EFFECTS OF CULTURAL VALUES AND
ATTRIBUTION OF OUTCOME FEEDBACK ON REASONING
IN CANADIAN AND CHINESE COLLEGE STUDENTS

by

MIN YAO

B.A., Dalian University of Foreign Languages, 1982
M.A., Shanghai Teachers University, 1986
Ed.D., United States International University, 1988

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

(Department of Educational Psychology and Special Education)

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

© Min Yao, 1995
In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Educational Psychology and Special Education

The University of British Columbia
Vancouver, Canada

Date March 15, 1996
ABSTRACT

The primary purpose of the present study was to investigate the joint effects of culture and attribution of outcome feedback on reasoning performance. This study attempted to address four major research questions: (a) Do Canadian and Chinese students have different cultural values and causal attribution patterns? (b) Do pre-experimental individual differences in causal attribution patterns lead to differences in Canadian and Chinese students' inductive reasoning performance? (c) Does attribution of outcome feedback affect Canadian and Chinese students' inductive reasoning performance? (d) Do Canadian and Chinese students conduct deductive reasoning differently as a function of outcome feedback and reasoning task contents?

A total of 120 college students (60 Canadian and 60 Chinese) performed three phases of computerized experimental tasks. The research design involved 2 types of culture groups (Canadian and Chinese) under 3 conditions of outcome feedback (success, failure, and control) as two independent variables. The dependent variables observed were the number of instances used or correct responses made and response time, when possible.

In terms of culture differences, Canadian students appear to be distinct and articulate about the matters of socio-cultural values, while Chinese students are relatively less distinct and articulate. When making attribution for other people's success, both Canadian and Chinese students held internal factors (i.e., good effort and high ability) as responsible. When accounting for other people's failure, Canadian students picked controllable factors (i.e., lack of effort), while Chinese students picked both controllable and uncontrollable factors (i.e., largely lack of effort and occasionally difficult task) as the reasons. However, following the success outcome feedback about their own reasoning performance, Canadian students emphasized mostly high ability and,
occasionally, effort as the reasons, while Chinese students picked mostly good luck and, occasionally, high ability. Given the failure outcome feedback about their own task performance, Canadian students attributed to lack of effort and bad luck as causes, while Chinese students exclusively picked lack of effort as the explanation.

Chinese subjects’ inductive and deductive reasoning performances remained relatively unswayed by success or failure outcome feedback, whereas Canadian subjects’ reasoning performance remained good only when success feedback was received. When failure feedback was provided, Canadian subjects’ reasoning performances deteriorated and remained poor throughout the experiment.

While Chinese students’ reasoning performance is not predictable from their low-ability attribution of other people’s failure outcome, Canadian students’ reasoning performance is highly predictable; that is, the more they attributed others’ failure to low ability, the faster they completed the culture-fair inductive reasoning task. On the other hand, when making attribution based on their own experience, given success feedback, Canadian students attributed their performance to their high ability. Given failure feedback, Canadian students attributed their performance to their lack of effort, with improved performance commensurable to their verbal causal attribution.

The present findings indicate that Canadian and Chinese college students showed differences in causal attribution patterns, depending on when they explain others' success/failure experiences or their own, and further that upon receipt of failure outcome feedback, Canadian students’ reasoning performance deteriorated, while Chinese students' performance remained insensitive to success or failure outcome feedback. Further fine-grained analyses of such causal attribution patterns interacting with outcome feedbacks and cognitive performance needs some more careful studies.
TABLE OF CONTENTS

ABSTRACT ................................................................................................................ ii

LIST OF TABLES ....................................................................................................... vii

ACKNOWLEDGEMENT ........................................................................................... viii

CHAPTER I

INTRODUCTION ............................................................................................................. 1

A. Purpose and Rationale of the Study ....................................................................... 4

B. Scope of the Study and Caveats ............................................................................ 6

CHAPTER II

REVIEW OF RELATED RESEARCH AND DEVELOPMENT OF HYPOTHESES .......... 8

A. Culture and Cultural Values .................................................................................. 8

B. Three Perspectives of Cultural Values ................................................................ 12

C. Reasoning ............................................................................................................. 16

D. Inductive Reasoning and Cultural Contexts ....................................................... 17

E. Deductive Reasoning and Cultural Contexts ...................................................... 19

F. Causal Attribution as Motivational Process and Cultural Contexts ................. 23

G. Development of Hypotheses and Experimental Predictions ............................. 28

CHAPTER III

METHODOLOGY ......................................................................................................... 33

A. An Overview of the Research Methodology ....................................................... 33

B. Experimental Design ......................................................................................... 33

C. Experimental Tasks ............................................................................................. 34

D. Subjects and Data Sources ................................................................................ 42

E. Translation of the Tasks into Chinese .................................................................. 42

F. Experimental Apparatus ...................................................................................... 43

G. Summary of Experimental Procedures .............................................................. 43

H. Pilot Test ............................................................................................................... 45

I. Data Analysis ....................................................................................................... 45
CHAPTER IV

RESULTS 46
A. Characteristics of Subjects and Cultural Context 47
1. Informal Observation of Chinese and Canadian students 47
2. Culture type classification 48
B. Individual Differences in Causal Attribution Patterns of Two Culture Groups 50
C. Analysis of Non-verbal and Verbal Inductive Learning Performances (Tasks 2 and 4) 55
1. Cultural Effects upon Acquisition of Conditional Rules (Non-verbal Task) 55
2. Joint Effects of Culture and Individual Differences in Objective Causal Attribution 57
3. Culture, Outcome Feedback and Their Joint Effects upon Acquisition of
   Conditional Rules (Verbal Task) 58
4. Joint Effects of Culture, Outcome Feedback, and Its Attribution upon Acquisition of
   Conditional Rules (Verbal Task) 62
D. Analysis of Culture-Fair Deductive Reasoning Performance (Tasks 5A, 5B1 and 5B2) 63
1. Applying a Conditional Rule with the Same Content as Task 2 64
2. Applying a Conditional Rule with Different Contents from Those in Task 2 66
E. Analysis of Culture-biased Deductive Reasoning Performance (Tasks 6A, 6B1 to 6B6) 67
1. Applying a Conditional Rule with Familiar Content as Task 4 68
2. Applying a Conditional Rule with Content Different from Task 4 69
   a. Analysis of between-subject results 69
   b. Interaction effects of task content features and culture groups 73
F. Chapter Summary 75
1. Hypothesis of Causal Attribution Patterns 75
2. Individualistic vs. Collective Cultural Preferences 76
3. Hypothesis of Culture and Consequences of Outcome Feedback on Reasoning 77
4. Hypothesis of Culture Effects on Acquisition of Conditional Rules 77
5. Hypothesis of Culture Effects on Application of Conditional Rules 78

CHAPTER V

DISCUSSION AND CONCLUSION 79
A. Summary of the Findings 80
B. Discussion 82
1. A Dialectical View about Reasoning in Different Cultures 82
2. Attribution of Outcome Feedback and Subsequent Reasoning Performance 84
3. Attribution of Outcome Feedback and Conditional Reasoning 85
4. Culture classification 86
C. Internal and External Validity of the Findings 87
1. Internal validity 87
2. External Validity 88
D. Limitations of the Present Study 89
E. Suggestions for Further Study 90
F. Conclusion 91

REFERENCES 93

APPENDICES

APPENDIX A 102
Task 1A: Objective Causal Attribution Task 102
APPENDIX B 104
Task 1B: Culture Type Classification Task 104
APPENDIX C 105
Task 2: Non-verbal Inductive (culture-fair) Reasoning Task 105
APPENDIX D 107
Task 3: Post-Task Performance Causal Attribution Task 107

March 12, 1996
<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>108</td>
</tr>
<tr>
<td>Task 4: Culture-biased Inductive Reasoning</td>
<td>108</td>
</tr>
<tr>
<td>F</td>
<td>110</td>
</tr>
<tr>
<td>Task 5A: Rule Application with Culture-Fair Arguments (Familiar Contents)</td>
<td>110</td>
</tr>
<tr>
<td>Task 5B1: Rule Application with Culture-Fair Arguments (Unfamiliar Contents)</td>
<td>111</td>
</tr>
<tr>
<td>Task 5B2: Rule Application with Culture-Fair Arguments (Unfamiliar Contents)</td>
<td>112</td>
</tr>
<tr>
<td>G</td>
<td>113</td>
</tr>
<tr>
<td>Task 6A: Rule Application with Culture-Biased Arguments (Familiar Contents)</td>
<td>113</td>
</tr>
<tr>
<td>Task 6B1: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)</td>
<td>114</td>
</tr>
<tr>
<td>Task 6B2: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)</td>
<td>115</td>
</tr>
<tr>
<td>Task 6B3: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)</td>
<td>116</td>
</tr>
<tr>
<td>Task 6B5: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)</td>
<td>118</td>
</tr>
<tr>
<td>Task 6B6: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)</td>
<td>119</td>
</tr>
<tr>
<td>H</td>
<td>120</td>
</tr>
<tr>
<td>TASKS AND INSTRUCTIONS FOR CHINESE SUBJECTS</td>
<td>120</td>
</tr>
<tr>
<td>试题一 (A)</td>
<td>121</td>
</tr>
<tr>
<td>试题一 (B)</td>
<td>123</td>
</tr>
<tr>
<td>试题二</td>
<td>125</td>
</tr>
<tr>
<td>试题三</td>
<td>127</td>
</tr>
<tr>
<td>试题四</td>
<td>128</td>
</tr>
<tr>
<td>试题五</td>
<td>130</td>
</tr>
<tr>
<td>试题五B1</td>
<td>131</td>
</tr>
<tr>
<td>试题五B2</td>
<td>132</td>
</tr>
<tr>
<td>试题六</td>
<td>133</td>
</tr>
<tr>
<td>试题6B1</td>
<td>134</td>
</tr>
<tr>
<td>试题6B2</td>
<td>135</td>
</tr>
<tr>
<td>试题6B3</td>
<td>136</td>
</tr>
<tr>
<td>试题6B4</td>
<td>137</td>
</tr>
<tr>
<td>试题6B5</td>
<td>138</td>
</tr>
<tr>
<td>试题6B6</td>
<td>139</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

Table 1. Experimental Design .................................................................................................................. 34
Table 2. Rule Truth Table for Task 2 ......................................................................................................... 37
Table 3. Rule Truth Table for Task 4 ......................................................................................................... 39
Table 4. Eight Types of Deductive Conditional Arguments in Task 5 ..................................................... 40
Table 5. Cell Means of Cultural Orientation (Preference) Scores by Culture Groups ............................... 48
Table 6. Cell Means of Aggregated Causal Attribution Scores by Culture Groups ................................. 51
Table 7. Pre- vs. Post- Performance Causal Attribution Patterns by Culture Groups ............................... 53
Table 8. Task 2: Means of the Total Number of Rule Instances and the Amount of Time Required for Mastery of Non-verbal Induction Task (Task 2) ........................................................................ 56
Table 9. Within-corrections of Four Success and Four Failure Attribution Scores with the Amount of Time to Mastery of Non-Verbal Inductive Task (Task 2) by Two Culture Groups (N=80) ........... 58
Table 10. Task 4: Cell Means of Total Number of Rule Instances Required for and Total Amount of Time Taken to Master the Criterion with Verbal Induction Task by Culture Groups and Outcome Feedback and Self-Attribution Choices .................................................................................. 59
Table 11. Task 4: Marginal Means of Number of Instances Required for and Amount of Time Spent on Mastering Performance Criterion by Culture Groups and by Outcome Feedback .......... 60
Table 12. Within-Correlations of Four Self-Attribution Choices at Outcome Feedback with the Amount of Time to Mastery of Verbal Inductive Task (Task 4) by Culture and Outcome Feedback (N=80) ........... 63
Table 13. Cell Means of Number of Correct Responses by Culture and Outcome Feedback (Tasks 5A and 5B) ................................................................................................................................................................. 64
Table 14 Tasks 6A: Cell Means of Correct Deductive Reasoning Response by Culture and Outcome Feedback Groups ........................................................................................................................................ 68
Table 15. Tasks 6B1 through 6B6: Cell Means of Correct Deductive Reasoning Response by Culture and Outcome Feedback Groups ........................................................................................................... 69
Table 16. Joint Effects of Culture and Outcome Feedback: Success vs. Control ........................................ 70
Table 17. Joint Effects of Culture and Outcome Feedback: Failure vs. Control ........................................ 71
Table 18. Culture Effects on Deductive Reasoning ..................................................................................... 71
Table 19. Outcome-Feedback Effects: Success vs. Control ....................................................................... 72
Table 20. Outcome-Feedback Effects: Failure vs. Control ....................................................................... 72
Table 21. Cell Means of Within-Subject Effects by Culture Groups ............................................................ 74
ACKNOWLEDGMENT

I am grateful to Dr. Seong-Soo Lee, the thesis supervisor and chair on my thesis advisory committee. His expertise, guidance, and encouragement contributed greatly to the completion of this research. Without his encouragement and guidance, I would never have completed this study.

I would also like to express my sincere appreciation to Dr. Art More, a member on my thesis advisory committee, for his warmest encouragement and constructive suggestions.

My thanks also go to Dr. Shelley Hymel, who kindly put aside her own work and accepted the invitation to be on the thesis supervisory committee at a critical time of my program. I am grateful for her detailed recommendations for finalizing the present study.

I would also like to thank all the students in Canada and China who participated in this study. Their cooperation made it possible to collect the necessary data for completing this study.
CHAPTER I

INTRODUCTION

The broad goal of this study was to gain an understanding of how people reason under different cultural contexts. Specifically, this study attempted to determine the relationship between culture and conditional reasoning by (a) examining reasoning outcomes as a result of differences in cultural beliefs, and by (b) manipulating attribution antecedents.

The study of reasoning is not a new subject. Many researchers have focused their attention on this subject, and different theories have been proposed and tested (e.g., Begg & Denny, 1969; Griggs & Cox, 1982; Holland, Holyoak, Nisbett, & Thargard, 1987; Mayer, 1992; Johnson-Laird, 1983, 1988; Lee & Lee, 1983; Lee, 1984, 1985; Staudenmayer & Bourne, 1978; Wason, 1966; Woodworth & Sells, 1935). A great deal of effort on this subject has broadened our view of human thinking. However, most of the findings were obtained in uni-cultural settings; few have taken cultural differences into research design consideration.

In the domain of cultural psychology a large number of researchers have addressed a broad range of topics in different cultural settings. For example, they

In addition, in the field of motivation research a number of researchers have explored the generalizability of attribution theories to non-Western cultures (e.g., Hortacsu & Karanci, 1987; Miller, 1984; Pepitone & Triandis, 1987; Shweder & Bourne, 1984; Stipek, Weiner & Li, 1989). Although these researchers have made progress on the generalizability of the general principles of attribution theories to other cultures, attribution behaviour was typically examined in isolation from the underlying cognitive process. Their discussion was generally limited to social motivational aspects of the attribution behaviour.

To understand human thinking in general and conditional reasoning in particular at a more authentic level, we need to study it in motivated cognition involving attribution patterns of behaviours in different cultural contexts. After all, we are living in a complex world and our thinking does not take place in a vacuum. Whenever we are trying to "figure out" how to do something or why something has happened, we not only have to examine the event per se, but also must consider the context in which the event took place or is going to take place. Inevitably, our thinking is influenced by the context in which the event has happened or is going to happen. Given a different context, we may perceive the same event from a different angle and come to a different conclusion about the event. This is especially likely to be true when the participants of the events were brought up in different cultures and follow certain cultural conventions. Therefore, to understand reasoning in a motivated human situation, we must take into account
motivated behaviour in different cultural contexts as well as the cognitive process of reasoning per se.

Empirical research in areas other than reasoning has shown that similar subjects in different cultures tend to perform the same tasks differently. For example, students in different cultures consistently have different mathematics achievement levels (Dossey et al., 1988; McKnight et al., 1987; Stevenson et al., 1986; Stigler et al., 1982), and general attribution patterns vary from one culture to the other (Betancourt & Weiner, 1982). In view of the findings of these cross-cultural studies, it is reasonable to assume that general cultural values, as related to attribution patterns and outcome feedback, would somehow affect reasoning processes and outcomes.

There are many definitions of culture by various researchers, and they have all contributed to cross-cultural research in one way or the other. However, for the purpose of this study, culture is defined as a set of human-made objective and subjective elements that in the past have increased the probability of survival and resulted in satisfactions for the participants in an ecological niche, and thus became shared among those who could communicate with each other because they had a common language and they lived in the same time and place (Triandis, 1994). Cultural values in the present study are discussed in terms of three levels: individual, family, and society. At the individual level, there are the egocentric self (exclusive self) who is a me-only individual, and the general self (inclusive self) who accommodates others. At this level, culture includes all personal (both inclusive and exclusive) aspects related to life and beliefs. At the family level, culture includes all aspects of life and beliefs pertinent to a group of individuals living under one roof. Collectively, this group of individuals have blood bond (e.g., parents and children) and share their resources for common goals (e.g., raising children). At the level of society, culture covers groups of individuals who speak the same language(s), live at defined geographical locations (e.g., Canada, China, or Russia), and share the same beliefs (e.g., bad luck associated with Friday the 13th in the United States and Canada, or effects of medical herb or acupuncture treating patients with cancer in China). An
individual may be a member of more than one group (as family member, political party member, a citizen of a nation, etc.) and function at different levels in a culture.

A. Purpose and Rationale of the Study

The purpose of the present study was to determine whether cultural values and associated motivational mechanisms would influence reasoning processes and outcomes. The primary reason for studying reasoning in different cultural contexts was that it would broaden our view and enhance our understanding of human reasoning. Although the research findings on reasoning by three generations of psychologists have greatly enriched our understanding of human thinking, nearly all the work was conducted in unicultural settings, mostly in Western cultures. Cultural factors have largely been left untouched in the study of human reasoning. Therefore, there is a need to determine if and how cultural values would influence human reasoning.

Regarding the role of cultural values in human reasoning, we may derive at least three different views from two general research paradigms (see Pepper, 1942; Reese & Overton, 1970). The first is the contextualist approach derived from a Vygotskian world view which emphasizes the role of historical events in cognitive development, and believes that cognitive ability is largely determined by social contexts. Following this view, human reasoning is entrenched, to a large extent, in the cultural settings in which people live. Because there are different cultures, there must be differences in human reasoning.

The second approach may be derived from the organismic view, which believes that people develop cognitive skills with few cultural constraints. Following this view, people develop more or less the same reasoning ability in different cultural contexts. Therefore, people in different cultures have more or less the same reasoning skills and perform reasoning tasks relatively free from cultural contexts.

However, we may also derive a third view by formulating a new perspective from the above two approaches. That is, the development of cognitive skills is partially an
internal cognitive process and partially influenced by social-cultural contexts. Following this view, human reasoning is, in general, a cognitive process of people in all cultures; however, there are differences in reasoning due to the influence of different values in different cultures.

It was hoped that the present study would shed some light on the theoretical formulation for cross-cultural aspects of human reasoning and be useful for conceiving a research paradigm whereby cross-cultural factors affecting reasoning could be identified. If no difference in reasoning process and thereby performance are found across different cultural groups, then studying cross-cultural reasoning from the perspective of the organismic-structuralist paradigm would be a useful avenue. If, on the other hand, we found that one cultural group's reasoning performance is quite different from another cultural group, then pursuing this topic from the contextualist research paradigm would be a more viable line of investigation. However, if reasoning performance between different cultural groups only differ to some extent, we would have to take the third view and admit that certain, not all, cultural values influenced reasoning performance.

The reason for taking attribution research issues into account in the present study was that the construct of attribution process occupies the centre of cognitive motivational mechanisms. In addition, examining the attribution of outcome feedback in different cultural contexts would enhance our knowledge of the joint effects of outcome feedback and cultural values upon reasoning performance. Although a large number of attribution studies have been conducted and some in cross-cultural contexts, none has examined the effects of attribution of outcome feedback upon the subsequent reasoning performance in different cultural contexts. Therefore, the study of attributions for outcome feedback as an additional independent variable in the present study would help us understand not only attribution behaviour per se but also its impact upon subsequent reasoning performance.

The outcomes of this research should have some educational implications, particularly for ESL instruction. Although it is generally believed that cultural values influence human thinking (e.g., Bloom, 1982; Sapir, 1949; Whorf, 1956), it is not clear
what cultural values affect thinking in general and conditional reasoning in particular. Therefore, to determine whether and how cultural values affect reasoning performance may have important implications for the development of more appropriate curriculum for ESL instruction. The knowledge of the attribution of outcome feedback and reasoning performance of students from different cultures helps instructors use appropriate intervention strategies in classroom teaching. In addition, findings of the relationship between inductive reasoning and deductive reasoning in different cultural settings helps determine the extent to which reasoning performance is mode-specific or mode-general in non-Western cultures (Lee, 1985).

B. Scope of the Study and Caveats

This study is primarily concerned with differences in conditional reasoning as a result of different cultural contexts and attributions for outcome feedback. It attempted to address the questions if and what cultural aspects influence conditional reasoning in the specific contexts of Canadian and Chinese cultures. In other words, the research interest of the present study is focused on the intersection between reasoning process and attributions for outcome feedback across cultural contexts.

Before reviewing literature and developing testable hypotheses, three assumptions about cross-cultural studies need to be made and examined for their validity. These three assumptions were adapted from Shweder and Sullivan (1993). These assumptions should remind us of the limitations of cross-cultural studies in general and the caveats of this study in particular.

First of all, cross-cultural research is the study of experience-near concepts. This means that acts of interpretation and representation can take place so rapidly and unconsciously that they are experienced by subjects as indistinguishable from consciousness itself, thereby creating the naive realist illusion that acts of consciousness are unmediated or direct. In other words, it is a kind of research in a realm where it is possible to know more than we can tell.
Secondly, cross-cultural research is the refashion of inherited complexity. This means that cross-cultural research should be conceptualized as the refashioning of what is inherited, prior, built-in, or given. It implies that we humans come to this world with certain innate mechanisms for learning which may or may not be universal. This, however, does not mean that everyone is uniform at birth. The point is that some of the learning mechanisms present at birth and in infancy will be shaped by culture.

Thirdly, recognizing culturally different cognitive functions should not lead to a denial of universals. This means that the goal of this study was not set at denying universals. It is true that certain cognitive functions vary in certain cultures. However, it is not to deny that there exist normal mental functions such as reasoning and attribution in all cultures. Therefore, this study aimed at enhancing the understanding of the differences or variances of cognitive functions in different cultures.
CHAPTER II

REVIEW OF RELATED RESEARCH AND DEVELOPMENT OF HYPOTHESES

As stated in the introduction, virtually all previous research on conditional reasoning was conducted in uni-cultural contexts, and cultural values have not been taken into consideration by previous researchers of human reasoning. It was also pointed out that most findings of attribution research were limited to the description of attribution performance *per se* and did not examine its subsequent effects upon cognitive performance, such as reasoning, especially in cross-cultural contexts. In this chapter, I will review research findings in the domains of reasoning and attribution in terms of the present study, and discuss their implications to the issues addressed in this study. However, before I review research work on reasoning and attribution, I will briefly discuss culture and cultural values.

A. Culture and Cultural Values

Triandis (1989, 1994) believes that cultures vary along three dimensions: (a) the individualistic-collectivist dimension, (b) the tight-loose dimension, and (c) the simple-complex dimension. According to Triandis (1989, 1994), people in individualistic cultures give priority to personal goals over the goals of collectives, tend to have small ingroups, are independent of ingroup members, like to challenge authorities, and emphasize self-reliance, independence, and creativity. In contrast, people in collectivist cultures subordinate their personal goals to the collective goals, are willing to share resources with ingroup memberships, feel interdependent with ingroup members, get
involved in the lives of ingroup members, tend to obey authorities, and stress reliability and proper behaviour.

Tight cultures have clear norms that are reliably imposed. Little deviation from normative behaviour is tolerated and severe sanctions are administered to those who deviate. In contrast, loose cultures have unclear norms about most of social situations or tolerate deviance from the norms. Along the simple-complex dimension, the number of relationships in and between groups is used as a measure for cultural complexity. In simple cultures, the number of relationships in and between groups are small and finite. In complex cultures, the number of relationships in and between groups are large and potentially infinite.

Canada and China include two different cultures. In contrast to Canadians who emphasize self-actualization and originality, Chinese stress obeying authority and altruism. Given the same circumstances, Canadians and Chinese often act differently according to different cultural values. For example, upon hearing compliments, a typical Canadian responds acceptingly with expressions such as "thank you", but a typical Chinese may respond rejectingly with expressions such as "I’m not good" or "not worth mentioning". In terms of social norms, in Canadian culture, being different from others is often encouraged and regarded as expression of self-actualization, whereas in Chinese culture, behaving in conformity with others is appreciated. In Canadian culture, one often has to promote oneself to seek employment; in contrast, in Chinese culture, understatement of one's own achievement is expected and praised as being modest. These differences in belief and values between Canadians and Chinese are my personal observations, and they are supported by the findings of studies of Canadian and Chinese cultures (e.g., Bagley, 1993; Cook, 1994; Li, et al., 1994; Milgrom & Jie, 1994; Rubin, Kenneth, & Li, 1992). These cross-cultural differences imply that same or similar contexts may produce different causal reasoning processes which may or may not be predicted from the reasoning and attribution theories developed in Western cultures.
Following the culture definitions proposed by Triandis (1989, 1994), Canadian culture may be defined by and large as individualistic, loose, and complex, as compared to Chinese culture, which may be classified as collective, tight, and also complex, relative to Canadian culture. That is, the Canadian and Chinese cultures may be regarded as differing in two of the three dimensions identified by Triandis (1989). If such cultural distinctions are valid, we should observe the expected different behaviours from samples in the two cultures along two (individualistic vs. collective and tight vs. loose) of the three cultural dimensions.

