undertakes to decide which prescriptions may have the highest priority for patient counseling, the evidence would suggest that they do consider the serious nature of adverse effects related to that drug. In the choice made by pharmacists in the four schematics, the primary evidence for their selection appeared to be the occurrence of major drug interactions and/or the potential for a severe adverse effect.

For scenario two, the attributes that ranked highest included new versus refilled prescriptions, the age of the patient, the number of medications on the patient profile, and the patient’s allergies. As was noted in scenario one, these attributes are not necessarily surprising given the nominal grouping transcripts. The pharmacists in the nominal groups as well as the MouseLab did take into
consideration whether the patient was receiving a new drug rather than a refilled drug. In the schematics, they were more likely to select to counsel a new prescription rather than a refilled prescription. Interestingly, some pharmacists noted the age of the patient as an important issue in the transcripts and the MouseLab revealed this as well. The pediatric patient was less likely to be selected in the simple task schematic with or without time pressure. Only one pharmacist selected the pediatric patient in both simple task schematics. The majority of the pharmacists selected the geriatric patient. In the complex scenarios, only geriatric patients were presented as part of increased task complexity. The selection of the geriatric patient appears to be consistent with the next highest ranked attribute, which is number of medications on the profile. Often times, geriatric patients have more medications then younger patients. In the simple task schematics with or without time pressure, the highest percentage of pharmacists did not actually choose the profile that had the most medications on it. However in the complex task schematics with or without time pressure, the highest percentage of pharmacist did select the profile that had the most medications in both schematics. This may provide some evidence for the use of this number as a simplifying heuristic in the noncompensatory pattern. Additional evidence may be provided in the form of the fourth attribute that being the patient’s allergies. In each of the four schematics regardless of task complexity and/or time pressure, the highest percentage of pharmacists chose a potential allergy problem as one they would select to give priority. The allergy profile appears to be another piece in the evidence of how pharmacists assess prescriptions for counseling.
Scenario three was a mixture of drug attributes as well as prescription (product) and patient attributes. These attributes appeared in both scenario one and scenario two. It was interesting to see how these attributes were handled when combined. Three out of the four attributes most often looked at by the pharmacists were patient and prescription (product) oriented rather than drug oriented. In schematic one and schematic two, the pharmacists selected primarily on the patient's age and the use (indication) of the drug. In schematic three and four with increased complexity, the issues new versus refilled prescription and the number of medications on the profile entered into the decision process as well as the two previously mentioned. In these last two schematics, it appears as if drug interaction data was also considered in the decision although this did not rank in the top four attributes. It is evident that the pharmacists do develop patterns with task complexity that allows them to simplify the thought process.

This research shows that there was a change in the pattern of choice that the pharmacists made as task complexity issues increased. Business research has explored the accuracy-effort framework and has shown differing results. Some research as shown a compromise to the accuracy-effort framework and others have shown a better decision with the developed noncompensatory patterns. Biggs (1985) showed with increasing task complexity that it altered the decisions made by loan officers about providing loans. These decisions were different from the decisions they made with loans that had no task complexity involved. One of the reasons it is difficult to answer this question as it pertains to pharmacy is that there are not guidelines as to who is the best patient to counsel and what is the right
answer. Many pharmacists would suggest that each pharmacist makes that decision as part of their professional judgement. So if one pharmacist felt that drug interactions was the most important issue and another believed in to be the age of the patient, it would be difficult to judge who was right and who was wrong.

The evidence would suggest that the MouseLab data was able to determine which attributes helped in the decision processes of the pharmacists. Therefore, the hypothesis for research question six is accepted for all three scenarios.

*Meaning for Pharmacy*

This research provides evidence for understanding the thought process of the pharmacist as it relates to the drug attributes, the patient attributes, and the prescription (product) attributes. Table 4.44 in chapter four provides the ranking of the top four for each scenario. In looking at these rankings combined across scenarios, it would appear that the use in therapy, the patient's age, the number of medications of the profile, new versus refill prescriptions, adverse events, drug interactions, and allergies were predominate issues. Seven of these nine issues are usually available on the patient's profile or within the computer prescription system (i.e. drug interactions). The adverse events and indications would also be readily retrievable from a pharmacy reference. However, it may often be difficult for the pharmacist to determine the actual prescribed indication. This could raise a question as to whether missing indication information could be a barrier to patient counseling especially since in this research the pharmacists gave it such a high priority.
This research also demonstrates the complex information that a pharmacist considers when making decisions about counseling. The fact that pharmacists looked at an average of between 16.4 to 20.75 unique boxes of information prior to making a decision regardless of time pressure demonstrates the information processing involved in counseling patients.

It was interesting to note in this research that geriatric patients with a large number of medications on the profile often received a high priority for counseling. Consideration was also given if there was a potential for adverse drug reactions.

**Future Research Implications**

Since the MouseLab can only test eight attributes per alternative at one time, it would be interesting to study other attributes and compare them with this data. Likewise, this research could be expanded to create scenarios, which provided data that had right and wrong answers or provided gambles. This could provide additional insight into the accuracy-effort framework as well as explore the impact of risk on the predecision process.
Research Question Seven

RQ7: Does an urban versus rural practice setting make a difference in the decision making of the pharmacist when counseling a patient?

H7: Rural versus urban settings do not make a difference in how a pharmacist decides to counsel a patient.

Results

These two groups (urban versus rural) were analyzed by using the Mann Whitney U test as the nonparametric equivalent to the two independent sample t-test for VATT and TPERACQ for each scenario. Urban pharmacists were compared to rural pharmacists based on location of their practice site. There is consistently no statistically significant difference between the urban and rural pharmacists for the VATT variable except for scenario three between schematic one and schematic three. However in analyzing the TPERACQ variable, there does not appear to be a difference between the urban and rural pharmacists across all three scenarios. On average, the urban pharmacists appeared to take less time per information acquisition then do pharmacists who practice in a rural setting but this difference was not statistically significant. The evidence suggests that at least with TPERACQ there may be a difference in time required for acquiring information. Both rural and urban pharmacists are using noncompensatory process when placed under task complexity. However, it appears as though urban pharmacists may have developed a different simplifying heuristic than the rural pharmacists in acquiring information.
In trying to determine if there was a difference in how the pharmacists chose to counsel patients, an additional analysis was done to compare the choices that the pharmacists made in selecting which prescription to give the highest priority. A chi-square analysis was performed to compare the urban versus rural pharmacists and the choices that they made by scenario and schematic to compare consistencies in their choices. The chi-square analysis revealed no statistical differences between the pharmacists in their choices by schematics.

With the evidence presented, the hypothesis for research question seven would be accepted for each scenario.

**Meaning For Pharmacy**

Evidence suggests that the location of the practice setting does not influence the predecisional behavior of the pharmacists. Although there were not statistically significant differences, the mean values suggest some minor differences in time acquisition.

