



City Research Online

City, University of London Institutional Repository

Citation: Bunning, K. (1996). Development of an 'individualised sensory environment' for adults with learning disabilities and an evaluation of its effects on their interactive behaviours. (Unpublished Doctoral thesis, City University London)

This is the accepted version of the paper.

This version of the publication may differ from the final published version.

Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/7938/>

Link to published version:

Copyright: City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

Reuse: Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

DEVELOPMENT OF AN
‘INDIVIDUALISED SENSORY ENVIRONMENT’
FOR ADULTS WITH LEARNING DISABILITIES
AND AN EVALUATION OF ITS EFFECTS
ON THEIR INTERACTIVE BEHAVIOURS

Volume I

Author: Karen Bunning

Ph.D.

City University

Clinical Communication Studies

June 1996

TABLE OF CONTENTS

List of Tables and Figures	p.8
Acknowledgements	p.18
Declaration	p.19
Abstract of Thesis	p.20
Abbreviations	p.21

The corresponding **Appendix** for each Chapter is detailed in the right hand column. The **Appendices** are to be found in consecutive order in **Volume II** of the thesis.

VOLUME I	Page No.	VOLUME II Appendices	Page No.
<u>Chapter 1: Introduction to Thesis</u>	17		
1.1 Introduction to the Chapter	17		
1.2 The Setting	17		
1.2.1 Closure of Local Institution and Development of Community Services	18		
1.3 Rationale	21		
1.3.1 Level of Engagement	21		
1.3.2 Definition of Learning Disability	22		
1.3.3 Prevalence of Communication Difficulties	23		
1.3.4 Speech and Language Therapy Assessment	24		
1.3.5 Intervention Strategies	26		
1.3.6 Summary of Problem Situation	28		
1.4 Aims of Research	28		
1.5 Structure of Thesis	29		
<u>Chapter 2: Review of Literature and Theoretical Framework</u>	32		
2.1 Introduction	32		
2.2 Intervention Practice and Service Philosophy	33		
2.2.1 Concept of Intervention	33		
2.2.2 Current Practice with the Learning Disabled	35		
2.2.3 The Communication Environment	37		
2.2.4 Level of Specification	41		
2.2.5 Methodology for Planning Intervention	45		
2.2.6 Measuring Outcomes	46		
2.2.7 Summary of Intervention Issues	47		

VOLUME I	Page No.	VOLUME II Appendices	Page No.
<u>Chapter 2 (continued)</u>			
2.3 The Role of Sensory Reinforcement	49		
2.3.1 Contingent and Non-Contingent Stimulation	49		
2.3.2 Sensory Leisure Environments	50		
2.3.3 Background to Sensory Reinforcement	52		
2.3.4 Vibratory Reinforcement	53		
2.3.5 Effects of Object Reactivity	54		
2.3.6 Implications for Intervention	56		
2.4 Sensory Integration Theory	57		
2.4.1 Definition	57		
2.4.2 Theoretical Framework	60		
2.4.3 Summary of Principles	63		
2.4.4 Candidacy	66		
2.4.5 Relevance to Intervention	66		
2.5 Sensory Integration Therapy	67		
2.5.1 Operational Definition	67		
2.5.2 The Form of Stimulation	69		
2.5.3 The Vestibular System	69		
2.5.4 Outcomes of Vestibular Stimulation	71		
2.5.5 The Tactile System	72		
2.5.6 Tactile Defensiveness	74		
2.5.7 Outcomes of Tactile Stimulation	75		
2.5.8 The Model of Sensory Integration Therapy	77		
2.5.9 Implications for Intervention	80		
2.6 Implications for a Therapy Model	81		
2.7 Theoretical Framework for the ‘Individualised Sensory Environment’ (I.S.E.)	82	<u>Appendix A:</u> <u>Theoretical</u> <u>Phase</u>	101
2.7.1 The Framework of Relationships	83		
2.7.2 The Model of Purposeful Adaptation	87		
2.7.3 The Model of the Learning Disabled Population	88		
2.7.4 The Model of the Sample Population	90		
2.7.5 The Model of I.S.E. Intervention	97		
2.8 Scope of the Study	104		
2.8.1 Research Objectives	104		
2.8.2 Research Hypotheses	106		
2.9 Summary of Chapter	107		

VOLUME I	Page No.	VOLUME II	Page No.
<u>Chapter 3: Definition of Population</u>	109	<u>Appendices</u>	112
		<u>Appendix B:</u>	
		<u>Definition Phase</u>	
3.1 Introduction to Definition Phase	109		
3.2 Ethics	110		
3.3 Definition of the Sample Population (Objectives 2.1, 2.2 and 2.3)	111		
3.3.1 Development of a Referral Form	112		
3.3.2 Data Analysis	115		
3.3.3 Interpretation of Results: Objective 2.1	117		
3.3.4 Interpretation of Results: Objective 2.2	120		
3.3.5 Interpretation of Results: Objective 2.3	123		
3.3.6 Summary and Conclusions	124		
3.4 Multi-Axial Comparison Between the Sample and Remainder (Objective 2.4)	125		
3.4.1 Development of a Case History Form	126		
3.4.2 Interpretation of Results (Objective 2.4)	128		
3.4.3 Summary of Multi-Axial Case History Survey	148		
3.5 Summary of Chapter	149		
<u>Chapter 4: Construction of Instrumentation and Pilot Studies</u>	150	<u>Appendix C:</u>	177
		<u>Construction</u>	
		<u>Phase</u>	
4.1 Introduction to Construction Phase	150		
4.2 Development of I.S.E. Decision-Making Schedule	150		
4.2.1 Concept	150		
4.2.2 Construction of Schedule	151		
4.2.3 Administration of Schedule	173		
4.2.4 Reliability of Schedule	174		
4.3 Engagement Background Questionnaire	176		
4.3.1 Introduction	176		
4.3.2 Concept	177		
4.3.3 Construction of Engagement Background Questionnaire	177		
4.3.4 Administration of Questionnaire	179		
4.3.5 Scoring System of Questionnaire	180		
4.3.6 Reliability of Questionnaire	181		
4.3.7 Discussion of Difficulties	185		

VOLUME I	Page No.	VOLUME II Appendices	Page No.
<u>Chapter 4 (continued)</u>			
4.4 Development of a Systematic Observation Procedure	186		
4.4.1 Concept	187		
4.4.2 Construction of Assessment Procedure	187		
4.4.3 Administration of Assessment Procedure	188		
4.4.4 Reliability of Assessment Procedure	189		
4.5 Pilot Studies	193		
4.5.1 Research Design	193		
4.5.2 Research Design Issues from Pilot Study 1	194		
4.5.3 Research Design Issues from Pilot Study 2	195		
4.5.4 Compliance with Recommended Frequency in Pilot Study 2	197		
4.5.5 Characteristics of Sample	199		
4.5.6 Data Collection Schedule	199		
4.5.7 Recording Medium	200		
4.5.8 Results from Pilot Study 1	202		
4.5.9 Discussion of Results	205		
4.5.10 Assessment by Observation	205		
4.5.11 Assessment by Questionnaire	206		
4.5.12 Conclusion and Implications for Main Study	207		
<u>Chapter 5: The Experimental Design and Methodology</u>	209	<u>Appendix D: Experimental Phase</u>	223
5.1 Experimental Design	209		
5.2 Definition of Variables	211		
5.2.1 Independent Variable	211		
5.2.2 Distinctive Features of Interventions	211		
5.2.3 Dependent Variable	214		
5.2.4 Classificatory Variables	216		
5.3 Assessment Methodology	218		
5.3.1 Systematic Observation	218		
5.3.2 Focus of Observation	218		
5.3.3 Recording System	220		
5.3.4 Observation Schedule	221		
5.3.5 Observational Settings	223		
5.3.6 Role of the Observer	225		
5.3.7 Selection and Training of Observers	226		
5.3.8 Recording Medium	227		
5.3.9 Scoring Method	227		

VOLUME I	Page No.	VOLUME II Appendices	Page No.
<u>Chapter 5 (continued)</u>			
5.4 Method of Experimental Analysis	228		
5.4.1 Statistical Analysis of Experimental Groups	228		
5.4.2 Analysis of Single Case Studies	229		
5.5 Summary of Chapter	229		
<u>Chapter 6: Summary of Results</u>	230	<u>Appendix E: Summary of Results for Single Cases</u>	227
6.1 Introduction to Results Chapter	230		
6.2 Summary of Group Data	230		
6.2.1 Hypothesis One	230		
6.2.2 Hypotheses Two, Three and Four	234		
6.2.3 Hypothesis Five	244		
6.2.4 Hypothesis Six	251		
6.2.5 Hypothesis Seven	254		
6.2.6 Hypothesis Eight	261		
6.3 Summary of Individual Cases	268		
6.3.1 Summary of Experimental Group 1: Therapy Group 1.1	268		
6.3.2 Summary of Experimental Group 1: Therapy Group 1.2	270		
6.3.3 Summary of Experimental Group 2: Therapy Group 2.1	272		
6.3.4 Summary of Experimental Group 2: Therapy Group 2.2	274		
6.3.5 Summary of Experimental Group 2: Therapy Group 2.3	276		
6.3.6 Summary of Differences Between Experimental Groups	277		
6.4 Summary of Chapter	277		

VOLUME II	Page No.
<u>Chapter 7: Discussion of Results</u>	4
7.1 Introduction to Chapter	4
7.2 Structure of Discussion	4
7.2.1 Hypothesis One: Effects of Interventions Over Time	5
7.2.2 Hypothesis Two: High Levels of Non-Purposeful Engagement	10
7.2.3 Hypothesis Three: Decrease in Non-Purposeful Engagement	19

VOLUME II		Page No.
<u>Chapter 7 (continued)</u>		
7.2.4	Hypothesis Four: Increase in Purposeful Engagements	27
7.2.5	Hypothesis Five: Changes in Engagement Levels from Baseline	34
7.2.6	Hypothesis Six: Contrasting Effects of the Two Interventions (I.S.E. & A.P.)	39
7.2.7	Hypothesis Seven: Maintenance of Effects After One Month	48
7.2.8	Hypothesis Eight: Maintenance of Effects After Four Months	53
7.2.9	Summary of Discussion	58
7.3	Review of Research Aims and Objectives	60
7.3.1	The Theoretical Phase	61
7.3.2	The Definition Phase	63
7.3.3	The Construction Phase	67
7.3.4	The Experimental Phase	71
7.3.5	Summary of Aims and Objectives	74
7.4	Summary of Chapter	74
<u>Chapter 8: Critique of Research and Implications for Future Work</u>		76
8.1	Introduction to Chapter	76
8.2	Critique of Research	76
8.2.1	Selection of Participants	76
8.2.2	Experimental Design	79
8.2.3	Methodology	82
8.2.4	Intervention	87
8.3	Implications for Future Work	88
8.3.1	Service Philosophy and Practice	88
8.3.2	Speech and Language Therapy Practice	94
8.4	Conclusion of Thesis	98
Appendices A, B, C, D and E		101
Bibliography		277

LIST OF TABLES AND FIGURES

Tables and figures are listed in chronological order. The exception is when the data from a table is illustrated in a subsequent figure. Then the numbering is identical to establish the connection.

<u>Volume I</u>	<u>Title of Table or Figure</u>	<u>Page No.</u>
Figure 2.5.8.1	Synchronic Model of Sensory Integration Therapy Effectiveness (Tickle, 1988).	77
Figure 2.5.8.2	Diachronic Model of Sensory Integration Therapy Effectiveness (Tickle, 1988).	79
Figure 2.7.1.1	The Framework of Relationships in the I.S.E. Model	83
Figure 2.7.2.1	The Purposeful Adaptation Process in the I.S.E. Model	87
Figure 2.7.3.1	The Learning Disabled Population on the I.S.E. Model	89
Figure 2.7.4.1	The Sample Population in the I.S.E. Model	91
Figure 2.7.5.1	The Intervention in the I.S.E. Model	97
Table 3.3.1.1	Additional Information Regarding Speech and Language Therapy Service	115
Table 3.3.3.1	Referral Form Response Groupings	118
Table 3.3.3.2	Referral Form Response Exclusions	118
Table 3.4.2.1	Other Problem Behaviours	147
Table 4.2.2.1	Rationale for the Organisation of a Core Lexicon	155
Table 4.2.2.2	Organisation of Core Lexicon for I.S.E. Schedule	156
Figure 4.2.2.3	Hierarchy of Presentation Cues for Person Contact	157
Figure 4.2.2.4	Hierarchy of Recurrence Cues for Person Contact	157
Figure 4.2.2.5	Hierarchy of Presentation Cues for Object Contact	158
Figure 4.2.2.6	Hierarchy of Presentation Cues for Person Contact (Vestibular Stimuli)	158
Figure 4.2.2.7	Hierarchy of Recurrence Cues for Person Contact (Vestibular Stimuli)	159
Table 4.2.2.8	Response Repertoire for Person Contact	161
Figure 4.2.2.9	Response Criteria in Person Contact	162
Figure 4.2.2.10	Response Criteria in Object Contact	162
Table 4.2.2.11	Response Repertoire for Object Contact	163
Table 4.2.2.12	Orientation Items for Person Engagement	164
Table 4.2.2.13	Orientation Items for Object Engagement	165
Table 4.2.2.14	Checklist for I.S.E. Decision-Making Schedule	166
Figure 4.2.2.15	Continuum of Sensory Registration and Responsivity (Fisher et al, 1991)	170
Table 4.2.2.16	Principles of Environmental Modification Applied to Sensory Responsivity Levels	171
Table 4.2.2.17	Order of Presentation of Person Items	172
Table 4.2.2.18	Order of Presentation of Object Items	172

	<u>Title of Table or Figure</u>	Page No.
Table 4.2.4.1	Inter-Rater Reliability - Person Engagement where Presentation Cues have been Used	174
Table 4.2.4.2	Inter-Rater Reliability - Person Engagement where Recurrence Cues have been Used	175
Table 4.2.4.3	Inter-Rater Reliability - Person Engagement where Presentation Cues have been Used	175
Table 4.2.4.4	Orientation Agreements Recorded for One Participant (group 1.1)	176
Table 4.3.5.1	Scoring System for Questionnaire	180
Table 4.3.6.1	Examples of Reliability Calculation for Questionnaire Items	181
Table 4.3.6.2	Table of Agreements by Category/Section	182
Table 4.3.6.3	Percentage Agreements by Questionnaire Item (Section A)	183
Figure 4.3.6.3	Graph to Show Percentage Agreements by Questionnaire Item (Section A) for Combined Data, i.e. Pilot Study 2 and Assessment 1	183
Table 4.3.6.4	Percentage Agreements by Questionnaire Item (Sections B, C & D)	184
Figure 4.3.6.4	Graph to Show Percentage Agreements by Questionnaire Item (Sections B, C & D) for Combined Data, i.e. Pilot Study 2 and Assessment 1	184
Figure 4.4.2.1	Sample Checksheet	188
Table 4.4.4.1	Percentage Agreements Between Observers by Category of Engagement	191
Table 4.4.4.2	Percentage Agreements Between Observers by Moments Observed	191
Table 4.4.4.3	Percentage Agreements of Same Observer by Category of Engagement	192
Table 4.4.4.4	Percentage Agreements of Same Observer by Moments Observed	192
Figure 4.5.1.1	Research Design of Pilot Study 1	193
Figure 4.5.2.1	Research Design of Pilot Study 2	195
Table 4.5.4.1	Table to Show Rate of Compliance Regarding the Running of Sessions in Pilot Study 2 (By Individual Participant)	197
Table 4.5.4.2	Table to Show Rate of Compliance with Recommended Frequency for Running of Therapy Sessions (By Experimental Group)	198
Table 4.5.8.1	Engagement Background Questionnaire/Participant X	202
Figure 4.5.8.1	Engagement Background Questionnaire/Participant X	202
Table 4.5.8.2	Observation by Momentary Time Sampling/Participant X	203
Figure 4.5.8.2	Observation by Momentary Time Sampling/Participant X	203
Table 4.5.8.3	Engagement Background Questionnaire/Participant Y	204
Figure 4.5.8.3	Engagement Background Questionnaire/Participant Y	204
Table 4.5.8.4	Observation by Momentary Time Sampling/Participant Y	204
Figure 4.5.8.4	Observation by Momentary Time Sampling/Participant Y	205

	<u>Title of Table or Figure</u>	Page No.
Figure 5.1.1.1	Model of Experimental Strategy	210
Figure 5.3.4.1	Schedule of Assessments for Main Study	222

The tables and figures of the statistical results are numbered similarly to acknowledge the connection between them. The letter (a) is added to every second table that relates to the same mean group data.

Table 6.2.1.1	ANOVA Summary for Group 1	231
Table 6.2.1.1a	Simple Main Effects for Group 1	231
Figure 6.2.1.1	Graph to Show Changes in Engagement Levels Over The Four Assessment Points for Group 1	232
Table 6.2.1.2	ANOVA Summary for Group 2	232
Table 6.2.1.2a	Simple Main Effects for Group 2	233
Figure 6.2.1.2	Graph to Show Changes in Engagement Levels Over The Four Assessment Points for Group 2	233
Table 6.2.2.1	ANOVA Summary for Group 1/Assessment (1) to (2)	234
Table 6.2.2.1a	Simple Main Effects for Group 1/Assessment (1) to (2)	235
Figure 6.2.2.1	Graph to Show Changes in Engagement Levels From Baseline to After the First Intervention (I.S.E.) for Group 1	235
Table 6.2.2.2	ANOVA Summary for Group 2/Assessment (1) to (2)	236
Table 6.2.2.2a	Simple Main Effects for Group 2/Assessment (1) to (2)	236
Figure 6.2.2.2	Graph to Show Changes in Engagement Levels From Baseline to After the First Intervention (A.P.) for Group 2	237
Table 6.2.2.3	ANOVA Summary for Group 1/Assessment (2) to (3)	237
Table 6.2.2.3a	Simple Main Effects for Group 1/Assessment (2) to (3)	238
Figure 6.2.2.3	Graph to Show Changes in Engagement Levels From Baseline to After Second Intervention (A.P.) for Group 1	238
Table 6.2.2.4	ANOVA Summary for Group 2/Assessment (2) to (3)	239
Table 6.2.2.4a	Simple Main Effects for Group 2/Assessment (2) to (3)	239
Figure 6.2.2.4	Graph to Show Changes in Engagement Levels From Baseline to After Second Intervention (I.S.E.) for Group 2	240
Table 6.2.2.5	ANOVA Summary for Group 1/Assessment (3) to (4)	240
Table 6.2.2.5a	Simple Main Effects for Group 1/Assessment (3) to (4)	241
Figure 6.2.2.5	Graph to Show Changes in Engagement Levels From Baseline to After Third Intervention (I.S.E.) for Group 1	241
Table 6.2.2.6	ANOVA Summary for Group 2/Assessment (3) to (4)	242
Table 6.2.2.6a	Simple Main Effects for Group 2/Assessment (3) to (4)	242
Figure 6.2.2.6	Graph to Show Changes in Engagement Levels From Baseline to After Third Intervention (A.P.) for Group 2	243
Table 6.2.3.1	ANOVA Summary for Group 1/Assessment (1) to (4)	244
Table 6.2.3.1a	Simple Main Effects for Group 1/Assessment (1) to (4)	245
Figure 6.2.3.1	Graph to Show Changes in Engagement Levels From Baseline to After Third Intervention (I.S.E.) for Group 1	245

	<u>Title of Table or Figure</u>	Page No.
Table 6.2.3.2	ANOVA Summary for Group 2/Assessment (1) to (3)	246
Table 6.2.3.2a	Simple Main Effects for Group 2/Assessment (1) to (3)	246
Figure 6.2.3.2	Graph to Show Changes in Engagement Levels From Baseline to After Second Intervention (I.S.E.) for Group 2	247
Table 6.2.3.3	ANOVA Summary for Group 1/Assessment (1) to (3)	247
Table 6.2.3.3a	Simple Main Effects for Group 1/Assessment (1) to (3)	248
Figure 6.2.3.3	Graph to Show Changes in Engagement Levels From Baseline to After Second Intervention (A.P.) for Group 1	248
Table 6.2.3.4	ANOVA Summary for Group 2/Assessment (1) to (4)	249
Table 6.2.3.4a	Simple Main Effects for Group 2/Assessment (1) to (4)	249
Figure 6.2.3.4	Graph to Show Changes in Engagement Levels From Baseline to After Third Intervention (A.P.) for Group 2	250
Table 6.2.4.1	ANOVA Summary for First I.S.E. Intervention Using the Combined Data from Both Groups	251
Table 6.2.4.1a	Simple Main Effects for First I.S.E. Intervention Using the Combined Data from Both Groups	252
Figure 6.2.4.1	Graph to Show the Combined Effects of the First I.S.E. Intervention for Both Groups	252
Table 6.2.4.2	ANOVA Summary for First A.P. Intervention Using the Combined Data from Both Groups	253
Figure 6.2.4.2	Graph to Show the Combined Effects of the First A.P. Intervention for Both Groups	253
Table 6.2.5.1	ANOVA Summary for Group 1/Assessment (4) to (5)	254
Table 6.2.5.1a	Simple Main Effects for Group 1/Assessment (4) to (5)	255
Figure 6.2.5.1	Graph to Show Changes in Engagement Levels From After the Final Intervention (I.S.E.) to After One Month Follow-up for Group 1	255
Table 6.2.5.2	ANOVA Summary for Group 2/Assessment (4) to (5)	256
Table 6.2.5.2a	Simple Main Effects for Group 2/Assessment (4) to (5)	256
Figure 6.2.5.2	Graph to Show Changes in Engagement Levels From After the Final Intervention (A.P.) to After One Month Follow-up for Group 2	257
Table 6.2.5.3	ANOVA Summary for Group 1/Assessment (1) to (5)	257
Table 6.2.5.3a	Simple Main Effects for Group 1/Assessment (1) to (5)	258
Figure 6.2.5.3	Graph to Compare the Engagement Levels of Baseline and One Month After the Withdrawal of Intervention for Group 1	258
Table 6.2.5.4	ANOVA Summary for Group 2/Assessment (1) to (5)	259
Table 6.2.5.4a	Simple Main Effects for Group 2/Assessment (1) to (5)	259
Figure 6.2.5.4	Graph to Compare the Engagement Levels of Baseline and One Month After the Withdrawal of Intervention for Group 2	260
Table 6.2.6.1	ANOVA Summary for Group 1/Assessment (5) to (6)	261
Table 6.2.6.1a	Simple Main Effects for Group 1/Assessment (5) to (6)	262
Figure 6.2.6.1	Graph to Show Changes in Engagement Levels From One Month to Four Months after the Withdrawal of Intervention-up for Group 1	262

	<u>Title of Table or Figure</u>	Page No.
Table 6.2.6.2	ANOVA Summary for Group 2/Assessment (5) to (6)	263
Table 6.2.6.2a	Simple Main Effects for Group 2/Assessment (5) to (6)	263
Figure 6.2.6.2	Graph to Show Changes in Engagement Levels From One Month to Four Months after the Withdrawal of Intervention-up for Group 2	264
Table 6.2.6.3	ANOVA Summary for Group 1/Assessment (1) to (6)	264
Table 6.2.6.3a	Simple Main Effects for Group 1/Assessment (1) to (6)	265
Figure 6.2.6.3	Graph to Show Changes in Engagement Levels Baseline to Four Months after the Withdrawal of Intervention-up for Group 1	265
Table 6.2.6.4	ANOVA Summary for Group 2/Assessment (1) to (6)	266
Table 6.2.6.4a	Simple Main Effects for Group 2/Assessment (1) to (6)	266
Figure 6.2.6.4	Graph to Show Changes in Engagement Levels Baseline to Four Months after the Withdrawal of Intervention-up for Group 2	267
Table 6.3.1.1	Summary of Characteristics of Groups 1.1	268
Table 6.3.1.2	Summary of Types of Changes in Engagement Levels for Participants in Group 1.1	269
Table 6.3.2.1	Summary of Characteristics of Groups 1.2	270
Table 6.3.2.2	Summary of Types of Changes in Engagement Levels for Participants in Group 1.2	271
Table 6.3.3.1	Summary of Characteristics of Groups 2.1	272
Table 6.3.3.2	Summary of Types of Changes in Engagement Levels for Participants in Group 2.1	273
Table 6.3.4.1	Summary of Characteristics of Groups 2.2	274
Table 6.3.4.2	Summary of Types of Changes in Engagement Levels for Participants in Group 2.2	275
Table 6.3.5.1	Summary of Characteristics of Groups 2.3	276
Table 6.3.5.2	Summary of Types of Changes in Engagement Levels for Participants in Group 2.3	276
Table 6.3.6.1	Summary Comparison of Characteristics in Groups 1 and 2	277
 <u>Volume II</u>		
Figure 7.2.1.1	The Direct Route of Therapeutic Effect	7
Figure 7.2.1.2	The Indirect Route of Therapeutic Effect	7
Figure 7.2.1.3	Interaction of the Direct and Indirect Routes of Therapeutic Effect	9

ACKNOWLEDGEMENTS

I would like to thank several people for their support and encouragement during the course of this study. Firstly, my academic supervisor, Professor John Weinman for his unswerving and gentle guidance during the course of my studies. My gratitude to Dr. Tim Pring for his generous help in the statistical analysis of the results. I am particularly indebted to my manager, Shirley Davis, at the inception of and during the main body of the research, for giving me the time, financial support and professional encouragement to proceed. A big thank you to my colleagues Dr. James Law and Professor Sally Byng for their support, both practical and psychological!

Many ideas were conceived in the early days by fruitful discussions with the Senior Instructor of the special needs unit, Zenia Melnyk-Wainwright, and the social services team of Day Centre officers in Lewisham. I would also like to thank Matt Laws, my then 'downstairs neighbour' for his willingness to listen and for his useful feedback. My love and thanks must also go to my partner, Joe, who shared the "ups and downs" of the writing-up phase and was always there when I needed him!

Thanks too must be given to all the Day Centre instructors who worked so willingly with me during the course of the project, without whom this intervention study would not have been possible. Finally, my warm appreciation to all the clients who worked so closely with me and who taught me so much about communication.

DECLARATION

I grant powers of discretion to the University Librarian to allow this thesis to be copied in whole or in part without further reference to the author. This permission covers only single copies made for study purposes, subject to normal conditions of acknowledgement.

ABSTRACT

This thesis is about the development and evaluation of an intervention incorporating structured sensory stimulation. It was designed for use with adults with learning disabilities who were not yet intentional communicators.

The intervention was termed an 'Individualised Sensory Environment' (**I.S.E.**). The main objective was to reduce the levels of non-purposeful engagement and to increase the levels of purposeful interaction. Appropriate opportunities for adaptive responding were organised by the provision of sensory stimulation that was identified as personally motivating to the individual. The reinforcing sensory experience was contingent on the participant's responses. The focal sensory domains of the intervention were the tactile and vestibular systems for input, and the proprioceptive for participant response feedback.

An alternating treatments design was used to evaluate the effects of the intervention (**I.S.E.**) on engagement levels of participants. An attention placebo condition was also used.

The participants attended a social service's Day Centre and formed therapy groups whose membership ranged from two to four, based on their location within the service's structure. Groupings were then randomly assigned to two experimental groups, the order of interventions for one being the reverse of the other.

Data was collected by systematic observation of participant's engagements in the natural environment: at baseline, after each phase of therapy and at two follow-up points. Analysis of variance was the main method of statistical interpretation. The results showed that high levels of non-purposeful behaviour were emitted at baseline when compared with the construct purposeful interaction. When the intervention (**I.S.E.**) was introduced, a significant decline in the level of non-purposeful behaviour was observed, which maintained its new lower level up to one month after the termination of therapy. The placebo condition also effected a similar change initially. However, a significant increase in purposeful interactions was only observed after a phase of the 'Individualised Sensory Environment'.

Some limitations of the study are discussed and recommendations for future work are indicated.

ABBREVIATIONS

Notation	Full Term	Definition
I.S.E.	Individualised Sensory Environment	Intervention A: I.S.E.
A.P.	Attention-Placebo or Action-Performance	Intervention B: A.P.
S.R.V.	Social Role Valorisation	Philosophy developed by Wolfensberger (1972) and others to guide the planning and delivery of services to adults with learning disabilities. Originally termed 'normalisation', it was renamed 'social role valorisation' to avoid the connotations of <i>normalising</i> . It is about valuing achievements and the 'ordinary' lifestyle.
M.T.S.	Momentary Time Sampling	Systematic approach to observation used to measure behaviour.
S.P.	Sample Population	Selected participants for the project characterised by limited communication skills and high levels of non-purposeful behaviour.
R.P.	Remainder of the Population	Those amongst the focal learning disabled population who did not meet the referral criteria for the study, i.e. characterised by intentional communication and purposeful behaviour.

CHAPTER 1: INTRODUCTION TO THESIS

1.1 Introduction to the Chapter

This chapter provides an introduction to the focus of the research project. It aims to set the scene regarding the current philosophy of care and service provision for adults with learning disabilities. This will serve as a backdrop for the consideration of the particular challenges experienced by Speech and Language Therapists in their working with learning disabled adults who are not yet intentional communicators.

In order to establish the need for an approach to assessment and intervention which is appropriate to the characteristics and skill sets of the target population, particular attention will be paid to the following areas, as reported in the literature: levels of purposeful activity or engagement; definition of characteristics perceived to be present; and the incidence of communication difficulties. Following this, there will be a brief overview of the current assessment tools used with adults with learning disabilities, together with an introduction to the main issues regarding relevant intervention strategies.

1.2 The Setting

It is only since the 1970s that consideration has been given to the education and enrichment of the lives of people with learning disabilities. Two main areas of activity appear to have been the focus of those employed to develop and deliver specialist services to people with learning disabilities. Firstly, the education of severely learning disabled children made a philosophical and practical shift from 'care' to 'stimulation'. This was stressed in the 1970 Education Act in England. Secondly, the closure of long stay institutions for people with learning disabilities and mental health problems was highlighted for consideration by Health and Local Authorities. It was primarily the responsibility of the Health Authorities and they started to formulate proposals for the planned closures of these large institutions and the provision of supported housing in the community.

In response to this second area of activity, the planning for institutional closure, the Guy's District Management Team established the "Development Group" on 1st May 1980. Their remit was to ascertain the number of people with a learning disability resident in or originating from the Guy's Health District who required services; to evaluate identified services already in existence; and to plan future services within the community setting.

1.2.1 Closure of Local Institution and Development of Community Services

The impending closure of one of England's largest institutions for people with learning disabilities located in the South East Thames Region, Darenth Park Hospital, heralded a revision of both residential and day services for the population. This meant an increase in community facilities with the accent on an ordinary life in the community. The philosophy of 'Normalisation' first formulated by Bank-Mikkelsen (1969), with later interpretations by Nirje (1969); and Wolfensberger (1972) was used in the planning of the new services. O'Brien (1981) in the *Values into Action Publication* adapted by Alan Tyne: "The Principle of Normalisation" summarised the philosophy thus:

"Using valued means to as much as possible enhance and support behaviours, appearance, and experiences, as well as perceptions by other people in the community which are culturally normative". (p.1)

Tensions arose due to the misinterpretation of certain concepts within the philosophy. The concept of 'what is normal' and meeting the specific needs of people with learning disabilities frequently clashed. For instance, the principle of age appropriateness (O'Brien, 1981) has frequently been misinterpreted by support staff to mean that practice should match the chronological age of the individual. Therefore, it was expected that 'normal' adult communication acts should be established with an individual regardless of the available skill set. The service and its components achieved a 'normal' image but at the expense of meeting individual needs. This led to the renaming and modification of 'normalisation' as 'Social Role Valorisation' (S.R.V.). This was in order that value could be given to the many different social roles performed by an individual (Wolfensberger, 1983). A relatively recent definition of S.R.V. was put forward by Wolfensberger (1992): *"the enablement,*

establishment, enhancement, maintenance, and/or defence of valued social roles for people - particularly for those at value risk--by using, as much as possible, culturally valued means.” (p. 32).

However, certain principles defined in the original works on ‘normalisation’ have been maintained in service philosophies. O’Brien defined five basic principles (In: Tyne, 1981), which he termed the ‘five accomplishments’. They were and still are used as a frame of reference by which to deliver and evaluate services for this population. The accomplishments are viewed as targeted achievements for the learning disabled and are summarised as:

- **Community Presence**
defined as the experience of using the same facilities and sharing the same physical space as non handicapped people;
- **Relationships**
defined as having a broad range of contacts and relationships with others participating;
- **Respect and Dignity**
defined as the right of individuals to a role of value, status, respect and dignity that is comparable with that of others;
- **Choice**
defined as the opportunity to make choices on all relevant issues;
- **Competence**
defined as the right to help to develop and grow; learn new skills thereby minimising any permanent disabilities.

Therefore, some of the tensions that existed under the former ‘normalisation’ due to misinterpretation in practice persist, despite the reformulation of the philosophy as ‘social role valorisation’.

In January 1981, the Development Group for 'Services for Mentally Handicapped People' made its report to the Guy's District Management Team. Issued for consultation in the planning of new services, it considered in its documentation the whole service planning of those people with the most severe learning disabilities or "special needs".

Four proposals were made. Firstly, it was felt that this group of people should not be excluded from the mainstream of services where building adaptations or additional staff support could help to maintain them in the community. Secondly, it was stated that when people have very special needs the first response should be to make available to them extra resources and support in the place they would normally be. Thirdly, that when people are in danger of being excluded due to behavioural problems, some very individual solutions should be sought. Fourthly, that because of the extreme deficits experienced by people with very severe mental handicaps, the daily programmes should be *'highly intensive, extremely active and with a positive/habitational emphasis'* (p. 82).

Prior to these proposals, the local Speech and Language Therapy service had been delivered on a restricted, sessional basis to meet the communication needs of those attending social service's Day Centres in the district. The planned dispersal of institutional residents, concurrent with the establishment of community based services, led directly to the development of 'Community Mental Handicap Teams'. These were multi-disciplinary structures that aimed to facilitate collaborative working effort amongst the professionals, i.e. Psychologist, Occupational Therapist, Physiotherapist, Community Nurse, Psychiatrist and Speech and Language Therapist.

Speech and Language Therapy as a profession started to play a major role in service provision to learning disabled adults, after 1980, when the first community mental handicap teams were set up to assist in the community resettlement programmes for institutionalised adults around the country according to the published government recommendations. They were specifically employed to assess the communication skills of residents in long stay institutions such as Darent Park Hospital, and to work with teams of support workers for the relocation of people to their borough of origin and for their ongoing maintenance in the community, in this case Lewisham and North Southwark. Speech and Language Therapy with people already resident in these London Boroughs, was also extended, to meet individual support needs and to preserve their continued presence in the community.

It therefore followed that developments should take place amongst the professions who were required to provide assessments; staff training and advise on therapeutic programmes in relation to this population.

1.3 Rationale

There were some amongst the learning disabled population who were reported to require a higher degree of support. They exhibited increased levels of dependence on their significant others regarding personal, cognitive, communicative and social needs. In short, there appeared to be a proportion of the learning disabled population who experienced extreme difficulties in all areas of independent living. The literature has reported on the engagement levels and the presenting characteristics of this group of people with learning disabilities. These will be reviewed in turn.

1.3.1 Level of Engagement

Low levels of purposeful activity provided in facilities for people with severe and profound learning disabilities seems to be a persistent problem. Grant and Moores (1976) studied severely learning disabled adults in two hospitals, finding a range of between 48% and 55% of their day was spent in purposeful activity. This sample did however exclude those participants described as '*totally non ambulant*' or '*deaf*' or '*blind*'. Their inclusion would very likely have caused a reduction in this level based on the premise that the more severe the disabilities are for the individual, the harder it is to engage in purposeful activity and for others to facilitate it. A later study by Felce, Kushlick and Mansell (1980) found that, from a cross section of severely learning disabled children resident in two hospital villas, the average purposeful activity per day was 31%, and from a similar cross section of adults in three hospital villas, 39% of the day. The average in similar cross sections of this population based in small community homes was found to be significantly higher. This may be due to the greater provision of residential care in an institutional setting to more severely learning disabled people with additional sensory and motor impairments, or else to the relative freedom from routine and increase in choice and opportunity that is found in smaller, community placements.

Jones, Favell, Lattimore and Risley (1984) looked more specifically at the independent and active use of leisure materials amongst residents with profound learning disabilities plus multiple handicaps. This was reported at less than 13% of the available time.

The researcher was concerned with the number of people with a learning disability who were not yet intentional communicators, and who seemed to experience diminished interactions with people and objects in the environment. The majority of these people attended special needs units under local authority social service day centres. The questions were: who were these people and how were they to be identified; how were their skills of pre-intentional communication to be measured; and what form should remediation take. Each of these questions is crucial to the current study.

1.3.2 Definition of Learning Disability

There have been many attempts to define this population, the most commonly used system being based on psychometric assessment of intelligence that distinguishes between the 'profound' and other degrees of learning disability (Grossman, 1983). Other classification systems have employed functional terminology in relation to the person's skills or lack of them (Presland, 1982; Sontag, Burke and York, 1973; Browning, Bailey and Clark 1981). In 1985 the National Development Team (N.D.T.) set up by the British Government to guide and advise local organisations on the development of services defined the features deemed to be characteristic of those with the highest level of dependency (Group IV): severely handicapped, doubly incontinent with multiple physical handicaps, severe epilepsy, extreme hyper kinetic behaviour and aggressive to self and others. It is unlikely that such an imprecise collection of features is completely descriptive of any one person and therefore can only be said to approximate the population of people with profound learning disability. Additionally, it is worth considering that functional definitions which describe the current skills of individuals may actually reflect lack of opportunity rather than potential.

Historically, people with learning disabilities have either been defined by the services being provided, i.e. attendance of a special care unit denotes a high level of dependency; or else by exclusion from a service, e.g. prior to 1975, profound learning disability was defined in

Scotland in terms of exclusion from educational services - "ineducable" (Browning, Bailey and Clark, 1981).

Because of the difficulties in standardising a definition of '*profound learning disability*', prevalence figures are hard to establish. Prevalence studies completed have revealed differences according to the following: where people live - in the community or an institution (Dupont, 1981); age range - (Fryers, 1984).

Although, it is likely that the communication status of individuals is associated with the degree of learning disability, this study is not concerned with the categorisation of degrees of learning disability as reported in the literature, but more with their communication skills and engagement levels.

1.3.3 Prevalence of Communication Difficulties

It is widely acknowledged that people with learning disabilities experience communication problems although the exact size of the problem has not been documented. A survey of clients in day centres and long stay hospitals completed by Blackwell, Hulbert, Bell, Elston, Morgan, Robertshaw and Thomas (1989), concluded that 33% had some verbal communication difficulty, with 25% of cases demonstrating marked problems, and 29% were non verbal, making a total of 62% of the population experiencing identifiable communication problems. It was not made clear what percentage of non verbal people were also severely physically disabled, thus perhaps accounting for a lack of verbal communication. Nevertheless, it is possible to see the extent of difficulties in the communication skill sets of the study population.

Another survey by Law and Lester (1991) in a social education centre found slightly higher levels of need: 81% were considered to require support for their communication skills; 9.5% being non-verbal and 5.9% experiencing low comprehension and/or low expression. The variations between these two studies may be explained by differences in the focal populations; the criterion used for their identification and data collection methods.

This study is concerned with the close examination of the communication skills and engagement levels of people who demonstrate severely restricted verbal use, in order that an appropriate assessment procedure and intervention may be developed for use by Speech and Language Therapists and significant others.

1.3.4 Speech and Language Therapy Assessment

Traditionally, Speech and Language Therapists have been associated with child speech and language development, and the acquired problems of adulthood. Some large institutions for the learning disabled may have received a Speech and Language Therapy service in the 1960-70s, but the assessments and therapy techniques were "borrowed" mainly from the paediatric and some from the adult fields. Informally, adapted versions of the '*Derbyshire Language Scheme*' (Knowles and Masidlover, 1982); developmentally based assessments such as '*The Reynell Developmental Language Scales*' (1978); were used, together with a battery of informal assessment procedures including subsections of global criterion referenced checklists: '*Behaviour Assessment Battery*' (B.A.B.; Kiernan and Jones, 1982); '*Berewecke Checklist*' (Felce, Mansell, Jenkins and de Kock, 1984); '*Next Step on the Ladder*' (Simon, 1981). Apart from the obvious problems of the standardisation restrictions arising from "borrowed" formal assessments, few of them included a detailed examination of early communication skills.

Other checklists comprise criteria which either relate specifically to communication skills at the pre-verbal level: '*The Pre-Verbal Communication Schedule*' (P.V.C.S; Kiernan and Reid, 1986); or else include a focused section at this level: '*Personal Communication Plan*' (P.C.P; Hitchings and Spence, 1992). The P.V.C.S. aims to provide detailed diagnostic information about pre-communicative, informal and formal communicative and receptive skills. It is in the form of a checklist comprising 195 items and the information gathered is largely descriptive. The assessor has the main responsibility for defining the context for the collection of assessment data. The P.C.P. seeks to profile communication skills according to O'Brien's five accomplishments attributed to the '*ordinary life*'. Again, the assessment takes the form of a checklist with an unspecified procedure for data collection, its main aim being to provide a format for long term assessment and programme planning.

Van der Gaag (1989) recommended the utilisation of the client's main carers in a joint assessment of communication skills. The '*Communication Assessment and Speech Profile*' (C.A.S.P.: van der Gaag, 1988) was devised specifically with the population of adults with learning disabilities in mind and was based upon the premise that the carer and professional should be equal partners in the assessment process. C.A.S.P. covers both verbal comprehension (from single word to sentence level, looking at naming vocabulary and attributes), and expressive skills (from single word to communicative functions). However, even its baseline presupposes a verbal communication skill set, of the individual being assessed.

An assessment procedure that focused on early communication behaviours for use with the severely learning disabled was developed by Coupe, Barton, Barber, Collins, Levy and Murphy (1985). They established a theoretical framework for their '*Affective Communication Assessment*'. The procedure aimed at providing a structure for the observation of differential responses by focal clients to sensory opportunities provided by the assessor. The application of its principles in the teaching and monitoring of communication development was later considered, (Coupe and Goldbart, 1988). Coupe et al made their suggestions based on observations of the behavioural repertoires of a paediatric population.

All these published assessment procedures raise a number of issues variously regarding: the reliability of information which is based on informal observation with a rating scale; time required to complete a checklist; the organisation needed in terms of stimuli required in sub-tests; the limitations of use when presented with a client with complex needs including additional sensory-motor impairments; a lack of clear direction in terms of target identification and an intervention procedure.

It was therefore the primary intention of the researcher, to assess in as objective manner as possible, the communication and interaction levels of learning disabled adults who present a diverse range of additional sensory and motor impairments. Secondly, the researcher was concerned with the development of an intervention to effect change in the daily interactions of the focal population.

1.3.5 Intervention Strategies

As with assessment packages, so there has also been significantly less material published on the application of Speech and Language Therapy techniques to learning disabled adults, compared with other presenting difficulties, i.e. developmental speech and language disorders, acquired neurologically-based communication problems, etc. Review of strategies reportedly used by Speech and Language Therapists with this population can be roughly subdivided into direct (client centred), and indirect (through significant other to client and via environmental adjustment) intervention strategies. However, it must be pointed out, that very often an approach encompasses both direct and indirect techniques to a greater or lesser extent. That is, the direct technique may be applied through the indirect coaching of the significant other.

1. Direct Techniques:

Little, if any investigative effort has been reported in the literature regarding those people with a more 'severe' learning disability. Van Dijk (1965a, 1965b) has described a number of hierarchical procedures for use with deaf-blind clients; Sternberg, Battle and Hill (1980) suggested some adaptations for use with many other types of profound disability; Sternberg, Pegnatore and Hill (1983) developed interactive communication behaviours through use of movements, signals, gestures objects, pictures, signs and speech, according to the functioning status of the individual. This latter study used the procedural stages to be found in a pre-language training approach: resonance; co-action; and deferred imitation, which respectively define: physical contact between client and therapist in simultaneous communication act; demonstration of model of communication behaviour; and removal of model prior to client's reproduction of behaviour. This applied hierarchy to meet individual needs was reported to be effective in the majority of cases, as communication behaviours generalised to other situations.

The most frequently quoted direct technique for use with the broader learning disabled population is '*Makaton*'. It is a language programme that utilises a core vocabulary of functional hand signs and/or symbols, developed by Walker and her associates (1976, 1978) originally designed to meet the communication needs of learning disabled adults with a

hearing loss. Signs are based on natural gesture and taught in a developmental sequence. Several advantages to its use have been pointed out, amongst which are: iconic, visual representation; facilitated auditory processing; and ease of response production (Karlán, Fristoe and Lloyd, 1984).

Makaton has been used with a wide range of this population: early language training with Down's children has been examined using both sign and symbol (Le Prevost, 1983); signing with the visually impaired (Mountain, 1984); and the deaf-blind (Clark, 1988). Walker reported in her initial research findings that intervention by Makaton showed an increase in expressive language, sociability, eye contact, attention levels and vocalisation (1978). She also commented that adults with learning disabilities could learn to sign with ease. Grove and Walker (1990) went on to examine the use of signs and symbols, the latter based on a rebus system, to develop interpersonal communication skills amongst people with learning disabilities. Makaton signing is considered relevant to the development of an intervention strategy in the current study. This will be explored in greater depth later on in the thesis.

2. Indirect Techniques:

Other therapy strategies have concentrated on intervention through the client's significant others termed an *indirect* approach. A speech teaching scheme was developed for use by Adult Training Centre staff by McCartney and Byers Brown (1980) to improve intelligibility of communication acts. More recently, Jones (1990) produced '*Intecom*', a programme planning package that focuses in part, on the training of the carers to promote communication development in the clients. It has been criticised for its over emphasis on the communication environment and its concurrent neglect of the communication impairment (van der Gaag and Dormandy, 1993). Furthermore, no measured outcomes have been reported on either strategy. It is the opinion of the researcher that a combined approach that encompasses both professional input and carer involvement, as recommended by Van der Gaag (1989), is likely to be the most effective.

This research project is concerned with the assessment of and intervention with people who present as largely non verbal. The selected publications or strategies mentioned here, have

been briefly surveyed in an appraisal of the current situation facing the Speech and Language Therapist working with adults with learning disabilities. A more detailed examination of interventions will be presented in the next Chapter which reviews the literature.

1.3.6 Summary of Problem Situation

This first chapter has introduced the reader to the current situation that exists within the field of Speech and Language Therapy and people with severe learning disabilities who are not yet intentional communicators. It has recounted the more recent developments in service provision, particularly since the 1980s. It has then moved on to overview the challenging issues which face the Speech and Language Therapist regarding: poor engagement levels amongst learning disabled clients; high incidence of communication difficulties; the restricted availability published assessment packages; and defined intervention strategies that have not necessarily been developed for use with those with profound learning disabilities. These issues will receive further attention in the following chapter: **Chapter 2: Review of Literature and Theoretical Framework.**

The aims of the current study are now recounted and an outline of the structure of the thesis is provided.

1.4 Aims of Research

The initial aim of the project was to develop a theoretical framework for a suitable intervention for learning disabled adults who are not yet intentional communicators, based on a synthesis of four key areas reported in the literature. These areas are: (i) intervention practice with adults with learning disabilities interfacing with current service philosophy; (ii) sensation as an artefact in therapy programmes in the forms of contingent and non-contingent reinforcement in relation to the learning process; (iii) Sensory Integration Theory; and (iv) Sensory Integration Therapy (Ayres, 1972; 1979). This is termed the **theoretical phase** of the project.

The second aim was to define the target population (people with learning disabilities who are not yet intentional communicators), in terms of presenting features, to make a comparison

with the remainder of the population (people with learning disabilities who are intentional communicators), and to ascertain the type of Speech and Language Therapy interventions currently being implemented. This is termed the **definition phase** of the project.

The third aim of the study was to develop appropriate instrumentation for the purposes of assessment and individualised intervention planning, and to pilot the procedures in a feasibility study. This is termed the **construction phase** of the project.

The final aim was to implement the intervention with a sample population in order to evaluate its effects. This is termed the **experimental phase** of the project.

1.5 Structure of Thesis

The thesis is contained in two volumes. **Volume I** consists of Chapters 1 to 6. **Volume II** consists of Chapters 7 to 8 and the Appendices. The relevant Appendices are identified in the text of **Volume I** for appropriate access by the reader.

Volume I

Chapter 2 focuses on the **theoretical phase** of the project. It provides a critical review of current Speech and Language Therapy intervention practice with learning disabled adults and examines the interface with current service philosophy. It then proceeds to explore the role of sensation in therapy programmes, focusing on both contingent and non-contingent reinforcement in relation to the learning process. The theoretical writings on Sensory Integration Therapy are then critically reviewed, together with its reported applications (Ayres, 1972; 1979). The final part of this chapter provides a synthesis of the literature review in a theoretical framework for the intervention termed '**Individualised Sensory Environment**' (**I.S.E.**). A clinical rationale is formulated to provide the foundations of the intervention. The scope of the study and the research objectives are summarised based on the previously stated aims in **Chapter 1**. The research hypotheses are provided at the end of the chapter.

Chapter 3 focuses on the **definition phase** of the project. It provides an account of the process conducted to deal with the ethical issues of the study. Then it is subdivided into three areas where the methodology and resulting data are discussed. Firstly, the selection process of the participants from one social services Day Centre is recounted for the main study. Next, a second survey of a similarly defined population in three Day centres in a neighbouring borough is also provided for comparison, with additional information regarding current Speech and Language Therapy interventions. Thirdly, there is a more detailed survey of the study population which provides a multi-axial comparison between the sample population and the remainder. The chapter provides a summary discussion of the characteristics which provides both a definition of the sample population, and outlines the implications for the empirical phase of the project.

Chapter 4 focuses on the **construction phase** of the project. It recounts the development of the instrumentation required for the purposes of assessment and intervention planning. It describes the two main pilot studies and reviews the data collection methodology and recording medium. There is a discussion of the difficulties that arose at each stage and a summary of the implications for the main study.

Chapter 5 and the remainder of the thesis focus on the **experimental phase** of the project. This chapter describes the methodology for the main experimental study. It outlines the experimental design used to evaluate the effects of the intervention supported by definitions of the variables including the attention-placebo condition. Justification for the chosen method of statistical analysis is provided.

Chapter 6 provides a summary of the results in two parts. The first part presents the mean group data in relation to the main experimental hypotheses. The second part presents a summary of the data arising from the single case studies.

Volume II

Chapter 7 provides a discussion of the research findings in relation to the eight main hypotheses and the literature review. The outcomes of the study are considered in the

context of a critical appraisal of the key theoretical positions cited in the review of the literature. The originally stated aims and objectives are discussed in the light of the achievements of the current study.

Chapter 8 concludes the thesis. It provides a critique of the present study and outlines the directions for future work. The first part discusses the complexities of the current research project with an appraisal of its limitations and the strategies that were invoked to deal with issues. Future research ideas are also highlighted. The second part attends to the potentially controversial relationship of the **I.S.E.** intervention of the current study to current service philosophy and practice. Finally, consideration is given to the direction of future work, policy development and the practical implications for the work of the Speech and Language Therapist.

CHAPTER 2: REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

2.1 Introduction

The review of the literature covers four key areas: intervention practice with adults with learning disabilities interfacing with current service philosophy; contingent and non-contingent sensory reinforcement in relation to the learning process; Sensory Integration Theory; and Sensory Integration Therapy (Ayres, 1972; 1979; Fisher, Murray and Bundy, 1991). The fifth and final section of this Chapter represents a synthesis of the previous four areas. It provides a theoretical framework for the intervention termed the 'Individualised Sensory Environment' (I.S.E.) incorporating the nature of intentional communication development, and its relevance to severely learning disabled adults.

1. Intervention Practice and Service Philosophy:

In order to establish an intervention and to later assess its contributions to the work of the Speech and Language Therapist, the first part examines *Intervention Practice* with adults with learning disabilities. Particular attention is paid to the interpretations of service philosophy which influence current practice, and which, may later require detailed review for the complex needs of some in the learning disabled population.

2. The Role of Sensory Reinforcement:

Once the nature of intervention practice and service philosophy is established, the review moves onto to examine the role of sensory reinforcement and stimulus reactivity in the learning process. This is considered to be a crucial part of the developing intervention. The various uses of contingent and non-contingent sensory stimulation are appraised, particularly the role of reinforcement in the learning process where sensory stimulation is a significant component of the intervention.

3. Sensory Integration Theory:

Having reviewed the reinforcing role of sensory stimulation in the learning process, and for the establishment of a clinical rationale for a sensory based intervention, this review proceeds to examine a theory based intervention that employs sensory stimulation as a key artefact in the therapy process. One such intervention is Sensory Integration Therapy

(Ayres, 1972; 79), which is based on a theoretical framework. As the most frequently published example of this kind of intervention, *Sensory Integration Theory* is critically reviewed here, with particular attention to its defined relationships amongst the central nervous system (C.N.S.), the environment and behaviour.

4. Sensory Integration Therapy:

Following this, the applied research on *Sensory Integration Therapy* is inspected with a particular focus on the clarity of its operational definition and reported practice.

5. Theoretical Framework for an Intervention:

The clinical rationale represents a synthesis of the four areas of the literature review previously presented. It is explained by the provision of a five part model which examines the relationships amongst the environment, the organisation of incoming sensory data and adaptive behaviour. It serves as the theoretical framework or foundation from which the operational definition will grow. The need for a developmental frame of reference when working with learning disabled adults is established within the model for its relevance to the overall goal of therapy.

Finally, a summary of the research objectives is provided, in relation to the scope of the study which is supported by the research hypotheses.

2.2 Intervention Practice and Service Philosophy

It is intended that a critical appraisal of current intervention practice and service philosophy with the learning disabled population, will highlight the need for development work regarding those people with severely restricted communication skills.

2.2.1 Concept of Intervention

Intervention, treatment or therapy, are all terms used interchangeably. Each is concerned with the introduction of a new variable to an existing situation with the aim of bringing about change in that situation. It is, very often, the main reason why a person attends a clinical Speech and Language Therapy service: to affect change in communication skill set use.

Interventions are usually devised as a result of an interpretation of assessment findings, where the skill set of the individual is profiled, based on his/her responses to a standard set of directives encased within an assessment package. The assessment would normally present a hierarchy of test items of increasing complexity in order to find the point at which the individual's skill set starts to break down. In short, a baseline reference is identified for the individual against which to compute any changes which might have been brought about by an episode of intervention.

The therapist needs to consider the client's potential to learn new behaviours, as in the case of the child with a developmental language problem, or to achieve more frequent use of their already existing response repertoire. Then, decisions are required regarding the structuring of the therapy procedure. Gerard and Carson (1990) outlined a systematic approach to decision-making in child language assessment: *'What objects, events, people and interaction patterns should be altered and how will they be altered.'* (p. 73). They were principally concerned with the ordering of clinical decisions based on an integration of assessment data relating to child performance and environmental factors.

The therapist formulates a series of hypotheses based on assessment findings and this represents the first stage in the planning process. Materials and activities are selected, facilitation strategies are invoked, in order that the appropriate setting or opportunity is created for the testing out of the hypotheses. A central question for the therapist making decisions for a client's intervention must be: what type and degree of information is provided by the assessment battery and how can it be integrated into a programme of intervention? Or, how does the assessment data relate to an intervention plan? It is perhaps at this point, that the therapist has the major responsibility for identifying the clinical decisions and then for taking them.