In the present study, while referring to Triandis' cross-cultural theory, I operationally defined culture as having three levels: (a) individual, (b) family, and (c) society. These three cultural levels roughly correspond to Triandis' three types of self (private, collective and public). However, there is a fundamental difference between Triandis' selves and the cultural levels. That is, while Triandis' types of self emphasize the aspects of personality in different contexts, the notion of three levels address cultural values influencing the reasoning process of individuals at three levels.

Canadians and Chinese differ considerably at these three cultural levels. As individuals, Canadians believe in acting logically and rationally and being treated fairly. They will not accept someone else's opinion without asking why, even if the opinion is from a top government official. As family members, Canadians encourage children to be autonomous, financially independent, and self-actualized. Parents are less likely to impose their beliefs and opinions upon their children. Parents' role is mediation rather than prescription. Children tend to leave home and be self-reliant from their parents as soon as they are able to. In terms of money matters, there is a clear line between family members. Husbands and wives often keep separate bank accounts. It is not unusual to see Canadian parents lend money to their children with formal legal procedures. Parents' obligation to children seems to end when their children reach legal age. There is a democratic touch in the Canadian family regarding almost everything. Canadian families also tend to be formed and re-formed frequently.
As members of the society at large, Canadians' primary concern is personal. Canadians enjoy more freedom than people in many other cultures. Politically, they are free to form or join a party and elect governments democratically. Economically, there is always the potential of getting wealthy if one turns the right stone or hits the lottery jackpot. Divorce and common-law relationships are accepted in the Canadian society. The government may even pay its citizens for sex re-assignment (e.g., in British Columbia). Creativity and originality are encouraged and appreciated more than hard work in the Canadian society. It is usually easy for Canadians to begin a conversation with strangers and talk about anything but personal life. It is also easy for Canadians to accept people of other cultures even though this sometimes means to bend the Canadian traditions (e.g., turbans allowed in the Royal Canadian Mounted Police).

In contrast to Canadians, as individuals, Chinese believe in hard work and tend to act emotionally and altruistically. They emphasize the integrity of ingroups (e.g., Wang's family, Li's Village, the Chinese nation, the Party). Individuals in the Chinese culture are less likely to challenge authority and often follow a call from their government without thinking if the call is beneficial to their personal goals. As family members, the Chinese are intimate and support each other's goals. Parents have absolute authority over their children even though the children may have become adults and have their own children. Harmony among family members is greatly valued and stressed. Extended families in which three or more generations live under one roof are regarded as signs of harmony and prosperity. Child rearing in Chinese families emphasizes honesty, reliability, obedience to parents and other elders. All members of the family must behave properly and must not bring disgrace to the family name with inappropriate behaviours (e.g., arguing with elders). Sacrifice for other family members, if necessary, is expected and taken for granted. When their children have financial difficulty, parents will try their best to assist by giving money without writing out IOUs. Children are always children in Chinese parents' eyes, no matter how old they have grown. It is always the parents' obligation to help their children when they are in difficulty.

March 12, 1996
As members of the society at large, Chinese tend to avoid political activities. Chinese seldom form political parties or join a political party other than the Communist Party of China even though by the Chinese Constitution they have the rights to do so. High ranking public servants are usually appointed rather than elected. In general, Chinese are less likely to tolerate behaviours that diverge from the cultural norm in the society. Divorce is traditionally considered as a behaviour by people with no sense of shame. Homosexuality is openly condemned and regarded as a crime. However, few would stand up and condemn the members of their society who deviate from the cultural norm. Instead, they would isolate these people. In other words, the punishment is silence and avoidance. Compared with Canadians, Chinese are less likely to reveal their feelings to strangers and usually will not accept foreigners into their social circles. People from other cultures (foreign devils, as often referred by the Chinese) are treated with politeness but may not be allowed into Chinese social ingroups. It is almost impossible for the Chinese Armed Police, the counterpart of Royal Canadian Mounted Police, to bend their uniform rules in order to accommodate the cultural or religious customs of people from minority cultures.

These informal, anecdotal descriptions of readily observable differences at these three cultural levels between Canadians and Chinese as well as findings by other researchers (i.e., Bagley, 1993; Cook, 1994; Li, et al., 1994; Milgrom & Jie, 1994; Rubin, Kenneth, & Li, 1992) suggest that such differences inevitably influence their thinking and other mental activities. Therefore, one can assume that these cultural differences may well lead to differences in conditional reasoning, which is an integrated part of human thinking.

B. Three Perspectives of Cultural Values

As was pointed out in Chapter I, the impact of cultural values upon reasoning may be viewed from three research perspectives - the contextualist view, the organismic view, and a dialectical view.
The contextualist perspective emphasizes the socially and culturally situated nature of reasoning process. Its theoretical argument is primarily derived from Vygotsky's contention that "the social dimension of consciousness is primary in fact and time. The individual dimension of consciousness is derivative and secondary" (1979, p.30).

There are a number of contemporary variants of this social-cultural theory, including cognitive apprenticeship (Brown et al., 1989; Rogoff, 1990), legitimate peripheral participation (Forman, 1992; Lave & Wenger, 1991), and negotiation of meaning in the construction zone (Newman, Griffin, & Cole, 1989). All these variants of the social-cultural theory assume that cognitive processes are subsumed by social and cultural processes, and therefore each of these variants will place reasoning process in co-participation in cultural practices.

In contrast to the contextualist view, the organismic view is mainly derived from the constructivist epistemology put forward by Piaget (1970, 1980). It stresses that reasoning is a process of actively constructing and re-constructing one's knowledge. Reaching a correct reasoning conclusion depends first and foremost on one's sensory motor skills and is relatively independent of social-cultural contexts. Piaget's organismic theory has been advanced by von Glasersfeld (1984, 1987, 1989) into a constructivist model of development and learning. In the model, he integrated Piaget's concepts of assimilation and accommodation with the cybernetic concept of viability. He contends that the driving force of development and learning is self-organization. It follows that reasoning is a process of self-organization in which people re-organize their activity to eliminate uncertainty, and that cultural values (external factors) do not have much role to play in reasoning processes.

Despite their theoretical differences, both the social-cultural theory and the constructivist theory recognize the important role activity plays in learning and development. However, the social-cultural theory stresses activity in culturally organized
practices, whereas constructivists emphasize the organism's sensory-motor activity (Cobb, 1994). Consequently, from the constructivist view reasoning should be studied in terms of conceptual processes located within the organism, whereas the social-cultural approach will be looking at the borderline between the organism and the outside world (i.e., the organism in cultural action).

Lately, some constructivists have begun to recognize the importance of social interaction in learning and development. For example, Bauersfeld (1988) views learning as "characterized by the subjective reconstruction of societal means and models through negotiation of meaning in social interaction" (p.39). This position is getting close to the social-cultural view. In fact, this implicitly acknowledges the importance of social-cultural practices in learning. Conversely, the social-cultural theory does not rule out the constructive activity as part of the learning practice. Therefore, it seems appropriate to say that active individual construction constitutes the background against which guided participation in cultural practices comes to fore for the social-cultural view, and this participation is the background against which self-organization comes to fore for the constructivist view (Cobb, 1994). That is, the two views should be viewed as complimentary to each other rather than opposing each other. To illustrate the point, let us now consider a hypothetical situation.

A Canadian zoology student on a field trip with a local guide in a remote Chinese mountain village hurts his leg by a fall. The statement "If one is hurt, one should see a doctor as soon as possible" holds true for both the student and the guide. However, there is only a Chinese traditional medicine-man in the village. A doctor trained in Western medicine lives five miles away. To the guide, the traditional Chinese medicine-man living in the village is no less a doctor than the one trained in Western medicine five miles away. He therefore would like to take the student to the medicine man. However, for the student who has never been treated by a Chinese traditional medicine-man before, the doctor of Western medicine five miles away is the only choice available. He therefore insists on going for five miles to see the doctor. In this case, both the student
and guide understood the conditional rule. However, when it is put in a cultural context, the reasoning outcomes are different. Because of his past experience in Canadian culture, the student did not consider the Chinese medicine man as a doctor. In contrast, by reason of his cultural belief, the guide did not doubt for a moment that the traditional medicine man was a doctor.

In the above case, neither the constructivist view nor the social-cultural view can provide a satisfactory explanation. The constructivist view may do a good job in explaining the first half of the case that both the student and the guide were able to grasp the meaning of the syllogism "If one is hurt, one should see a doctor as soon as possible". That is, the formal reasoning schema has been developed free from cultural beliefs. However, it is difficult for the constructivist view to explain why the student and his guide reached different conclusions since the constructivist view rules out cultural values as a factor influencing reasoning process.

On the other hand, the contextualist view does a good job explaining the difference in reasoning outcomes. Namely, the difference in cultural values between the student and the guide influenced their reasoning outcomes. However, the contextualist view does not explain well the other half of the story. That is, why both the student and the guide had no problem understanding the statement even though they were brought up and lived in different cultures?

Thus, each of the two opposing views only explains half the story. To provide a comprehensive account of reasoning process, we must take a new view, a dialectical view. Essentially, this dialectical approach argues that both the internal cognitive activities and the external societal interactions play a role in reasoning performance. However, the internal cognitive activities are the pre-requisite for reasoning process, whereas the external social-cultural interactions are the conditions for the reasoning process. Reasoning process is completed through internal cognitive activities in the external social-cultural contexts. In effect, the development of reasoning ability is an internal cognitive process which is influenced by social-cultural contexts. Following this
Cultural Values, Outcome Feedback and Reasoning - Min Yao

view, human reasoning is in general a cognitive ability of people in all cultures, which is affected by social-cultural contexts. Because there are differences between cultures, there are also differences in human reasoning.

C. Reasoning

Reasoning is a basic function of human thinking. It underlies almost all mental activities, such as learning, problem solving, decision-making, and planning. In general, reasoning tasks for research have been arranged in two modes, deductive and inductive. Deductive reasoning involves reaching conclusions based on previous beliefs possibly in a step-by-step manner. Inductive reasoning concerns arriving at conclusions supported but not guaranteed by given beliefs based on subjectivity. While the current research interest in deductive reasoning has been following the tradition set by Peter Wason (see Wason & Johnson-Laird, 1972) and further developed into major programs of propositional reasoning (Johnson-Laird & Byrne, 1991), the recent research interest of inductive reasoning stems from the seminal work by Bruner (1956), investigating the way in which people learn arbitrary sets of geometric shapes, random dot patterns, or schematic faces. This has also grown into the major front of cognitive science (Holland, Holyoak, Nisbitt, & Thargart, 1987).

To date, there are two noticeable limitations about research on reasoning:

(a) Research on reasoning has by and large been conducted independently, either on inductive reasoning alone or on deductive reasoning alone. The relationships between the two modes of reasoning have not been sufficiently studied.

(b) Virtually all research on reasoning has been conducted in uni-cultural contexts, mostly in Western cultures.

One study that examined both inductive and deductive reasoning modes was done by Lee (1985). In his study, Lee used inductive conditional reasoning tasks as training means and then measured school children’s learning with deductive reasoning tasks. Lee successfully demonstrated the close relationship between inductive and deductive
reasoning and concluded that training in inductive reasoning improved subjects’ performance on deductive reasoning. However, Lee examined the two reasoning modes only in one culture.

In the next two sections, more research work on reasoning will be reviewed, as related to the present study using the conventional distinction between inductive and deductive reasoning.

D. Inductive Reasoning and Cultural Contexts

Early on, the majority of studies on inductive reasoning were conducted in the domain of concept learning. There are two main types of concept-learning tasks used in most of the studies, concept identification and concept formation (Bourne, Jr., 1972; Haygood & Bourne, 1968; Mayer, 1993).

In concept (attribute) identification tasks (e.g., Bruner, 1956), the subject is told, in advance, the number of dimensions/attributes and a defining rule of a concept and asked to identify the relevant attributes that define the target concept. For example, subjects are given a pile of cards with pictures of different colours, shapes, and sizes. The colours are red and green, the shapes are triangle or square, and the sizes are small and large. The subjects are asked to classify the cards into two response categories by testing hypotheses concerning attribute relevance. Each time a subject makes a selection of a set of attributes as relevant, she/he is told if the hypothesis is correct or incorrect. The task will not terminate until the subjects learn the correct set of attributes that define the rule for classification.

A variant of conceptual rule formation, which differs from attribute identification, is that subjects are told the number of dimensions and attributes of a concept (rule), but must develop the conceptual rule by themselves (Lee, 1984, 1985). In the above examples, we present the subjects with a card bearing a red large circle and tell the subjects the card belongs to Category A. Next we present another card bearing a green large square and tell the subjects it also belongs to Category A. We repeat this
presentation procedure with all the cards. Then we present a card with a red large square and ask the subjects to determine to which category this card belongs. The task is terminated when the subjects have learnt the rule and are able to make correct classification. When the subjects come to code the potential dimensions of the concept and formulate the rule(s) for classification, this type of concept learning is also called complete conceptual rule learning.

In the literature about concept learning, there are four primary types of logical rules that have been investigated in the research tradition of classical concept learning. They are the conditional rule (if..., then...), conjunction (and), disjunction (or), and the biconditional (iff), all derived from formal logic. In the present study, the focus was on the formation of the conditional rule.

The basic issue of how concepts (i.e., conditional rules) are learned was addressed by Bourne (1976) and Lee (1985), and more recently by Margolis (1994) (cf., Medin, 1989). In contemporary terms, the rule seems to be constructed by learners through interactive experiences with the aid of feedback from the environment. However, we cannot assume that the learned concepts (i.e., conditional rules) will automatically be transformed into a propositional statement "IF X then Y" and used in subsequent reasoning performance (see Lee, 1985). In other words, the learned concepts will not be automatically transferred and applied to new situations unless something is done to facilitate the transfer of the learned concept to new situations (tasks). What constrains the transfer? Lee (1985) identified explicit symbolic expressions as a powerful form of the constraints and successfully demonstrated that the transfer was improved by training subjects with explicit symbolic expressions of the conditional rules. However, we know that symbolic, hence, linguistic expressions are only one form of the constraints. I argued that cultural contexts are also a type of constraint. Because of differences in cultural beliefs, certain concepts (conditional rules) may be easy to learn or apply for people in one culture but may prove to be difficult for people in another culture.
Based on the above discussion, the hypothesis about inductive reasoning across cultures is that, in performing inductive reasoning tasks, the success of learning the conditional rule would depend, among other things, on the cultural background of the task contents. Specifically, in performing a culture-fair inductive reasoning task based on geometric shapes as concept attributes, because the geometric shapes would carry little or no cultural constraints, it would be likely to observe little or no difference in the performance on the inductive reasoning tasks between Canadian and Chinese subjects. On the other hand, when an inductive task was based on a belief in Chinese culture but not in Canadian culture, the cultural belief would become a constraint for Canadian subjects to perform the inductive reasoning task. Because of their unfamiliarity with the cultural belief in the task, Canadian subjects would be most likely to take a longer time and more trials to learn the concept as compared with Chinese subjects. In contrast, because of their familiarity with the cultural belief, Chinese subjects would be most likely to learn the concept in less time and fewer trials as compared with Canadian subjects.

For example, October 1 is Chinese National Day, one of the most celebrated statutory holidays in the People’s Republic of China. Offices and factories in China are closed on October 1 to observe the holiday. Therefore, it is natural for Chinese people to associate October 1 with taking a day off from work. Thus, if a reasoning task based on the syllogism “If it is October 1, then do not work” is given to both Canadian and Chinese students, because of their cultural knowledge of the special connotation associated with October 1, Chinese students are expected to come to the correct conclusion faster than Canadian students.

E. Deductive Reasoning and Cultural Contexts

Deductive reasoning can serve as the final cognitive task for the present study. The main format of deductive reasoning is the syllogism consisting of two premises and a conclusion. Syllogisms are known in three kinds, categorical (e.g., chair and furniture relationship), linear (e.g., time sequential relationship), and conditional (Mayer, 1992),
depending on the kind of fundamental structural rule involved. As stated earlier, the focus of this study was on conditional reasoning. Therefore, in the following paragraphs, I will review research work in the area of conditional deductive reasoning, as related to the present study.

Conditional deductive reasoning takes the form "If p, then q; p is given; q", where p is the condition and q is the consequence. This kind of reasoning proposition is called a syllogism. For each syllogism, there are eight possible types of arguments (Lee, 1985), where the left and right side of each "/" are the slot for the minor premise and conclusion, respectively: Affirming antecedent/affirmative (p/q), affirming antecedent/negative (p/not q), denying antecedent/affirmative (not p/q), denying antecedent/negative (not p/not q), affirming consequent/affirmative (q/p), affirming consequent/negative (q/not p), denying consequent/affirmative (not q/p), and denying consequent/negative (not q/not p).

One of the areas which researchers have studied in considerable depth is conditional reasoners' performance on selection tasks. In 1966, Wason published his pioneer study based on a card-selection task. In the experiment, subjects were shown four cards along with the statement that "If a card has a vowel on one side, then it has an even number on the other side". The four cards represented an affirming antecedent (the letter A), denying antecedent (the letter D), affirming consequent (the number 4), and denying consequent (the number 7). The subjects were asked to flip over only necessary cards to validate the truth of the rule statement. As logical reasoners, we would expect that Wason's subjects would turn over only two cards: the letter A and the number 7. Wason found that 46% of his subjects flipped over the letter A and the number 4. Only 4% of the subjects flipped over the two correct cards. Wason's study provided evidence for the argument that humans are not always logical thinkers, but it failed to provide an explanation why people made errors when performing this type of reasoning tasks.

Because Wason's selection task was abstract, it was suspected that subjects might perform differently given concrete tasks. To clarify the clouds over Wason's findings, Johnson-Laird et al. (1972) designed a concrete version of Wason's selection task and
tested it on college students. In the study, the conditional statement became "If an envelope is sealed, then it has a 50-lira stamp on it". The subjects were shown four envelopes: a sealed envelope (affirming antecedent), an unsealed envelope (denying antecedent), an envelope with a 50-lira stamp (affirming consequent), and an envelope with a 40-lira stamp (denying consequent). Contrary to Wason's findings, most of the subjects in the concrete version of the experiment chose the right envelopes. The results from the study imply that human reasoning is influenced by the content of the tasks. The more concrete the task materials, the fewer errors people make. The thematic-material effect found in Johnson-Laird's study was later replicated by other researchers (Griggs & Cox, 1982). Furthermore, based on findings from their studies, Griggs and Cox (1982) argued that what affected subjects' reasoning was not concreteness but familiarity. They proposed what they called the instance theory which argued that subjects performed better in their experiments because they were familiar with the task materials.

The instance theory was challenged by Cheng, Holyoak, and colleagues (Cheng & Holyoak, 1985; Cheng, Holyoak, Nisbett, & Oliver, 1986), who argued that subjects performed better not because they remembered instances of past experience but because they developed a reasoning schema. They suggest a pragmatic reasoning schema theory which states that people reason with highly generalized clusters of rules extracted from experience. To test their theories, Holyoak and colleagues gave subjects a standard envelope task and a modified version of the task with a rationale sentence (permission schema) added to the end of the task. They found that subjects performed better with the rationale version of the task, thus obtaining evidence to support their argument.

However, it is interesting to note that, although the instance theory and the schema theory were proposed as opposing theories, both imply the importance of the context in which the reasoning tasks were presented. With the instance theory, it is the familiarity of the contextual content. The more familiar the contextual content, the better the task performance. With the schema theory, it is the addition of contextual comments or reminders. With appropriate contextual comments, which are not part of the
syllogistic premises *per se*, reasoning performance improved. This leads me to the belief that success in deductive reasoning, as well as in inductive reasoning, depends on the context in which the syllogistic premises are introduced. For the convenience of our discussion, let us use the term "reasoning context" for these relevant aspects of reasoning. 

*On a micro level*, reasoning context may include comments and prompts presented with the premises that guide the learner through the learning and application of the conditional rule, such as used by Lee (1985). *On a macro level*, reasoning context may be any cultural beliefs or values that may influence reasoning outcomes. Thus, because people in different cultures have different beliefs and values, they would perform the same reasoning tasks differently. In other words, certain reasoning constraints may pose a problem for people in one culture but not for people in another culture. That is, people may reason differently due to differences in cultural values and beliefs. This was the central thesis of the present study.

Based on the review of the above research work on conditional reasoning, my contention is that conditional reasoning is, to a considerable extent, specific to cultural context. When the premises of a syllogistic proposition differ from certain beliefs or values in a culture, people in that culture will have difficulty reaching the correct conclusion. Specifically, *as individuals*, because of their traditional belief in certain constructs such as ability, logical action, and equality, Canadians may find it difficult to reach the correct conclusion in a syllogism that uses constructs in conformity to Chinese cultural beliefs but contrary to their own cultural beliefs as premises. In comparison, because the syllogism is based on constructs in conformity to their cultural beliefs such as hard work or obedience, Chinese subjects will probably find it less difficult to reach the correct conclusion.

Because of different beliefs in family and social values, the same difference in deductive reasoning will also be observed at both the family and society levels of cultures. *As family members*, because of their traditional belief in autonomy, financial independence, and self-actualization, Canadians may likely find it easy to reach correct
conclusions in syllogisms with these beliefs built in them. In contrast, Chinese subjects will find it difficult to reach the same conclusions because they believe in harmony, filial obedience, and absolute parental authority which are different from those that Canadians hold.

By the same token, as members of their society at large, Canadians may find it easy to carry out deductive tasks based on their cultural beliefs such as society goals being subsumed by personal goals and differences. In comparison, Chinese subjects may find it difficult to complete the same deductive task because in their culture personal goals are subsumed by the goals of their society.

F. Causal Attribution as Motivational Process and Cultural Context

As stated in Chapter 1, the reason for taking attribution research issues into the present study was that the construct of attribution process occupies the centre of cognitive motivational mechanisms, just as the contextual factors of human cognition are so much potent in our every day mental life. It was hoped that examining the attribution of outcome feedback in different cultural contexts would enhance our knowledge of the joint effects of attribution of outcome feedback and cultural values upon reasoning performance. Although a large number of attribution studies have been conducted and some in cross-cultural context, none has examined the effects of attribution of outcome feedback upon the subsequent reasoning performance in different cultural contexts. Therefore, inclusion of the attribution of outcome feedback as an independent variable in the present study would help us understand not only attribution behaviour per se but also its impact upon subsequent reasoning performance.

It is generally believed that attribution research began with Fritz Heider's milestone book, “The psychology of interpersonal relations” (1958). Early research focused on two broad topics, the perceived causes of other people’s behaviour and the perceived causes of one’s own behaviour. Early attribution researchers made the distinction between attribution theories and attributional theories (Kelley & Michela,
Attribution research involves systematic assessment or manipulation of antecedents of attribution and observation of attribution behaviour. In comparison, attributional researchers focus on the consequences of attribution such as feelings and expectations. In this study, my interest was in consequences of attribution. Further, following the recent trend in attribution research, I used the term "attribution research" to refer to studies of both attribution antecedents and attribution consequences.

The consequences of achievement attribution has been a heated topic and has its practical value in classroom instruction and labour management. The research question here is if and how people react differently after achievement is attributed to different factors. Early research on this topic was conducted by Phares (1957), who found that when subjects were told that their success on a judgment task was due to skill, expectancy of future success was higher than when success was due to chance. In contrast, failure attributed to chance rather than skill led to higher expectancy of future success. This finding suggests that attributing success to internal factors or attributing failure to external factors increases future expectation of success.

Perhaps few early attribution-consequence researchers had more influence on the direction of attribution research than Weiner. In a series of papers, Weiner et al. (1972, 1976, 1979, 1986, 1990) proposed a systematic attribution theory which consists of a two-dimensional classification grid. With this grid, attribution is classified in terms of the two dimensions, stability (stable vs. unstable) and locus (internal vs. external). According to this classification scheme, ability (skill) is internal and stable, luck (chance) is external and unstable, effort is internal and unstable, and task difficulty is external and stable. Weiner (1986) believes that success expectation is a result of the perceived stability of the cause rather than the perceived locus of the cause. Findings by other researchers lent support to Weiner's theory (e.g., Carrol, 1978; Riemer, 1975). In addition to the two attribution dimensions identified by Weiner (1972), a third dimension, globality (global vs. local), was added to the theory by Abramson et al. (1978), who made a distinction between causes across situations and causes specific to a situation. In later
sections, we will review more recent studies in relation to Weiner's attribution classification theory.

In recent years, despite the efforts to synthesize different theories in attribution studies and attempts to achieve a comprehensive theory, classical works on attribution such as Heider (1958), Jones and Davis (1965), and Kelley (1971) remained influential in the 1980s. Attribution researchers in this period mainly tested and refined theories put forward by earlier researchers. One of the important contributions to attribution research was the development of refined instruments for measuring attribution. Noticeable progress was made by Harvey et al. (1980), Wong and Weiner (1981), and Lee and Lee (1983) who devoted much of their research to developing and validating assessment instruments for attribution studies in both natural and experimental settings. Others, influenced by the rise of cognitive research, were concerned with details of attribution processes. Terms such as perceptual processes (McArthur & Ginsburg, 1981; Taylor & Thompson, 1982), cognitive processes, and causal schemata (Fiedler, 1982; Harvey et al., 1980) began to appear in some researchers' work.