**Future Research Implications**

It would be interesting to pursue an alternative hypothesis looking at potential differences among urban and rural pharmacists based strictly on prescription volume for the pharmacists. One suggestion would be if the rural pharmacists routinely have a lower volume of prescriptions each hour they may be use to taking more time to acquire information than urban pharmacists who may have a higher volume. More research needs to be done in this area.
Other Implications

Pharmaceutical Care

With the emphasis on pharmaceutical care, the concern becomes what happens to the pharmaceutical care process when pharmacists change from a compensatory process to a noncompensatory process. In the compensatory process, the pharmacists are essentially gathering everything they need to provide patient counseling. In reality with task complexity and time pressures, the pharmacist is changing to a noncompensatory model. Is there adequate documentation that good patient counseling can be achieved with these pressures and this change in processing? Knowing the time pressures and predecisional processes of the pharmacist may provide an opportunity to change the work environment such that pharmacists can complete the compensatory process. Examples would be to provide technical support for some of the process or develop computer programs, which help in the decision process. In addition, models could be developed that allow the pharmacist to be better trained to develop accurate heuristics. Further research could look at developing these models as well as testing workload issues.

MouseLab

The MouseLab program is an excellent inexpensive tool for analyzing information processing behavior. The difficulty with MouseLab is the extensive amount of time it takes to program an MS-DOS based tool. Future implications would be the development of a Windows® based product that would be easier to
program, easier to use, and would be more attractive on the computer screen. Another exceptional aspect of MouseLab is the ability to analyze and summarize the data using the bisect.exe file. A challenge to developing a Windows® based product would be to maintain the ability to collect and analyze all relevant information pertaining to information tracing process. Additional research would need to be done to assure that the Windows® based program was equivalent to MouseLab MS-DOS program. It would also raise an interesting research question to see how a Windows® based program would compare to other information tracing process techniques.

**Other Research Implications**

This research raises some curiosity as to other potential areas of research. Some of these areas were suggested with each research hypothesis. This section suggests some other potential areas of research. These include other areas of pharmacy practice, consumer behavior in choice decisions related to medications and/or pharmacist selection, curriculum and education of pharmacy students, and economic decisions within pharmacy practice. This research could be extended to other areas of health care including other health care professions as well as decision in providing health.

An interesting research question to explore in the future would be to determine if pharmacy students use similar compensatory and noncompensatory processes when presented with similar patient counseling decisions. In addition, the predecisional process could be evaluated at different stages of their academic
career to see if the process changes as they learn more about pharmacy. Likewise, a study could explore the impact that internships, externships, and clerkships have on the predecisional process. When do pharmacy students start developing similar noncompensatory processes like the pharmacists under task complexity?

This research could also provide some basis for doing a similar research project in the area of clinical pharmacy and clinically based decisions. It would be interesting to explore differences in clinical pharmacy decisions by practice site and by pharmacist training. It would be interesting to see what type of information processing occurs when pharmacists make decisions about drug recommendations like pharmacokinetic consults. What type of information do they glean from the patient chart that helps them make judgements about therapy? Is there a difference in the judgement process between pharmacists and pharmacy students that could be addressed in this particular area?

Another potential area of research would be to compare the information processing of different health care professionals that work together in multidisciplinary teams. Do they process information in a similar fashion? Do they look at different aspects of the information when making their decisions? If a difference existed in the processing of information, could this help explain why a team concept maybe more successful than a single health care professional approach. What type of similarities and differences exist among health care professionals?
**Study Limitations**

The results of this study should be interpreted considering the limitations of the study. This study represented urban and rural pharmacists from eight counties in Ohio. Any generalizations to other groups are only appropriate to the extent that this group represents other pharmacists.

This study explored the relationship between age and years of professional experience as it may apply to compensatory versus noncompensatory decision making. The underlying assumption would be that an inexperienced pharmacist would be one who has only been in practice a few years. Pharmacy students are required to do internship and externship experiences prior to graduation from an accredited college of pharmacy. A limitation would be whether this training provides enough experience to make the issue of years of professional experience mute. Further research may include pharmacy students at different points in their training as it relates to compensatory versus noncompensatory decision making.
Conclusions

The MouseLab technique is an effective tool for analyzing the adaptive decision behavior of the pharmacist when deciding priorities for patient counseling. The MouseLab was able to show that pharmacists’ use a compensatory process with low task complexity and change to a noncompensatory process with higher task complexity. The pharmacist appeared to use a more attribute-based process when acquiring information to make decisions. The level of professional experience does not seem to influence the change from compensatory to noncompensatory processing with task complexity. The attributes most commonly used by the pharmacists in making their decisions included indication, patient age, drug interactions, adverse reactions, new versus refilled prescriptions, and the number of medications found on the profile. A comparison of urban and rural pharmacists indicated that both switch from a compensatory to a noncompensatory process with exposure to task complexity. This study provides insight into the predecisional process of the pharmacists and provides an opportunity for future research in this area. With this insight, the opportunities exist to develop work environments and support systems to allow for the optimal decisions regarding patient counseling.
Transcript: Nominal Grouping
Group One
May 19, 1999
9:30 PM EST

CODING: M for Moderator and R is for Participants

M> Hello, I will be providing everyone with additional information on how we are going to run this nominal group. We will be following a specific order. Just so everyone knows, you all have been given a code to respond which will show up on the screen as an “R”. There is no way to identify who you are and what response you have given. Your answers are completely anonymous. Here is the procedure:

- **Stage I:** Idea generation
- **Stage II:** Round-robin feedback
- **Stage III:** Discussion
- **Stage IV:** Initial voting on priority items
  
  *(Prioritize the items based on those with that you feel would have the greatest impact on your decision to counsel?)*
- **Stage V:** Discussion of voting
- **Stage VI:** Final vote
  
  *(After listening to all of the discussions, please rank those items that you feel would have the greatest impact on patient counseling?)*

M> Any questions for me before we start?
R> Hello
R> Hi, how is it going?
R> No
R> No
R> Let’s go
R> No
M> Please respond to this question.
M> What professional issues or counseling issues do you feel impact your decision to counsel a patient on their prescription?
R> Definitely time as a factor, too many prescriptions, too little time
R> Insurance companies can be a pain, end up on hold, run around but I don’t feel this influences whether I counsel the patient or not.
R> I would say the type of insurance coverage is considered especially if they have a specific requirement for counseling, also whether they reimburse for counseling.
R> time, time
R> Do you want things like what I take into consideration?
M> Yes
R> I take into consideration any drug interactions or allergies the patient may have as well
R> I do too
R> I think the most important aspect is the patient issues
R> I do make considerations for refills versus new prescriptions especially if I know
the customer pretty well
R> In regards to insurance coverage, I do get concerned when a pt has no insurance
and they have a RX for a expensive drug
R> Me too.
R> I will often counsel to make sure they know how to use it properly and not waste
any of it
R> I will try to find a cheaper alternative and sometimes call the prescriber
R> That is a good point, I will often send them to some agencies if necessary
R> I watch closely to see if I am dealing with a pediatric or geriatric patient too
R> especially if they have a lot on their profile
R> I think cost is an important issue, it is certainly not the overriding concern but I
do use that information to counsel
R> Cost and insurance have a role, I am not sure if it is important for every
prescription but it plays a factor, should be considered
R> Not that I heard it mentioned, I also get concerned with pts with allergies or with
many meds on profile, interactions concern me—I think of Coumadin and I
counsel
R> I have been adding grapefruit juice to my list of drug interactions to counsel for
R> That is a good idea
M> Any other suggestions or ideas? Has everyone had a chance to express their
ideas?
R> Yes
R> yep, I'm done
R> Yes
R> done
M> Any further discussions about what has been presented?
R> no
R> not for me, I agree with what has been said
R> done
R> no
M> Okay, we need to take an initial priority vote, please take a few minutes a put the
most important factors in your opinion in a rank order list and then hit enter
R> Cost, New Prescription, Time, Allergies, Drug Interactions, Pediatrics,
Geriatrics, Insurance Coverage
R> cost, coverage, refill vs. new, profile information, time
R> time, refill, cost
R> Cost, new script, time, drug interactions, allergies, time
M> Give me a minute to tabulate a list
R> okay
R> k
R> yep

