An investigation of several psychological factors impinging on the perception of fresh fruits and vegetables

A thesis submitted for the degree of Doctor of Philosophy of the University of New England.

by
Sue-Ellen Kjeldal, B.A. Hons. (UNE)
February, 1998
Declaration

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification. I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in the thesis.
Abstract

The subject of this thesis is fresh fruit and vegetable perception in Australia. A review of the literature in this field reveals very little systematic study, with most investigations having been conducted by various public and private industry groups. Given the embryonic stage of research into fresh fruit and vegetable perceptions and choice, a particular program of research is warranted, with an emphasis on inductive processes progressing to deductive methods. That is, initial research attempts should be concentrated upon the collection of fundamental, descriptive data relating to consumer knowledge structures of fresh fruits and vegetables. This type of research is facilitated by relatively unstructured research methods. The data thus yielded can be subjected to deductive methods, which require a more experimental, structured research method, involving testing hypotheses that suggest themselves from the inductively-derived data. A review of existing (largely industry-based) studies reveals methodological difficulties that centre around a tendency of researchers in this field to conduct deductively-derived studies in the absence of existing fundamental data that should properly inform these studies.

A research program is introduced that closely approximates the stages of knowledge acquisition posited by Aristotle and accepted by contemporary scientists. The Word Association Method is presented as an unstructured methodology which is beneficial in providing descriptive, relatively context-free data. This method is used to provide fundamental information on the knowledge structures (repositories of information relating to an object) relating to ten fruits and ten vegetables. This particular methodology also affords an opportunity to analyse the content and structure of these cognitive repositories which, in turn, allows for an informative discussion of the relative merits of two theories of cognitive processing, namely unitary- and dual-processing theories.

The above-mentioned review of existing literature necessarily extends to a discussion of contemporary marketing and consumer behaviour theories, and it is proposed that the influence of the psychological construct of self-monitoring (Snyder, 1974) on consumer attention to product attributes is
relevant to the present thesis. The fundamental data provided using the Word Association Method is analysed to provide insight into the proposed influences of self-monitoring on consumer behaviour. That is, a specific exploration of the extent to which individuals differing in self-monitoring propensity attend selectively to particular product attributes is undertaken. The present thesis thus combines inductive and deductive research methods in the study of fresh fruit and vegetable perception and choice.

The thesis is concluded with a discussion of the implications of the findings of the present thesis for the study of cognitive processing models, self-monitoring, and the nature of subsequent studies relating to fresh fruit and vegetable perception and choice.
Acknowledgments

There are a number of people whose guidance, assistance and support has been invaluable during the completion of this thesis.

My supervisors, Dr. Richard Gates, Dr. Ray Cooksey and Dr. Vic Wright have demonstrated all of the positive attributes one would wish for in a supervisor: specialised knowledge in relevant disciplines, expertise in undertaking a large research project, an ability to provide constructive criticism without crushing my sometimes fragile confidence, kindness, generosity of time, patience, a willingness to listen to my embryonic ideas with enthusiasm, encouragement when things seemed a little bleak, and faith in me to complete a major piece of work. Their guidance and intellectual insight have helped me to grow academically.

Kate Owen and I began work on our theses at around the same time, and her background in Agricultural Economics and Marketing was extremely helpful to me in broadening my (primarily) psychological viewpoint. Our area of research (fresh fruit and vegetable choice) provided us with many hours of debate and information exchange.

Many people from fresh fruit and vegetable industry groups in Australia have provided me with valuable information and ideas, and have encouraged me by showing interest in my research endeavours.