Attribution was studied in conjunction with other cognitive performance such as memory (Harvey et al., 1980; Sherman & Titus, 1982; Wells, 1982) and attention (Sabini & Silver, 1981). For example, Meyer (1970, German original; quoted by Weiner, 1972) gave 72 high school students a series of 15-digit progressions to solve. Following their performance, the subjects estimated how many of the problems they answered correctly. Success and failure were manipulated by providing false feedback that two fewer or two more of the problems were solved than anticipated. The subjects then indicated "how much luck or accident played a role" the in the outcome, as well as "how much ability played a role." Responses were on a 10-point scale anchored at the extremes. Meyer found that individuals high in resultant achievement motivation ascribe success to high ability and failure to bad luck, while individuals low in resultant achievement needs attribute success to good luck and failure to a lack of ability.
However, none of these studies took cultural effects into account. Most of the research findings in this period reconfirmed what was proposed by early attribution researchers. In general, the findings suggest that people tend to accept more personal responsibility for their positive outcomes than for their negative outcomes. In the late 1980s, the focus of attribution research began to shift from laboratory experiments to behaviours in classrooms. One of the frequently investigated topics was the so-called human learned helplessness. If an individual frequently makes internal, stable, and global attributions for his/her negative outcomes, that individual is said to demonstrate a "learned helplessness" syndrome (Abramson & Martin, 1981; Dweck, 1986).

The influence of attribution pattern on subsequent learning performance has been reported by Dweck and her colleagues in a number of studies (Cain & Dweck, 1995; Dweck & Leggett, 1988; Heyman & Dweck, 1992a, 1992b; Smiley & Dweck, 1994). Their findings indicate that students who were given negative feedback and then attributed the failure to ability tended to develop the so-called helplessness syndrome, with which students lost the motivation to learn. A number of models for explaining learned helplessness have been proposed (Anderson, 1983; Lewinson et al., 1981; Peterson et al., 1992a, 1992b), but little consensus has been achieved and none of these researchers examined the issue in different cultures.

After more than two decades of research, the attribution field is still full of controversy. There is also a lack of consensus about some key concepts, such as the difference between attribution and attributional research. On the other hand, attribution is studied with a broad range of other cognitive performance variables such as attitude change and persuasion, guilt and anger, commitment, helping behaviour, equity behaviour, and frustration and aggression. Nonetheless, most of these studies were conducted in Western cultures, and few had attempted to extend their theories to the Chinese culture or studied the joint effects of attribution and culture upon reasoning performance.
In an effort to determine if the general attribution theory has explanatory power in different cultures, Weiner and his colleagues conducted a study in the People's Republic of China (Stipek, Weiner, & Li, 1989). The study was carried out with 101 undergraduates at Hangzhou University. Stipek, Weiner and Li used similar tasks designed for American subjects in their earlier studies in the U.S. Among other things, they examined the Chinese subjects' attribution pattern in terms of the relationship between two traditional attribution variables, ability (high and low) and effort (high and low). They found that the Chinese subjects followed a similar attribution pattern as found in American subjects. Ability, as well as effort, was recognized and emphasized by Chinese students as an important factor for success. In failure situations, Chinese students tended to blame the lack of effort and task difficulty. Based on the data obtained from these Chinese students, the authors concluded that there was little difference in attribution behaviour between Chinese and American subjects. They claim that the data obtained from the Chinese subjects provided evidence for generality of their attribution principles from American culture to Chinese culture.

While the data obtained from these 101 Chinese undergraduates seem to be consistent with findings obtained with American subjects in terms of Weiner's general attribution theory (i.e., Weiner et al., 1972, 1976, 1979, 1986, 1990), there are a number of issues that need to be clarified before a definitive conclusion can be drawn. First of all, were the Chinese subjects in the study typical as compared with the general population of Chinese college students? Secondly, compared with Americans, Chinese have traditionally stressed hard work (effort) as the key to success and played down the role of ability in accomplishment. However, Stipek et al. (1989) reported that there was no evidence that Chinese emphasized effort over ability as a cause of achievement. Given the Chinese tradition of valuing hard work as the route to achievement, Weiner et al.'s conclusion seems to be rather debatable.

Thirdly, in their study Stipek et al. asked the subjects to think of themselves as teachers and provide evaluation on pseudo students' achievement performance. In so
doing, the subjects did not personally experience success or failure. This raises a question about the attribution of outcomes provided by the subjects. Had the subjects personally experienced the success or failure on performance tasks, would they have provided the same ratings? Fourthly, Stipek et al. did not investigate the consequences of attribution of outcome feedback. We do not know what effects attributing achievement outcomes have on the Chinese subjects' subsequent actual performance. The data obtained from American subjects suggest that attributing success to ability (an internal factor) will result in more achievement, and attributing success to external factors will result in less achievement in the subsequent performance. Can we obtain similar findings from Chinese and Canadian college students and will Chinese and Canadian college students have different attribution patterns?

These questions lead to two hypotheses regarding casual attribution and cultural context. In terms of attribution pattern, because of the traditional emphasis on hard work and modesty in Chinese culture, it is expected that success will be most likely attributed to effort rather than ability, whereas failure will be more likely attributed to lack of effort rather than low ability by Chinese subjects. In contrast, because of the emphasis on ability in Canadian culture, success is expected to be attributed to ability rather than effort, while failure is expected to be attributed to external factors rather than ability.

In terms of performance after attributions for outcome feedback, because of their traditional emphasis on effort as the key factor for success and failure, Chinese subjects' performance outcomes will not likely be affected by their experience of success or failure. In contrast, because of their emphasis on ability for success or failure, Canadian subjects' performance outcomes will likely be correlated with their experience of success or failure.

G. Development of Hypotheses and Experimental Predictions

The central thesis of the present study is that rule acquisition and application (i.e., inductive and deductive reasoning), as discussed earlier, are affected or biased by
prevailing performance conditions, which include the socio-cultural contexts and the nature of reasoning tasks.

**Hypothesis 1. Attribution Patterns in Different Cultural Contexts:** It is hypothesized that because of their traditional emphasis on hard work as the key to success, Chinese subjects are more likely to attribute success and failure outcomes to effort as compared with Canadians. Conversely, because of the recognition of ability as an important factor for achievement in Western cultures, Canadian subjects are more likely to attribute success outcomes to ability and failure outcomes to task difficulty. Therefore, this hypothesis predicts that differences in cultural beliefs and values will lead to different attribution patterns between Canadian and Chinese subjects. Specifically, Chinese subjects are likely to attribute success and failure outcomes to internal, controllable factors (e.g., effort), whereas Canadian subjects’ attribution patterns will depend more on the outcomes of performance. That is, when success situations are presented, Canadian subjects will attribute the achievement to internal factors such as ability. On the other hand, when failure situations are presented, Canadian subjects will likely choose external factors such as task difficulty for explanation. Also, because of the difference in cultural values between Canadian and Chinese subjects, it is predicted that attribution patterns may change with the shift from attributing others’ success or failure outcomes (objective attribution) to attributing one’s own success or failure outcomes (self attribution).

**Hypothesis 2. Individualistic vs. Collective Cultural Preferences.** According to Triandis (1989, 1994), people in individualistic cultures tend to give priority to personal goals over group goals, consider achievement as personal, and are not willing to share resources, whereas collectivists consider success as group achievement, prioritize group goals, and are willing to share resources. This leads to the prediction that Canadian subjects will be concerned with personal goals and achievements, whereas Chinese subjects will give priority to their family and society.
Hypothesis 3. Consequence of Attribution of Outcome feedback: It is further hypothesized that Chinese subjects' conditional reasoning performance is less likely to be affected by outcome feedback and their attribution patterns because they are accustomed to attribute both success or failure experience to effort (an internal controllable factor). On the other hand, whether or not Canadian subjects' conditional reasoning performance will be affected by their attribution patterns depends on the feedback about their performance (i.e., success or failure). More specifically, regardless of culture group membership, when a subject experiences success and attributes it to high ability, his/her subsequent reasoning performance will not likely be affected. On the other hand, if a Chinese subject experiences failure and attributes it to low effort, his/her subsequent reasoning performance will not likely be affected because of the Chinese cultural belief in emphasis on hard work as the key to success. However, if a Canadian subject experiences failure and attributes it to poor ability, his/her subsequent cognitive performance will be depressed as a result of emotional consequences (Weiner, 1986). This hypothesis predicts that Chinese subjects' reasoning performance as measured by response time and number of correct responses will be more or less the same regardless of success or failure feedback and irrespective of prior attribution patterns. On the other hand, Canadian subjects who experienced failure will not perform reasoning tasks as well as those who experienced success.

Hypothesis 4. Conditional Rule Acquisition (Inductive Reasoning): As argued earlier, cultural values are hypothesized to function as a moderating variable in rule learning (inductive reasoning). If the content of a conditional rule is culture-fair in that the rule instances carry no biased cue to people of any particular culture, the rule will be acquired by people in different cultural settings with equal amount of effort. If, however, the content of a conditional rule is culture-biased in that people's knowledge or past experience in certain cultures facilitates the learning of rule instances, the rule will be acquired by these people with less effort, as compared with those who do not have such cultural knowledge or experience. Accordingly, it predicts that (a) both Canadian and
Chinese college students will make more or less the same number of errors in learning a culture-fair conditional rule with colour (e.g., red, blue, or yellow) and geometric shapes (i.e., square, triangle, circle) as relevant dimensions of rule instances, and that (b) as compared with Canadian students, Chinese students will make fewer errors in learning a conditional rule based on an event in the Chinese culture, because the instances of the culture-biased task are biased towards Chinese subjects.

Hypothesis 5. Conditional Rule Application (Deductive Reasoning): Similarly, cultural values are also hypothesized to function as a moderating variable in deductive reasoning (i.e., application of a conditional rule) as argued earlier. If the content of a conditional rule is culture-fair in that the content of the rule carries no culturally biased cues to people of any particular culture, the performance of applying the conditional rule (deductive reasoning) will be more or less the same for people in different cultural settings. On the other hand, if the content of the conditional rule is culture-biased in that the rule content is familiar only to people in certain cultures, the reasoning performance of these people who have the cultural knowledge or experience will be better than people who do not have the knowledge or experience. This hypothesis leads to the prediction that

(a) When applying a conditional rule whose content does not require special cultural knowledge or cultural experience to understand the rule, there will be no significant difference in reasoning performance between Chinese and Canadian subjects as measured by their response time and number of correct responses.

(b) Functioning as individuals, Canadian subjects will make fewer deductive reasoning errors than Chinese subjects if the conditional rule emphasizes certain Canadian beliefs such as ability as key to achievement. On the other hand, when the conditional rule is based on certain Chinese beliefs such as the healing effects of Chinese herbal medicine, Chinese subjects will make fewer deductive reasoning errors than Canadian subjects.
(c) Functioning as family members, Chinese subjects will make more deductive reasoning errors than Canadian subjects if the rule content is based on Canadian family values such as self-reliance, autonomy, and self-actualization.

(d) Functioning as members of their society at large, Chinese subjects will make fewer deductive reasoning errors than Canadian subjects, if the content of the conditional rule is based on Chinese social values such as obeying authority and concealing feelings.
CHAPTER III

METHODOLOGY

A. An Overview of the Research Methodology

In order to address the hypotheses developed in Chapter II, seven sets of experimental tasks were used. These tasks were arranged into three experimental phases, including one set of culture type classification task, two sets of attribution tasks and four sets of conditional reasoning (two inductive and two deductive) tasks. All tasks were computerized. The tasks were administered in a single session to 120 college students (60 in Canada and 60 in China) in order of (1) the objective attribution task, (2) the culture type classification task, (3) the culture-fair inductive conditional reasoning task, (4) the self-attribution task, (5) the culture-biased inductive conditional reasoning task, (6) the culture-fair deductive conditional reasoning task, and (7) the culture-biased deductive conditional reasoning task. Details of the experimental design and methodology are described in the following sections.

B. Experimental Design

To test the four hypotheses developed in Chapter II, the necessary set of data were acquired through three phases of experiments: (1) pre-experimental testings, (2) manipulation of outcome feedback with inductive reasoning tasks, and (3) deductive reasoning tasks. The experimental design of Phase 2 involved two types of cultures (Canadian vs. Chinese) and two types of outcome feedback experience (success and
failure) as between-subject dependent variables. Phase 3 of the design involved an additional control group as outcome condition and two types of task content bias (Canadian content vs. Chinese content) and three cultural levels (individual, family, and society) as within-subject dependent variables. Subjects’ responses and response time were recorded automatically by computers as dependent measures. The experimental design layout is shown in Table 1.

Table 1. Experimental Design

<table>
<thead>
<tr>
<th>Phase I Pre-Experimental Tasks</th>
<th>Phase II Inductive Reasoning Tasks</th>
<th>Phase III Deductive Reasoning Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>Inductive (Rule Learning) non-verbal/culture-fair</td>
<td>Culture</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>Feedback</td>
</tr>
<tr>
<td>Canadian Sample</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese Sample</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dependent measures =
(a) number of instances to criterion or correct responses
(b) total response time to mastery/sec

C. Experimental Tasks

**Objective Attribution Task (Task 1A):** This task was adapted from Lee and Lee (1983). The content of the task is shown in Appendix A. In their study, Lee and Lee used the multidimensional unfolding technique and assessed the internal validity of this task. In the present study, the purpose of using this task was to determine the subjects’ attribution tendency as an individual-difference construct before the experiments and to check if Chinese and Canadian subjects differed in attribution preference (i.e., difference in attributing other people’s success or failure situations). There were 12 hypothetical situations in the task (six success and six failure). For each situation, there were four causal choices attributing the consequence of success or failure to four sources, ability,
task difficulty, effort, and luck. The four alternatives were paired in all possible combinations (Torgerson, 1958). Thus, there were six paired comparisons for each of 12 situations (i.e., 72 items in the task). Subjects’ task was to choose one answer out of each paired statements. The following is an example of one of the six success situations:

1. Sally did very well on her French spelling test. Why do you think she did well?
   a. She is good at spelling.
   b. The spelling test was easy.
   c. She studied a lot for the test.
   d. She was lucky.

As stated earlier, this task was administered with computers. Subjects’ responses and response time were automatically recorded. The data collected will be analyzed in Chapter IV by a one-way ANOVA with culture as the independent variable and the frequency of attribution type chosen as the dependent variable. Also in Chapter IV, the results will be compared with those found from Task 3, the Self-attribution Task, to determine if subjects’ attribution pattern changed as a result of personally experiencing success or failure.

Culture Type Classification Task (Task 1B): This task was designed to determine if the assumption was valid that Chinese culture is collective relative to Canadian culture which was assumed to be individualistic (see Appendix B for the content of this task). The task consisted of three critical constructs of culture (goal, resources, and success), as identified by Triandis (1994, p.167). Each of the three constructs was arranged into four statements matching the three cultural levels as defined in Chapter I (individual, family, and society) plus a level of egocentricity representing the exclusive-self of individualism (Lee, 1994). These four statements were put into all possible pair choices. That is, for each statement, there were six pairs of choices. The task was to choose one of the two statements from each pair. Thus, within each construct item, for any one of the four given culture levels, the maximum number of choices a subject could make was 3 and the minimum number of choices was 0. Therefore, the scores across the four levels are pairwise exclusive. The following is an example of this task:
Jack is 19 years old and is selecting his major at UBC. He wants to go to medical school and become a doctor. Why do you think Jack wants to be a medical doctor?

- a. Jack wants to live a comfortable life in the future.
- b. Jack wants to be somebody.
- c. Jack wants to bring glory to his family.
- d. Jack wants to help those less fortunate in society.

The results of the task helped determine if the presumed difference in type between Canadian and Chinese cultures was a valid one. The data collected will be analyzed in Chapter IV by MANOVA with culture (Canadian vs. Chinese) and culture level (egocentricity, individualistic, family, and society) as two independent variables.

**Non-verbal Inductive Reasoning Task (Rule Learning, Task 2):** This culture-fair task was constructed to observe the baseline reasoning performance on the two groups. It is a traditional conceptual rule learning task adapted from Lee (1985), which involved two dimensions with three geometric attribute/values on each dimension (colour varying in red, green, and white; shape varying in circle, square and triangle). In the present study, a total of 18 instances of the conditional rule were constructed. The conditional rule consists of two dimensional attributes (*e.g.*, if red, then circle). The rule instances were displayed continuously in a set of 18 graphs by a portable computer. On each design, a rectangular border was drawn around each instance (coloured square, circle, or triangle). The subjects were presented with the instances one at a time. The task was to find the rule and classify the instances into two yes-no categories by the conditional rule. After the subject had made a choice, the computer automatically provided the subject with feedback if a correct or an incorrect choice had been made. The rule instances (geometric shapes) were continuously displayed to the subject one at a time. The computer display continued until the subject made 18 consecutive correct responses (correctly classifying each of the 18 instances, *i.e.*, learned the rule). The number of trials and the time taken to master the conditional rule were recorded by the computer. The structure of the task is shown in Table 2.
To ensure that subjects had learned the rule, after the learning criterion was met, subjects were asked to verbalize the rule (When it is red, then it is a circle) into the IF-THEN format (IF it is red, THEN it must be a circle). Except for those in the control groups (n=20 in each cultural sample), this task was administered to all subjects. This task served as two functions: (a) a baseline of assessing other reasoning performances and (b) the base information to manipulate outcome feedback for subjects’ self attribution.

**Self-attribution Task (Task 3):** The self-attribution task consisted of (a) randomly telling half the subjects that their performance on the non-verbal inductive learning (Task 2) was much better (success) or worse (failure) than the average, and (b) asking the subjects to identify one of the four reasons as explanation for their success or failure. The four choices were developed on the basis of four causal factors:

(a) I am (not) always good at this kind of task (ability)
(b) The task was easy/difficult (task difficulty)
(c) I have not had much practice/I have done this kind of task before (effort)
(d) I happened to have done extremely well/poorly today (luck)

The construct validity of this single-item question may not be seriously questioned since each subject may have made the preference judgment immediately after his/her direct task experience and its outcome. Except for the subjects in the control
groups, half the subjects in each cultural group (n=20) were randomly assigned to either success or failure conditions. The data collected here were used to determine if the subjects’ attribution preference was different from those obtained from the objective attribution task (Task 1A) involving other people’s cause-outcome situations, and the data were also to be used as a reference for interpreting patterns of shifts if subjects’ subsequent performance was affected by their achievement experience and attribution pattern.

Verbal Inductive Conditional Reasoning Task (Rule Learning, Task 4): Because the overall time required to perform all the tasks in this study is considerable, only one set of the verbal inductive conditional reasoning (rule learning) task was designed in order to prevent subjects from task fatigue. In principle, the structure of the verbal inductive reasoning task was the same as the non-verbal inductive conditional reasoning task (Task 2). Although the task content was culture-biased in favour of Chinese subjects, the results from this task under the two outcome conditions (success and failure) could be examined in reference to those from the culture-fair inductive conditional reasoning task (Task 2).

This task employed two stimulus dimensions, each varying in two values (date: October 1 and November 1; action: work or vacation). Since October 1 is the Chinese National Day, an important statutory holiday in the People’s Republic of China (special cultural cue to the Chinese subjects), it is expected that Chinese subjects will be performing this task better than Canadian subjects. In the task, subjects were told that people on a small Pacific island took certain actions on certain dates. They were asked to find out the rule about doing things on certain dates by predicting the action after a date is given. A total of 16 instances were presented based on the truth table (Table 3). The instances were displayed in a set of 16 computer-screen shows with a rectangular border around each instance (i.e., an if-then text). Subjects were presented with the instances one at a time, and then were asked to guess if the given action was correct.
After the response, the computer told the subject if the guess was correct (i.e., feedback). The computer automatically stored the number of trials and the amount of time taken each subject to master the conditional rule (if it is October 1, then go on vacation). Once again, except for the subjects in the control groups, half the subjects in each cultural group (n=20) were randomly assigned to either success or failure conditions. The task was to find a rule to predict the action after a date was given. The criterion for mastery of the rule was that a subject was able to provide 16 consecutive correct responses (see Table 3). To ensure that subjects had learned the prediction rule, after the learning criterion was met, subjects were asked to convert the prediction rule (When it is October 1, then we go on vacation) into the IF - THEN format (IF it is October 1, THEN we go on vacation).

Table 3. Rule Truth Table for Task 4

<table>
<thead>
<tr>
<th>Truth Class</th>
<th>Response</th>
<th>Truth Class</th>
<th>Response</th>
<th>Truth Class</th>
<th>Response</th>
<th>Truth Class</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-V</td>
<td>Yes</td>
<td>O-V</td>
<td>Yes</td>
<td>O-V</td>
<td>Yes</td>
<td>N-V</td>
<td>Yes</td>
</tr>
<tr>
<td>N-W</td>
<td>Yes</td>
<td>O-W</td>
<td>No</td>
<td>O-W</td>
<td>No</td>
<td>O-W</td>
<td>No</td>
</tr>
<tr>
<td>N-V</td>
<td>Yes</td>
<td>O-V</td>
<td>Yes</td>
<td>N-V</td>
<td>Yes</td>
<td>N-V</td>
<td>Yes</td>
</tr>
<tr>
<td>N-W</td>
<td>Yes</td>
<td>N-W</td>
<td>Yes</td>
<td>O-W</td>
<td>No</td>
<td>N-W</td>
<td>Yes</td>
</tr>
</tbody>
</table>

O = October 1; N = November 1; V = vacation; W = work

Culture-Fair Deductive Task (Task 5: Rule Application): This task consisted of two sets of arguments (24 arguments in all). The first set of eight syllogisms contained the same rule structure with exactly the same rule content as in Task 2 (If red, then circle, as shown in Table 4). The second set of 16 syllogisms involved unfamiliar context with the same rule structure but different rule content (If it is the liquid detergent NewForever, the test paper will turn red; If it is liquid detergent FreshClear, the test paper will turn blue). The two sets of syllogisms were presented individually to the subjects, one at a
time, by a computer. The following is an example of the task, from which a set of eight types of syllogism was constructed, as shown in Table 4.

Whenever the colour of a geometric shape's interior is red, then the shape is a circle. Another way of describing the rule is:

**IF the colour is red, THEN the shape must be a circle.**

Now, please use this rule and answer the following questions:

Now suppose it is found that the colour of the shape is red. Is the conclusion that the shape is a circle

a) Always true?
b) Sometimes true?
c) Never true?

The subjects were asked to use the conditional rule structure they learned in Task 2 and indicate if each given conclusion was (a) always true, (b) sometimes true, and (c) never true. No feedback was given. Once again, subjects' responses and response time were automatically recorded by the computer. All subjects, including the control groups, performed this experimental task, with no cultural biases. Data collected here were to be examined for the effects of outcome feedback given to the two culture groups.

**Table 4. Eight Types of Deductive Conditional Arguments in Task 5**

<table>
<thead>
<tr>
<th>Types of Argument</th>
<th>Correct Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Premise</td>
<td>Conclusion</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Affirming</strong></td>
<td><strong>Affirmative</strong></td>
</tr>
<tr>
<td>Antecedent</td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td><strong>Denying</strong></td>
<td><strong>Affirmative</strong></td>
</tr>
<tr>
<td>Antecedent</td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td><strong>Affirming</strong></td>
<td><strong>Affirmative</strong></td>
</tr>
<tr>
<td>Consequent</td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td><strong>Denying</strong></td>
<td><strong>Affirmative</strong></td>
</tr>
<tr>
<td>Consequent</td>
<td><strong>Negative</strong></td>
</tr>
</tbody>
</table>

A = Always True; S = Sometimes True; N = Never True
Deductive Task of Culture-Biased Contents (Task 6: Rule Application): This task consisted of seven sets of deductive reasoning questions, each having eight possible arguments based on the conditional rule structure learned in Task 4 (see Appendix G for the content of this task). Of the seven sets of culture-biased arguments, one was designed as a familiar context. That is, one set of the arguments was designed with the same conditional rule as used in Task 4 (If it is October 1, then we go on vacation).

The other six sets of questions were designed as unfamiliar contents, with two sets on each cultural level (i.e., two at individual level; two at family level; and two at society level). Thus, there were 56 questions in total, which were presented to the subjects one at a time by a computer. The subjects were asked to indicate if each given conclusion was (a) always true, (b) sometimes true, and (c) never true. No feedback was provided. Subjects' responses and response time were recorded by the computer. All subjects, including those in the control group, performed this task. The six conditional statements used for testing reasoning with unfamiliar materials are:

(1) If Sarah is good at math, she will win the math award (biased toward Canadian culture).

(2) If Lili takes some Chinese herb medicine, her fever will be gone (biased toward Chinese culture).

(3) If Maria cleans her parents' house, she always asks her parents to pay for her cleaning work (biased toward Canadian culture).

(4) If Jane has tattoo printed on her arms, then her parents will be very angry with her (biased toward Chinese culture).

(5) If Jane does not get along well with her husband, she always goes to consult the psychologist (biased toward Canadian culture).

(6) If the government calls young people to help build a strong armed force against its enemies, then Martin, a computer science student at UBC, will give up his studies and join the army (biased toward Chinese culture).
The cultural biases in the task contents were constructed based on the advice from two certified Chinese-English translators.