183
Here is an initial list: cost, new prescription, insurance coverage, time, drug interactions, allergies

Do you agree with this list and the order of the list

Yes

yep, I agree

I would put allergies before drug interactions

I would put time before cost but I can live with this list

I agree, I could live with this too

Please provide me with your final vote

mine is the same

me too

time, refill, cost

cost, coverage, refill, time

Okay, thanks

On to the next question, we will handle this in the same format

okay

Here is the question.

What characteristics of the drug product impact on your decision to counsel a patient about their medication?

Please provide me with your thoughts

adverse reactions are important to me as well as DI

Indications, type of therapy, how the pt responds

Drug Interactions, and ADR

I do get concerned about narrow therapeutic indexes but, I never see lab values so it is hard for me to get too excited about that

I do consider drugs that have narrow ranges for possible drug interactions—I would have to call that more DI

side effects are important but I really only discuss the most common, I like to know how likely they are to occur

right, what is the probability the pt could actually see this

Need to know that

me too, although I will mention a serious one if it is life-threatening and the pt can figure it out by my instructions

something like liver failure where they turn jaundiced or their urine darkens

I concur with the group, I also like to know how long the therapy is going to last, I am less likely to counsel a patient if it is a short duration or prn use. Except antibiotics, I do counsel on those

Getting back to the issue of NTT, I do get lab results back and I do like to monitor the pts, this is an important part of what I do

it goes beyond blood levels, it is about the patient and their therapy

I too like at both serious and common ADRs but more likely to talk about common, you can only go over so much

monitoring is essential, I agree
R> what is the direction of our profession, if we do not monitor the drugs and the pts we give them too.
R> we have to know if they are reaching their target or goals
R> I certainly like to have the indication, there are frustrating times when a patient is getting something and you tell them it is for something else
R> drives me crazy
R> me too
M> any other information that anyone wants to add
M> everyone still there?
R> yes, I am done
R> yep
R> me too
R> still here
M> Ready to give an initial vote, go ahead and take a few minutes to give me your lists
R> indication, length of therapy, drug interactions, ADR, chance of ADR, monitoring
R> monitoring patients is essential top of the list
R> drug interactions, indication, ADR, monitoring
R> after monitoring, I would put drug interactions, use of drug and for what and how long, then ADR and their chance of occurring
R> drug interactions, ADR, use, monitoring
M> Let me put this into a list for voting
M> drug interactions, use of drug (indication), ADR, monitoring, length of therapy, ADR probability
R> looks good
R> I would vote but put ADR probability up with ADR occurrence
R> I would put monitoring first but I really consider all of these issues so the order really makes no difference to me, can we say they all have priority?
M> Sure, I will take that into consideration
R> works for me
M> Do we have consensus?
R> yes
R> yes as long as all considered
R> okay
R> yep
M> On to the last question, same format as before.
M> Discuss this question
M> What are the characteristics that a customer/patient may have that would affect your decision to counsel the patient?
R> age is important to me but profile is essential
R> I need the profile information
R> need to know number of meds, interactions exponentially
R> age is important
R> I find it difficult to counsel patients when they leave and do not come back to get their script until I have left or I don't know they were there to pick it up and the tech sends them on their way without talking to me first.
R> It is hard because people don't like to wait but I like to know if they are there.
R> me too!! So frustrating.
R> this maybe a unique issue since I work in a clinic but we have major issues with language barriers primarily migrant workers who speak predominately Spanish.
R> I have that problem as well but mine is not Spanish but rather Japanese since Honda and Panasonic are near our store.
R> often the Japanese men have better English skills but if they are not the patient or not picking up the script, it is hard.
R> I just had a case whether the mother was picking up a script for her son and I could not communicate at all—it scared me because I am not sure she understood how to give the antibiotic.
R> I am going to bring up insurance issues again, what they will pay for and what they won't.
R> if the insurance company requires counseling, we have had some reports from our headquarters that insurance companies have gotten complaints about not counseling and that if they require it, they won't pay.
R> so we ask now and have them sign as to whether we counseled.
R> we have them sign too.
R> I deal with mostly government contracts so we are required to counsel.
M> Any other ideas.
R> no.
R> done.
R> me too.
R> no.
M> okay, then give me your list.
R> # meds, profile, age, allergies, etc., if they are waiting and language barriers.
R> age, insurance coverage, English, profile info.
R> if they are here, who is picking it up, meds on profile, age, allergies, insurance card.
R> how many meds, age, are they there and who is picking it up, coverage.
M> Anything else?
R> no.
R> no.
R> no.
R> no.
M> Give me a minute to summarize.
R> ok.
R> k.
M> # of meds on profile, age, who is waiting, who is picking up Rx, allergies, insurance coverage, language.
R> okay.
R> works for me
R> I would move language up after age
R> I agree
R> I can live with that
M> Ready for final vote
R> mine is the same
R> I agree with what you have just put language as a priority
R> I am okay with it
M> Any other issues or concerns that you want to raise?
R> No
R> Not for me
R> no, I'm done
R> No
M> okay then, thank you so much for participating
M> I will share my results
M> Thanks again and good night
R> Good night
R> Nite
R> See you
R> Goodnight
Transcript: Nominal Grouping
Group Two
May 20, 1999
10:30 PM EST

CODING: M for Moderator and R is for Participants

M>Hello, I will be providing everyone with additional information on how we are going to run this nominal group. We will be following a specific order. Just so everyone knows, you all have been given a code to respond which will show up on the screen as an “R”. There is no way to identify who you are and what response you have given. Your answers are completely anonymous. Here is the procedure:

R> Hi, Karen
M> Hi
R> How is it going?
M> Good
R> It appears as though we have everyone on board, I see four codes
M> Ready?
R> Yes
R> Yes
R> Yep
R> Ready
M> Here are the stages
M> Stage I: Idea generation
M> Stage II: Round-robin feedback
M> Stage III: Discussion
M> Stage IV: Initial voting on priority items
    (Prioritize the items based on those with that you feel would have the greatest impact on your decision to counsel?)
M> Stage V: Discussion of voting
M> Stage VI: Final vote
    (After listening to all of the discussions, please rank those items that you feel would have the greatest impact on patient counseling?)