Geoff Bailey acted as my research assistant during the computer-driven study, and his hard work and ability to place research participants at ease is greatly appreciated. David Elkins (formerly of Media Resources Unit at the University of New England) displayed great skill and professionalism in photographing the fruits and vegetables used in the present research. The artistic talent of Hilary Pollock in making line drawings from David's photographs is gratefully acknowledged. Mr John Burne of the Computing Services Centre at the University of New England spent many hours with me, writing a computer program that I had designed. His patience in altering small details to my satisfaction and generally putting a great deal of effort into the task was instrumental in the success of the study.
Annette Ince was extremely helpful in formatting, and providing editing expertise in relation to the figures and tables included in the thesis, and general assistance in aesthetic issues. Her skills in this area were of huge benefit to me, and saved me from weeping bitter and frustrated tears into my computer keyboard on numerous occasions.

The staff of the Department of Marketing and Management, and the Graduate School of Business Administration at the University of New England have supported and encouraged me throughout the thesis, and their kind words and deeds have been a powerful tonic during these past five years.

Gillian Carpenter took on the painstaking task of reading through the final document, and providing advice relating to technical and grammatical matters. She has also been a supportive friend and fellow student throughout my years of study. Many thanks.

My son, Trevor, has been enormously understanding and patient, and has soldiered on beside me through the turbulent times that accompany the writing of a thesis. Profuse thanks go to Mary–Anne Glynn for her friendship and commonsense advice over the years. Cameron Barnes and Margaret Murphy have behaved likewise, and I thank them sincerely.

My parents and siblings, and friends have encouraged me to reach the goal I have set for myself, and their confidence in me has been an enormous source of support.
# TABLE OF CONTENTS

Declaration ..........................................................................................................................i ii
Abstract ............................................................................................................................ii iii
Acknowledgments .............................................................................................................v

## CHAPTER 1

1. Introduction .....................................................................................................................1
1.1 Outline of the problem ...............................................................................................1
1.2 Limitations of existing fruit and vegetable studies ..................................................2
1.3 An understanding of the process of knowledge acquisition is important ...............2
1.4 Contemporary decision theory ...................................................................................3
1.5 Fruits and vegetables are unique foodstuffs ............................................................4
1.6 The role of self-monitoring in consumer behaviour .................................................4
1.7 Data analysis ...............................................................................................................6
1.8 Structure of thesis .......................................................................................................6

## CHAPTER 2

Previous fruit and vegetable research, the nature of knowledge acquisition, and the utility of existing marketing research methods in tapping knowledge structures .................................................................................................................................9
2.1 Apparent consumption of fruits and vegetables – recent data ..................................9
2.2 Systematic research – how to proceed? ...................................................................12
2.3 Literature review – studies investigating fresh fruit and vegetable selection by consumers .................................................................................................................................16
2.3.1 General fruit and vegetable studies .....................................................................16
2.3.2 Studies on school children’s fruit and vegetable consumption .............................21
2.3.3 Stone fruit studies ...............................................................................................24
2.3.4 Potato research ..................................................................................................25
2.3.5 Apple research ...................................................................................................27
2.3.6 Strawberry research .........................................................................................27
2.3.7 Mushroom research ..........................................................................................29
2.3.8 Capsicum research ............................................................................................31
2.3.9 Banana research ...............................................................................................31
2.3.10 Mango research ...............................................................................................31
2.3.11 Pineapple research ..........................................................................................32
2.3.12 Studies on taste development and perception ..................................................35
2.3.13 Conclusion – summary of existing findings and critique of existing methods ....35
2.4 Consumer marketing methodologies – can these be used to investigate fresh fruits and vegetables? .........................................................................................................................36
2.4.1 Free-response methodologies in consumer marketing .......................................38
   The Verbal Proto-col .................................................................................................38
   Focus Groups ............................................................................................................38
   Other projective methodologies ...............................................................................39
   Means-end Chains and Laddering Techniques ......................................................41
2.5 Summary – Chapter 2 ...............................................................................................43
CHAPTER 3

Cognitive information processing and its implications for fruit and vegetable research ................................................................. 45