D. Subjects and Data Sources

The subjects of the study were 120 college students, 60 (30 men and 30 women) from a teachers college in Anshan, a northern city in the People's Republic of China, and 60 (30 men and 30 women) from a community college in Vancouver, British Columbia, Canada. The two groups of students had a similar age range (18-29) and were all enrolled in degree- or diploma-oriented programs. In addition, to be eligible for the study, each student must have gone through the entire elementary and secondary educational systems in her/his respective countries. Further, to control for within-culture confounding effects, offers for participation in the study from Canadian students of Chinese origins were declined. Participation in the study was voluntary.

Although the educational systems in Canada and China differed substantially, the two experimental sites, Vancouver and Anshan, shared many similarities. Both cities were large metropolitan centers with diversified urban life styles and both were playing an important role in the economical development in their respective countries. There were many similarities in the two colleges, too. Both colleges were comprehensive public educational institutions funded by their respective provincial governments, and both served students from their local and surrounding rural areas. These demographic similarities formed the basis for comparing the subjects' performance across cultures.

E. Translation of the Tasks into Chinese

The tasks were developed in English and then translated into Chinese. To ensure the natural language flow of the translation, English proper names (e.g., Jack, Maria, UBC) were replaced with equivalent Chinese ones. The translation was done by myself (a certified English-Chinese translator by the Chinese government) and validated by two other certified Chinese-English translators.
F. Experimental Apparatus

All seven tasks were presented to subjects with a portable IBM compatible 486-DX25 computer made by NEC (NEC UltraLite Versa 486-SL25). The computer had an advanced active colour matrix display which was nearly as sharp and clear as a high-quality NEC desktop monitor. Its enhanced VGA graphic mode was suitable for displaying the colour instances of Task 2 (non-verbal inductive reasoning test) as well the non-graphic test items in the other six tasks. In addition, the portable computer weighed only 6.7 pounds and could run without AC power for more than three hours. With a dual-voltage 110V-240V AC adapter, the computer was easy to carry around and set up for administering the tasks and recording the data (responses and response time) in both Chinese (220 voltage power) and Canadian (110V power) test settings. The 180 MB hard drive (13mm access time) and 8 MB RAM of the computer made it fast and easy to collect and store data.

All computer programming, including graphics control, was completed with Microsoft QuickBasic Version 4.5. The Chinese version of the tasks was displayed in Chinese characters with 2-byte 16x16 character display mode, which was equivalent to the English text mode (screen 1; width 80). Therefore, in terms of task presentation, the two versions of the tasks were the same except for language.

G. Summary of Experimental Procedures

Tasks 1A and 1B were presented to all subjects, including subjects in the control groups. The computer displayed instructions about the task and each pair of the statements per screen. The computer also allowed subjects to mark only one of the two statements from each pair of choices. No feedback was provided.

In Task 2, the computer gave a brief instruction about the task to the subjects and then displayed rule instances, one at a time, on its screen until the mastery criterion (18 consecutive correct responses) was met. The subjects were asked to learn the concept by
responding "yes" or "no" to each rule instance. Feedback was provided automatically. Subjects had the control of the task pace (pressing a key to continue after each instance was responded to). The task administrator stood by to provide technical assistance. There was no time limit but subjects were encouraged to respond as fast as they could. To facilitate the completion of the task, paper and pencils were provided to the subjects for jotting down notes (i.e., external memory aid is allowed). After the conditional rule was learned, subjects were asked to confirm the rule by identifying an IF-THEN syllogistic expression among four choices in an answer sheet. The answer sheets were collected after the test.

Once Task 2 was completed, the subjects were randomly told that their performance was either much above or below the average, and asked to answer the four-choice attribution question (i.e., Task 3). To ensure the effects of this hypothetical success-failure condition, at the beginning of each following tasks, subjects were reminded by the computer of their hypothetical outcomes from this task.

Before Task 4 was displayed, the subjects were reminded by the computer of their hypothetical outcomes from Task 2 as manipulated for the experiment. Then, Task 4 was presented to the subjects in the same manner as Task 2. All responses and response time were automatically recorded in the hard drive of the portable computer while the subjects were responding to the task questions. After the conditional rule was learned, subjects were asked to verbalize the rule by identifying an IF-THEN syllogistic expression on paper.

Once before Task 5 and once before Task 6 were administered, the subjects were reminded of their outcomes from Task 2 by the computer. Then, the 24 deductive arguments of Task 5 were displayed one by one. No feedback was provided. The subjects' responses and response time were automatically recorded. The seven sets of eight deductive arguments in Task 6 were presented in the same manner. Response time was recorded by the computer. After subjects completed the tasks, the answer sheets were collected for analysis.
H. Pilot Test

Both the Chinese and English versions of the six tasks were pilot-tested (six Chinese participants and four English participants). On the average, it took about 60 minutes for the pilot-test participants to complete all the tasks. Based on the feedback from the pilot-test participants, the original task instructions and screen displays were modified and improved. The English version and Chinese version of the tests were also compared by two other certified translators (other than myself) and they were both of the opinion that the two versions of the tests were functionally equivalent.

I. Data Analysis

Data analysis was conducted on an IBM RS/6000 mini mainframe computer. The data collected and stored in the hard drive of the portable computer were uploaded into the UNIX-platform IBM RS/6000 mainframe computer. SPSS for UNIX Version 5.0 was used to carry out all data management and analysis. The results of these analyses are reported in the next chapter.
CHAPTER IV

RESULTS

The results of this study are presented in this chapter in five sections: (a) characteristics of the subjects and their culture type, (b) individual differences in causal attribution patterns, (c) analysis of non-verbal inductive learning performances, (d) analysis of culture-fair deductive reasoning performances, and (e) analysis of culture-biased deductive reasoning performances. As stated in Chapter II, the central thesis of this study is that the acquisition and application of conditional rules could be affected by causal attribution and cultural values. Specifically, people in different cultures reason in a similar manner when the situated cultural values are similar, and they will reason differently when the situated cultural values are different. Based on this thesis, numeric data as well as some verbal response protocols were collected in the design scheme shown in Chapter III. All statistical hypotheses were tested at the conventional Type I error of 0.05. Although gender was not the focus in the research framework of the present study, preliminary univariate analysis of gender as a main effect was conducted for all the tests. None of the gender main effects was statistically significant. Therefore, gender was dropped in the final data analysis and discussion.
A. Characteristics of Subjects and Cultural Context

1. Informal Observation of Chinese and Canadian students

With the assistance from faculty and administration at Anshan Teachers College in Liaoning Province of the People’s Republic of China, a list of 200 first- and second-year students was obtained. Sixty students (30 male and 30 female) were randomly selected from this list. These students were between 18 and 29 years of age and had passed the National College Entrance Examination administered by the Chinese Central Ministry of Education. All of the subjects went through the mandatory 12-year primary and secondary education in China, and none of them was enrolled in English or other Western language programs. One-third of the students were direct intake from out-of-province high schools. As less than five percent (5%) of high school graduates in China can pass the National College Entrance Examinations and go to college each year (Chinese National Commission on Advanced Education, 1992), these students presented the few fortunate of the Chinese young people. In comparison, 43% of Canadian high school graduates go on to post-secondary education institutions (Statistics Canada, 1995).

Furthermore, all of the Chinese subjects admitted that they had never been out of China and had little contact with foreigners. However, since China opened its door to the West in the early 1980s, a large number of Western films and TV programs had been shown in China. As a result, these students were not totally free from Western cultural influence. In fact, most of them had seen some foreign movies and seemed to have up-to-date knowledge about life in the West.

The 60 Canadian students (30 male and 30 female subjects) were all selected from a community college in Vancouver, British Columbia. In order not to confound the results of this study, offers for participation in the present study by students with Chinese or other Asian origins were declined. In addition, students taking Chinese language courses were also excused. Most of the Canadian subjects were from Vancouver or had lived in Vancouver for a considerable period of time and deemed themselves as local
residents. They learned about this study either through their instructors or from the advertisement posted up by their student union. Because there was a relatively large Chinese population in Vancouver, most of the Canadian students selected for this study seemed to know something about Chinese culture.

2. Culture type classification

In Chapter II, based on the culture classification theory proposed by Triandis et al. (1988) and on my informal observation, the assumption was made that Chinese culture was collective as compared with Canadian culture, which was hypothesized to be relatively individualistic. To test this assumption, a culture classification task (Task 1B) was designed. The test contained three critical constructs of culture (goal pursuing, success attribution, and resources sharing) as identified by Triandis (1994, p. 167). Each of the three constructs were arranged into four statements representing four culture levels: egocentricity, individual, family, and society. The four choices for each statement were put into all possible paired combinations (Torgerson, 1958), resulting in six pairs of choices for each critical cultural construct. Thus, within each construct item, for any one of the four given culture levels, the maximum number of choices a subject could make was 3 and the minimum number of choices was 0. Therefore, the scores across the four levels are pairwise exclusive.

Table 5 and Figure 1 show the cell means of the three cultural constructs (goal pursuing, attribution of success, and resource sharing) by four culture levels (egocentricity, individualism, family, and society).

As can be seen from Table 5 and Figure 1, there were differences between Canadian and Chinese subjects in terms of the three critical cultural constructs (goal pursuing, success attribution, and resources sharing) on the four culture levels (egocentricity, self, family, and society). MANOVA test results show that Canadian and Chinese subjects differed significantly in each of the three critical cultural constructs on all four culture levels.
Table 5. Cell Means of Cultural Orientation (Preference) Scores by Culture Groups

(N = 120)

<table>
<thead>
<tr>
<th>Cultural Level</th>
<th>Egocentricity</th>
<th>Individualism</th>
<th>Family</th>
<th>Society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>G</td>
<td>S</td>
<td>R</td>
<td>G</td>
</tr>
<tr>
<td>Chinese</td>
<td>1.550</td>
<td>1.620</td>
<td>0.550</td>
<td>1.320</td>
</tr>
<tr>
<td>Canadian</td>
<td>2.080</td>
<td>0.333</td>
<td>1.330</td>
<td>1.080</td>
</tr>
<tr>
<td>Total</td>
<td>1.815</td>
<td>0.977</td>
<td>0.940</td>
<td>1.200</td>
</tr>
</tbody>
</table>

Cultural constructs: G = Pursuing Goals; S = Attributing Success; R = Sharing Resources.

Specifically, Canadian subjects are more egocentric than Chinese subjects in goal pursuing (2.08 vs. 1.55) and resources sharing (1.33 vs. 0.55), whereas Chinese subjects were more egocentric than Canadian subjects in success attribution (1.62 vs. 0.33) [Hotellings(s=1,m=0.5,N=57)=1.321, p<.001]. Further, Canadian subjects were more individual-oriented than Chinese subjects in sharing resources (2.92 vs. 2.68) and attributing success (1.50 vs. 1.38), but not in goal pursuing (1.08 vs. 1.32) [Hotellings(s=1,m=0.5,N=57)=0.097, p<.013]. In addition, Canadian subjects were more family-oriented than Chinese subjects in attributing their success (0.92 vs. 0.65) and sharing their resources (3.00 vs. 2.35), whereas Chinese subjects were more family-
oriented than Canadian subjects in pursuing goals (1.50 vs. 0.67) \( [\text{Hotellings}(s=1, m=0.5, N=57) = 1.476, p<.001] \). Subsequently, Canadian subjects were more willing to help those who are less fortunate in their society while pursuing personal goals (2.17 vs. 1.63) and were more likely to credit others for success (1.83 vs. 1.05) than Chinese subjects, who, in contrast, were more willing to share resources with others in their society than Canadian subjects (1.72 vs. 0.17) \( [\text{Hotellings}(s=1, m=0.5, N=57) = 1.225, p<.001] \). These findings confirm my informal observation of cultural differences between the two culture groups. As can be seen in Figure 1, Canadian subjects' cultural preferences show distinctive features to express egocentric goal pursuing, individualistic success attribution, resource sharing with family, and societal goal pursing. In contrast, Chinese students' preferences show no distinctly distributed features with exceptions of individualistic success attribution and resource sharing with family, but to a lesser degree than Canadian students' expressed preferences.

B. Individual Differences in Causal Attribution Patterns of Two Culture Groups

Two causal attribution tasks were administered, one before Task 2 (non-verbal conditional rule learning task) and the other after Task 2. The purpose of administering these two causal attribution tasks was to determine if there was any difference in causal attribution between Canadian and Chinese subjects. It was hypothesized in Chapter II (Hypothesis 1) that Chinese college students would be more likely than their Canadian counterparts to attribute success or failure to internal, controllable factors, such as effort, because of their cultural emphasis on hard work for success. Likewise, it was hypothesized that Canadian college students' attribution pattern would depend on the outcomes of performance. In the first attribution pattern task, when other people's success situations were presented, Canadian subjects would attribute success to internal factors such as ability and effort. On the other hand, when other people's failure situations were presented, Canadian subjects would likely choose external factors such as task difficulty and bad luck for explanation.
During the Objective Causal Attribution Task (Task 1A, i.e., attributing other people's success or failure situations), twelve items representing 12 hypothetical situations (six success and six failure situations) were administered to the subjects. Each item contained four causal choices attributing the consequence of success or failure to four sources: ability, task difficulty, effort, and luck. The four choices were presented to the subjects in all possible paired combinations, resulting in six paired comparisons for each item (a total of 72 paired comparisons for the 12 items). The subjects were instructed to choose one of two answers in a paired comparison and therefore had little chances of faking their responses. Thus, within each item, for any one of the four given causal sources, the maximum number of choices a subject could make was 3 and the minimum number was 0. This also means that within the six success situations (or the six failure situations), for any one of the four given causal sources, the maximum number of choices a subject could make was 18 and the minimum number of choices was 0.

Table 6 presents the cell means of the four types of attribution scores across success and failure situations by the two culture groups.

<table>
<thead>
<tr>
<th></th>
<th>ABILITY MEAN</th>
<th>TASK DIFFICULTY MEAN</th>
<th>EFFORT MEAN</th>
<th>LUCK MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Success Situations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese (n=60)</td>
<td>12.183</td>
<td>6.600</td>
<td>12.117</td>
<td>5.100</td>
</tr>
<tr>
<td>Canadian (n=60)</td>
<td>12.800</td>
<td>5.367</td>
<td>15.533</td>
<td>2.300</td>
</tr>
<tr>
<td>Entire sample</td>
<td>12.492</td>
<td>5.983</td>
<td>13.825</td>
<td>3.700</td>
</tr>
<tr>
<td><strong>Failure Situations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese (n=60)</td>
<td>8.650</td>
<td>9.800</td>
<td>11.717</td>
<td>5.833</td>
</tr>
<tr>
<td>Canadian (n=60)</td>
<td>6.483</td>
<td>10.700</td>
<td>14.533</td>
<td>4.283</td>
</tr>
<tr>
<td>Entire sample</td>
<td>7.567</td>
<td>10.250</td>
<td>13.125</td>
<td>5.058</td>
</tr>
</tbody>
</table>

A MANOVA procedure was run with culture group as the independent variable and the eight types of aggregated attribution scores (ability, task difficulty, effort, and luck in four success and four failure situations) as dependent variables. Test results show
that Canadian and Chinese subjects differed significantly in all eight types of scores, suggesting that Canadian and Chinese subjects did not make the same causal attribution (i.e., there is an inter-group difference in attribution). Specifically, as predicted by Hypothesis 1, given success situations, Chinese subjects attributed success more to the easiness of the tasks (i.e., 6.6 vs. 5.37), $F_{(1,118)}=13.729$, $p<.001$ (MSe=3.325), and to luck (i.e., 5.1 vs. 2.3), $F_{(1,118)}=33.117$, $p<.001$ (MSe=7.186) than Canadian subjects. However, contrary to what was predicted by Hypothesis 1, Canadian subjects attributed success more to effort than Chinese subjects (i.e., 12.12 vs. 15.53), $F_{(1,118)} = 50.700$, $p<.001$ (MSe=6.910). Canadian and Chinese subjects did not differ significantly in attributing success to ability (i.e., 12.18 vs. 12.80). On the other hand, given failure situations, as predicted by Hypothesis 1, Chinese subjects blamed lack of ability and bad luck more than did Canadian subjects, $F_{(1,118)}=3.908$, $p<.050$ (MSe=6.219), and $F_{(1,118)}=7.859$, $p<.006$ (MSe=9.168) for the failure. Canadian subjects attributed failure to task difficulty more often than Chinese subjects, $F_{(1,118)}=3.905$, $p<.050$ (MSe=6.219). Contrary to what was predicted, however, Canadian subjects attributed failure to lack of effort more often than Chinese subjects, $F_{(1,118)}=33.630$, $p<.010$ (MSe=7.077). Nonetheless, these differences are a matter of degree rather than a matter of kind.

The Self-Attribution Pattern Task (Task 3) was administered to the subjects after they went through the Non-verbal Reasoning Task (Task 2). For the self-attribution pattern task, half the subjects were randomly told that their performance on the reasoning task was much better (success) or much worse (failure) than most of the other subjects. Then, the subjects were asked to identify one of the four reasons as explanation for their success or failure. The four choices corresponded to the four causal sources in the Objective Causal Attribution Task, i.e., ability, task difficulty, effort, and luck.

Subjects’ self-attribution patterns turned out to be different from those in the Objective Attribution Task (Task 1A). Under success conditions, Chinese subjects mostly attributed their hypothetical good performance to luck (12/20), whereas Canadian subjects attributed their success to their ability (15/20). In failure conditions, both
Canadian and Chinese subjects ruled out lack of ability and task difficulty as causes for the hypothetical inferior performance (20/20). Chinese subjects unanimously blamed lack of effort for poor performance, whereas Canadian subjects attributed failure evenly to lack of effort (10/20) and bad luck (10/20). The differences in attribution patterns between the two culture groups are statistically significant [Chi-square Likelihood Ratio(3)=8.133, p<.043].

Shown in Table 7 is a cross-tabulation of the responses to the Objective Causal Attribution Task with results from the Self-Attribution Task. In the table, subjects’ objective attribution patterns (i.e., when attributing other people’s success or failure) were derived from using their most prominent choice responses in the task. For example, if a subject’s objective attribution score was 10 for ability, 8 for effort, 5 for task difficulty and 6 for luck in success situations, then, that subject was regarded as having an ability attribution pattern in success situations and therefore counted as an ability choice in the table under the success condition. Condensing these objective attribution scores, however, does not change subjects’ objective attribution patterns as computed from the continuous measures. The objective attribution patterns (from Task 1A) and self attribution choices are shown in column total and the row total of each quadrant of Table 7, respectively.

Table 7. Pre- vs. Post- Performance Causal Attribution Patterns by Culture Groups

<table>
<thead>
<tr>
<th>Chinese Subjects’ Causal Attribution Pattern</th>
<th>Personally Experienced Success</th>
<th>Personally Experienced Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>other people’s success situation</td>
<td>Ability</td>
<td>Task D</td>
</tr>
<tr>
<td>Ability</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Task Difficulty</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Effort</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Luck</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Canadian Subjects’ Causal Attribution Pattern</th>
<th>Personally Experienced Success</th>
<th>Personally Experienced Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>other people’s success situation</td>
<td>Ability</td>
<td>Task D</td>
</tr>
<tr>
<td>Ability</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Task Difficulty</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Effort</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Luck</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>
It is interesting to observe the difference in attribution patterns between prior to and after experiencing success or failure by the two culture groups. The examinations of diagonal entries of the four contingency tables indicate that attribution patterns differ most obviously after success experiences than after failure experiences for both culture groups. More specifically, following successful performance on the inductive learning task, Chinese students’ causal attribution to effort (10/20) or ability (7/20) in the objective attribution task (Task 1A) shifted to good luck (12/20) notably from effort (6) and ability (5), in the self-attribution task (Task 3); while Canadian students’ causal attribution to effort (11/20) or ability (9/20) in the objective attribution task (Task 1A) shifted to ability (15/20) notably from effort (9) and ability (6), in the self-attribution task (Task 4). Following failure performance on the task, however, Chinese students’ prior attribution to lack of effort (13/20) remained the same or was reinforced (20/20), notably from lack of ability (2) and task difficulty (4), whereas Canadian students’ prior attribution to lack of effort (19/20) either remained the same (10/20) or shifted to bad luck (9/20).

To sum up, when attributing other people’s success, both Canadian and Chinese subjects believed that exerting effort was the key to success. However, after they personally experienced success, Canadian subjects gave credit to their ability (an internal factor), whereas Chinese subjects gave credit to their good luck (an external factor). In interpreting the failure of hypothetical others, both Canadian and Chinese subjects also believed that not making enough effort would lead to failure. However, after personally experiencing failure, Canadian subjects were divided between blaming themselves and not having the luck (an external chance factor), whereas Chinese subjects took the failure upon themselves by admitting that they did not exert enough effort.

These findings lead to two interesting questions: (a) Does the causal attribution of others’ success or failure experiences have impact on the subsequent reasoning performance and (b) Does the causal attribution of outcome feedback of one’s own
performance have impact on the subsequent reasoning performance? These questions will be addressed in the following sections.

C. Analysis of Non-verbal and Verbal Inductive Learning Performances (Tasks 2 and 4)

Task 2 was a non-verbal (culture-fair) traditional concept formation task. In the task, a total of 18 rule instances were constructed from two dimensions (colour and shape), each defined by three attributes. The rule instances were displayed to the subject one at a time. The display of each instance would continue until the subject made 18 consecutive correct responses (rule learning). Task 4 had a similar structure to that of Task 2, except that the contents of the conditional rule in the task were designed to be culture-biased in favor of Chinese subjects. Subjects were told that the residents on a small Pacific island depended on certain calendar dates for making their decisions to go to work or go on holiday. The subject's task was to predict the local residents' activities when a date was given. The presentation of instances would continue until the subject made 16 consecutive correct predictions. In both tasks, the number of instances and response time (measured by seconds and then rounded up to minutes) were recorded automatically by the computer.

Before the analysis was made, to achieve equal variance between the culture groups, four outliers distinctly shown in task performance measures were set to 99 in both Tasks 2 and 4. And then, the number of instances was transformed by raising the raw score to the power of -0.75 for Task 2 and -0.25 for Task 4, respectively. A 10-base log transformation was performed on the amount of time for both Tasks 2 and 4. After the transformations, the dependent variables showed near-normal distribution and equal variance, which were judged to have met the assumptions for applying MANOVA.

1. Cultural Effects upon Acquisition of Conditional Rules (Non-verbal Task)

In essence, the results of the acquisition of conditional rules in different cultures are the focus of Hypothesis 4, which states that cultural values can function as a
moderating variable in rule learning (inductive reasoning). If the content of a conditional rule is culture-fair, the rule will be learned by people in two culture groups with equal effort. The marginal means of the raw scores as well as the transformed scores obtained from Task 2 are presented in Table 8. To test this hypothesis, MANOVA was used with the number of instances and the amount of time the subjects spent on Task 2 as the dependent variable and culture groups as the independent variable.

Table 8. Task 2: Means of the Total Number of Rule Instances and the Amount of Time Required for Mastery of Non-verbal Induction Task (Task 2)

<table>
<thead>
<tr>
<th>TASK 2 Number of Instances</th>
<th>RAW SCORE</th>
<th>TRANSFORMED SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Chinese</td>
<td>51.600</td>
<td>54.198</td>
</tr>
<tr>
<td>Canadian</td>
<td>33.900</td>
<td>5.719</td>
</tr>
<tr>
<td>For entire sample</td>
<td>42.750</td>
<td>39.314</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TASK 2 Response Time (Minutes)</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>9.205</td>
<td>3.683</td>
<td>.932</td>
<td>.172</td>
<td>40</td>
</tr>
<tr>
<td>Canadian</td>
<td>5.593</td>
<td>4.225</td>
<td>.620</td>
<td>.351</td>
<td>40</td>
</tr>
<tr>
<td>For entire sample</td>
<td>7.399</td>
<td>4.337</td>
<td>.776</td>
<td>.316</td>
<td>80</td>
</tr>
</tbody>
</table>

It can be seen from Table 8 that Chinese subjects tried more instances (difference of 17.7 instances) and spent longer time (difference of 3.612 minutes) than Canadian subjects in order to learn the culture-fair conditional rule. Multivariate test results indicate that the performance difference is statistically significant \(\text{Hotellings}_S(s=1,m=0,n=37.5) = .522, p<.001; \) Number of Instances in Task 2, Univ. \(F_{(1,78)}=3.583, p<.052, MSe=.001; \) Amount of Time in Task 2, Univ. \(F_{(1,78)}=25.405, p<.001, MSe=.076\). In view of other possible differences between the two culture groups unaccounted for here, it is not surprising that Chinese subjects performed less well in the culture-fair task than Canadian subjects, although this finding supported Hypothesis 4. Other possible sources of the differences in reasoning performance can be sought in subjects’ individual differences in general causal attribution patterns.
2. Joint Effects of Culture and Individual Differences in Objective Causal Attribution

As indicated earlier, a more interesting question is whether students’ causal attributions of hypothetical others' success or failure outcomes have any actual impact on the inductive reasoning performance beyond the level of talking. In order to answer this question, an additional analysis was made by incorporating each subject’s four success causal attribution and four failure causal attribution scores into the analytical model. Namely, a MANOVA design was used, with culture groups as the independent factor, the eight attribution scores as concomitant predictors, and the number of instances and the total time to master the conditional rule as the dependent measures.