As well as the assessment data regarding communication skill set level, a number of extraneous variables inform the therapist's clinical decisions, such as: age of person; cognitive functioning level; presence of additional sensory or motor impairments; medical condition; service context or setting for the realisation of therapy targets; and the role of significant others. The therapist would usually plan the client's intervention based on an informal review of the interaction of the significant factors with the assessment findings.

Although intervention may be considered to be central to the work of the Speech and Language Therapist, there are few programmes that have been operationally defined, with a clear specification regarding: (i) candidacy; (ii) first level clinical decisions for entry to the programme to identify appropriate facilitation or presentation strategies, activities and equipment, and client response repertoire to be expected in the course of therapy; (iii) structure of intervention session; (iv) a uniform recording method for logging client's performance that is appropriate to the specific intervention; (v) a systematic procedure for the adjustment of programmes currently running.

2.2.2 Current Practice with the Learning Disabled

Using ethnographic methods, van der Gaag and Davies (1994) examined the working practice of four Speech and Language Therapists specialising in the field of learning disabilities. They refer to the '*complex integration of knowledge and skills*' (p. 215), which appear to be used in every day clinical practice. Furthermore, data regarding knowledge used in case management and therapeutic skills included only a very few recognised techniques, amongst which were Makaton techniques and the Derbyshire Language Scheme (D.L.S.). Broad recognition was given to many different domains of knowledge and skill, such as the use of demonstration and modelling techniques; strategies for managing challenging behaviour; social skills training; use of the community setting to achieve objectives; and maintenance of the client's interest and motivation. However, this information was not necessarily accompanied by standard operational definitions, therefore their interpretation across the Speech and Language Therapists reporting the use of such techniques, may not have been consistent.

More traditional language programmes that were reported to be in use with learning disabled adults have originally been developed for use with children, e.g. D.L.S. and Makaton. Whilst acknowledging the advantages that these structured approaches offer in terms of specified stimuli, controlled teaching and reinforcement procedures, their restricted views of the interactional process cannot be ignored. This will be expanded on in the following section which addresses the advantages of a more indirect approach to the communication environment.

It would seem that current Speech and Language Therapy practice with learning disabled adults can best be summarised as the use of specific therapeutic skills within the settings

in which people live and work. The practical application of these skills has been guided initially by the philosophy of normalisation and later social role valorisation (S.R.V.). This is based on the writings of Wolfensberger (1972) and O'Brien (1981) amongst others. It has served to influence the shape of residential and clinical services for the learning disabled, particularly over the last two decades in this country. The emphasis has been on community presence with the closure of the long stay institutions, and user participation in the design and delivery of services.

The recently published assessment and programme planning package: 'Personal Communication Profile' (P.C.P.) (Hitchings and Spence, 1992) used the 'five accomplishments' for the structuring of their checklist assessment and for the recommended procedure for communication goal planning. However, the process for important therapeutic decisions is still dependent on subjective observations and the use of unspecified procedures for the selection of appropriate goals and teaching strategies.

Selection of communication targets for the individual, has, not surprisingly, frequently focused on the fourth accomplishment, '*choice*'. Perhaps this is due to the obvious constraints that the presence of a communication skill deficit places on the realisation of this principle. Additionally, with the exception of the defined accomplishment of '*competence development*', the other three principles (i.e. community presence; respect and dignity; and developing relationships), would appear to be valued outcomes that are dependent on a carefully managed process.

The accomplishments '*choice*' and '*competence development*', however, might be viewed as crucial mechanisms of that process, e.g. the achievement of '*developing relationships*' could be said to be dependent on the individual's ability to exercise choice of human contact; '*respect and dignity*' might relate to the individual's developing competence to exercise personal and civil rights, such as being able to sign own name in order to receive pay, or being able to look after and to use a key to the front door. Nozaki and Mochizuki (1995) acknowledged the relevance of choice making to the personal autonomy and dignity of the person with profound learning disabilities. Others have looked at incorporating choice opportunities into daily routines (Bambara, Kroger, Katzer, and Davenport, 1995); choice making strategies among children with Rett's Syndrome (Sigafos, Laurie and Pennell, 1995); and facilitating choice making by the

use of a microswitch to indicate a change in recreational stimuli with people with profound, multiple disabilities (Kennedy and Haring, 1993).

Although the philosophy of S.R.V. and its defined principles have provided a common direction for the development and evaluation of services, their realisation is largely dependent on different domains of knowledge and skill as highlighted in the van der Gaag and Davies survey (1994). In a field of Speech and Language Therapy, where assessment procedures mainly involve informal strategies and subjective recording devices, the decision-making process for intervention planning must be strongly questioned. What is the relationship between assessment data collected and the resulting intervention? How can specific outcomes be measured when assessment procedures are frequently imprecise and dependent on the informal observations of the clinician? What factors inform the therapist's choice of intervention technique? What is the specific role of the therapist in the intervention and in relation to the significant others? How can any one procedure be replicated if it is based on a knowledge base and skill set which may vary from therapist to therapist? All these questions point to a need for clarity in skill mix and theoretical knowledge, and a greater specification in therapy procedures.

2.2.3 The Communication Environment

Popular practice with this population has tended to focus on the communication environment of the service user. Assessments have included a focus on environment (C.A.S.P.: van der Gaag, 1988; P.C.P.: Hitchings and Spence, 1991), and emphasis has been placed on environmental modification by the training of significant others. A number of reasons have been suggested in support of such an indirect approach. Increased interest in the influential role of the communication partner has been shown by a number of researchers. MacDonald and Gillette (1986) criticised the traditional language programme approach with children for its neglect of interactional skills. They also pointed out that the predominantly active communication role of the adult in these programmes may in fact encourage the role of respondent in the child. Furthermore, their own study of adult-child interactions led them to suggest that communication skill set match is infrequently achieved.

Another reason in support of an indirect approach has been the poor generalisation of newly acquired skills from therapeutic to natural environment. People with learning

disabilities are frequently unable to assume responsibility for their own learning and the maintenance of their skill sets due to the very nature of their collective impairments. Furthermore, the automatic transference of new skills acquired in one situation, into another cannot be assumed (Calculator and Bedrosian, 1988). Learning disabled adults are dependent on their significant others for this. Therefore, it is thought that an approach that seeks the implementation of therapeutic goals within a real life setting where the significant other is the facilitator, may more effectively achieve the generalised use of newly acquired skills. It may also be helpful to view the communication act as a partnership between two or more people thereby restricting the potential communicative domination of the significant other.

Providing appropriate support and facilitation for the communicative attempts of non-speaking adults with severe learning disabilities, can prove difficult due to the limited nature of responding behaviour. Significant others frequently need to be good observers of minimal behaviours and to fulfil an interpreting role based on their familiarity, knowledge and experience of the person (McLeod, Houston and Seyfort, 1995). They also require considerable skills in the use of facilitative language techniques, such as joint attention, turn-taking, and for the '*reading*' of client responses.

Specific methods have been recommended for strategic intervention in the natural setting. Halle (1988) wrote about the Mand Model Technique which focuses on the organisation of opportunities for communication and the Time Delay Procedure whereby the facilitator observes the client's approach of a desired item and waits for up to 15 seconds in expectation of some form of communicative behaviour. Haring, Neetz, Lovinger, Peck and Semmel (1987) documented methods known as '*Incidental Teaching*' which concentrated on the creation of opportunity to communicate. For instance, client's needs in terms of goods and services would not be supplied immediately, thereby establishing the need for a communicative response, i.e. the tea is presented without the milk prompting the client to make an appropriate request. These techniques, whilst providing a defined strategy for response facilitation represent only a small part of the intervention process. The major decisions regarding which facilitative strategy, stimuli specifications, therapist role, reinforcement schedule and further planning still require careful consideration.

In support of the recognised importance of the communication environment and the interactional process, therapists have been engaged in the development and delivery of training packages to staff teams and significant others. Jones (1990) produced '*Intecom*' in an attempt to formalise a joint planning procedure for the remediation of communication difficulties. It involves the carers in facilitated awareness of communication breakdown and the learning of suitable repair strategies. One major criticism is its over emphasis on environmental issues and its resulting neglect of impairment. It also ignores the need for objective measurement of outcomes of this form of intervention in relation to communication environment changes.

Cullen (1988) has suggested a practical 'bottom-up' approach to training which is broadly relevant to current issues within the existing service. Briefly, this is interpreted as an initial identification of present challenges or needs, and the facilitation of significant other learning to meet them. This, necessarily involves the use of training knowledge and teaching skills.

However, although the training of significant others in strategies and techniques to meet client communication needs is a frequently tried area of work, little has been reported on their specific content and outcomes, in terms of benefits to the client. One study reported positive benefits to both client and significant others as an outcome of a thirty minute training programme (Calculator and Luchko, 1983). Blackstone (1991) emphasised the need for research in this area and identified a list of ten ways to facilitate adult learning for the modification of attitudes and behaviours. Amongst the strategies proposed were: keeping topics highly relevant and encouraging the active learning of participants. She suggested that there may be limited advantages to the provision of one-off training sessions whilst acknowledging that stresses on service, both in terms of finance and staffing resources may make this more likely.

McLeod et al (1995) investigated the effectiveness of a two and a half hour teaching session to naive and experienced carers of non-speaking adults with severe disabilities. Five principles of communication were taught: eye contact; being at the same physical level; waiting; responding; and structuring the environment to encourage communication. Three interesting outcomes were reported. Firstly, that there was no significant difference between naive and experienced participants at baseline assessment, which

rather suggests that experience does not '*teach*' people good practice and further stresses the need for training intervention. Secondly, that attitudes to communication facilitation beyond formal mechanisms such as sign and symbol, had positively changed. Thirdly, that together with an increased knowledge of communication strategies, participants expressed their confidence at putting them into practice. However, although McLeod et al (1995) point out the importance of the shifts in staff attitudes, their study falls short in its lack of measurement of the actual modified communication strategies used by carers with their clients, and in following up the generalisation of new skills in the communication environment. Furthermore, some participants expressed their apprehensions regarding the amenability of the working environment for the use of the new strategies. Clearly, the issue of skills transference to, and their implementation with clients, needs to be addressed, i.e. the link between the 'classroom' and the 'natural environment'.

The importance of indirect approaches has been outlined in this section. The need for an approach that targets communication acts in the natural environment has been stressed. However, the problem of 'what to do with clients' in terms of activity selection or engagement opportunities has not been considered. This is a frequently expressed concern by support staff both in residential and day services, where the more able service users have access to employment schemes and can participate to various degrees in domestic tasks, and a range of educational and social activities. However, for those clients who are much less able and severely restricted in their communication skills, the options for their participation are less broad. It is not enough to just consider the strategies for carer facilitation of communication acts with clients, there needs to be a consideration of the context and the type of opportunities to be provided. An example of an inappropriate opportunity, as experienced by the researcher, is provided. A client who was considered to be of pre-intentional communication status was employed to staple leaflets in the office of a community team. Observation of the activity revealed an almost total lack of participation by the client, whose hand was held to the top of the stapler by the carer, who applied pressure at the strategic point in the process, so the staple was appropriately embedded in the papers. The carer's use of modified strategies could not counteract the effects of contextual demands that required object engagement of a client whose assessment had revealed a singular lack of object attention. Indeed, the client was assessed to demonstrate basic person engagement skills such as fleeting eye contact!

The activity in the example cited previously could be considered to fulfil three of the ‘5’ accomplishments: (i) community presence, i.e. the location was an office; (ii) respect and dignity, i.e. the employment on offer was age appropriate; and (iii) relationships, i.e. the client was in contact with non-disabled adults in a work place. However, both the nature of the task and the procedure for its execution ignored the other two ‘process’ accomplishments: competence development and choice. The demands of the task had not been matched to the individual’s competence and the passive compliance of the client did not allow for the opportunity of choice. Attention needs to be paid to the context, content and structure of opportunities provided to these clients. This is so that the demands of the situation are an appropriate match to the client’s skill set thereby promoting the success of the communication act.

2.2.4 Level of Specification

The variations which appear to exist amongst therapist’s intervention practice with the learning disabled population have been considered. The previously mentioned, ethnographic study by van der Gaag and Davies (1994) concluded that Speech and Language Therapy as a profession was something of a ‘*polymath....drawing on many different domains of knowledge and skill*’ (p.216). Perhaps this is particularly true of the work that is currently being carried out with learning disabled adults, where there is an acknowledged paucity of standardised assessments, and intervention procedures frequently involve the drawing together of selected techniques, such as those already mentioned. The taking of clinical decisions would seem to be based on the skills and knowledge base of the individual therapist, which may be viewed as being dependent on the level of pre- and post-qualification training. This together with the lack of specificity regarding clinical decisions must necessarily affect variations in intervention practice. In view of this, an evaluation of named therapy procedures will now follow, in order to assess their level of specification which must necessarily influence consistency in practice.

The first three procedures have been reported in use by Speech and Language Therapists and others with the target population: (i) Gentle Teaching (McGee, Menolascino, Hobbs, and Menousek; 1987); (ii) Intensive Interaction (Nind and Hewett, 1994); and (iii) Objects of Reference (cited by McLarty, 1995). The next two therapy procedures have been more specifically profiled as language programmes. The first has been adapted for

use with learning disabled adults and the second aims to treat people with moderate learning disabilities: (iv) Derbyshire Language Scheme (D.L.S.) (Knowles and Masidlover, 1982); and (v) Social Use of Language Programme (S.U.L.P.) (Rinaldi, 1992).

It is the author's intention to critically review the level of operational specification of each procedure for consistency of implementation, in order that a direction for the I.S.E. intervention may be established. Each procedure will be appraised in terms of: candidacy, therapy objectives, stimuli details, facilitative strategies, participant response requirements and reinforcement specification.

(i) Gentle Teaching:

Gentle Teaching has been developed primarily as a technique for use with people who display challenging behaviour, i.e. behaviour that places a risk on the physical or social safety of the individual and others. It was developed in direct opposition to those techniques which were considered to be more aversive, such as restraint and behaviour modification, (Jones, Walsh and Sturmey, 1995). Its main goal is the '*human participation*' of the individual (McGee, Menolascino, Hobbs and Menousek, 1987). It defines its approach as centring on an interaction of four core themes: the unconditional valuing of the individual whereby attention is given in a non-contingent way; the reciprocal process of human valuing which is taught to the client; the need for attitude change amongst staff which reflects its central concept of 'solidarity and mutuality'; and the importance of human engagement.

However, although a widely reported technique, Gentle Teaching lacks a clear operational definition of its central concepts. Therefore, its implementation in a therapy plan demands considerable interpretation from the therapist and furthermore, inhibits replication of the standard technique across professionals and service users.

(ii) Intensive Interaction:

Intensive Interaction was developed as an approach to establish the basics of communication with people with severe learning disabilities. It was devised in the 1980s at the Harperbury Hospital School where a large amount of curriculum development work was being undertaken. A range of informal interactive games were devised for use

with pre-verbal clients who '*...were experiencing extreme difficulty in learning and in relating to others and who were demonstrating ritualistic and challenging behaviours.*' (Nind and Hewett, 1994; p. 8).

Its practical application has been described as '*...spontaneous and responsive rather than pre-planned.*' (p. 9). Therefore, there is little, if any, defined detail provided for the potential practitioner regarding specific therapy objectives, stimuli details, facilitative strategies, and response criteria for reinforcement. The decisions that are intrinsic in the planning of intervention have not been externalised. It provides guidance for spontaneous interaction with this population and in doing so focuses on the social environment. However, until the decision-making process of 'Intensive Interaction' has been defined and externalised, its operationalisation as an intervention remains unclear. It may ultimately say more about the development of a positive attitude to the disabled person than it does about the delivery of a therapeutic technique. Similar to Gentle Teaching, it lacks the cohesion and specificity one requires of an intervention procedure.

(iii) Objects of Reference:

Objects of reference have been a central part of interventions applied to those with dual sensory impairments. It forms one component of a holistic method for dealing with the communication environment of individuals. Originally devised by van Dijk in a school for the deaf-blind, it has been referred to more as a philosophy than a technology. Its primary aim as a technique is to '*fill the gaps in the process of communication development*' (McLarty, 1995). Objects of reference have been invoked for the development of human relationships; the understanding of environmental structure; the demonstration of choice; the establishment of a link between object and activity in relation to time; and the transition from object of reference to a more sophisticated communication mode, such as gesture or sign.

It is a technique that is frequently employed in intervention programmes. As a component of a more holistic approach it is clear that the responsibility for therapy objectives, stimuli details, facilitative strategies and participant response requirements lies principally with the clinician. Objects of Reference, although a potentially useful technique, must necessarily be invoked as part of a broader system of clinical decisions.

(iv) The Derbyshire Language Scheme (D.L.S.):

The D.L.S. (Knowles and Masidlover, 1982), originally designed for use with children in special schools, has been adapted to apply to adults with learning disabilities, and as such, it is reviewed here. It provides a standard assessment which serves to identify the level at which the client should enter the language scheme. However, it is not based on a profile of the individual's preferences but more on their assessed linguistic needs. It is most commonly used within the context of the classroom as a schematic approach to meeting the communication needs of those concerned. Equipment and activities are outlined but individualisation of facilitative strategies is ignored. For instance, a client may be assessed to be functioning at a comprehension level of two information carrying words and will subsequently be presented with activities at that level, but no hierarchy of support is offered to facilitate progression to the three word stage. In short, its strength lies in its baseline assessment and its systematic application within a given setting. However, its weakness lies in its neglect of the other important variables which inform the therapy process, e.g. selection of stimuli based on individual preferences; appropriate facilitative strategies, etc.

(v) The Social Use of Language Programme (S.U.L.P.):

The S.U.L.P. was devised by Rinaldi (1992). Originally developed for use with adolescents with moderate learning disabilities, its main aim is to '*.....help clients use language in a social context....*'. It provides an assessment framework that focuses on both verbal and non verbal skill set use, and gives guidelines for targeting therapy with practical ideas and activities for intervention. S.U.L.P.'s strengths lie in its:

- detailed assessment to identify and analyse a range of social skills utilising rating charts and a questionnaire. Progress is easily recorded by the use of a descriptive rating scale in chart form;
- simple individual planning system. Guidelines are given for the setting of long term goals, and record sheets are provided with suggestions for specific activities;
- educational therapy plans covering a total of nineteen individual topics. It provides general introductory information and group warm up exercises as well as detailed guidance on each topic. In Part II of the programme, 'simulated' social contexts are used for the practice of functional social skills, i.e. asking for directions, introducing self, asserting rights as communicator;

- client's record booklet. An eight page booklet is provided for recording assessment details and charting progress.

S.U.L.P. provides a clearly defined programme of intervention detailing its candidacy criteria and main purpose. Therapy objectives are based on the client's initial responses to the early stages of the programme and the application of a questionnaire which involves the use of a rating scale. However, evaluation of its effectiveness is largely dependent on the client's own record booklet and repeating the assessment by questionnaire and rating charts. Thus it relies on fairly informal methods which lack some objectivity. No specific facilitation strategies are given for the repair of communication breakdown or for the coaching of individuals.

Five different approaches to intervention have been reviewed here. Apart from one (S.U.L.P.), operational definitions tend to lack the clarity and specificity required for their standard application. Some would more accurately be referred to as component techniques which form only part of a more holistic approach. There exists a singular lack of structure and objectivity amongst procedures regarding clinical decisions which relate to the actual therapy process.

It would seem that the responsibility for systemising the approach lies principally with the clinician, and is based on the professional domains outlined by van der Gaag and Davies (1994). Systemisation of early clinical decisions for the planning of therapy as highlighted by Gerard and Carson (1990), is surely essential if interventions are to be replicated, their efficacy proved, and their uniformity preserved for the benefit of more clients.

2.2.5 Methodology for Planning Intervention

It has already been seen that few intervention programmes offer a set format for decision-making at the point of client entry to therapy. It would appear that current practice relies more on a variously described knowledge base and professional skill mix than it does on a precisely developed methodology. Naturally, there must be an element of flexibility in any intervention which attends to the interaction process of the human organism, but perhaps, the favoured route would be one where knowledge and skills are exercised within a carefully constructed framework of clinical decisions. Therefore, the

uniformity of clinical decisions across clients is preserved and a basis for review of programme planning is established.

Encouraging a Natural and Better Life Experience (E.N.A.B.L.E.) (Hurst Brown and Keens, 1990) provides a structure for summarising client assessment information and a procedure for defining goals for implementation. The communication environment is stressed in its introductory stage. It is dependent on the prior completion of a battery of assessments to be selected and carried out by the clinician. Its primary focus would appear to be on the process by which likely goal areas are identified. However, rating scales for this procedure have not been validated and seem to be almost entirely based on the opinion of the therapist. Thus it is considered to provide a general structure for *writing* goals rather than to be an intervention strategy founded on theory and scientific research.

In summary, therapy planning tends to be based on the client's presenting features and the clinician's assessment findings. The therapist uses her professional knowledge base and skill mix to evaluate the deficits and strengths within the client's interactional repertoire and from there the intervention is planned. Gerard and Carson (1990) referred to this process as a '*complex system*' which requires '*...better assessments.....; a systemic and systematic assessment battery.....*' which '*...can be related to each other and to the intervention process.*' (p.74). Furthermore, they outlined a complex system of decisions that feeds into the purpose of the intervention and for the design of a programme.

The current study is focused on the development of a framework that outlines the important decisions for a client's initial entry into the intervention. The systemisation of ongoing clinical decisions relating to programme adjustments is also emphasised.

2.2.6 Measuring Outcomes

The measurement of outcomes after an episode of intervention has frequently been done by reassessment of the client's communication skills using a standardised instrument, i.e. a language assessment. Interest in outcomes measurement has soared in the last decade. It is no longer accepted that therapeutic contact is of itself beneficial. This may also be a

response to the new contracting arrangements of the Health Service where attention has been given to quality assurance and treatment efficiency.

Services for adults with learning disabilities are no less affected by this area of work. Although lacking the necessary standardised tools, their concern for intervention efficacy and the measurement of client outcomes is equally important. Olswang (1990) has defined treatment efficacy as comprising three separate strands: the effectiveness of the treatment; its efficiency in relation to other interventions; and its positive influences on client behaviour. Van der Gaag (1993) has stressed the importance of this kind of evaluative work if Speech and Language Therapists are to avoid '*...professional suicide.*' (p. 206), and to maintain service stability.

If, as it seems, that evaluation work on treatment efficacy is highly relevant to current trends in service contracting and resourcing, greater clarity in intervention methods is necessarily implicated. Intervention methods require a high level of specification such that effects on client behaviour may be fully understood and comparisons between procedures may take place.

2.2.7 Summary of Intervention Issues

This first part of the literature review has primarily been concerned with the broader issues of Speech and Language Therapy intervention with learning disabled adults. Attention has been paid to the concept of intervention with a more detailed look at some procedures currently in use in this area of work. It appears that current practice is largely dependent on the professional domains of professional knowledge, skill mix and published techniques (van der Gaag and Davies, 1994). This means that variations in clinical practice, both across the client group and the profession most probably exist. It will also affect the potential usefulness of research findings if the treatment methodology is imprecise in its operational definition.

A number of conclusions were drawn from an overview of strategies which focus on the communication environment, i.e. Intecom (Jones, 1990). The advantages of an approach which targets significant others were highlighted, but, it seems, at the disadvantage of meeting the impairment based needs of the individual, i.e. the assessment and intervention process is viewed as an indirect method *from* the environment *to* the client,

instead of centring clinical decisions initially *on* the client. This may have a direct impact on the selection of appropriate facilitation strategies based on individual need rather than general, environmental need. Objective measurement of outcomes in relation to intervention with the communication environment has not been dealt with satisfactorily by the programmes mentioned, i.e. Intecom (Jones, 1990). Indeed, if the main premise of such an approach is to modify the communication environment, measures of the interaction between client and significant other must necessarily be carried out, i.e. analysis of discourse patterns looking at the antecedents and consequences of client communication behaviours.

The level of specification in programmes of intervention has been examined. Three techniques that have been reported to be in use with learning disabled people were reviewed, i.e. (i) Gentle Teaching; (ii) Intensive Interaction; and (iii) Objects of Reference. Two commercially available, language programmes were also reviewed, i.e. (iv) D.L.S.; (v) S.U.L.P. The first three techniques are frequently employed as part of a more holistic approach and it is the therapist who is largely responsible for their integration in a systematically planned programme. This bears out the findings of van der Gaag and Davies (1994), who referred to Speech and Language Therapy as a '*polymath profession*' (p. 216) where intervention plans tend to be based on the domains of knowledge, skill mix and therapy techniques. The second two programmes, whilst providing a clear, structured approach, lack independent outcome measures and the suitable strategies required for therapy decisions in relation to programme adjustment for the individual.

The methodology for therapy planning requires a formal structure in order to preserve uniformity and consistency in intervention practice. Gerard and Carson (1990) recommended the systemisation of clinical decisions from the point of referral acceptance to reassessment. This is surely essential if the quality of interventions is to be assured and their successes replicated. They also stressed the need for further work on programme design which is based on '*...a system of decisions.*' (p. 75).

Issues concerning treatment efficacy and measurement of client outcomes are regarded as topical in the current climate of service contracting and provision, therefore the specification of intervention methods to a high degree is necessarily implicated. The

importance of this evaluative work is considered directly relevant to the contractual stability of the Speech and Language Therapy service.

Finally, and with the learning disabled population in focus, there exists a need for operational clarity and theoretical foundation to intervention methodology, which provides a coherent framework for clinical decisions by the therapist. This would not be to the exclusion of the relevant domains of professional skill, knowledge and technique, but would systemise their integrated use in a more uniform way. Thus outcomes could be explained, efficacy evaluated and the benefits of an intervention could be more broadly applied.

2.3 The Role of Sensory Reinforcement

Having explored some of the popular interventions currently in use with adults with learning disabilities, the literature review now focuses on those approaches which have used sensory stimulation as a key factor. These are of particular relevance to the current study.

Initially, the separate roles of contingent and non-contingent sensory stimulation are explored, as documented in the literature. Contingent stimulation is defined as an effect that is dependent on the operational activity of the individual thereby providing consequences said to be reinforcing. Non-contingent stimulation occurs independently of the actions of people.

2.3.1 Contingent and Non-Contingent Stimulation

The importance of non-contingent stimulation has long been pointed out by developmental psychologists (Bowlby, 1953), whilst highlighting that a lack of environmental stimulation may lead to a depression in skills acquisition. This does not mean that non-contingent (unconditional) stimulation is sufficient in itself to produce skill development in children with a learning disability (Clarke and Clarke, 1974). Indeed, contingent reinforcement in behaviourally based programmes has been used increasingly in this field for the purpose of establishing new response modes.

In relation to these two processes of sensory stimulation, this part of the literature review explores a number of contexts where they are employed. Firstly, the concept of sensory-

based, leisure environments that incorporate both contingent and non-contingent forms of stimulation is reviewed. Secondly, the role of sensory stimulation in more objectively designed therapy programmes is considered, taking into account the phenomenon of sensory reactivity.

2.3.2 Sensory Leisure Environments

Sensory stimulation has been viewed as an important component of a leisure environment for children and adults with severe learning disabilities, where the emphasis is placed on the provision of pleasure and relaxation. One such sensory environment has originated from Holland (Hulsegge and Verheul, 1987), and is termed '*Snoezelen*'. The word '*snoezelen*' is a contraction of two separate words: *sniffing* and *dozing*. This is said to identify the two important aspects of '*snoezelen*', the activation or exploration of the environment, and the passive or restful surroundings. '*Snoezelen*' has been defined as:

'....a selective offer of primary stimuli in an attractive setting.'

'....a primary activation of severely mentally handicapped people, especially aimed at sensory perception and experience, by means of light, sound, touch, smell and taste.'

(Hulsegge and Verheul, 1987, p.31).

Hulsegge and Verheul (1987) stress the importance of personal experience facilitation for those people who are '*different*', through the provision of fixed environments comprising a variety of sensations and activities. Sensory stimulation is a mixture of non contingent and contingent reinforcement. So far there have been few objective evaluations of '*snoezelen*' to assess its impact on users, other than the anecdotal evidence provided by some staff. The Dutch '*snoezelen*' workers have declined to formally evaluate its effects arguing that its purpose is one of leisure, and an objective assessment of user outcomes would shift the environment into a therapeutic and skills development dimension. Hulsegge and Verheul (1987) mention that '*snoezelen*' may give rise to therapeutic opportunities but that is not its primary purpose.

An initial investigation into the effects of '*Snoezelen*' on the concentration and responsiveness of eight people with profound learning disabilities was conducted by Ashby, Lindsay, Pitcaithly, Broxholme and Geelen (1995). Assessments took place immediately after the cessation of each therapy session. Two participants showed significant improvement in their concentration levels with smaller gains in four others.

Due to the limited sample size and the multiple variables present in the therapeutic condition, i.e. '*Snoezelen*' is an environment containing multiple forms of sensory stimulation, the results were inconclusive.

Others have been concerned with the nature of user experiences in this environment, focusing more specifically on the client-carer relationship; positive expressions of pleasure and relaxation time spent in '*snoezelen*'. Haggar and Hutchinson (1991) reviewed the use of a '*Snoezelen*' suite in a long stay hospital for the learning disabled, and concluded that it provided a valuable leisure resource for the residents, influencing an increase in the amount of time spent off the wards. However, its success is probably dependent on it being the sole opportunity for recreational pursuit within the hospital context, i.e. alternative openings were severely restricted.

The multi-sensory approach has had significant influence over curriculum planning and educational equipment over recent years. Longhorn (1988) developed a multi-sensory curriculum for children with profound and multiple learning difficulties. Her reasoning for such an approach was the '*awakening*' of the senses to facilitate a greater understanding of the world. Her work is a collection of practical ideas which has, more recently, been expanded to integrate with some National Curriculum subjects in selected special schools (Cavet and Mount, 1995).

There are a variety of commercial companies that manufacture and market equipment that is associated with the multi-sensory environment or associated approaches. A collection of devices and objects are on offer which provide stimulating or relaxing sensory experiences. Most of the equipment has been designed specifically for use by people with profound and multiple disabilities (Cavet and Mount, 1995), although some of the items that produce visual effects have originated from discotheques, i.e. strobe lights, etc.

To date, there has been little evidence in support of the idea that the provision of a multi-sensory approach optimises the learning process in severely learning disabled children or adults. Cavet and Mount (1995) stress the need for some rigorous research to evaluate the effects of multi-sensory environments. They identify a number of questions in relation to the introduction of such environments, some amongst which, demand the

specific address of the following issues: (i) justification for the choice of equipment; (ii) establishment of compatibility with the philosophy of social role valorisation in adult settings; (iii) rationalisation of specific need for this approach, i.e. could normal, every day activities provide the client with the same opportunities for responding; (iv) recording method of individual responses and progress; (v) measurement of effectiveness over time; and (vi) training of significant others for the support of focal people.

This study is not concerned specifically with multi-sensory approaches or sensory-based leisure environments, but nevertheless, these six issues mentioned above, translate into relevant goals for the development and evaluation of an intervention for severely, learning disabled adults. For the rationalisation of an intervention that employs sensory stimulation as a key artefact of the therapy process, the concept of sensory reinforcement first needs to be explored.

2.3.3 Background to Sensory Reinforcement

The role of sensory reinforcement in the changing of old behaviours and the learning of new ones, has long been of interest. Kish (1966) initially drew attention to the potential usefulness of sensory reinforcement and its effect on the behaviour of animals. In conclusion of his investigations, Kish recommended that *"various forms of stimulation may function as reinforcers even though unrelated to the usual organic drive conditions"* (p.150).

A more extensive investigation was conducted by Olds and Milner (1954) who looked at the behaviour of rats when electrical stimulation was applied to some areas of the brain, later referred to as "pleasure areas" (Campbell, 1973). It was hypothesised that these brain domains might also be made electrically active by nerve impulses originating from stimulation of peripheral receptors.

Obviously, for practical and ethical reasons, direct stimulation of the human brain presents difficulties. In the 1960s research into non-invasive procedures incorporating contingent reinforcement was carried out. Murphy (1982) reports on the positive effects of contingent sensory stimuli on the responses of young non-handicapped children.

Other studies have concentrated on drawing comparisons between sensory stimulation and other types of reinforcement, such as edibles (Jones, 1979; Goodall et al, 1982), and social reinforcers (Johnson, Frith and Davey, 1978). It was concluded that sensory reinforcement with some individuals can be at least as effective as food (Jones, 1979; Goodall et al, 1982); and more effective than social rewards (Johnson, Frith and Davey, 1978; Goodall et al, 1982).

2.3.4 Vibratory Reinforcement

Vibration is a form of stimulation that has frequently been used in behavioural management programmes based on the differential reinforcement of an incompatible behaviour (D.R.I.); the differential reinforcement of the other behaviour (D.R.O.); or the differential reinforcement of an alternative behaviour (D.R.A.) (Jones, Walsh and Sturmey, 1995). These schedules have been used specifically to affect a reduction in levels of stereotypies, aggression and other aberrant behaviours (Repp, Barton and Brulle, 1983; Walsh, 1986; Jones, Baker and Murphy, 1988).

Studies supporting the use of vibration have been reported in the literature. One of the earliest reports on its application to humans was by Shaefer (1960) who observed that a seven month old child tended to prolong contact with an electric hair cutter by head movements at the end of each hair cutting stroke. Further observations of the child's engagement were recorded upon the presentation of an electric toothbrush. The child held the brush at different times in his lap, against his knee, in his mouth, and most frequently but for shorter durations, against his head. As many as 150 responses were recorded during one 30 minute session. Shaefer later used the toothbrush to reinforce aspirin taking behaviour.

Contingent vibration has been used to reinforce purposeful behaviour whilst affecting a change in the identified incompatible behaviour (Meyerson, Kerr and Michael, 1967; Bailey and Meyerson, 1969; 1970). Exploratory work on its effects on skill set acquisition of children with multiple handicaps has been conducted. Byrne (1979) provided structured and consistent vibro-tactile input to the environment of a 12 year old girl who had been diagnosed as deaf-blind. By means of a range of vibro-tactile devices the participant was provided with feedback about her actions on the environment and

therefore, reportedly learned to stand, walk, dance, swim, feed herself, and help with bathing and dressing - all within a six week period.

A review of the literature has specifically revealed skill acquisition in the following areas, when vibratory reinforcement has been contingent in the learning schedule:

- taking medication (Shaefer, 1960);
- switch operation (Meyerson, Kerr and Michael, 1967; Rehagen and Thalen, 1972; Kupperschmidt, 1982);
- performance on discrimination tasks (Johnson, Frith and Davey, 1978);
- interaction with others (Byrne, 1979; Jones, 1980);
- exploring and manipulating objects (Jones, 1980; Murphy, Carr and Callias, 1986)
- a reduction in undesirable behaviours including stereotypies and self-injury (Bailey and Meyerson, 1969; Nunes, Murphy and Ruprecht, 1977; Jones, Baker and Murphy, 1988).

The inclusion of vibro-tactile stimulation in the repertoire of therapies and reinforcements for use with learning disabled people is recommended (Prosser, 1988). It has been reported to have a clear advantage over edibles in its contingent nature (i.e. access to food is non-contingent and there may be ethical concerns over its inclusion in a stimulus-reinforcement programme). Satiation level may also be reached quite quickly. Kiernan (1974) proposed that the most effective reinforcement is a sensory event which may be applied immediately, maintaining the response contingent model.

Having recognised the importance of contingent reinforcement needs in the therapy procedure as a prime facilitator of response change in clients, the concept of stimuli reactivity is now dealt with in relation to justification of equipment choice.

2.3.5 Effects of Object Reactivity

The differential effects of certain types of play materials on the play and social responses of non-handicapped children have been observed (Hendrickson, Trembley, Strain and Shores, 1981; Quilitch and Risley, 1973). Additionally, some evidence has been submitted to suggest that toys with reactive qualities can substantially influence children's toy manipulation (Corter and Jamieson, 1977).

Reactive toys are said to be highly responsive to a child's manipulation. Hooper and Wambold (1978), described them as those items which, when acted upon, temporarily sustained motion and/or produced auditory, visual or tactile feedback. Non-reactive toys, on the other hand, were said to possess limited potential to provide sensory feedback as a consequence of manipulation during the normal course of play.

Thomas, Phemister and Richardson (1981) found that both non-handicapped and severely learning disabled children interacted more with a "novel" object that produced both a visual and tonal effect when manipulated than with three other non-reactive toys typically found in a nursery class. Bambara, Spiegel-McGill, Shores and Fox (1984) compared the effects of three commercial reactive toys and three non-reactive toys on the estimated amount of time three children with severe learning disabilities engaged in manipulative activity and visual attention with the toys. The non-reactive toys were identical to the reactive ones, but were modified to eliminate or restrict their sensory feedback features of sound and sustained motion. They concluded that in comparison to the non-reactive toys, the reactive toys had a substantially greater influence on the amount of time each of the three participants engaged in manipulative activity.

In 1986, Murphy, Carr and Callias examined the quantity and quality of toy contact in twenty children with a profound learning disability. They used specifically adapted toys which made extra stimuli available as a reinforcer to manipulations in one of the two experimental conditions, and none in the other. They concluded that the children were more actively engaged with the adapted toys than the control toys, and also exhibited fewer stereotypies whilst playing with the special toys.

Realon, Favell and Dayvault (1988) evaluated the use of adapted leisure materials on the engagement of people with a profound learning disability. Two conditions were compared: the use of electronic adaptations; the use of verbal prompts and social reinforcement. Their findings supported the use of adapting electrically operated leisure materials, as a means of increasing independent leisure activity engagement in profoundly learning disabled people.

The concept of reactivity potential as an influential factor in participant engagements is important to an intervention that employs sensation as a conducting agent between the

person's self and people/objects in the environment, e.g. what is the effect of reactive objects and person contact on the engagement levels of severely learning disabled people compared to that of non-reactive stimuli? This question is only partly addressed in the present study. The concept of stimulus reactivity serves to influence equipment and activity selection for the main intervention (I.S.E.) and the effects of the sensory based intervention are compared with those of a placebo condition.

The studies reported here provide empirical support for the use of reactive objects for stimulating activity. A number of recommendations may be made based on these research findings. Firstly, items which provide sensory feedback that is contingent on participant activity/manipulations are preferred over non-contingent reactivity, or those which sustain activation after only one motor response. The latter are thought not to stimulate active participant responding. Secondly, individual differences in preferences for sensory feedback should be taken into account in a therapy schedule, as supported by Gutierrez-Griep (1984); Rincover, Newson, Lovaas and Koegel (1977). Finally, consideration should be given to selecting reactive objects/items which are commensurate with the skill set level of the client.

2.3.6 Implications for Intervention

The uses of both contingent and non-contingent sensory stimulation have been explored here, both in the contexts of multi-sensory environments and more objectively designed approaches, such as behaviour modification programmes. The concept of sensory reactivity as a facilitator of client attention and engagement levels has also been examined.

The development of a suitable intervention, where the underlying aim is to increase the purposeful responding behaviour of its participants, must necessarily pay attention not only to the reinforcing qualities of the material used, but also to the process by which targeted behaviours may be rewarded. Briefly, the intervention aims to encourage participant responses by the provision of motivating consequences, in order that purposeful behaviours are increased. It therefore follows, that the resulting theoretical framework must include: the principles of contingent sensory reinforcement as demonstrated in behaviour modification programmes; and the use of sensory based activities that are reactive to participant behaviour and provide reinforcing feedback.

For the next stage in the development of a clinical rationale for I.S.E. intervention, this review proceeds to critically examine a theory based intervention that employs sensory stimulation as a key artefact in the therapy process. The writings on Sensory Integration Theory are reviewed before an evaluation of its reported applications.

2.4 Sensory Integration Theory

Sensory Integration Theory is a relatively recent formulation that originates from the neurosciences: writings on the evolution of the nervous system; knowledge derived from basic neuroscience research; and outcomes from human brain damage studies (Dunn, 1988). It is principally the work of Jean Ayres in the early 1960s that is responsible for the development of Sensory Integration Theory and Therapy. Her reported clinical observations and findings have led to the development of a treatment rationale that has been used with many different client populations.

Ayres developed her theory in an effort to explain the potential relationships which exist between behaviour and the process by which sensory data is integrated for use (Fisher, Murray and Bundy, 1991). Ayres was latterly concerned with assessment and the standardisation of her battery of tests: the *Sensory Integration and Praxis Test* (S.I.P.T., 1989) in order to better define the difficulties in motor planning and function observed in children with learning or behavioural problems. Numerous clinical studies have been undertaken in the last decade by Occupational Therapists and some Speech Pathologists in the U.S.A., in an attempt to further support and strengthen the theoretical basis originally proposed by Ayres and her associates, and in doing so, to emphasise the usefulness of a therapeutic intervention programme to certain populations, with its foundation firmly embedded in Sensory Integration Theory.

2.4.1 Definition

Sensory Integration has been referred to by scientists as a neurological process by which sensory data of all kinds are organised into meaningful information. In order to delineate how this 'process' actually operates in human beings, the intimate relationship between the central nervous system activity (C.N.S.) and behaviour has been investigated both in basic, and applied research projects. Other researchers have focused on a third dimension in addition to the two mentioned above: the relationships among sensation, brain development and adaptive behaviour. Many of the specific relationships that have

been clearly identified in these investigations are the principles upon which Sensory Integration is based.

Basic neuroscientific research helped to identify and to establish the major sensory systems (Henson, 1961; Noback and Demarest, 1981; Heimer, 1983; Kandel and Schwartz, 1985). The interpretations of these researchers have particular significance for Sensory Integration Theory, which requires an implicit understanding of the processes by which these sensory systems receive, encode, transmit and interpret sensations from the environment, for the initiation of individual action and its subsequent feedback. Stimuli that are not easily recognisable to these systems are likely to be disregarded by sensory receptors and therefore, may be said to be less desirable stimuli. The filtering process by which some sensations are received and others are ignored is important to the higher organisation of sensory integration. Ayres referred to "*... the process of accepting some and rejecting other information ...*" as being fundamental to integration. She reiterated that "*The mere summation of stimuli, of course, does not make for integration ...*" (1972, p.29).

In order to establish a reliable knowledge base of self and environment, the ability to receive and process information is importantly acknowledged, as Dunn (1988) wrote: "*Sensation provides data out of which accurate and reliable maps of self and environment are constructed.*" (p. 421).

Coren, Porac and Ward (1984) provide us with a slightly more romantic description of the process of environmental data assimilation and interpretation: "*The minds of all living, thinking organisms are prisoners that must rely on information smuggled into them by your senses. Your world is what your senses tell you it is. The limitations of your senses sets the boundaries of your conscious experience.*" (p. 2).

Throughout her writings on this subject Ayres has continually emphasised the importance of the relationships among C.N.S. functions, sensations and adaptive behaviour:

(1) the role of central organisation of sensory data in inspiring overt behaviours -

"...organising sensory input as a basis for an adaptive motor response."

(Ayres, 1972, p.22).

(2) the reciprocal relationship/interactions between, information coming in to the nervous system from the environment and the use of this information for action going out to the environment:

"Information from the environment is organised and interpreted for the planning and execution of interaction with the environment". (Ayres, 1972, p.26).

(3) the influence of this reciprocal relationship on the development of C.N.S. mechanisms:

"Central to the concept of brain development and function is the action of the environment upon the organisms and the reaction of that organism to the environment."
(Ayres, 1972, p.22)

One definition of Sensory Integration proposed by Montgomery and Richter (1977), refers to this process as 'Sensori-Motor Integration' which seems to be synonymous with sensory integration, but assigns dual roles to the process of integration: not only a sensory one, but also a motor one. Their account of the process by which sensory information is organised and thereby planned action is executed, summarises what is essentially a very complicated chain of events. Because at first reading, Montgomery and Richter's definition (1977) can be confusing, this has been broken down by a simplified commentary in the adjacent parentheses.

"Sensori-motor integration refers to the neurological sequence of sensory input, ... (the way we receive sensations from the environment via various types of receptors - the organism's interface with the environment);

"... followed by the sensory integration and the sorting out process which occurs at various levels of the nervous system, ... (basically, there are two dimensions by which sensory impulses are transmitted: horizontal and vertical, and each dimension comprises many levels where integration may take place. In the horizontal dimension, integration of information arising from both sides of the body takes place: spinal cord, brain stem, between the two sides of the thalamus, and the two cerebral hemispheres. In the vertical dimension, integration takes place of ascending information from a lower level to a higher level, and in the reverse for descending information: spinal cord, brain stem, diencephalon, basal ganglia, and the cortex.);

"... a motor response, ... (the overt response to sensory information);

"... and subsequent sensory input which provides feedback and is again integrated by the nervous system." (we are provided with information about our own motor actions which provides further information for neurological processing.).

Montgomery and Richter (1978) have attempted to describe the intricate process by which sensory information is relayed for organisation at various levels of the nervous system. They have summarised the complex relationships which appear to exist amongst the C.N.S., incoming sensations, and adaptive behaviour.

More recently, Ayres (1989) expanded on her original definition of sensory integration as: *'the neurological process that organises sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment'*. (p.11)

In conclusion, Sensory Integration is *'a theory of brain-behaviour relationships'* (Fisher et al, 1991, p.4) supporting the notion that the human organism possesses networks of neurones that feedback and feed forward sensory information, and are so constructed that every time we engage in any action, we simultaneously provide ourselves with sensory input arising from the action, i.e. feedback. Sensory information could therefore be viewed as the conduit between the environment and the nervous system (Cool, 1987).

2.4.2 Theoretical Framework

Ayres postulated that three major principles formed the foundations of Sensory Integration Theory. Firstly, that normal individuals receive sensory information arising from the environment and their own actions, process and integrate this sensory data within the nervous system for the use in planning and organisation of behaviour. Secondly, that deficits in the integration of sensory input may result in impaired patterns of development. Thirdly, that by a structured intervention programme of sensory stimulation in the context of a meaningful activity, where there is the opportunity for the planning and production of adaptive behaviour, sensory integration will be enhanced and therefore positively influence learning.

Ayres went on to highlight six main areas, thought to constitute the general process of neurological development. To these six areas she assigned significant roles which she believed were germane to the treatment of learning disorders.

Briefly, these have been defined as:

1. **The Role of Functional Inter-dependence:** the brain functions as a whole and no single area is able to execute its given function without communication with other areas of the brain. Sensory Integration Theory does not ignore localisation theory and acknowledges that each primary sensory area of the cerebral cortex is surrounded by an integrating area which overlaps with the integrating areas of other sensory modalities. This overlapping topography presumably facilitates the co-ordination and totality of brain function (Luria, 1966).
2. **The Role of Brain Mechanisms:** this is a frequently used construct in the framework of Sensory Integration Theory. Ayres (1972) defined it as "*... a transformation process whereby information, often of a sensory nature, is utilised to determine an act, usually of a motor nature*". (p.14). The brain mechanisms execute their roles by various means and methods in sequence, thus receiving sensory data for organisation and interpretation, and transmitting data to other mechanisms. It is a concept used to explain the functions and various relationships of the C.N.S. which would be difficult to describe structurally. Ayres goes on to suggest that the child with a diagnosed learning disorder demonstrates evidence of some kind of malfunction in the brain's self-organising mechanisms. She felt that an intervention programme should aim at the normalising of the defective mechanisms.

Closely related is the assumption that the nervous system is organised in a hierarchy, and the higher level functions of the cortex are dependent on those at the lower levels of the brain stem (Ayres, 1972; 1979; 1989), although this notion has been criticised by a number of researchers (Ottenbacher and Short, 1985; Short-de Graff, 1988), who have favoured a more holistic approach in the explanation of brain function. The idea of hierarchical structuring has been thought to ignore the importance of interdependent functioning. In response of these criticisms, Fisher and Murray (1991) proposed a '*systems view of the nervous system*' (p. 17) which would take into consideration the concept of an interactive, holistic hierarchy which they term

'simultaneous causation' (p. 17). They employed this notion to serve as an acknowledgement of the interactive nature of brain mechanisms, thereby recognising that *'both cortical and subcortical structures contribute to sensory integration.'* (p. 17).

This has led to the view that both the person and the C.N.S. are open systems comprised of interrelated structures. Functions are organised into a much broader whole. It is within this concept of *'open systems'* that the significance of the person's adaptive responding and the environment may be included, and acknowledged as open systems in their own right. However, the more recent writings on Sensory Integration Theory (Fisher, Murray and Bundy; 1991), whilst developing this idea, do not really examine the role of the environment in its assessment methods or its intervention practice.

3. **The Role of Plasticity of Neural Function:** this refers to the inherent quality of relevant structures and their associated functions to be influenced by existing activity without loss of utility. As we mature, we are able to assimilate and accommodate newer information without compromising our knowledge base. Plasticity can be described as the gradual change of the neural state both in ontogenetic and evolutionary development. According to Ayres (1989), the extent to which development is promoted through interactions between person and environment in the course of intervention, is dependent, in part, on the inherent neural plasticity of the brain.
4. **The Role of the Neural Synapse:** a synapse refers to the structural and functional basis of neural interconnections. It can be useful to view the neural synapse as a junction box between neurones, the neurone being the basic functioning unit of the nervous system. The importance of the excitatory and inhibitory properties of various synapses in relation to adaptive behaviour is considered in Ayres' therapy programme. It considers controlled sensory stimulation in association with the appropriate environmental demands being placed on an individual.
5. **The Role of Sensation:** this refers to the critical role of sensation or sensory stimulation and its interactions with C.N.S. growth and overt behaviour, in the

general development of the individual. Sensation seems to be crucial to the organism's understanding of self, and in relation to the people and objects in the environment, (Dunn, 1988). It is a medium of communication and interaction between the person and his/her surroundings.

Studies of the effects of sensory deprivation largely contribute to the important stance of sensation together with maturation and learning (Riesen, 1961; Melzack, 1962). However, in formulating a rationale that advocates the provision of sensory stimulation as a means of remediation of learning disorders, it is not enough to focus on the effects of sensory deprivation, it is also important to consider what an enriched environment will do to the behaviour and development of the individual. The effects of early stimulation on 'visually directed reaching' (a visual motor response that develops in clearly specified maturational steps), was demonstrated by White (1965).

6. **The Role of Organism-Environment Interaction:** the intricate relationship between sensory integration and the sensory motor response is explored within the framework of the theory. Ayres (1972) referred to "*... the action of the environment on the organism and the reaction of the organism upon the environment.*" (p.22). She felt this formed the essence of the neurological sequence of development. One of the primary functions of the brain, as she saw it, was to translate sensory data into meaningful units of information and to organise the appropriate motor response.

Sensory Integration Theory assumes that adaptation or the emission of goal directed actions is intrinsic to the sensory integration process. It enables the learning and acquisition of new interactive strategies (Ayres 1972; 1979; 1985). Brooks (1986) extended this notion and talked about '*production feedback*' and '*outcome feedback*' as the core components of the feedback loop. Respectively, the first refers to information arising from active movement produced by the body, and the second refers to goal achievement of the planned action, i.e. the consequence.

2.4.3 Summary of Principles

To summarise, much of the content of the theoretical framework, upon which Ayres based her objectives of therapeutic intervention, are found in the functions of the nervous

system and the principles that govern the concept of brain development. The notion of interdependence in reference to brain structures serves to promote the idea that therapeutic stimulation through one sensory modality will necessarily be communicated to other modalities, and that central organisation involves more than just one isolated area of the brain - thus the clinician would expect the effects of stimulation via one sensory channel to have widespread effects throughout the C.N.S. The concept of brain mechanisms captures the picture of multi-directional sensory impulses, whereby data is transmitted from lower mechanisms to higher mechanisms, and vice versa, thus preserving the idea of totality of brain function.

The assumed principle of neural plasticity would seem to be crucial to the whole process of change and development, without which, the newly born infant's C.N.S. status would be unable to register neurologically, additional information gained from the environment. This innate flexibility of the nervous system is essential to the successful relationships among sensation, maturation and behaviour. Importantly, the target population for this study are adults, where differences in the degree of neural plasticity may exist.

However, Sensory Integration Theory states, the more stimulating the environment is, the greater the neural structures involved and the more diverse their interconnections, therefore the richer the output and the more sophisticated the adaptive functions. So through sensory input, the person is stimulated to produce a response.

What is actually meant by the term '*sensory stimulation*' here? It is used to describe the direct application of sensations to the individual. It serves as an essential component of both Sensory Integration Therapy (S.I.T.) (Ayres, 1972, 1979) and Sensori-Motor Therapy (Montgomery and Richter, 1978). Sensations are selectively input to the relevant sensory modalities, i.e. olfactory, touch pressure, vestibular, visual and auditory, etc., which are viewed as key pathways that provide an interface between the person and the environment. The purpose is sensory registration which involves arousal of the organism, orientation to the incoming stimulus, and preparation for action (Koomar and Bundy, 1991). Sensory stimulation is said to have a strong and cumulative effect on the autonomic nervous system and does not necessarily require an immediate adaptive response, (Murray and Anzalone, 1991). It could even be said that the client is initially passive to the process.

It is intended that the development of an intervention for the target population, should focus in more detail on the interaction between the adaptive response of the participant and the provision of the sensory stimulation. Therefore a link will be established with behaviourist theory for the realisation of the intervention practice.

The structural and functional basis for the transmission of sensory information is attributed to the neural synapse, where temporary and permanent changes of a structural/biochemical nature may be registered. Under-use of the synapse may lead to a weakening of its function and therefore to an arrest in development. It was therefore hypothesised by Ayres (1972) that appropriate sensory stimulation should increase synaptic transmissions in terms of quality and quantity, and by this activity, promote development. However, to date there has been no hard evidence of this, only clinical observations that have been used to formulate the hypothesis. The notion of synaptic enrichment or atrophy must therefore be viewed as a postulation which has yet to be examined scientifically.

A more recent conceptual model of Sensory Integration Theory was proposed by Fisher et al (1991) and termed the '*Spiral Process of Self-Actualisation*'. Sub spirals or feedback loops are incorporated into the greater spiral process of development called '*self-actualisation*'. More importantly the model features both environment and behaviour within its definition. Arendt, McLean and Baumeister (1988a) earlier criticised the writings on and applications of sensory integration theory for its critical omission of environmental effect when observing development and skill set acquisition.

The model also redefines the term 'adaptive behaviour' as '*...the output of the human open system...*' and '*...an action of change in relation to the environmental change or stimuli.*' (Fisher et al, 1991, p.20). Its inclusion of the outcome '*occupational behaviour*' as the achievement or goal of adaptive behaviour moves Sensory Integration Theory into a more functional framework. This supports the ideas expressed by Kielhofner (1985) who wrote that adaptive behaviour: "*...is not an automatic or passive response to the environment. Before the system intakes it must have a reason for doing so, thus the built in, or acquired, purposes or goals of the system are critical.*" (p.7).

Finally, Sensory Integration Theorists are keen to point out that they do not offer an explanation of the neuro-motor deficits associated with cerebral palsy (e.g. spasticity), Down's Syndrome (e.g. hypotonicity), or stroke (e.g. decreased tactile perception). It is further stated that a diagnosis of sensory integration dysfunction requires evidence from assessment data using the recommended clinical tools (e.g. S.I.P.T.), demonstrating the presence of deficits in the central processing of vestibular, proprioceptive and tactile sensory inputs.

2.4.4 Candidacy

It is important to recognise that Sensory Integration Theory is focused on child development, although reportedly, it has been applied to some people in whom sensory integration deficits have persisted into adulthood. As a theory it cannot be applied in its entirety to the present study, only as a frame of reference upon which to develop a clinical rationale for intervention suitable to the study population.