M> Any questions for me before we start?
R> Hi Karen
R> No
R> No
R> Ready and waiting
R> I am still at work, so I am ready to go, my partner should be covering the phones
M> Let me know if you have to leave so that I know if you have left the conversation
R> okay
M> Please respond to this question
M> What professional issues or counseling issues do you feel impact your decision to counsel a patient on their prescription?
R> time
R> yeah, time
R> who has enough time
R> to many prescriptions for one person to handle
R> it would not be so bad if you did not have to fight with the third parties all of the time, I feel like my phone is connected to them constantly. What they will cover and what they won't. Give us a better idea.
R> Tell the doctors too!
R> I counsel my patients regardless, the hard part is having to call the office when the card does not cover the med and now you have to call to get it changed
R> I know some companies are tracking with customers about who gets counseled
R> Do any of you get paid for that
R> Sometimes
R> me too
R> We do but not often or it is related to more of a disease-state management intervention depending on the plan
R> I take more time to counsel customers with certain problems like blood pressure and diabetes
R> they just require more time and care
R> esp. if newly diagnosed
R> right
R> I think is important to know what is on there profile
R> I know too many pharmacists that just bypass the meds screen but you got to know
R> I like to know if they have any problems with their meds like allergies, intolerances, drug interaction issues
R> I am going to harp on time again, this is such a big issue
R> I get tired of working 10-12 hour days with barely time to eat or pee
R> ME TOO
R> I have learned to divide and conquer
R> I have certain rules I go by
R> Such as?
R> I look at whether it is a new script and if I know the customer, I look at coverage and cost, I look at the profile for age, allergies, intolerances, preferences like that
R> I am more likely to counsel a new script than an old one
R> I know which customers need my help
M> Any other issues that you want to share? Other ideas? Are we missing anything?
R> done
R> no
R> no
R> me too
M> any further discussion of the issues
R> no
R> no
R> nope
R> no
M> Ready for the first vote, tell me what priority you would give
time, cost, and coverage, knowing the customer
R> new script, age, allergies, drug interactions, cost, coverage, time
R> new versus refill, cost issues both regular and insurance, profile issues, time
R> cost, refill info or new RX, allergies, time
M> Discussion about this voting
R> I am not sure that time will ever change but it is an important factor, I would put
it last—you just make time. That is the best we can do. I just make people wait
if I think it is important for them to know. I lose customers that way but that is
the only way that I can practice.
R> I agree, I would put it last as well
R> you learn to make time, comes with the territory
R> I would put another plug in for the profile information and the cost
R> I make a conscience effort to save them money especially when they write for
such high price stuff
R> I am not afraid to a call on that one either
R> yeah, but it takes more time out of your day
M> more discussion?
R> no
R> I am off my soap box now
R> me too
R> I am done
M> Give me a minute to summarize the findings
M> okay
M> new script, cost, profile information including allergies, drug interactions,
coverage, time
R> works for me
R> I like it
R> okay
R> yes
M> Any changes that you would like to see?
R> nope
R> fine
R> no
R> okay
M> Ready for final vote?
R> Yes
R> yep

190
M> Give me your final vote
R> same as above
R> me too
R> same as I gave before
R> I vote for what you have
M> Great, thanks. Next question.
M> What characteristics of the drug product impact on your decision to counsel a patient about their medication?
R> that is an easy one
R> side effects esp. things that are common or if they are like gray box warnings
R> something the company has sent a letter about
R> a “dear” letter
R> yep that kind
R> the old dear pharmacist letter
R> drug interactions
R> I like to know what the drug is being used for
R> it helps when you get weird doses, like I filled one the other day for Tagamet for a 8 year old kid for warts. Really strange dose
R> Really?
R> I have seen that as well
R> I’m telling the mom about acid reflux and she is looking at me like I am nuts
R> of course my face said it all when she told me it was for his warts
R> go figure
R> I am less likely to get concerned about the serious adverse stuff
R> I like to concentrate on the common side effects
R> I work in a clinic environment—we do dispense—but we also monitor the pt
R> so we have monitoring charts for things like ADR, DI, blood levels, renal and hepatic function
R> we are responsible for notifying the docs if we see something out of wack
R> we monitor our customers but in ways like how are they reaching their goals, what is their blood pressure, what is their blood glucose and hemoglobin A1c, stuff like that
R> we don’t have access to that but we do try to follow our regular customers, you are more advanced then us
M> Any other thoughts, ideas, comments?
R> no
R> nope
R> done
R> no
M> let us vote then, give me your priorities
R> use, ADRs, DI, blood levels
R> indications like Tagamet for warts, how long they are being treated (I think I forgot to say this before—I am trying to scroll back in the log—don’t see it), ADR, DI
monitoring in general whether that be ADRs, incidence of reactions, DI, use or goals of therapy, I think they are all relevant
me too, it is hard to vote, I think they should all be included
I can include them all, I need to get a general sense for the important issues in order to describe realistic scenarios
Gotcha
That sounds cool
Are you going to share your results
I hope to
I will let you know when it is all done
Any discussion about the votes and preferences or changes in priority?
Comments?
no
done
nope
no
Final vote
same as above
monitoring, use, goals
same
what you put up works for me
good, thanks
next question
What are the characteristics (such as age or disability) that a customer/patient may have that would affect your decision to counsel the patient?
age is a big issue, the peds and elderly esp
I like to know the profile information
I think we do a good job of recording the necessary things like age, reactions, problems, number of meds
we could do a better job with otc stuff
our clinic records OTCs as part of our med history
I would say the med history which could be someone elses profile
I like to know who I am talking to when I counsel, is it the patient?
I am counseling the wrong person about the inhaler—I need to see the pt
Our clinic requires us to talk directly to the patient whenever possible
That is not always possible, it can be hard in some of our stores
I agree with age
I also agree with number of meds on profile that is so important
we have the automatic drug interaction checks
any other comments?
no
nope
done
no

192
M> ready to give me your priority list?
R> yes
R> sure
R> profile, age, who am I talking to
R> # drugs, age, profile stuff, age, regular customer that I know
R> profile, age, allergies
R> meds, age, allergies, waiting on script, if I know they need help or if they don’t
M> Give me a minute to summarize
M> # of meds on profile, other profile information like age and allergies, regular
customer, if they are waiting, who you are talking to
R> looks good
R> ditto
R> yes
R> I would move the knowing the customer up further in the list but I like it
M> any more discussion about the vote? Comments?
R> no
R> no
R> nope
R> ditto
M> Ready for final vote
R> same as above
R> same
R> # meds, profile, who is waiting
R> I agree
M> okay, great
M> I think we are done, anything else?
M> Thanks so much for your help
M> I will keep you posted
R> no
R> no, good night
R> nope
R> no
M> good night
R> bye
This is to notify you of the approval of your proposal submitted to the Ohio Northern University’s IRB on April 15, 1999. At the May 5, 1999 meeting, your proposal titled, “A Study of the Adaptive Decision-making Ability of Pharmacists’ When Patient Counseling Using Process-Tracing Techniques” was been approved by the committee as submitted.
APPENDIX C
Demographic Survey

This survey is part of a research project that is utilizing a MouseLab program to look at how pharmacists make decisions about patient counseling. Please provide the following information prior to completing the MouseLab. All information will be strictly confidential and all results will be reported as grouped data. This survey should take you less than 5 minutes to complete. Please give the completed survey to the researcher when you have completed all of the questions.