This analysis yielded a complete analysis of 13 estimates of effects, of which only five effects were statistically significant beyond the level of $p<0.039$. More specifically, regardless of the culture group membership, subjects who attributed others’ success outcomes to high ability performed the reasoning task differently in terms of the amount of time used to learn the conditional rule ($F_{(1,66)}=7.01$, $p<0.01$, $MSe=0.034$) and their mastery time correlated with their verbal attribution significantly (correlation $r=-0.449$, $p<.001$). As well, those who attributed others’ failure outcome to lack of effort or to low ability performed the culture-fair inductive task (Task 2) differently ($F_{s(1,66)}=13.28$ and 22.74, $p_s<0.001$ and 0.0005, $MSe’s=0.034$ and 0.034, respectively), and their attribution patterns correlated with their task performance time ($r=-0.282$ and $r=-0.275$, respectively). Most importantly, however, there was a significant interaction between the two culture groups and their attribution of failure outcome to lack of ability [$Hotellings^2(s=1,m=0,n=31.5)=0.2412$, $p<0.001$]. This significant multivariate effect was mostly reflected in the amount of time to mastery of the conditional rule, $F_{(1,66)}=15.92$, $p<0.005$, $MSe=0.034$. This significant interaction effect can be tracked down to the difference between two correlation coefficients, 0.025 and -0.706, shown in Table 9, for Chinese and Canadian groups, respectively. In other words, while Chinese students’ reasoning performance is not predictable from their low-ability attribution of others’
failure outcomes, Canadian students' reasoning performance is highly predictable; that is, the more they attributed others' failure to low ability, the faster they completed the culture-fair inductive reasoning task, \( Z_{pb}=3.89, p<0.0002 \). Because of these effects accounting for mastery time variance, the significance of culture main effect was somewhat attenuated, \( F_{(1,66)}=4.45, p<0.039, MSe=0.034 \).

Table 9. Within-corrections of Four Success and Four Failure Attribution Scores with the Amount of Time to Mastery of Non-Verbal Inductive Task (Task 2) by Two Culture Groups (\( N=80 \))

<table>
<thead>
<tr>
<th>Factor Transformed</th>
<th>Success Attribution</th>
<th>Failure Attribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture Mean Time</td>
<td>Ability Task Effort</td>
<td>Ability Task Effort</td>
</tr>
<tr>
<td>Chinese .932</td>
<td>.082 .124 .055</td>
<td>.087 .025 .283 .220</td>
</tr>
<tr>
<td>Canadian .620</td>
<td>-.675 .098 .518</td>
<td>-.090 .706 .588 .051</td>
</tr>
<tr>
<td>( Z_{pb} ) of difference*</td>
<td>3.17 -2.25</td>
<td>3.89 -1.65</td>
</tr>
<tr>
<td>(p-value)</td>
<td>(.003) (.0371)</td>
<td>(.0002) (.102)</td>
</tr>
</tbody>
</table>

* \( Z_{pb} \) Stands for Z-test values of the difference between Chinese and Canadian within-correlation coefficients.

3. Culture, Outcome Feedback and Their Joint Effects upon Acquisition of Conditional Rules (Verbal Task)

We have noted that Canadian students' performance on the non-verbal, culture-fair inductive task was more proficient than that of Chinese students and was predictable from their attribution of others' failure to low ability. What if they experienced success or failure outcome and performed a verbal, culture-biased, inductive reasoning task? As the first step to answering this question, a full analytical model of the dependent measures was developed on the data shown in Table 10, which presents the cell means of both raw and transformed data obtained from Task 4, the culture-biased conditional rule learning task, in a design of two (culture groups) by two (types outcome feedback).
Table 10. Task 4: Cell Means of Total Number of Rule Instances Required for and Total Amount of Time Taken to Master the Criterion with Verbal Induction Task by Culture Groups and Outcome Feedback and Self-Attribution Choices

<table>
<thead>
<tr>
<th>Variable .. TASK 4</th>
<th>number of instances</th>
<th>Attribution Choices (Frequencies)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAW SCORE</td>
<td>TRANSFORMED SCORE</td>
</tr>
<tr>
<td>Chinese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>29.100</td>
<td>15.376</td>
</tr>
<tr>
<td>Failure</td>
<td>36.700</td>
<td>37.737</td>
</tr>
<tr>
<td>Canadian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>23.300</td>
<td>5.162</td>
</tr>
<tr>
<td>Failure</td>
<td>32.850</td>
<td>4.069</td>
</tr>
<tr>
<td>Total</td>
<td>30.487</td>
<td>20.845</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable .. TASK 4</th>
<th>amount of time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAW SCORE</td>
</tr>
<tr>
<td>Chinese</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>8.574</td>
</tr>
<tr>
<td>Failure</td>
<td>10.972</td>
</tr>
<tr>
<td>Canadian</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>6.312</td>
</tr>
<tr>
<td>Failure</td>
<td>12.446</td>
</tr>
<tr>
<td>For entire sample</td>
<td>9.576</td>
</tr>
</tbody>
</table>

The data obtained from this design were analyzed with a MANOVA with two dependent measures (*i.e.*, the number of instances and the amount of mastery time), two independent factors, culture groups and outcome feedback, and four concomitant binary variables (ability, task difficulty, effort, and luck) from subjects’ self-attribute choices. Due to the sparse non-empty cell frequencies, it was not possible to use a complete full analytical model. Table 11, which is derived from Table 10, shows the main effects in terms both raw and transformed mean scores.

First, the main effect of culture group (Canadian vs. Chinese) was found significant [Hotellings\(_{s=1,m=0,n=35}\) = .2002, \(p < .05\)], for the number of instances and amount of mastery time, respectively. However, univariate F-tests indicated that the effect is significant only on the amount of mastery time \([F(1,73) = 6.58, \ p < .012]\), but not on the number of instances \([F(1,73) = 2.53, \ p < .115]\). The actual effect size is only .394 minutes (*i.e.*, Canadian subjects completed the task .394 minutes faster than Chinese subjects). Since the effect size of mastery time is negligible, in essence Canadian and Chinese
students completed the task with similar proficiency. Namely, Chinese subjects appeared to have benefited from the culture-biased conditional rule in their favour and improved their performance in Task 4 as compared with their task performance in Task 2.

Secondly, the main effect of outcome feedback was also significant

\[ \text{Hotellings } s(=1, m=0, n=35) = .477, p < .0005 \], Univ. F \(_{s(1,73)} = 2.329 \) and 21.51, \( p < .131 \) and .0005, MSe’s = .00168 and .03081 for the number of instances and amount of mastery time, respectively. As can be seen from Table 11, the significant outcome feedback effect means that in general subjects who were told of inferior performance (the failure group) tried more instances and spent longer time than those who were told of superior performance (the success group) to learn the conditional rule (mean difference in number of instances: 8.575 trials; mean difference in amount of performance time: 4.266 minutes).

Table 11. Task 4: Marginal Means of Number of Instances Required for and Amount of Time Spent on Mastering Performance Criterion by Culture Groups and by Outcome Feedback

<table>
<thead>
<tr>
<th>Cell Means and Standard Deviations</th>
<th>RAW SCORE</th>
<th>TRANSFORMED SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TASK 4 Number of Instances</strong></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Chinese</td>
<td>32.900</td>
<td>28.702</td>
</tr>
<tr>
<td>Canadian</td>
<td>28.075</td>
<td>6.666</td>
</tr>
<tr>
<td>For entire sample</td>
<td>30.488</td>
<td>20.845</td>
</tr>
<tr>
<td><strong>TASK 4 Response Time (Minutes)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>9.773</td>
<td>4.814</td>
</tr>
<tr>
<td>Canadian</td>
<td>9.379</td>
<td>4.362</td>
</tr>
<tr>
<td>For entire sample</td>
<td>9.576</td>
<td>4.567</td>
</tr>
<tr>
<td><strong>TASK 4 Number of Instances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>26.200</td>
<td>11.695</td>
</tr>
<tr>
<td>Failure</td>
<td>34.775</td>
<td>26.564</td>
</tr>
<tr>
<td>For entire sample</td>
<td>30.488</td>
<td>20.845</td>
</tr>
<tr>
<td><strong>TASK 4 Response Time (Minutes)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>7.443</td>
<td>4.193</td>
</tr>
<tr>
<td>Failure</td>
<td>11.709</td>
<td>3.920</td>
</tr>
<tr>
<td>For entire sample</td>
<td>9.576</td>
<td>4.567</td>
</tr>
</tbody>
</table>
There appears to be a strong joint effect of culture and outcome feedback upon acquisition of conditional rules. This joint effect, \textit{i.e.}, the differential effect of outcome feedback -7.6 vs. -9.55 instances and 2.89 vs. 6.13 minutes for Chinese and Canadian students), is statistically significant \textit{[MANOVA results of transformed data: Hotelling's S = i; m = o, n = 35] = .118, p < .018; Number of Instances in Task 4, Univ. F(1,73) = .498, p < .483, MSe = .0017; Amount of Time in Task 4, Univ. F(1,73) = 5.461, p < .022, MSe = .0308].}

The degree of this significant interaction effect is illustrated by the plots shown in Figures 2 and 3. Chinese students who received the success feedback completed the inductive reasoning task with fewer trials and less time (7.6 instances fewer and 2.89 minutes less) than did Chinese students who received failure feedback (Chinese subjects who received success feedback spent an average of 29.1 trials and used 8.57 minutes, as compared with 36.7 trials and 10.97 minutes spent by those Chinese subjects who received failure feedback). In contrast, Canadian students who received the success outcome feedback completed the inductive reasoning task used 9.55 instances fewer and 6.13 minutes less than those Canadian students who received failure feedback (Canadian subjects who received success feedback spent an average of 23.3 trials and used 6.31 minutes, as compared with 32.85 trials and 12.44 minutes spent by those Canadian subjects who received failure feedback). Chinese subjects’ rule-learning performance was not affected by outcome feedback as much as that of Canadian subjects; that is, Canadian students’ performance is depressed when given failure feedback.
4. Joint Effects of Culture, Outcome Feedback, and Its Attribution upon Acquisition of Conditional Rules (Verbal Task)

As indicated earlier, a more interesting question is whether the significant interaction of outcome feedback with culture groups can account for causal attribution of success or failure outcome feedback. Because of the ipsative nature of four attribution choices (i.e., four binary choices), only three less sparse attribution choices (i.e., ability, effort, and luck, dropping task difficulty) were entered into three 2nd-order interaction terms, of which only interaction of culture and outcome feedback with effort factor was significant [Hotelling's $S(i,m=0,n=35) = .149$, $p < .007$; Univ. $F(s_{1,73}) = .332$ and 7.60, $p_s < .57$ and .007, $MSe's = .002$ and .0308] for the number of instances and amount of mastery time, respectively. This multivariate interaction effect was mostly reflected in the amount of time used to learn the conditional rule.

The nature of the significant interaction of the effort causal attribution factor with culture and outcome feedback can be explicated with within-correlations of four conditions (two culture groups by two types of outcome feedback), as displayed in Table 12. The effort causal attribution choices correlate significantly with the verbal inductive reasoning performances by Canadian students given success and failure outcome feedback in terms of $r_{pb} = .918$ and -.833, respectively. In other words, Canadian students' reasoning performances were predictable from their causal attribution choice, in this case, effort. Chinese students explained their success mostly with good luck and failure exclusively with lack of effort, with no distinctly noticeable improvement in reasoning performance. On the other hand, given success feedback, Canadian students attributed their performance to their high ability. Given failure feedback, Canadian students attributed their performance to their lack of effort, with improved performance commensurable to their verbal causal attribution, but their performance took longer than that of Chinese students. This is most likely associated with attributing failure to bad luck ($r_{pb} = .833$). It appears that the failure outcome feedback was debilitating for Canadian students.
Table 12. Within-Correlations of Four Self-Attribution Choices at Outcome Feedback with the Amount of Time to Mastery of Verbal Inductive Task (Task 4) by Culture and Outcome Feedback (N=80)

<table>
<thead>
<tr>
<th>Factor of Culture</th>
<th>Chinese</th>
<th>Canadian</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success</td>
<td>Failure</td>
</tr>
<tr>
<td>Attribution</td>
<td>Freq. $r_{pb}$</td>
<td>Freq. $r_{pb}$</td>
</tr>
<tr>
<td>Ability</td>
<td>$5 -.233$</td>
<td>$0 .233$</td>
</tr>
<tr>
<td>Task Difficulty</td>
<td>$1 .176$</td>
<td>$20 .10$</td>
</tr>
<tr>
<td>Effort</td>
<td>$2 .208$</td>
<td>$20 .0$</td>
</tr>
<tr>
<td>Luck</td>
<td>$12 .0$</td>
<td>$20 .0$</td>
</tr>
<tr>
<td>Total</td>
<td>$20 .20$</td>
<td>$20 .20$</td>
</tr>
</tbody>
</table>

$r_{pb}$ stands for point biserial correlation coefficients between binary choice responses and the amount of time to task mastery.

* stands for $p<.0005$.

D. Analysis of Culture-Fair Deductive Reasoning Performance (Tasks 5A, 5B1 and 5B2)

As subjects entered the third phase of the experiment, the Canadian students who received failure outcome feedback appeared to have suffered from the negative feedback received after Task 2. To control for confounding effects, subjects' deductive reasoning performance is compared with that of the control groups.

Three culture-fair deductive reasoning tasks were used to examine the effects of culture and outcome feedback on the application of the learned conditional rules. Each of the three sets of the culture-fair tasks contained eight possible types of arguments (syllogisms). The first set (Task 5A) of the eight syllogisms contained a conditional rule with exactly the same rule structure and content as in the Culture-Fair Inductive Reasoning Task (If the colour is red, then the shape must be a circle). The second and third sets (Tasks 5B1 and 5B2) of the culture-fair deductive reasoning tests each contained a conditional rule with the same rule structure as that of Task 2 but with different rule contents (If it is the liquid detergent NewForever, then the test paper will turn red; if it is the liquid detergent FreshClear, then the test paper will turn blue). The subjects were asked to use the conditional rule learned in Task 2 (inductive reasoning...
test) as a reference to indicate if each given conclusion was (a) always true, (b) sometimes true, and (c) never true. Subjects’ correct response to each syllogism was coded as 1 and incorrect response as 0. Because the second task (Task 5B1) and the third task (Task 5B2) were essentially the same except for the wording, the scores obtained from these two tasks were merged and the combined scores were analyzed. Thus, for Task 5A (with the same rule content as that in Task 2), the highest possible score a subject could obtain was 8 and the lowest possible score was 0, whereas, for the combined task scores (Tasks 5B1 and 5B2 with different rule content from that of Task 2), the highest possible score a subject could obtain was 16 and the lowest possible score was 0.

1. Applying a Conditional Rule with the Same Content as Task 2

Hypothesis 3 predicts a joint effect of culture and earlier outcome feedback (i.e., success or failure when acquiring the conditional rule in Task 2) upon the application of learned conditional rules. Specifically, because of the emphasis on hard work in the Chinese culture, Hypothesis 3 predicted that Chinese subjects’ task performance would be less affected than Canadian subjects’ in failure conditions. Subjects’ deductive reasoning performance on Task 5A appears to support this prediction, as can be seen from Table 13 for the cell means of task scores by culture and outcome feedback.

Table 13. Cell Means of Number of Correct Responses by Culture and Outcome Feedback (Tasks 5A and 5B)

<table>
<thead>
<tr>
<th>Number of Correct Responses</th>
<th>Task 5A Mean (5B1+5B2)</th>
<th>Task 5B Mean (5B1+5B2)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CULTURE Chinese OUTCOME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>4.550</td>
<td>10.500</td>
<td>20</td>
</tr>
<tr>
<td>Failure</td>
<td>4.050</td>
<td>9.300</td>
<td>20</td>
</tr>
<tr>
<td>Control</td>
<td>3.950</td>
<td>11.650</td>
<td>20</td>
</tr>
<tr>
<td>CULTURE Canadian OUTCOME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>4.500</td>
<td>10.150</td>
<td>20</td>
</tr>
<tr>
<td>Failure</td>
<td>2.500</td>
<td>11.500</td>
<td>20</td>
</tr>
<tr>
<td>Control</td>
<td>4.500</td>
<td>11.000</td>
<td>20</td>
</tr>
<tr>
<td>For entire sample</td>
<td>4.008</td>
<td>10.683</td>
<td>120</td>
</tr>
</tbody>
</table>
As compared with the control group, Canadian subjects’ task performance in the failure group seems to have been much more depressed (failure group<2.5; control group<4.5) by the earlier outcome feedback than that of the Chinese subjects in the failure group, who showed almost no performance difference from the control group (failure group = 4.05; control group = 3.95). Additionally, regardless of culture groups, subjects in the control groups appeared to have performed worse (0.3 score lower) than those in the success groups but better (0.95 score higher) than those in the failure groups. To test if these observed differences are statistically significant, ANOVA procedure was used with culture group (two groups) and outcome feedback (three conditions) as independent variables and the number of correct responses as dependent variable. A special contrast matrix (1 1 1, 1 0 -1, 0 1 -1) was used to test the significance of the performance differences between the control group and the success group and between the control group and the failure group.

Univariate F-test results showed that the overall interaction effects (joint effects of culture and outcome feedback) were statistically significant ($F_{(2,110)}=3.566, p<.031, \text{MSe}=3.28$). However, when the overall joint effects were further analyzed, i.e., partitioned to success vs. control (contrast 1) and failure vs. control (contrast 2), the univariate F-test results indicated that Canadian subjects’ performance was depressed as compared to Chinese subjects’ performance when failure condition was compared with control conditions, $F_{(1,114)}=6.72, p<.011 (\text{MSe}=3.28)$, but no such differential effects were observed under success condition as compared to control condition.

These findings suggest that the Canadian and Chinese students differed in reasoning performances only when they received failure outcome feedback. With success feedback, they appeared to have the same reasoning performance level. Specifically, compared with Chinese subjects, Canadian subjects who previously received failure outcome feedback were prone to errors (Canadian subjects who received failure feedback made 2.0 fewer correct responses than those Canadian subjects in the control group,
while Chinese subjects who received failure feedback made almost the same number of correct responses as those Chinese subjects in the control group). In other words, Canadian subjects' cognitive performance on applying conditional rules appears to have been swayed by outcome feedback.

Furthermore, the non-significant differences in task performances between the success and control groups imply that receiving success feedback or receiving no feedback at all did not seem to have made a difference in subjects' culture fair deductive reasoning. These results support the predictions derived from Hypothesis 4; namely, Canadian subjects' deductive reasoning performance under the culture-fair condition seems to have been depressed by failure feedback.

2. Applying a Conditional Rule with Different Contents from Those in Task 2

The combined scores of Tasks 5B1 and 5B2 are shown in Table 13. As can be seen from the table, there appears to be an interaction effect between culture groups and outcome feedback. Canadian subjects in the control group appeared to have performed worse (11.0 vs. 11.5) than those in the failure feedback group but better (11.0 vs. 10.15) than those in the success feedback group, whereas Chinese subjects in the control group seemed to have made more correct responses than both the success (11.65 vs. 10.5) and failure (11.65 vs. 9.30) feedback groups. Additionally, regardless of cultural groups, subjects in the control groups achieved the highest score (11.33, as compared to 10.33 by the success feedback groups and 10.04 by the failure feedback groups). To test if these differences are statistically significant, ANOVA was used in the same manner as with Task 5A (i.e., two special contrasts were made to test the difference between the success and control group, and failure and control group, respectively).

Univariate F-tests indicated that the joint effects of culture groups and outcome feedback were statistically significant, $F_{(2,110)}=4.01$, $p<.021$, (MSe=6.12). However, when the joint effects were partitioned into two contrast effects (control vs. success and control
vs. failure), test results showed that the interaction effect was only significant on the control vs. failure contrast, $F(1,110)=6.64, p<.011$, (MSe=6.12). More specifically, unlike Task 5A, Chinese subjects’ performance was depressed especially under failure as compared to control conditions, but no such differential effects were observed in Canadian subjects. The interaction effect of the success vs. control contrast with culture groups and the two other main effects were not statistically significant. Thus, as compared with Canadian subjects, Chinese subjects who previously received failure outcome feedback started showing its delayed impact on their performance (2.35 fewer correct responses) as compared to Canadian subjects.

These results indicate that when subjects were applying conditional rules with the same contents, as reported in the previous section, failure outcome feedback in general tends to depress subjects’ reasoning performance.

E. Analysis of Culture-biased Deductive Reasoning Performance (Tasks 6A, 6B1 to 6B6)

Seven culture-biased deductive reasoning tasks were administered to the subjects. As in the culture-fair tasks (Tasks 5A, 5B1 and 5B2), each culture-biased deductive reasoning task had eight possible arguments in syllogism format based on the conditional rule structure learned in Task 4. The first set of syllogisms (Task 6A) was based on a familiar content of the conditional rule in Task 4 (if it is October 1, then we go on vacation). The remaining six sets of items were contentwise unfamiliar tasks, although their rule structures were the same as the one used in Task 4 but with different rule contents. Further, the rule contents of the unfamiliar items were designed on three culture levels as defined in Chapter I (i.e., Tasks 6B1 and 6B2 at individual level; Tests 6B3 and 6B4 at family level; and Tests 6B5 and 6B6 at society level, with each pair consisting of two task contents biased for Canadian and Chinese). These seven sets of items were administered to subjects, one at a time, in a random sequence. As in the culture-fair tests, subjects’ correct answer to each item was coded as 1 and incorrect answer as 0.
Therefore, for each set of the task items, the highest possible score a subject could obtain was 8 and the lowest possible score was 0.

1. Applying a Conditional Rule with Familiar Content as Task 4

Presented in Table 14 are the cell means of subjects’ task scores from Task 6A, which contained the same content as Task 4 (biased in favour of Chinese culture). An ANOVA was performed on the 2x3 factorial data structure, with the same contrast matrix used for Task 5A (1 1 1, 0 0 1, 0 1 -1) on the three levels of outcome feedback factor. It can be seen from Table 14 that, overall, subjects in the control groups performed better than both the success (1.4 score higher) and failure (1.126 score higher) groups. Although these contrast effects were significant \[F(2,118) = 26.62 \text{ and } 17.19, p<.001 \text{ (MSe=1.47)}\] for contrast 1 and 2, respectively, the performance differences were qualified by the interaction effects, as discussed in the next paragraph.

Table 14: Tasks 6A: Cell Means of Correct Deductive Reasoning Response by Culture and Outcome Feedback Groups

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>CODE</th>
<th>Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CULTURE</td>
<td>Chinese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>Success</td>
<td>5.850</td>
<td>20</td>
</tr>
<tr>
<td>Feedback</td>
<td>Failure</td>
<td>5.900</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>5.650</td>
<td>20</td>
</tr>
<tr>
<td>CULTURE</td>
<td>Canadian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>Success</td>
<td>4.000</td>
<td>20</td>
</tr>
<tr>
<td>Feedback</td>
<td>Failure</td>
<td>4.500</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>7.000</td>
<td>20</td>
</tr>
<tr>
<td>For entire sample</td>
<td></td>
<td>5.483</td>
<td>120</td>
</tr>
</tbody>
</table>

The test results show that the interaction effects between culture groups and success vs. control condition (contrast 1) and between culture groups and failure vs. control condition (contrast 2) were statistically significant \[F(2,118) = 34.76 \text{ and } 25.67, \ p=.001, \text{ MSe=1.47 for the interaction with contrasts 1 and 2, respectively}\]. These significant interaction effects represent the differential patterns of the two culture groups’
deductive reasoning performances depending on which outcome feedback was provided earlier. The observed interactions stem primarily from the fact that on Task 6A Chinese subjects’ performances were not swayed by the type of prior feedback, whereas Canadian subjects’ performances were depressed again with the task positively biased for Chinese.

2. Applying a Conditional Rule with Content Different from Task 4

Analysis of the application of conditional rules with content different from that in the originally learned rule was conducted in two steps: (1) between-subject analysis and (2) within-subject analysis. The between-subject analysis focused on the joint effects of culture and outcome feedback, whereas the within-subject analysis concentrated on the effects of culture levels and culture bias built in the content of the conditional rules. Presented in Table 15 are the cell means of subjects’ performance on the six culture-biased deductive reasoning tasks (with rule contents different from that in the originally learned conditional rule, i.e., Task 4).