3.1 Cognitive information processing ........................................... 45

3.1.1 Dual Coding Theory ..................................................... 45

3.1.2 Multiple-Coding Theory ................................................ 46

3.1.3 Broad introduction showing neuropsychological evidence of separate memory systems ....................................................... 49

3.1.4 The relation of Multiple-processing to Decision Theory ......... 50

3.1.5 Contemporary Decision Theory ....................................... 50

Hammond’s ideas ........................................................................ 50

Contemporary Decisions on Theory – Epstein’s ideas ................ 53

Contemporary Decisions on Theory – Damasio’s ideas ............... 57

Contemporary Decision on Theory – Jaynes’s ideas .................... 58

Contemporary Decision on Theory – Loewenstein’s ideas ............. 59

3.1.6 Tentative convergence for Decision and Cognitive Theory ... 61

3.1.7 Implications of contemporary decision theory for fruit and vegetable research ................................................................. 63

3.2 Use of the word association method in the present research ....... 66

3.3 Extrapolating from findings of other products ......................... 68

3.3.1 Uniqueness of fruits and vegetables ................................ 69

3.4 Summary of Chapter 3 .......................................................... 73

CHAPTER 4

The Word Association Method – a useful tool for gathering fundamental, descriptive data ................................................................. 74

4.1 Ways of gathering Stage One data ........................................ 74

4.1.1 The Word Association Method ........................................ 75

4.1.2 Psychoanalytic context .................................................... 78

4.1.3 Uses in other settings ....................................................... 78

4.1.4 The word association methodology .................................. 79

4.1.5 Fruit and vegetable word association norms ...................... 81

4.1.6 Word association methods in marketing ............................ 83

4.1.7 An example of word association methods used previously to capture cognitive structure .................................................... 84

4.2 Linking attributes and consumer knowledge structures .......... 86

4.3 A ‘quasi-deductive’, research method was used in the present research ................................................................. 87

CHAPTER 5

The role of self-monitoring in fresh fruit and vegetable research ........ 89

5.1 The psychological construct of self-monitoring ..................... 89

5.2 Self-monitoring and consumer behaviour ............................... 91

5.3 Linking self-monitoring with traditional marketing research .... 93

5.4 Attitude functions as an explanation for consumer motivations ... 93

5.5 Product functionality as a variable moderating the relationship between self-monitoring propensity and attention to product attributes ................................. 96
CHAPTER 6
Methodological Issues................................................................. 108
6.1 Overview of thesis thus far...................................................... 108
6.2 The utility of the word association method in identifying attributes salient to an object................................................................. 110
6.3 General overview of methodological issues.............................. 112
6.4 Methods ...................................................................................... 113
   6.4.1 Preliminary Commonality Study............................................ 113
       Introduction........................................................................... 113
       Methods............................................................................... 115
       Procedure........................................................................... 115
       Results................................................................................. 116
       Discussion.......................................................................... 120
   6.4.2 Word Association Studies .................................................. 122
       Subjects............................................................................. 122
       Procedure........................................................................... 122
       Computer Driven Word Association Study............................. 124
       Planned approach to data analysis......................................... 126

CHAPTER 7
Results............................................................................................ 127
7.1 Descriptive Data....................................................................... 127
   7.1.1 Network Categories.......................................................... 131
       Category 1 Sense (or Appearance)........................................ 131
       Category 2 Function (or Uses).............................................. 134
       Category 3 Horticulture....................................................... 135
       Category 4 Idiosyncratic (or Experiential)............................ 136
       Category 5 Evaluation............................................................ 138
   7.2 Networks For Each Fruit and Vegetable.................................. 139
       7.2.1 Apples........................................................................... 139
       7.2.2 Bananas...................................................................... 142
       7.2.3 Grapes......................................................................... 145
       7.2.4 Lemons........................................................................ 148
       7.2.5 Oranges........................................................................ 151
       7.2.6 Peaches....................................................................... 153
       7.2.7 Pears............................................................................ 156
       7.2.8 Pineapple................................................................. 159
       7.2.9 Strawberries.............................................................. 162
       7.2.10 Watermelon............................................................... 165
7.2.11 Beans......................................................... 168
7.2.12 Broccoli.................................................... 170
7.2.13 Carrots...................................................... 173
7.2.14 Cauliflower................................................ 175
7.2.15 Lettuce...................................................... 177
7.2.16 Onions....................................................... 179
7.2.17 Peas.......................................................... 181
7.2.18 Potatoes..................................................... 183
7.2.19 Pumpkin..................................................... 186
7.2.20 Tomatoes.................................................... 188