There have, however, been many instances in the literature on Sensory Integration Theory that exceed these stated boundaries (Arendt et al, 1988a; Bonder and Fisher, 1989; Densem, Nuthall, Bushnell and Horn, 1989). This is also true of its main assessment tool, S.I.P.T. (Ayres, 1989) where validation data was collected from children with known C.N.S. disorders, i.e. cerebral palsy, learning disabilities, spina bifida and brain injury, to demonstrate its effectiveness as an assessment of sensori motor behaviour. It was also reported that some of Ayre's participants' sensori-motor deficits were assumed to reflect poor sensory integration functioning. It was not made clear that the praxis and tactile perception deficits were more likely attributable to higher level brain damage characteristic of children with cerebral palsy than indicative of sensory integration impairments (Fisher et al, 1991).

2.4.5 Relevance to Intervention

The framework of Sensory Integration Theory has been outlined here. This part of the literature review has aimed to provide the reader with the underlying principles and related hypotheses that were first described by Ayres (1969, 1972, 1979) and later by Fisher et al (1991).

The roles of sensation and the organisms' interactions with the environment have been explored in later publications by Sensory Integration Theorists (Fisher et al, 1991), but little attention has been paid to the effects of environment and external stimuli, together with their relationship to the strategies by which people learn. There exists a need to examine environmental effect and the role of behavioural expression in the learning process. These, together with their inherent feedback spiral have the most immediate relevance to devising a clinical rationale suitable for people with learning disabilities.

2.5 Sensory Integration Therapy

This section reviews the implementation of an intervention based on the framework of Sensory Integration Theory. It critically appraises the reported empirical evidence of its various applications and aims to evaluate its relevance to the development of a clinical rationale for the current study.

2.5.1 Operational Definition

Sensory Integration Therapy or treatment as it has commonly been referred to, is reportedly a complex configuration (Miller and Kinnealey, 1993). Therefore, perhaps not surprisingly, a review of the literature has revealed many interpretations in its use and variations in its applications. Sensory Integration Theorists stress the importance of distinguishing between the characteristics of Sensory Integration Therapy and sensory stimulation in a critical appraisal of its effectiveness, although the literature itself does not appear to conform to the stated boundaries agreed by Ayres and her colleagues. Thus the literature presents a somewhat confusing, and at times, conflicting picture of the applications of Sensory Integration Theory within an intervention programme.

Sensory Integration Therapy lacks a clear operational definition which may account for the various interpretations to be found in research journals. One of the most frequently quoted definitions of Sensory Integration Therapy has been provided by Ayres (1979) in her book 'Sensory Integration and the Child'.

"Treatment (involves) sensory stimulation and adaptive responses to it according to the child's neurologic needs. Therapy usually involves full body movements that provide vestibular, proprioceptive and tactile stimulation. It usually does not involve activities at a desk, speech training, reading lessons, or training in specific perceptual or motor

skills. The goal of therapy is to improve the way the brain processes and organises sensations." (p.184)

Included in this definition are three elements that require expansion:

1. precisely what form the stimulation takes;
2. what procedure is to be followed in order to meet the stated goal of therapy;
3. what evidence is provided to support achievement of the goal of therapy.

Kimball (1988) attempted a summary of its essential characteristics as applied to the target population, children with diagnosed sensory integration deficits:

- active participation of the child in the therapeutic process;
- child is agent of self directed activities;
- treatment is individualised to meet child's needs;
- activities are purposeful or goal oriented;
- treatment requires adaptive responding of the child;
- sensory input varies according to the child's responses to it;
- activities are rich in proprioceptive, vestibular and tactile input;
- there is the implied or stated goal of improving processing and organisation of incoming sensory data;
- therapy is administered by a trained physical or occupational therapist.

Although this itemised description provides a framework for therapy planning, it still lacks specificity regarding the decisions required in designing an intervention programme for an individual, the core components of each characteristic, and the actual procedure to be followed. Ottenbacher (1991) supports the notion that to assure its validity, Sensory Integration Therapy needs to be carefully and specifically operationalised as an independent variable. Because of this lack of clarity in definition, many studies are reportedly difficult to replicate and similarly, to interpret (Miller and Kinnealey, 1993).

Most therapists agree that central to the therapy programme is the provision of planned and controlled sensory input, the subsequent elicitation of an appropriate or related adaptive response, in order to enhance the organisation of brain mechanisms (Chu, 1989), although to date there has been no ethical method of scientifically demonstrating

improvement in C.N.S. organisation. Sensory Integration Therapists generally accept that this change can only be inferred from observation of indirect variables, such as the child's performance (Tickle, 1988), however this assumption of change in the organisation of brain mechanisms is still central to their reasoning. This supposition is not supported by this research project which views environmental effect, the learning process and behavioural outcomes as major components of the clinical rationale.

2.5.2 The Form of Stimulation

The therapeutic techniques advocated by Ayres and her colleagues to enhance the intersensory integration at brainstem level, mainly utilise three major sensory systems: tactile, vestibular and proprioceptive. Her reasons were founded on a basic understanding of the evolutionary process in relation to neuro-development, the hierarchical structures within the C.N.S., knowledge of social behaviour development in relation to the role of sensory stimulation.

The vestibular and tactile systems are now reviewed, based on the writings of the Sensory Integration Theorists and Therapists. The proprioceptive system is not examined in detail, although its role in providing feedback about motor actions of the individual is acknowledged within the sensory feedback loop. It is not viewed as an input channel for sensory stimulation in a therapeutic programme in the same way as the tactile and vestibular systems.

2.5.3 The Vestibular System

1. Introduction:

Ayres (1972) has argued that the vestibular system has often been overlooked because many of its functions take place largely below the level of personal awareness, therefore its activity is often taken for granted unless it is disturbed. The vestibular system provides us with information concerning the effects of gravity and motion. Together with the tactile system, the vestibular system is said to be one of the oldest systems in the evolutionary sense, and is also one of the earliest to develop in the ontogenetic sense. The human organism is constantly receiving vestibular stimulation, indeed it often features in activities intended to be arousing to the individual: an infant is rocked by a parent, a toddler is tossed or swung in play; an older child may engage in curb/wall walking, hopscotch, swings, roundabouts and fairground rides; an adult may go skiing,

motor bike riding, racing human participation in vestibular based activities continues from birth through to adulthood.

2. Functions:

It may be useful to understand the essential functions of the vestibular system in order to appreciate fully the reasons for its vital inclusion in any therapy programme based on the principles of sensory integration. Firstly, it has a role to perform in the maintenance of the vertical equilibrium through influence on postural reflexes and muscle tone. Secondly, it is pertinent to the direction of eye gaze. Thirdly, it affects the co-ordination of eye and head movements (Weeks, 1979 a; b).

3. Relationship to Motor Activity:

The vestibular system has been implicated as the basic mechanism facilitating the emergence of motor activity by mediation of the neurological interconnections between proprioceptive, visual and motor systems (Eviator, Eviator and Naray, 1974). Stimulation results from movement and gravitational changes as detected by the semi-circular canals located in the inner ear. Reportedly, the vestibular system responds to the initiation and cessation of linear and angular movements; and the more dramatic the change, the greater the stimulation to the canals. Linear stimulation is produced by bouncing or rocking motions with angular movement produced by spinning or rotation motions (Parker, 1977).

4. Summary:

In simpler terms, the vestibular system enables the organism to detect motion, especially acceleration, deceleration and the earth's gravitational pull. It also helps the organism to know whether any given sensory input, visual, tactile, or proprioceptive, is associated with movement of the body or is a function of the external environment. Quite simply, it tells the person if he is moving within the room or the room is moving about him! Although the effects of gravity and motion are not entirely separable, they are attributed usually but not entirely, to different anatomical structures: motion to the semicircular canals; and gravity to the saccule and utricle. However, they are generally considered together in treatment and in discussion of the system (Walsh, 1960).

2.5.4 Outcomes of Vestibular Stimulation

Investigations utilising vestibular stimulation have observed improvements in:

- *gross motor, fine motor and reflexive abilities* in normal pre-ambulatory children (Clark, Kreutzberg and Chee, 1977); learning disabled children (Kantner, Clark, Allend and Chase, 1976; Ottenbacher, Short and Watson, 1981; Kuharski, Rues, Cook and Guess, 1985); children with cerebral palsy (Chee, Kreutzberg and Clark, 1978);
- *levels of self-injury* (Bright, Bittick and Fleeman, 1981);
- *frequency and duration of eye contact* (Resman, 1981).
- *stereotypic rocking behaviour in learning disabled adults* (Dave, 1992).

The studies reported in the literature have mainly employed the use of vestibular techniques via Sensory Integration Therapy or an alternative approach such as the Bobath approach. The importance of the vestibular system as a source of sensory stimulation has been considered but few investigations have reported significant findings, (Kantner, Kantner and Clark, 1982). Where the results have been reported as statistically significant, behaviour modification principles may have been employed in the experiment, thereby raising the question of whether this is truly an example of Sensory Integration Therapy (Arendt et al, 1988a). The application of contingent sensory stimulation may serve as a positive reinforcement for desirable behaviour (Murphy, 1982; Sandler and McLain, 1987) and may also explain reductions in stereotypies and self-injury during therapy sessions, if treatments involve the removal of task demands considered aversive to the individual, concurrent with the introduction of an activity with motivating consequences.

These variations that exist in the reported research of Sensory Integration Therapy may be due to a poorly defined operational definition of the intervention. This makes the critical reading of interpreted results extremely difficult.

Vestibular stimulation has been used as the chief component in a number of Sensory Integration treatment regimes with a variety of populations and for different therapeutic objectives:

1. *people with learning disabilities*, to - (a) affect change in stereotypic behaviour patterns (Bonadonna, 1981; Storey, Bates, McGhee and Dycus, 1984; Sandler, and McLain, 1987; Brocklehurst-Woods, 1990; Dave, 1992); (b) reduce levels of self-injurious behaviour (Bright, Bittick and Fleeman, 1981; Wells and Smith, 1983; Dura, Mulick and Hammer, 1988; Reisman, 1993); (c) improve eye contact (Resman, 1981); (d) affect positive changes in language development (Magrun, Ottenbacher, McCue and Keefe, 1981; Kantner, Kantner and Clark, 1982); (e) affect changes in sensori motor development (Huff and Harris, 1987).
2. *autistic children*, to - (a) improve language and other interactive behaviours (Ayres and Tickle, 1980; Ayres and Mailloux, 1981; Reilly, Nelson and Bundy, 1983); (b) reduce stereotypic and self-stimulatory behaviours (Ayres and Mailloux, 1983).
3. *children with hearing impairments*, to improve motor co-ordination, balance and tactile defensiveness (Matzke and Bragers, 1993).
4. *adults during stroke rehabilitation*, to improve functions in self care, mobility, mealtimes preparation and sensori motor integration (Jongbloed, Stacey and Brighton, 1989).
5. *pre-school children severe learning disabilities and multiple handicaps*, to affect changes in sitting behaviours (Kuharski, Rues, Cook and Guess, 1985).
6. *inpatients with dementia*, to improve general functioning (Robichaud, Hebert and Desrosiers, 1994).

Many other studies have been reported in the literature, with the stated treatment procedure of '*sensory integration*', but what this has actually entailed in application is not made clear. It has already been pointed out that Sensory Integration Therapy has frequently been criticised for its lack of a clear operational definition for a standard application. Hence there have been reported difficulties in replication of treatment procedures which are far from specific.

2.5.5 The Tactile System

1. Introduction:

Ayres (1972) stressed the inclusion of tactile based activities in a programme that sought to improve the individual's sensory integration. She referred to it as a primal sensory modality that was representative of man's phyletic heritage. She felt the tactile system

was a major source of information for the individual about his or her environment, and recognised the importance of its role in the 'fight or flight' responses of the organism.

Touch has been described as “...*our first language*.”, and as the human being’s “...*primary system for making contact with the world*” (Royeen and Lane, 1991, p.108). It has been suggested that the tactile system has a pervasive influence on the development of early behaviour patterns (Inamura, Wiss and Parham, 1993).

2. Development of the Tactile Sense:

The tactile sense is said to be highly developed at birth and appears to feature in the majority of interactions that take place between parent and infant. Day (1982) reported a study to compare the amount of stimulation to five sensory systems in an infant, that occurred every day as a result of mother-infant interactions. She reported that there was a significantly higher proportion of time spent in tactile stimulation than in any of the other four modalities.

The importance of the tactile system in the normal development of psycho-social behaviour has often been acknowledged. The skin can be viewed as the literal boundary between 'self' and 'no-self'. Early studies in deprivation have demonstrated the need for tactile contacts in order that the organism should develop normal social behaviours (Harlow, 1958). The effects of tactile stimulation to neonates who had failed to thrive have been observed. After the application of therapy massage, preliminary findings suggested there was an increase in social interactions and feeding (Miller-Hunt, 1993).

3. Tactile Equipment:

Equipment used by Sensory Integration Therapists is of reportedly simple mechanical design: techniques for providing tactile stimulation include rubbing and brushing with different textured objects, such as towels or hair brushes, other larger gymnasium equipment may be used to provide deep pressure sensations, such as placing the client between two mats whilst pressure is exerted by the clinician from above, in what Ayres described as the "hamburger" technique.

2.5.6 Tactile Defensiveness

Perhaps it is appropriate at this stage to mention the phenomenon of 'tactile defensiveness', as this seems to feature highly in the Sensory Integration Therapists' evaluations of the client and any subsequent programme planning. Tactile defensiveness has been described as a sensory integration disorder that results in a collection of behaviours which may include: "... *excessive emotional reactions, hyperactivity or other behavioural problems*" (Ayres, 1979, p.184). Factor analyses of a number of behavioural parameters related to sensory integration dysfunction, in the majority of cases, consistently linked hyperactivity and distractibility, tactile defensiveness and diminished tactile discrimination (Ayres, 1964, 1965, 1966, 1969, 1972).

One theoretical explanation of the phenomenon was proposed by Fisher and Dunn (1983), who said that tactile input is regulated by inhibitory influences from higher levels of the C.N.S. at the level of the spinal cord. In cases of tactile defensiveness, the higher level of modulation is missing, which may result in an over reaction to certain types of touch leading to an aversive form of responding.

It is also considered to be a construct, the existence of which has been observed and documented in autistic children (Ayres and Tickle, 1980); children with learning difficulties (Kinnealey, 1973); developmentally delayed children (Larson, 1982). This construct of tactile defensiveness has been said to manifest itself as aversive reactions to touch, manifested in a typical psychological or motoric behaviour. In 1985, Royeen conducted a survey to ascertain the variety of behaviours that could be said to relate to this domain, by reviewing the literature and canvassing the members of the sensory integration study group in the Greater Washington D.C. area, who were required to list the relevant characteristic behaviours which they considered pertinent to the condition. The survey yielded a list of approximately eighty behaviours which was then revised by Ayres and her colleagues and rated by a panel of experts. Only descriptors that had a mean of six or more were included in the final list thus reinforcing the construct validity of the domain. Examples of the descriptors are:

- e.g. Item (15) Lace on clothing bothers me;
- e.g. Item (29) It bothers me to play in the sandbox;
- e.g. Item (43) I am ticklish.

In 1986, Royeen went on to develop a touch scale for measuring tactile defensiveness in a child which contained forty-nine test items in the form of a questionnaire. The questions really focused on the attitude of the individual to tactile input. Examples of questions contained in the test are:

e.g. Item (1) Does it bother you to go bare footed?

e.g. Item (2) After someone touches you do you feel like rubbing that spot?

It is postulated that an appropriate therapy programme seeks to normalise or restore an equilibrium between excitation and inhibition by considering that certain types of somatosensory input are more arousing to the individual, and therefore more likely to produce an aversive reaction in the person. The form of the tactile stimulation is therefore based on the individuals' own evaluations of it, and their subsequent responses to it. This will obviously influence the clinician's choice of equipment and method of application.

More recently, Sensory Integration Theorists have considered the ideas first introduced by Knickerbocker (1980), of '*sensory defensiveness*' and '*sensory dormancy*', reflecting increased sensitivity to incoming sensory data resulting in disorganised responding or even hyperactivity, and a level of immunity to inputs resulting in passivity or neutral responding respectively. This continuum of responsivity is observed in the intervention planning process used in this study and is further examined in **Chapter 4** where the development of appropriate instrumentation is recounted.

2.5.7 Outcomes of Tactile Stimulation

Tactile stimulation has formed the core therapy technique in a number of sensory based programmes with differing populations, some of which have been referred to as Sensory Integration Therapy, usually with the shared objective of righting the diagnosed sensory integration deficit of tactile defensiveness:

1. Sears (1981) used an *environmental modification programme* with tactile defensive children in a classroom;
2. Royeen and Lane (1991) reported on a single case, applying massage and deep touch pressure to a *tactile defensive infant*. Positive changes were measured on the '*Test of Sensory Functions in Infants*' (DeGangi and Greenspan, 1989).

3. Storey, Bates, McGhee and Dycus (1984) applied *sensory awareness training* based on sensory integration principles in a single case study, to reduce the self stimulatory behaviour of a female with a profound learning disability. The outcome was reportedly positive although the observational measures were unspecified.
4. McKibben (1973) examined the effect of additional tactile stimulation in a *perceptual motor treatment programme* for school children with developmental dyspraxia and poor tactile perception. No significant difference between the experimental group (with additional tactile stimulation) and the control group was found, although significant gains in all groups were measured and maintained.
5. Brocklehurst-Woods (1990) demonstrated significant treatment effects by the application of *tactile stimulation* together with *vestibular stimulation* to reduce the stereotypic behaviours of two learning disabled adults.

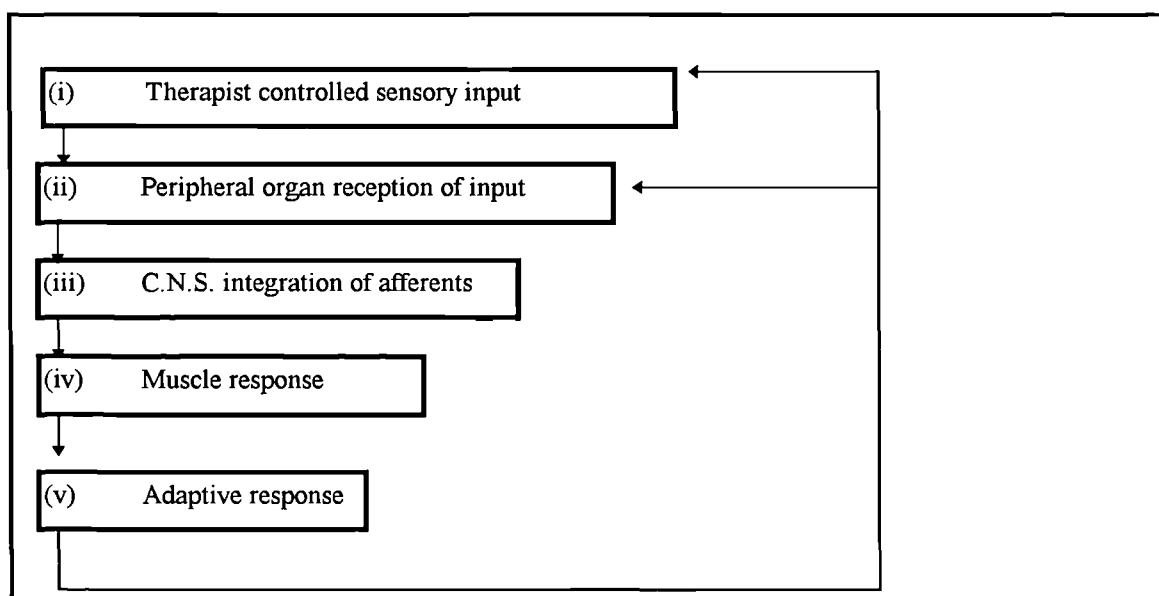
Again, the application of Sensory Integration Therapy in each of these studies has varied although they have been cited as '*sensory integration*' studies (Clark and Pierce, 1988). The first study, used indirect methods in the form of environmental modifications to texture and form, the second used direct methods in a single case study, the third used a combination of methods, i.e. environment and direct methods, but looked specifically at reducing self stimulatory behaviour during treatment sessions in a single case, and the fourth applied 'extra' tactile input to an alternative therapy programme using a direct approach. The last study to be cited employed the direct techniques of Sensory Integration Therapy. These extreme variations in reported studies of Sensory Integration Therapy make it difficult to draw any conclusions regarding the efficacy of the intervention procedures.

The studies referred to above all claim to have used sensory integration treatment procedures, yet clearly demonstrate the diversity amongst the target populations, the objectives of intervention, and the dependent variables measured. The defined populations, in most cases appear to exceed the stated boundaries of Sensory Integration Therapy, e.g. children with diagnosed sensory and motor organisation deficits as assessed by the Sensory Integration and Praxis Test (S.I.P.T.) (Ayres, 1989). Similarly, treatment procedures applied to adults would seem to defy the assumed importance of the principle of neuro-plasticity. Sensory Integration Therapy has been defined as a suitable treatment technique for young children where the plasticity of neurological

functions is recognised, and not for adults where C.N.S. function is an issue, i.e. adults with learning disabilities.

2.5.8 The Model of Sensory Integration Therapy

Two models illustrating the relationship between Sensory Integration Theory and its practical applications have been proposed by Tickle (1988). The first model she labelled the synchronic model, to illustrate what actually happens during intervention; the second, she termed the diachronic model to demonstrate the long term effects of Sensory Integration Theory over successive periods of time.



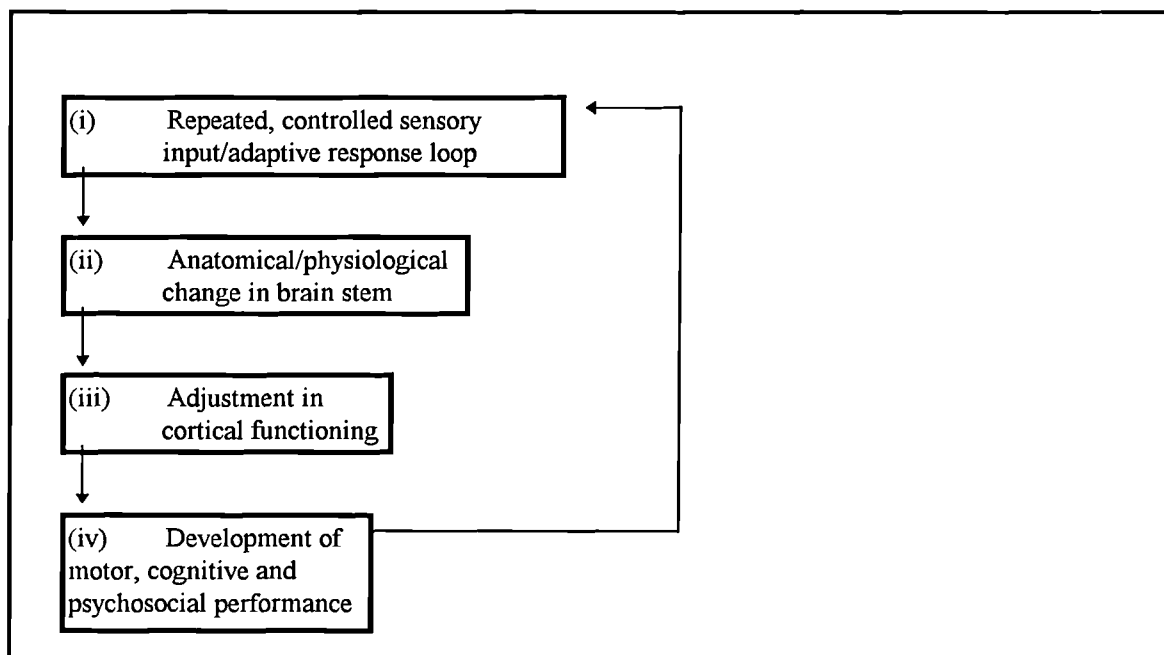
**Figure 2.5.8.1: Synchronic Model of
Sensory Integration Therapy Effectiveness (Tickle, 1988)**

The synchronic model of sensory integration effectiveness was proposed to describe the process by which structured sensory input begets an observable adaptive response, (Reilly, Nelson & Bundy, 1983). However, it does not examine the role of the feedback loop in the course of one therapy session. It is generally expected that the nature of sensory activities to which the therapist exposes the participant should change as a result of his/her responses. This also suggests that direct physiological feedback into the participant's own nervous system would raise the probability of a second response following the first one.

In consideration of the relationship between (i) and (ii): some research suggests that vestibular stimulation occurs only when linear and vertical accelerations are of a particular magnitude and duration, therefore, not all vestibular stimulation would create an appropriate organ response (Kantner, Clark, Allen and Chase, 1976). This model lacks a clear operational definition of the type of sensory stimulation, upon which the relationship between (i) and (ii) must be heavily dependent.

Furthermore the *Therapist controlled sensory input* defined at (i) in the synchronic model would seem to be in direct opposition to Kimball's recommendation (1988), quoted earlier in this section, of *child directed activities*. The role of the therapist in relation to *sensory input* clearly requires careful definition for the internal consistency of the intervention. So the need for clarity in the operational relationship between (i) *Therapist control* and (v) *adaptive response* is clearly essential during the course of any one intervention session and over time.

The synchronic model should be viewed as a simple representation of a much more complex process. It describes limited connections in the integration process and does not attempt to illustrate its representation at various levels of the C.N.S., i.e. at the level of receptor, synapse, brain stem, etc. The current study is focused on a more detailed model to describe the therapy process, one that includes detailed examination of the relationships among adaptive responding, C.N.S. activity and the intervention. More specifically, this research is *directly* focused on **adaptive responding** in relation to **therapeutic input**, and *indirectly* on **C.N.S. activity**. The first two (adaptive responding and therapeutic input) are open to *direct* observation by the researcher, and the latter (C.N.S. activity) is *indirectly related* to the other two, i.e. there is no facility in the current study for the measurement of changing sensory integration levels.



**Figure 2.5.8.2: Diachronic Model of
Sensory Integration Therapy Effectiveness (Tickle, 1988)**

This describes the effects of the repeated occurrence of the controlled sensory input/adaptive response feedback loop over time, for the development of motor, cognitive and psycho-social performance. This is to be found in the multiple measurement periods which occur in a course of therapy.

One criticism frequently levelled at Sensory Integration Therapy is the unfounded assumption highlighted in point (ii) of the diachronic model, together with the lack of clarity of the therapy process defined in the synchronic model.

For obvious ethical reasons, no direct evidence of change in brain mechanisms of human participants has been established. It has also been suggested that the term sensory integration is not an explanation of neurological development but rather serves as a hypothetical construct for descriptive purposes, (Arendt et al, 1988a). In relation to this underlying principle, is the assumption that a lack of stimulation is caused by failure of the participant's C.N.S. to process sensory data effectively, and not by an environmental failure. Thus the emphasis is placed on the internal organisation of sensory data rather than the overt responses of the participant to environmental stimulation.

This highlights an important question: can the internal sensory integration process be viewed separately from the external influences of the environment? The failure of Sensory Integration Theory to explore the role of environment in any detail leaves its concept of existing relationships among the C.N.S., sensory information and client adaptive responding, deficient. The environment is perhaps the most accessible part of this concept to manipulate through the introduction of an intervention, therefore the present study is concerned primarily with environment, for the provision of adaptive responding opportunities. The effect on C.N.S. activity is inferred by the measurement of adaptive responding behaviour by the client.

2.5.9 Implications for Intervention

Sensory Integration Theory has provided a framework from which many different therapeutic interpretations have grown. Variations have been revealed regarding operational definitions of practice, candidacy and outcome measures. Chu (1989) commented on common practice that utilises aspects of both Sensory Integration Therapy and other neuro-developmental approaches such as the Bobath programme.

The relative weaknesses of Sensory Integration Theory and Therapy have been discussed here. Ottenbacher and Short (1985) recommended that the relationship between physiological effect and behavioural adaptation be considered based on their findings from a quantitative analysis of existing data on Sensory Integration Therapy. They also emphasised the need to demonstrate empirically a causal connection between Sensory Integration Therapy and a measurable dependent variable, such as an improvement in an academic area, e.g. legibility of hand writing. This is directly opposed to the unproved assumption of changes in brain mechanisms which facilitate improved central organisation of incoming sensory data.

Arendt et al (1988a) stressed the importance of establishing the distinction between Sensory Integration Therapy techniques, and other therapeutic practices that could be explained by the theory of Sensory Integration. Due to the obvious ethical reasons, it is extremely difficult to establish the validity of the sensory integration construct as applied to human beings. The only alternative as recommended by Arendt and his colleagues, is to test hypotheses about the structure of the sensory integration construct through inferential procedures applied to behavioural evidence. They also point out that the term

'sensory integration' is not an explanation of neurological development, but a hypothetical construct that serves descriptive or heuristic purposes.

This part of the literature review has provided some justification for the inclusion of tactile and vestibular forms of sensory stimulation within a related intervention, and has prompted further investigation of the connection between environment and human adaptation. The current study is concerned with observable, responding behaviour of participants and examination of the effects of a structured sensory approach to intervention, i.e. manipulation of incoming sensory information. The manufacture of an explicit therapy design that incorporates a decision-making protocol for its delivery is acknowledged to be of prime importance, if the pitfalls of inconsistency are to be avoided.

2.6 Implications for a Therapy Model

The review of the literature has covered: (i) intervention practice with the learning disabled population; (ii) the roles of contingent and non-contingent stimuli in leisure environments and behaviour modification programmes; (iii) Sensory Integration Theory; and (iv) Sensory Integration Therapy.

(i) A review of current intervention practice has identified possible variations in clinical practice which relies heavily on a synthesis of own knowledge base, skill mix and learned techniques, rather than interventions that have been clearly defined with proven efficacy. A system of clinical decisions needs to be constructed for the development of an intervention approach. The role of the therapist needs to be defined in relation to client responding for the realisation of actual clinical practice. In short, the resulting intervention should be founded on a theoretical framework, that focuses on the process of change. The following areas are highlighted for address: candidacy, i.e. who is the intervention appropriate for?; client responses; therapist's role; the interaction process; and the selection and presentation of stimuli.

(ii) The roles of contingent and non-contingent sensory stimulation have been explored together with the phenomenon of sensory reactivity. The use of sensory reinforcement in behaviour modification programmes has revealed evidence to support its influence on the reduction of undesirable behaviour and on the increased production

of target responses. This has prompted the need to look at contingent presentation of stimuli within a programme of intervention.

(iii) **Sensory Integration Theory** and (iv) **Sensory Integration Therapy** have been critically reviewed. The importance assigned to the vestibular and tactile systems is acknowledged together with the role of the proprioceptive system within the feedback loop. The restricted attention paid by Sensory Integration Therapists to the role of the environment in relation to adaptive responding and C.N.S. activity has been highlighted for consideration in the current study.

The next part of the literature review defines the clinical rationale of I.S.E. intervention. This represents a synthesis of the concepts and research findings reviewed in the earlier part of this Chapter.

2.7 Theoretical Framework for the 'Individualised Sensory Environment' (I.S.E.)

A five part model is presented. Apart from the *first figure* which provides definitions of the various elements and their relationships in the model, the subsequent four figures have shaded areas which serve to highlight particular issues for consideration within its specified context. The *second figure* defines the relationships amongst environment, organisation of incoming sensory data and purposeful adaptive responding in relation to the normal population; the *third figure* reviews the learning disabled population; the *fourth figure* examines the influences of a profoundly learning disability (the sample population of the study, i.e. learning disabled adults who do not yet exhibit intentional communication behaviours and engage in apparently high levels of non-purposeful engagement) and the probable presence of additional sensory or motor impairments; and the *fifth figure* examines their relationships with the introduction of the intervention.

2.7.1 The Framework of Relationships

The first model provides the framework for the four subsequent models which relate to specific population contexts and the intervention process. Definitions for the named areas within this foundation model are provided together with their relationships to each other.

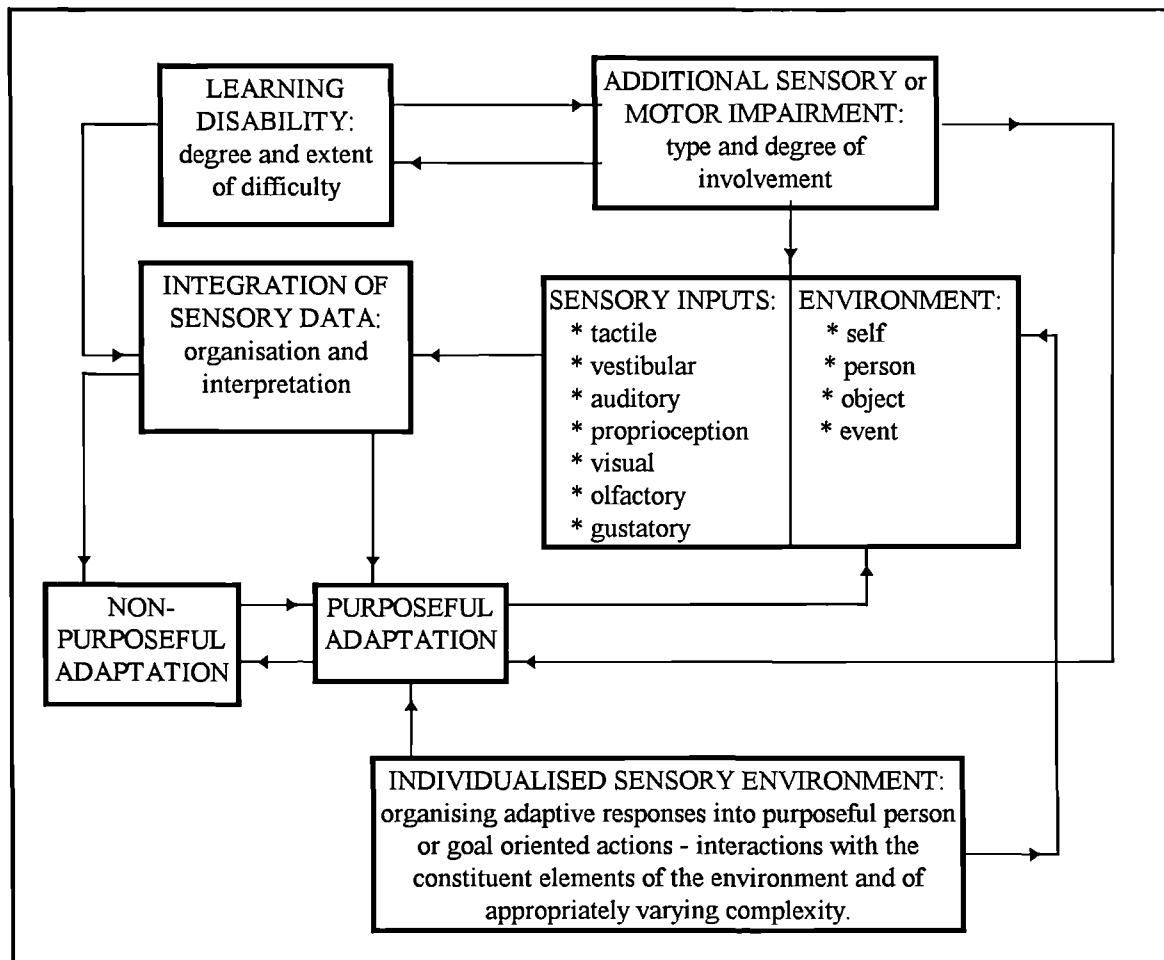


Figure 2.7.1.1: Framework of Relationships in the I.S.E. Model (to define the elements of the model and their relationships for later clarification in subsequent versions of the model.)

1. The Environment:

The environment of the human organism for the purposes of interaction/communication comprises four major constituents: self, person, object, event (where a person and an object come together in one or a series of fluid actions).

The neonate engages in *body-self* activity, trying out various operations and demonstrating the body's capabilities. Piaget (1952), as summarised by Philips (1981),

relates this as the earliest phase of the sensori-motor period. He considered that the infant is constructing an understanding of the world through its perceptions and movement. Contacts with at least one other *person* are attempted through reaching, vocalising, eye contact - the person is engaged in inter-personal relations with peer group and others (Bangs, 1982). Interactions occur in such a way that they mutually influence each other (Chapman, 1981).

Object engagement is attempted as the infant moves from non-specific actions to manipulative schemes as applied to objects and their relations in space (Uzguris and Hunt, 1975; Dunst, 1980). Schemes of looking, reaching, grasping and manipulation lead to consistent dealing with stable objects and to the development of understanding of agent actions on object in relation to its position, and of objects in relation to each other (Hogg and Sebba, 1986). The development of visual pursuit and object permanence is apparent, fixation, tracking and other active engagement with objects (Hogg and Sebba, 1986).

Event knowledge is established as the person is able to combine the constituents of person and object in one or a series of fluid actions. The person emits some movement or sound in which eye contact is alternated between object and person (Bates, 1976; Bruner, 1978). There is the co-ordination of individual actions and their use in producing an effect on the environment (Hogg and Sebba, 1986). With the establishment of event knowledge comes the beginnings of intentional communication.

2. Sensory Inputs:

The human organism receives sensory information arising from engagement with the essential components of the environment, and these environmental signals are picked up by the peripheral organs of reception (Tickle, 1988) and conveyed through the nervous system. There are seven major sensory systems (input channels):

- tactile system receives the sensations of touch and feel;
- auditory system receives speech and non-speech sounds from the environment;
- vestibular system receives the sensations arising from movement and gravity;
- proprioceptive system receives sensory information arising from the muscles and joints, ligaments and receptors associated with the human skeleton;

- visual system receives sensory data arising from seeing;
- olfactory system receives the sensations of smell;
- gustatory system receives the sensations of taste.

Interdependence of the sensory systems exists. One system does not develop or function in isolation and research has shown that one system can be influenced by treating another.

3. Integration of Sensory Data:

This refers quite simply to the interaction and co-ordination amongst two or more neural functions or processes. It is the means by which the brain filters, organises and interprets sensory information, in order that appropriate functions may be executed and that development may take place. It accounts for the ability of the human organism to make sense of his/her world. Ayres (1972) wrote "*The acting organism is an expression of the totality of integrative acts.*" (p. 26). Integration is seen as the ability of the individual to organise sensory data arising from the environment, into meaningful information that may be used to interface the person with his/her surroundings.

The use of the term '*integration*' here, does not assign it the sole explanation of why a person develops neurologically, (Arendt et al, 1988), rather it is used as a hypothetical construct to illustrate the relationships among sensations arising from the constituents of the environment; adaptive or overt responses; and central nervous system activity.

It has already been pointed out that Sensory Integration Theory (Ayres, 1979) assumes that a lack of stimulation is caused by failure of the child's C.N.S. to process the sensory signal properly, and not by an environmental failure. This view is not shared or supported in this model and this emphasises the critical difference between Ayre's work and the present study in which the roles of the environment, C.N.S. activity, and adaptive responding are considered to be collectively influential.

4. Purposeful Adaptation:

The overt responses of the person are the means by which he/she relates to external events (Hogg and Sebba, 1986). In the process of normal development, there exist mutual influences between the child's internal organisation of cognitive schemes and

external adaptation through encounters with the environment. Organisation and adaptation may be viewed as ... "*aspects of a single mechanism*" ... (Philips, 1981, p.12). Piaget's theory expands on the processes which underlie adaptation. He defines the terms '*assimilation*' and '*accommodation*' as the mechanisms which form the foundations of a child's adaptation to external reality. *Assimilation* describes a child's ability to apply established schemes (old information) to all objects. The child does what is usually done regardless of the properties of the object.

Accommodation refers to a change in agent action based on the new properties (information) arising from an object. The child's behaviour is described as accommodation to the object and thus a new scheme evolves. Assimilation and accommodation are said to be reciprocal - they exert mutual influences on each other. One has consequences for the other and accommodation permits assimilation in future situations.

For the development of adaptation a balance needs to exist for the practice of established schemes (assimilation) and the opportunity to meet new environmental demands (accommodation). Piaget terms this "equilibrium" meaning the critical balance between rehearsed adaptation and new responses to novel situations.

5. Non-Purposeful Adaptation:

Two types of non-purposeful behaviour are included here. The first, is sometimes referred to as maladaptive responding or behaviour that is said to be either personally or socially maladaptive (Hogg and Sebba, 1986a), e.g. stereotypic rocking behaviour. A more detailed explanation of maladaptive behaviour is to be found in support of the relevant model (part 4). The second refers to those people who are perceived as engaging in high levels of neutral behaviour, e.g. engaging in routine body actions such as walking and gazing straight ahead (Felce, 1986).

6. The Process:

There is no defined starting point for the process, rather it should be viewed as interconnections amongst the environment and sensations arising from it; organisation and interpretation of sensory data; and adaptation, all of which lead to more complex schemes and responses being added to simpler ones.

The human organism exists in an environment of self; person; object and event. Sensations arising from the environment are input to the C.N.S. for organisation and interpretation. An adaptive response is emitted, usually of a motor nature, which in turn provides further sensory information about the environment which is input for organisation and interpretation. Thus we receive feedback about our own actions on the environment.

2.7.2 The Model of Purposeful Adaptation

The shaded areas represent the constituents of environment, internal organisation of incoming sensory data and adaptation. Their relationships are stressed in this model which views the normal population.

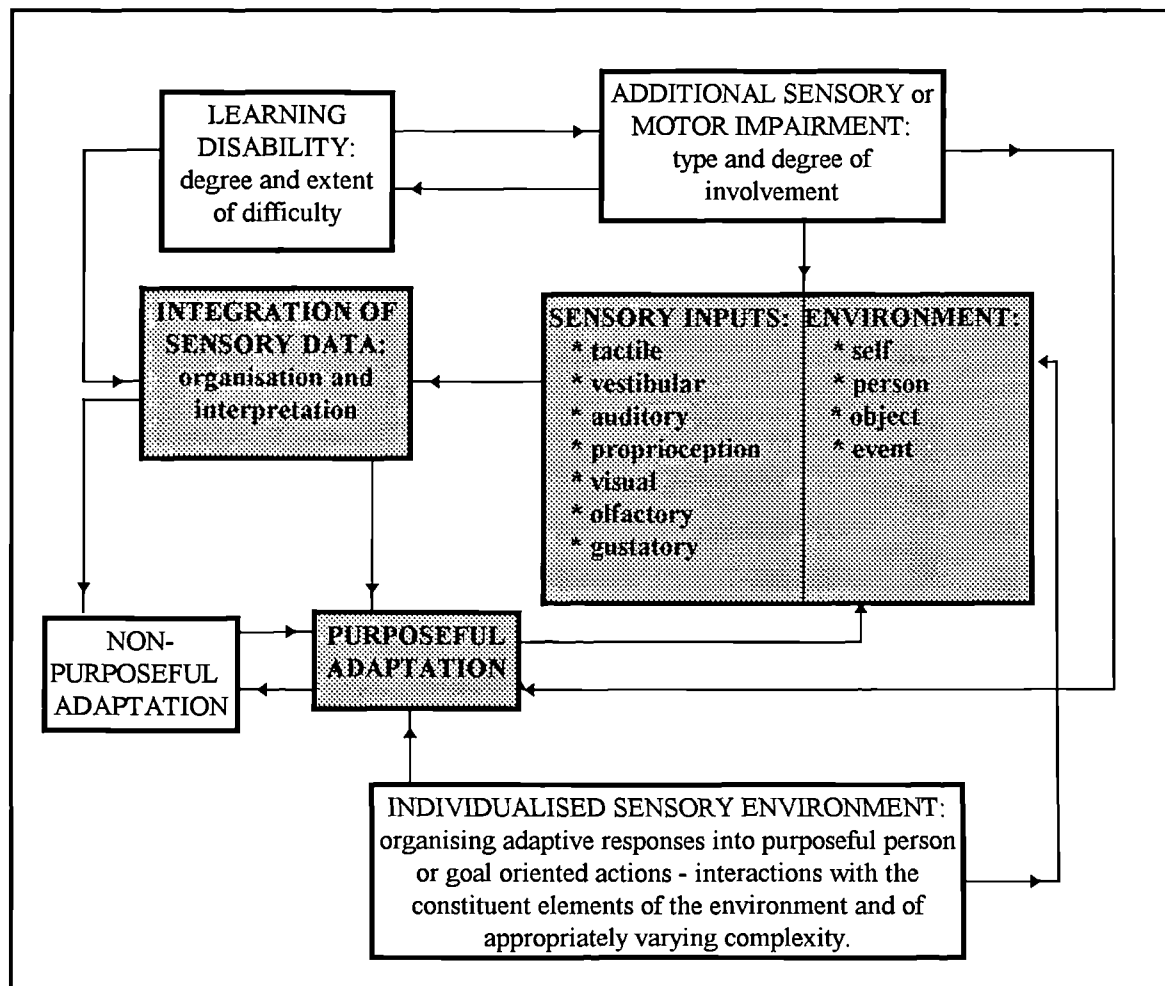


Figure 2.7.2.1: The Purposeful Adaptation Process in the I.S.E. Model

(to illustrate relationships amongst the environment,

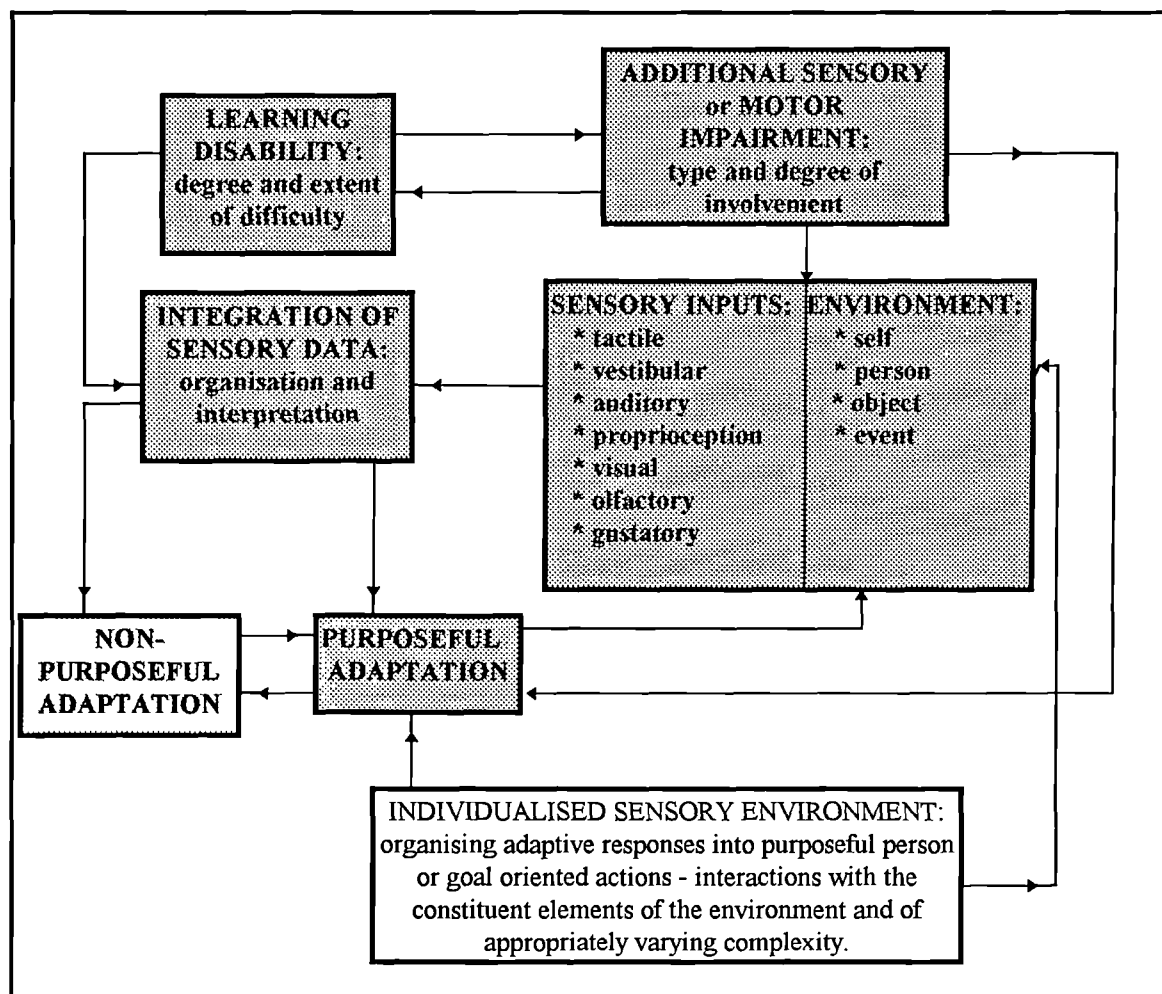
C.N.S. and adaptive behaviour.)

This second part of the model illustrates the relationships which usually exist amongst the environment and sensations arising from its constituent elements; C.N.S. activity; and adaptive responding. It relates to the synchronic model of Sensory Integration Therapy effectiveness proposed by Tickle (1988) and mentioned in the literature review, but also adds in the constituent elements of the environment together with sensory inputs. This demonstrates the importance placed on the role of the environment and also acknowledges the importance of behavioural reinforcement in the intervention process.

Thus the human organism lives in an environment which comprises other people, objects and events. Both non-contingent and contingent sensory information arises from the environment and is processed, organised and interpreted by the C.N.S. In response to this incoming information and the interpretation that is placed on it, the human produces a response said to be adaptive to that sensory input. The adaptive response then produces new information which is in turn feedback into the process.

2.7.3 The Model of the Learning Disabled Population

The shaded areas include the potential influences of a learning disability and additional sensory or motor impairments on the relationships among environment; C.N.S. activity; and adaptive responding. The purposeful adaptation box has been shaded darker than its counterpart, the non-purposeful adaptation box. This is to acknowledge the presence of non-purposeful behaviour in the general learning disabled population, but also its diminished level compared with the sample population which is defined in the subsequent model. This supports the higher incidence of non-purposeful behaviour amongst those with the more severe learning disabilities (Hogg and Sebba, 1986).



Members of the study population have been diagnosed as having a learning disability, the degree or extent of which varies from person to person. It has been reported that the incidence of additional sensory or motor impairments is greater amongst the learning disabled population than those of "normal intelligence" (Dupont, 1981). It has also been reported that the more severe the learning disability, the higher the incidence and the severity of the additional impairments. Both the learning disability and any existing additional sensory or motor impairments are variables of influence on this process.

Firstly, the learning disability interacts with any additional impairment: one will affect the other in terms of the individual's skill set acquisition; response repertoire and the process of learning and development. ***Secondly***, the learning disability and its influences may affect the individual's ability to make sense of the world and therefore to interpret

incoming information. *Thirdly*, any additional sensory or motor impairment may impinge upon potential sensory data arising from the constituent elements of the environment. *Fourthly*, the existence of an additional impairment is likely to influence the kinds of adaptive responses that the individual makes.

However, the person with a learning disability and an additional sensory or motor impairment may acquire a skill set for use that enables participation/communication in many daily events to an acceptable level. Learning disability with additional impairment does not equal a limited skill set and poor communicative or interactive responding. The person with a learning disability may acquire skills towards independent living and achieve intentional communication to various degrees of effectiveness.

2.7.4 The Model of the Sample Population

The shaded areas serve to represent the existence of high levels of non-purposeful behaviour compounded by the influences of a severe-profound learning disability, together with the more likely presence of additional sensory or motor impairments. Their interactive influences on the relationships among environment; C.N.S. activity; and adaptive responding are considered. The purposeful adaptive box is shaded to a lesser extent in acknowledgement of its existence, but also to reflect its hypothesised lower level in relation to that of the non-purposeful behaviour.

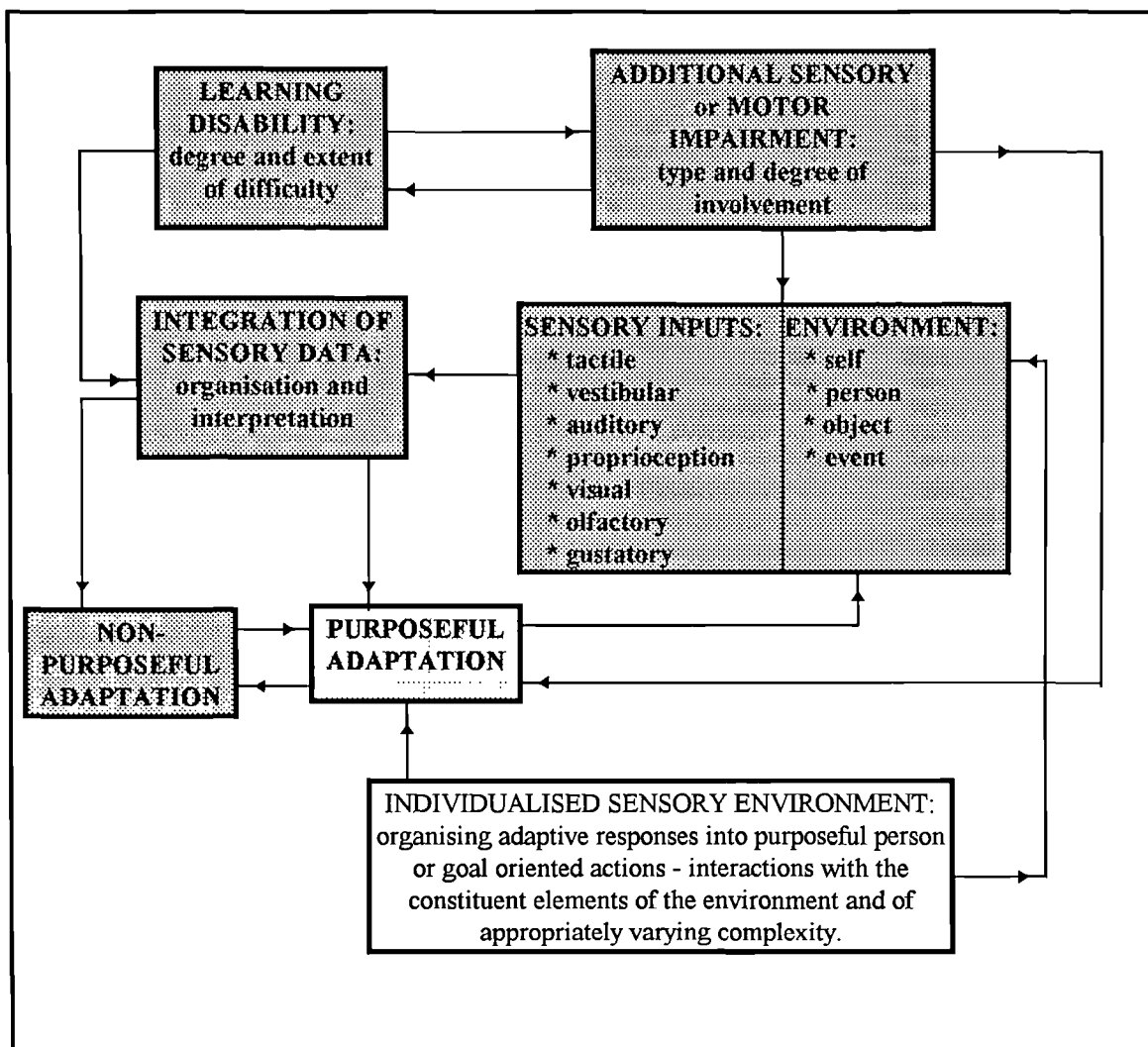


Figure 2.7.4.1: The Sample Population in the I.S.E. Model

(to define those people who are not yet intentional communicators who engage in high levels of non purposeful behaviour, i.e. maladaptation and neutral.