Table 15. Tasks 6B1 through 6B6: Cell Means of Correct Deductive Reasoning Response by Culture and Outcome Feedback Groups

<table>
<thead>
<tr>
<th>Culturally Biased Variable ..</th>
<th>Canadian CULTURE</th>
<th>Canadian FEEDBACK</th>
<th>Chinese CULTURE</th>
<th>Chinese FEEDBACK</th>
<th>Canadian CULTURE</th>
<th>Chinese FEEDBACK</th>
<th>Marginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR CODE</td>
<td>TASK 6B1 Mean</td>
<td>TASK 6B2 Mean</td>
<td>TASK 6B3 Mean</td>
<td>TASK 6B4 Mean</td>
<td>TASK 6B5 Mean</td>
<td>TASK 6B6 Mean</td>
<td></td>
</tr>
<tr>
<td>CULTURE</td>
<td>Chinese</td>
<td>Success</td>
<td>3.450</td>
<td>5.600</td>
<td>4.100</td>
<td>6.000</td>
<td>5.050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Failure</td>
<td>4.250</td>
<td>5.250</td>
<td>4.200</td>
<td>6.150</td>
<td>5.100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>3.700</td>
<td>5.500</td>
<td>4.300</td>
<td>6.000</td>
<td>5.550</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>3.800</td>
<td>5.450</td>
<td>4.200</td>
<td>6.050</td>
<td>5.517</td>
</tr>
<tr>
<td>CULTURE</td>
<td>Canadian</td>
<td>Success</td>
<td>5.500</td>
<td>5.500</td>
<td>4.750</td>
<td>4.750</td>
<td>5.750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Failure</td>
<td>3.050</td>
<td>3.650</td>
<td>2.000</td>
<td>4.500</td>
<td>2.450</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>4.000</td>
<td>4.000</td>
<td>4.500</td>
<td>5.600</td>
<td>6.000</td>
</tr>
</tbody>
</table>

a. Analysis of between-subject results

In Table 15, it appears that Chinese subjects’ task scores obtained from the two experimental conditions (either success or failure feedback) in general are similar to those
obtained by the Chinese subjects in the control group, whereas Canadian subjects who received the failure feedback scored much lower than those in the control group. To test if these observed interaction effects are statistically significant, a MANOVA was used, with the two culture groups and three feedback types as independent variables, and task scores obtained from Tasks 6B1 to 6B6 as dependent variables. A special contrast matrix (1 1 1, 1 0 -1, 0 1 -1) was used.

Multivariate F-tests indicated that the interaction effect, namely, the difference in task means between the success and control groups by the two culture groups, was statistically significant especially in terms of Task 6B1 (i.e., $p<.010$ in Table 16). The difference in the marginal means between Chinese success and control groups is -0.16 ($=4.75-4.91$), whereas the difference between Canadian success and control groups is 0.27 ($=5.04-4.77$).

Table 16. Joint Effects of Culture and Outcome Feedback: Success vs. Control

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Exact F</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotellings</td>
<td>0.21836</td>
<td>3.96688</td>
<td>6.00</td>
<td>109.00</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: F statistics are exact.

EFFECT: CULTURE BY OUTCOME FEEDBACK (1) (Cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypoth. SS</th>
<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>TASK6B1</td>
<td>15.31250</td>
<td>254.85000</td>
<td>15.31250</td>
<td>2.23553</td>
<td>6.84962</td>
<td>.010</td>
</tr>
<tr>
<td>TASK6B3</td>
<td>1.01250</td>
<td>215.95000</td>
<td>1.01250</td>
<td>1.89430</td>
<td>1.92352</td>
<td>.168</td>
</tr>
<tr>
<td>TASK6B4</td>
<td>3.61250</td>
<td>214.10000</td>
<td>3.61250</td>
<td>1.87807</td>
<td>3.2352</td>
<td>.001</td>
</tr>
<tr>
<td>TASK6B5</td>
<td>.31250</td>
<td>301.55000</td>
<td>.31250</td>
<td>2.64518</td>
<td>.11814</td>
<td>.732</td>
</tr>
<tr>
<td>TASK6B6</td>
<td>1.01250</td>
<td>166.55000</td>
<td>1.01250</td>
<td>1.46096</td>
<td>.69304</td>
<td>.407</td>
</tr>
</tbody>
</table>

The task mean difference between the failure and control groups by the two culture groups was also statistically significant, especially in terms of Task 6B1, 6B3, and 6B5 favouring Canadian (i.e., $p_s=.027$, .001, .001, respectively, as shown in Table 17). The difference in the marginal means between Chinese failure and control groups was 0.11 ($=5.02-4.91$), whereas the difference between Canadian failure and control groups was -1.459 ($=3.27-4.77$).
Multivariate test results also showed that the difference in task score between the two culture groups was statistically significant; namely, on the average, Chinese subjects obtained 0.531 scores higher than Canadian subjects (marginal mean: 4.893 vs. 4.362).

However, univariate F-test results shown in Table 18 indicated that the difference in task performance between the two culture groups was significant only on Tasks 6B2 (e.g., means 4.0 vs. 5.5 for Canadian vs. Chinese control at individual level), 6B4 (e.g., means 5.6 vs. 6.00 for Canadian vs. Chinese control at family level), and 6B5 (e.g., means 6.0 vs. 5.5 for Canadian vs. Chinese control at society level), at p = .001, .001, and .010, respectively. Nonetheless, these results should be interpreted with caution because of the significant joint effects of culture and outcome feedback.
Multivariate F-test results presented in Tables 19 and 20 also indicated that the outcome feedback effects were statistically significant. On the average, the subjects in the success group obtained 0.055 scores higher than the subjects in the control group (marginal mean: 4.895 vs. 4.84), and the subjects in the failure group obtained 0.693 scores lower than the subjects in the control group (marginal mean: 4.148 vs. 4.84), prominently on Tasks 6B3 and 6B5. These test results suggest that, in general, subjects who received success feedback performed deductive reasoning tasks better than those who did not receive any feedback (i.e., the control group), and that subjects who received failure feedback performed deductive reasoning tasks worse than those who did not receive any feedback (the control group). Once again, it should be noted that this main effect by outcome feedback may have been qualified by the significant joint effects between culture and outcome feedback.

**Table 19. Outcome-Feedback Effects: Success vs. Control**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Exact F</th>
<th>Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotellings</td>
<td>.25376</td>
<td>4.61006</td>
<td>6.00</td>
<td>109.00</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note.. F statistics are exact.

**EFFECT .. CULTURE (Cont.)**

**Univariate F-tests with (1,114) D. F.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypoth. SS</th>
<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>TASK6B1</td>
<td>7.81250</td>
<td>254.85000</td>
<td>7.81250</td>
<td>2.23553</td>
<td>3.49470</td>
<td>.064</td>
</tr>
<tr>
<td>TASK6B3</td>
<td>.01250</td>
<td>215.95000</td>
<td>.01250</td>
<td>1.89430</td>
<td>.00660</td>
<td>.935</td>
</tr>
<tr>
<td>TASK6B4</td>
<td>3.61250</td>
<td>214.10000</td>
<td>3.61250</td>
<td>1.87807</td>
<td>1.92352</td>
<td>.168</td>
</tr>
<tr>
<td>TASK6B5</td>
<td>2.81250</td>
<td>301.55000</td>
<td>2.81250</td>
<td>2.64518</td>
<td>1.06326</td>
<td>.305</td>
</tr>
<tr>
<td>TASK6B6</td>
<td>1.51250</td>
<td>166.55000</td>
<td>1.51250</td>
<td>1.46096</td>
<td>1.03527</td>
<td>.311</td>
</tr>
</tbody>
</table>

Overall, these between-subject analysis results indicate that Canadian subjects' performance on deductive reasoning tasks with different rule contents from the one originally learned was depressed considerably by failure feedback. Chinese subjects' deductive reasoning performance on the same tasks, on the other hand, was not observed to have been swayed significantly by either success or failure feedback. When outcome feedback was held constant, Chinese subjects showed better performance on these six
deductive reasoning tasks than Canadian subjects. These results support Hypothesis 3 to the extent that culture and outcome feedback have significant joint effects on reasoning performance.

Table 20. Outcome-Feedback Effects: Failure vs. Control

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Hypoth. SS</th>
<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 6B1</td>
<td>.80000</td>
<td>254.85000</td>
<td>.80000</td>
<td>2.23553</td>
<td>.35786</td>
<td>.551</td>
<td></td>
</tr>
<tr>
<td>Task 6B2</td>
<td>1.8000</td>
<td>365.10000</td>
<td>1.8000</td>
<td>3.20263</td>
<td>.56204</td>
<td>.455</td>
<td></td>
</tr>
<tr>
<td>Task 6B3</td>
<td>3.68000</td>
<td>215.95000</td>
<td>33.80000</td>
<td>1.89430</td>
<td>17.84302</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Task 6B4</td>
<td>4.51250</td>
<td>214.10000</td>
<td>4.51250</td>
<td>1.87807</td>
<td>2.40273</td>
<td>.124</td>
<td></td>
</tr>
<tr>
<td>Task 6B5</td>
<td>49.61250</td>
<td>301.55000</td>
<td>49.61250</td>
<td>2.64518</td>
<td>18.75584</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Task 6B6</td>
<td>1.80000</td>
<td>166.55000</td>
<td>1.80000</td>
<td>1.46096</td>
<td>1.23206</td>
<td>.269</td>
<td></td>
</tr>
</tbody>
</table>

b. Interaction effects of task content features and culture groups

Although the effects of content features of the deductive reasoning tasks, such as cultural bias and cultural levels, were meant to be investigated, conceptual basis for any hypotheses regarding interaction phenomena between culture groups, outcome feedback, and the task contents by the three culture levels has not been developed in the present research. However, it seems possible to take a first step to explore the effects of the task contents with the cultural bias and the three levels of culture only as related to the two culture groups (i.e., interaction between culture group and culture level task content). In so doing, controlling for confounding effects from outcome feedback is called for. To this end, subjects who received outcome feedback (experimental groups) were excluded from the between-subject effect analysis. Therefore, only subjects in the two control groups (N=40) were included in the analysis. Table 21 presents the task means broken down by culture groups.
Table 21. Cell Means of Within-Subject Effects by Culture Groups

<table>
<thead>
<tr>
<th>Culture Group</th>
<th>Content</th>
<th>Biasedness for Culture Level</th>
<th>Individuals</th>
<th>Family</th>
<th>Society</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>Std d.</td>
<td>Mean</td>
<td>Std d.</td>
</tr>
<tr>
<td>Chinese (n=20)</td>
<td>Canadian</td>
<td></td>
<td>3.700</td>
<td>1.949</td>
<td>4.300</td>
<td>1.625</td>
</tr>
<tr>
<td></td>
<td>Chinese</td>
<td></td>
<td>5.500</td>
<td>1.638</td>
<td>6.000</td>
<td>1.686</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.600</td>
<td>---</td>
<td>5.150</td>
<td>---</td>
</tr>
<tr>
<td>Canadian (n=20)</td>
<td>Canadian</td>
<td></td>
<td>4.000</td>
<td>1.026</td>
<td>4.500</td>
<td>0.513</td>
</tr>
<tr>
<td></td>
<td>Chinese</td>
<td></td>
<td>4.000</td>
<td>1.026</td>
<td>5.600</td>
<td>0.598</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.000</td>
<td>---</td>
<td>5.050</td>
<td>---</td>
</tr>
</tbody>
</table>

A repeated measure MANOVA analysis was conducted on the one between- and two within- subjects factor design data in a 2 (culture group) x 2 (content bias) x 3 (culture level) scheme. Overall, both Chinese and Canadian control subjects’ performances were almost at the same level (marginal means, 4.908 vs. 4.767, respectively). The statistical test of the culture group factor shows this to be the case, F(1,38)=0.17, NS, (MSe=1.20).

Table 21 shows that Canadian subjects obtained 0.133 score higher (difference between marginal means) from syllogisms with rule contents favouring their culture than from syllogisms favouring Chinese culture, while Chinese subjects obtained 0.783 score higher (difference between marginal means) from syllogisms with contents favouring their culture than from syllogisms favouring Canadian culture. The univariate F-test indicate that this interaction effect was statistically significant (culture group by rule content bias: F(1,38)=8.52, p=.006, MSe=12.6).

Also from Table 21, it can be seen that the differences between the three culture levels’ means appeared to be different across the two culture groups; namely, Chinese subjects achieved higher scores at individual (4.6 vs. 4) and family (5.15 vs. 5.05) levels than Canadian subjects, who outperformed Chinese subjects at the society level (5.25 vs. 4.975). In particular, an interaction effect was significant, F(1,38)=8.79, p<.005 (MSe=0.717). This significant interaction means that Chinese subjects’ performance was higher than Canadian subjects’ performance with the individual oriented task, whereas
Canadian subjects’ performance was similar to or higher than Chinese subjects’ at the other two culture levels.

Further, Table 21 also shows that there was a significant second-order interaction between culture groups, content bias, and culture level (i.e., the contrast of individual vs. family and society combined), \( F_{(0.39)} = 5.19, p<0.028 \) (MSe=1.126). This interaction stems from the fact that Chinese subjects performed worse on the task containing Canadian culture content at the individual level than at family and society levels. In contrast, Canadian subjects in general performed less well on the tasks at the individual level than at family and society levels, regardless of the cultural content in the tasks.

The analysis of the interaction involving these within-subject test results suggests that subjects’ deductive reasoning performance was modified by the contents of the conditional rules. When the content of a conditional rule was culturally biased in favour of the Chinese subjects, subjects in that culture group in general showed good deductive reasoning performance. On the other hand, when the content of a conditional rule was culturally biased in favour of the other culture group, the deductive reasoning performance of these subjects declined. Particularly, Chinese subjects’ reasoning performance was markedly obstructed by the task with Canadian biased content at the individual level.

F. Chapter Summary

1. Hypothesis of Causal Attribution Patterns

Subjects in the two culture groups showed different attribution patterns in the objective and self attribution tasks. In the Objective Causal Attribution Task (Task 1A) in which other people’s performance was used for attribution, Canadian and Chinese subjects showed similar attribution patterns. They both attributed success to internal factors (i.e., effort and ability). In failure conditions, both Canadian and Chinese subjects
blamed lack of effort (external, controllable factor) as the main reason for poor performance.

In the self-attribution task (Task 3) in which subjects personally experienced (bogus) success or failure, subjects' attribution patterns were different from Task 1 (Objective Attribution Task). Given success feedback, Chinese subjects mainly attributed their good performance to good luck (an external, unstable, and uncontrollable factor) and high ability (an internal, stable but uncontrollable factor), whereas Canadian subjects mainly used ability (an internal, stable but uncontrollable factor) and effort (an external, controllable factor) to account for their success. Given failure feedback, Canadian subjects used lack of effort (an internal, unstable and controllable factor) and bad luck (external, unstable, and uncontrollable factor) to explain their failure. In contrast, Chinese subjects believed that lack of effort (external, unstable, and uncontrollable factor) was the sole reason for their poor performance. These results support Hypothesis 1 in that Chinese and Canadian subjects had different attribution patterns due to their different cultural backgrounds and experience, and that attribution patterns changed as one's attribution context changed.

2. Individualistic vs. Collective Cultural Preferences

The findings from the present study provide somewhat mixed support for my assumption that Canadian culture is individualistic as compared to Chinese culture, which was assumed to be collective. In general, Chinese subjects showed less tendency to be egocentric and individualistic as measured by the three culture constructs (goal pursuing, success attribution, and resource sharing), as compared with Canadian subjects. However, Canadian subjects' cultural preferences were much more distinctive than those of Chinese subjects.
3. Hypothesis of Culture and Consequences of Outcome Feedback on Reasoning

As predicted by Hypothesis 3, Chinese subjects' reasoning performance was not affected as much as Canadian subjects' reasoning performance by outcome feedback in performing culture-biased inductive (rule-learning) tasks. Whether outcome feedback was success or failure, in general (i.e., except in Tasks 5B1 and 5B2), Chinese subjects seemed to have similar rule-learning performance. In contrast, Canadian subjects who experienced failure made more response errors than those who experienced success in performing the same culture-biased inductive (rule-learning) tasks. The same performance pattern was observed in deductive reasoning (rule application). Chinese subjects' performance on deductive reasoning (rule-application) tasks did not vary significantly whether they received success or failure outcome feedback. In contrast, Canadian subjects who previously received success outcome feedback exhibited better performance on the same rule application tasks than those Canadian subjects who received failure feedback. These findings suggest that the failure outcome feedback had a prolonged obstructing effect upon Canadian subjects, and they support the predictions derived from Hypothesis 3.

4. Hypothesis of Culture Effects on Acquisition of Conditional Rules

Canadian and Chinese subjects differed in their performance on non-verbal inductive reasoning tasks. Chinese subjects required more instances and spent more time than Canadian subjects to learn a conditional rule whose content was culture-fair. However, the performance gap disappeared in performing verbal inductive reasoning tasks. Specifically, despite the initial difference in cognitive competence, there was no significant difference in the number of instances or task mastery time between Chinese and Canadian subjects in learning a culture-biased conditional rule whose content was familiar to Chinese subjects but not to Canadian subjects. Apparently, Chinese subjects benefited from the built-in cultural cue in the content of the conditional rule and
improved their rule-learning ability. These findings support the predictions derived from Hypothesis 4 made in Chapter II.

5. Hypothesis of Culture Effects on Application of Conditional Rules

As expected, Canadian and Chinese subjects did not differ significantly in performing culture-fair deductive reasoning tasks, due to the fact that the contents of the conditional rules in these culture-fair tasks carried no particular cultural cues to either culture groups. With culture-biased tasks, in general, when the content of a conditional rule was culturally biased in favour of one culture group of subjects, the subjects in that culture group showed good deductive reasoning performance. On the other hand, when the content of a conditional rule was culturally biased not in favour of a culture group, the deductive reasoning performance of these subjects declined. In general, these results support the predictions derived from Hypothesis 5 in that culture bias in the contents of conditional rules affects subjects’ deductive reasoning performance.
CHAPTER V

DISCUSSION AND CONCLUSION

The broad goal of this study was to gain an understanding of how people reason under different cultural contexts. Specifically, this study was concerned with differences in performance proficiency with conditional reasoning tasks as a result of different cultural contexts and attribution of outcome feedbacks. The question this study attempted to address was if and what cultural aspects would influence conditional reasoning in the specific contexts of Canadian and Chinese cultures.

Based on a review of related literature, five hypotheses were developed with regard to (a) causal attribution patterns, (b) culture tendency (individualistic vs. collective cultures), (c) culture effects and consequences of outcome feedback on reasoning proficiency, (d) culture effects on acquisition of conditional rules, and (e) culture effects on application of conditional rules.

To test these five hypotheses, three phases of experimental tasks were used. The experimental effects were observed on a set of six multivariate measurements. Specifically, the experimental tasks involved two culture groups (Canadian vs. Chinese) and three types of achievement experience (success, failure, and control) as between-subject dependent variables. Response time and number of correct answers or trials were dependent variables. To encompass individual differences, acquisition and application of cognitive tasks involved reasoning mode (inductive vs. deductive) and culture levels (individual, family, and society) as well as task content cultural bias. Thus, seven sets of
tasks were developed. The tasks were programmed in both English and Chinese, pilot-tested, revised, and administered with computers to 120 college undergraduate students (60 in Canada and 60 in China).

A. Summary of the Findings

**Culture type classification.** The two culture groups of subjects did not provide a clear distinction between collective and individualistic cultures, as found in other typical cultures (Triandis, 1994). In many cases, the results were mixed. For example, as expected, Canadian college students were more egocentric than Chinese college students in pursuing their goals and sharing resources. These are the attributes associated with individualistic cultures. However, not as expected, Chinese subjects were more egocentric than Canadian subjects in attributing success. Therefore, these findings only in part support my assumptions made in Chapter II about Canadian culture being individualistic and Chinese culture being collective. Specifically, Canadian subjects’ cultural preferences showed distinctive features to express egocentric goal pursuing, individualistic success attribution, resource sharing with family, and societal goal pursuing. In contrast, Chinese students’ preferences showed no distinctly distributed features with the exception of individualistic success attribution and resource sharing with family, but to a lesser degree than Canadian students’ expressed preferences.

**Attribution patterns.** Canadian and Chinese students showed different attribution patterns, depending on when attributing other people’s hypothetical success or failure situations and when attributing their own success or failure experiences. Before going through the experimental tasks, when they were attributing other people’s success or failure (i.e., they did not personally experience these success or failure situations), Canadian and Chinese subjects showed similar attribution patterns (i.e., the difference was not a matter of a kind but a matter of degree). They both attributed success to internal factors (i.e., effort and ability). In failure conditions, both Canadian and Chinese subjects blamed lack of effort (external, controllable factor) as the main reason for poor
performance. However, in reflecting upon their own personally-experienced success or failure, Canadian college students attributed their success mainly to ability or a little to effort and failure to effort or bad luck, whereas Chinese college students believed that their good luck or somewhat ability bought them success and not making enough effort definitely led them to failure. These findings in general support the predictions derived from Hypothesis 1 in that Chinese subjects used effort to account for other people's success or failure and that Canadian subjects mainly used ability to explain their success. However, what was not predicted by Hypothesis 1 is that Canadian and Chinese subjects showed different attribution patterns between attributing others' success or failure and attributing their own success or failure.

Culture effects on acquisition of conditional rules. Canadian college students were faster than Chinese college students in learning a conditional rule when the content of the conditional rule was culture-fair. However, when the content of a conditional rule was culture-biased in that the content of the conditional rule was based on an event in Chinese culture, Chinese college students caught up and did equally well as Canadian college students in learning the conditional rule. These findings support the predictions derived from Hypothesis 4; namely, being brought up and living in one culture may cultivate certain values not known or appreciated in another culture, which may in turn affect one's reasoning proficiency.

Culture effects on application of conditional rules. When the content of a conditional rule was culture-fair, Canadian and Chinese college students did not differ significantly in using the conditional rule to arrive at the right conclusions. However, when the content of a conditional rule was culture-biased, Canadian and Chinese college students differed significantly in using the conditional rule to reach the correct conclusions. Depending on the cultural values on which a conditional rule was based and the cultural contexts in which the deductive reasoning took place, Canadian and Chinese college students differed in their deductive reasoning as individuals, family members, and members of their societies. In particular, Chinese students performed better on the tasks.
favouring their own culture at individual and family levels. This supports the predictions derived from Hypothesis 2, in that people in different cultures may conduct deductive reasoning differently when the content of conditional rule contains cultural cues known only to one culture group but not known to the other culture group.

Joint effects of culture and attribution of outcome feedback. Joint effects of culture and attribution of outcome feedback were found on Canadian subjects who received failure feedback. Chinese subjects' reasoning performance was not affected as much as Canadian subjects' reasoning performance by outcome feedback in performing culture-biased inductive (rule-learning) tasks. Whether the outcome feedback was success or failure, Chinese subjects seemed to have similar rule-learning performance. In contrast, Canadian subjects who experienced failure made more response errors than those who experienced success in performing the same culture-biased inductive (rule-learning) tasks. The same joint effects were found in the application of deductive reasoning rules. In applying conditional rules, Chinese subjects' task performance did not vary much whether they received success or failure outcome feedback. In contrast, Canadian subjects who received earlier success outcome feedback had better performance on the same rule application tasks than those Canadian subjects who received failure feedback. These findings support the predictions derived from Hypothesis 3; namely, Canadian college students are more vulnerable than Chinese college students to failure outcome feedback.

B. Discussion

1. A Dialectical View about Reasoning in Different Cultures

about reasoning in different cultural contexts. I proposed that a third view, a dialectical view, be taken to provide a more comprehensive theoretical framework to account for the fact that using the same conditional rules people in different cultures often reached different conclusions. The findings about inductive and deductive reasoning in this study supported my proposal. In the present study, when culture-fair inductive reasoning tasks were given to the subjects, Chinese college students were slower than Canadian college students in learning the conditional rule. However, when a culture-biased conditional rule was used with its content based upon a meaningful date in Chinese culture, Chinese college students’ performance showed such a dramatic improvement that the performance difference observed in the culture-fair inductive reasoning between Chinese and Canadian college students disappeared. In the experiment, nothing was changed (the same experimental instrument and the same conditional rule structure) except that the content of the conditional rule was based on an event in Chinese culture. This observation needs to be interpreted with caution, since an induction task favouring Canadian students was not tested in the present study, thus providing only partial information. Canadian and Chinese college students also showed significant performance differences in deductive reasoning tasks balanced over bias and culture levels.

Based on these findings, I believe that both internal cognitive activities and external societal interactions play a role in reasoning performance. The internal cognitive activities are the pre-requisite for reasoning process, whereas the external social-cultural interactions are the conditions for the reasoning performance. Reasoning process is completed through internal cognitive activities in the external social-cultural contexts. Therefore, instead of taking the social contextualist view and the organismic view as two opposing views, I consider the two as complimentary to each other. I believe that human reasoning is in general a cognitive process of people of all cultures, but this process can be and is affected by social-cultural contexts. As long as there are different cultures, people in two different cultures will reason differently when the content of a conditional rule is based on an event or experience in only one of the two cultures. Those who know
the cultural event or have the cultural experience will have an advantage in conditional reasoning over those who do not have this cultural knowledge or have not experienced this event in their culture.

2. Attribution of Outcome Feedback and Subsequent Reasoning Performance

In an effort to test their attribution theory in other cultures, Stipek, Weiner, and Li conducted a study of 101 students in a Chinese university near Shanghai (Stipek, Weiner, & Li, 1989). They found that Chinese college students’ attribution pattern was similar to that of American college students in success situations. Namely, they emphasized ability and effort as important factors for success. However, in failure situations, the authors reported, Chinese college students differed from American college students in that Chinese college students still recognized ability as well as low effort as important factors, while American college students would relate failure only to low effort.

In this study, two attribution tasks were administered, one in which subjects made attribution based on other people’s experience of success or failure, and the other in which subjects personally experienced success or failure and then made attribution. In the first task in which subjects did not personally experience success or failure, Chinese college students made similar attribution patterns as found by Stipek, Weiner, and Li from the college students near Shanghai. Namely, Chinese college students picked ability and effort as the main cause for success but mainly blamed lack of effort and task difficulty for failure. Canadian college students also showed a similar attribution pattern to that of American college students, as reported by Weiner and his colleagues. That is, Canadian college students attributed success to both ability and effort but blamed lack of effort or task difficulty as the main cause for failure.