1. What is your age? _____________________

2. What is your gender?

   _____ Male

   _____ Female

3. What year did you graduate from pharmacy school?__________

4. What is the location of your practice site?

   _____ Urban (> 100,000 people)

   _____ Rural (< 50,000 people)

5. How many years have you practiced at your current location?

   ____________________________

6. How long have you practiced pharmacy?

   ____________________________

7. Which of the following would best describe your practice site?

   _____ Independent

   _____ Chain
APPENDIX D
Scenario One
The command lines written for scenario one were as follows:

@BEGIN<FILE>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
Thank you for agreeing to participate in this study. The next few screens will have directions for the project and the use of MouseLab.

The Mouse will appear as a cross at the top middle of each screen. To go the next page, the mouse must be taken to the white part at the bottom of the screen. Click on this white line at the bottom to proceed to the next screen.

@END<SCREENTEXT>
@END<TEXT>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
This is an exercise using a program called MouseLab and should take less than 10 minutes of your time. A total of four screens will appear requiring you to look at specific attributes and then select which prescription product you would put as your highest priority in counseling. MOVE AND CLICK the mouse on a covered box to reveal information that you want to view. You may go back to any box and click again to reveal that information for as many times as you feel necessary. Collect the information that you feel is most pertinent to deciding which prescription has the highest priority. You DO NOT have to reveal all of the boxes to make your final decision. When you have decided which prescription you want to choose between Script A, B, C or D, move the mouse to that Script Box at the bottom of the screen and click on it. Once you click on the selected box, you will notice it confirms this at the bottom of the screen. Confirm the correct answer and click at the bottom of the screen to continue to the next screen. On two of the screens, you will see a time clock. The first time clock is 30 seconds in length and the second time clock is 45 seconds in length. When the time clock runs out, you will be asked to make your choice at that point. Click on your answer as soon as you have made a decision. You do not have to wait for the time clock to run out. Continue through and complete each screen until the screen goes blank.

@END<SCREENTEXT>
@END<TEXT>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
The following abbreviations are used.
CBC complete blood count
WBC white blood count
fxn function
fail failure
SCr serum creatinine as an indicator of renal function
Dec decreased
GI  gastrointestinal  
K+  potassium level  
It is very important to move the mouse around the boxes (in the  
black area of the screen) that you do not want to look at. Passing  
the mouse over the white boxes will result in the boxes opening and  
the computer reports that information as part of your decision  
process.

This is the last instruction screen. The next screen will be a  
practice screen so that you can become familiar with how the  
Mouselab works. After that screen, the experiment will begin. If you have questions about this process, please ask the researcher now.

Thank you for your assistance in this research project.
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<th>Priority</th>
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<td>SCR, K+</td>
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END MATRIX

BEGIN MATRIX

SET RESPONSELINE="Which script would have top priority for patient counseling." »

SET TRANSPOSE=ON

SET CLOCK=ON; TIME=45.0

SET ALTERNATIVES=4; ATTRIBUTES=8


SET ATTR[3]="Therapy Length"

SET ATTR[4]="Common ADR"

SET ATTR[5]="Severe ADR"

SET ATTR[6]="ADR Probability"

SET ATTR[7]="Drug Interaction"

SET ATTR[8]="Monitoring"

SET BOX[1,1]="$50.00"; BOX[2,1]="$60.00"; BOX[3,1]="$53.00"; BOX[4,1]="$57.00";

SET BOX[1,2]="Arrhythmia"; BOX[2,2]="Anticonvulsant"

SET BOX[3,2]="Antifungal"; BOX[4,2]="Diabetes"

SET BOX[1,3]="maintenance"; BOX[2,3]="maintenance"

SET BOX[3,3]="20 days"; BOX[4,3]="maintenance"


SET BOX[4,4]="Constipation"

SET BOX[1,5]="liver fail"; BOX[2,5]="dec WBC"

SET BOX[3,5]="renal fail"; BOX[4,5]="dec platelets"

SET BOX[1,6]="0.001%"; BOX[2,6]="0.0015%"; BOX[3,6]="0.007%"; BOX[4,6]="0.03%"


SET BOX[1,8]="liver fxn"; BOX[2,8]="CBC"; BOX[3,8]="SCR, K+"

SET BOX[4,8]="blood level"

END MATRIX

SET RESPONSELINE="Which script would have top priority for patient counseling."

SET TRANSPOSE=ON

SET CLOCK=ON; TIME=45.0

SET ALTERNATIVES=4; ATTRIBUTES=8


SET ATTR[3]="Therapy Length"

SET ATTR[4]="Common ADR"

SET ATTR[5]="Severe ADR"

SET ATTR[6]="ADR Probability"

SET ATTR[7]="Drug Interaction"

SET ATTR[8]="Monitoring"

SET BOX[1,1]="$57.50"; BOX[2,1]="$55.00"; BOX[3,1]="$61.00"; BOX[4,1]="$60.00"

SET BOX[1,2]="Arrhythmia"; BOX[2,2]="Hypertension"

SET BOX[3,2]="Diabetes"; BOX[4,2]="Thyroid"

SET BOX[1,3]="maintenance"; BOX[2,3]="maintenance"

SET BOX[3,3]="45 days"; BOX[4,3]="maintenance"


SET BOX[4,4]="bloating/gas"

SET BOX[1,5]="Allergy"; BOX[2,5]="Dec platelet"

SET BOX[3,5]="liver fail"; BOX[4,5]="GI bleed"

SET BOX[1,6]="0.001%"; BOX[2,6]="0.002%"; BOX[3,6]="0.025%"; BOX[4,6]="0.0002%"


SET BOX[1,8]="blood levels"; BOX[2,8]="CBC"
Scenario Two
The command lines for scenario two were as follows:

@BEGIN<FILE>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
Thank you for agreeing to participate in this study. The next few screens will have directions for the project and the use of MouseLab.

The Mouse will appear as a cross at the top middle of each screen. To go to the next page, the mouse must be taken to the white part at the bottom of the screen. Click on this white line at the bottom to proceed to the next screen.
@END<SCREENTEXT>
@END<TEXT>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
This is an exercise using a program called MouseLab and should take less than 10 minutes of your time. A total of four screens will appear requiring you to look at specific attributes and then select which prescription product you would put as your highest priority in counseling. MOVE AND CLICK the mouse on a covered box to reveal information that you want to view. You may go back to any box and click again to reveal that information for as many times as you feel necessary. Collect the information that you feel is most pertinent to deciding which prescription has the highest priority. You DO NOT have to reveal all of the boxes to make your final decision. When you have decided which prescription you want to choose between Script A, B, C or D, move the mouse to that Script Box at the bottom of the screen and click on it. Once you click on the selected box, you will notice it confirms this at the bottom of the screen. Confirm the correct answer and click at the bottom of the screen to continue to the next screen. On two of the screens, you will see a time clock. The first time clock is 30 seconds in length and the second time clock is 45 seconds in length. When the time clock runs out, you will be asked to make your choice at that point. Click on your answer as soon as you have made a decision. You do not have to wait for the time clock to run out. Continue through and complete each screen until the screen goes blank.
@END<SCREENTEXT>
@END<TEXT>
@BEGIN<TEXT>
@BEGIN<SCREENTEXT>
The following abbreviations are used.
# number
It is very important to move the mouse around the boxes (in the black area of the screen) that you do not want to look at. Passing the mouse over the white boxes will result in the boxes opening and the computer reports that information as part of your decision process.