It would appear that there are those amongst the population who have a much more severe learning disability. Prevalence of additional sensory impairments is reportedly higher amongst this section of the population (Dupont, 1981; Gustavson, 1981), although it is commonly recognised that many conditions remain undiagnosed due to difficulties in using standard visual (Ellis, 1986) and audiometric assessment (Yeates, 1990). Yeates (1992 a & b) reported that 71% of participants attending Day Centres were able to co-operate on standard audiometric assessment procedures. The alternative for those unable to comply is the expensive, more involved procedures of 'Brain Stem Evoked Responses' (B.S.E.R.) and 'Cortical Evoked Responses' (C.E.R.). For this to happen a service first needs to be in place that will provide participants with the necessary electro-physiological tests. Fortunately, the study population had access to

such a specialist audiology service through the South East Thames regionally funded project to identify and rehabilitate people with a learning disability and a hearing loss. Thus the model identifies the important influences of a more severe learning disability and any potential sensory or motor impairments, taking into account the difficulties of detection, on the environmental stimulus-interpretation-response process. It is postulated that the extents of these influences may variously contribute to an increase in maladaptation to environment (Stainback and Stainback, 1980; Schroeder, Mulick and Rojahn, 1980; Eyman and Call, 1977; Ross, 1972).

Non-purposeful adaptation refers to two behavioural manifestations: (i) neutral behaviour, and (ii) maladaptive behaviour. *(i) Neutral behaviour* is defined by the passive nature of client activity characterised by engagement in usual body routines and action (Felce, 1986). The client does not appear to be aroused into purposeful action by the stimuli and events present in the environment. He or she may wander around or sit gazing around at nothing in particular. The participant is engaged in routine tasks, doing nothing specifically (Pope, 1988). No rhythm; ritual; repetition is observed to be intrinsic to the behaviour. This may be due to the provision of inappropriate opportunities or else the sensory dormancy of the individual where environmental stimuli appear to have little effect on the person's responding behaviour (Knickerbocker, 1980).

(ii) Maladaptive behaviour has been defined as the participant engaging in behaviour which is said to be personally or socially maladaptive (Hogg and Sebba, 1986). This behaviour is characterised by repetition, environmental independence, irrelevance to any ongoing activity, with highly predictable feedback (Richer, 1979). Behaviours may appear to be autonomous, such as stereotyped behaviours, where people engage in actions that have a lack of apparent function and appear not to be goal oriented (Presland, 1991). Actions are repetitive and often rhythmic in nature, such as rocking, hand flapping or self-injurious behaviours such as head banging or hand biting.

Although it is not the purpose of this study to examine in depth the *causes* of maladaptive behaviour, it does aim to assess its level at baseline in relation to the levels of purposeful engagement, and to evaluate any changes affected by introduction of the intervention. Therefore, it is considered relevant to review the major theoretical positions in explanation of maladaptive behaviour that are documented in the literature, and to

relate it to the context of the model proposed in this study. Generally, most researchers concur that it is often very difficult to ascertain the exact origins and maintenance factors of the maladaptive behaviour. This is largely due to the retrospective nature of the information available.

The psychodynamic position has influenced several early hypotheses put forward in explanation of maladaptive behaviour. These provide us with no experimental evidence and are largely descriptive of a child's early experience. Zuk (1960) differentiated between the self-injury of children with psychosis (presumably autistic), which he considered to reflect aggressive impulses against the self, and that of learning disabled children, which he interpreted as aggression against an object (the child's own body), not perceived as the self because of "*regression of the ego to an infantile level*".

Hypotheses based on the psychodynamic position are largely untestable and mainly speculative, providing nothing much beyond clinical impressions to support this theoretical position.

Organic and psychopharmacological hypotheses have been put forward. Two rare conditions have been reported in which self injury very often occurs: Lesch-Nyhan Syndrome (Lesch and Nyhan, 1964) and de Lange Syndrome (Bryson, Sakati, Byhan and Fish, 1971). Their existence provides some support for the organic explanation of self injury: that is, it is founded on a biochemical basis rather than an environmental one. However, this theory does not identify which parts of the individual's biological constitution are responsible for the ensuing behaviour.

Corbett and Campbell (1981) proposed that the neurological and biochemical roles of the brain, in particular those of the limbic system, provided an explanation for self-injurious behaviour. It has further been postulated that the close association between self injury and the extreme levels of organic dysfluency, occurs in people with profound learning disabilities.

The Developmental theorists postulate that stereotypic behaviour may represent a continuation and extension of behaviours which are normally present early on in development. Head banging in infancy reportedly appears at around eight months and

mainly disappears by four years of age (Kravitz, Rosenthal, Tepiltz, Murphy and Lesser, 1960; de Lissovoy, 1962).

It is further suggested that since the incidence of self injury is highest among people with profound learning disabilities, the mental age of people who head bang in the two populations is roughly equivalent in most cases (that is, between two months and four years of age). However, differences between the kind of head banging displayed by both normal and learning disabled children have been noted. The production of major injuries or tissue damage is often the case with learning disabled children. For normal children it is said to be self-limiting and does not often become an all engrossing activity (Jones, Walsh and Sturmey, 1995). Moreover, normal infants do not usually engage in other forms of self injury such as hand biting, eye poking etc., which also distinguishes them from their counterparts.

The developmental position raise importantly the question of what function the behaviour therefore serves for the individual. Certainly the behaviour may have a developmentally linked function, but discerning this is not an easy or straightforward matter. The repetitive and invariant nature of the behaviour makes its educational value questionable (i.e. as compared with constructive play).

Maladaptive behaviour may arise as a side effect of a minor illness. Pain such as that from an ear infection may lead to head banging in a desperate attempt to ease it. Skin allergies may cause self-injurious scratching as a way of relieving irritation. Associations between the incidence of head banging and middle ear infections have been reported in the literature (de Lissovoy, 1963). However, there is no direct evidence in the largely retrospective accounts reported in the literature between this theoretical explanation of the origins of the behaviour and later persistent stereotypies. Maintenance of such behaviours may be supported by social reinforcement (Carr and McDowell, 1980).

The self-stimulation hypothesis puts forward an explanation of maladaptive behaviour, including stereotypy and self injury. It assumes that self injury is merely another form of stereotypy. It has been proposed that the main function of stereotypic behaviour is to provide sensory stimulation which is rewarding to the self. There is much evidence to suggest that environmental influences are almost always implicated: a lack of materials

and activities of motivating consequence may lead to increased stereotypic behaviour. Firstly, this position is supported by research into the effects of sensory impairments on behaviour (Thurrell and Rice, 1970; Rutter, Tizard and Whitmore, 1970; Meadow, 1980). Secondly, learning disabled people in the unstimulating environment of an understaffed hospital ward often show high levels of stereotypic behaviour (Griffin, Williams, Stark, Altmeyer and Mason, 1986).

Similarly, it is well established that stereotypic levels may be decreased when the individual is distracted by an object or toy (Berkson and Mason, 1964; Murphy, Carr and Callias, 1985). The toys and objects are presumed to provide some sensory input which obviates the need for stereotypy (Murphy, 1983). Thirdly, there is considerable evidence reported on the use of contingent stimulation - lights or sounds are dependent on the emission of simple responses such as lever presses - such that stereotypies reduce in approximate proportion to the alternative stimulation (Goodall et al, 1982; Murphy, 1982). Interestingly, it has been suggested that very close links can be seen between the stimuli produced by an individual's stereotypies and the preferred external stimuli (Rincover, 1978; Rincover, Cook, Peoples and Packard, 1979).

One theoretical position speculates the existence of an '*arousal homeostat*'. This possibility was first suggested in the 1950s (Bexton, Heron and Scot, 1954; Heron, 1957) and is discussed in a paper by Brodemus and Swanson (1977). The arousal homeostat was seen as a mechanism that monitors the level of stimulation and directs the organism to take steps to increase or decrease it in order to maintain an optimal level of arousal (Berlyne, 1960). There is, however, little direct evidence for this view since independent measures of arousal are rarely taken (Murphy, 1983).

The self-stimulation theory is an unproven construct. However, the importance of the environment to the person's engagement levels is acknowledged in terms of the quantity and quality of available stimuli in the environment. This has been referred to as the 'setting event', described as an influential factor on responding behaviour (Bijou, 1976). Furthermore, Jones et al (1995) referred to the importance of 'stimulus functions'. These are defined as specific environmental stimuli which in turn trigger behavioural responses. The environment is not viewed as the sole reason for maladaptive or stereotypic behaviour. The learned behaviour hypothesis is considered in association with it. This

position suggests if a behaviour is reinforced, then this behaviour is likely to increase. It is viewed as one of the most influential explanations of self-injury. The origin of the behaviour may be explained by a number of reasons, such as accidental response, side effect of minor illness, but it is maintained by reinforcement or reward in some way, usually by social events. The kinds of social events envisaged are extra attention, the provision of a favourite toy, or cessation of an undesirable activity.

The theoretical framework presented in this model acknowledges that the origins of stereotypic behaviour may be found in various states or events. The hypotheses of self-stimulation and learned behaviour are viewed together, acknowledging the potentially important influence of the environment on a person's engagement levels. Function is assigned to the stereotypies as essentially stimulus producing, thus the behaviour is emitted to produce a motivating sensory consequence which is reinforcing to the individual.

Four critical factors of influence on the engagement levels of the individual are identified: (i) the degree of learning disability; (ii) the existence and severity of any sensory or motor impairments; (iii) the environment, its constituent elements and sensations arising from it, and (iv) the ability of the individual to receive, organise, interpret incoming information and to produce purposeful, adaptive responses are all

The cyclic effect of stereotypic behaviour may be explained by the collective and interactive influences of the environment and cognitive status of the person. The individual exists in an environment where there are other people (person); object(s); and event(s) (person-object). The individual engages in rocking behaviour for instance. '**Rocking**' involves the constituent element of '*self*' in the activity; it provides sensory information about this motion through the vestibular system (a response to changes in gravity and movement), and the proprioceptive system (feedback from receptors in muscles, ligaments and joints). This sensory data is received, organised and interpreted by the C.N.S. and the maladaptation of rocking is produced which in turn negatively affects the level of adaptation (the increase in one affects a decrease in the other). The maladaptive response of '**rocking**' is feedback to *the person*, providing the same sensory information via the vestibular and proprioceptive systems, which is organised and interpreted - a further rocking is produced thereby establishing a vicious cycle of self-

activity of a repetitive nature. This in turn may impose limitations on person, object engagement and event participation such that the person becomes socially isolated.

2.7.5 The Model of I.S.E. Intervention

The shaded areas identify the key factors within the intervention process. The non-purposeful adaptation box is less shaded than the purposeful adaptation box in order to demonstrate the therapy objective of: increasing the level of the latter (purposeful) whilst reducing the level of the former (non-purposeful).

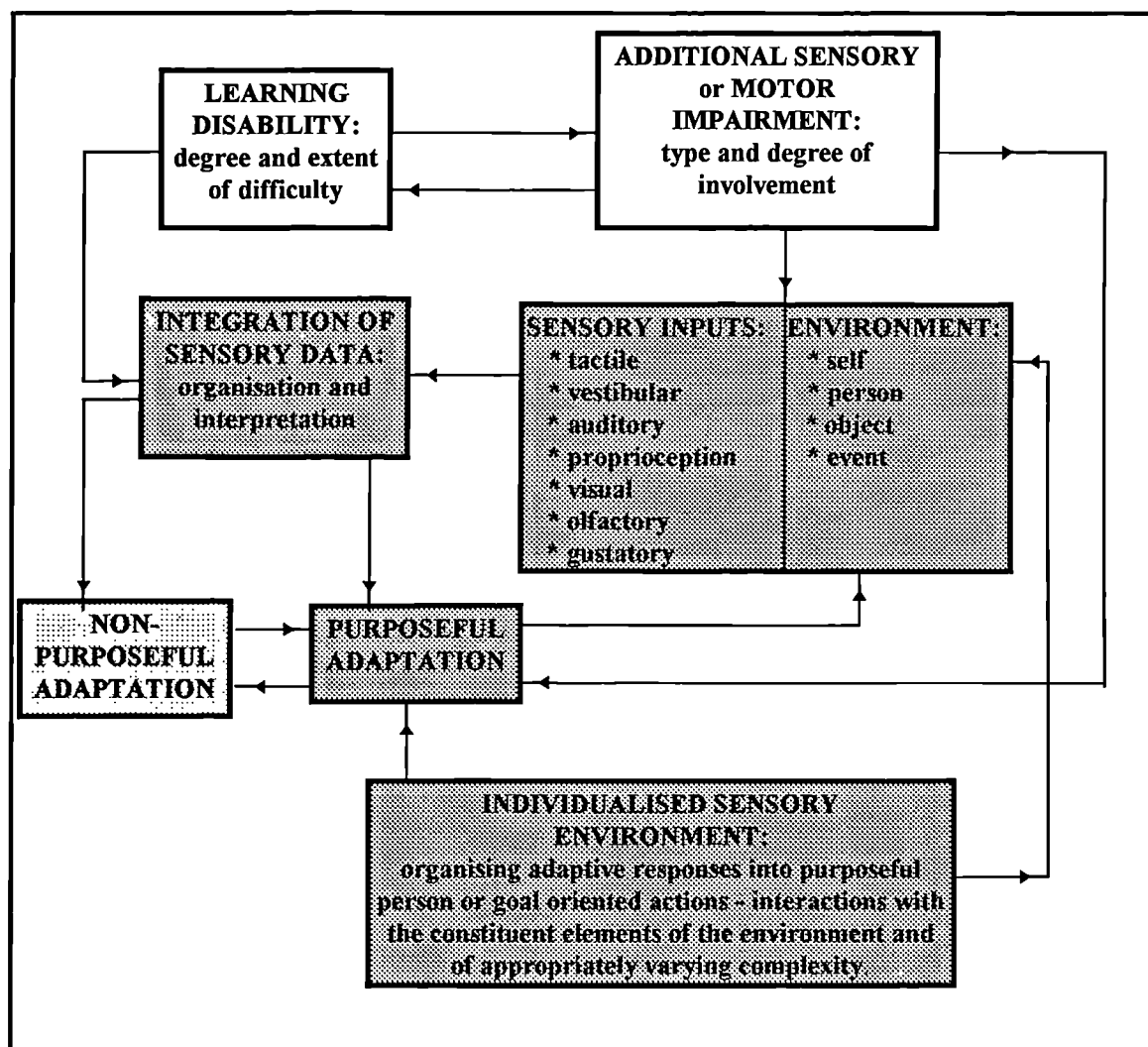


Figure 2.7.5.1: The Intervention in the I.S.E. Model (to show the main objectives underlying the development and provision of structured sensory input.)

The potential for establishing a vicious circle of maladaptive or stereotypic behaviour has already been illustrated in the previous Figure 2.7.4.1. The self-perpetuating cycle of neutral/passive behaviour that may result from an unstimulating environment and/or a

limited skill set has also been mentioned. The model for an intervention programme proposed here, seeks to affect positive change in the cycles illustrated in the previous model. The intervention termed the '*Individualised Sensory Environment*' aims to establish appropriate and motivating opportunities for purposeful interaction, thereby affecting the levels of non-purposeful behaviour.

The specific areas within the intervention are now explored: 1. the communication partnership of therapist and client regarding the assignment of responsibilities between the sender and the receiver in the communication act; 2. the provision of social interaction opportunities; 3. the provision of motivating consequences and the focal sensory systems; 4. the response contingency of therapy.

1. Communication Partnership:

The development of intentional communication and the assignment of responsibilities within the communication act, between the role of sender and the role of receiver are viewed as crucially important to the communication partnership. This is so that the interactive opportunities offered to the client are not only motivating but also represent appropriate demands of the client's skills. Examination of this communication partnership provides definition of the therapist's role regarding the use of a hierarchy of support cues which is described in the operational document for the I.S.E. intervention in **Appendix A1**.

An act of communication may be viewed as the intentional transmission of an idea to another for decoding. The development of intentional communication is represented by a continuum, along which the roles of encoder and decoder are variously assigned to the sender and the receiver in the communication act. McLean and Snyder-McLean (1985) referred to "*a continuum of behaviours*".

The current study is focused on the progression of learning disabled adults towards the '*communication of semantic roles*' (Goldbart, 1988). Therefore, the instrumentation needs to be constructed to reflect the development of intentionality and semantic role assignment in the communication act.

The development of intentionality and semantic role assignment is viewed as a continuum of constantly emerging communication behaviours of progressive sophistication. It is acknowledged that the role of the receiver counterbalances the role of the sender in terms of assigned responsibility in the communication act. That is, at the earlier stages in development, the receiver's role in assignment of meaning and intent to the communication behaviours of the sender, is of paramount importance to the success of the act. At later stages, where intentional communication is emerging, the sender is able to transmit meanings in a code or form which is shared by the receiver, thus reducing the demands for meaning assignment and interpretation.

The development of intentionality is viewed as a communication partnership between the sender and the receiver which changes according to the needs of the individual. The assignment of roles within this partnership, is not only relevant to the intervention process, but also to the daily communication acts which take place between learning disabled adults and their support workers or carers. In order to facilitate a greater success rate in communicative exchanges between client and carer, the various responsibilities of the partnership need to be understood, so that appropriate modifications may be made.

Three areas within the developing continuum of intentional communication have been identified.

(i) Pre-intentional Communication - From Reflexive to Reactive:

The earliest stage of pre-intentional communication has been characterised by the *reflexive* and later *reactive* responding of the individual sender. Early *reflex* responses to both internal and external stimuli gradually become more selectively *reactive* to certain events and people in the environment, as the ability to discriminate incoming sensory data develops.

The role of the receiver is crucial for the assignment of communicative intent and meaning to the sender's signals. In the earliest stages, the receiver draws heavily on his/her own knowledge base of the client (sender) and proceeds as interpreter through trial and error, i.e. '*the guessing game*'. As the sender's responses become more

specifically reactive to constituents in the environment, so the role of the receiver in '*inference of intent*' changes, (Gibb Harding, 1983)

(ii) Pre-intentional Communication - Proactive:

Proactive responding emerges as the sender starts to act purposefully on people and objects in the environment, such that these acts '*become signals*', to the receiver, (Coupe and Joliffe, 1988). Vocalised dialogues between sender and receiver occur, comprising both spontaneous and imitated sound sequences. Eye contact and routines of joint attention and joint action start to emerge, allowing the sender to anticipate each contact in the routine. The sender searches and reaches for desired objects, engages in non specific actions with objects, i.e. hitting, shaking, manipulating, etc.

In response to the actions of the sender, the receiver becomes increasingly selective. Indeed, the consistent reactions of the receiver are a major influence on the development of intentional communication. The role of assignment of meaning and intent is reduced by the discriminating signals emanating from the sender. The receiver is a good observer of the client's behaviour for the construction of an appropriate response in support.

(iii) Intentional Communication From Basic to Conventional and Referential:

Intentional communication has been referred to as *basic (or primitive)*, *conventional* and *referential* forms of responding. The *basic* level is characterised by the context of the communication. There is emerging evidence of event knowledge, as the sender starts to alternate eye gaze between the receiver and a desired item. Frequently, the movement of objects occurs whilst looking at the receiver (Bruner, 1978). Sometimes the receiver is moved to a desired object or location. The receiver recognises the sender's actions in context and uses the cues of the situation to interpret the sender's meaning.

The *conventional* level sees the emergence of signals in the forms of gestures; vocalisations (e.g. jargon); verbalisations (e.g. protowords); and first words (Coupe and Joliffe, 1988). Communications begin to have purpose and functions emerge: requestive; responding; informing about self and world; greeting; protesting; rejecting people, objects and events, (Roth and Speckman, 1984 a & b). The receiver is supported in the interpretation role by the *contextually mobile* signals of the sender, pointing out people and objects in the environment to the receiver.

The *referential* level is characterised by speech or a formalised alternative, such as signed communication. These have been described as '*signal bearers*' of the intended meanings (Coupe and Joliffe, 1988). Both functions and meanings are expanded. The demands of the interpreting role are reduced significantly as a common code of communicative reference is employed in the intentional communication act.

This developmental continuum provides direction to a number of components considered important to the development of the I.S.E. intervention. Firstly, it highlights the changing role of the therapist as receiver in a communication partnership with a client and the need for a systematic realisation of that role, e.g. a hierarchy of support cues to reflect the various levels identified on the continuum of intentional communication development. Secondly, it provides the basis for the definition of the constituent areas of the interaction or engagement, namely person, object and person-object. Thirdly, it establishes the direction of the intervention or the ultimate goal of therapy, towards more clearly defined signals of communication, where there is less emphasis on the inferential role of the significant other, and more on the role of the client as sender of communicative messages. Finally, it provides a reference for the strategies being demonstrated to the therapist assistants during the course of the intervention, e.g. the recognition of communication behaviours emitted by the participants; providing the appropriate reinforcement for those responses, etc.

2. Provision of Social Interaction Opportunities:

The therapeutic environment identifies the crucial, main constituents, for the individual's engagements. The person's self is the centre of his/her universe; there is person(s); object(s); and event(s) (person-object) which provide possible contact/interaction points. It is recognised that participant assessment data may reveal one or more areas of individual preference regarding the constituent elements of interactions, and this should influence the design of the person's therapeutic programme. The objective is to work to the strengths of the individual and to use each person's skill set in an effective and realistic way.

The role of social interaction and schemes as they apply to the constituent elements of the environment is considered within this model. The development of social interaction describes how we interact with, learn about, and therefore communicate about, our

environment. Early in the developmental process, an increasingly complex pattern of social interactions between person and significant other emerges. During the sensori-motor phase of development, as defined by Piaget (1952) there is an increasing awareness of the properties and functions of objects. Six major domains of development have been summarised by Hogg and Sebba (1986a): object permanence; spatial understanding; time; intentional behaviour and means-end relations; causality; imitation.

Therefore, the nature of our conceptualisation of objects, and the pattern of our social interactions with significant others, must be acknowledged in the development of an intervention which identifies the environment as an important constituent. For when person interactions are combined with object schemes in one or a series of fluid or alternating actions, event knowledge can be said to be firmly established and basic intentional communication is ready for use.

3. Motivating Consequences and Focal Sensory Systems:

In order to attract client attention to the properties and functions of environmental constituents, whether objects or forms of person contact, the intervention is concerned with forms of sensory stimulation that provide motivating consequences for the individual. The objective is that an environment which is stimulating to the individual will engender their purposeful responses to it.

Three major sensory systems provide the focus of stimuli: tactile; vestibular; and proprioceptive. Although these systems are emphasised more importantly, the other four main sensory systems are considered because of the nature of sensory interdependence which exists in the C.N.S. of the human organism. The main reasons for the selection of the tactile and vestibular systems are now referred to.

Sensory Integration Therapy (Ayres, 1972; 1979) advocates the use of tactile and vestibular modes of stimulation with learning disordered children. Indeed, both sensory modalities are said to be primal, both in the evolutionary sense, and in the ontogenetic sense. The content of the interactions between parent and infant has been depicted as mainly tactile in type (Day, 1982), and toddlers through to adults engage in many vestibular based activities, such as skate boarding; swings; ski-ing; driving fast cars.

There are few adults who can resist turning a revolution or two in one of those executive swivel chairs!

Perhaps, more importantly, tactile stimulation represents a more immediate form of environmental contact which does not require symbolic representations such as spoken words; iconic gestures; formal sign communications; for it to happen. The stimulus-response demands are reduced in touch contact. Complex encoding or decoding is not required at a cortical level. Incoming tactile information appears to be modulated at the level of spinal cord and this process is dependent on information descending from higher levels of the C.N.S. (Fisher and Dunn, 1983).

Vestibular stimulation represents either an excitatory form of arousal, i.e. rotation which is angular stimulation of the semi-circular canals; or a calming form of stimulation i.e. rocking, which is linear stimulation of the semi-circular canals. The excitatory nature of angular stimulation focuses on changes in the rate and direction of the rotations. The calming influence of linear stimulation focuses on a slow, rhythmic pattern of rocking.

Of course, the third sensory modality of importance is the proprioceptive channel, or the route by which our brains are informed of our actions in the world. Since most of the responses produced by clients are likely to be motoric, this crucial link must be included in the feedback loop (Tickle, 1988).

4. Response Contingency of Therapy:

The participant is an active participant in the course of intervention. The sensory stimulation is dependent on the client producing the target response, and in turn reinforces that response. In short, some of the principles of behaviour modification are employed: the voluntary behaviour of the individual is modified by and through, the manipulation of its consequences and in relation to the reinforcer preferences exhibited by the participant. The determination of individual preferences will be explained in **Chapter 4**, where the 'Decision-Making Schedule' is described. Thus the principles of operant conditioning in the learning process are intrinsic to the intervention schedule. This relates directly to the provision of social opportunities and motivating consequences for the frequent emission of target responses by the client.

In summary, the '**Individualised Sensory Environment**' comprises meaningful forms of stimulation which engender purposeful responses by the individual. The application of sensory stimuli is contingent on the participant's responses to it. Client adaptive responding is facilitated by focusing sensory input on the tactile and vestibular channels and ordering the constituent elements of self, person, object and event in the individual's sensory environment. The operational documents for the intervention: '**Individualised Sensory Environment**' are to be found in **Volume II: Appendix A1, Appendix A2 and Appendix A3**.

2.8 Scope of Study

The current study is concerned with the engagement levels of learning disabled adults who are not yet intentional communicators. Two main parameters of engagement have been identified: (i) purposeful, i.e. person, object and person-object interactions; and (ii) non-purposeful, i.e. neutral and maladaptive. The aim is to develop a systematic procedure for the assessment of and intervention with the target population, and to evaluate the effects of the intervention: the '**Individualised Sensory Environment**' (**I.S.E.**) on the dependent variables (the defined categories of engagement). The relationship between the stimulating environment and the engagement levels of the learning disabled adult who is not yet an intentional communicator will be discussed. Participants who appear to meet the criterion for project entry but have an alternative diagnosis of elective mutism, are not considered in the current study.

2.8.1 Research Objectives

The current chapter has focused on the realisation of the initial aim of the current study, referred to as: **1. the theoretical phase**. Two main objectives have been covered.

Objective 1.1: To establish a theoretical framework based on a synthesis of the four areas of the literature review: (i) intervention practice with adults with learning disabilities interfacing with current service philosophy; (ii) contingent and non-contingent sensory reinforcement in relation to the learning process; (iii) Sensory Integration Theory; and (iv) Sensory Integration Therapy (Ayres, 1972; 1979).

Objective 1.2: To operationally define the '**Individualised Sensory Environment**' intervention (**I.S.E.**).

The following objectives define the three remaining aims of the research project and are grouped according to the relevant phases of the project: **2. the definition phase** (survey of population for characteristic description and selection of participants); **3. the construction phase** (development of the appropriate instrumentation and the pilot studies); and **4. the experimental phase** (evaluation of the effects of the intervention on the interactive behaviours of the sample population).

2. Definition Phase:

Objective 2.1: To identify amongst the study population of people diagnosed as having some degree of learning disability, those who are not yet using symbolic representations in intentional communication acts; who are largely dependent on others for the maintenance of their support needs; and who spend a perceived majority of their time engaged in non-purposeful activity.

Objective 2.2: To compare the study population with a similar population using learning disability services in a neighbouring borough.

Objective 2.3: To gather information regarding the types of Speech and Language Therapy intervention being offered to that population.

Objective 2.4: To survey and recount the distinctive features of the sample population in a multi-axial descriptive comparison with the remainder of the study population.

3. Construction Phase:

Objective 3.1: To develop a standard schedule whereby clinical decisions are structured for the operationalisation of the programme of intervention termed 'Individualised Sensory environment' (I.S.E.).

Objective 3.2: To develop a structured interview with keyworkers for quantifying their perceptions of the interactive behaviours of the participants.

Objective 3.3: To generate a categorical description of the focal engagement behaviours concentrating on the constituents of: self, person, object and person-object for use in a momentary time sampling schedule.

Objective 3.4: To pilot the instrumentation and to run the intervention in order to appraise the feasibility of the experimental procedures.

4. Experimental Phase:

Objective 4.1: To apply the standard clinical decision-making schedule to the relevant participants. To quantify the potential engagements of each participant during a structured session of controlled sensory stimulation, and to make local decisions for their entry into an intervention schedule.

Objective 4.2: To run the intervention with the sample population and to alternate it with an attention-placebo condition (A.P.).

Objective 4.3: To ascertain the proportion of time each participant typically spends engaged with: self; person; object; and person-object. To achieve baseline measurements of participant interactions and to repeat those measures between the alternating interventions at the defined points in time and at two follow-up points.

Objective 4.4: To discuss the results in relation to the experimental hypotheses and to the literature reviewed.

2.8.2 Research Hypotheses

Hypothesis 1: There will be a significant improvement in the dependent variables over the four assessment points, including baseline and after each of the three subsequent phases of intervention.

Hypothesis 2: There will be higher levels of non-purposeful behaviour (i.e. *self-active* and *self-neutral*) than purposeful behaviour (i.e. *person*, *object* and *person-object*).

Hypothesis 3: The introduction of the I.S.E. (Intervention A) will effect a reduction in the level of non-purposeful behaviour (i.e. *self-active* and *self-neutral*).

Hypothesis 4: The application of the **I.S.E. (Intervention A)** will effect an increase in the level of purposeful behaviour (i.e. *person*, *object* and *person-object*).

Hypothesis 5: There will be a significant increase in the level of purposeful behaviour, (i.e. *person*, *object* and *person-object*), and a reduction in the level of non-purposeful behaviour (i.e. *self-neutral* and *self-active*) compared with baseline.

Hypothesis 6: The effects of an initial phase of **I.S.E. (Intervention A)** will be significantly greater than the effects of an initial phase of the attention-placebo (**Intervention B**).

Hypothesis 7: The positive effects of the **I.S.E. (Intervention A)** will be maintained up to one month after the withdrawal of the intervention

Hypothesis 8: The positive effects of the **I.S.E. (Intervention A)** will be maintained up to four months after the withdrawal of the intervention.

2.9 Summary of Chapter

This chapter has provided a review of the literature covering four key areas: (i) intervention practice with adults with learning disabilities interfacing with current service philosophy; (ii) contingent and non-contingent sensory reinforcement in relation to the learning process; (iii) Sensory Integration Theory; and (iv) Sensory Integration Therapy (Ayres, 1972; 1979). The final section has attempted a synthesis of the previous four areas in a theoretical framework for the intervention termed the ‘**Individualised Sensory Environment**’ (**I.S.E.**).

The theoretical framework of the **I.S.E.** intervention was described, based on a five part model that initially served to describe the relationships amongst the environment, adaptive behaviour and the C.N.S. Further detail was provided in the latter four models in order to provide explanations of the adaptive behaviour process; the potential influences of a learning disability and associated sensory or motor impairments; the non-purposeful behaviour cycle of those with more severe learning disabilities with an overview of its possible origins; and the key objectives of **I.S.E.** intervention.

The scope of the study has been defined together with its limitations. The research objectives have been identified according to the four distinct phases of the project: theoretical; definition; construction; and experimental. The latter three will be attended to in the following chapters as appropriate. The research hypotheses have been specified for address in the main study.

The next chapter provides an account of the ethical issues addressed. It focuses on the **definition phase** of the project including the selection of participants.

CHAPTER 3: DEFINITION OF POPULATION

3.1 Introduction to Definition Phase

This chapter is about the selection of participants for the empirical part of the study and the definition of their demographic and behavioural characteristics. This is referred to as the **definition phase**. Prior to the development of the instrumentation and the pilot studies, information was gathered about the study population. This chapter provides an account of the methodology used for that purpose and summarises the results of this separate study which serves to preface the design and running of the main experimental phase.

The broad variations which appear to exist in the literature regarding a clear definition of the population with profound learning disabilities were mentioned in the introductory chapter of this thesis. It was the concern of the researcher that the candidates for the intervention should be identified by the parameters of intentional communication and purposeful engagement, rather than by psychometric assessment, by statements in the Case History notes of individuals relating to the degree of learning disability, or by the type of service currently being provided, i.e. members of the Special Needs Unit in the Day Centre. Two separate surveys were conducted:

1. Selection of Participants and Identification of Current Speech and Language Therapy:

The first survey was carried out in two parts. The first part focused on the *selection of participants* for the main study. The second part focused on a *comparison with a neighbouring population* of similar designation, to ascertain the representativeness of the study sample, i.e. people in attendance of a Day Centre(s) for the learning disabled. Additional information was gathered regarding the *type of Speech and Language Therapy Service* that was currently being provided. This additional information regarding Speech and Language Therapy provision was for the identification of popular interventions within a local service, and to confirm the need for development work on intervention techniques with the learning disabled population.

2. Multi-Axial Comparison Between the Sample Population and the Remainder of the Learning Disabled Population (i.e. those who did not meet the candidacy criteria):

The second survey focused on a multi-axial comparison between the sample population, as defined by the first part of the initial survey, and those amongst the learning disabled population who did not meet the criteria set for the sample population, i.e. the **remainder** of the learning disabled population who were defined as intentionally communicating and engaging in purposeful behaviour. The multi-axial frame of reference incorporated the following areas: personal history, medical background, functional skill set, community participation, behavioural characteristics and perceived support needs.

The aim was to identify the areas of distinction between those participants who fitted the candidacy profile for the main experiment and those who did not. Three main objectives were identified in relation to this aim: (i) firstly, to provide a richer description of the skills, difficulties and support needs of the sample population, thereby highlighting the need for specific development work in the field of therapy with this section of the learning disabled population; (ii) secondly, to identify the complex needs of the target population and thereby, forewarn the researcher of current or dynamic issues that might need dealing with in the course of the experimental phase, e.g. the use of practical strategies in the running of the planned intervention; and (iii) thirdly, to give direction to the later discussion of intervention issues and their relevance to the sample population. The survey findings are related to comparable studies reported in the literature and their implications for the main study are summarised after each section in this chapter.

3.2 Ethics

Prior to the commencement of the study, permission was obtained from the priority care ethics committee of the then Lewisham and North Southwark Community Health Service. A short presentation was addressed to the committee outlining the project details and the proposed storage of confidential information. The target population was already receiving an on-site Speech and Language Therapy service, and as such participants were treated as part of the normal referral process, no separate permission being required. However, certain steps were taken to keep parents, residential carers and significant others fully informed. Outlines of the main objectives and intervention plans were presented to the relevant people in their support group meeting prior to the

start of the project. They were not informed of the central hypotheses. Positive encouragement for this new initiative in the Day Centre was expressed by all concerned, their main sentiment being “*at last there is something for our people*”. Similar presentations were made to the keyworking staff employed in the day centre who were to be of extreme importance throughout the running of the project.

3.3 Definition of the Sample Population (Objectives 2.1, 2.2 and 2.3)

This section deals with the selection of participants and the identification of current Speech and Language Therapy being delivered.

Objective 2.1: To identify amongst the study population of people diagnosed as having some degree of learning disability, those who are not yet using symbolic representations in intentional communication acts; who are largely dependent on others for the maintenance of their support needs; and who spend a perceived majority of their time engaged in non-purposeful activity.

Objective 2.2: To compare the study population with a similar population using learning disability services in a neighbouring borough.

Objective 2.3: To gather information regarding the types of Speech and Language Therapy intervention being offered to that population.

These three objectives are grouped together because they are all primarily concerned with the development and introduction of the same Referral Form. There were some minor modifications for the realisation of ***Objective 2.3*** regarding Speech and Language Therapy provision. The rationale for the development of a referral form is explained, with an account of its construction, content and administration details. The various survey findings are then discussed in relation to the three research objectives. The relevant survey forms are to be found in the appropriate part of the appendices: **Appendix B1** and **Appendix B2**.

3.3.1 Development of a Referral Form

1. Concept:

The purpose was to survey the target population of adults with learning disabilities by examining the parameters of intentional communication and purposeful activity. By determining those who were not yet intentional communicators and who also engaged in non-purposeful activity, the criteria for suitable participants for the study were established. This is referred to as *Survey 1: Study Population*.

A second Referral Form was constructed for survey of a similar population in a neighbouring borough, with the added purpose of collecting data regarding the type of Speech and Language Therapy currently being provided by the specialist service. This was to ascertain the representativeness of the sample and to establish the need for development work regarding intervention procedures. The second survey is referred to as *Survey 2: Survey Population*.

2. Construction:

The Referral Form needed to be a short questionnaire format comprising homogenous statements that would serve as clear indicators of the two parameters: intentional communication; and purposeful activity. The Referral Forms for *Survey 1: the Study Population*, and *Survey 2: the Survey Population* are to be found respectively in **Appendix B1** and **Appendix B2**.

The four statements presented on the Referral Forms were:

1. The client usually uses spoken words, signs or symbols to communicate with others.
2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented.
3. The client's personal needs are usually supplied and anticipated by others.
4. The client usually engages in non-purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in nature.

The opposing statements of meaning (i.e. statements 1 and 3; 2 and 4) were included to safeguard the internal reliability of referral completions, i.e. a client was not typically able to:

"... use spoken words, signs or symbols to communicate with others"

if it was also true that:

"The client's personal needs are usually supplied and anticipated by others".

Similarly, it could not be said to be typical or characteristic of a client to:

" ... usually engage(s) in purposeful activity of own accord, which is either goal or person oriented"

if it was also characteristic that the person:

" ... usually engages in non-purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in nature".

3. The parameters:

Two parameters of interest were defined: (i) intentional communication; (ii) purposeful behaviour.

(i) Intentional Communication in this study, was interpreted as the '*referential level*' as described by Coupe and Joliffe (1988). The client was required to use spoken words, signs or symbols in their communication acts. The two earlier stages of intentional communication referred to by Coupe and Joliffe (1988), namely the "primitive" and "conventional", where intentional actions on adults/objects, and conventional signals such as gesture, vocalisation, appropriately directed eye gaze, were not included in the final statement on the Referral Form. The researcher wished to separate those who were able to communicate with a common referential code from those who relied on potentially ambiguous forms, thus requiring inference to various degrees from the significant other. The opposite end of this parameter of intentional communication was referred to as the significant other's anticipation of the client's needs, therefore indicating a high degree of inference on their behalf.

The use of '*referential communication*' was to maintain the simplicity of referral definitions for ease of completing the form by the significant others, and to broaden the criteria of participants included in the project. Clients with some pre-intentional and intentional communication behaviours were included in the project as the inferential status of the significant other was still considered to be variously important to the success of the communication act. A greater degree of inference is required from the significant other in both primitive and conventional communication acts, whereas in

referential communication, the client is able to use a common code, such as sign and words, thereby facilitating the significant other's decoding. This reduces any potential ambiguities in the communication acts. Prior to this emergence of reference, the role of the significant other is one of degrees of interpretation through pre-intentional communication up to and including the 'conventional level' of intentional communication.

(ii) **Purposeful Behaviour** was defined to include person or goal oriented interactions with the environment, the emphasis being placed on individual initiative. This was to differentiate between purposeful activity which is regularly prompted by the significant other, where a client may in fact be passive to the process, and interactions with people and objects which demonstrate participant initiative. The researcher was primarily interested in active behaviour rather than respondent behaviour or passive compliance.

4. Administration:

The Referral Form was distributed by the researcher to the identified keyworker for each client within the identified setting. The keyworker was required to have worked with the client for a minimum period of six continuous months. If this minimum of six months had not been achieved, the previous keyworker was to be approached. However, there was no one person in the study population who had been in the service less than six months.

The keyworker was asked to complete the form based on their knowledge of the participant. Consideration of each statement was required, and if deemed to be typical or characteristic of the client for most of the time, the item was ticked. If a statement was not considered to feature highly in the client's behaviour, it was not ticked. If the keyworker felt the statement was not typical but occurred sometimes or occasionally, the comments section was used. All completed Referral Forms were returned to the researcher.

Upon receipt of completions it was obvious that some displayed contradictions in their statement responses, e.g. a client was said to usually engage in purposeful activity as well as to usually engage in non-purposeful. A further step in the referral process was added, whereby the researcher instructed the keyworker to rank order the two statements, only ticking the *most typical* statement, and commenting on the other.

Interpretation of the Referral Forms was as follows:

- participants defined as typically representative of statements 1 and 2 were immediately excluded from the project as intentional communicators who engaged in purposeful, goal or person oriented activity;
- participants defined as typically representative of statements 3 and 4 were immediately included in the project as communicatively dependent on others to supply and anticipate their needs, and who may engage in non-purposeful activity.

The survey of the population in a neighbouring borough had extensions to the Referral Form as shown in full in **Appendix B2**. This was subsequently completed by the appropriate Speech and Language Therapist for each client.

QUESTION	RESPONSE
• Is the client receiving Speech and Language Therapy?	YES/NO
• If Yes, what kind of therapy?	
• Do you expect significant change?	YES/NO/UNSURE

**Table 3.3.1.1: Additional Information Regarding
Speech and Language Therapy Service**

The objective of these extended questions was to find out what kind of clients were receiving Speech and Language Therapy input (intentional or non-intentional communicators etc.); the therapeutic approaches being used; and the expectations for progress by the therapist. Thus it was intended to establish the need for the development of a more standardised assessment and intervention procedure for use with clients of a greater dependency level on others, both in terms of communication and engagement level.

3.3.2 Data Analysis

Appendix B1: Referral Form (Survey 1: the Study Population)

Upon completion of the **Appendix B1: Referral Form** by the relevant keyworkers, the sample population was defined using the already stated criteria: those clients who were said to exhibit behaviours 3. *The client's personal needs are usually supplied and anticipated by others*; and 4. *The client usually engages in non-purposeful activity*

which is not goal or person oriented and may be repetitive or stereotypic in nature, in any combination. The addition of statement 1. The client usually uses spoken words, signs or symbols to communicate with others, was only included when qualified by written comments from the keyworker. Those clients exhibiting behaviour 2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented, in any combination were automatically excluded from the sample population.

As well as defining the sample population, the survey by *Referral Form* aimed to describe the clients according to distribution of sex; age; and to draw comparisons with the remainder of the population. Quality of *Referral Form* completions was examined together with the response groupings for all returned forms.

Appendix B2: Referral Form (Survey 2: the Survey Population):

A second survey was carried out in three Day Centres for adults with learning disabilities in a neighbouring borough, using an extended version of the *Referral Form*. Additional information sought related to the incidence and type of Speech and Language Therapy input currently being carried out with the population, and the expected outcomes of the intervention as perceived by the relevant Speech and Language Therapist.

Due to a lack of clarity in the keyworker system, the *Referral Forms* were variously completed by keyworkers and the Speech and Language Therapists. Unfortunately, incomplete data on returned forms prevents the reporting of the gender distribution. The stringent confidentiality applied to this survey on a population not known to the researcher forbade any kind of follow up of missing data.

3.3.3 Interpretation of Results: Objective 2.1

Keys are provided as a preface to each section, informing the reader of the size of the relevant survey population(s). A full summary of the survey's data in the form of tables and figures with relevant captions is to be found in **Appendix B3**, for which the reader is referred to **Volume II** (p. 112).

Objective 2.1: To identify amongst the study population of people diagnosed as having some degree of learning disability, those who are not yet using symbolic representations in intentional communication acts; who are largely dependent on others for the maintenance of their support needs; and who spend a perceived majority of their time engaged in non-purposeful activity.

1. Distribution of Responses on Referral Forms:

(Appendix B3)

Completed Referral Forms were sub-grouped according to the definitions over the page. These were based on the various potential response combinations that might occur. They were assigned to the sample population or the remainder, according to the two parameters of intentional communication and purposeful activity. The four statements that appeared on the Referral Form are provided for the reader as reference for the tables of definitions.

2. Referral Form Statements:

1. The client usually uses spoken words, signs or symbols to communicate with others.
2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented.
3. The client's personal needs are usually supplied and anticipated by others.
4. The client usually engages in non-purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in nature.

SAMPLE POPULATION	REMAINDER POPULATION
<i>Group A:</i> Statements 3 and 4 identified positively.	<i>Group E:</i> Statements 1 and 2 identified positively.
<i>Group B:</i> Statement 4 only identified positively.	<i>Group F:</i> Statements 1, 2 and 3 identified positively, e.g. contains contradiction between statements 1 and 3.
<i>Group C:</i> Statements 3 and 4 identified positively with the inclusion of Statement 1, when qualified through consultation with the relevant keyworker.	<i>Group G:</i> Statements 2 and 3 identified positively, either singularly or else in combination.
	<i>Group H:</i> Statements 1 and 4 were identified positively and accompanied by qualification of statement 2 by hand written comments, e.g. the participant was said to exhibit some non-purposeful behaviours but was acknowledged to also engage in purposeful activity.

Table 3.3.3.1: Referral Form Response Groupings

Two additional categories were formed to cater for: (i) particular clients with similar presenting features to the sample population but with an alternative diagnosis; and (ii) invalid referral form completions.

EXCLUSIONS	
<i>Group D:</i> Statements 3 and 4 identified positively but participants excluded due to known other diagnosis, e.g. elective mutism.	<i>Group I:</i> Referral forms were deemed invalid due to: (a) all statements identified; (b) no statements identified.

Table 3.3.3.2: Referral Form Response Exclusions

3. The Sample Population:

(Appendix B3)

KEY for SURVEY 1: Total Population = 136; Sample Population = 21; Remainder of the Population = 115
--

The **sample population** was defined as those clients amongst the total population who were described appropriately in the listed statements as: (3) *Client's needs are usually supplied and anticipated by others*; and (4) *Client usually engages in non purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in type*. Additionally statement (1) *Client usually uses spoken words, signs or symbols to communicate with others*; was included when qualified by comments from the keyworker regarding the size of vocabulary and its uses. This was done, as it was clear to the researcher that few keyworkers were able to discriminate between evidence of intentional communication and the existence of non-functional echolalic language.

Survey 1 identified a sample population of 15% (n = 21) with three clients being excluded. These three clients had "*slipped through the net*" on the first round of form completions, two of whom were known to the researcher as having an alternative differential diagnosis of elective mutism. Thus they appeared to be non communicating and withdrawn but actually had the appropriate skill sets to be intentional communicators. They had opted out of purposeful activity and communication act participation. The third excluded client was later found to be new to the Centre having recently moved from paediatric to adult services, and together with a reserved disposition had not yet integrated into the events of the Centre. She was found to have reasonable communication skills but lacked the confidence to practise her skills as yet.

3.3.4 Interpretation of Results: Objective 2.2

Objective 2.2: To compare the study population with a similar population using learning disability services in a neighbouring borough.

1. Sample Population:

KEY for SURVEY 1: Total Population = 136; KEY for SURVEY 2: Total Population = 194.

Survey 2 identified a smaller sample population of 10% ($n = 19$) with no identified exclusions. A number of reasons may account for this difference in sample size between the two survey locations:

- i) The first survey location had recently completed a resettlement programme of clients from a large institution into community based residential and day services. The higher incidence of people with severe-profound learning disabilities with multiple sensory impairments in long stay institutions has been reported (Mansell, Felce, de Kock and Jenkins, 1982), and this may have affected the sample figures in a Centre where such a programme of integration had already happened. This may partly explain the increased level of clients who did not exhibit referential communication behaviours and engage in non-purposeful behaviour in the *Survey 1*.
- ii) A further explanation may lie in the younger population in the location for *Survey 1*. The planned closure of the nation's large residential institutions for people with learning disabilities, meant a greater emphasis being placed on community services, including educational, social, health and domestic care. The prevention of re-admission to hospital has run concurrently with this. Thus a survey of a younger population will be influenced by the nature of its community services and its lack of institutional care practice, e.g. people who would have been institutionalised ten years before are now maintained in community services.
- iii) A policy move within the social services department at the time of *Survey 1*, recommended a restriction on Day Centre places for those people with lower dependency needs, diverting them into the appropriate special needs courses run in the local Further Education College, or else into the borough based employment

initiative for work experience or paid employment. Thus the shift in Day Centre use had been towards meeting the needs of those learning disabled people with higher support and dependency requirements.

2. Remainder of the Population:

KEY for SURVEY 1: Total Population = 136; KEY for SURVEY 2: Total Population = 194.

Both survey locations showed the largest number of referral responses to fall within **Group E**. Clients complied with statements *1. The client usually uses spoken words, signs or symbols to communicate with others;* and *2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented.* This group represented the greater percentage of the remainder of the population in both locations.

Distributions in **Group F** were represented by a contradiction between two opposing statements, i.e. *1. Client usually uses spoken words, signs or symbols to communicate with others;* *3. Client's needs are usually supplied and anticipated by others.* This may be explained either by the difficulty experienced by the keyworkers in rank ordering the statements within the parameter of intentional communication, or else by a lack of clarity in the defined statement 3, i.e. keyworkers were seen to interpret statement 3 as evidence of the client's laziness rather than a limited skill set - "*x doesn't help him/herself*" or "*I end up doing it all for x*".

Group G was defined by the following statements: *2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented;* *3. The client's personal needs are usually supplied and anticipated by others.* It identified those clients who experienced specific communication difficulties that affected their ability to supply their own needs. **Group H** was defined by those clients who complied with statement *1. The client usually uses spoken words, signs or symbols to communicate with others;* and both statements *2. The client usually engages in purposeful activity of own accord, which is either goal or person oriented;* and *4. The client usually engages in non-purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in nature.* However, Statement 4 was qualified as second to Statement 2 according to the keyworker's evaluation.

Those clients who were distributed in *Groups E - H* were therefore said to comprise the **Remainder of the Population**, and were excluded from the assessment and intervention phases of the project.

3. Age Range of Total Population:

The age range of each survey population was examined. *Survey 1: the Study Population* attending a single Day Centre facility comprised a younger population with its oldest members in the age range of '31-40 years', a second Day Centre was designated for those service users above the age of 30 years. The two clients who fell within the '31-40 years' age range were considered exceptions to the rule, one client having been granted a special dispensation to remain at the younger Day Centre for personal reasons, another client having only just entered adult services was completing an assessment phase prior to moving on.

In contrast, *Survey 2* examining the population using three Day Centres in a neighbouring borough, focused on all ages, as services were integrated. The oldest clients in this survey were '61 plus' years. One client's age was reported as 'unknown'.

In *Survey 2* there is evidence of a positive skewing of the age distribution, that is more than 50% of the population fell within the younger age ranges (18 to 30 years of age). The incidence of debilitating illness early on in the ageing process amongst the learning disabled population may be a factor, e.g. Alzheimer's Disease, which may prevent attendance of the day service or even result in death. Reid and Aungle (1974) surveyed learning disabled patients and found the prevalence of dementia to be more than double the rate for the normal population: about 7% of those over 45 years, and nearly 14% of the over 65s. It was acknowledged that these figures were probably influenced by the inclusion of people with Down's Syndrome where a link with Alzheimer's is well established as commented on by Prosser (1989).

4. Quality of Referral Form Completions:

The second survey contained only 3% contradictions as opposed to 9% in the first survey. This difference is explained by the fact that *Referral Form* completions were only partially completed by keyworkers in *Survey 2*, due to the already mentioned lack of clarity in the staffing system, the remainder being done by the relevant Speech and

Language Therapist. *Survey 1* relied entirely on the staff team of keyworkers. The professional knowledge base and skill mix of the Speech and Language Therapist regarding assessment and the use of client questionnaires probably accounts for the disparity between the two survey locations concerning the number of *Referral Forms* containing contradictory responses, i.e. the keyworking staff were not as practised in filling out this kind of Referral Form.

3.3.5 Interpretation of Results: Objective 2.3

Objective 2.3: To gather information regarding the types of Speech and Language Therapy intervention being offered to that population (*Survey 2*).

KEY for SURVEY 2: Total Population = 194; Sample Population = 19; Remainder of Population = 175.

Additional questions were posed to the Speech and Language Therapist in the second survey concerning: (a) *the distribution of Speech and Language Therapy input*; (b) *the type of therapy techniques being used*; (c) *the expected outcomes of therapy as perceived by the Speech and Language Therapist*.

1. Distribution of Speech and Language Therapy Input:

Only 34% (n = 59) of the remainder of the population were receiving therapy as opposed to 63% (n = 12) of the defined sample. Two possible explanations for this difference are offered: (i) the Speech and Language Therapist had expressed interest in the use of '*sensory-based activities*' with non communicating clients; and (ii) the special needs unit had been prioritised for input by a limited Speech and Language Therapy resource.

2. Type of Therapy:

Therapy for the remainder of the population largely involved the application of '*role play*' techniques and '*basic functional communication*' work, both of which emphasise the role of the intentional communicator to various degrees. '*Direct speech work*' represented only 2% (n = 1) of therapy activity with the remainder of the population and is probably due to the lack of documented success in this type of work with learning disabled people. '*Sensory activities*' made up 42% (n = 5) of therapy activity to the sample population but by the therapist's own admission was not based on a clear clinical

rationale or assessment findings, but more on intuition and borrowed ideas from documentation on sensory leisure environments, (i.e. Snoezelen: Hulsege and Verheul, 1986), and the writings of the Sensory Integration Theorists (Ayres, 1972; 79). In short, interest in these sorts of activities was expressed and there was an element of '*trying out*' activities which supported the notion of sensory stimulation, but no formal protocol for decision-making in therapy was evident.

3. Expected Outcomes of Therapy Input:

Expected outcomes of therapy were rated for each technique by the Speech and Language Therapist. A similar rating of positive outcomes in over half of cases in both the sample and remainder of the population was shown. The rest of the cases were considered to have '*unsure*' outcomes. The paucity of standard assessment and therapy packages available for clinical use with this population, together with the relative novelty of Speech and Language Therapy in this field of work (i.e. 1980 heralded the employment and development of multi-disciplinary teams for the learning disabled including Speech and Language Therapy), and a shortage of available and documented research into assessment and intervention strategies with this population, has probably effected this lack of clear prediction regarding therapeutic outcomes.

3.3.6 Summary and Conclusions

Thus the **Sample Population** was identified. It was recognised that the *Referral Form* (Appendices B1 and B2), whilst sensitive to those clients who were apparently not engaging in purposeful activity and relying on others to supply their needs, did not discriminate sufficiently between those people who were described as characteristically not using '*symbolic representations to communicate with others*', and those who were simply not observed to be practising the use of their skill sets. This seems to be the case for the three excluded clients. It therefore follows, that cautious use of the *Referral Form* is recommended, with interpretation restricted to a first level upon which to describe a population.

Fortunately, two of the three clients in **Group D** (the excluded category), had been previously assessed by the Speech and Language Therapy service and their diagnosis of '*elective mutism*' was known to the researcher. The third person who was new to the Centre presented as '*extremely shy*' and further investigations via the keyworker and

residential placement revealed verbal communications with her peers, particularly at home. It was felt that a useful adjunct to the *Referral Form* (**Appendix B1**) would have been a section to ascertain:

- (a) length of time client has attended the Centre and a space for office use only to record follow up details;
- (b) information gathered from keyworker/significant other contact, individually documented records, particularly in relation to an alternative diagnosis.

Unfortunately, reliability ratings were not included in this initial survey due to the use of the already established keyworker system in the Centre and the lack of availability of a second, familiar, significant other at that time. Later on in the research project this problem was minimised due to the establishment of keyworker teams led by a senior staff member who was familiar with all the clients within the relevant team. However the Speech and Language Therapy service in the Centre had previously identified those amongst the population who could be said to meet the referral criteria, thus agreement was achieved and the suitable participants identified.

3.4 Multi-Axial Comparison Between the Sample and Remainder

(Objective 2.4)

Objective 2.4: To survey and recount the distinctive features of the sample population in a multi-axial descriptive comparison with the remainder of the study population.