However, subjects showed different attribution patterns after they personally experienced success or failure instead of making judgment based on other people’s success or failure experience. Specifically, after personally experiencing success, Chinese college students believed that their good performance was mainly due to their
good luck or high ability whereas Canadian college students thought that their success was the result of having the ability to perform the tasks or their effort. After experiencing failure, all of the Chinese subjects blamed lack of effort (an internal factor) for their failure, whereas Canadian subjects identified either lack of effort or bad luck (internal and external factors) for their failure. It is noteworthy that “luck” has been used as a causal factor frequently by Chinese subjects for success attribution and by Canadian subjects for failure attribution. Thus, it seems to add a surplus meaning arising from cultural contexts:

Based on these findings, one should note that there is a significant difference in attribution patterns between making attribution based on one’s own personal experience of a success or failure and making attribution based solely on other people’s experience. That is, attribution pattern is situated in attribution contexts. Stipek, Weiner, and Li (1989) only observed Chinese college students make attribution in one situation (attributing other people’s success or failure) and concluded that Chinese college students made attribution in a similar way to that of their American counterparts. Had they placed some of their Chinese subjects in a situation where they personally experienced success or failure, the same attribution pattern may not have been observed, as suggested by the findings of the present study. Therefore, it is arguable that the general attribution theory (Weiner, 1972, 1976, 1979, 1986, and 1990) can be extended to Chinese culture without modification, as Stipek, Weiner, and Li concluded.

3. Attribution of Outcome Feedback and Conditional Reasoning

The general attribution theory (i.e., Weiner et al., 1972, 1976, 1986, 1990) predicts that in general people tend to show better task performance after experiencing success than after experiencing failure. In this study, findings from Canadian college students’ reasoning performance support the prediction made with the general attribution theory. Those Canadian subjects who experienced success performed both inductive and
deductive tasks better than those who experienced failure. However, findings about
Chinese college students’ conditional reasoning do not always lend support to the general
attribution theory, because Chinese students’ reasoning performance was not affected as
much as that of Canadian students by their success or failure experience or by their
attribution pattern. These findings further indicate that the general attribution theory may
not be readily extended to Chinese culture without some modification. Namely, it must
account for the dual attribution patterns demonstrated by the Chinese subjects in the
present study.

4. Culture classification

Triandis (1989, 1990) proposes a culture classification theory. According to
Triandis, cultures may vary along three dimensions: (a) the individualistic-collectivist
dimension, (b) the tight and loose dimension, and (c) the simple-complex dimension. In
addition, Triandis (1994, p.167) also identified three critical constructs of culture, (a)
goal, (b) resources, and (c) success. In the beginning of this study, with the classification
criteria set by Triandis, Canadian culture was assumed to be by and large individualistic,
loose, and complex. In contrast, relative to Canadian culture, Chinese culture was
assumed to be collective, tight, and also complex. Based on Triandis’ three critical
constructs of culture, a culture classification task was designed. The findings from this
culture classification task only partially support Triandis’ culture classification theory. In
goal pursuing situations, Chinese college students were more egocentric and society
oriented but more individualistic and family oriented than Canadian college students.
However, in resource sharing situations, Chinese college students were more egocentric
but less individualistic, family oriented, and society oriented than Canadian college
students. On the other hand, in attributing success, Canadian college students were less
egocentric, individualistic, family-oriented, but more society-oriented than Chinese
college students.
Overall, the findings from the culture classification task seem to indicate that Chinese culture is collective only relative to Canadian culture. In some situations (e.g., resource sharing), Chinese college students may be quite egocentric, as opposed to the predictions derived from Triandis' culture classification theory. This, I suspect, may be the result of the introduction of Western cultures to China in recent years. In the past few years, China has opened its door to the West even wider. With the importation of technology from the West, Western books and movies also found their way into Chinese markets. New songs and music from the West are quickly accepted by the Chinese, especially by the young people. Because of this exposure to Western cultures, the Chinese society is undergoing a quite yet fundamental change, especially in Chinese coastal cities. More and more young Chinese are abandoning traditional Chinese values and quickly adapting Western values seen and learned from the imported movies and newspapers. As a result, the Chinese subjects who participated in this study might not have been as “pure” Chinese as the older generation or as those young people in inland or remote areas of China. If the participants had been selected from a remote area in China, the results of the culture classification task might have been different. Perhaps a clear individualistic culture pattern could have been observed. Nonetheless, the culture classification theory and critical constructs proposed by Triandis have served as a general guideline and provided useful definitions of culture in this study.

C. Internal and External Validity of the Findings

1. Internal validity

A number of measures were taken to ensure the internal validity of this study. First of all, the design of the study was based on a thorough review of related literature. Whenever possible, tasks for the experiments were adapted from existing tests with proven internal validity. For example, the Objective Attribution Task (Task 1A) was adapted from a task used by Lee and Lee (1983) in their study and was validated by the
Lees with statistical analysis (the multi-dimensional unfolding technique), and the Non-verbal (Culture-fair) Inductive Reasoning Task (Task 2) was also adapted from a task used and validated by Lee in his study (1985). In addition, the tests were pilot tested with both English and Chinese native speakers and revisions were made with the pilot task data. To ensure the validity of the translation, the Chinese version of the tasks was checked by two other translators who were certified by the Chinese government as professional English-Chinese translators. The experiments were strictly controlled in the sense that all tests were delivered by a microcomputer and all subjects were given the same instruction. However, despite the caution taken in the design of the study and during the experiments, a possible threat to the internal validity of the findings was the differential learning effect. This is particularly true with the deductive reasoning experiments in which subjects were required to take as many as six sets of tasks of the same structure. Some of the subjects could have suffered from fatigue or learned the structure of the tasks even though the tasks were randomly ordered so as not to study learning improvement per se. In addition, the wording of Choice C in Task 3 (Self-attribution) should have been more specific to refer to effort. More of this is discussed in the section Limitations of the Present Study.

2. External Validity

Because the tasks were administered to subjects in two countries, the difference in the task environments (different classrooms, lighting, noise level, etc.) might have affected subjects’ response time and level of concentration. Furthermore, there was a difference in the level of familiarity with microcomputers between the Canadian and Chinese college students who participated in the study. Nearly all of the Canadian subjects had used microcomputers before the experiments, whereas a substantial number of the Chinese subjects had never touched a computer prior to the experiments. Therefore, this pre-existing difference in computer exposure between the two cultural groups could have affected the subjects’ response time in the ways not known to me and therefore posed a threat to the external validity of the findings.
D. Limitations of the Present Study

One of the noticeable limitations of the present study was that, in order to avoid response fatigue, only one culture-biased inductive reasoning task in favour of Chinese subjects (Task 4) was used. The cultural cue in the content of this task helped Chinese subjects improve their reasoning performance dramatically. It would have been interesting to see if Canadian subjects would maintain their superior performance over that by Chinese subjects if another inductive reasoning task based on Canadian culture had been used. Because of the absence of such a task, we can only assume that, based on Chinese subjects’ performance on the culture-biased reasoning task, Canadian subjects’ performance would have been improved if a culture-biased task favouring Canadian culture had been used.

Another limitation of the present study is the wording of Choice 3 (effort) in the Self-attribution Task (Task 3). Although the statement “I did this kind of task before” (for success feedback) or “I never did this kind of task before” (for failure feedback) implies making or lacking effort. The degree of the implication of effort did not seem to be strong enough. If I could re-do the study, I would use the wording “I tried really hard” (for success feedback) or “I didn’t try very hard”. With the present wording, some subjects who received failure feedback and made this choice might have selected one of the other three choices as their causal explanation for the success or failure if the reference to effort had been stronger.

In addition, subjects’ attribution choice in the Self-attribution Task (Task 3) might have been influenced by factors not known to me, because there was no background information provided in Task 3, based on which subjects could make attribution on the same level. The implication of this task is that subjects’ decision to select a causal source might not have been fully based on the success or failure feedback provided in the task.

Although the findings from the two control groups validated the six constructs used for the design of culture-biased tasks (i.e., Tasks 6B1 to 6B6), not all Canadians
may agree that the three constructs intended to favour Canadian subjects are typical Canadian cultural constructs. The same is true for the three Chinese cultural constructs. Ideally, these six constructs should have been given to a large sample of the population in each culture and be rated for their cultural representativeness. Then, the question of cultural representativeness of these constructs would not have remained certain until the results of final analysis of subjects’ performance were known.

E. Suggestions for Further Study

Although the findings of this study have provided new information about human reasoning and attribution in different cultural contexts, a number of new issues have arisen as a result of this study and need further exploration. First of all, one of the important findings of this study is that Canadian and Chinese college students reason differently when the content of a conditional rule is familiar to only one of the two cultural groups. Can we generalize this difference to other Western and Eastern cultures? For example, if British college students and Vietnamese college students were given the same tests, could the same reasoning outcomes be observed? It is therefore suggested that the tasks and methodology of this study be used with college students in other Western and Eastern cultures to determine the generalizability of the findings from this study.

Secondly, the findings of this study indicate that Chinese college students’ attribution patterns differ between making attribution based on one’s personal experience of success or failure and making attribution based solely on other people’s experience of success or failure. It would be very interesting to see if the same dual attribution pattern can be found from college students in other Asian cultures. Therefore, it is recommended that a new attribution study be designed with two experimental conditions, one in which subjects personally experience success or failure and the other in which subjects do not go through the experience to determine if the dual attribution pattern is solely a Chinese phenomenon or it is a common phenomenon in other Asian cultures.
Thirdly, the data about culture classification collected from this study failed to provide a clear cut differentiation between collective and individualistic cultures, as defined by Triandis (1994) in not-so-typical cultures (i.e., cultures other than US or Japanese cultures). Canadian and Chinese subjects showed somewhat mixed cultural tendencies. This raises a question about the applicability of the culture classification theory (Triandis, 1994). With typical collective cultures, such as Japanese culture, or typical individualistic cultures, such as the American culture, the culture classification theory works well. However, with less typical cultures, such as Canadian and Chinese cultures, it is difficult to use the culture classification theory to make a clear and fine distinction of cultures. The fact is that there are more non-typical cultures than typical cultures in this pluralistic world of ours. How should we classify these non-typical cultures? Do we need to modify the existing culture classification theory or do we have to develop new culture classification scales that work better with non-typical cultures? These questions need to be addressed so that we can talk more accurately about cultures. Therefore, new studies need to be conducted to address these issues.

F. Conclusion

The findings of this study present a new view about human reasoning in different cultural contexts. Although conditional reasoning is a basic process of all peoples, the reasoning outcomes from a given conditional rule may not be all the same when the content of the conditional rule is culture-biased. That is, cultural values may and can influence one’s reasoning results. The findings of this study also throw light on the theoretic framework regarding cross-cultural studies. Namely, what is an appropriate view about cross-culture research? The findings of this study do not fully support the contextualist view which tends to use culturally situated factors as explanation for all observed performance differences, nor do the findings of this study fully support the organismic view which tends to use the difference in the development of sensory motor skills to account for the observed cognitive differences. The findings of this study lead to
the acceptance of a dialectic view, which advocates that all thinking processes, including reasoning, is completed though internal cognitive activities in the external social-cultural contexts.

The findings of this study also showed for the first time that attribution pattern may not be a constant. That is, Chinese college students have dual attribution patterns. When they make attribution about other people's success or failure, they behave almost like American college students, as reported by Stipek, Weiner, and Li (1989). However, after they have personally experienced success or failure, Chinese college students changed their attribution patterns. To my knowledge, this dual attribution pattern has not been reported by any other attribution researchers. The discovery of this dual attribution pattern may rekindle the interest of cross-cultural research of attribution and reasoning. It also raises question about extending the general attribution theory (Weiner et al. 1972, 1976, 1979, 1990) to other cultures, particularly to non-typical cultures, i.e., cultures other than American culture (typical individualistic culture) and Japanese culture (typical collective culture).

The findings of this study also have educational implications. The findings of the present study indicate that failure outcome feedback tends to reduce Canadian students' task performance. This may imply that Canadian subjects are not used to negative performance feedback. In the last two decades or so, education advocates and practitioners in Canada have been emphasizing on the role of positive performance feedback in motivating students' learning. While positive performance feedback certainly has its place as a good teaching tactic in the classroom, there is also a side effect. Namely, over-using positive feedback tends to condition students to good remarks and therefore make students unable to learn in failure situations. Thus, when negative feedback is given, students may not be able to handle the failure. Therefore, it is suggested that instructors in Canadian colleges help students cope with failure performance by providing both success and failure feedback to students.
REFERENCES


APPENDICES

APPENDIX A

Task 1A: Objective Causal Attribution Task

(Note: Tasks were displayed on the computer screen one pair of choices per screen.)

1. Sally did very well on her French spelling test. Why do you think she did well?
   a. She is good at spelling.
   b. The spelling test was easy.
   c. She studied a lot for the test.
   d. She was lucky.

2. Ken did very poorly on his math test. Why do you think he failed?
   a. Ken was not good at math.
   b. The math test was too difficult for everyone.
   c. Ken was careless.
   d. Ken just had bad luck that day.

3. Why did the instructor say Tony’s work was very good?
   a. He is a very bright student.
   b. The homework problem was easy.
   c. He worked very carefully on his assignment.
   d. The instructor was in a good mood.

4. Anne got a poor grade on her report of Indian history. Why do you think that the instructor didn’t like her paper?
   a. Anne isn’t very good at writing reports.
   b. The assignment was too difficult for everyone.
   c. Anne didn’t spend enough time working on the report.
   d. The instructor was in a bad mood.

5. Nancy solved a difficult math problem. Why do you think she managed to solve it?
   a. Nancy is good at solving math problems.
   b. The problem in fact was a very easy one.
   c. She worked on it for a long time.
   d. Just by chance, she found the solution.

6. Bill could not solve a new puzzle. Why do you think he couldn’t do it?
   a. He is not good at solving puzzles.
   b. The puzzle was a very difficult one.
   c. He gave up too soon.
   d. Some of the puzzle pieces were missing.
7. Why do you think that John is the captain of the baseball team?
   a. He is the best baseball player on the team.
   b. It is his turn to be the captain.
   c. He practises a lot to improve his baseball skills.
   d. The coach likes him.

8. Kelly’s friend was climbing up a tree and fell down. Why do you think this happened?
   a. She is not good at climbing up a tree.
   b. It was difficult to climb because the tree was very slippery.
   c. She was not very careful that time.
   d. It was an accident.

9. Suzie’s college band won first prize in the festival. Why do you think they were the winners?
   a. All band members are good musicians.
   b. The other bands weren’t very good.
   c. All the band members practised very hard.
   d. The judges just happened to like the song they played.

10. Scott’s hockey team lost their last game by a score of 12 to 2. Why do you think this happened?
    a. They are not a very good team.
    b. The other team is the best in the league.
    c. They did not have enough practice before the game.
    d. They had bad luck.

11. David’s college basketball team won a close game last week. Why do you think they won the game?
    a. The coach gave them very good training.
    b. The other team was not a very strong team.
    c. The team practiced a lot before the game.
    d. They were lucky.

12. Jane’s college band played very poorly at the Christmas concert. Why do you think this happened?
    a. Most band members were not good musicians.
    b. They were playing a very difficult piece of music.
    c. They did not practise enough before the concert.
    d. Some of the band members were not feeling well that day.
APPENDIX B

Task 1B: Culture Type Classification Task

(Note: Tasks were displayed on the computer screen one pair of choices on each screen.)

Instruction: This learning program consists of a number of small sessions. In the next session, you will be asked to express your opinion about paired statements. All you have to do is to indicate your preference by pressing A or B on the computer keyboard.

Statement 1: Jack is 19 years old and is selecting his major at UBC. He wants to go to medical school and become a doctor. Why do you think Jack wants to be a medical doctor?

a. Jack wants to live a comfortable life in the future.
b. Jack wants to be somebody.
c. Jack wants to bring glory to his family.
d. Jack wants to help those less fortunate in society.

Statement 2: Jane is a second-year college student majoring in journalism. She was recently nominated as the Young Writer of the Year by the Canadian Young Writers' Association. What do you think is the most important factor for Jane's success?

a. Jane always wanted to defeat others and be recognized as the best.
b. Jane spent a lot of time practising story-writing.
c. Jane's family supported her.
d. Jane's instructor did a good job teaching her.

Statement 3: John is a first-year student at SFU. His mother is working two jobs to support his education. He just won $10,000 cash in a random luck draw organized by a major car company. What do you think John should do with the money?

a. John should keep the money to himself and spend it on what he had always wished for.
b. John should open a personal bank account and deposit the money under his name.
c. John should give half of the money to his mother.
d. John should give half of the money to the Disabled Children Society.
APPENDIX C

Task 2: Non-verbal Inductive (culture-fair) Reasoning Task

**Instruction:** In this learning session, you are going to see a number of geometric shapes such as circles, triangles or squares with different colours (red, white, green, etc.). Dr. Johnson, a physics professor, studied these colours and geometric shapes. He discovered that some of these shapes, when combined with certain colours, would bring good luck to his students in term exams. That is, when he showed some coloured shapes to his students before exams, all his students got high scores. Then, Dr. Johnson found a simple rule to identify the lucky coloured geometric shapes. Your task is to help me find out this simple rule that identifies the lucky shapes.

You will see these geometric shapes one at a time on the computer screen. When a geometric shape appears on the screen, you will be asked to guess if the geometric shape is a lucky one or not. After you make a prediction, the computer will tell you if your guess is correct. Remember, the goal is to find out Dr. Johnson’s rule which will help you identify the lucky shapes. The program will stop when you make several correct guesses in a row. To help you find the lucky geometric shapes, please use the paper and pencil to take notes. Thank you.

**Answer recording sheet:** To help you solve the problem, please use the following space to record your prediction and the feedback.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Geometric Shape</th>
<th>Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes or No?</td>
</tr>
</tbody>
</table>

(continued on the next page)
You have completed this learning session.

What was the rule or idea you discovered in getting more correct answers? Please write down the rule or idea in your own words:

________________________________________________________________________________________

What is the simplest rule that is being used here?

Whenever the colour on the screen is ___________, the geometric shape is ___________.
   (red, green, or white)   (square, circle or triangle)

Please press a key on the keyboard to continue the learning program.
APPENDIX D

Task 3: Post-Task Performance Causal Attribution Task

**Hypothetical Success Group:** (on the computer screen) Well done, First-Name of the subject. Compared with other people who took this colour-shape test, you scored much higher than most other people. Please tell me which of the following statements best describes the reason for your excellent task performance?

Which of the following do you think best describes the reason you did well in the last task?

a) I am always good at this kind of task
b) The task was very easy for me
c) I did this kind of task before
d) I don't know why I did so well today

**Hypothetical Failure Group:** (on the computer screen) That was quite challenging, First Name of the subject. Compared with other people who took this colour-shape test, you scored much lower than most other people. Please tell me which of the following statements best describes the reason for your poor task performance?

Which of the following do you think best describes the reason you did not do well in the last task?

a) I'm not good at this kind of task
b) The task was very difficult for me
c) I never did this kind of task before
d) I don't know why I did so poorly today
APPENDIX E

Task 4: Culture-biased Inductive Reasoning

**Instruction:** Now, suppose that you are on a small Pacific island and asked to help a sociologist find the behaviour pattern of the local people. The local people have strict rules about doing certain things on certain dates. Your task is to determine if a prediction of the local people's activity on a given date is correct. That is, when you see a prediction on the screen about some local people's activity on a certain date, tell me if you think the prediction is correct. After you make each guess, I will tell you if your guess is correct. The goal here is to find a simple RULE that will help the sociologist decide if each prediction is correct or not. After you make several correct responses in a row, the program will stop. You may want to use the answer sheet below to help you find the rule.

**Answer recording sheet:** To help you solve the problem, please use the following space to record your prediction and the feedback.

<table>
<thead>
<tr>
<th>Date</th>
<th>Predicted activity of the local Indians</th>
<th>Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes or No?</td>
</tr>
</tbody>
</table>

continued on the next page...
Task 4 continues...

You have observed that the local people do certain things regularly on certain dates.

What was the rule or idea you discovered in getting more correct answers? Please write down the rule or idea in your own words:

What is the simplest rule that is being used here?

Whenever it is ________, the local people ________,

(a date) (an action)

press any key on the keyboard to continue the learning program.
APPENDIX F

Task 5A: Rule Application with Culture-Fair Arguments (Familiar Contents)

In the colour-shape learning session, you have learned the rule:
Whenever the colour of a shape's interior is red, then the shape is a circle. Another way of describing the rule is:
\textbf{IF the colour is red, THEN the shape must be a circle.}

Now, please use this rule and answer the following questions:

1. Now suppose it is found that the colour of the shape is red. Is the conclusion that the shape is a circle
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose it is found that the colour of the shape is red. Is the conclusion that the shape is NOT a circle
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose it is found that the colour of the shape is NOT red. Is the conclusion that the shape is a circle
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose it is found that the colour of the shape is NOT red. Is the conclusion that the shape is NOT a circle
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose it is found that the shape is a circle. Is the conclusion that the colour is red
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose it is found that the shape is a circle. Is the conclusion that the colour is NOT red
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose it is found that the shape is a NOT circle. Is the conclusion that the colour is red
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose it is found that the shape is a NOT circle. Is the conclusion that the colour is NOT red
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 5B1: Rule Application with Culture-Fair Arguments (Unfamiliar Contents)

You have learned how to use a rule to evaluate if a given statement is true or not in the last task. Now here is a new rule:

IF the water contains the detergent NewForever, THEN the test paper becomes red.

Please use this rule to answer the following questions:

1. Now suppose it is found that the water contains detergent NewForever. Is the conclusion that the test paper becomes red
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose it is found that the water contains the detergent NewForever. Is the conclusion that the test paper DOES NOT become red
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose it is found that the water DOES NOT contain the detergent NewForever. Is the conclusion that the test paper becomes red
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose it is found that the water DOES NOT contain the detergent NewForever. Is the conclusion that the test paper DOES NOT become red
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose it is found that the test paper becomes red. Is the conclusion that the water contains the detergent NewForever
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose it is found that the test paper becomes red. Is the conclusion that the water DOES NOT contain the detergent NewForever
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose it is found that the test paper DOES NOT become red. Is the conclusion that the water contains the detergent NewForever
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose it is found that the test paper DOES NOT become red. Is the conclusion that the water DOES NOT contain the detergent NewForever
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 5B2: Rule Application with Culture-Fair Arguments (Unfamiliar Contents)

You have learned how to use a rule to evaluate if a given statement is true or not in the last task. Now here is a new rule:

**IF the water contains the detergent FreshClean, THEN the test paper becomes blue.**

Please use this rule to answer the following questions:

1. Now suppose it is found that the water contains detergent FreshClean. Is the conclusion that the test paper becomes blue
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose it is found that the water contains the detergent FreshClean. Is the conclusion that the test paper DOES NOT become blue
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose it is found that the water DOES NOT contain the detergent FreshClean. Is the conclusion that the test paper becomes blue
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose it is found that the water DOES NOT contain the detergent FreshClean. Is the conclusion that the test paper DOES NOT become blue
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose it is found that the test paper becomes blue. Is the conclusion that the water contains the detergent FreshClean
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose it is found that the test paper becomes blue. Is the conclusion that the water DOES NOT contain the detergent FreshClean
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose it is found that the test paper DOES NOT become blue. Is the conclusion that the water contains the detergent FreshClean
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose it is found that the test paper DOES NOT become blue. Is the conclusion that the water DOES NOT contain the detergent FreshClean
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6A: Rule Application with Culture-Biased Arguments (Familiar Contents)

In Task 3, you learned the rule:

**IF** it is October 1, **THEN** we go on vacation.

Now, please use this rule and answer the following questions:

1. Now suppose that it is October 1. Is the conclusion that we go on vacation
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose that it is October 1. Is the conclusion that we do not go on vacation
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose that it is not October 1. Is the conclusion that we go on vacation
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose that it is not October 1. Is the conclusion that we do not go on vacation
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose that we go on vacation. Is the conclusion that it is October 1
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose that we go on vacation. Is the conclusion that it is not October 1
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose that we do not go on vacation. Is the conclusion that it is October 1
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose that we do not go on vacation. Is the conclusion that it is not October 1
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6B1: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Sarah is a first-year student at SFU. She wants to win the national math competition to be held in Ottawa. we know that: IF Sarah has the ability for math, THEN she will certainly win the competition award.

Now, using this logic, please answer the following questions.

1. Now suppose Sarah has math ability. Is the conclusion that Sarah will certainly win the math competition
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

2. Now suppose Sarah has math ability. Is the conclusion that Sarah will certainly not win the math competition
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

3. Now suppose Sarah does not have math ability. Is the conclusion that Sarah will certainly win the math competition
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

4. Now suppose Sarah does not have math ability. Is the conclusion that Sarah will certainly not win the math competition
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

5. Now suppose Sarah will win the math competition. Is the conclusion that Sarah has math ability
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

6. Now suppose Sarah will win the math competition. Is the conclusion that Sarah doesn’t have math ability
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

7. Now suppose Sarah will not win the math competition. Is the conclusion that Sarah has math ability
   a) Always true? 
   b) Sometimes true? 
   c) Never true?