This is the last instruction screen. The next screen will be a practice screen so that you can become familiar with how the Mouselab works. After that screen, the experiment will begin. If you have questions about this process, please ask the researcher now.

Thank you for your assistance in this research project.
@SET<ATTR[6] = "Allergies">
@SET<ATTR[7] = "Pick-up Rx">
@SET<ATTR[8] = "Pt Waiting">
@SET<Box[1,1] = "New"; BOX[2,1] = "Refill"; BOX[3,1] = "New"; BOX[4,1] = "Refill">
@SET<Box[1,2] = "35"; BOX[2,2] = "4">
@SET<Box[3,2] = "87"; BOX[4,2] = "80">
@SET<Box[1,3] = "English"; BOX[2,3] = "English">
@SET<Box[3,3] = "English"; BOX[4,3] = "Spanish">
@SET<Box[1,4] = "3"; BOX[2,4] = "5"; BOX[3,4] = "9">
@SET<Box[4,4] = "2">
@SET<Box[1,5] = "$3 copay"; BOX[2,5] = "welfare">
@SET<Box[3,5] = "cash"; BOX[4,5] = "30% copay">
@SET<Box[1,6] = "none"; BOX[2,6] = "potential"; BOX[3,6] = "potential">
@SET<Box[4,6] = "none">
@SET<Box[1,7] = "Spouse"; BOX[2,7] = "Mother"; BOX[3,7] = "Patient">
@SET<Box[4,7] = "Daughter">
@SET<Box[1,8] = "No"; BOX[2,8] = "No"; BOX[3,8] = "Yes"; BOX[4,8] = "Yes">
@END<MATRIX>
@BEGIN<MATRIX>
@SET<RESPONSELINE = "Which script would have top priority for patient counseling.">
@SET<TRANSPOSE=ON>
@SET<CLOCK=ON; TIME=30.0>
@SET<ALTERNATIVES=4; ATTRIBUTES=8>
@SET<ATTR[1] = "New/Refill"; ATTR[2] = "Pt Age">
@SET<ATTR[3] = "Spoken Lang">
@SET<ATTR[4] = "# Profile Med">
@SET<ATTR[5] = "Ins Cover">
@SET<ATTR[6] = "Allergies">
@SET<ATTR[7] = "Pick-up Rx">
@SET<ATTR[8] = "Pt Waiting">
@SET<Box[1,1] = "New"; BOX[2,1] = "Refill"; BOX[3,1] = "Refill"; BOX[4,1] = "New">
@SET<Box[1,2] = "78"; BOX[2,2] = "41">
@SET<Box[3,2] = "87"; BOX[4,2] = "8">
@SET<Box[1,3] = "Spanish"; BOX[2,3] = "English">
@SET<Box[3,3] = "English"; BOX[4,3] = "English">
@SET<Box[1,4] = "5"; BOX[2,4] = "10"; BOX[3,4] = "6">
@SET<Box[4,4] = "2">
@SET<Box[1,5] = "$5 copay"; BOX[2,5] = "welfare">
@SET<Box[3,5] = "welfare"; BOX[4,5] = "cash">
@SET<Box[1,6] = "potential"; BOX[2,6] = "none"; BOX[3,6] = "potential">
@SET<Box[4,6] = "none">
@SET<Box[1,7] = "Patient"; BOX[2,7] = "Friend"; BOX[3,7] = "Patient">
@SET<Box[4,7] = "Father">
@SET<Box[1,8] = "No"; BOX[2,8] = "Yes"; BOX[3,8] = "Yes"; BOX[4,8] = "No">
@END<MATRIX>
@BEGIN<MATRIX>
@SET<RESPONSELINE = "Which script would have top priority for patient counseling.">
@SET<TRANSPOSE=ON>
Scenario Three
The command lines for scenario three were as follows:

Thank you for agreeing to participate in this study. The next few screens will have directions for the project and the use of MouseLab.

The Mouse will appear as a cross at the top middle of each screen. To go the next page, the mouse must be taken to the white part at the bottom of the screen. Click on this white line at the bottom to proceed to the next screen.

This is an exercise using a program called MouseLab and should take less than 10 minutes of your time. A total of four screens will appear requiring you to look at specific attributes and then select which prescription product you would put as your highest priority in counseling. MOVE AND CLICK the mouse on a covered box to reveal information that you want to view. You may go back to any box and click again to reveal that information for as many times as you feel necessary. Collect the information that you feel is most pertinent to deciding which prescription has the highest priority. You DO NOT have to reveal all of the boxes to make your final decision. When you have decided which prescription you want to choose between Script A, B, C or D, move the mouse to that Script Box at the bottom of the screen and click on it. Once you click on the selected box, you will notice it confirms this at the bottom of the screen. Confirm the correct answer and click at the bottom of the screen to continue to the next screen. On two of the screens, you will see a time clock. The first time clock is 30 seconds in length and the second time clock is 45 seconds in length. When the time clock runs out, you will be asked to make your choice at that point. Click on your answer as soon as you have made a decision. You do not have to wait for the time clock to run out. Continue through and complete each screen until the screen goes blank.

The following abbreviations are used.
It is very important to move the mouse around the boxes (in the black area of the screen) that you do not want to look at. Passing the mouse over the white boxes will result in the boxes opening and the computer reports that information as part of your decision process.

This is the last instruction screen. The next screen will be a practice screen so that you can become familiar with how the Mouselab works. After that screen, the experiment will begin. If you have questions about this process, please ask the researcher now.

Thank you for your assistance in this research project.