Once the sample population had been defined according to the referral criteria, it was decided to provide a richer description of the participants, by drawing multi-axial comparisons with the remainder of the population. The rationale for the development of a Case History form with coding frame is initially explained, with an account of its construction, content and administration details. Information was gathered from a variety of sources including: social services records; Speech and Language Therapy casenotes; keyworker/significant other interview. The findings are then discussed in relation to the defined areas for comparison. The relevant Case History form with integral coding frame is to be found in **Volume II: Appendix B4 (p. 122)**.

3.4.1 Development of a Case History Form

1. Concept:

In order to define the sample population, a Case History form was devised, the specific objectives being:

- a) to describe trends in service received by participants;
- b) to quantify skill sets of participants;
- c) to describe the problems of participants;
- d) to identify the demographic features of the population.

Ultimately, it was intended that comparisons between the sample and remainder of the population could be drawn on a multi-axial frame of reference.

2. Construction:

The Case History sought to collect information relating to each participant, and covering the following areas:

- social and demographic characteristics;
- family information and background;
- medical history;
- sensory profile (hearing, vision, mobility);
- skill set (self help skills, continence, literacy and community living skills);
- communication skills (status, history, previous management);
- problem oriented list;
- perceived support needs.

The Case History format aimed to formalise the procedures by which the therapist would usually collect background data relevant to clinical practice. Thus collection and response procedures within the Case History varied according to the type and source of the information. Sources included: established social and medical records of participants; previous Speech and Language Therapy casenotes; and interview of significant other.

The Case History format was based on a survey of new referrals to a Psychiatry Service conducted by the National Unit for Psychiatric Research and Development (NUPRD), and completed and published by Bouras, Drummond, Brooks and Laws (1988). Their Case History items had been defined by combining the 'Disability Rating Scale'

(Humphreys, Lowe and Blunden, 1983); the 'Speech, Self Help and Literacy' (S.S.L.), 'Social and Physical Incapacity' (S.P.I) Scales (Kushlick, Blunden and Cox, 1983) and the 'Disability Assessment Schedule' (Holmes, Shah and Wing, 1982).

Their use of the 'Clinical Psychopathology Mental Handicap Scale' was not included in the current survey. This was the professional domain of interest of the Bouras et al survey (1988) which was Psychiatry led. However, the current study focused on three sections in expanded formats that were considered to be more representative of the professional domain of interest:

- hearing;
- communication skills;
- support needs.

The section on '*hearing*' was expanded due to the improved availability of accurate assessment information on the hearing status of participants. Concurrent with this study, the researcher was also involved in a district wide project to discover the prevalence of hearing impairment amongst adults with learning disabilities, hence more relevant and precise information was available.

The section on '*Communication Skills*' was broadened due to its specific relevance to the project and to the availability of background data through previous Speech and Language Therapy records from paediatric service assessments to adult service casenotes. The researcher gathered information directly relating to the current and previous communication status of the person, particularly to identify any skill set loss. It was observed that amongst the Speech and Language Therapy caseload, there were those who reportedly "*used to say some/a word(s)*" when young. The researcher aimed to examine the prevalence of '*lost words*' amongst the population and to see if any might emerge during the course of intervention.

The Case History consisted of simple questions that offered a coded frame of responses, similar to the usual format of a data base. The code '*other*' was included where the coding frame by its very nature could not be definitive, e.g. place of residence; medication etc. Certain areas employed a rating scale to be used by the significant other, i.e. to determine frequency of epileptic seizures; extent of functional skills - literacy,

numeracy; communication; and community living skills. Severity with frequency was rated for the problem oriented list, and a ratio scale was employed for the '*Support Needs*' of the client.

3. Administration:

The Case History was administered by the researcher who gained access to each client's social and medical records; audiometric test results; and previous Speech and Language Therapy case notes.

For the completion of items requiring the use of a rating scale, the relevant significant other was interviewed and the responses were recorded. The definition of an appropriate significant other was identical to that applied in the administration of the Referral Form, i.e. a Day Centre worker who had known the client continuously for no less than six consecutive months.

Thus, the population was defined in terms of the areas mentioned, and the potential for comparisons between those clients who fell within the sample population and those in the remainder, was established.

3.4.2 Interpretation of Results: Objective 2.4

Objective 2.4: To survey and recount the distinctive features of the sample population in a multi-axial descriptive comparison with the remainder of the study population.

The interpretation of the Multi-Axial Case History information follows the order in which sections appear. Sections are also labelled in similar format. The reader is referred to **Volume II, Appendices B5 to B15 (p. 128)**, for the appropriate tables and figures in support of the text. The relevant appendix is identified at the beginning of the discussion for each area of the Case History information, together with a key of notations used and the sub-population's size. The key issues from each area of the survey are highlighted regarding their implications for the main study.

A. Personal Information

(Appendix B5)

KEY: S.P. = Sample Population of 21 participants; R.P. = Remainder of the Population of 115 participants.
--

1. Gender Distribution:

Overall there was a higher percentage of males in the total population which is similar to other prevalence studies of learning disability (Bouras, Drummond, Brooks and Laws, 1988).

2. Home Environment

In both defined sections of the population, the majority of *people lived* in the family home. The low age range of the total population being in the 18 to 30 year range probably accounts for the limited use of other residential provision, i.e. client increase in age is concurrent with parental increase in age, which may result in a declining ability to 'care' for the learning disabled son or daughter. It is also true that an ageing population with learning disabilities will have changing needs which may prompt the need for a move. Therefore, the older the client, the greater the need for alternative residential provision.

The use of hostel accommodation was roughly the same percentage for both sub-sections of the population. A small number of the R.P. ($n = 7$; 6%) were in lodgings. This was a semi-independent scheme within the borough for more able clients. The rest of the S.P. were resident in community homes ($n = 3$; 14%) which compared with just one person in the R.P. The differing residence in community homes may be explained in part, by the fact that at that time, the community homes in the borough were set up as alternative accommodation for people returning to the community from long stay institutions for the learning disabled, a large number of whom had high dependency needs.

3. Institutional History:

Current living circumstances need to be considered in the context of the institutional history or experience of individuals. A greater proportion of the S.P. ($n = 7$; 33%) were documented as having been resident in a long stay institution at some time, compared with only 7% ($n = 8$) of the R.P. Mansell, Felce, de Kock and Jenkins (1982) commented on the increased use of residential care for learning disabled people who were considered

'severely incapacitated' (i.e. non-ambulant, incontinent or behaviourally disturbed) (p. 598) as reported by the Department of Health and Social Security (1980).

Some information relating to duration of episode in institutional care was not available, particularly with regard to the R.P. Of those people who had been institutionalised at some time, proportionally more in the S.P. (n = 4 participants) had spent in excess of five years in an institutional residence. This was the case for only one person in the R.P. For two people with an institutional history, this information was not available. These proportional differences may be supported by the more frequent institutionalisation in the past of people with severe disabilities as defined by the criteria for the S.P.

4. Implications for Main Study:

The relevance of each participant's personal history and the potential effects of different living situations on the skills and social behaviours of individuals is acknowledged (Zigler, Balla and Kossan, 1986). In order to understand the presenting characteristics of the sample population, knowledge of an individual's institutional history is considered useful. Furthermore, for the future planning of services, the experiences of the past and their possible influences on the current skill set use by, and the behaviour of, clients is deemed important.

B. Family Background

(Appendix B6)

KEY: S.P. = Sample Population of 21 participants; R.P. = Remainder of the Population of 115 participants.
--

1. Parent and Siblings:

Both defined populations were described according to *parents alive* and *siblings*. There were more parents reported to be alive amongst the S.P. than the R.P. and in both the maternal parent was the most frequently alive. The majority of participants had at least one sibling.

2. Family History of a Learning Disability:

This was reported in only a few cases in both sub-populations (R.P.: n = 8 ; S.P.: n = 3) which is roughly similar to the findings of Bouras et al (1988). They reported that 9% of

cases surveyed in a large institution had a relevant family history. This was reported variously as either parent, sibling(s) or other relative with a learning disability.

3. Family History of Psychiatric Problems:

This was reported in only a few cases again, although there was incomplete data available. Bouras et al (1988) reported the higher figure of 26.2% for an institutionalised population with learning disabilities. This difference may be due in part to variations between a community based and an institutionalised population, and also to possible inaccuracies recorded in social services records used for this research project as opposed to the medically based records used for the survey conducted by Bouras and his colleagues (1988).

4. Implications for Main Study:

This information, whilst forming part of the normal Case History data gathered by Speech and Language Therapists does not have any particular implications for the main study.

C. Medical Information

(Appendix B7)

KEY: S.P. = Sample Population of 21 participants; R.P. = Remainder of the Population of 115 participants.
--

1. Aetiology of Learning Disability:

Not surprisingly, the most frequently reported known *aetiology of learning disability* was 'Down's Syndrome' for the total population (n = 42; 39%). Of this figure for the total population, the highest number of participants fell within the R.P. (n = 40; 38%). 'Peri/post natal trauma' was the greatest known aetiology reported for the S.P. (n = 4; 19%) although the majority of information was either reported as 'not known' (n = 4; 19%) or 'not available' (n = 6; 19%). The category 'other' represented 19% (n = 4) of the S.P. which included one participant with Rett's Syndrome; and one with Turner's Syndrome.

2. Epilepsy:

The prevalence of *epilepsy* for the total population was 20.6% (n = 28) which is slightly lower than the 28.3% found by Bouras et al in their institutional survey (1988). This may

be accounted for by differences in level of disability in the institutionalised population as compared with those placed within the community. A higher percentage of the S.P. (n = 9; 43%) was reported as having epilepsy as opposed to 17% (n = 19) of the R.P., the frequency and type of seizure being respectively higher and more severe for the S.P. This must be highly significant and is borne out by the literature which states that the higher the dependency level or the more the severe the learning disability, so there is also an increase in prevalence, severity and frequency of epileptic seizures (Jacobson and Janicki, 1983).

3. Medication:

The most frequently prescribed *medication* amongst the study population was anti-convulsant in type. Psychotropic medication was prescribed for just a few participants in the total population (n = 7; 5%). Bouras et al (1988) reported usage to be higher at around 15%. These differences may be explained by contrasts in levels of disability between the community based population of the present survey, and the institutional population surveyed by Bouras et al (1988). The history of the institutional service may also be significant, where perhaps medication was used more frequently to manage difficult behaviour. Community services with the inception of multi-disciplinary teams has introduced the use of behavioural management and other educational programmes on a more wide spread scale and this is likely to have affected the prescription and use of medication to remediate behaviour.

5. Implications for Main Study:

The higher incidence of epilepsy and the use of anti-convulsant medication with its potential effects on participant performance again may provide an explanation of current behaviour. The therapist needs to be aware of those clients who experience petit-mal seizures characterised by minor absences, as their occurrence will affect the delivery of therapy in any one session. Similarly, the timetabling of intervention sessions may be influenced by the occurrence of seizures or the taking of medication, e.g. an individual's drug regime may influence his/her performance at certain times during the day (rendering the client drowsy or lethargic), which in turn will require adjustments to the timing of therapy sessions if optimal client performance is to be attained.

D. Sensory Information

(Appendix B8)

KEY: S.P. = Sample Population of 21 participants; R.P. = Remainder of the Population of 115 participants.

Information on *sensory impairment* was not always readily available to the researcher. The main difficulties concerned the documentation of assessment results as '*unreliable*' or the client described as '*untestable*'. In short, the usual performance tests requiring the use of conditioned, voluntary motor responses, as used with the normal population for the assessment of visual and hearing acuity, were often unsuited to the learning disabled population, particularly for those with much higher levels of dependence. Hogg and Sebba (1986a) commented on the difficulties in acquiring reliable assessment information on auditory and visual status for those with profound learning difficulties, due to problems with standard assessment procedures. The possibility of deficient assessment data on participant's hearing and vision may have implications for the main study regarding the application of therapy procedures.

1. Visual Acuity:

Not surprisingly for 33% (n = 8) of the S.P. no reliable data were available on *visual status* as opposed to only 6% (n = 7) of the R.P. This is probably due to the inability of the more severely disabled S.P. to co-operate on performance test procedures and the lack of availability of the more suitable electro-physiological response investigations.

Poor vision was reported for 16% (n = 18) of the R.P. and only 10% (n = 2) of the S.P. There was no reported incidence of '*bilateral blindness*' although 2% (n: 2) of the R.P. experienced '*unilateral blindness*'. This differs significantly from the 11% incidence of '*bilateral blindness*' identified in the Bouras survey (1988). Ellis (1979) reported an expected 5% incidence in his wider literature review. The National Development Team gave a 5.2% figure amongst learning disabled hospital residents who were classified 'blind'.

This variance amongst the reported prevalence figures may be attributed in part to the differences in definition of visual impairments: a variety of terms have been used in studies of prevalence, including 'visual handicap', 'visual impairment', 'blindness', 'partial sight', 'visual acuity', amongst others (Hogg and Sebba, 1986). A second reason

CHAPTER 4:

CONSTRUCTION OF INSTRUMENTATION AND PILOT STUDIES

4.1 Introduction to Construction Phase

This chapter is about the development of the instrumentation and the pilot studies. The construction part of this project has focused on the development of appropriate instrumentation for the purposes of assessment and intervention planning. Two pilot studies were also completed to check the feasibility of the experimental procedure.

This chapter concentrates on *Objectives 3.1, 3.2, 3.3 and 3.4*. The two main pilot studies are called **Pilot Study 1** and **Pilot Study 2**. Each followed the full research procedure to test the feasibility of the larger scale study. Out of the two, only the first was a planned pilot study. The second study should have been the initial phase of the actual research, however a number of difficulties arose that had not been encountered in the first pilot, thus defining its status as a second pilot. This caused a delay in the start of the planned research project.

The two pilot studies are referred to in the first part of this chapter with regard to the development and construction of the instrumentation. The second part of this chapter gives a fuller account of the findings of the two studies and outlines the implications for the main study.

4.2 Development of I.S.E. Decision-Making Schedule

Objective 3.1: To develop a standard schedule whereby clinical decisions are structured for the operationalisation of the programme of intervention.

4.2.1 Concept

It was the researcher's aim to construct a standard format for the taking of clinical decisions regarding intervention planning for all participants. Decisions were to be focused on the following key questions: (i) What responses are produced by and can therefore be expected of the participant?; (ii) What support cues facilitate the participant's responding behaviour?; (iii) Which sensory feedback features of distinction

motivate the participant to respond and which ones provoke an aversive response?; (iv) What constituents of the interaction are identified for the individual as evident by their responding behaviour, i.e. person, object, person and object?.

Other key areas needed to be addressed in the construction of the Decision-Making Schedule:

- selection of vocabulary for presentation of items;
- order of presentation of items;
- identification of potential risks for each participant.

It was the researcher's intention to construct a Decision-Making Schedule that would set the structure for the individual's '*Sensory Environment*' by a standard procedure, thereby facilitating a consistent approach across all participants.

4.2.2 Construction of Schedule

The Decision-Making Schedule was constructed in eight main areas: 1. the initial criteria governing the selection of stimuli; 2. the support cues required in order to meet client needs regarding response facilitation; 3. the selection of vocabulary for use by the therapist in the presentation of items within the Schedule; 4. a standard format or checklist for recording the response repertoires of clients; 5. identification of the constituent elements that make up an interaction; 6. the order of presentation of stimuli; 7. the final choice of stimuli for the Decision-Making Schedule; and 8. the procedure for a response contingent sensory input.

1. Selection of Sensory Stimuli:

A number of influential factors were considered in the initial selection of sensory stimuli.

Cost: Firstly, due to a limited budget the choice of equipment needed to be relatively low in cost and in total not exceeding £200.00.

Portability: Due to the research environment, i.e. non-laboratory type conditions, the equipment needed to be small and portable enough to be moved between locations within the Day Centre.

Constituents: The choice of stimuli needed to have the facility for both person and object interactions.

Dimensional Analysis of Feedback Features: Initially, an extended resource of equipment was "tried out" in three pilot therapy groups to examine their potential as motivating and stimulation forms of input. These items were a mixture of shop bought and those ordered from a special needs catalogue. The only criteria for including an item were that:

- a tactile feedback should be evident;
 - vestibular feedback should result;
- and not necessarily occurring together.

Then a dimensional analysis of all sensory stimuli was carried out with reference to the analysis of feedback features used by Bambara, Spiegel-McGill, Shores and Fox (1984), for the comparison of reactive and non-reactive toys on the manipulative play of disabled children. They used the dimensions of: a) sound production; and b) sustained movement (which related to the effects of object manipulation). It was decided to expand the number of dimensions used for analysis purposes, and to add: c) tactile feedback; d) visual qualities; e) vestibular feedback; all as appropriate to the item.

The table '*Dimensional Analysis of Feedback Features*' in the Appendices: **Appendix B1**, and described later on in this Chapter, presents a summary of the group of items. Items were initially grouped according to one shared feature, i.e. the vibro-bubble, body massager, vibro-tube, vibro-cushion had the sensation of vibration in common.

2. Hierarchy of Support Cues:

Although it was recognised that the execution of adaptive responses is largely dependent on continual feedback of sensory data, and adequate organisation and interpretation of incoming information, it was also recognised that how an activity is presented may be relevant to the individual's ability to respond. That is, each person needs various degrees of support in order to achieve the target response.

Thus, incorporated into the presentation of sensory items, was a hierarchy of cues, defined to ascertain the degree of help required by each participant. Prompts usually encompass physical, gestural or verbal support as long as the target behaviour results (Hogg and Sebba, 1986b). Prompted responses are rewarded and prompts are faded quickly to prevent prompt dependency. In this respect, the schedule's purpose differed,

the main intention being to find out the most appropriate communication stimulus for each participant. Response to a verbally more complex cue was acknowledged to be evidence of participant progress, or of less dependence on gestured or physical guidance. The hierarchy of cues is summarised below:

- i) Verbal presentation;
- ii) Verbal and referential gesture presentation;
- iii) Verbal and conventional gesture presentation;
- iv) Physical prompt presentation (the fourth cue under the '*presentation*' section was added in after Pilot Study 1 to prevent a “no response” occurring, i.e. ‘physical prompt’ would always get a baseline response).

Cues (i), (ii) and (iii) had an imitative component in that a model of the target behaviour was presented for the participant to copy. Baer, Peterson and Sherman (1967) emphasised this technique for the teaching of children with limited skill sets. Cue (iv) represented the simplest form of support in that the response demands on the participant were minimal. Murphy and Doughty (1977) taught simple arm movements to people with profound and multiple disabilities by the use of physical guidance. It was decided to include such a cue to cater for those participants for whom the behaviour was not currently evident. Alternatively, assistance was given to the participant rather than waiting until the behaviour occurred in order to reward it.

The cues were presented in order of the most complex or the one with the highest response demand of the participant, the first being verbal only; the second being supported by referential gesture (sign); the third being verbal supported by conventional gesture (arm reach); and the fourth being verbal supported by physical guidance resulting in a co-active arm reach. This hierarchy was designed to reflect a progression over four cues of help from (i) the least to (iv) the most supportive.

3. Selection of Vocabulary:

In order to uphold the principle of structured sensory input and to reflect the pre-intentional communication status of participants, it was decided to structure a small, functional core vocabulary for use within the Decision-Making Schedule. The aim was to use a minimal verbal code of important meanings, in order to avoid verbal

bombardment, and to maintain the sensory focus of the tactile and vestibular stimulation. It was acknowledged that "too much" verbal stimulation for the person with restricted linguistic comprehension may be equally as isolating as "too little" for the person with normal understanding.

In the construction of a small, meaningful, core vocabulary the following areas were considered:

- form of the message;
- content of the message;
- function of the message (Karlan and Lloyd, 1983).

Additional consideration was given to:

- frequency of occurrence of lexical item;
- functional utility across situations;
- basic human needs (Karlan and Lloyd, 1983);
- and the examination of the content categories demonstrated to be within the developing lexica of normal children (Bloom and Lahey, 1978).

The table over the page provides a summary of the proposed lexicon for the intervention, based on an initial sign lexicon proposed by Fristoe and Lloyd (1980). They incorporated the areas of form, content and use in their examination of the communicative message.

CONTENT	FORM			USE
	RELATIONAL		SUBSTANTIVE	
	NOT OBJECT SPECIFIC	RELATING TO MANY OBJECTS	OBJECT SPECIFIC	
Rejection	negative			Responsive
Non existence or Disappearance	negative, gone			Reporting fact
Cessation of action	negative, stop, gone			
Prohibition of action	no, stop			
Recurrence of object and actions on objects	more			Requestive
Noting the existence of objects	look	Look 'Name'		
Actions on object		Go		

Table 4.2.2.1: Rationale for the Organisation of a Core Lexicon

(based on Fristoe and Lloyd, 1980 - 'First Sign Lexicon')

The rationale for a core lexicon within the intervention is based on a number of issues referred to in the literature: (i) Leeming, Swann, Coupe and Mittler, (1979); and Kiernan, Reid and Jones (1982) concluded that many children were **failing to develop functional communication at a single word level**; (ii) Coupe, Barton and Walker (1988) observed that the **teaching of comprehension and expression tended to focus on object labels and identifications, rather than intended effects of communication**; (iii) Mittler and Berry (1977) suggested that an **over-emphasis on the teaching of labels may be counter-productive to development**; and (iv) whilst it is acknowledged that a child's initial lexicon contains a high proportion of object words (Benedict, 1979 - 50 per cent), **intervention strategies seem to ignore the role of semantics, so underlying concepts were not taught**. This was seen in the formal teaching strategies advocated for use by the Makaton Vocabulary Development Project (Walker, 1985).

Thus, the core vocabulary for the Decision-Making Schedule was based on:

- a) the use of first meanings concepts rather than verbal labels;
- b) introduction of concepts in a setting that offers relevance/significance of meaning to the participant, specifically relating to actions and object;
- c) opportunities for participants who are not yet ready to use words, for intentional communication with gestures and vocalisations.

The following table summarises the key meanings selected for use within the Decision-Making Schedule. They are structured according to the concepts of form, content and use.

FORM	CONTENT	USE <i>(with reference to Halliday, 1975)</i>
'NAME' <i>(participant's name)</i> LOOK	EXISTENCE <i>(noting the existence of another person)</i>	<ul style="list-style-type: none"> • Regulatory • Informational
GONE	NON EXISTENCE or DISAPPEARANCE <i>(noting the disappearance or withdrawal of an item)</i>	<ul style="list-style-type: none"> • Regulatory • Informational
GO STOP	ACTION/CESSATION OF ACTION <i>(observable change of activity or state)</i>	<ul style="list-style-type: none"> • Regulatory • Informational
MORE	RECURRENCE <i>(requesting repetition of action or object)</i>	<ul style="list-style-type: none"> • Regulatory • Instrumental

Table 4.2.2.2: Organisation of Core Lexicon for I.S.E. Schedule

(with reference to Bloom and Lahey, 1978; Leonard, 1984;

Coupe, Barton and Walker, 1988)

The selected core vocabulary was arranged into a hierarchy of presentation and recurrence cues for use within the Decision-Making Schedule. This is illustrated in the following Figures 4.2.2.3-4.2.2.7.

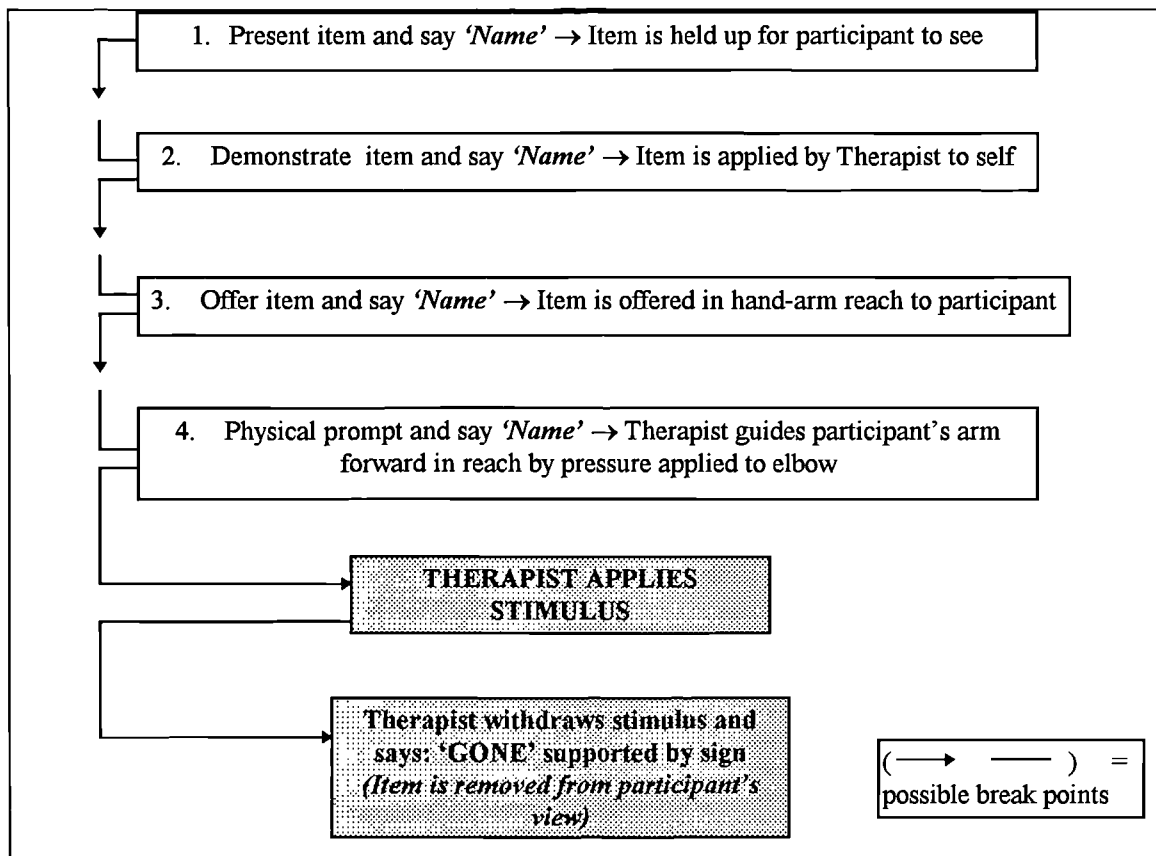


Figure 4.2.2.3: Hierarchy of Presentation Cues for Person Contact

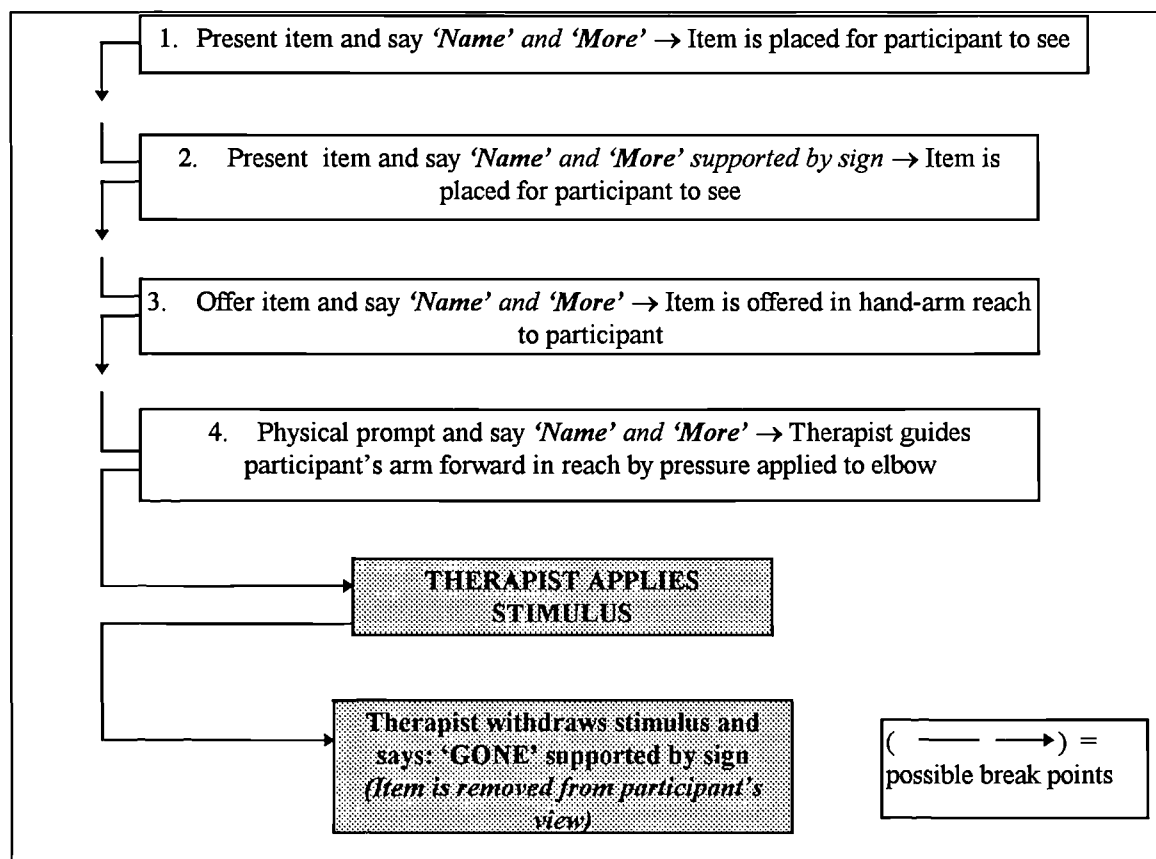


Figure 4.2.2.4: Hierarchy of Recurrence Cues for Person Contact

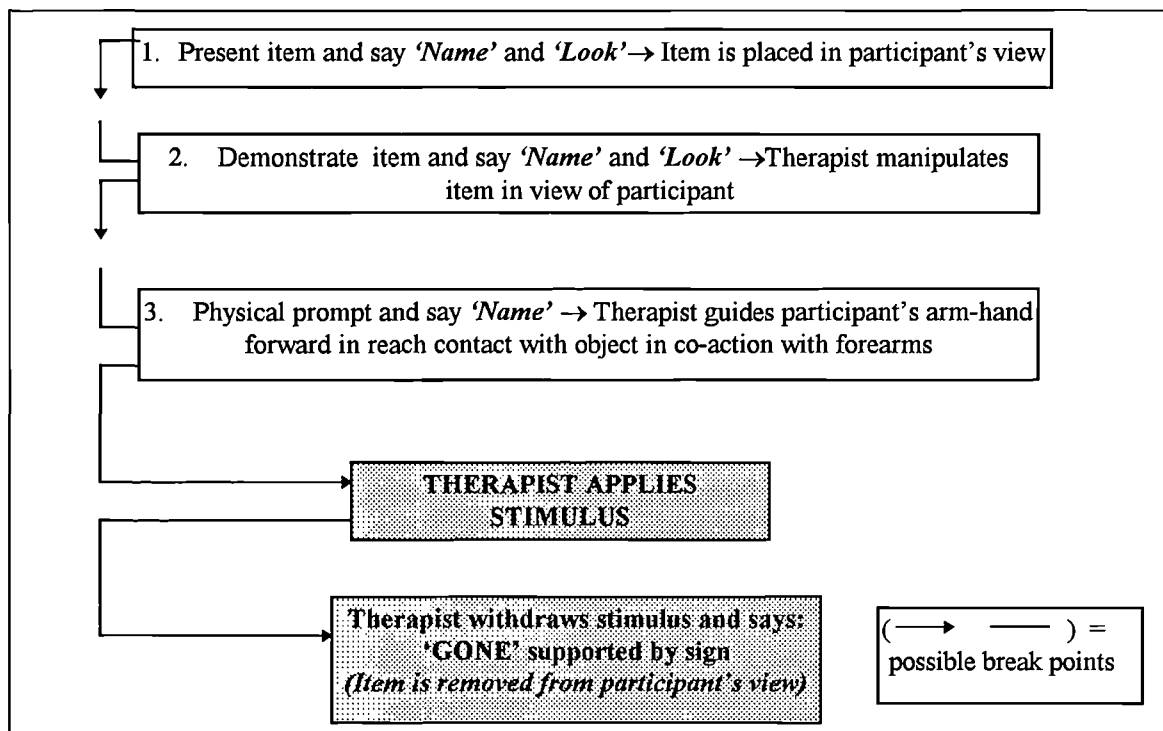


Figure 4.2.2.5: Hierarchy of Presentation Cues for Object Contact

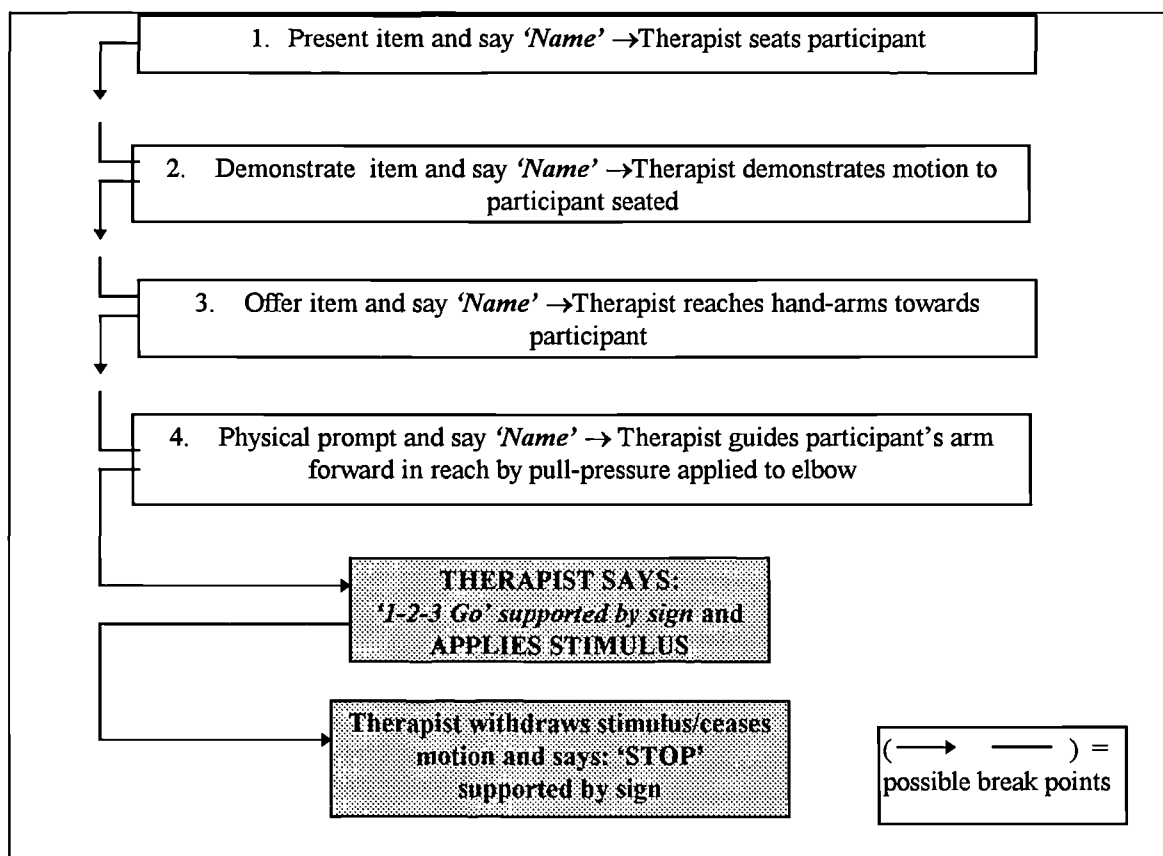


Figure 4.2.2.6: Hierarchy of Presentation Cues for Person Contact

(Vestibular Stimuli)

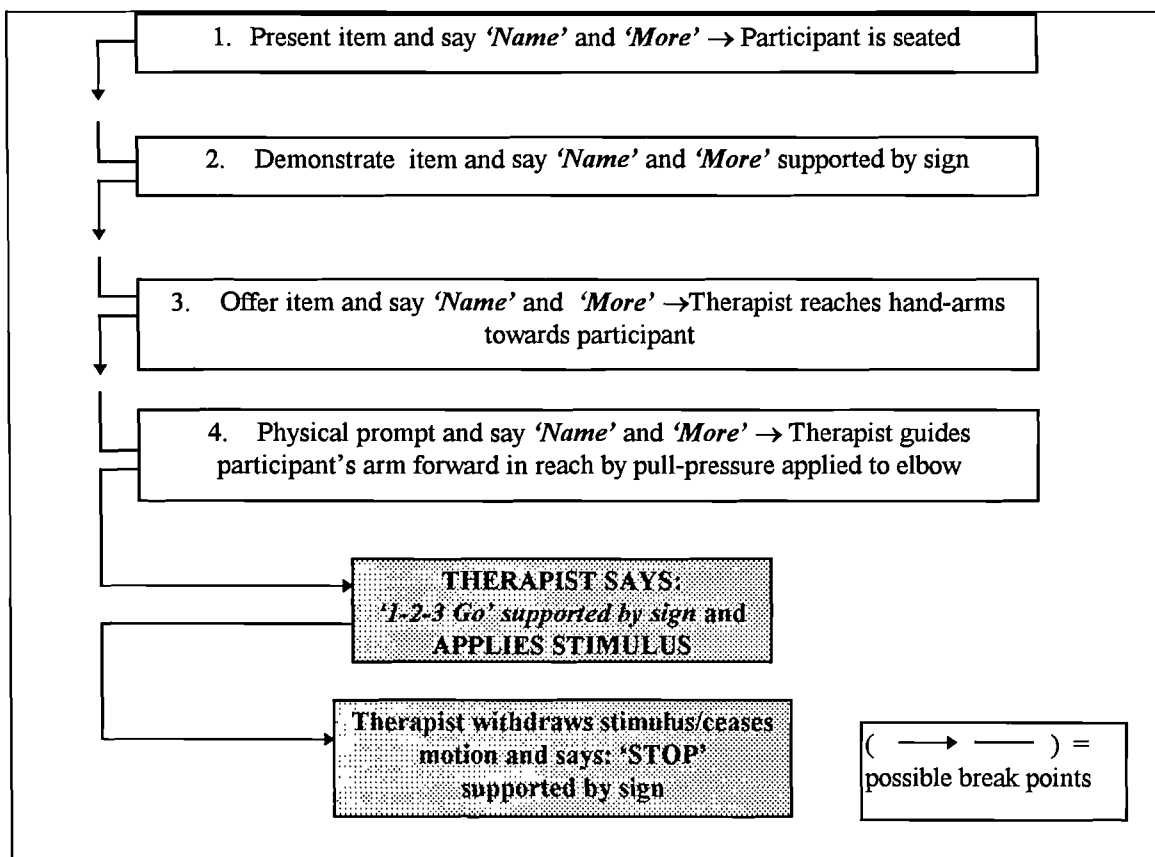


Figure 4.2.2.7: Hierarchy of Recurrence Cues for Person Contact
(Vestibular Stimuli)

The core vocabulary being largely non-object specific was selected for its functional utility across situations, its potential frequency of use in the given context of structured sensory stimulation, and its relevance to the early development of concepts and meanings as evident in studies of child language acquisition. It was intended that this vocabulary would achieve further focus in the **I.S.E.** intervention strategy.

4. Response Repertoire:

A format for the recording of participant responses to presented stimuli was drafted in the form of a brief checklist. An early draft of the relevant instrumentation was tried out in the first official **Pilot Study 1**. This comprised a small checklist for specific observations and a comments space for the recording of general observations. These two items raised a number of difficulties which in turn had implications for the main study. These are now recounted.

The comments column was omitted for the recording of general observations, as this was considered time consuming to use, difficult to evaluate, and impracticable. Some checklist items included were redefined, omitted, or new ones added according to difficulties in evaluation and clinical decision requirements. The words in italics refer to items included in the pilot schedule. The underlined words refer to the modified items included for the main study.

Checklist items were amended as follows:

- *gesture* was redefined as 'sign' to discriminate between the conventional gesture of '*pointing*' and a referential gesture;
- *smile/vocalise* was redefined as 'vocalisation' only, due to difficulties in the discrimination of a true smile;
- 'clap hands' was included as an expression of pleasure;
- *eye contact* was omitted due to difficulties experienced in its evaluation through observation (the direction and destination of the participant's eye gaze could not always be discriminated by the observer). It was included in the definitions under the newly defined section '**ORIENTATION**', and termed 'relating to other person'. This also included other non-verbal behaviours such as body movement and hand touch. When included under the sections on **OBJECT ENGAGEMENT**, this item was defined as relating an object to another person to demonstrate 'event (person-object)' knowledge.

Also included under the section '**ORIENTATION**' was the item 'relating to self' which was inserted to describe participant's overt notice of stimulus, such as touching cream to face; smelling object presented etc.

'**DENIAL**' was inserted as a new section to allow for the recording of an aversive reaction to stimuli by the participant, or an aberrant response which would prompt a withdrawal of the stimulus by the presenter. Included under '**DENIAL**' were:

- (a) participant moves away, i.e. participant has moved self away from stimulus;
- (b) participant pushes away, i.e. it is clear the participant is rejecting the stimulus;
- (c) participant consumes, i.e. participant attempts to eat/swallow the stimulus and is potentially "at risk", therefore the section is discontinued (as with (a) and (b)).

A small checklist was included in the Decision-Making Schedule for the recording of participant responses. The following areas were identified as appropriate to a descriptive framework for the participant response repertoire:

- (i) an itemised response repertoire which reflected the various levels of support cue;
- (ii) items representative of self-expression;
- (iii) the orientation of the participant's interactions to self or other person;
- (iv) items to reflect stimulus denial or rejection prompting the discontinuation of a trial.

These are now dealt with in order.

(i) Response Repertoire:

1.0 RESPONSES	
1.1	Appropriate word
1.2	Appropriate sign
1.3	Points
1.4	Reaches

Table 4.2.2.8: Response Repertoire for Person Contact

Presentation: any one of the above responses qualified the participant to receive the sensory stimulation. '1.4: reaches' was said to occur even when manipulated by the physical prompt.

Recurrence: the responses 1.1 and 1.2 were accepted as the success criteria for the subsequent application of the sensory stimuli for the first two support cues: a) verbal only; b) verbal plus referential sign. Thus, the participant was given the opportunity to produce an imitative verbal or signed response.

The following Figures 4.2.2.9 and 4.2.2.10 illustrate the response criteria in relation to the hierarchy of support cues. The arrows connect the response criteria to the appropriate support cues.

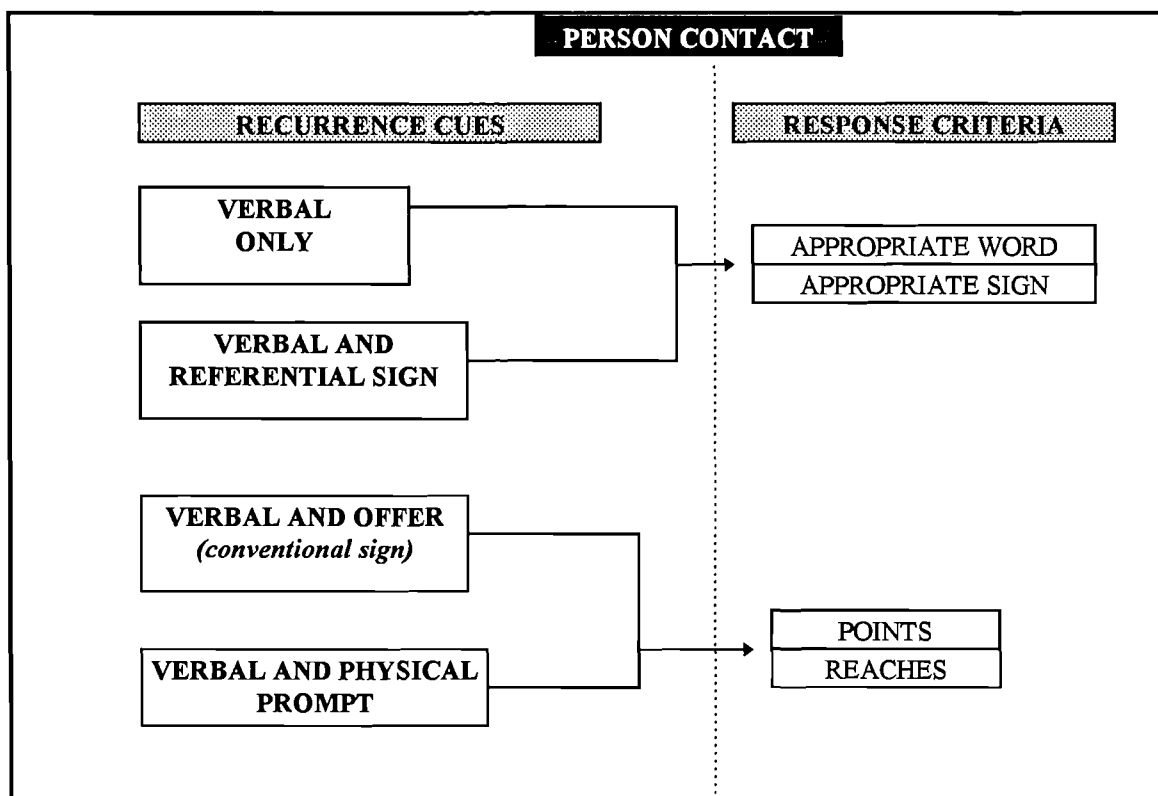


Figure 4.2.2.9: Response Criteria in Person Contact

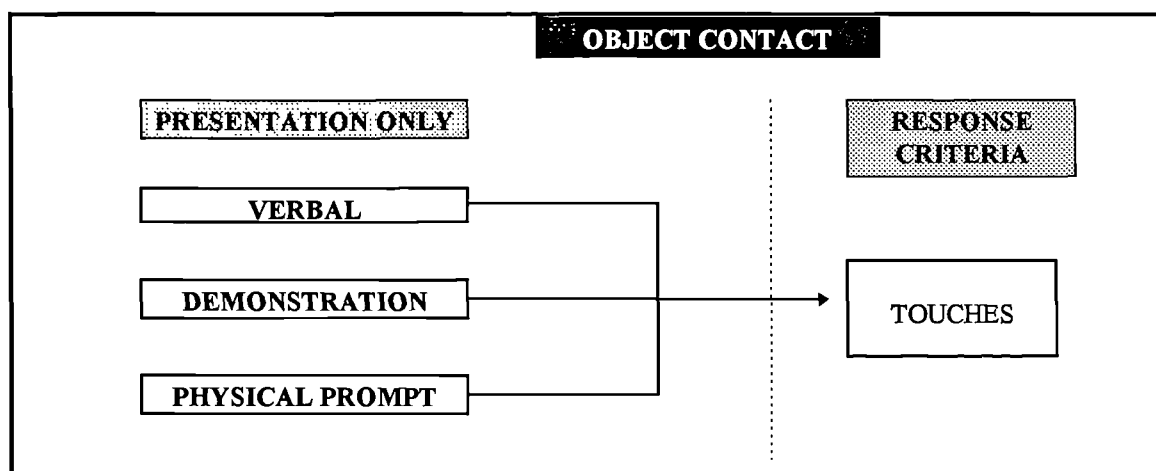


Figure 4.2.2.10: Response Criteria in Object Contact

As shown in the above Figure 4.2.2.10, '*touches item*' was set as the minimum criteria for the success of each cue, i.e. if it was not achieved on the first cue, the therapist was required to move on to the second cue and then the third, where it was achieved through physical prompt.

Other responses to object contact were itemised in the checklist:

1.0	RESPONSE
1.1	Picks up
1.2	Pats/bangs item
1.3	Manipulates
1.4	Push/pulls item
1.5	Fill/pours item
1.6	Relates 2 or more objects in activity

Table 4.2.2.11: Response Repertoire for Object Contact

These items were derived from the developmental behaviours identified by Bangs (1982) with particular reference to those listed as emerging in the 6-12 months age range of the "Problem Solving - Avenues of Learning" section.

(ii) Self-Expression:

Just two items were included in the final version of the checklist, reduced from four. This section was included to note the personal-social behaviours which related to interpersonal relations with peer group and others, and to gain some notion of the participant's positive response to any one sensory stimulus. The four original items were: (a) vocalises; (b) smiles; (c) eye contact; and (d) claps hands. The focus was behaviours emerging in the first year of life. Reference was made to the checklist items documented by Bangs (1982), in particular, the sections on 'Language Expression' and 'Social-Personal', the first three years of which were criterion referenced a couple of years earlier.

However, items (b) and (c) were omitted after Pilot Study 1 due to poor level of agreement between raters. In the first instance, there was some debate as to what constituted a 'smile' and because of certain ambiguities which are also questioned in the development of smiling behaviour, i.e. the grimace of indigestion or a "true" smile, and the effect a physical disability may have on the muscular action for smiling, it was decided to omit item (b).

Item (c) also caused a rating problem for observers. Decision-Making Schedules were videoed, thus rendering identification of true eye contact extremely difficult as affected by the camera shot's angle and the orientation of the participant. This difficulty was further compounded by the incidence of uncoordinated eye motor function amongst the participants, i.e. it was impossible to identify the true direction of eye gaze. It was thus decided to add a new section to the checklist that would cater for a more generalised item: **ORIENTATION**.

(iii) Orientation:

Orientation was identified as:

- relates to self;
- relates to other person.

This part of the checklist was designed to encompass the social directions of the individual including: eye gaze; torso movement; hand-arm reach; and other behaviour relevant to self or demonstrating reciprocation with other person, and to identify participant behaviours which could be said to be representative of event (person-object) knowledge.

(a) Person Engagement:

ORIENTATION	DEFINITION
Relates to self	Participant relates stimulus to self by smelling, tasting, self-touching, rubbing hands together, applying item to self, etc.
Relates to other	Participant relates to other person by eye contact, body movement towards that person, hand touch returned to person, applying item/stimulus to other person, etc.

Table 4.2.2.12: Orientation Items for Person Engagement

(b) Object Engagement:

ORIENTATION	DEFINITION
Relates to self	Participant relates item to self by smelling, tasting, applying to other body parts, i.e. vibro-bubble is picked up and held against face, etc.
Relates to other person	Participant relates item to other person by offering item, alternating social direction between object and other person, applying item to person and moving it in their direction, etc. Where this is observed, it is interpreted as evidence of present or emerging event knowledge, which is significant to the therapy programme planning process.

Table 4.2.2.13: Orientation Items for Object Engagement

(iv) Denial

This section was introduced as a separate part of the checklist after the completion of **Pilot Study 1** which included two items:

- withdraws (i.e. participant moves away from stimulus);
- rejects (i.e. participant pushes item away).

It was intended to acknowledge the differences which exist between individual evaluations of sensory input and to respect the rights of each participant to reject a stimulus. Thus, not only would the rejected stimulus/feedback feature be omitted from any subsequent therapy programme, but that particular item on the Decision-Making Schedule might be discontinued.

A third item was added to the **DENIAL** section: '*consumes*'. This was included for practical reasons. During **Pilot Study 2** a number of clients were observed to place items in their mouth as in the act of eating, i.e. hand cream, and were therefore considered to be at potential risk. Whilst recognising that "mouthing on objects/items" is a normal stage in cognitive development, the risk to the participant needed to be monitored. Therefore, such an act was recorded as '*consumes*', and prompted one of the following strategies as appropriate:

- (a) discontinuation of stimulus item;

- (b) omission of item/feedback feature/stimulus from subsequent therapy programme;
- (c) individual attention/monitoring strategy for use of stimulus in therapy to minimise personal risk to participant and to facilitate behavioural development.

The researcher favoured the use of option (c) in most cases, (b) occurring only on occasion in a therapy session due to severity of behaviour, and similarly (a).

The final version of the checklist is shown in Table 4.2.2.14, response differences existing between **Person Contact** and **Object Contact**.

CHECKLIST SECTION	PERSON CONTACT	OBJECT CONTACT
RESPONSE	Appropriate word Appropriate sign Points Reaches	Touches Picks up Pats/bangs Manipulates Pushes/pulls Fills/pours Relates 2+ objects
SELF-EXPRESSION	Vocalises Claps hands	Vocalises Claps hands
ORIENTATION	Relates to self Relates to other person	Relates to self Relates to other person
DENIAL	Pushes away Withdraws Consumes	Pushes away Withdraws Consumes

Table 4.2.2.14: Checklist for I.S.E. Decision-Making Schedule

5. Constituent Elements:

The Decision-Making Schedule comprised the three constituent elements observed in interactions:

- person;
- object;
- person-object (event).

Stimulus items were grouped on purpose to demonstrate either person or object contact. Specific items were not included to focus on the constituent '*person-object*' as it was thought that this behaviour would be emitted by the participant as a competency in either *person* or more especially, *object* items, if the individual's skill set permitted, i.e. participant relates object to other person.

Evaluation of constituent elements and participant responses to, or demonstrations of them, would directly influence the programme plan of the individual in terms of:

- (a) choice of activities, i.e. person contact or object engagement;
- (b) role of therapist in presentation of activities, particularly in the provision of opportunities for participant to demonstrate event knowledge.

6. Choice of Stimuli:

A number of factors influenced the choice of equipment or stimuli. These were:

- (a) cost per item;
- (b) stimulus properties in terms of tactile and vestibular sensations;
- (c) distinctive feedback features between similar items;
- (d) potential uses;
- (e) availability.

To start with, a survey of current resources within the Day Centre and Speech and Language Therapy Service was conducted, providing an inventory of items with specific tactile or vestibular properties. This equipment had previously been used in the preliminary groups prior to registration of the project.

Next, a dimensional analysis of this equipment was completed, based on the comparison of reactive and non-reactive toys by Bambara et al (1984), and the defined parameters of reactivity by Hooper and Wambold (1978). The following dimensions were used for analysis of feedback features:

- I. Tactile Sensation:** texture, temperature, consistency;
- II. Sustained Movement:** motion of item when acted upon;
- III. Vestibular Sensation:** angular (rotation) or linear (rocking) stimulation of semi-circular canals as a result of induced motion;

IV. Visual Content: although not focused on for its stimulatory properties, this needed to be observed in order to control for its effect if necessary on the individual (e.g. if participant had phobia of items coloured red etc.). It included observation of colour, form, visual movement, shade and light reflection properties.

V. Sound Production: although not specifically focused on for its stimulatory properties, its potential effects on participants needed to be monitored. This included volume, form and operation of sound.

The dimensional analysis of all equipment/stimuli provided summaries of the following: a description per item; feedback features in terms of attributes described in concrete language; and potential uses by participant and therapist. This is to be found in **Appendix C1**.

After the initial dimensional analysis had been completed, the distinctive features between groups of stimuli were identified for *person* contact and *object* contact separately. *Person* contact items were sub-divided according to their "contact" properties:

(1a) Indirect: Therapist does not make touch (hand) contact with the participant.

(1b) Direct: Therapist does make touch (hand) contact with the participant.

(2a) Non-Touch: Stimulus or item of equipment does not come into contact with participant's skin.

(2b) Touch: Stimulus or item of equipment does come into touch contact with the participant.

They were also distinctively compared according to:

- sound production;
- tactile consistency; or
- vestibular sensation.

This is summarised in **Table C2.2 of Appendix C2**.

The *object* contact stimuli were similarly analysed, although contact properties were defined as vibro-tactile and the vestibular sensation was not an option. This is summarised in **Table C2.2 of Appendix C2**.

The third step in the selection of the stimulus items was to identify the most practical one to administer in each group. The final list of stimuli is tabulated in Tables C3.1 and C3.2 of Appendix C3.