7.3 Network Analyses for Fruits, is a Group, and Vegetables, as a Group.............. 190
7.3.1 All Fruits..................................................... 191
7.3.2 All Vegetables.............................................. 193

7.4 The salience of price in word associations produced by the respondents used in the present study ................................................................. 195

7.5 Descriptive Data Analysis....................................... 196
7.5.1 Descriptive Findings for Vegetables.................................. 196
    Three-Way Interaction.......................................... 196
    Two-Way Interactions.......................................... 198
    Main Effects For Age, Sex, and Category.......................... 199

7.5.2 Descriptive Findings for Fruit.................................... 202
    Three-Way Interaction.......................................... 202
    Two-Way Interactions.......................................... 204
    Main Effects...................................................... 205

7.5.3 Summary of Findings of Descriptive Data.................................. 208

7.6 Mode of Presentation........................................... 212
7.6.1 Quantitative Differences as a Function of Mode of Presentation.............. 212
7.6.2 Qualitative Differences as a Function of Mode of Presentation.............. 212

7.7 Self-Monitoring Findings........................................... 220

CHAPTER 8

Discussion.......................................................... 226

8.1 Systemic Network Analyses............................................. 226

8.2 Descriptive Data (differences in word association responses as a function of sex, age and product functionality)............................................. 231

8.3 Mode of Presentation Findings........................................... 239

8.4 Self-monitoring Findings............................................ 244

8.4.1 General Descriptive Findings........................................ 244
8.4.2 Findings indicate that fruits and vegetables have different functions.............................. 245
8.4.3 The role of product functionality on self-monitoring............................................. 247
8.4.4 Word associations for fruits revealed a self-monitoring pattern............... 248
8.4.5 Implications of the findings of the present research for self-monitoring theory........ 252