The actual study matrices will now appear after this screen.
@SET<TRANSPOSE=ON>
@SET<ALTERNATIVES=4;ATTRIBUTES=8>
@SET<ATTR[1]="New/Refill";ATTR[2]="Use">
@SET<ATTR[3]="Therapy Length">
@SET<ATTR[4]="Pt Age">
@SET<ATTR[5]="Severe ADR">
@SET<ATTR[6]="# Profile Meds">
@SET<ATTR[7]="Drug Interaction">
@SET<ATTR[8]="Cust Waiting">
@SET<Box[1,1]="New";BOX[2,1]="Refill";BOX[3,1]="New";BOX[4,1]="Refill">
@SET<Box[1,2]="Antibiotic";BOX[2,2]="Hypertension">
@SET<Box[3,2]="Inflammation";BOX[4,2]="Arrhythmia">
@SET<Box[1,3]="3 days";BOX[2,3]="maintenance">
@SET<Box[3,3]="PRN";BOX[4,3]="maintenance">
@SET<Box[1,4]="35";BOX[2,4]="4";BOX[3,4]="87">
@SET<Box[4,4]="80">
@SET<Box[1,5]="Allergy";BOX[2,5]="Dec platelet">
@SET<Box[3,5]="GI bleed";BOX[4,5]="liver fail">
@SET<Box[1,6]="3";BOX[2,6]="5";BOX[3,6]="9";BOX[4,6]="2">
@SET<Box[1,7]="none";BOX[2,7]="minor";BOX[3,7]="minor";
@SET<Box[4,7]="major">
@SET<Box[1,8]="No";BOX[2,8]="No";BOX[3,8]="Yes";BOX[4,8]="Yes">
@END<MATRIX>
@BEGIN<MATRIX>
@SET<RESPONSELINE="Which script would have top priority for patient
counseling.">
@SET<TRANSPOSE=ON>
@SET<CLOCK=ON;TIME=30.0>
@SET<ALTERNATIVES=4;ATTRIBUTES=8>
@SET<ATTR[1]="New/Refill";ATTR[2]="Use">
@SET<ATTR[3]="Therapy Length">
@SET<ATTR[4]="Pt Age">
@SET<ATTR[5]="Severe ADR">
@SET<ATTR[6]="# Profile Meds">
@SET<ATTR[7]="Drug Interaction">
@SET<ATTR[8]="Cust Waiting">
@SET<Box[1,1]="New";BOX[2,1]="Refill";BOX[3,1]="Refill";BOX[4,1]="New">
@SET<Box[1,2]="Arrhythmia";BOX[2,2]="Hypertension">
@SET<Box[3,2]="Antibiotic";BOX[4,2]="Antifungal">
@SET<Box[1,3]="maintenance";BOX[2,3]="maintenance">
@SET<Box[3,3]="30 days";BOX[4,3]="30 days">
@SET<Box[1,4]="78";BOX[2,4]="41";BOX[3,4]="87">
@SET<Box[4,4]="8">
@SET<Box[1,5]="nausea";BOX[2,5]="Dec WBC">
@SET<Box[3,5]="liver fail";BOX[4,5]="Dec platelets">
@SET<Box[1,6]="5";BOX[2,6]="10";BOX[3,6]="6";BOX[4,6]="2">

209
@BEGIN<MATRIX>
@SET<RESPONSELINE= "Which script would have top priority for patient counseling.">
@SET<TRANSPOSE=ON>
@SET<ALTERNATIVES=4; ATTRIBUTES=8>
@SET<ATTR[1]= "New/Refill"; ATTR[2]= "Use">
@SET<ATTR[3]= "Therapy Length">
@SET<ATTR[4]= "Pt Age">
@SET<ATTR[5]= "Severe ADR">
@SET<ATTR[6]= "# Profile Meds">
@SET<ATTR[7]= "Drug Interaction">
@SET<ATTR[8]= "Cust Waiting">
@SET<Box[1,1]= "New"; BOX[2,1]= "New"; BOX[3,1]= "New"; BOX[4,1]= "Refill">
@SET<Box[1,2]= "Arrhythmia"; BOX[2,2]= "Anticonvulsant">
@SET<Box[3,2]= "Antifungal"; BOX[4,2]= "Diabetes">
@SET<Box[1,3]= "maintenance"; BOX[2,3]= "maintenance">
@SET<Box[3,3]= "20 days"; BOX[4,3]= "maintenance">
@SET<Box[1,4]= "76"; BOX[2,4]= "78"; BOX[3,4]= "87">
@SET<Box[4,4]= "80">
@SET<Box[1,5]= "Liver fail"; BOX[2,5]= "dec WBC">
@SET<Box[3,5]= "renal fail"; BOX[4,5]= "dec platelets">
@SET<Box[1,6]= "7"; BOX[2,6]= "10"; BOX[3,6]= "9"; BOX[4,6]= "8">
@SET<Box[1,7]= "major"; BOX[2,7]= "major"; BOX[3,7]= "major"; BOX[4,7]= "minor">
@SET<Box[1,8]= "Yes"; BOX[2,8]= "Yes"; BOX[3,8]= "Yes">
@SET<Box[4,8]= "No">
@END<MATRIX>

@BEGIN<MATRIX>
@SET<RESPONSELINE= "Which script would have top priority for patient counseling.">
@SET<TRANSPOSE=ON>
@SET<CLOCK=ON; TIME=45.0>
@SET<ALTERNATIVES=4; ATTRIBUTES=8>
@SET<ATTR[1]= "New/Refill"; ATTR[2]= "Use">
@SET<ATTR[3]= "Therapy Length">
@SET<ATTR[4]= "Pt Age">
@SET<ATTR[5]= "Severe ADR">
@SET<ATTR[6]= "# Profile Meds">
@SET<ATTR[7]= "Drug Interaction">
@SET<ATTR[8]= "Cust Waiting">
@SET<Box[1,1]= "Refill"; BOX[2,1]= "New"; BOX[3,1]= "New"; BOX[4,1]= "New">
@SET<Box[1,2]= "Arrhythmia"; BOX[2,2]= "Hypertension">
@SET<Box[3,2]= "Diabetes"; BOX[4,2]= "Thyroid">
@SET<Box[1,3]= "maintenance"; BOX[2,3]= "maintenance">
@SET<Box[3,3]= "45 days"; BOX[4,3]= "maintenance">
@SET<Box[1,4]= "86"; BOX[2,4]= "75"; BOX[3,4]= "84">
@SET<Box[4,4]= "70">
@SET<Box[1,5]= "Allergy"; BOX[2,5]= "Dec platelet">

210
<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>liver fail</td>
<td>GI bleed</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>major</td>
<td>minor</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
APPENDIX E
## Task Complexity and Time Pressure by Schematic within Each Scenario

<table>
<thead>
<tr>
<th>Schematic One</th>
<th>Schematic Two</th>
<th>Schematic Three</th>
<th>Schematic Four</th>
</tr>
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<tbody>
<tr>
<td>Low task</td>
<td>Low task</td>
<td>High task</td>
<td>High task</td>
</tr>
<tr>
<td>complexity</td>
<td>complexity</td>
<td>complexity</td>
<td>complexity</td>
</tr>
<tr>
<td>No time pressure</td>
<td>Time pressure</td>
<td>No time pressure</td>
<td>Time Pressure</td>
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### Scenario One Schematic One Attributes