7. Order of Presentation:

The presentation of stimuli was organised into two groups of items:

- (i) Person Engagement;
- (ii) Object Engagement.

Group (i) activities preceded group (ii) as the most suitable order given the novel presence of the assessor, i.e. it was considered to be more natural to introduce person based activities when a new contact had just been established. A randomised order was not considered necessary as the main purpose was to standardise the clinical decisions of therapy and not to assess the individual's performance. However, a specific order was imposed within the activity groups, for a combination of reasons owing to ease of administration and to support the clinical rationale.

(i) Person Engagement:

Items were ordered to cater for the possible presence of the phenomenon 'tactile defensiveness'. This was described by Ayres in 1954 when she first proposed a provisional theory to explain a clinical syndrome. She hypothesised that tactile defensiveness was symptomatic of an imbalance between the processes of reception and inhibition of sensory information and subsequent adaptive responding. The "syndrome" is said to be characterised by an aversive reaction to being touched and to using hands/body to engage in touch contact for any length of time. Knickerbocker (1980) was the first to introduce the term "sensory defensiveness" as a more general term applied to hypersensitivity of the tactile and other sensory systems.

More recent hypotheses have been proposed:

Ayres (1972 b) suggested a conceptual model for tactile defensiveness which supported the notion that the provision of specific tactile and proprioceptive stimuli would inhibit the protective response to touch and diminish associated levels of distractibility and hyperactivity. There is however, no evidence that bears out this concept; Larson (1982) hypothesised that tactile defensiveness may be due to "a filtering deficit", resulting in

distractibility and self-protection resulting from inadequate inhibition of irrelevant data; Fisher and Dunn (1983) further proposed that “tactile defensiveness” could be usefully described as a “lack of inhibition”.

The most recent perspective defines a much broader set of characteristics termed "sensory defensiveness", which includes visual and auditory defensiveness. These phenomena of "sensory defensiveness" and "sensory dormancy" as first mentioned by Knickerbocker (1980), were elaborated on by Royeen (1985; 1986; 1989) and Fisher et al (1991). They defined them respectively as: increased sensitivity characterised by hyperactivity and bizarre behaviour; and excessive inhibition of sensory input characterised by passive and compliant behaviour, saying they could be considered under the collective title of sensory modulation disorders. This is seen as a continuum of sensory registration and responsivity.

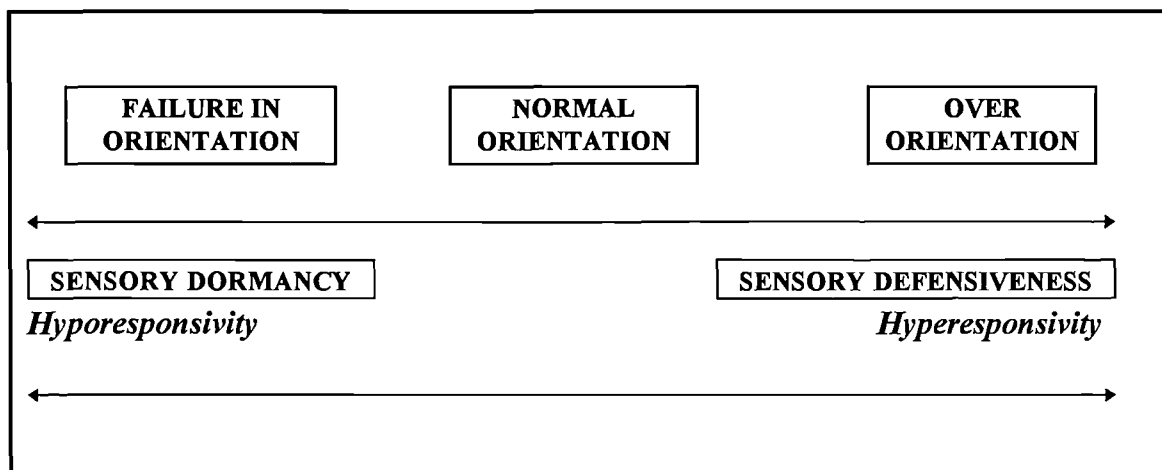


Figure 4.2.2.15: Continuum of Sensory Registration and Responsivity
(Fisher et al, 1991: p.121)

Royeen (1989) further speculated that the continuum was circular, implying that sensory dormancy and sensory defensiveness were located adjacently and related under a sensory modulation disorder. This also inferred that a person could exhibit extreme shifts between dormancy and defensiveness without passing through the normal phase of the continuum.

In acknowledgement of the concept of “tactile defensiveness” highlighted in Sensory Integration Theory, the Decision-Making Schedule was organised to encompass some of

the principles of environmental modification and direct intervention it recommended, thereby influencing any subsequent programme planning for individuals. These principles and their interpretation for the I.S.E. Decision-Making Schedule and Intervention Programme are outlined in the following table.

ENVIRONMENTAL MODIFICATION BY:	INTERPRETATION
The control of extraneous stimuli.	Control of auditory (verbal) and visual stimuli.
Increasing activities designed to provide more appropriate types of sensory experiences.	Participant denial was acknowledged and responded to appropriately. Only items identified as personally motivating to the individual were included.
The provision of enhanced opportunities to take in deep touch pressure, proprioceptive and linear vestibular information (Ayres, 1972; Fisher and Dunn, 1983).	These items were all included in the schedule.
Increasing self-initiated tactile activities (Sears, 1981).	A hierarchy of support cues was introduced to allow for varying levels of independent responding across all participants.

Table 4.2.2.16: Principles of Environmental Modification Applied to Sensory Responsivity Levels

Person engagement items were ordered for presentation based on two parameters considered to be descriptive of the form of tactile contact:

- 1. Direct and Indirect Contact** - defined as the orientation of the tactile (hand to hand) contact of therapist and participant.
- 2. Touch and Non-Touch Contact** - defined as the orientation of the tactile contact between stimulus and the participant's skin or hand.

Activities were sequenced in order, with the least invasive first, graduating to the most invasive 'direct touch' contact. Vibro-tactile contact then followed being considered the most arousing although indirect, due to its motor generated sound production and deep

tactile sensation. Vestibular stimulation then followed for the practical administration of change in the participant's position and furniture placement within the assessment room.

Thus, the order of person contact activities was as follows:

1. PERSON ENGAGEMENT
(a) Indirect Non Touch Contact
(b) Indirect Touch Contact
(c) Direct Touch Contact
(d) Indirect Vibro-touch Contact
(e) Vestibular Sensation

Table 4.2.2.17: Order of Presentation of Person Items

(ii) Object Engagement:

Activities were ordered without reference to tactile dormancy/defensiveness and were simply organised for practical administrative reasons, i.e. dry or liquid content of the stimuli. Thus, the order allowed for the drying of the participant's hands for engagement with DRY activities:

B. OBJECT ENGAGEMENT
(a) Wet Touch Contact
(b) Dry Touch Contact
(c) Vibro-touch Contact
(d) Sensory tray <ul style="list-style-type: none"> • dry touch • wet touch

Table 4.2.2.18: Order of Presentation of Objects

Importantly, neither the Decision-Making Schedule nor the subsequent therapy programme sought to assess or remediate tactile defensiveness/dormancy. It was simply acknowledged as a potentially relevant concept. Indeed, it was more the intention of the researcher to identify stimuli which provided motivating consequences and to

appropriately include them in the individual's I.S.E. The recommended order of *person* contact activities was rather to graduate the invasiveness of the tactile contact than treat a conceptualised phenomenon such as tactile defensiveness.

8. Response Contingent Sensory Input:

The order for the application of stimuli needed to assign a pro-active role to the participant as demonstrated in the following sequence:

1. Presentation cue, i.e. stimulus is shown to participant;
2. Participant produces minimum response requirement, i.e. participant reaches towards stimulus;
3. For the application of the stimulus by the therapist;
4. Which is then withdrawn;
5. Before the cycle repeats itself.

Minimal response criteria were set for each support cue as illustrated in the previous section: **4. Response Repertoire.** Each participant was given the opportunity to respond in three trials on each item, so that accommodation of response demands could be facilitated, and the most frequently responded to cue could be selected appropriately for the individual's programme.

4.2.3 Administration of Schedule

The Decision-Making Schedule did not aim to measure participant responsiveness, but looked to make decisions appropriate to the individual's I.S.E. programme:

- a) What potential responses are to be expected from the participant in terms of:
 - *person* contact;
 - *object* contact?
- b) Does the participant show event knowledge by their orientation to the other person in *object* contact?
- c) What help or support cues does the participant need in order to respond for presentation and recurrence?
- d) Which equipment items and their feedback features motivate the participant to respond?

- e) Which items and their feedback features cause the participant to reject them or withdraw self?
- f) Are there any items which may cause the participant to be at personal risk? (i.e. danger of consuming item.)

Each participant was seen in a closed room where just the therapist (who carried out the schedule), the observer (who recorded the schedule by video for later evaluation), and the participant were present. If a participant was unable to complete the schedule due to illness, epileptic seizure, observable distress, agitation or distractibility, completion was planned for a later time.

4.2.4 Reliability of Schedule

Each participant was videoed during completion of the Decision-Making Schedule, and this was later rated separately by the researcher and assistant therapist after a short period of training in the use of the instrumentation. Inter rater reliability was calculated for the response repertoire demonstrated by each participant and is displayed here as percentage agreements between the raters for each section of the appropriate checklist.

I.S.E. PHASE	RESPONSE	EXPRESSION	ORIENTA- TION	DENIAL
First: 1.1 & 1.2	98.72%	94.06%	96.39%	100%
Second: 1.1 & 1.2	98.75%	94.16%	91.6%	99.44%
First: 2.1, 2.2 & 2.3	99.21%	96.87%	97.65%	100%
Percentage Agreement	98.89%	95.03%	95.21%	99.81%

Table 4.2.4.1: Inter-Rater Reliability - Person Engagement
where Presentation Cues have been Used

I.S.E. PHASE	RESPONSE	EXPRESSION	ORIENTA- TION	DENIAL
First: 1.1 & 1.2	98.72%	93.22%	92.37%	96.61%
Second: 1.1 & 1.2	99.15%	95.76%	88.98%	100%
First: 2.1, 2.2 & 2.3	99.15%	96.73%	93.47%	100%
Percentage Agreement	99%	95.23%	91.6%	98.87%

**Table 4.2.4.2: Inter-Rater Reliability - Person Engagement
where Recurrence Cues have been Used**

I.S.E. PHASE	RESPONSE	EXPRESSION	ORIENTA- TION	DENIAL
First: Groups 1.1 & 1.2	94.7%	93.1%	85.3%	98.85%
Second: Groups 1.1 & 1.2	96.12%	93.54%	86.29%	98.92%
First: Groups 2.1, 2.2 & 2.3	97.6%	98.33%	92.5%	100%
Percentage Agreement	96.14%	94.99%	88.03%	99.25%

**Table 4.2.4.3: Inter-Rater Reliability - Object Engagement where Presentation
Cues have been Used**

Percentage agreements range from 88.03% for *object: orientation* to 99.81% for *person: denial*. Throughout the assessments, the section *orientation* achieved lower percentage agreements than the other sections in the checklist, particularly on the object activities, where there was a lower percentage agreement recorded for *groups 1.1 and 1.2*. This seems to be affected by the agreements recorded for one particular participant in the first group.

I.S.E. Therapy	(P) Presentation	(P) Recurrence	(O) Object
Phase 1	1/18	1/18	2/22
Phase 2	7/18	10/18	9/22

Table 4.2.4.4: Orientation Agreements Recorded for One Participant (group 1.1)

KEY: (P) = Person; (O) = Object
--

This may be due to the large number of other responses emitted by the participant which served as distracters in the observation of orientation, i.e. a change in head direction may go undetected when the participant is engaged in manipulative schemes with objects. This particular participant was noted to engage in ritualistic head and arm movements at certain times which again could have confused the codings of observed responses. The category '*orientation*' achieved consistently lower percentage agreements from the dual ratings, and this may indicate the problems experienced by observers in the detection of head direction and eye gaze, in relation to significant others. It is recommended that this category is used with caution by observers.

Once completed the I.S.E. Decision-Making Schedule (Appendix C4) was evaluated and the information was then transferred to the individual programme form (Appendix C5). The schedule was repeated prior to any new phase of I.S.E. Therapy.

4.3 Engagement Background Questionnaire

Objective 3.2: To develop a structured interview with keyworkers for quantifying their perceptions of the interactive behaviours of the participants.

4.3.1 Introduction

Although data arising from the administration of the 'Engagement Background Questionnaire' was not eventually used in the project's final analysis of participant engagement, its development is reported on here, with a consideration of the reasons for its exclusion.

4.3.2 Concept

It was thought that information from the significant other/keyworker on the participant would be one level on which to compute change in participant behaviour, before, after and between phases of therapy.

A questionnaire was developed and introduced, the main objective being to establish the opinions or perceptions of the significant other regarding the participant's range of interactive behaviours. It was expected that as participant purposeful behaviour was measured to increase, so it would be reflected in the perceptions of the significant other. It was recognised how important the positive perceptions of the significant other were to the progress of the participant and how a negative attitude can lead to diminished opportunities and therefore limited experience for the participant. This can consequentially inhibit the development of interactions (O'Brien, 1981).

The questionnaire was constructed around four areas which coincided with the four main categories defined in the systematic observation process: *self-active*; *person*; *object*; and *person-object*.

Readability of questionnaire items was initially checked out by asking Day Centre officers in a London borough to complete a questionnaire on twenty clients and to feedback their comments and queries on particular items they found difficult to understand. Then two pilots were completed: one on all the members of a special needs unit in the centre, and one as part of the **Pilot Study 2** to check feasibility of format and reliability of content. Reliability measures (inter/intra-rater) were taken at two assessment points during the course of the project.

4.3.3 Construction of Engagement Background Questionnaire

The construction of the questionnaire involved a number of steps. Initially, it was intended to conduct an interview with the significant other. Indeed, prior to the study's commencement a short interview was tried, containing open ended questions such as:

"How does your client make contact with other people?"

"What activities/equipment items is your client most responsive to?"

Because of the absence of a pre-determined response coding schedule and the lack of structure, responses were difficult to encode and analyse in any meaningful way. The unstructured format proved time consuming and too dependent on the observational memory of the significant other. The nature of the questions provided insufficient information and specificity, to prompt reliable and meaningful responses from the interviewees. At the start of the project, it was decided to develop a questionnaire format comprising closed format questions with a response coding frame in terms of a simple rating scale.

(i) Definition of Areas to be Covered:

These stemmed naturally from the hypotheses already stated and were based on the categorised definitions of engagement, i.e. *person*, *object* and *person-object*.

The area on '*self-active*' behaviour was constructed from items borrowed from the 'Aberrant Behaviour Checklist' (A.B.C.), an empirically derived psychometric instrument to rate the inappropriate and maladaptive behaviours of learning disabled people (Aman, Singh, Stewart and Field, 1985). Their total number of items was high although post factor analysis indicated a five-factor solution. These were: (a) Irritability, crying, agitation; (b) Lethargy, social withdrawal; (c) Stereotypic behaviour; (d) Hyperactivity, non compliance; (e) Inappropriate speech.

Based on the researcher's diary descriptions of participants from informal observation sessions, and with reference to the 'Aberrant Behaviour Checklist' (A.B.C.) and the relevant writings of others (Donnellan, Mirenda, Mesaros and Fassbender, 1984). Questionnaire items were drafted into five main areas:

- head and body movements;
- hand-arm movements;
- inappropriate self-touching and self-injury;
- inappropriate sounds;
- inappropriate person and object contact.

These were broadly defined to be more objectively descriptive of observed behaviours and to avoid any interpretation of participant behaviour by the significant other.

An early draft of the questionnaire comprised 36 items, 21 of which were assigned to the section on 'self-active' behaviour. A trial was completed by a staff team from a small special needs service in another London Borough to check the comprehensibility of items and the linguistic content. This resulted in the omission of one item in subsequent questionnaires: *"The client usually walks in ritualistic patterns"*. Reportedly, the item provoked discussion and different interpretations in its appropriate application. The problem appeared to be related to the definition of what constructed a 'walk' and how it compared with a rocking or bouncing behaviour that also involved the participant being propelled by steps. It was decided to omit this ambiguous item from the revised questionnaire format.

(ii) Definition of Response Format

A closed response format for the questionnaire was selected to facilitate the coding process and minimise the time needed to collect responses. Questions were constructed as short statements which the significant other was required to assign the most appropriate response in describing the participant. A three point, semantically defined scale was used. The response choices were: (i) YES; (ii) NO; and (iii) SOMETIMES. They were supported by definitions to clarify their meanings.

It was thought that this response format would allow for a middle 'undecided' response, whilst also providing a choice between a positive and negative response. The potential risk of the acquiescent response mode phenomenon was acknowledged in the middle response 'SOMETIMES', but in order to get some notion of the frequency of the behaviour without compromising the simplicity of the format, it was decided to include it. In order to safeguard against acquiescence, clear definitions of the response choices were constructed. The **'Engagement Background Questionnaire'** is to be found in **Appendix C7**.

4.3.4 Administration of Questionnaire

Initially, in **Pilot Study 1**, the questionnaires were distributed to and left with the significant other for completion. Unfortunately, the return rate of completed questionnaires proved to be low, and in **Pilot Study 2**, some participant questionnaires had to be re-issued due to loss of the original. It was therefore deemed to be a time consuming and unreliable method of administration, and so a more structured format was

established that required the presence of the questionnaire administrator. Instructions for the administration of the questionnaire were documented. These are to be found in **Appendix C8**. The questionnaire was administered by the researcher or the Speech and Language Therapy assistant, according to a set of instructions issued prior to the commencement of data collection. Briefly, the questionnaire was administered as follows:

- (i) The administrator sat with the significant other during completion of the questionnaire in order to ensure its timely return;
- (ii) The administrator read out each statement for the significant other to select an appropriate response;
- (iii) The administrator had the facility to provide a relevant support statement from a standard typed list if the significant other requested further clarification of the original statement.

The keyworker/significant other was required to have known the participant for a continuous period of no less than six months. Reference to other completed questionnaires was discouraged by the interviewer and measures to ensure against collaborative effort with colleagues to complete the questionnaire were taken. The questionnaire was administered at each of the defined data collection points. It was intended to access the same significant other throughout the project's duration. However, staff changes rendered this impossible in some cases.

4.3.5 Scoring System of Questionnaire

The questionnaire responses were scored as follows, in order to derive a raw score for each area and participant; and to compute perceived changes in participant behaviour over time.

SECTION(S)	SCORING
SECTIONS A, B, C and D	YES = 2 NO = 0 SOMETIMES = 1

Table 4.3.5.1: Scoring System for Questionnaire

It was acknowledged that the scores for Category A should be viewed differently to the other three sections. That is, the researcher was looking for a reduction in the level of 'self-active' behaviour, compared to a rise in the other three engagement behaviours, i.e. *person*, *object* and *person-object*.

4.3.6 Reliability of Questionnaire

The researcher aimed to examine the reliability of the questionnaire. Significant others were not informed of the true purpose of the reliability measures taking place.

(i) **Inter rater reliability:** this was carried out in Pilot Study 2 and at Assessment Points 1 and 4. The second rater was the Senior Instructor or leader of the appropriate team base for the participant and keyworker. The selection of this person was reasoned by their placement in the same team base and the likelihood of a six month continuous contact with the participant.

(ii) **Intra rater reliability:** this was carried out in Pilot Study 2 (20 participants) and at Assessment Points 1 and 4 in the main study (16 participants). The keyworker/significant other was required to complete two questionnaires on the same participant within the identified data collection point. Each questionnaire was administered at separate times of at least one week apart. In summary, both forms of reliability were calculated for the following fields:

- (a) agreement/errors in scores for each section;
- (b) agreement/errors on each item within a section.

For the evaluation of (b), the errors were calculated according to the degree of difference or error between the two scores for any one item, and halved to reflect whole disagreement and partial disagreement. The following table summarises this.

ITEM	FIRST RATING	SECOND RATING	DEGREE OF ERROR
Item 1	SOMETIMES = 1	YES = 2	1 = 0.5
Item 2	YES = 2	NO = 0	2 = 1

Table 4.3.6.1: Examples of Reliability Calculation for Questionnaire Items

Thus the degree of agreement between raters and successive ratings was ascertained. This is presented as tables here with a finally summary graph illustrating the overall relationship between reliability measures taken. A report of reliability at Assessment Point 4 is not presented here due to the paucity of data collected caused by the poor availability of Senior Instructors and keyworkers.

Section A: Self-active	Pilot Study 2	Assessment 1
% Inter-rater Agreement	87.04%	86.98%
% Intra-rater Agreement	96.04%	94.76%
Section B: Person	Pilot Study 2	Assessment 1
% Inter-rater Agreement	85.42%	73.33%
% Intra-rater Agreement	85.72%	85%
Section C: Object	Pilot Study 2	Assessment 1
% Inter-rater Agreement	83.34%	77.5%
% Intra-rater Agreement	80.41%	85%
Section D: Person-object	Pilot Study 2	Assessment 1
% Inter-rater Agreement	89.59%	88.33%
% Intra-rater Agreement	84.16%	94.16%

Table 4.3.6.2: Table of Agreements by Category/Section

KEY: Pilot Study 2: n = 18 participants; Assessment 1: n = 16 participants.
--

Section A: Self-active Items	Pilot Study 2		Assessment 1	
	Inter-rater	Intra-rater	Inter-rater	Intra-rater
1.	78.12%	94.4%	72.5%	90%
2.	78.12%	88.8%	70%	82.5%
3.	84.37%	94.4%	82.5%	92.5%
4.	65.62%	66.6%	77.5%	87.5%
5.	59.37%	75%	85%	85%
6.	84.37%	83.3%	67.5%	92.5%
7.	90.62%	91.6%	80%	95%
8.	84.37%	83.3%	87.5%	97.5%
9.	78.12%	91.6%	87.5%	95%
10.	93.75%	88.8%	82.5%	85%
11.	59.37%	72.2%	70%	77.5%
12.	87.5%	91.6%	97.5%	97.5%
13.	75%	83.3%	75%	82.5%
14.	59.37%	75%	85%	80%
15.	78.12%	83.3%	77.5%	82.5%
16.	81.25%	75%	57.5%	85%
17.	87.5%	91.6%	85%	97.5%
18.	81.25%	94.4%	87.5%	100%
19.	71.87%	86.1%	77.5%	100%
20.	75%	88.8%	80%	87.5%

Table 4.3.6.3: Percentage Agreements by Questionnaire Item (Section A)

KEY: Pilot Study 2: n = 18 participants; Assessment 1: n = 16 participants; Total: n = 34.

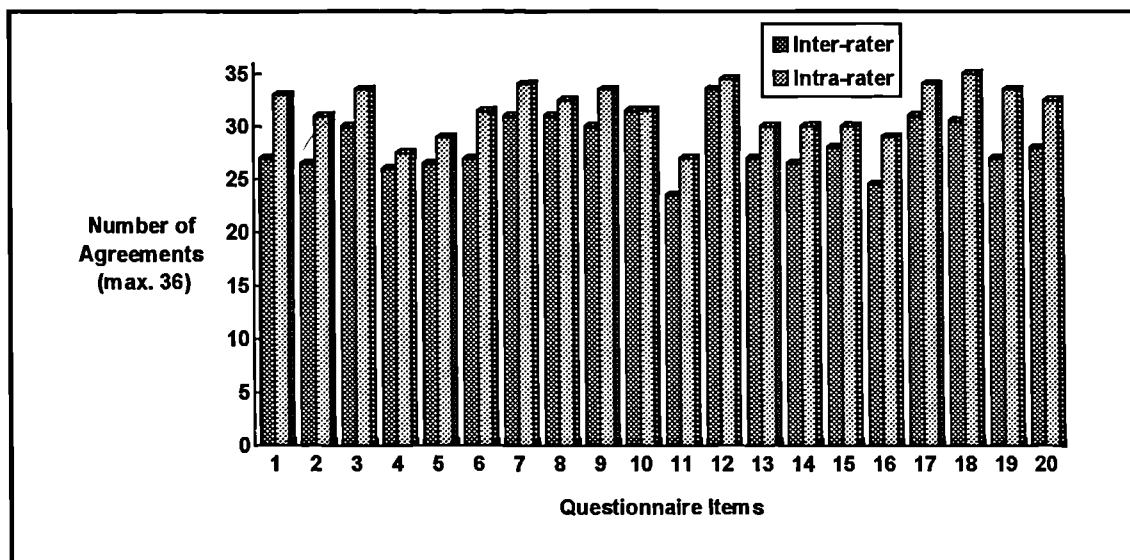


Figure 4.3.6.3: Summary Graph to Show Percentage Agreements by Questionnaire Item (Section A) for Combined Data, i.e. Pilot Study 2 and Assessment 1

Agreements between raters were generally lower than for repeated attempts by the same rater.

Section B: Person Items	Pilot Study 2		Assessment 1	
	Inter-rater	Intra-rater	Inter-rater	Intra-rater
1.	81.25%	75%	72.5%	75%
2.	75%	83.3%	45%	80%
3.	78.12%	83.3%	65%	82.5%
4.	68.75%	80.5%	75%	87.5%
Section C: Object Items	Pilot Study 2		Assessment 1	
	Inter-rater	Intra-rater	Inter-rater	Intra-rater
1.	71.87%	77.7%	72.5%	80%
2.	71.87%	75%	62.5%	75%
3.	81.25%	69.4%	75 %	92.5%
4.	84.37%	80.5%	80%	82.5%
Section D: Person-object Items	Pilot Study 2		Assessment 1	
	Inter-rater	Intra-rater	Inter-rater	Intra-rater
1.	81.25%	80.5%	80 %	87.5%
2.	84.37%	83.3%	72.5%	90%
3.	93.75%	88.8%	92.5%	95%
4.	84.37%	83.3%	87.5%	97.5%

Table 4.3.6.4: Percentage Agreements by Questionnaire Item
(Sections B, C and D)

KEY: Pilot Study 2: n = 18 participants; Assessment 1: n = 16 participants; Total: n = 34.

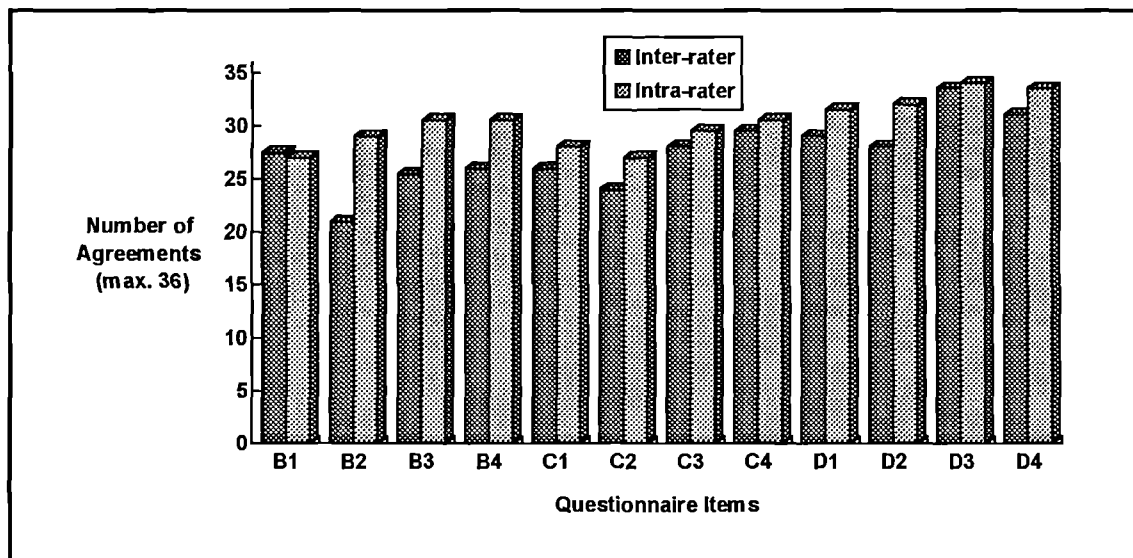


Figure 4.3.6.5: Graph to Show Percentage Agreements by Questionnaire Item
(Sections B, C & D) for Combined Data, i.e. Pilot Study 2 and Assessment 1

Again, agreements between raters were generally lower than for repeated attempts by the same rater.

By Category:

The range of agreement rate varied from 96.04% to 73.33%, and generally seemed better in the categories of *A: Self-Active*; and *D: Person-Object*. This may be due to the clearer definitions provided in these two categories in that *A: self-active* is quite distinct from all the other three categories, and *D: Person-object* comprises more complex interactions than both *B: person* and *C: object*, thereby facilitating the decisions of the significant other.

By Questionnaire Item:

The percentage range of agreement varies greatly from item to item, the lowest being 45% (B2: *Person: 'Client looks closely at another person's face'* - inter-rater/Assessment 1); 59.37% (A11 *Client touches self repetitively* and A14: *Client makes repetitive non-speech sounds* - inter-rater/Pilot Study 1). As perhaps would be expected, the subsequent completions by the same significant other, reveal a higher agreement level than between two individual raters, in this case the keyworker and the relevant Senior Instructor. This raises the question of suitability of the Seniors in this role with particular regard to their knowledge base of and familiarity with the participants. Attention to item B2/Assessment 1, highlights this difference: percentage agreement between raters - 45%; percentage agreement same rater - 80%.

4.3.7 Discussion of Difficulties

A number of difficulties were experienced in the administration of the questionnaire which informed the researcher's decision to exclude it from the final presentation and analysis of assessment data. These are reported on here.

(i) The first difficulty encountered was with regard to keyworker stability. It was originally intended that the same significant other should be contacted at each consecutive assessment point during the course of the project, in order that their changing perceptions could be evaluated. However, internal changes to the Centre's staff structure; movement of participants between base groups; planned and unplanned absenteeism of staff; and turn over in establishment rendered this impossible. Therefore, questionnaire data for a proportion of the participants involving various significant others meant that carer perceptions could not be assessed accurately over time.

(ii) The poor levels of the reliability measures has already been reported on. There are a number of reasons why this may have been so. The lack of availability of a suitable co-rater was a problem, and although the Senior Instructor for each staff team was accessed, it was acknowledged that their degree of involvement in the day to day contact with the participants was minimal. The job of the Seniors was to administrate the running of the daily timetable and to represent their team at the weekly management team meetings. Thus the perceptions of the Senior would have been different to those of the keyworker who was in daily contact with the participant.

(iii) The original purpose of the questionnaire was to ascertain the opinions or perceptions of the significant other regarding the participant's range of interactive behaviours. However, the content of the questionnaire with its restricted rating scale served to provide a description of established or emerging interactions, rather than to identify changing attitudes. The questionnaire, with its extended section of 'self-active' items and limited sections on 'person', 'object' and 'person-object', not only skewed the contents, but also ignored any potential changes in 'self-neutral' engagement.

The researcher concluded that the initial objective to assess carer perceptions and attitudes was a relevant construct to the present study, but the instrument developed for this purpose did not serve it effectively. For future investigation of this area, detailed consideration of the purpose, together with a review of the questionnaire contents, with particular regard to the literature on attitudes assessment is recommended, together with the application of a broader rating scale, examination of administration requirements and reliability investigations.

4.4 Development of a Systematic Observation Procedure

(NOTATION: momentary time sampling = M.T.S.)

Objective 3.3: To generate a categorical description of the focal engagement behaviours concentrating on the constituents of: self, person, object and person-object for use in a momentary time sampling schedule.

4.4.1 Concept

The main aim was to develop integrated descriptions of what constitutes an interaction. The behaviours of interest were operationally defined and grouped into homogenous categories, according to a common set of criteria. Secondly, a corresponding method for data collection with integral scoring system was required. As Bijou, Peterson and Ault (1968) commented "*Observer reliability is directly related to the comprehensiveness and specificity of definition in the observational code*" (p.138); thus it was acknowledged that the coding definitions needed to be clear and unambiguous.

4.4.2 Construction of Assessment Procedure

Prior to the actual data collection, and for the purposes of instrument development, a period of informal observation was completed. This was to provide the raw material upon which to base the research questions and hypotheses, and to establish the appropriate recording and measurement methods.

To this end, a number of informal pilot groups were run in order to observe participant responses in a structured environment of multi-sensory stimulation. Short video recordings were taken of all the participants who were not considered to be intentional communicators. Both sets of observations were recorded as diary narratives in terms of:

- the structure of the behaviour;
- the individual's orientation to features of the environment, i.e. self, person, object and person-object.

This provided descriptive evidence of the kinds of interactive behaviours emitted by the participants. There then followed the taxonomic organisation of behaviours listed by considering their functional relatedness to the fields of environment orientation. With reference to the literature the categories of interactive behaviour were defined.

The defined categories of engagement and momentary time sampling procedure (M.T.S.) were piloted through the main **Pilot Study 1** and **Pilot Study 2**. In order to minimise ambiguities between each category of engagement, definitions were extended from their summary descriptions shown in **Appendix C9** to the extended definitions in **Appendix C10** (prefaced by user instructions). The categories are similarly structured using the headings recommended by Hawkins (1982): a descriptive name; a general definition; an

elaboration that describes the critical parts of the behaviour; typical examples of the behaviour; and questionable instances, i.e. border line or difficult examples of both occurrences and non-occurrences of the behaviour.

Instruments for the data collection using momentary time sampling (M.T.S.) procedures were developed. The reasons for using M.T.S. as an assessment method are discussed fully in the next chapter. A lack of finance severely limited the researcher's options regarding technology for data collection, and an event recorder with relevant software was not available for use. Therefore, a check sheet and pencil method was implemented.

The basic design of the check sheet was as follows. Columns denoted the categories of behaviour and rows represented the successive sample intervals.

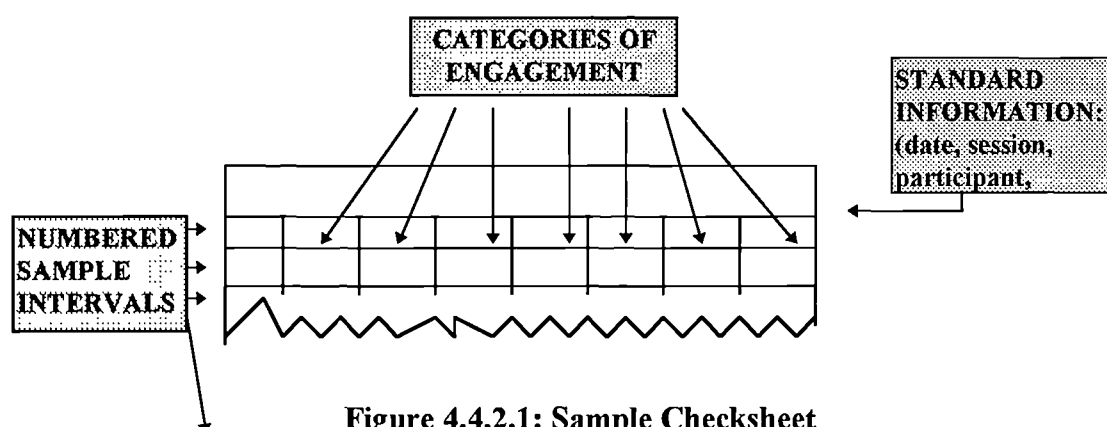


Figure 4.4.2.1: Sample Checksheet

There were seven columns in all with seventy rows for moments sampled within a 15 minute period. An interval value of 10 seconds with a three second delay was used (Appendix C11).

4.4.3 Administration of Assessment Procedure

For the appropriate administration of the M.T.S. procedure it was decided to insert a three second delay immediately prior to each moment to be sampled. This was used by Bratt and Johnston (1988) when they examined the changes in life style for young adults with profound handicaps following discharge from hospital care into a community house. This procedure was used to assist in the accurate coding of participant behaviour and for ease of determination whether a behaviour was purposeful or not. In short, important lead in information about a behaviour was made available to the observer.

For the accurate and equal timings of sample intervals with three second delays inserted, audio tapes were made up in the Audio Visual Department, by timed recordings of an electronic bleep. This was then played on a personal stereo through ear phones. When there was more than one observer two sets of ear phones were plugged in to the same device in order to control for accuracy of timings.

An orientation/training schedule was developed for the observers as recommended by Barlow and Hersen (1984) for the adequate collection of data. One observer role was fulfilled by the recruitment of a Speech and Language Therapy Assistant with a student background in Speech and Language Therapy and the other was taken up by the researcher. It was not considered ideal for the researcher to be an observer, but funds and staffing constraints prohibited the recruitment of a second assistant.

4.4.4 Reliability of Assessment Procedure

(i) Dimensions

In order to assess data quality a number of dimensions were selected for particular attention. These included:

- (a) Observers - variance in agreements between two observers, simultaneously recording the interactive behaviours of the same participant (inter rater reliability), or else variance in agreements between successive recordings of the same interactive behaviours and participant by the same observer (intra rater reliability) using a video recording of the participant. The second part of this dimension seeks to assess observer accuracy.
- (b) Coding Categories - variance in scores between two simultaneously recorded observation periods and by individual coding category .

(ii) Conditions

It was recognised that the degree of overtness in reliability checking could possibly affect the performance of the observers. It was also acknowledged that due to resource constraints, the researcher was necessarily required to be one of the observers and this too could bias the quality of data collected. In order to minimise these potentially influential factors, two steps were taken:

- a) Two observers would simultaneously collect the required data over data collection points 1-4 in the natural environment. Agreements between observers would be calculated on all data collected at these points;
- b) A random sample of video recordings of ten research participants completed in **Pilot Study 2** would be used for the successive coding of data on two separate occasions by the same observer.

(iii) Levels of Data

- a) At the Composite Unit Level, comparisons were made between the scores derived for each category, representative of homogeneously related component behaviours, by agreements of the same observer and agreements between different observers. This was applied to measurements made over time:
 - data collected at each assessment point;
 - comparison of scores over time to ensure a similar rate of inter observer agreement at the start, middle and end of the project.
- b) At the component unit level, agreement rates were calculated by both different and the same observer ratings of each moment sampled within a data collection period.

(iv) Summary Reliability Statistic

According to the recommendation for reliability measurements proposed by Hartmann and Wood (1982), the following summaries have been included in this research project:

- a) reliability estimates on inter rater consistency, accuracy and assessment reliability;
- b) reliability estimates on intra rater accuracy, consistency and assessment reliability;
- c) reliability estimates of a) and b) to be calculated on both the composite units (raw scores by category), and the component units (percentage of occurrence/non-occurrence agreements for sampled moments).

CATEGORY OF ENGAGEMENT	Assessment 1	Assessment 2	Assessment 3	Assessment 4
Self-neutral	97.33%	97.62%	97.5%	98.16%
Self-active	96.96%	98.3%	99.01%	98.93%
Person	98.79%	98.36%	97.77%	98.57%
Object	98.59%	99.18%	99.43%	99.21%
Person-object	100%	99.54%	99.52%	99.66%

Table 4.4.4.1: Percentage Agreements Between Observers
by Category of Engagement

KEY: n = 16 focal participants

ASSESSMENTS	% AGREEMENTS
Assessment 1	92.8%
Assessment 2	92.38%
Assessment 3	94.06%
Assessment 4	94.86%

Table 4.4.4.2: Percentage Agreements Between Observers
by Moments Observed

Reliability between raters was established at an acceptably high level when category scores were compared, although it was noted that a lower agreement level, but still acceptable, was attained when moments sampled were investigated. This was not considered unusual, as areas where disagreements were most likely to occur were found at changeover points between one interaction type and another. For instance, a participant engaged in a *self-active* behaviour may move into *object* activity, or *self-neutral* engagement. There is a point at which the *self-active* behaviour may become extinct but the exact moment is unclear, thereby causing the potential for errors in agreement between raters. Thus the higher rate of agreements recorded for category scores probably explains the dispersal of this type of disagreement between the two raters, i.e. it is a vulnerable area for both raters which adjusts itself in the final category scores.

CATEGORY OF ENGAGEMENT	<u>Pilot Study 2</u> (video assessments)
Self-neutral	96.07%
Self-active	96.78%
Person	99.85%
Object	99.71%
Person-object	100%

**Table 4.4.4.3: Percentage Agreements of Same Observer
by Category of Engagement**

ASSESSMENT	% AGREEMENTS
Pilot Study 2	95.57%

**Table 4.4.4.4: Percentage Agreements of Same Observer
by Moments Observed**

As perhaps might be expected, the level of same observer agreement was higher than for between observers. It must be acknowledged that a smaller sample was utilised for this calculation (ten participants) and the data represented an assessment time very early on in the project, thus levels of *person*, *object* and *person-object* engagements were minimal, and therefore unlikely to cause vulnerability to agreement ratings. Again, disagreements mainly occurred at the points of extinction of one type of behaviour and the emergence of another.

Further use of video recordings for reliability assessment would have been extremely useful at later stages in the project, for the calculation of observer consistency and accuracy. However, time constraints and the physical dimensions of the Day Centre (i.e. small work spaces), together with the limited recording equipment available (insufficiently portable and without a wide angle lens), did not allow for this.

4.5 Pilot Studies

Objective 3.4: To pilot the instrumentation and to run the intervention in order to appraise the feasibility of the experimental procedures.

4.5.1 Research Design

For the purposes of recounting the relevant issues encountered during the pilot phase, the initial planned pilot study is referred to as **Pilot Study 1**, and the second unplanned pilot study is referred to as **Pilot Study 2**.

Pilot Study 1 involved two participants from another Day Centre being assessed for baseline activity before and after a defined period of therapy. **Figure 4.5.1.1** illustrates the research design of this pilot study. The main purpose of the first pilot was to test the feasibility of the assessment and therapy methods. Two participants from a neighbouring day centre who matched the referral criteria were randomly assigned to the different therapy conditions: **PARTICIPANT X** to I.S.E.; **PARTICIPANT Y** to A.P.

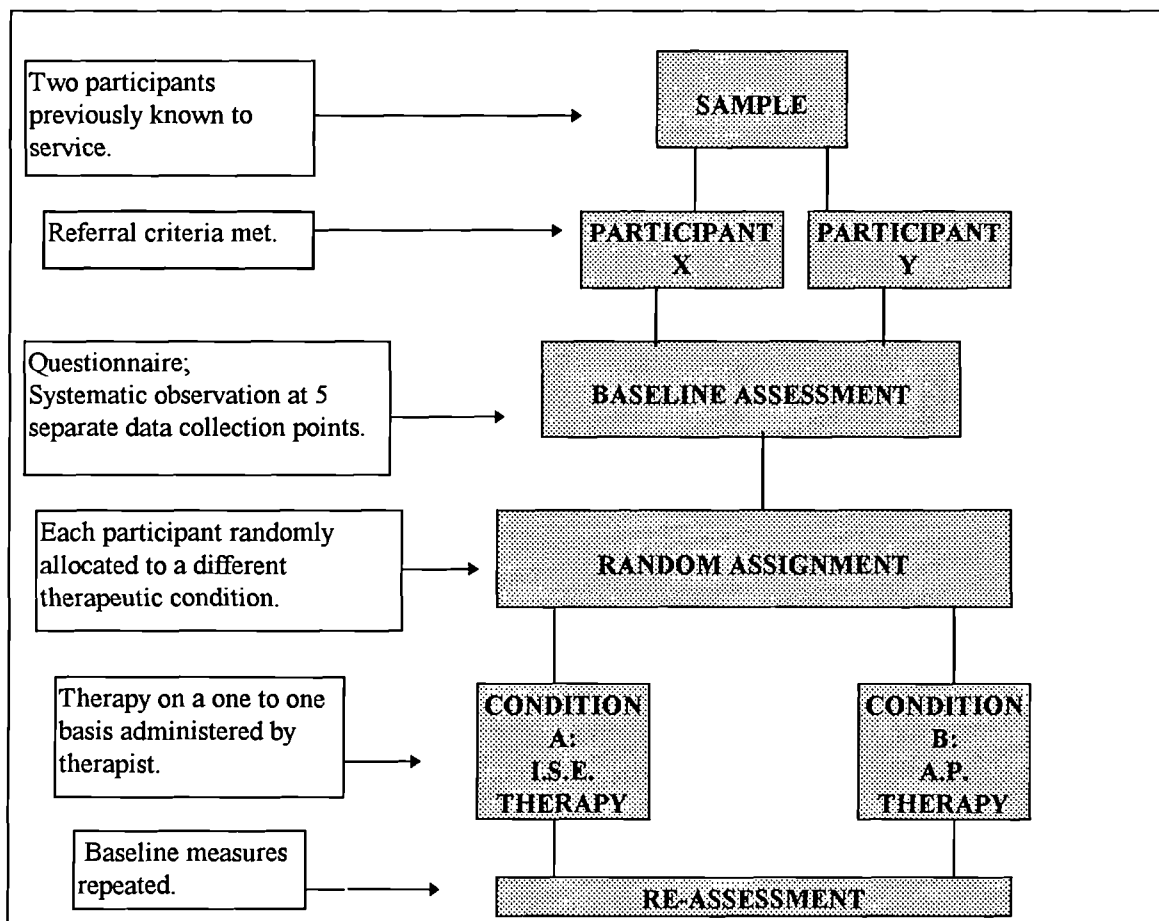


Figure 4.5.1.1: Research Design of Pilot Study 1

A number of key issues were raised regarding the research design and methodology. These will now be dealt with.

4.5.2 Research Design Issues from Pilot Study 1

1. Role of Therapist:

The Speech and Language Therapist was responsible for conducting each therapy session. This was mainly manageable in terms of time allocation because of the restricted number of participants ($n = 2$). It was acknowledged that assignment of the therapist role would need to change for a larger number of participants where time would be a factor. It was therefore recommended that the *Therapist Role* should be undertaken by the participant's significant other after demonstration of the programme by the Speech and Language Therapist. The significant other would be responsible for carrying out the programme; recording completed sessions in the therapy log and maintaining the equipment.

2. Location:

Therapy was conducted in a corner of the main work room (open plan) in the Day Centre. Ambient noise, visual distractions and interruptions from other people were significant intervening factors in the therapy session. It was therefore recommended that the *Location* of the therapy sessions should be a separate, closed room with minimal distractions.

3. Frequency/Duration:

Therapy was delivered in twenty minute sessions, four times a week. This was considered by those involved as too long for staff 'therapists' to devote to the intervention. It was therefore recommended that the *Frequency/Duration* of therapy sessions should be decreased to maximise 'therapist' compliance in the administration of the intervention.

The second pilot was originally planned as the first phase of the actual research project. Due to certain difficulties which arose, its status was reduced to second pilot. Nineteen participants were assigned to the two study groups for administration of the therapy condition in reversed orders. Recommendations from the first pilot were incorporated into the research design of **Pilot Study 2**. The main difference was in the shift of

responsibilities for conducting the therapy session from therapist to significant others/keyworkers.

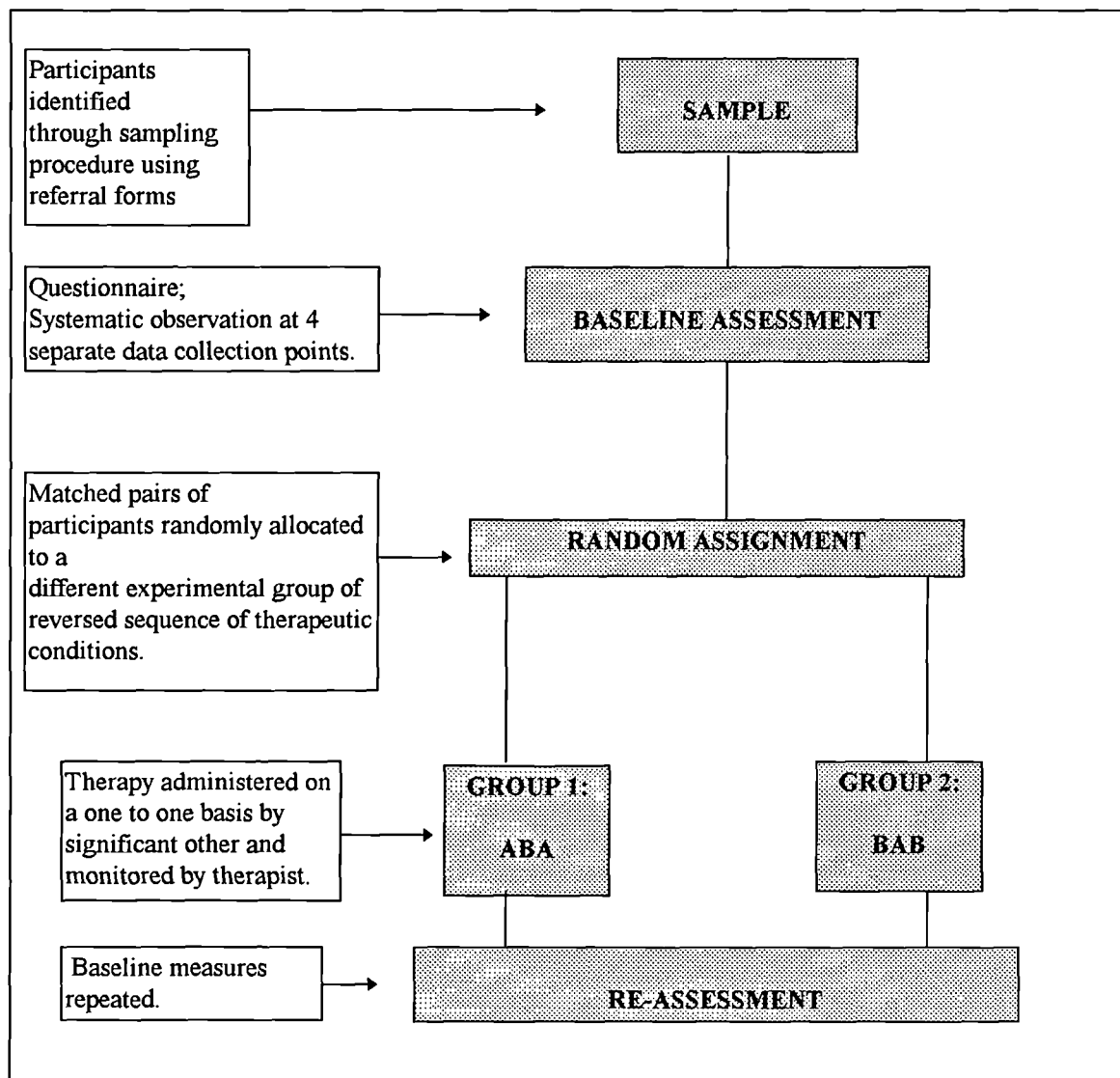


Figure 4.5.2.1: Research Design of Pilot Study 2

A number of key issues were raised regarding the research design and methodology. These will now be dealt with.

4.5.3 Research Design Issues from Pilot Study 2

1. Role of Therapist:

Problems were encountered regarding:

- precise duration of the therapy session (timing was inconsistent);
- consistency in therapy administration (lack of control over language input to participant, presentation of materials, response contingency of sensory stimulation);

- completion of sessions as per programme specification (staff shortages and other more immediate client needs adversely affected this);
- reliable completion of the therapy log (designated 'therapist' omitted to fill in the documented log in any consistent way).

It was therefore recommended that the *Role of Therapist* be assumed by the Speech and Language Therapist defined as the "Group Manager" assisted by a significant other designated "Specialist Helper ". An account of this is to be found in **Appendix A2**. It was felt that 'therapist' duties required an appropriate operational definition for the control of and consistency amongst:

- timing of therapy session;
- administration particulars of therapeutic condition;
- completion of sessions according to recommended requirement;
- recording in therapy log.

2. Individual Sessions:

It was observed that participants seen on a one to one basis were denied:

- the opportunity to extend person engagement through the interaction response levels and peer orientation dimensions;
- the opportunity for response repertoire to include event knowledge i.e. person-object engagement.

It was acknowledged that the presence of other people was necessary in order to expand engagement repertoires. It was therefore recommended that participants be grouped for therapy sessions, with a group membership minimum of two, and maximum of four.

3. Duration/Frequency:

Reportedly sessions did not happen sometimes due to participant absenteeism, thus the minimum frequency of four per week was not achieved. The duration of the session negotiated with significant others to ten minutes was considered "not long enough" to complete all programme requirements.

Regarding the formation of small, therapy groups, it was recommended that the *duration/frequency* of sessions be 1 hour on a twice weekly basis. A specific timetable for groups was to be drawn up and given to the significant others, together with an arrangement for mutual notice regarding any cancellation by participant(s) or therapist for the re-scheduling of a contingency.

4.5.4 Compliance with Recommended Frequency in Pilot Study 2

Further information is provided regarding the compliance rate attained in the second pilot and suggested reasons for the lack of achievement of the minimum requirement per week ($n = 4$) of therapy sessions.

STUDY GROUP A						
PARTICIPANT	WEEK 1	WEEK 2	WEEK 3	WEEK 4	AVERAGE COMPLIANCE RATE \bar{x}	PERCENTAGE OF RECOMMENDED MINIMUM FREQUENCY %
1	3	3	3	4	3.25	81.25
2	1	2	2	0	1.25	31.25
3	4	2	1	2	2.25	56.25
4	3	2	1	3	2.25	56.25
5	4	2	2	1	2.25	56.25
6	4	3	3	2	3.0	75.00
7	1	1	0	0	0.5	12.5
8	2	2	1	3	2.0	62.5
9	2	2	3	3	2.5	62.5
10	1	1	2	2	1.5	37.5
STUDY GROUP B						
11	1	3	1	0	1.0	25.0
12	2	3	0	0	1.25	31.25
13	3	2	1	1	1.75	43.75
14	3	3	3	3	3.0	75.0
15	4	3	3	2	3.0	75.0
16	2	2	2	2	2.0	50.0
17	3	3	2	3	2.75	68.75
18	3	2	2	2	2.25	56.25
19	2	2	2	3	2.25	56.25
20	1	1	3	2	1.75	43.75

Table 4.5.4.1: Table to Show Rate of Compliance Regarding the Running of Sessions in Pilot Study 2 (By Individual Participant)

EXPERIMENTAL GROUP	AVERAGE COMPLIANCE RATE [x]	PERCENTAGE OF RECOMMENDED FREQUENCY %
A	2.075	51.9
B	2.1	52.5

Table 4.5.4.2: Table to Show Rate of Compliance with Recommended Frequency for Running of Therapy Sessions (By Experimental Group)

As the above table illustrates, the rate of compliance for both study groups was just over 50%. Out of the total sample, 65% showed a compliance rate of at least 50%, and only 20% showed a compliance rate of 75% and above.

When asked, "therapists" mentioned a number of factors they considered to have adversely affected the minimal rate of compliance with recommended frequency. These are summarised below:

- staff shortages affecting availability of time to carry out therapy session;
- "therapist" own absence due to sickness or annual leave;
- participant unavailable due to timetable commitments;
- "therapist" unavailable due to timetable commitments;
- more immediate needs of other clients requiring spontaneous intervention, i.e. client exhibiting challenging behaviour; client requiring support for toileting.

Implications for Main Study:

In conclusion, alterations to the original research design were deemed necessary to cope with problems experienced regarding: the role of the therapist; assignment of participants; structure of therapy sessions; and frequency/duration of intervention. In order that these changes could be made, therapy was withdrawn for a period of two months, when the participants were regrouped and the baseline assessment of each participant was re-established. Due to the sudden death of one of the participants, the withdrawal of attendance by another and an attack of chicken pox on yet another, the sample was reduced to eighteen. Two participants were identified for single case study at a later date.