8. Now suppose Sarah will not win the math competition. Is the conclusion that Sarah doesn’t have math ability
   a) Always true? 
   b) Sometimes true? 
   c) Never true?
Task 6B2: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Here is a new rule: **IF Lili takes some Chinese herb medicine, THEN her fever will soon be gone.**
Now, using this logic, please answer the following questions.

1. Now suppose Lili takes some Chinese herb medicine. Is the conclusion that Lili's fever will soon be gone
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose Lili takes some Chinese herb medicine. Is the conclusion that Lili's fever will not soon be gone
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose Lili has NOT taken any Chinese herb medicine. Is the conclusion that Lili's fever will soon be gone
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose Lili has NOT taken any Chinese herb medicine. Is the conclusion that Lili's fever will not soon be gone
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose Lili's fever will be gone soon. Is the conclusion that Lili has taken some Chinese medicine
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose Lili's fever will be gone soon. Is the conclusion that Lili has not taken any Chinese medicine
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose Lili's fever will NOT be gone soon. Is the conclusion that Lili has taken some Chinese medicine
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose Lili's fever will NOT be gone soon. Is the conclusion that Lili has not taken any Chinese medicine
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6B3: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Here is a new rule: IF Maria cleans her parents' house, THEN she always asks her parents to pay for her cleaning work. Now, using this logic, please answer the following questions.

1. Now suppose Maria cleaned her parents' home. Is the conclusion that Maria will ask her parents to pay her for her cleaning work
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose Maria cleaned her parents' home. Is the conclusion that Maria will not ask her parents to pay her for her cleaning work
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose Maria has NOT cleaned her parents' home. Is the conclusion that Maria will ask her parents to pay her for her cleaning work
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose Maria has NOT cleaned her parents' home. Is the conclusion that Maria will not ask her parents to pay her for her cleaning work
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose Maria is asking her parents to pay for her cleaning work. Is the conclusion that Maria has cleaned her parents home
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose Maria is asking her parents to pay for her cleaning work. Is the conclusion that Maria has not cleaned her parents home
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose Maria will NOT ask her parents to pay for her cleaning work. Is the conclusion that Maria cleaned her parents home
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose Maria will NOT ask her parents to pay for her cleaning work. Is the conclusion that Maria didn’t clean her parents home
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6B4: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Here is a new rule: **IF Jane has tattoos printed on her arms, THEN her parents will be very angry with her.** Now, using this rule, please answer the following questions.

1. **Now suppose that Jane has tattoos on her arms. Is the conclusion that Jane's parents will be very angry with her**
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. **Now suppose that Jane has tattoos on her arms. Is the conclusion that Jane's parents will not be very angry with her**
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. **Now suppose that Jane DOES NOT have tattoos on her arms. Is the conclusion that Jane's parents will be very angry with her**
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. **Now suppose that Jane DOES NOT have tattoos on her arms. Is the conclusion that Jane's parents will not be very angry with her**
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. **Suppose that Jane’s parents are very angry with her. Is the conclusion that she had tattoos printed on her arms**
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. **Suppose that Jane’s parents are very angry with her. Is the conclusion that she did not have tattoos printed on her arms**
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. **Now suppose that Jane's parents are NOT angry with her. Is the conclusion that Jane has tattoos on her arms**
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. **Now suppose that Jane's parents are NOT angry with her. Is the conclusion that Jane DOES NOT have tattoos on her arms**
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6B5: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Here is a new rule: IF Jane does not get along well with her husband, THEN she always goes to see a family psychologist for counseling. Now, using this rule, please answer the following questions.

1. Now, suppose that Jane gets along well with her husband. Is the conclusion that she will go to see a family psychologist for counseling
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now, suppose that Jane gets along well with her husband. Is the conclusion that she will not go to see a family psychologist for counseling
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now, suppose that Jane doesn’t get along well with her husband. Is the conclusion that she will go to see a family psychologist for counseling
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now, suppose that Jane doesn’t get along well with her husband. Is the conclusion that she will not go to see a family psychologist for counseling
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now, suppose that Jane will go to see a family psychologist for counseling. Is the conclusion that Jane gets along well with her husband
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now, suppose that Jane will go to see a family psychologist for counseling. Is the conclusion that Jane doesn’t get along well with her husband
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now, suppose that Jane will not go to see a family psychologist for counseling. Is the conclusion that Jane gets along well with her husband
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now, suppose that Jane will not go to see a family psychologist for counseling. Is the conclusion that Jane doesn’t get along well with her husband
   a) Always true?
   b) Sometimes true?
   c) Never true?
Task 6B6: Rule Application with Culture-Biased Arguments (Unfamiliar Contents)

Here is a new rule: IF the government calls young people to help build a strong armed force, THEN Martin, a computer science student at UBC, will give up his studies and joined the army. Now, using this rule, please answer the following questions.

1. Now suppose that the government has called young people to help build strong armed forces. Is the conclusion that Martin has given up his study
   a) Always true?
   b) Sometimes true?
   c) Never true?

2. Now suppose that the government has called young people to help build strong armed forces. Is the conclusion that Martin has not given up his study
   a) Always true?
   b) Sometimes true?
   c) Never true?

3. Now suppose that the government didn’t call young people to help build strong armed forces. Is the conclusion that Martin has given up his study
   a) Always true?
   b) Sometimes true?
   c) Never true?

4. Now suppose that the government didn’t call young people to help build strong armed forces. Is the conclusion that Martin has not given up his study
   a) Always true?
   b) Sometimes true?
   c) Never true?

5. Now suppose that the Martin has given up his study. Is the conclusion that the government has called young people to help build strong armed forces
   a) Always true?
   b) Sometimes true?
   c) Never true?

6. Now suppose that the Martin has given up his study. Is the conclusion that the government has not called young people to help build strong armed forces
   a) Always true?
   b) Sometimes true?
   c) Never true?

7. Now suppose that the Martin has not given up his study. Is the conclusion that the government has called young people to help build strong armed forces
   a) Always true?
   b) Sometimes true?
   c) Never true?

8. Now suppose that the Martin has not given up his study. Is the conclusion that the government has not called young people to help build strong armed forces
   a) Always true?
   b) Sometimes true?
   c) Never true?
APPENDIX H

TASKS AND INSTRUCTIONS FOR CHINESE SUBJECTS

A Computer Aided

STUDENT LEARNING PROGRAM

Designed and Programmed

By Min Yao

Copy Right Reserved

July, 1994
试题一 (A)

这个电脑辅助学习程序是由一系列的小单元组成，整个练习需要半个小时的时间。

1. 小李在俄语拼写测试中得了高分，你认为他为什么得了高分？
   A. 他的拼写能力强。
   B. 那个俄语拼写测试很容易。
   C. 小李为准备这个俄语拼写测试花了不少时间。
   D. 小李碰巧得了高分。

2. 小张数学测试没及格，你认为他为什么没及格？
   A. 小张数学能力差。
   B. 那个数学测试很难。
   C. 小张粗心大意。
   D. 小张那天没走运。

3. 老师为什么说李军的作业做得好？
   A. 李军聪明。
   B. 作业中的问题都很简单。
   C. 李军花了很多功夫做那个作业。
   D. 老师当时心情特别好。

4. 宋玲那篇关于近代史的稿子没及格，你认为她的稿子为什么没及格？
   A. 宋玲的写作能力很差。
   B. 那个作业的要求太高。
   C. 她为那篇稿子用的时间太少。
   D. 老师阅稿时心情不太好。

5. 林莉解答了一道数学难题，你认为她为什么能解答这个难题？
   A. 林莉的数学能力强。
   B. 实际那道数学题一点都不难。
   C. 她花了很多时间做那道题。
   D. 她解答了那道数学难题真是瞎猫碰了只死耗子。

6. 吴国军找不出那个字谜的答案，你认为他为什么找不出字谜的答案？
   A. 他呀，天生就不是玩字谜的料。
   B. 那个字谜太难。
   C. 他没做几下就不做了。
   D. 那个字谜本身就语句不清楚。

7. 你怎么知道刘杰是乒乓球队的队长？
   A. 他是乒乓球队里打得最好的队员。
   B. 该轮到他当队长了。
   C. 他刻苦训练，提高球技。
   D. 教练喜欢他。
8. 小王的朋友爬树摔了下来，你认为他为什么从树上摔下来？
   A. 他那朋友根本就不会爬树。
   B. 那棵树太滑很难爬。
   C. 他那朋友太不小心了。
   D. 那只是偶然的一次意外。

9. 钢院的乐队在高校联赛中得了第一，你认为钢院乐队为什么得第一？
   A. 钢院乐队的成员个个都是高手。
   B. 其它高校的乐队都不怎么样。
   C. 钢院乐队的成员都很努力练习。
   D. 裁判喜欢钢院的乐队。

10. 广州排球队以2比3输了昨晚的球赛，你认为他们为什么输了球？
    A. 广州排球队实力不行。
    B. 他们的对手是全国联赛的冠军。
    C. 他们训练得不够。
    D. 他们的运气不好。

11. 山西篮球队上星期险胜一场球，你认为他们为什么赢了球？
    A. 他们的教练训练有方。
    B. 他们的对手不是强队。
    C. 他们赛前做了大量的训练。
    D. 他们那天运气特别好。

12. 前进中学的乐队在春节晚会上演奏得不理想，你认为他们为什么没演奏好？
    A. 大部分乐队队员的音质水平都不高。
    B. 他们演奏的那个曲子难度很大。
    C. 他们演奏前练习得不够。
    D. 有几个乐队队员那天身体不太舒服。
试题一 (B)

第一组：
小王十九岁，正在选上大学的专业，他想进医科大学，做医生。
你认为小王为什么想做医生？

a. 小王要当医生是因为他想成名。
b. 小王要当医生是因为他要为他家争光。

你认为哪一种说法可能是小王想当医生的原因，a或b？

第二组：
小王十九岁，正在选上大学的专业，他想进医科大学，做医生。
你认为小王为什么想做医生？

a. 小王要当医生是因为他想成名。
b. 小王要当医生是因为他要为他家争光。

你认为哪一种说法可能是小王想当医生的原因，a或b？

第三组：
小王十九岁，正在选上大学的专业，他想进医科大学，做医生。
你认为小王为什么想做医生？

a. 小王要当医生是因为他想成名。
b. 小王要当医生是因为他要为他家争光。

你认为哪一种说法可能是小王想当医生的原因，a或b？

第四组：
小刘是大学二年级新闻专业的学生。她最近被中国作家协会命名为全国优秀青年作家。你认为什么是促使她成功的最重要的因素？

a. 小刘被命名是因为她老师教得好。
b. 小刘被命名是因为她用功，做了很多练习。

你认为哪一种说法可能是小刘被命名的原因，a或b？

第五组：
小刘是大学二年级新闻专业的学生。她最近被中国作家协会命名为全国优秀青年作家。你认为什么是促使她成功的最重要的因素？

a. 小刘被命名是因为她家里的支持。
b. 小刘被命名是因为她用功，做了很多练习。

你认为哪一种说法可能是小刘被命名的原因，a或b？
第六组：
小刘是大学二年级新闻专业的学生。她最近被中国作家协会命名为全国优秀青年作家。你认为什么是促使她成功的最重要的因素？

a. 小刘被命名是因为她老师教得好。
b. 小刘被命名是因为她家里父母的支持。

你认为哪一种说法可能是小刘被命名的原因，a或b？

第七组：
李军是辽宁师范大学一年级的学生。他最近由于一次偶然机会，中了一家自行车厂主办的抽奖大赛，得了1000元现金奖。你认为李军应该如何处理这笔钱？

a. 李军应该把钱全部留着自己花。
b. 李军应该把钱分一半给他妈。

你认为哪一种说法可能是李军被命名的原因，a或b？

第八组：
李军是辽宁师范大学一年级的学生。他最近由于一次偶然机会，中了一家自行车厂主办的抽奖大赛，得了1000元现金奖。你认为李军应该如何处理这笔钱？

a. 李军应该把钱分一半捐给残疾人协会。
b. 李军应该把钱分一半给他妈。

你认为哪一种说法可能是李军被命名的原因，a或b？

第九组：
李军是辽宁师范大学一年级的学生。他最近由于一次偶然机会，中了一家自行车厂主办的抽奖大赛，得了1000元现金奖。你认为李军应该如何处理这笔钱？

a. 李军应该把钱全部留着自己花。
b. 李军应该把钱分一半捐给残疾人协会。

你认为哪一种说法可能是李军被命名的原因，a或b？
试题二

在这组练习中，你会看到一些彩色的几何图形（红色、白色、绿色、圆、三角、方块、等）。数理物理的刘老师对这些彩色图形做了系统的研究。他的研究表明，如果学生同时看到某个颜色和某个图形组合在一起，他们期末考试就会有好运气。根据他的研究，刘老师总结出一个规律，把这些彩色几何图形分成两类：幸运类和不幸类。你的任务是找出这个规律。当你彩色的几何图形出现在电脑屏幕上时，请判断它是不是属于幸运类。你做出判断后，我（电脑）会告诉你，你的判断是不是正确。请用提供的纸和笔做记录。当你连续做出一些正确判断后，这个游戏单元就会停止。

答案记录:

<table>
<thead>
<tr>
<th>颜色</th>
<th>几何图形</th>
<th>答案对错</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
在刚才的练习中，你发现了什么规律来区分幸运或不幸运图形？请把这个规律写出来：

________________________________________________________________________

用最简练语言的说，区分幸运或不幸运图形规则就是：

如果任何一个几何图形是_____颜色的话，那么这个几何图形一定是一个_____。
试题三

成功组
和其他做过这个练习的人相比，你的练习结果比他们好多了，请告诉我下面
哪一条原因最能解释你的好成绩？

a) 这种练习我总是做得很好。
b) 刚才的练习太容易。
c) 我以前做过这类练习。
d) 我不知道我为甚么做得这么好。

哪一条，a), b), c), 或d)?

失败组
和其他做过这个练习的人相比，你的练习结果比他们差多了，请告诉我下面
哪一条原因最能解释你的不理想成绩？

a) 这种练习我总是做得很糟。
b) 刚才的练习太难了。
c) 我以前从没做过这类练习。
d) 我不知道我为甚么做得这么差。

哪一条，a), b), c), 或d)?
试题四

这是第四部分练习，你在彩色图形练习中比其他人做得都好，继续做下去。

假如你在一个太平洋小岛上，帮助一位社会学家研究当地人的习俗。岛上的人起居非常有规律，他们什么日子做什么事，都是固定不变的。你的任务是找一条能预测他们行事的规律。也就是说，当你在荧光屏上看到一个关于当地人在某日做某事的预测，请说明这个预测是否正确。你做完判断后，我会告诉你，你的判断是否正确。根据我的提示，你可找到一个简单方法，正确预测当地人的行为。请用提供的纸和笔做记录以帮你尽快完成这个练习，当你连续做出若干正确判断后，这个练习会自动停止。

你做完了第四部分的练习，请翻到记录纸的最后一页，回答上面的两个问题，然后，按一下任何一个键子继续做下一个练习，谢谢。

答题记录:

日期  

答案对错

活动
在刚才的练习中，你发现了什么规律来区分当地人的活动？请把这个规律写出来。

用最简练语言的说，区分当地人的活动规则就是：

如果是________（日期），那么当地人就________（活动）.
试题五
成功组：这是第五部分的练习，你在灰色图形练习中比其他人做得都好，
继续做下去。

失败组：这是第五部分的练习，你在灰色图形练习中比其他人做得都差，
努力赶上去。

在灰色图形练习中，你总结出这样一条规律：任何时候如果红颜色出现，
几何图形就是圆的，换句话说，这条规律就是：

如果荧光屏上有红颜色出现，那么一个圆形几何图案一定会出现。

请用这个规则回答下列问题：

1. 假如现在有红颜色在屏幕上出现，那么所伴随的几何图形就一定是个圆。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如现在有红颜色在屏幕上出现，那么所伴随的几何图形就一定不是个圆。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如现在没有红颜色在屏幕上出现，那么所伴随的几何图形就一定是个圆。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如现在没有红颜色在屏幕上出现，那么所伴随的几何图形就一定不是个圆。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如现在屏幕上的几何图形是个圆，那么红颜色就一定出现了。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如现在屏幕上的几何图形是个圆，那么红颜色就一定没有出现。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如现在屏幕上的几何图形不是个圆，那么红颜色就一定出现了。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如现在屏幕上的几何图形不是个圆，那么红颜色就一定没有出现。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题五B1:

我们继续作第五部分的练习。你在一个班中比其他人做得都好(都差)，继续做下去(努力赶上)。

在刚才的练习中，你学会了用一种规则来判断推理结论。现在有一条新规则:

如果是永新牌洗衣粉，那么化学成分试剂会显示红色。

请用这个规则回答下列问题:

1. 假如现在水中含有永新牌洗衣粉，化学成分试剂显示了红色。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如现在水中含有永新牌洗衣粉，化学成分试剂没有显示红色。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如现在水中不含有永新牌洗衣粉，化学成分试剂显示红色。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如现在水中不含有永新牌洗衣粉，化学成分试剂没有显示红色。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如现在化学成分试剂显示了红色，那么水中一定含有永新牌洗衣粉。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如现在化学成分试剂显示了红色，那么水中不含有永新牌洗衣粉。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如现在化学成分试剂没有显示红色，那么水中一定含有永新牌洗衣粉。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如现在化学成分试剂没有显示红色，那么水中不含有永新牌洗衣粉。
   这个结论:
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题五B2：

我们在作第五部分的练习，你在彩色图形练习中比其他人做得都好（都差），继续做下去（努力赶上去）。

在刚才的练习中，你学会了用一条规则来判断推理结论，现在有一条新规则：

如果是清洁牌洗衣粉，那么化学成份试纸会显示兰色。

请用这个规则回答下列问题：

1. 假如现在水中含有清洁牌洗衣粉，化学成份试纸显示了兰色。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

2. 假如现在水中含有清洁牌洗衣粉，化学成份试纸没有显示兰色。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

3. 假如现在水中不含有清洁牌洗衣粉，化学成份试纸显示了兰色。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

4. 假如现在水中不含有清洁牌洗衣粉，化学成份试纸没有显示兰色。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

5. 假如现在化学成份试纸显示了兰色，那么水中一定含有清洁牌洗衣粉。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

6. 假如现在化学成份试纸显示了兰色，那么水中不含有清洁牌洗衣粉。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

7. 假如现在化学成份试纸没有显示兰色，那么水中一定含有清洁牌洗衣粉。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

8. 假如现在化学成份试纸没有显示兰色，那么水中不含有清洁牌洗衣粉。
   这个结论：
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确
试题六

成功组：这是第六部分的练习，你做得很好，继续做下去。

失败组：这是第六部分的练习，你做得不好，请努力赶上。

在做太平洋岛人行为观察那个练习中，你总结出这样一条规律：

如是十月一日，那么太平洋岛人就休假。

现在请用这个规则回答下列问题：

1. 假如现在是十月一日，结论：太平洋岛人休假了。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如现在是十月一日，结论：太平洋岛人没有休假。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如现在不是十月一日，结论：太平洋岛人休假了。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如现在不是十月一日，结论：太平洋岛人没有休假。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如现在太平洋岛人休假了，结论：现在是十月一日。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如现在太平洋岛人休假了，结论：现在不是十月一日。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如现在太平洋岛人没有休假，结论：现在是十月一日。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如现在太平洋岛人没有休假，结论：现在不是十月一日。
这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题6B1：

张玲是辽宁大学的一年级学生，她想在北京举行的数学竞赛上获奖，我们知道规律是：

如果张玲数学能力强，那么她就一定能在竞赛中获奖。

现在请根据这个规则回答下列问题：

1. 假如张玲数学能力强，结论：她就一定能在这次数学竞赛中获奖。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如张玲数学能力强，结论：她就不能在这次数学竞赛中获奖。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如张玲数学能力不强，结论：她就一定在这次数学竞赛中获奖。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如张玲数学能力不强，结论：她就不能在这次数学竞赛中获奖。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如张玲在这次数学竞赛中获奖，结论：她的数学能力一定很强。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如张玲在这次数学竞赛中获奖，结论：她的数学能力不强。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如张玲在这次数学竞赛中没有获奖，结论：她的数学能力一定很强。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如张玲在这次数学竞赛中没有获奖，结论：她的数学能力不强。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题6B2:

我们知道：

如果林苗吃点中药，那么她就会很快退烧的。

现在请根据这个规则回答下列问题：

1. 假如林苗吃了些中药，结论：她就会很快退烧的。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如林苗吃了些中药，结论：她不会很快退烧的。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如林苗没吃任何中药，结论：她会很快退烧的。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如林苗没吃任何中药，结论：她不会很快退烧的。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如林苗很快退了烧，结论：她吃了中药。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如林苗很快退了烧，结论：她没吃任何中药。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如林苗没有很快退烧，结论：她吃了中药。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如林苗没有很快退烧，结论：她没吃任何中药。这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题6B3:

了解小马的人都知道:

如果小马帮她父母打扫房子，那么她就一定会跟他们要打扫房子的工钱。

现在请根据这个规则回答下列问题:

1. 假如小马帮她父母打扫了房子，结论：她向父母要了打扫房子的工钱。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

2. 假如小马帮她父母打扫了房子，结论：她没有向父母要打扫房子的工钱。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

3. 假如小马没有帮她父母打扫房子，结论：她向父母要了打扫房子的工钱。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

4. 假如小马没有帮她父母打扫房子，结论：她没有向父母要打扫房子的工钱。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

5. 假如小马向父母要了打扫房子的工钱，结论：她帮父母打扫了房子。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

6. 假如小马向父母要了打扫房子的工钱，结论：她没有帮父母打扫房子。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

7. 假如小马没有向父母要打扫房子的工钱，结论：她帮父母打扫了房子。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确

8. 假如小马没有向父母要打扫房子的工钱，结论：她没有帮父母打扫房子。
   这个结论:
   a)总是正确
   b)有的时候正确
   c)任何时候也不会正确
试题6B4:

熟知朱雪家的人都知道，他的父母反对他纹身。事实是:

如果朱雪纹了身，他的父母会给他气得半死。

现在请根据这个事实回答下列问题:

1. 假如朱雪纹了身，结论：他的父母将会十分生气。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

2. 假如朱雪纹了身，结论：他的父母不会生气。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

3. 假如朱雪没有纹身，结论：他的父母十分生气。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

4. 假如朱雪没有纹身，结论：他的父母没有生气。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

5. 假如朱雪父母十分生气，结论：朱雪纹身了。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

6. 假如朱雪父母十分生气，结论：朱雪没有纹身。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

7. 假如朱雪父母没有生气，结论：朱雪纹身了。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确

8. 假如朱雪父母没有生气，结论：朱雪没有纹身。
   这个结论:
   a) 总是正确
   b) 有时候正确
   c) 任何时候也不会正确
试题6B5:

芳是第二汽修厂的工人，邻居们都知道：

如果李芳和丈夫吵了架，那么她就会去看家庭心理医生。

现在请根据李芳的情况回答下列问题：

1. 假如李芳和丈夫吵了架. 结论：她去看了家庭心理医生。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

2. 假如李芳和丈夫吵了架. 结论：她没有去看家庭心理医生。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

3. 假如李芳没有和丈夫吵架. 结论：她去看了家庭心理医生。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

4. 假如李芳没有和丈夫吵架. 结论：她没有去看家庭心理医生。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

5. 假如李芳去看了家庭心理医生，结论：她和丈夫吵了架。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

6. 假如李芳去看了家庭心理医生，结论：她没有和丈夫吵架。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

7. 假如李芳没有去看家庭心理医生，结论：她和丈夫吵了架。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确

8. 假如李芳没有去看家庭心理医生，结论：她没有和丈夫吵架。
   这个结论：
   a) 总是正确
   b) 有的时候正确
   c) 任何时候也不会正确
试题6B6:

郭国庆出身军人家庭，从小就受到爱国主义的教育。同学们都知道，

如果政府号召年青人参军建设一很高强的国防力量，那么在北京大学
计算机系学习的郭国庆就会放弃学业报名参军。

现在请根据郭国庆的情况回答下列问题：

1. 假如政府现在号召年青人参军建设一很高强的国防力量，结论：在北
    京大学计算机系学习的郭国庆就会放弃学业报名参军。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

2. 假如政府现在号召年青人参军建设一很高强的国防力量，结论：在北
    京大学计算机系学习的郭国庆绝不会放弃学业报名参军。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

3. 假如政府现在没有号召年青人参军建设一很高强的国防力量，结论：在北
    京大学计算机系学习的郭国庆会放弃学业报名参军。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

4. 假如政府现在没有号召年青人参军建设一很高强的国防力量，结论：在北
    京大学计算机系学习的郭国庆绝不会放弃学业报名参军。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

5. 假如在北京大学计算机系学习的郭国庆放弃了学业报名参军，结论：
    政府现在号召年青人参军建设一很高强的国防力量。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

6. 假如在北京大学计算机系学习的郭国庆放弃了学业报名参军，结论：
    政府现在没有号召年青人参军建设一很高强的国防力量。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

7. 假如在北京大学计算机系学习的郭国庆没有放弃学业报名参军，结论：
    政府现在号召年青人参军建设一很高强的国防力量。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确

8. 假如在北京大学计算机系学习的郭国庆没有放弃学业报名参军，结论：
    政府现在没有号召年青人参军建设一很高强的国防力量。
    这个结论：
    a) 总是正确
    b) 有时候正确
    c) 任何时候也不会正确