8.5 General Discussion and Implications..................................... 255

REFERENCES.................................................................. 263
# LIST OF FIGURES

2.1 Per Capita Fruit consumption in Australia from 1938-1994................................. 9
2.2 Per Capita Vegetable consumption in Australia from 1938-1994.......................... 10
7.1 Systemic Network Structure............................................................................... 130
7.2 Sub-component of Network Analysis - Sense....................................................... 132
7.3 Sub-component of Network Analysis - Function.................................................. 134
7.4 Sub-component of Network Analysis - Horticulture.......................................... 136
7.5 Sub-component of Network Analysis - Idiosyncratic........................................... 137
7.6 Sub-component of Network Analysis - Evaluation............................................. 138
7.7 Network Analysis - Apple................................................................................... 139
7.8 Network Analysis - Bananas............................................................................... 142
7.9 Network Analysis - Grapes................................................................................. 145
7.10 Network Analysis - Lemons............................................................................... 148
7.11 Network Analysis - Oranges............................................................................. 151
7.12 Network Analysis - Peaches............................................................................... 153
7.13 Network Analysis - Pears................................................................................... 156
7.14 Network Analysis - Pineapple............................................................................ 159
7.15 Network Analysis - Strawberries...................................................................... 162
7.16 Network Analysis - Watermelons...................................................................... 165
7.17 Network Analysis - Beans................................................................................ 168
7.18 Network Analysis - Broccoli............................................................................ 170
7.19 Network Analysis - Carrots............................................................................... 173
7.20 Network Analysis - Cauliflower........................................................................ 175
7.21 Network Analysis - Lettuce............................................................................... 177
7.22 Network Analysis - Onion................................................................................ 179
7.23 Network Analysis - Peas................................................................................... 181
7.24 Network Analysis - Potatoes............................................................................ 183
7.25 Network Analysis - Pumpkin............................................................................ 186
7.26 Network Analysis - Tomatoes.......................................................................... 188
7.27 Network Analysis - All Fruits.......................................................................... 191
7.28 Network Analysis - All Vegetables.................................................................... 193
7.29 Female Responses for the 2-way Interaction...................................................... 197
7.30 Male Responses for the 2-way Interaction......................................................... 197
7.31 Age x Sex Interaction...................................................................................... 198
7.32 Category x Sex Interaction................................................................................ 199
7.33 Category x Age Interaction................................................................................ 199
7.34 Vegetables: Main Effect - Age........................................................................ 200
7.35 Vegetables: Main Effect - Sex.......................................................................... 201
7.36 Vegetables: Main Effect - Category.................................................................. 201
7.37 Female Responses for the 2-way Interaction...................................................... 202
7.38 Male Responses for the 2-way Interaction......................................................... 202
7.39 Age x Sex Interaction...................................................................................... 204
7.40 Age x Category Interaction.............................................................................. 204
7.41 Fruit: Main Effect - Age................................................................................... 205
7.42 Fruit: Main Effect - Sex................................................................................... 206
7.43 Fruit - Main Effect - Category......................................................................... 206
7.44 Error bar plot of mean frequency scores for the seven mode of presentation groups........................................................................................................ 213
LIST OF TABLES

6.1 Fruits and vegetables found to be most commonly consumed by sample of respondents used in the present study ................................................................. 117

6.2 Fruits and vegetables found to be most commonly consumed using Australian Bureau of Statistics (ABS) Consumer Price Index Market Basket Survey (March, 1994) ........................................................................................................... 118

6.3 Fruits and vegetables found to be most commonly consumed using Consumer Study of the Fruit and Vegetable Market (CSFVM) (1990) ...................................................... 119

7.1 Descriptors of 'Sense' Terminal Categories ................................................................. 133

7.2 Descriptors for 'Uses' Terminal Categories .................................................................. 135

7.3 Descriptors for 'Horticulture' Terminal Categories ...................................................... 136

7.4 Descriptors for 'Idiosyncratic' Terminal Categories .................................................... 137

7.5 Descriptors for 'Evaluation' Terminal Categories ....................................................... 138

7.6 Mean Fruit Favourability Ratings for Females and Males of Various Age-Groups ................................................................. 207

7.7 Mean Vegetable Favourability Ratings for Females and Males of Various Age Groups ........................................................................................................... 207

7.8 Mean Fruit and Vegetable Favourability Ratings for Females and Males (for fruit, as a category, and for vegetables, as a category) .................................................. 207

7.9 Group summary statistics used in the one-way ANOVA .............................................. 213

7.10 Contingency Table relating category breakdown for all fruit and vegetable responses and mode of presentation ................................................................. 214

7.11 Contingency Table relating category breakdown for all fruit responses and mode of presentation ........................................................................................................ 217

7.12 Contingency Table relating category breakdown for all vegetable responses and mode of presentation ................................................................. 218

7.13 Contingency Table for Fruit Extreme Self-monitoring Scores X Category ................ 220

7.14 Contingency Table for Terminal Category Frequencies X Extreme Self-monitoring Scores ........................................................................................................... 222

7.15 Contingency Table for Vegetables Extreme Self-monitoring Scores x Category ..... 224

7.16 Summary Contingency Table showing all significant differences in observed versus expected findings for terminal categories ................................................. 224

7.17 Summary Contingency Table showing all differences in observed versus expected findings for terminal categories relating to the global category 'idiosyncratic' ........................................................................................................... 225