4.5.5 Characteristics of Sample

The criteria laid down for participant suitability were easily conformed to in **Pilot Study 1**, due to the size of the sample (two participants), and its main purpose being to test the feasibility of the assessment and intervention programme. Each participant fitted the candidacy profile according to the referral criteria (**Appendix B1**).

The sample population defined in **Pilot Study 2** raised a couple of problems in terms of the characteristics of participants, which needed to be dealt with. Specifically, two of the participants, both of whom fitted the candidacy profile, also had a recognised diagnosis of autism. This in itself was a management factor, in that it was intended that the two participants would form a matched pair and be part of a separate single case study. Both participants exhibited challenging behaviour in terms of striking self and others. However, this was at a time when their main day service providers had not the local support required to meet their specific needs. An increase in the challenging behaviour of both participants initially resulted in their infrequent attendance to the day service by the two participants, thereby restricting the access of the researcher for the purposes of data collection and intervention, (both sets of carers preferred to keep their son(s) at home in order to prevent further incidents of challenging behaviour which may have resulted in harm to others); and secondly, resulted in one participant being temporarily transferred to a short stay unit, out of borough, and the other participant receiving a reduced day service within the borough. Due to these difficulties it was decided that both participants should not be involved in the project at the present time. A small, separate study was planned for a later stage in the project, involving the two participants. However, their personal situations were not resolved in time. Thus the sample size for the actual study was reduced to sixteen.

4.5.6 Data Collection Schedule

The schedule of focal observations for **Pilot Study 1** was arranged according to the Day Centre's timetable. Each observation session of 15 minutes duration was allocated accordingly and within timetabled session. There were five observation points which were dispersed over different days of the week and at different times, as appropriate to the day centre schedule: **Session 1: 9.30-10.30 am; Session 2: 11.00-12.00 pm; Session 3: 12.00-1.30 pm; Session 4: 1.30-2.30 pm; and Session 5: 2.30-3.30 pm.**

Difficulties arose regarding participant availability (absence of focal participant did not allow for observation of next available participant, thereby causing stress on observation time) and lunchtime as an observation point led to the following problems:

- ambient noise and crowding in dining room led to distorted visual/auditory representation of participant behaviour on the video recording;
- a focal participant engaged in eating and drinking led to difficulty in coding, e.g. object engagement (feeding self); person engagement (fed by another); or neutral engagement, as representative of a routine/usual body action. This directly influenced the tighter definition and elaboration of the engagement categories.

Implications for Pilot Study 2:

For the scheduling of four observation points for each of twenty participants within a time frame, the following recommendations were made:

- each participant to be observed once at each timetabled session and on a different day;
- participants within each base team to be randomly ordered for observation on a rotational basis;
- when a participant is unavailable the observer moves to the next name on the list;
- the four base teams in the centre are also randomly listed for observation on a rotational basis;
- when a base team is unavailable the observer moves to the next team on the list.

To cope with the difficulties experienced at the midday assessment point, lunchtime as a sampling point was omitted. A participant engaged in eating/drinking at any other time was classified as '*neutral*' under the more specific category definitions. This was to draw a distinction between person or goal oriented purposeful behaviour in the natural environment, and something that happens on a routine basis for survival, i.e. nutritional intake is likened to breathing. All participants were viewed to engage in eating and drinking with various degrees of independence no matter what their engagement behaviours outside meal times were.

4.5.7 Recording Medium

For **Pilot Study 1** a video camera was used to record focal behaviour in the pre-specified observation period. In order to reduced obtrusiveness, the camera was placed in a fixed

location for the recommended duration. Coding of sampled moments of behaviour was completed subsequent to the actual recording. However, use of the video camera in a fixed location was found to restrict the field of view. The rapid response demanded by changes in the natural environment in order to continue the observation period was often not possible, i.e. the location of the camera had to be adjusted.

In **Pilot Study 2** the video camera was held by the observer, who sat in a discreet position in the room. Rate of responsiveness to environmental change was improved by the 'fixed' location with the observer, who moved as appropriate. The observer was required to "look elsewhere" than in the viewer in order to detract focus on the focal participant.

Implications for Main Study:

The use of the video camera was still found to restrict the field of view and depth of focus on the participant. There was considerable attention given to the observer by others in the environment giving cause for concern regarding its reactivity potential. Repeat viewing and coding of the film tape was time consuming. Thus a more rapid and direct method of observation/coding was preferred for the main project. However, already established video tape data was used to demonstrate intra-rater reliability of the behavioural categories and to train the co-observers.

4.5.8 Results of Pilot Study 1

1. Participant X:

CATEGORY	BASELINE		AFTER I.S.E. INTERVENTION	
	n	%	n	%
Self-Active	6	15	5	12.5
Person	3	37.5	3	37.5
Object	2	25	8	100
Person-Object	0	0	5	62.5

Table 4.5.8.1: Engagement Background Questionnaire/Participant X

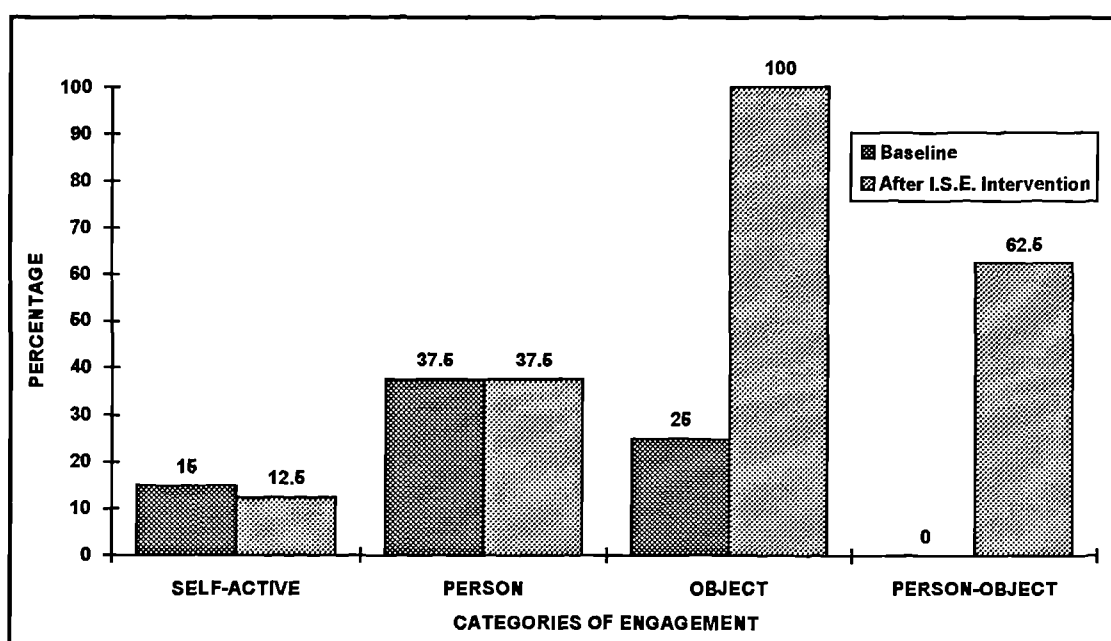


Figure 4.5.8.1: Engagement Background Questionnaire/Participant X

After a four week episode of I.S.E. intervention, the keyworker reported gains in purposeful activity, i.e. *person*, *object* and *person-object*. A small decline in *self-active* behaviour was also reported.

CATEGORY	BASELINE		AFTER I.S.E. INTERVENTION	
	n	%	n	%
Self-Neutral	53.12	75.9	40.63	58.04
Self-Active	15.87	22.7	1.25	1.78
Person	0.5	0.7	2.25	3.21
Object	0.5	0.7	24.75	35.35
Person-Object	0	0	0.12	0.17
Self-Intimate	0	0	0	0
Out of View	0	0	1	1.42

Table 4.5.8.2: Observation By Momentary Time Sampling/Participant X

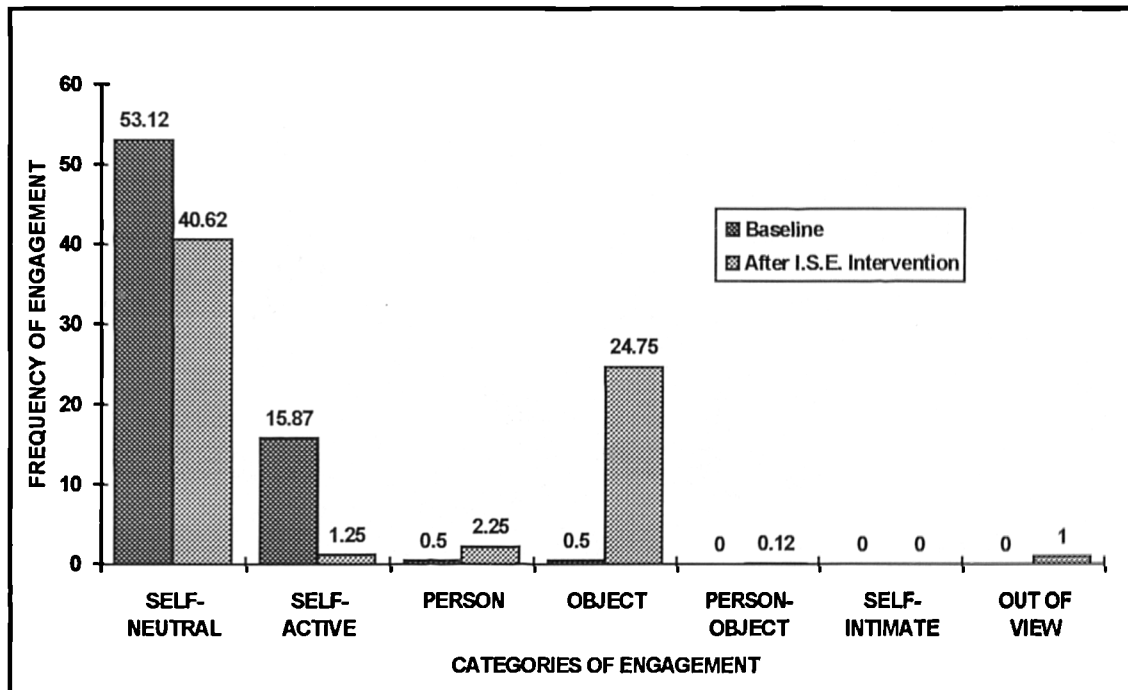


Figure 4.5.8.2: Observation By Momentary Time Sampling/Participant X

Assessment by momentary time sampling after the I.S.E. intervention revealed a large gain in *object* engagement with lesser rise in *person* contact. *Self-active* engagement has dropped dramatically and *self-neutral* less so.

2. Participant Y:

CATEGORY	BASELINE		AFTER A.P. INTERVENTION	
	n	%	n	%
Self-Active	10	25	8	20
Person	3	37.5	4	50
Object	4	50	2	25
Person-Object	0	0	0	0

Table 4.5.8.3: Engagement Background Questionnaire/Participant Y

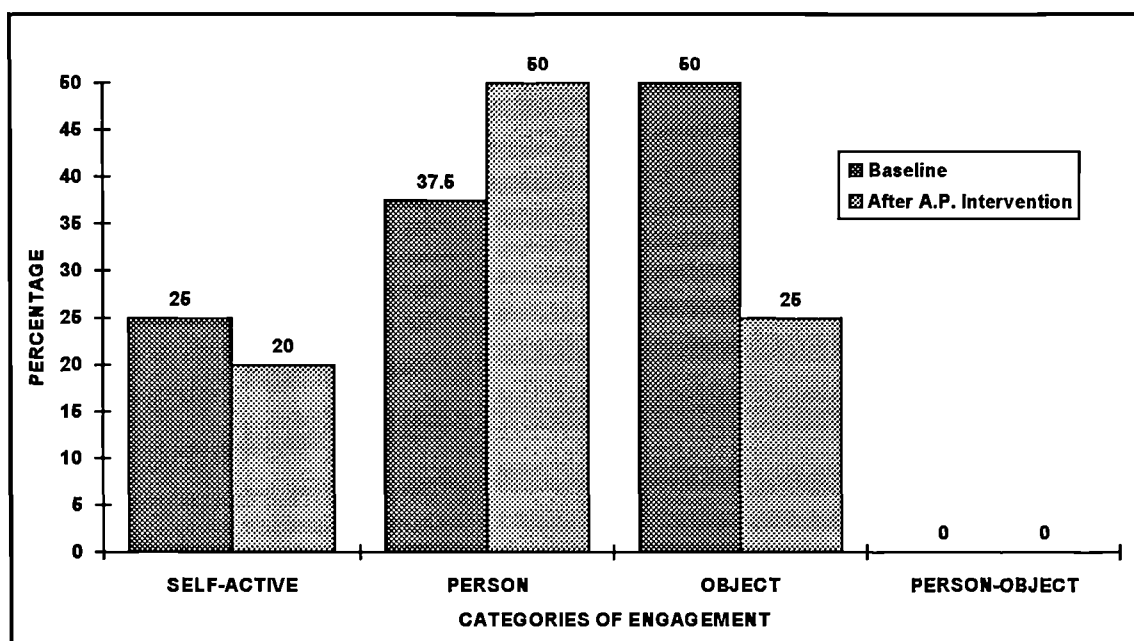


Figure 4.5.8.3: Engagement Background Questionnaire/Participant Y

After the application of the placebo condition (A.P.), reductions in *self-active* and *object* are shown as perceived by the keyworker. *Person* engagement shows a rise.

CATEGORY	BASELINE		AFTER A.P. INTERVENTION	
	n	%	n	%
Self-Neutral	10	14.28	19.5	27.85
Self-Active	59.12	84.45	49.37	70.52
Person	0.12	0.17	0.37	0.52
Object	0	0	0	0
Person-Object	0	0	0	0
Self-Intimate	0	0	0	0
Out of View	0.75	1.07	0.75	1.07

Table 4.5.8.4: Observation By Momentary Time Sampling/Participant Y

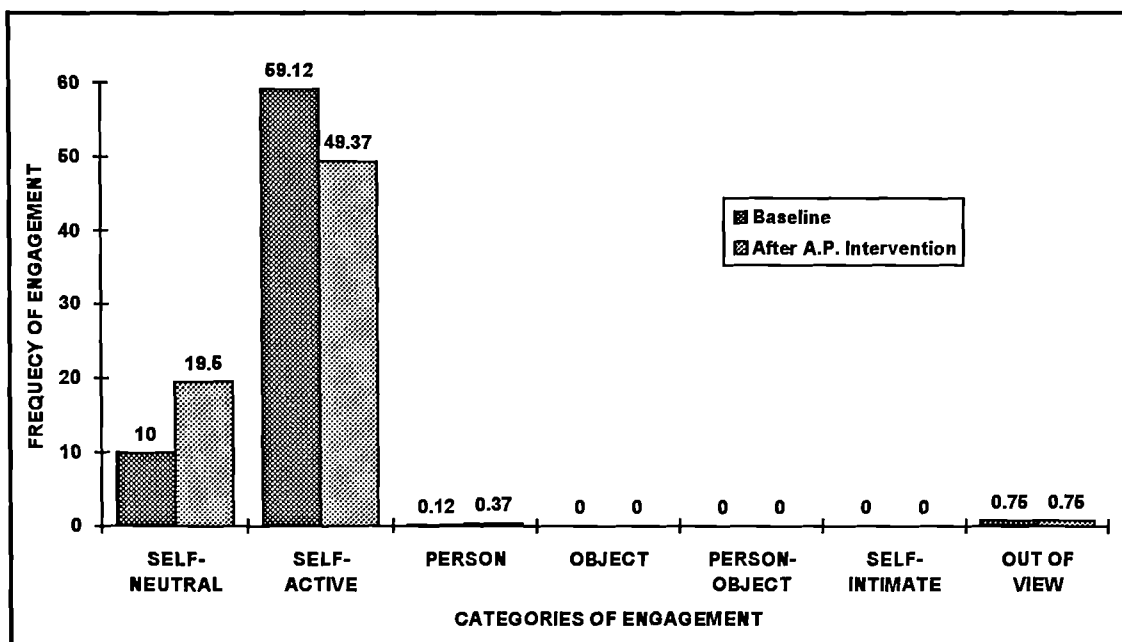


Figure 4.5.8.4: Observation By Momentary Time Sampling/Participant Y

A small drop in *self-active* engagement is shown here together with a small rise in *self-neutral*.

4.5.9 Discussion of Results

At baseline assessment, both participants were observed to engage in combined high levels of *self-neutral* and *self-active* engagement, although the **Participant X** was higher in the former ($n = 53.12$) than the latter ($n = 40.62$), which was almost the reverse of the **Participant Y** whose scores were: *self-neutral* ($n = 10$); *self-active* ($n = 59.12$). Despite the differences in baseline measurements, it was the research hypothesis that a decline in either of these two categories would signal an increase in any of the other defined engagement behaviours, i.e. *person*, *object*, and *person-object*. It was also acknowledged in the case of **Participant Y**, that a reduction in *self-active* behaviour may initially relate to a rise in *self-neutral* behaviour, before growth in the other three categories of engagement.

4.5.10 Assessment by Observation

Participant X (I.S.E. Intervention):

Declines in *self-neutral* and *self-active* behaviours were observed reducing by 18% and 21% respectively. Large rises in *person*: 4.5 times; and *object* engagements: 49.5 times, were observed.

Participant Y (A.P. Intervention):

A lesser decline in *self-active* behaviour was observed: reduction by 14% with *self-neutral* behaviour almost doubling its former level. The other engagement categories remained exactly or virtually at the same levels.

It would appear that the greater changes are seen in the **Participant X** who received **I.S.E.** therapy and this bears out the research hypothesis. A small reduction in the *self-active* behaviour of the **Participant Y** was observed after **A.P.** therapy which would seem to be commensurate with a rise in *self-neutral* engagement. This was thought to be effected by the extra attention and general stimulation that was brought by the placebo activities, and possibly by environmental influences, i.e. significant others starting to be interested in the client and to facilitate increased engagement on tasks and activities. However, this latter source of influence would also be the same for the **Participant X**.

4.5.11 Assessment by Questionnaire

The questionnaires, whilst showing change between the two points of measurement did not always concur with specific engagement increases and declines outlined in the observational measurements. The **Participant X** was identified as showing increased *object* engagement ($n = 6$; 75% rise) which reflected some of the increase seen in the observational data. Only a small reduction in *self-active* was shown. Its level at baseline was comparatively low which probably accounts for the minimal change. *Person* engagement maintained consistency before and after the intervention and a 62.5% gain in *person-object* was revealed. The **Participant Y** showed a small drop in *self-active* behaviour, a small rise ($n = 1$; 12.5%) in *person* and a larger decline ($n = 2$; 25%) in *object* engagement. *Person-object* engagement remained consistently non existent across the data points. Again the important changes did not appear to tally with those of the observational data.

It appeared to the researcher that the questionnaire results probably said more about the subjective assessment of the participant by the significant others, than they did about their attitudes to them. This altered its original purpose as an assessment of the changing attitudes of the significant others over time. Intra-rater reliability of the questionnaire was demonstrated at an overall agreement score of 87.12%. Due to the lack of a second

significant other, familiar with the participants, measurement of inter-rater agreements could not be carried out.

4.5.12 Conclusion and Implications for Main Study

The **Pilot Study 1** proved the feasibility of the study: activities and equipment were identified for both therapeutic conditions and the structure of the programmes was established. Certain changes were made regarding the experimental design and data collection method as has already been recounted in the preceding part of this section. These are now summarised.

1. Decision-Making Schedule: Adjustments were made to the actual schedule in terms of the Checklist contents for ease of interpretation. The comments section was omitted.

2. Engagement Background Questionnaire: Once the researcher had moved from the use of a qualitative interview format to a Questionnaire with coding frame, adjustments were made regarding its contents. In particular, the item referring to '*walks in ritualistic patterns*' was omitted. Although the Questionnaire was not used in the final data analysis of the main study for the reasons stated earlier, it was included as an assessment instrument.

3. Systematic Observation Procedure: Although the chosen method of momentary time sampling was retained, adjustments were made to the schedule of observations. The midday point was omitted, and the use of video was abandoned in favour of *in situ* observations by two raters. The defined categories of engagement were refined and structured to reduce areas of potential ambiguity.

4. Experimental Design and Methodology: The main experimental design did not alter dramatically, apart from adjustments to the sample population and the regrouping of participants for the purposes of intervention. The latter is summarised below. The main alteration to the former, was the exclusion of the two autistic participants who had been identified for single case study, due to circumstances beyond the control of the researcher.

5. Intervention Procedure: The delivery of therapy was changed considerably. The participants were grouped according to their already established base groups within the Day Centre, each group having a membership of between two and four, for random location to each experimental group. The techniques of 'room management' were invoked for the assignment of therapist's duties amongst the researcher (Speech and Language Therapist) and the keyworkers/significant others and for the implementation of therapy.

The next Chapter will focus on the main study. It aims to redefine the experimental design and to summarise the chosen methodology in the light of the recommendations that have arisen from the construction of instrumentation and the pilot studies.

CHAPTER 5: THE EXPERIMENTAL DESIGN AND METHODOLOGY

5.1 Experimental Design

This chapter is about the experimental design of the main study. The recommendations recounted in the previous chapter which arose from the various pilot studies in the Construction Phase of the project, are incorporated in the methodology.

The main study combines a number of different research methods in a single case experimental design. To overcome the difficulty in developing and evaluating effective intervention techniques, methods appropriate to the study of complex behaviours are incorporated in the overall design. Briefly, it is acknowledged that the research design should lend itself to the development and evaluation of therapeutic techniques. The matching of a large group of people with similar symptomology has often been regarded as impossible (Bergin and Strupp, 1972), and the withholding of therapy from a control group of participants raises certain ethical problems.

The selection of the participants has already been recounted in the earlier **Chapter 3: Definition of Population**, where the target population was sampled and further described in a multi-axial comparison with the remainder of the population, i.e. those who did not meet the defined candidacy criteria for the project.

Once the sample population was defined, the membership of the therapy groups was identified. An assignment procedure was used for the allocation of participants to one of two experimental groups which then followed a single case study design. The research project therefore incorporated elements of both group and single case experimental designs. This was in order that an attention-placebo condition could be introduced separately from the defined therapy condition and to each participant. These interventions could then be administered in reversed sequence to the two groups. This is called an alternating treatment design (Barlow and Hayes, 1979).

Pre-test/post-test methods were included in the overall design, i.e. measurements of the outcomes or dependent variables were taken both before and after each phase of

intervention in order to allow for the calculation of change for individual cases and within groups. Two follow up points of measurement were planned at different time intervals after the termination of the final therapeutic condition in each experimental group.

A summary of the experimental design for the main study is given in the figure below.

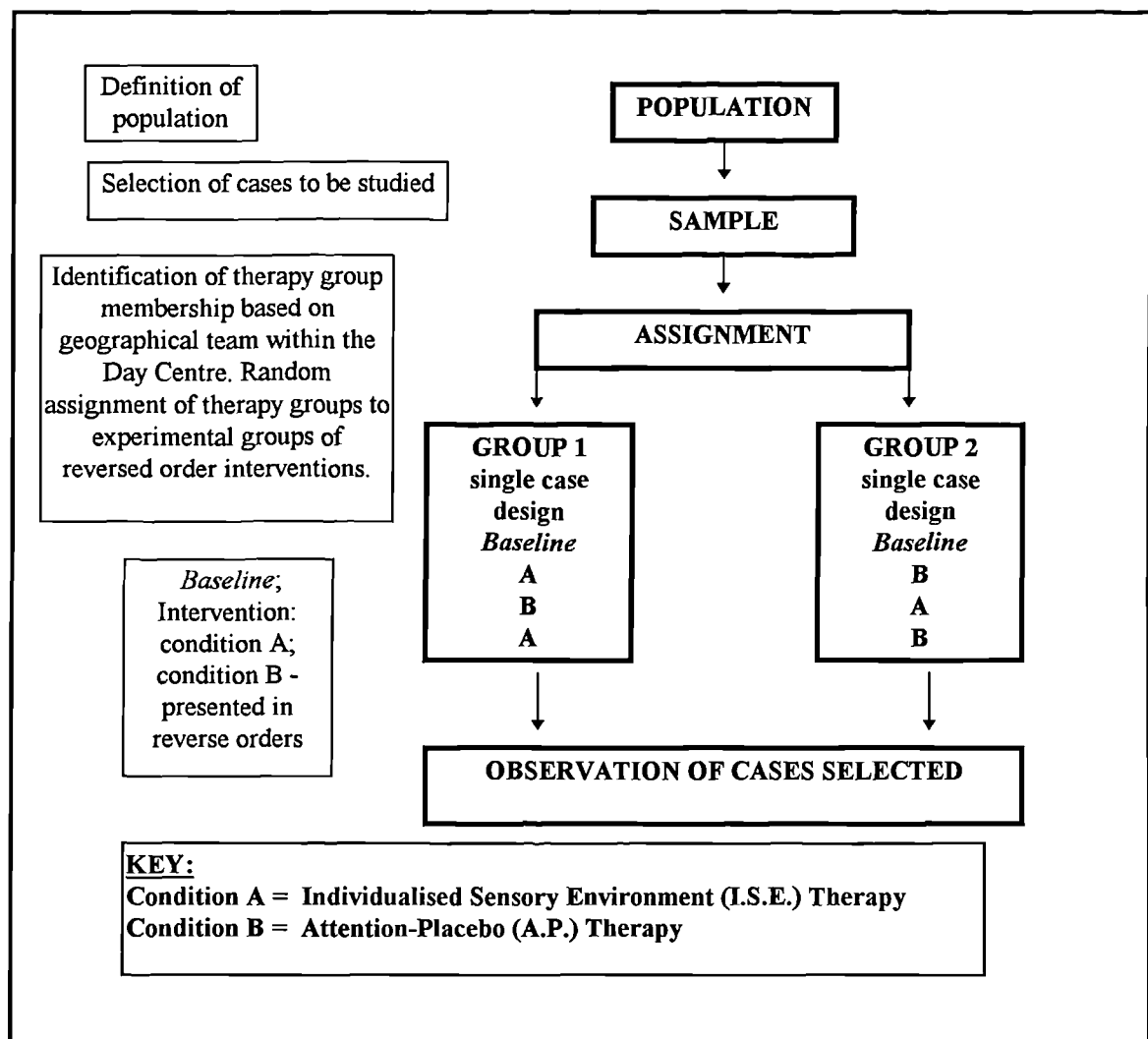


Figure 5.1.1.1: Model of Experimental Strategy

It was the researcher's intention to examine individual participant data: the changes to the level of the dependent variables at critical points in time, and to formally observe the data within each experimental group for potential change between the phases of therapy and over time. Comparisons between each group of participants and the effects of order of intervention could then be investigated.

5.2 Definition of Variables

5.2.1 Independent Variable

There were two levels of the independent variable in this study described as interventions. The rationale of **Intervention A: 'Individualised Sensory Environment', (I.S.E.)** has been outlined in the earlier **Chapter 2**. An individually structured programme was devised for each participant and based on a standard Decision-Making procedure. The therapy condition, although individualised with regard to the definition of specific target responses, support cues required, and the distinctive features of the forms of sensory stimulation, was administered in group settings.

In order to demonstrate the validity of **Intervention A (I.S.E.)**, and to control for the possible effects that the extra therapy time and attention might have on the dependent variables (i.e. the interactive behaviours of the participants), a placebo condition was introduced (**Intervention B**). Participants under this condition received similar amounts of attention to those in the **I.S.E. (Intervention A)**.

In order that the effects of the 'Therapy Assistants' involved in the administration of the neutral or placebo intervention should be minimised, and their potential roles as agents of change be controlled, the 'attention-placebo' condition was represented by an alternatively 'named' therapy. In this study the placebo condition (i.e. **B**) was termed '**Action-Performance Therapy**' and was presented to the Therapy Assistants as a valid alternative to **I.S.E.** To attain a degree of credibility for the placebo condition, specific educational equipment was selected and relevant activities included. To avoid replication of the **I.S.E.** intervention, certain constraints were imposed on the equipment and activities utilised in the placebo condition. That is, it was a requirement of the research that the two interventions should be distinctly different from each other.

5.2.2 Distinctive Features of Interventions

Examination of the distinctive features of the 'Individualised Sensory Environment' intervention, served as a base from which to identify different features for the definition of the attention-placebo condition termed '**Action-Performance Therapy**'.

1. Equipment:

I.S.E. equipment has been defined according to the sensory feedback features of the tactile and vestibular systems. Objects used incorporated features of tactile and vestibular reactivity. A dimensional analysis and specification of the equipment can be found in **Appendix C1**.

A.P. equipment was defined by its symbolic functions or uses, (i.e. hairbrush; cup; plate; fork etc.) and the feedback features of the visual and auditory systems, (i.e. equipment which emitted sounds upon operation or else possessed distinctive attributes regarding colour, form, texture, light and movement. The equipment was designed for special educational needs and ordered from the relevant commercial catalogues.

2. Presentation:

I.S.E. utilised a defined hierarchy of support cues characterised by minimal verbal coding (i.e. a standard core vocabulary); and enhanced by iconic signs, i.e. Makaton. The most appropriate cues for the individual were identified through the administration of the Decision-Making Schedule.

A.P. utilised a defined hierarchy of support cues and instructions according to the requirements of the activities. These were characterised by standard verbal phrases and iconic signs. Use of the cues varied according to the participant's responding behaviour.

3. Activities:

I.S.E. activities were based on the clinical rationale defined in the final section of **Chapter 2**, and by the administration of a Decision-Making Schedule to each participant. Its main purpose was operationalised in four key areas: (i) to identify those feedback features which represented motivating consequences to the individual; (ii) to describe his/her response repertoire; (iii) to ascertain which constituents of the interaction were meaningful to the participant, i.e. person, object or event; and (iv) to identify the means by which the individual rejects presented items. Activities were thus devised to reflect the information collected by the administration of the Decision-Making Schedule.

A.P. activities were based on the development of symbolic understanding and commercially recommended activities and equipment for people with special educational needs.

4. Therapy Procedure:

I.S.E. therapy procedure was based on a response contingency model. The application of sensory stimulation was dependent on the emission of the target response(s) by the participant. Thus it reinforced the purposeful actions of the individual.

A.P. therapy involved the demonstration of object use; visual matching of items; appropriate sign production; visual attention and cause-effect activities. Social praise as a reinforcer of participant activity was employed, i.e. *'that's right'*, *'well done'*, etc.

5. Therapy Aims:

Both **I.S.E.** and **A.P.** therapy had a similarly identified purpose. This was in order that the attitudes of keyworkers/significant others, who might variously be involved in the assessment and intervention procedures, should be impartial to the two interventions. The researcher wished to control for potential product bias thereby giving each an equal chance to work. The broad aim was: to improve the interactions and communications of all participants.

An itemised description of the equipment for the Attention-Placebo condition (**Action-Performance Therapy**) is to be found in **Appendix D1**. This is followed by an outline of a typical therapy session and its internal structuring of activities in **Appendix D2**.

An itemised description of the equipment for the '**Individualised Sensory Environment**' (**I.S.E.**) is to be found in **Appendix D3**.

The research project aimed to assert the influence of the **I.S.E.** intervention on the dependent variables or the outcomes measured for each participant. The attention-placebo schedule (**A.P.**) was formulated as a viable or credible alternative to the **I.S.E.** therapy, to maximise the internal validity of the manipulated condition, such that the measurable effects of the intervention could be attributable to the type of therapy and not to the extra attention received by the participants.

5.2.3 The Dependent Variable

The pre-defined interactive behaviours of each participant constituted the dependent variables to be measured. Using the structure for defining behavioural categories recommended by Barlow and Hersen (1984), the dependent variables were delineated.

The complete definitions of the categories for the target behaviours together with their administrative requirements, are to be found in **Appendix C10**. Only brief summary descriptions are provided here.

1. Self-Neutral Engagement:

The participant was observed to engage in routine tasks, doing nothing specifically (Pope, 1988). Usual body actions were observed and the passive responding to the actions of others. No rhythm, ritual, repetition was observed to be intrinsic to the behaviour. The participant was said to be neutrally engaged (Felce, 1986) and in public view.

2. Self-Active Engagement:

The participant was engaged in behaviour said to be personally or socially maladaptive (Sebba and Hogg, 1986). These were non-purposeful movements or actions characterised by repetition; environmental independence; irrelevance to any ongoing activity; highly predictable feedback (Richer, 1979).

3. Person Engagement:

The participant was said to be engaged in interpersonal relations with peer group and others (Bangs, 1982). Interactions occurred in such a way that they mutually influenced each other (Chapman, 1981).

4. Object Engagement:

The participant was engaged in manipulative schemes applied to objects and their relations in space (Uzguris and Hunt, 1975; Dunst, 1980). The development of visual pursuit and object permanence is apparent, fixation, tracking and other active engagement with objects (Hogg and Sebba, 1986a).

5. Person-Object Engagement:

The participant was observed to emit some movement or sound in which eye contact is alternated between object and person (Bates, 1976; Bruner, 1978). There is the co-ordination of individual actions and their use in producing an effect on the environment (Hogg and Sebba, 1986a). The participant combines the constituents of person and object in one or several fluid actions.

Two additional categories were devised: **Self-Intimate** and **Out of View**. These were not defined as potential outcomes measures but as practical essentials to the method of measurement, i.e. systematic observation techniques using momentary time sampling (M.T.S.). The category **Self-Intimate** was to cope with the observed absence of focal participants; and the category **Out of View** was to cater for the presence of extraneous variables, such as the behaviour and actions of other people, and the location of fixtures and fittings that may impede the observer's view of participant movements. Brief definitions are now supplied. The complete operational definitions are to be found in **Appendix C10**.

(a) Self-intimate Engagement:

A non-obtrusive code was devised to describe personal or private activities which may take place in secluded areas. The behaviour was not viewed in order to preserve the respect and dignity of the participant at all times. Were a participant to move to a similarly identified area, the observation period was completed as the observer continued to attribute activity to this category. In the event of grand mal epileptic seizure, or sudden and traumatic illness seen by chance in a public place, the observer coded to this category.

(b) Out of View:

The participant was temporarily unseen due to a change in environmental circumstances. In summary, the dependent variables or measured outcomes of the manipulated condition were the defined categories of interactive behaviours. Two supplementary categories were included, not as measures of outcome, but to operationalise the chosen method of assessment: systematic observation by momentary time sampling (M.T.S.). Measurement aimed to quantify levels of engagement in each category and over time. The administration of M.T.S. and the application of the defined categories has been

explained in the previous **Chapter 4: Construction of Instrumentation and Pilot Studies**.

5.2.4 Classificatory Variables

Although the matching of human participants with similar symptomology is often not possible, the research project aimed to hold constant four characteristics of potential influence on the dependent variables, in order that their effects be neutralised as far as possible.

1. **The age range:** the population from which the study sample was selected had an age range 18-30 years.
2. **The service location:** the study population from which the sample was drawn comprised those people with learning disabilities on the regular attendance register at a social services run day centre.
3. **The support staff team:** the sample population was grouped for intervention purposes based on their location within the day centre and the staff team which supported them in their daily activities. Allocation to staff teams in the day centre was already based on participant residence within the borough which also dictated their social services bus-run.
4. **Diagnosed Learning Disability:** the study population comprised young men and women with a diagnosed learning disability who had been in receipt of specialist learning disability services for most of their lives. The study focused on a population of adults with a learning disability who were in daily attendance of a social services-run Day Centre whose main purpose was 'social education'. The Day Centre was within the London Borough of Lewisham and its service users were all resident in the same borough. The age range of the centre was 18-30 years of age and catered for adults with a diagnosed learning disability, who would usually have attended a special educational establishment to meet their needs in their childhood years.

For the purpose of defining the sample population, further classificatory variables were identified. These were presented within the Referral Form (**Appendix B1**). Briefly these were:

- The participant **does not** usually use spoken words, signs or symbols to communicate with others;
- The participant **does not** usually engage in purposeful activity of own accord, which is either goal or person oriented;
- The participant's personal needs are usually supplied and anticipated by others;
- The participant usually engages in non-purposeful activity which is not goal or person oriented and may be repetitive or stereotypic in nature.

In short, the classificatory variables for the sample population sought to determine the non or pre-intentional communication status of its participants and to identify the characteristic of non-purposeful behaviour.

The potential influence of other possible intervening variables needs to be examined:

(1) External factors such as educational timetable changes which occurred during the course of study and may have affected the measured dependent variables; and (2) internal factors such as conceptual states within each participant, which although largely hypothetical may describe the process between stimulus and response, such as learning; motivation; personality, etc., and may explain the various outcomes between different participants under the same conditions.

Certain controls were imposed on the study to minimise the effects of potential intervening factors:

1. External Factors

- Non-availability of therapy equipment outside specified times (all equipment was stored in locked cupboards under the charge of the researcher);
- Therapy groups arranged within staff and client teams already set up in the centre to control for the influences of the therapeutic condition on 'support staff', i.e. the same influences will operate at any one measurement point of the dependent variable;
- All therapy groups led by a qualified Speech and Language Therapist with the assistance of a support worker or Therapy Assistant to control for the order and presentation of therapy.

2. Internal Factors

- Single case experimental design but within a group allocation in order that any one participant may be compared with self.

Further discussion of the effects of the extraneous variables will take place in the discussion of the results.

5.3 Assessment Methodology

5.3.1 Systematic Observation

In order to measure the dependent variable, or the categories of engagement mentioned in the previous section, systematic observation in the natural environment was selected as the most suitable assessment procedure. Naturalistic observation is not only the preferred method of data collection for its greater content validity, but it may also be the least inferential method of assessing the effects of the interventions in naturalistic settings. Direct observation techniques were employed in this study for the accurate measurement of the target behaviours in everyday settings (Murphy 1987) and to evaluate the effects of the two therapy conditions (I.S.E. and A.P.) within a single case experimental design (Barlow and Hersen, 1984).

5.3.2 Focus of Observation

1. Categories of Engagement:

These represent the dependent variable which was to be repeatedly measured at the identified times before and after each phase of therapy and at the two follow up points. An operational definition of each of the categories was established emphasising its topography (Johnston and Pennypacker, 1980).

In order to maximise the potential reliability of the categories, behaviours regarded as homogenous, sharing similar properties, were grouped together, thereby reducing the total number of categories. Seven categories were employed in the data collection technique. Five of the categories represented true target behaviours for the measurement of treatment effect on the participants (self-neutral; self-active; person; object; person-object). Two categories were supplied to cope with obscured views or temporary absenteeism of participant and removal/withdrawal of participant to a designated "private" area where observation was not permitted: out of view and self-intimate

respectively. The categories served to group behavioural events according to their salient features and referred only to the observable characteristics of the behaviours.

In order to minimise inter-rater disagreements and other definition problems such as ambiguities between categories, definitions were structured according to the following components as recommended by Hawkins (1982):

- a general definition, as in a dictionary;
- an elaboration that describes the key parts of the behaviour;
- typical and observable examples of the behaviours;
- questionable instances - difficult examples of both occurrences and non-occurrence of the behaviour, with suggestions of appropriate alternative category.

(Appendix C10)

The independent state of each category was determined according to its operational definition and relationship to the other categories. This is explained below:

- a) The categories: *self-intimate*; and *self-neutral*; were mutually exclusive and could not occur together. They were also mutually exclusive to all the other categories and could only occur in isolation.

The category *self-intimate* described behaviour which had occurred within a designated "intimate" area where observation was not permitted (i.e. the lavatory), or else in relation to the intimate nature of the event when it occurred in a public area, such as a participant experiencing a convulsion. Its inclusion amongst the operational definitions of the dependent variable was to preserve the respect and dignity of the participant at all times.

The category *self-neutral* was recorded only when it was observed in isolation. This was because no matter what other category of behaviour is engaged in by the participant, *self-neutral* behaviour will always coincide: the participant engaging with an object is necessarily standing, sitting, engaging in usual body actions concurrently. Routine body actions which may involve the use of an object or the support of another person were also coded as *self-neutral* in order

to distinguish between customary practice for survival and well being, i.e. eating and drinking, and purposeful engagement.

- b) The category *self-active* could be said to occur at the same time as the categories for person; object; and person-object engagement. In the event of the participant engaging in two or more different acts simultaneously each was recorded at the same time. This has a direct influence on the scoring method which is explained later on.
- c) The categories: *person*; *object*; and *person-object* were all mutually exclusive and could not occur together.

2. Response Dimension:

Data collection sought to yield the proportion of all sampled moments where the behaviour pattern was occurring, within the specified observation time. The total number of occurrences attributed to any one target behaviour was said to represent a proportion (or percentage) of time spent performing the behaviour. This is a derivative of the response dimension duration.

5.3.3 Recording System

Momentary time sampling was adopted as a suitable strategy for the collection of data. The interval between observations was to allow for the convenient recording of behaviour and for the economical use of observer time (Brulle and Repp, 1984). This intermittent procedure was first developed by Bindra and Blond (1958), now known as momentary time sampling (M.T.S.).

In collecting objective data through naturalistic observations, assessment information is recorded intermittently. That is, the observer records the occurrence or non-occurrence of the target behaviour precisely at the end of a pre-specified time interval (Brulle and Repp, 1984). The relative accuracy of M.T.S. procedures has been examined by Powell, Martindale and Kulp, (1975), and Powell, Martindale, Kulp, Martindale and Bauman (1977). They concluded 'momentary time sampling' is to be recommended as a data collection procedure where duration is the response dimension of interest (Powell et al, 1977). This is reinforced in a review of direct observational methods by Murphy (1987).

A decision regarding the choice of interval between sampled moments was required. Obviously, the duration of the intervals between each data point needed to be fixed and potential measurement errors kept at a minimum. Powell et al (1977) noted that momentary time sampling procedures with intervals of 120 seconds yielded measurement errors as high as 20 percent.

Heward, Test, Wegner, Cowardin, Olson and Shrewsberry (1980), as reported by Brulle and Repp (1984) found inaccuracies at a 60 second inter-observation interval. Brulle and Repp researched the accuracy of momentary time sampling and the effects on data accuracy of the interval duration. They concluded that intervals or M.T.S. values of 10, 20 and 30 seconds are accurate, both with respect to their absolute error in estimation and their ability to reflect the absence or presence of trend. They recommended extreme caution in the use of the large values of 60, 120 and 240 seconds where accuracy had not been demonstrated. This study utilised the M.T.S. value of 10 seconds in accordance with previously researched evidence.

In order to facilitate the process of accurate coding of behaviour, a delay of three seconds subsequent to the moment to be sampled was set. This was to allow for the clear determination of the observed behaviour as purposeful or not. Such a procedure was used by Bratt and Johnston (1988) who observed changes in the life styles of young adults following discharge from hospital care to a community based service.

A tape recording of bleeps signalling the moments to be sampled and the three second lead in alert was played through the earphones of a "walkman" style cassette player. This had the added advantage of rendering the observer to be engaged in a normal but solitary activity, i.e. listening to music through a personal stereo. Thus it was intended to reduce the effects of observer reactivity, and to partially conceal from the participant(s) the observer's true intention.

5.3.4 Observation Schedule

At each data collection point a total duration of one hour's observation time was recorded from four separate periods of 15 minutes each. According to the timetable of the Day Centre, four potential sessions were identified for the completion of observations. The suggested time periods were:

Session	Time Period
1	9.30-10.45am
2	10.45-12.00pm
3	1.30-2.30pm
4	2.30-3.30pm

Each participant was required to be observed once in each session to make up one hour's worth of observational data. Each 15 minute observational period for one participant needed to occur on a different day. That is, no participant was observed for more than 15 minutes on the same day.

Assessment by systematic observation procedure was carried out prior to the commencement of the first phase of intervention, i.e. baseline measurement; after each of the three phases of intervention and before the start of the new therapy, i.e. at changeover points. Assessments were planned at two follow up points after the termination of the last phase of therapy. This schedule is illustrated in the following figure.

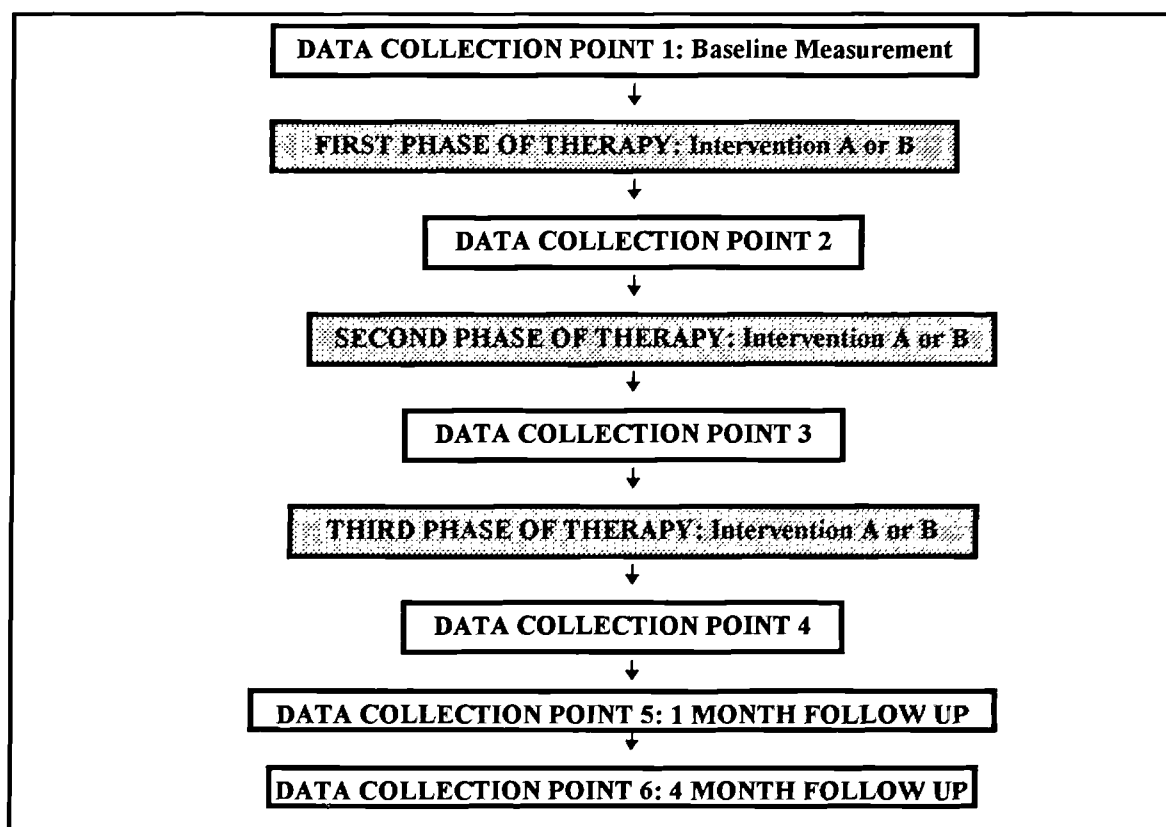


Figure 5.3.4.1: Schedule of Assessments for Main Study

In order to maximise use of observation time available and to restrict the duration of any one data collection point, or time between two phases of therapy, the following rules were applied to the sequence of focal observation periods:

- (i) Participants were observed in random order within their relevant team base group. This was dependent on:
 - availability/presence of participant;
 - session/time period requirement of focal observation.
- (ii) Where the participant was not present, or had already been observed at that particular time period or was in a prohibited setting, the observer moved on to the next participant on the list.
- (iii) Team base groups were taken in random order for focal observation of individual participants. This was dependent on:
 - availability/presence of team base group;
 - session/time period requirement of participants within the group.
- (iv) Where the team base group was not present within the Centre (i.e. on an outing), or the participants had all been observed in that particular time period, or the setting was excluded from the data collection procedure, the observer moved on to the next team, base group on the list.

5.3.5 Observational Settings

The settings for naturalistic observation were the work areas and classrooms; kitchen; garden; and other communal areas within the Day Centre. A number of constraints were placed by necessity on certain settings, due to their potential influences on data collection:

- accuracy in the coding of behaviour;
- influence on the interactive behaviours of participants due to the purpose of the setting.

Examples of the settings to be avoided in terms of the observation procedure were:

- a) Settings where music, movement and dance were in focus (i.e. it is often difficult to distinguish rhythmic swaying to the music from rocking behaviour of an habitual exponent).
- b) Settings where television and video watching was the focal activity (i.e. it was thought that this might possibly bias the levels of self-neutral engagement as compared with person, object and person-object engagement).
- c) Settings where personal or intimate activity was its main focus. Should the participant enter a setting designed for this purpose during the course of a focal observation period, the engagement was coded as self-intimate and the observation period thus completed. When the observer knew the participant to be in such a setting at the intended commencement of the focal observation period, the participant was considered unavailable and the observer moved on to the next focal participant on the list.

Movement of a participant into one of the aforementioned settings was not considered as 'time out' as recommended by Martin and Bateson (1986), as it was the researcher's concern that:

- this would place significant pressure on the duration of the whole data collection;
- the amount of time a participant, from this particular sample population, spends in *Self-Intimate* engagement as dictated by their support needs, was considered relevant to all their other engagements.

Obviously, participant behaviour may vary according to the physical characteristics of each setting, the persons present, the purpose and structure within the setting and the control exerted by the observation process (Nay, 1979). To control for possible variance in the environment, the following steps were taken:

- a) The physical characteristics: all observations were completed within the targeted Day Centre building. Work areas/classrooms; the kitchen, garden and other communal areas were included in the definition of observational settings. The toilet areas, bathroom, dining room (at refreshment time) were avoided.
- b) The persons present: observation periods were assigned to four timetabled work or class sessions, where peers and at least one staff member should be present.

- c) The purpose and structure: timetabled work sessions were targeted, where the common purpose was education in terms of social, motor, communication, creative and other life skills. It was acknowledged that the degree of structure imposed on a setting was likely to be influenced by the purpose of each setting, the peers present and the staff member, and as such was not so controlled.
- d) Control executed by the observation process: the threats posed by the presence of an observer on visible activity in the naturalistic setting necessarily prompted stringent definition of: the role of the observer; training and selection of the observers; expectancy and feedback within the observational setting. These will be dealt with in order.

5.3.6 Role of the Observer

In defining the role of the observer, attention was given to the phenomenon of reactivity (i.e. potential responses of participant to being observed). The expectancy or prejudices of the observer is also known to influence the data collection process, i.e. an observer may impose patterns of regularity and orderliness on otherwise complex and unruly data (Hollenbeck, 1978; Mash and Makohoniuk, 1975). This will now be dealt with by a definition of the observer's role.

- a) *Partial participant* - that is the identity and global purpose of the observer was disclosed to the staff members. Permission to observe was obtained and although the sample participants within the team base group were known to the staff member(s), the order of the focal observations was not revealed. The participant and all other persons in the setting were naive regarding the experimental purpose of the observation.

Verbal response to interactive initiatives of other person/staff was permissible although a neutral, indifferent attitude was maintained towards the participant, i.e. an interactive initiative directed to the observer was ignored - no response from the observer followed. For this purpose, a participant engagement thus defined was coded neutral, to control for any potential feedback from the observer to the participant, e.g. eye contact between the participant and observer.

- b) *Habituation* - prior to the commencement of the first observation period in a team group setting, the observer settled in the environment only simulating observer activity, i.e. there was a delay on true data collection.
- c) *Appearance* - the observer wore the earphones leading to a personal stereo "walkman" style, and gave the impression of 'listening to music' and 'note taking' on a clip board. Attention given to the focal participant and all other persons was avoided. The appearance was one of a person engaged in a solitary activity.
- d) *Location and Distance* - the observer was situated in the most conveniently located corner of the setting, either sitting or standing, dependent on the view of the participant. An approximate distance of at least 5 feet and no greater than 20 feet was maintained. Location and distance was adapted according to movements and position of the focal participant.

5.3.7 Selection and Training of Observers

A schedule of training on the selected systematic observation method was defined and carried out. Two observers were identified to collect essential data: one was the researcher, the second a Speech and Language Therapy Assistant, employed within the same department. The dual role of the researcher as both 'researcher' and 'co-observer' was not ideal; constraints on funds to employ a second person necessarily influenced the selection of the observers. However, the Speech and Language Therapy Assistant/observer was unaware of the true hypothesis of the study, being only briefed that the various forms of stimulation in both I.S.E. and A.P. were being evaluated. A definition of A.P. (**Action-Performance Therapy**) was given to the Assistant, similar to the one given to the relevant team of support staff.

Once selected, the observers entered a period of training as recommended by Barlow and Hersen (1984) which comprised:

- a) *General Orientation:* this involved watching video recordings of people who met the set criteria for the sample population, giving feedback of general observations and receiving feedback from the researcher.

b) Observation Manual and Checksheets: this required the learning of the observation rules; familiarisation with the defined categories of engagement; and becoming accustomed to the layout of the checksheet (Appendices C10 and C11).

c) Conducting Analogue Observations: the observers practised M.T.S. procedures on the video recordings, utilising the tape with pre-recorded bleeps and the appropriate checksheets.

d) In Situ Practice: at least two trial observation sessions were completed to provide experience of potential environmental disturbance and the coping strategies recommended for focal observation.

e) Recapitulation: the observer was tested on his/her knowledge of the observation method, paying particular attention to the engagement categories, i.e. a behaviour was described and the observer was required to provide instantaneous categorisation.

f) Debriefing: the observer was interviewed at the end of the training period in order to detect any biases or other factors of potential influence on results. The schedule for the true observations was then given to the observer.

5.3.8 Recording Medium

Sampled moments of behaviour were recorded on a simple checksheet supported on a clipboard. The observer recorded the occurrence or non-occurrence of a behaviour at the end of a pre-specified time interval by an oblique line in the appropriate box. The checksheet is to be found in Appendix C11.

5.3.9 Scoring Method

For each recorded occurrence of a behaviour coded to an engagement category a value of '1' was assigned. Where the participant was recorded as engaging in '*self-active*' behaviour, together with '*person*', '*object*', or '*person-object*', a possible configuration, a value of '0.5' was assigned to each of the two coded behaviours. Therefore, the score for any one moment sampled must be '1'. A raw score was derived for each participant on the distribution of their engagement behaviours over the seven categories at any one data collection point.

5.4 Method of Experimental Analysis

The analysis of assessment data was planned in two parts: the first part concentrating on the mean data from the two experimental groups in relation to the eight research hypotheses; the second part focusing on the key issues arising from inspection of the single case studies.

5.4.1 Statistical Analysis of Experimental Groups

The central question of the researcher was *'Has the intervention had a reliable or veridical effect on the defined behaviour?'*, or more specifically, *'Are the effects of I.S.E. therapy of significance to the engagement levels of the sample population?'*. It was therefore essential that comparisons were drawn between the dependent variable (or engagement behaviour) under different conditions (post I.S.E. and A.P. phases of therapy) and over time.

Analysis of variance (ANOVA) was selected as the most suitable method of interpreting the experimental results, thereby calculating the proportions of total variance due to the independent variable, the interactions between the variables and the proportion due to all other variables (error variance). This was carried out in three main steps in order to address the focal questions posed by the research. Firstly, ANOVAs were run on the two experimental groups separately to examine changes in engagement behaviour within groups and between critical assessment points: (i) significant change between consecutive assessment points; and (ii) change from baseline (1) to subsequent assessment points [(2), (3) and (4)]. Unplanned comparisons using Newman-Keuls test were made between measured values at any two different data points and examination of the simple main effects amongst categories of behaviour was carried out.

Secondly, in order to evaluate the effectiveness of I.S.E. therapy, the data occurring immediately before and after the first I.S.E. therapy phase for both experimental groups was combined to assess the significance of the independent variable. A similar procedure was carried out combining the data occurring after the first A.P. interventions for their effective comparison.