<table>
<thead>
<tr>
<th>Prescription</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>$7.50</td>
<td>$35.00</td>
<td>$21.00</td>
<td>$60.00</td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>Antibiotic</td>
<td>Hypertension</td>
<td>Inflammation</td>
<td>Arrhythmia</td>
</tr>
<tr>
<td><strong>Therapy Length</strong></td>
<td>3 days</td>
<td>Maintenance</td>
<td>PRN</td>
<td>Maintenance</td>
</tr>
<tr>
<td><strong>Common ADR</strong></td>
<td>Nausea</td>
<td>Dizziness</td>
<td>Blurred vision</td>
<td>GI upset</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
<td>Allergy</td>
<td>Decrease platelets</td>
<td>GI bleed</td>
<td>Liver failure</td>
</tr>
<tr>
<td><strong>ADR Probability</strong></td>
<td>0.001%</td>
<td>0.01%</td>
<td>0.025%</td>
<td>0.0002%</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>None</td>
<td>Minor</td>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
<td>None</td>
<td>Blood pressure</td>
<td>None</td>
<td>Blood levels</td>
</tr>
<tr>
<td></td>
<td>Prescription A</td>
<td>Prescription B</td>
<td>Prescription C</td>
<td>Prescription D</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$35.50</td>
<td>$9.00</td>
<td>$60.00</td>
<td>$21.00</td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>Arrhythmia</td>
<td>Hypertension</td>
<td>Antibiotics</td>
<td>Antifungal</td>
</tr>
<tr>
<td><strong>Therapy Length</strong></td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>10 days</td>
<td>30 days</td>
</tr>
<tr>
<td><strong>Common ADR</strong></td>
<td>Gas</td>
<td>Nausea</td>
<td>Constipation</td>
<td>GI upset</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
<td>Nausea</td>
<td>Decreased WBC</td>
<td>Liver failure</td>
<td>Decreased platelets</td>
</tr>
<tr>
<td><strong>ADR Probability</strong></td>
<td>0.1%</td>
<td>0.0025%</td>
<td>0.001%</td>
<td>0.0002%</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>None</td>
<td>Minor</td>
<td>None</td>
<td>Major</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
<td>Blood levels</td>
<td>Blood pressure</td>
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**Scenario One Schematic Two Attributes**

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<tr>
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<th>Prescription A</th>
<th>Prescription B</th>
<th>Prescription C</th>
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<tbody>
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<td>$50.00</td>
<td>$60.00</td>
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</tr>
<tr>
<td><strong>Use</strong></td>
<td>Arrhythmia</td>
<td>Seizures</td>
<td>Antifungal</td>
<td>Diabetes</td>
</tr>
<tr>
<td><strong>Therapy Length</strong></td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>20 days</td>
<td>Maintenance</td>
</tr>
<tr>
<td><strong>Common ADR</strong></td>
<td>Nausea</td>
<td>GI upset</td>
<td>Diarrhea</td>
<td>Constipation</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
<td>Liver failure</td>
<td>Decreased WBC</td>
<td>Renal failure</td>
<td>Decreased platelets</td>
</tr>
<tr>
<td><strong>ADR Probability</strong></td>
<td>0.001%</td>
<td>0.0015%</td>
<td>0.007%</td>
<td>0.03%</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Minor</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
<td>Liver function</td>
<td>CBC</td>
<td>SCr, K+</td>
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**Scenario One Schematic Three Attributes**
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<tr>
<td><strong>Use</strong></td>
<td>Arrhythmia</td>
<td>Hypertension</td>
<td>Diabetes</td>
<td>Thyroid</td>
</tr>
<tr>
<td><strong>Therapy Length</strong></td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>45 days</td>
<td>Maintenance</td>
</tr>
<tr>
<td><strong>Common ADR</strong></td>
<td>Nausea</td>
<td>GI upset</td>
<td>Diarrhea</td>
<td>Gas</td>
</tr>
<tr>
<td><strong>Severe ADR</strong></td>
<td>Allergy</td>
<td>Decreased platelets</td>
<td>Liver failure</td>
<td>GI bleed</td>
</tr>
<tr>
<td><strong>ADR Probability</strong></td>
<td>0.001%</td>
<td>0.002%</td>
<td>0.025%</td>
<td>0.0002</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>Major</td>
<td>Minor</td>
<td>Major</td>
<td>Minor</td>
</tr>
<tr>
<td><strong>Monitoring Parameters</strong></td>
<td>Blood levels</td>
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Scenario One Schematic Four

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<td><strong>New/Refill</strong></td>
<td>New</td>
<td>Refill</td>
<td>New</td>
<td>Refill</td>
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<tr>
<td><strong>Patient’s Age</strong></td>
<td>35</td>
<td>4</td>
<td>87</td>
<td>80</td>
</tr>
<tr>
<td><strong>Spoken Language</strong></td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>Spanish</td>
</tr>
<tr>
<td><strong># Profile Medications</strong></td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td><strong>Insurance Coverage</strong></td>
<td>$3.00 copay</td>
<td>Welfare</td>
<td>Cash</td>
<td>30% copay</td>
</tr>
<tr>
<td><strong>Allergies</strong></td>
<td>None</td>
<td>Potential</td>
<td>Potential</td>
<td>None</td>
</tr>
<tr>
<td><strong>Person Picking Up Script</strong></td>
<td>Spouse</td>
<td>Mother</td>
<td>Patient</td>
<td>Daughter</td>
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<tr>
<td><strong>Patient Waiting</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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Scenario Two Schematic One Attributes

215
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Scenario Three Schematic Three Attributes

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Scenario Three Schematic Four Attributes
SUBJECT #11 MouseLab Data

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**ATTs:** 8

| 12 8 8 2 | 0.715 | 1.422 | 1 . | Matrix Screen -> ALTs: 4 |

**ATTs:** 8

| 12 8 8 10 | 0.390 | 0.718 | 2 . |
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| 12 8 8 10 | 0.223 | 0.332 | 6 . |
| 12 8 8 2  | 0.168 | 0.437 | 7 . |
| 12 8 8 4  | 3.129 | 3.457 | 8 . |
| 12 8 8 2  | 0.551 | 0.883 | 9 . |
| 12 8 8 12 | 0.551 | 0.660 | 10 . |
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| 12 8 8 15 | 0.500 | 0.609 | 12 . |
| 12 8 8 23 | 0.441 | 0.441 | 13 . |
| 12 8 8 31 | 1.258 | 1.309 | 14 . |
| 12 8 8 26 | 1.372 | 1.481 | 15 . |
| 12 8 8 25 | 0.992 | 1.152 | 16 . |
| 12 8 8 27 | 1.980 | 2.859 | 17 . |
| 12 8 8 28 | 0.993 | 1.430 | 18 . |
| 12 8 8 29 | 0.660 | 1.262 | 19 . |
| 12 8 8 30 | 0.219 | 0.390 | 20 . |
| 12 8 8 97 | 29.988 | 0.000 | 21 . |
| 12 8 8 36 | 4.832 | 5.160 | 22 . |
| 12 8 8 100 | 36.629 | 0.0 | 23 4.00 |

**ATTs:** 9

| 12 9 9 2 | 0.719 | 0.770 | 1 . | Matrix Screen -> ALTs: 4 |

**ATTs:** 8

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| 12 9 9 26 | 1.652 | 2.250 | 4 . |
| 12 9 9 10 | 0.172 | 0.222 | 5 . |
| 12 9 9 2 | 0.821 | 1.039 | 6 . |
| 12 9 9 3 | 0.391 | 0.391 | 7 . |
| 12 9 9 11 | 0.438 | 0.488 | 8 . |
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236
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| 12 10 10 35 | 1.211 1.653 | 23 |
| 12 10 10 100| 26.961 0.0  | 24 3.00 |
LIST OF REFERENCES


238


Smead, R.J., Wilcox, J.B., & Wilkes, R.E. How valid are product descriptions and protocol in choice experiments? *Journal of Consumer Research, 8*, 37-42.