A third stage of analysis was carried out to examine the effects of withdrawal of therapy at the two follow up data points, at one month (5) and at four months (6). This was

analysed separately using only data derived from those participants who were represented at each follow up point. The main question was two-fold, *'To what extent are the effects of intervention maintained after intervention has been withdrawn?'* and *'Do engagement levels revert to their former baseline?'*

5.4.2 Analysis of Single Case Studies

The single case studies were examined for the degree of change in engagement levels that occurred over time, for the direction of those changes and any individual differences.

5.5 Summary of Chapter

The research design was a combination of single case study within a group design of reversed order interventions. There were two levels of independent variable represented by different types of intervention. They were referred to as **Intervention A**: the **'Individualised Sensory Environment' (I.S.E.)**, and **Intervention B**: the placebo condition termed **'Action-Performance Therapy' (A.P.)**. It was a two factor (assessments over time and measures of engagement), within groups design.

Participants were grouped for therapy according to their location within the Centre's four staffed team bases. Each group had a membership of between two and four. Therapy groups were then matched according to their similar membership numbers and randomly allocated to one of two experimental groups, such that each group within a matched pair, would be allocated to a different experimental group.

The main method of assessment was a systematic observation procedure termed **'Momentary Time Sampling' (M.T.S.)**. Data was collected in the natural environment but was influenced by identified features of the Day Centre setting, in terms of timetabled activities; and designation of particular work areas. Measures of interactive behaviours, as defined by the operational categories of *self-neutral*, *self-active*, *person*, *object* and *person-object* were taken at the identified assessment points, at baseline, between therapy phases and at two follow-up points. Data analysis was planned in two parts: experimental group and single case. The planned method and stages of the statistical analysis (ANOVA) have been outlined.

The next Chapter summarises the results from the empirical phase of the project.

CHAPTER 6: SUMMARY OF RESULTS

6.1 Introduction to Results Chapter

This Chapter is divided into two parts. The first part (6.2) presents the mean group data and statistical analysis with reference to the main research hypotheses. The second part (6.3) concentrates on the single case studies. It reviews the key issues that emerged from this level of analysis in relation to the questions of treatment efficacy. The reader is referred to the more detailed account to found in the Appendices E1 and E2.

6.2 Summary of Group Data

As a preliminary, the reader is provided with a 'Definition of Experimental Groups' to serve as a reminder of the terms used to refer to them, and their respectively defined orders of intervention.

Definition of Experimental Groups

Group 1 (7 participants) received two phases of **I.S.E. (Intervention A)** and one of **A.P. (Intervention B)** in the order of 'ABA'.

Group 2 (9 participants) received two phases of **A.P. (Intervention B)** and one of **I.S.E. (Intervention A)** in the order of 'BAB'.

A key to the notations used within the tables is provided at the base of each page.

6.2.1 Hypothesis One

Hypothesis 1: There will be a significant improvement in the dependent variables over the four assessment points, including baseline and after each of the three subsequent phases of intervention.

The combined data for each experimental group over the first four assessment points was analysed.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	9.567	1.594		
a	3	10.520	3.507	2.876	.0648
Error	18	21.944	1.219		
b	4	16517.010	4129.252	9.325	.0001
Error	24	10627.763	442.823		
ab	12	3941.607	328.467	7.338	.0000
Error	72	3222.848	44.762		

Table 6.2.1.1: ANOVA Summary for Group 1 (7 participants)

The interaction between the first four assessment points and the measures (engagement levels) is seen to be significant ($p < .0001$). This is an important result which is echoed throughout the analysis. It shows that variations in the measures across assessment points exist.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	89.429	3	18	75.323	1.187	.343
a at b2	927.705	3	18	54.139	17.136	.000
a at b3	71.887	3	18	9.038	7.954	.001
a at b4	212.624	3	18	33.978	6.258	.004
a at b5	15.730	3	18	7.788	2.020	.147
b at a1	2747.877	4	24	66.589	41.266	.000
b at a2	528.564	4	24	187.970	2.812	.048
b at a3	1136.043	4	24	151.806	7.484	.000
b at a4	702.171	4	24	170.744	4.112	.011

Table 6.2.1.1a: Simple Main Effects for Group 1 (7 participants)

Significant differences are revealed not only in the value of b2 (*self-active*: $p < .001$), but also in the values of b3 (*person*: $< .001$) and b4 (*object*: $p < .005$). It therefore seems a reduction in *self-active* will facilitate gains in the values of *person* and *object* engagements. There are no significant changes reported in b1 (*self-neutral*) and b5 (*person-object*). However, *self-neutral* levels for **Group 1** were much lower at baseline than for *self-active* possibly indicating less facility for effect.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

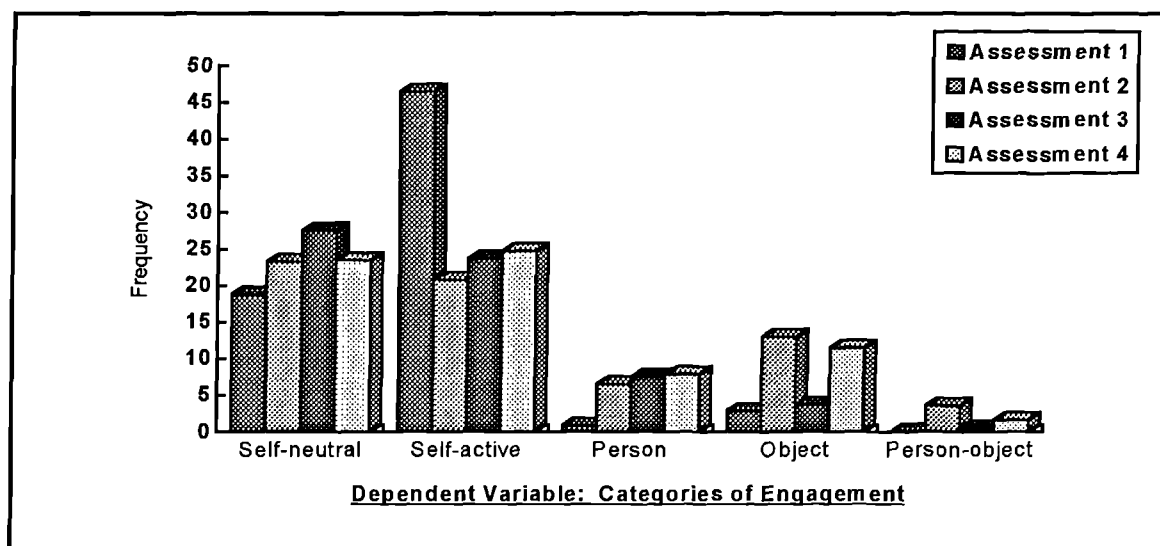


Figure 6.2.1.1 Graph to Show Changes in Engagement Levels

Over the Four Assessment Points for Group 1 (7 participants)

This demonstrates a major change in the value of b2 (*self-active*), particularly between the first two assessment points (a1 and a2) when the first I.S.E. (Intervention A) was run.

Source of variation	df	Sum of Squares	Mean Square	F	p
Participants	8	22.065	2.758		
a	3	16.908	5.636	1.729	.1877
Error	24	78.222	3.259		
b	4	44454.673	11113.668	32.424	.0000
Error	32	10968.358	342.761		
ab	12	1098.097	91.508	4.352	.0000
Error	96	2018.480	21.026		

Table 6.2.1.2: ANOVA Summary for Group 2 (9 participants)

The interaction between the assessment points and the measures (engagement levels) is seen to be significant ($p < .0001$). Further examination of where the significant changes occur, in terms of post intervention assessment point, is required in order to ascertain where the largest effects occur.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
 b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	67.110	3	24	33.573	1.999	.141
a at b2	168.003	3	24	31.956	5.257	.006
a at b3	78.665	3	24	7.848	10.024	.000
a at b4	55.619	3	24	11.275	4.933	.008
a at b5	2.271	3	24	2.712	.838	.487
b at a1	2722.272	4	32	110.497	24.637	.000
b at a2	3165.008	4	32	109.159	28.994	.000
b at a3	2287.261	4	32	123.084	18.583	.000
b at a4	3213.651	4	32	63.098	50.931	.000

Table 6.2.1.2a: Simple Main Effects for Group 2 (9 participants)

Significant differences are revealed not only in the value of b2 (*self-active*: $p < .01$), but also in the values of b3 (*person*: $< .001$) and b4 (*object*: $p < .01$). There are no significant changes reported in b1 (*self-neutral*) and b5 (*person-object*).

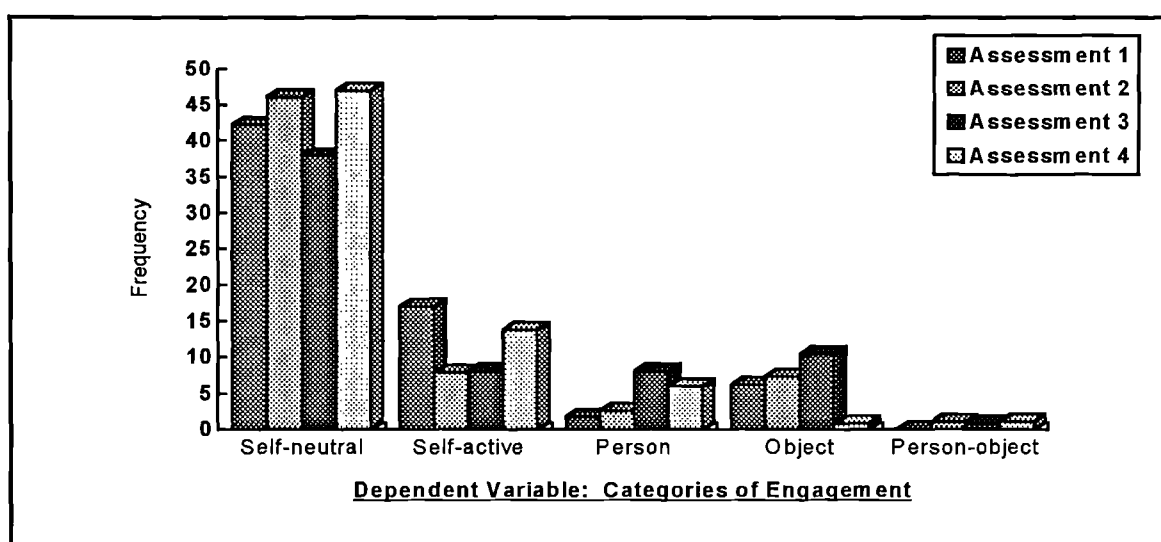


Figure 6.2.1.2: Graph to Show Changes in Engagement Levels

Over the Four Assessment Points for Group 2 (9 participants)

The larger change in the value of b2 (*self-active*) is seen, particularly between the first two assessment points.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

6.2.2 Hypotheses Two, Three and Four

Hypothesis 2: There will be higher levels of non-purposeful behaviour (i.e. *self-active* and *self-neutral*) than purposeful behaviour (i.e. *person*, *object* and *person-object*).

Hypothesis 3: The introduction of the I.S.E. (Intervention A) will effect a reduction in the level of non-purposeful behaviour (i.e. *self-active* and *self-neutral*).

Hypothesis 4: The application of the I.S.E. (Intervention A) will effect an increase in the level of purposeful behaviour (i.e. *person*, *object* and *person-object*).

ANOVAs were carried out on pairs of data over consecutive assessment points within each experimental group, i.e. from baseline (1) to assessment (2); from assessment (2) to assessment (3).

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	3.933	.655		
a	1	.880	.880	6.995	.0383
Error	6	.755	.126		
b	4	10161.963	2540.491	13.850	.0000
Error	24	4402.350	183.431		
ab	4	2943.799	735.950	10.347	.0001
Error	24	1707.068	71.128		

Table 6.2.2.1: ANOVA Summary for Group 1 (7 participants)/Assessment (1) to (2)

From Baseline to After First Intervention (I.S.E.)

Examination of the effects of the first phase of I.S.E. (Intervention A) reveals a significant interaction between the levels of engagement and the assessments ($p < .0001$).

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
 b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	72.960	1	6	154.717	.472	.518
a at b2	2302.729	1	6	57.504	40.045	.001
a at b3	103.904	1	6	11.069	9.387	.022
a at b4	421.083	1	6	46.608	9.035	.024
a at b5	44.002	1	6	14.739	2.985	.135
b at a1	2747.877	4	24	66.589	41.266	.000
b at a2	528.564	4	24	187.970	2.812	.048

Table 6.2.2.1a: Simple Main Effects for Group 1 (7 participants)/Assessment (1) to (2)

After the first intervention (I.S.E.) a decline is revealed in b2 (*self-active*: $p < .001$) with a significant increase in b3 (*person*: $p < .05$) and also in b4 (*object*: $p < .05$).

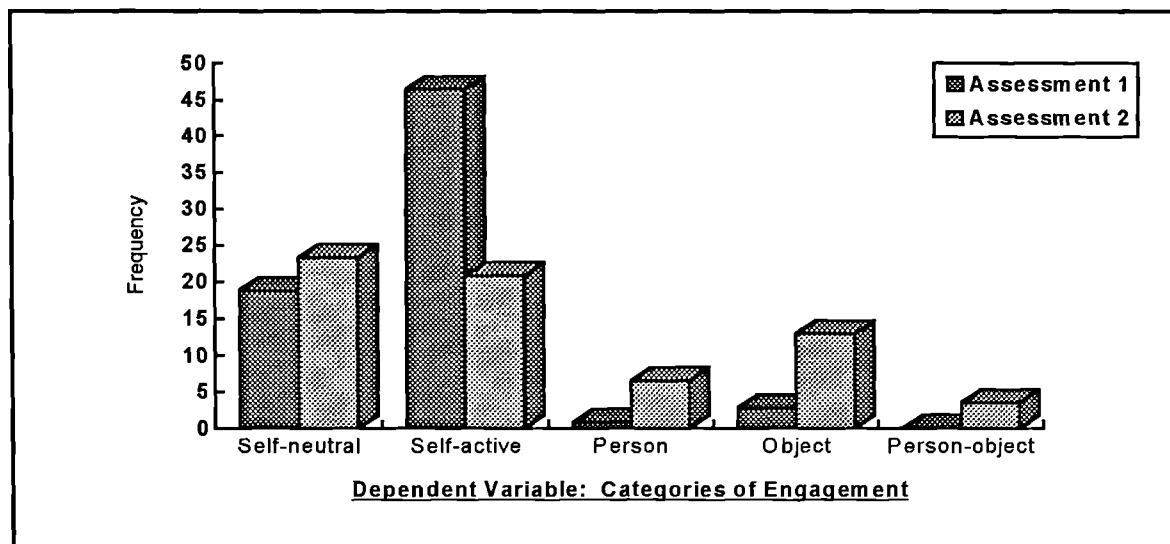


Figure 6.2.2.1: Graph to Show Changes in Engagement Levels

From Baseline to After the First Intervention (I.S.E.) for Group 1 (7 participants)

Higher levels of *self-active* and *self-neutral* engagement are shown at baseline (Assessment 1). After the first intervention a large reduction in the level of *self-active* is observed. Gains in the levels of *person* and *object* are to be seen, and *person-object*, although less so. A small gain in *self-neutral* is also observed.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	8	39.397	4.925		
a	1	4.534	4.534	.851	.3833
Error	8	42.629	5.329		
b	4	23091.881	5772.970	28.962	.0000
Error	32	6378.585	199.331		
ab	4	457.241	114.310	5.624	.0015
Error	32	650.431	20.326		

Table 6.2.2.2: ANOVA Summary for Group 2 (9 participants)/Assessment (1) to (2)

From Baseline to After First Intervention (A.P.)

The interaction between the assessments over time and the values of dependent variable is significant ($p < .005$).

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	69.070	1	8	43.145	1.601	.241
a at b2	378.950	1	8	25.438	14.897	.005
a at b3	3.627	1	8	2.997	1.210	.303
a at b4	5.746	1	8	11.794	.487	.505
a at b5	4.381	1	8	3.259	1.344	.280
b at a1	2722.272	4	32	110.497	24.637	.000
b at a2	3165.008	4	32	109.159	28.994	.000

Table 6.2.2.2a: Simple Main Effects for Group 2 (9 participants)/Assessment (1) to (2)

Examination of the simple main effects of the first phase of intervention (placebo condition: A.P.), reveals a significant decline in b2 (*self-active*; $p < .005$) with no change in the values of the other four categories. This is presumably due to the initial effects of attention on engagement levels.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

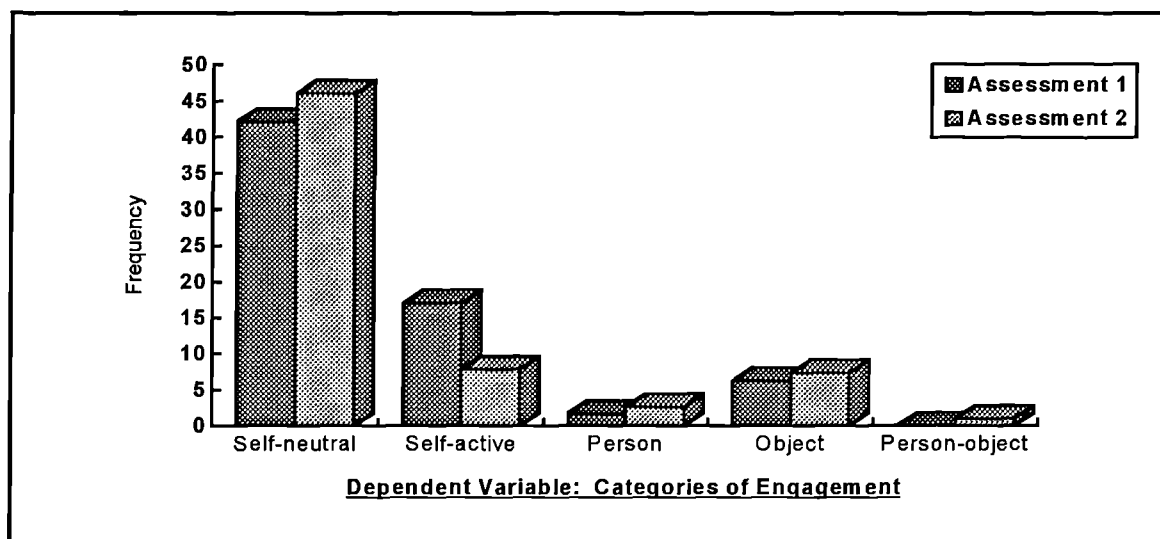


Figure 6.2.2.2: Graph to Show Changes in Engagement Levels From Baseline to After the First Intervention (A.P.) for Group 2 (9 participants)

After the first intervention (A.P.), a reduction in the value of b2 (*self-active*) is seen. A small rise in the level of *self-neutral* is shown and much less so in the levels of *person*, *object* and *person-object*. Overall the effects of **Intervention B (A.P.)** appear to be less marked than those of **Intervention A (I.S.E.)**.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	11.930	1.988		
a	1	3.463	3.463	1.319	.2945
Error	6	15.756	2.626		
b	4	6114.126	1528.532	5.186	.0037
Error	24	7073.652	294.735		
ab	4	544.299	136.075	3.021	.0376
Error	24	1080.962	45.040		

Table 6.2.2.3: ANOVA Summary for Group 1 (7 participants)/Assessment (2) to (3)
After Second Intervention (A.P.)

The interaction is shown to be significant ($p < .05$) between assessment points (2) and (3).

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	61.279	1	6	73.957	.829	.398
a at b2	99.165	1	6	42.587	2.329	.178
a at b3	3.540	1	6	7.621	.465	.521
a at b4	360.274	1	6	44.034	8.182	.029
a at b5	23.504	1	6	14.587	1.611	.251
b at a1	528.564	4	24	187.970	2.812	.048
b at a2	1136.043	4	24	151.806	7.484	.000

Table 6.2.2.3a: Simple Main Effects for Group 1 (7 participants)/Assessment (2) to (3)

The introduction of the attention placebo condition (A.P.), does not appear to have significantly affected the engagement levels apart from a significant decline in b4 (*object*: $p < .05$).

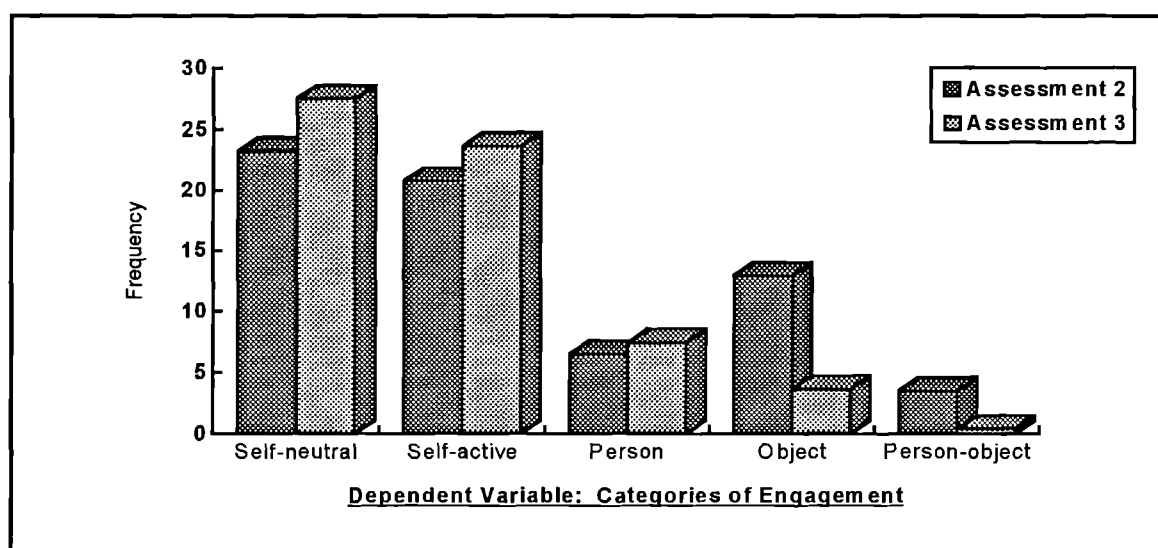


Figure 6.2.2.3: Graph to Show Changes in Engagement Levels After Second Intervention (A.P.) for Group 1 (7 participants)

It would appear that the original gain achieved after the initial I.S.E. intervention, has been reversed under A.P. However, apart from *object* engagement, the effects of the previous I.S.E. therapy have been maintained in the other categories.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	8	28.437	3.555		
a	1	15.055	15.055	3.515	.0977
Error	8	34.265	4.283		
b	4	21555.036	5388.759	24.805	.0000
Error	32	6951.764	217.243		
ab	4	254.040	63.510	4.234	.0073
Error	32	480.035	15.001		

Table 6.2.2.4: ANOVA Summary for Group 2 (9 participants)/Assessment (2) to (3)

After Second Intervention (I.S.E.)

The overall interaction is significant ($p < .01$). The introduction of the I.S.E. intervention seems to have effected a change in the engagement levels between the two points of assessment.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	92.299	1	8	17.061	5.410	.048
a at b2	.333	1	8	20.009	.017	.900
a at b3	134.316	1	8	12.821	10.476	.012
a at b4	42.014	1	8	11.171	3.761	.088
a at b5	.133	1	8	3.225	.041	.844
b at a1	3165.008	4	32	109.159	28.994	.000
b at a2	2287.261	4	32	123.084	18.583	.000

Table 6.2.2.4a: Simple Main Effects for Group 2 (9 participants)/Assessment (2) to (3)

Significant effect can be seen in b3 (*person*: $p < .05$) and a small effect, although not statistically significant, in b4 (*object*: $p < .1$). There is no further decline of b2 (*self-active*) which is presumably due to a significant decline occurring after the A.P. condition which may have reached saturation point, i.e. no further effect is possible. However a significant decline in the level of *self-neutral* behaviour may be seen (b1: $p < .05$) and it might be expected that following a reduction in *self-active* behaviour, a decline in *self-neutral* behaviour would follow and concurrent with their declining levels, the other three engagement categories would rise.

KEY FOR TABLES AND FIGURES

(a) – assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) – measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

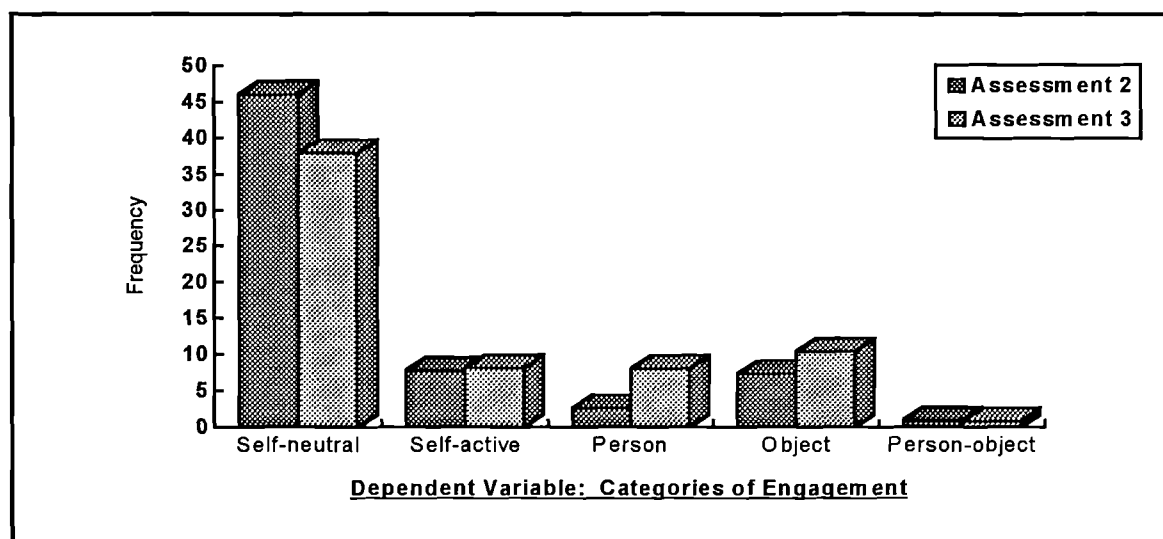


Figure 6.2.2.4: Graph to Show Changes in Engagement Levels

After Second Intervention (I.S.E.) for Group 2 (9 participants)

The reduction in *self-neutral* and the rise in *person* can be observed, together with small, but non-significant increase in *object* engagement. *Self-active* engagement remains virtually stable.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	19.201	3.200		
a	1	7.943	7.943	6.253	.0465
Error	6	7.621	1.270		
b	4	7078.404	1769.601	6.280	.0013
Error	24	6762.291	281.762		
ab	4	274.451	68.613	1.682	.1869
Error	24	978.903	40.788		

Table 6.2.2.5: ANOVA Summary for Group 1 (7 participants)/Assessment (3) to (4)

After Third Intervention (I.S.E.)

The interaction here is not significant. This means that the third intervention, where the I.S.E. therapy was repeated, has had no further effect over the situation.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	60.071	1	6	49.921	1.203	.315
a at b2	7.243	1	6	61.406	.118	.743
a at b3	.875	1	6	3.705	.236	.644
a at b4	212.706	1	6	47.639	4.465	.079
a at b5	1.498	1	6	1.749	.856	.390
b at a1	1136.043	4	24	151.806	7.484	.000
b at a2	702.171	4	24	170.744	4.112	.011

Table 6.2.2.5a: Simple Main Effects for Group 1 (7 participants)/Assessment (3) to (4)

A small increase in b4: *object* engagement is observed (*object*: $p < .1$), although it is not statistically significant. This may represent a partial reversal of the previous decline seen after the A.P. intervention (Assessment (2) to (3)).

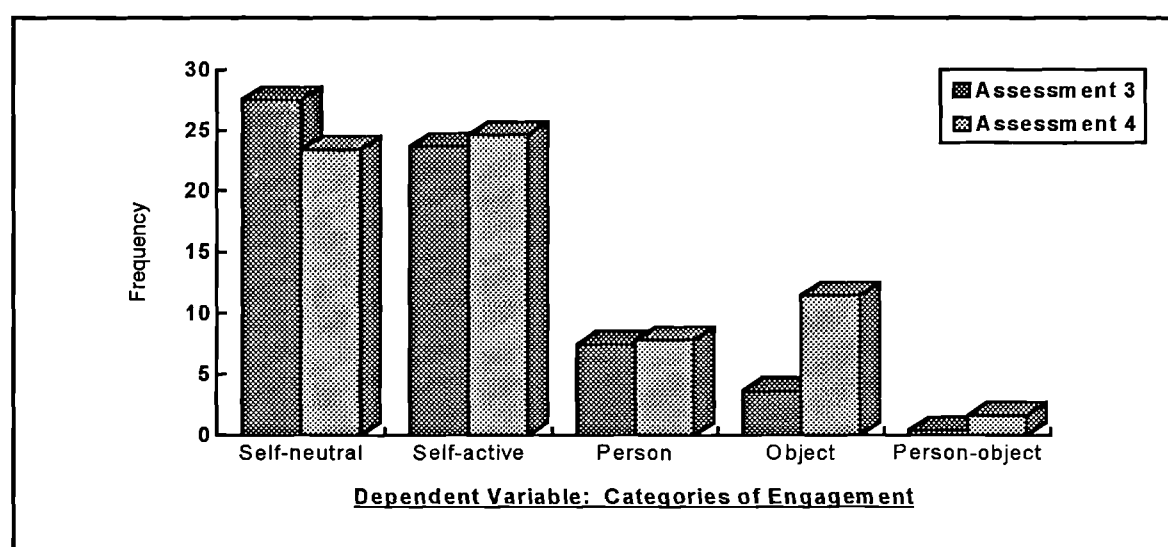


Figure 6.2.2.5: Graph to Show Changes in Engagement Levels After Third Intervention (I.S.E.) for Group 1 (7 participants)

The rise in *object* engagement is shown, whilst the remaining categories of engagement appear to have maintained stability. There is also a small decrease in *self-neutral* engagement to be seen.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	8	10.722	1.340		
a	1	.608	.608	.646	.4449
Error	8	7.538	.942		
b	4	21684.819	5421.205	32.401	.0000
Error	32	5354.042	167.314		
ab	4	318.829	79.707	4.224	.0074
Error	32	603.780	18.868		

Table 6.2.2.6: ANOVA Summary for Group 2 (9 participants)/Assessment (3) to (4)

After Third Intervention (A.P.)

The overall interaction is significant ($p < .01$) with some important changes shown in the simple main effects.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	132.085	1	8	28.650	4.610	.064
a at b2	9.783	1	8	26.031	.376	.557
a at b3	20.034	1	8	3.934	5.093	.054
a at b4	157.117	1	8	16.242	9.674	.014
a at b5	.417	1	8	1.558	.268	.619
b at a1	2287.261	4	32	123.084	18.583	.000
b at a2	3213.651	4	32	63.098	50.931	.000

Table 6.2.2.6a: Simple Main Effects for Group 2 (9 participants)/Assessment (3) to (4)

One important effect observed is the significant decline in the value of b4 (*object*: $p < .05$). There is an almost significant effect in b3 (*person*), again a small drop in level. The values of both b4 (*object*) and b3 (*person*) formerly showed gains after the previous I.S.E. intervention, although only the latter, significantly. It therefore appears that the positive effects of the intervention I.S.E. are not maintained, and are even reversed during the following placebo condition (A.P.).

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

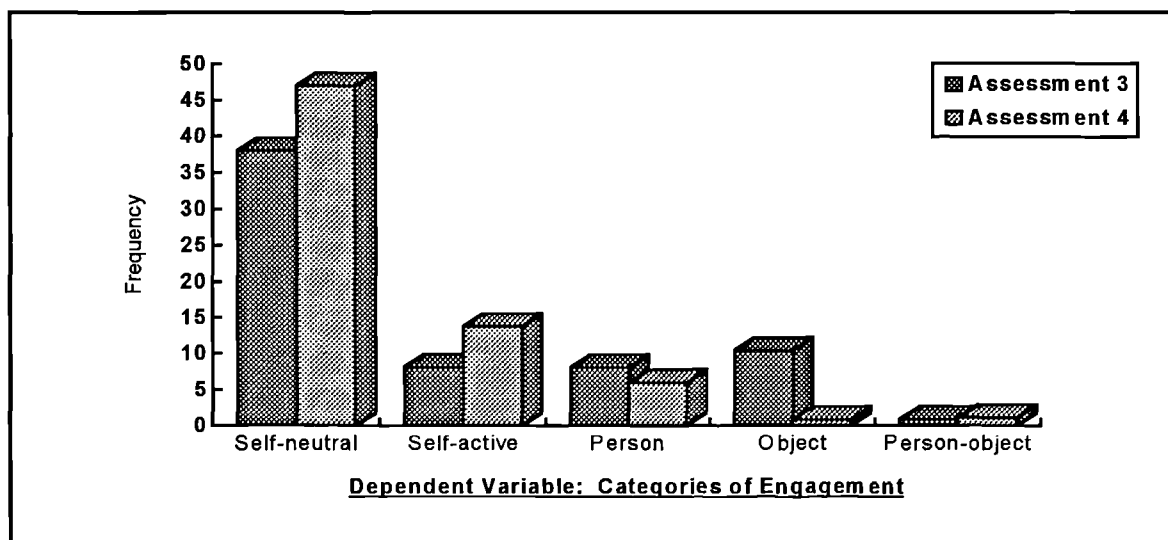


Figure 6.2.2.6: Graph to Show Changes in Engagement Levels

After Third Intervention (A.P.) for Group 2 (9 participants)

This shows a regression in the areas of previous growth, namely *person* and *object* engagements. There is also a small but non significant rise in *self-neutral*.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
 b3 = person; b4 = object; b5 = person-object.

6.2.3 Hypothesis Five

Hypothesis 5: There will be a significant increase in the level of purposeful behaviour, (i.e. *person*, *object* and *person-object*), and a reduction in the level of non-purposeful behaviour (i.e. *self-neutral* and *self-active*) compared with baseline.

ANOVAs were performed on pairs of assessment data within each experimental group from baseline assessment (1) to each of the subsequent assessment points, i.e. from baseline (1) to after the first intervention (2); from baseline (1) to after the second intervention (3), etc. The first group of paired assessments include those whose last intervention was a phase of **I.S.E.** The second group of paired assessments include those whose last intervention was a phase of **A.P.**

Analyses of the pairs of data from baseline (1) to after the first intervention (2) for both groups have been presented in the previous section.

1. Paired Assessments - Baseline to After I.S.E.:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	1.581	.263		
a	1	.000	.000	.001	.9761
Error	6	2.243	.374		
b	4	11629.487	2907.372	15.157	.0000
Error	24	4603.466	191.811		
ab	4	2170.705	542.676	11.921	.0000
Error	24	1092.531	45.522		

**Table 6.2.3.1: ANOVA Summary for Group 1 (7 participants)/Assessment (1) to (4)
From Baseline to After the Third Intervention (I.S.E.)**

The combined effects of two interventions (**I.S.E.**) and one placebo condition (**A.P.**) are reported as highly significant ($p: <.0001$) in this comparison between the baseline and the fourth assessment point.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	74.290	1	6	83.478	.890	.382
a at b2	1658.112	1	6	58.088	28.545	.002
a at b3	169.267	1	6	9.922	17.059	.006
a at b4	259.979	1	6	29.775	8.731	.025
a at b5	9.056	1	6	1.200	7.549	.033
b at a1	2747.877	4	24	66.589	41.266	.000
b at a2	702.171	4	24	170.744	4.112	.011

Table 6.2.3.1a: Simple Main Effects for Group 1 (7 participants)/Assessment (1) to (4)

A significant decline in b2 (*self-active*: $p < .005$) is observed which has maintained its reduced level since the first I.S.E. intervention, the lasting effect of which, seems to have been very strong indeed. Concurrent significant increases in b3 (*person*: $p < .05$) and in b4 (*object*: $p < .05$) are also to be seen, together with the appearance of a small but significant effect at b5 (*person-object*: $p < .05$).

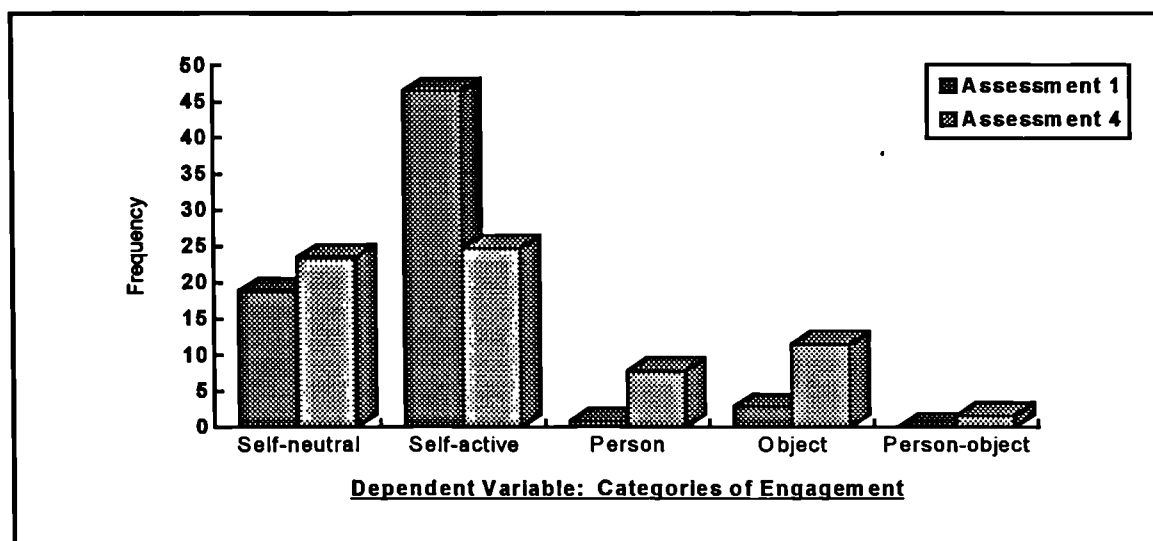


Figure 6.2.3.1: Graph to Show Changes in Engagement Levels

From Baseline to After Third Intervention (I.S.E.) for Group 1 (7 participants)

A sharp decline in *self-active* engagement is shown with large gains in *person* and *object*, less so in *self-neutral* and a minor gain in *person-object*.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	8	14.675	1.834		
a	1	5.620	5.620	2.532	.1502
Error	8	17.755	2.219		
b	4	19752.784	4938.196	24.553	.0000
Error	32	6435.849	201.120		
ab	4	615.096	153.774	6.227	.0008
Error	32	790.185	24.693		

Table 6.2.3.2: ANOVA Summary for Group 2 (9 participants)/Assessment (1) to (3)

The interaction between the assessment points from baseline to after the second intervention (I.S.E.) and levels of the dependent variable is shown to be significant ($p < .001$).

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	.008	1	8	27.719	.000	.987
a at b2	356.801	1	8	51.586	6.917	.030
a at b3	182.087	1	8	9.543	19.081	.002
a at b4	78.835	1	8	11.654	6.765	.032
a at b5	2.985	1	8	.491	6.081	.039
b at a1	2722.272	4	32	110.497	24.637	.000
b at a2	2369.697	4	32	115.316	20.550	.000

Table 6.2.3.2a: Simple Main Effects for Group 2 (9 participants)/Assessment (1) to (3)

A significant change to the value of: b2 (*self-active*) is revealed ($p < .05$). However there is no significant reduction to its value between assessment points (2) and (3) after the I.S.E. intervention (refer to previously presented 'Table 6.2.1.4'). This would seem to indicate that increased levels of attention, as in the A.P. condition, have had an initial effect on the level of *self-active* behaviour, which has had no further effect under the I.S.E. condition, possibly due to reaching saturation point in the previous intervention. Significant change to the values of not only b3 (*person*: $p > .005$) and b4 (*object*: $p > .05$) have occurred, and also to the more complex interactive behaviour of b5 (*person-object*: $p > .05$). This result shows the cumulative effect of interventions overtime and that after the I.S.E. intervention (assessment point 3), the change in *person-object* from baseline is significant.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

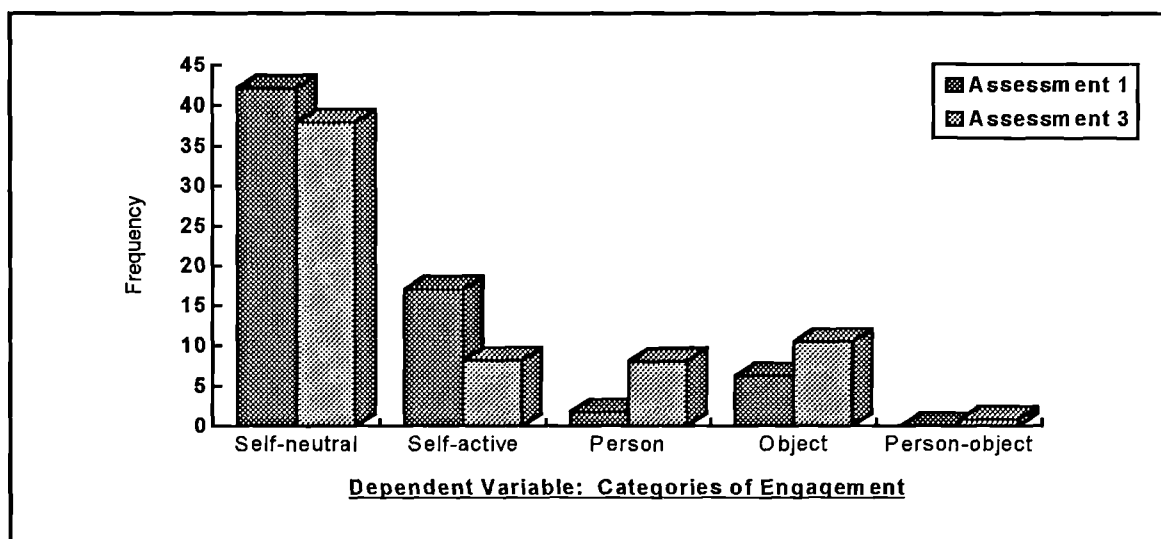


Figure 6.2.3.2: Graph to Show Changes in Engagement Levels

From Baseline to After Second Intervention (I.S.E.) for Group 2 (9 participants)

Gains in *person* and *object* are shown, and less so in *person-object*. The level of *self-active* appears to have reduced by half with a much smaller decline in *self-neutral* engagement.

2. Paired Assessments - Baseline to After A.P.:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	6	12.103	2.017		
a	1	7.836	7.836	3.352	.1167
Error	6	14.024	2.337		
b	4	13678.012	3419.503	19.251	.0000
Error	24	4263.074	177.628		
ab	4	1857.667	464.417	11.392	.0000
Error	24	978.404	40.767		

Table 6.2.3.3 ANOVA Summary for Group 1 (7 participants)/Assessment (1) to (3)

From Baseline to After Second Intervention (A.P.)

The combined effects of one I.S.E. (Intervention A) and one A.P. (Intervention B) are seen here in this comparison between baseline (Assessment 1) and after the second intervention (A.P.). The interaction is reported to be significant ($p < .0001$). This may be due to the endurance of the effects of the earlier phase of **Intervention A (I.S.E.)**.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	279.969	1	6	63.116	4.246	.085
a at b2	1446.175	1	6	81.275	17.794	.006
a at b3	145.802	1	6	7.307	19.955	.004
a at b4	2.370	1	6	12.800	.185	.682
a at b5	3.187	1	6	.908	3.509	.110
b at a1	2747.877	4	24	66.589	41.266	.000
b at a2	1136.043	4	24	151.806	7.484	.000

Table 6.2.3.3a: Simple Main Effects for Group 1 (7 participants)/Assessment (1) to (3)

Self-active engagement (b2) appears to be significantly less than the baseline value ($p < .01$), thus indicating that the change achieved after the first intervention (I.S.E.) was relatively stable during the second intervention (A.P.). A significant increase in b3 (*person*; $p < .005$) is observed which again would seem to indicate maintenance of the initial effect seen after the first intervention, although this is not the case for the value of b4 (*object*) where no significant change is seen.

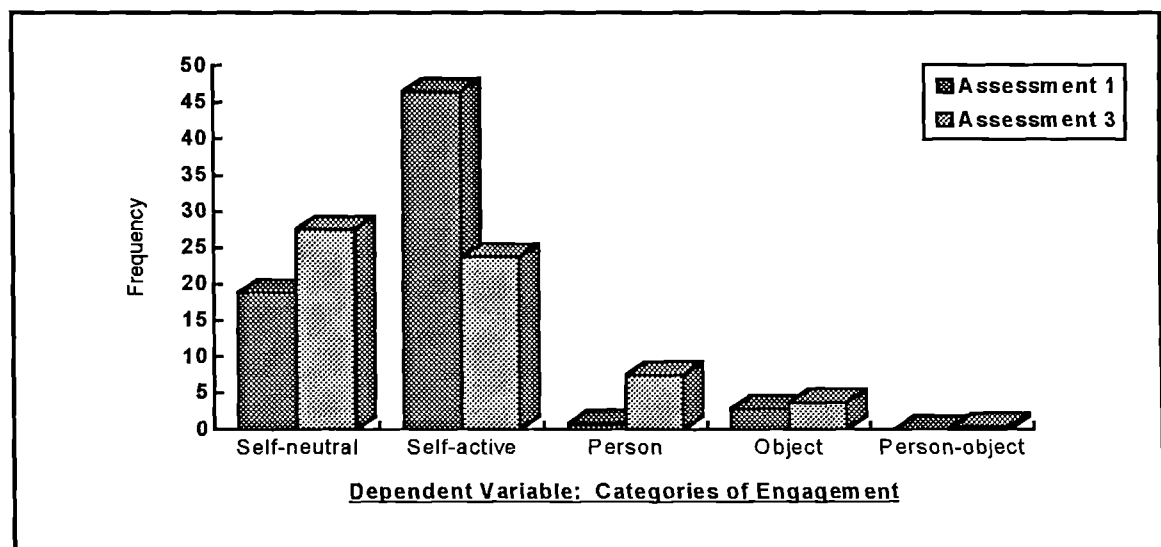


Figure 6.2.3.3: Graph to Show Changes in Engagement Levels

From Baseline to After Second Intervention (A.P.) for Group 1 (7 participants)

The large decrease in *self-active* is shown with rises in *self-neutral*, *person* and to a lesser extent in *object*.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of variation	df	Sum of Squares	Mean Square	F	p
Participants	8	14.307	1.788		
a	1	.942	.942	.324	.5849
Error	8	23.278	2.910		
b	4	23291.924	5822.981	39.562	.0000
Error	32	4709.943	147.186		
ab	4	451.770	112.942	4.277	.0070
Error	32	845.096	26.409		

Table 6.2.3.4: ANOVA Summary for Group 2 (9 participants)/Assessment (1) to (4)

From Baseline to After Third Intervention (A.P.)

The combined effects of two interventions (A.P.) and the one I.S.E. phase are seen in this comparison between the baseline and the fourth assessment points where the overall interaction between assessments and measured values is significant ($p < .01$).

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	103.968	1	8	42.108	2.469	.155
a at b2	248.422	1	8	51.705	4.800	.060
a at b3	81.324	1	8	8.859	9.180	.016
a at b4	13.364	1	8	3.964	3.372	.104
a at b5	5.634	1	8	1.866	3.019	.120
b at a1	2722.272	4	32	110.497	24.637	.000
b at a2	3213.651	4	32	63.098	50.931	.000

Table 6.2.3.4a: Simple Main Effects for Group 2

(9 participants)/Assessment (1) to (4)

Examination of the simple main effects reveals a small but almost significant decline in b2 (*self-active*) which has perhaps been influenced by the small rise observed between assessments (3) and (4) after I.S.E. (refer to the previously presented 'Table 6.2.1.6'). A significant increase in b3 (*person*: $p < .05$) is also reported which may be affected similarly. There is no significant change to the values of the other three categories of engagement.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

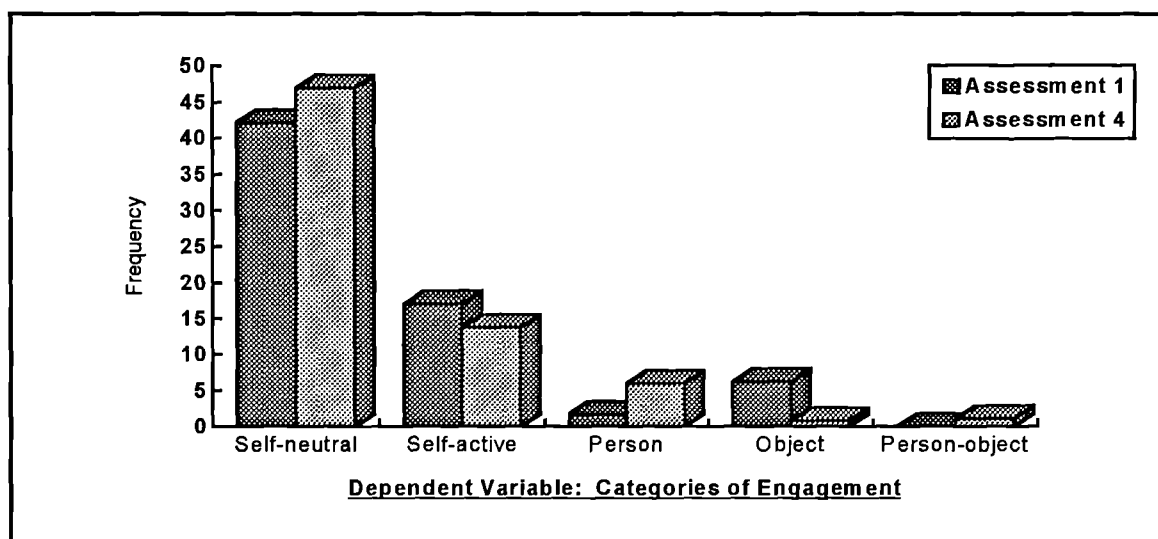


Figure 6.2.3.3: Graph to Show Changes in Engagement Levels

From Baseline to After Third Intervention (A.P.) for Group 2 (9 participants)

Changes to the levels of purposeful engagement are shown although only that of *person* is statistically significant.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after each of the three subsequent intervention phases;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
 b3 = person; b4 = object; b5 = person-object.

6.2.4 Hypothesis Six

Hypothesis 6: The effects of an initial phase of **I.S.E. (Intervention A)** will be significantly greater than the effects of an initial phase of the attention-placebo (**Intervention B**).

For a closer examination of the **Intervention A (I.S.E.)** as the agent of potential change, the data at two specific assessment points for the two groups was combined: (i) after the first intervention (**I.S.E.**) for Group 1, and (ii) after the second intervention (**I.S.E.**) for Group 2. Both sets of data represented the results of the initial phase of **I.S.E.** therapy for all participants, i.e. from baseline to after first **I.S.E.** intervention.

The corresponding data for the attention-placebo condition (**Intervention B: A.P.**) was combined for the two groups: (i) after the second intervention (**A.P.**) for Group 1; and (ii) after the first intervention (**A.P.**) for Group 2. Both sets of data represented the results of the initial phase of the placebo condition (**A.P.**) for all participants, i.e. from baseline to after first **A.P.** intervention.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	15	35.628	2.375		
a	1	5.242	5.242	1.720	.2094
Error	15	45.714	3.048		
b	4	22438.096	5609.524	16.312	.0000
Error	60	20633.017	343.884		
ab	4	1572.280	393.070	6.186	.0003
Error	60	3812.662	63.544		

Table 6.2.4.1: ANOVA Summary for First I.S.E. Intervention

Using the Combined Data from Both Groups (16 participants)

The interaction between the assessment points and the measures was found to be highly significant ($p < .0005$).

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after first I.S.E. intervention phase;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	2.420	1	15	81.842	.030	.866
a at b2	980.138	1	15	121.868	8.043	.013
a at b3	238.220	1	15	11.266	21.146	.000
a at b4	339.822	1	15	32.819	10.354	.006
a at b5	16.922	1	15	9.430	1.794	.200
b at a1	3692.608	4	60	232.872	15.857	.000
b at a2	2309.985	4	60	174.556	13.234	.000

Table 6.2.4.1a: Simple Main Effects for First I.S.E. Intervention

Using the Combined Data from Both Groups (16 participants)

Examination of the simple main effects reveals significant changes to the values of b2 (*self-active*: $p < .05$) which shows a sharp decline; b3 (*person*: $p < .001$) which shows an increase together with b4 (*object*: $p < .01$). The value of b5 (*person-object*) is not a significant result.

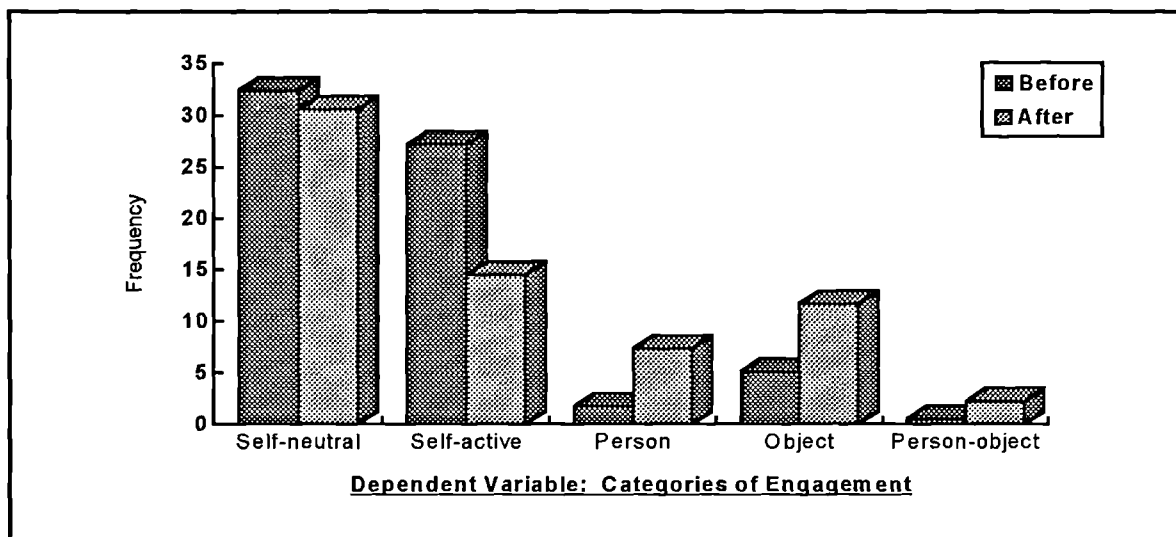


Figure 6.2.4.1: Graph to Show the Combined Effects of the

First I.S.E. Intervention for Both Groups (16 participants)

Large increases are shown in the levels of purposeful engagement defined by the categories *person*, *object* and less so for *person-object*. Declines in the levels of non-purposeful engagement are revealed, although that of *self-active* is more marked than *self-neutral*.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after first I.S.E. intervention phase;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	15	52.073	3.472		
a	1	7.997	7.997	2.054	.1723
Error	15	58.386	3.892		
b	4	25279.954	6319.989	21.820	.0000
Error	60	17378.290	289.638		
ab	4	311.959	77.990	1.933	.1166
Error	60	2420.974	40.350		

Table 6.2.4.2: ANOVA Summary for First A.P. Intervention

Using the Combined Data from Both Groups (16 participants)

There was no significant interaction observed between the variables in stark contrast with that of the I.S.E. data.

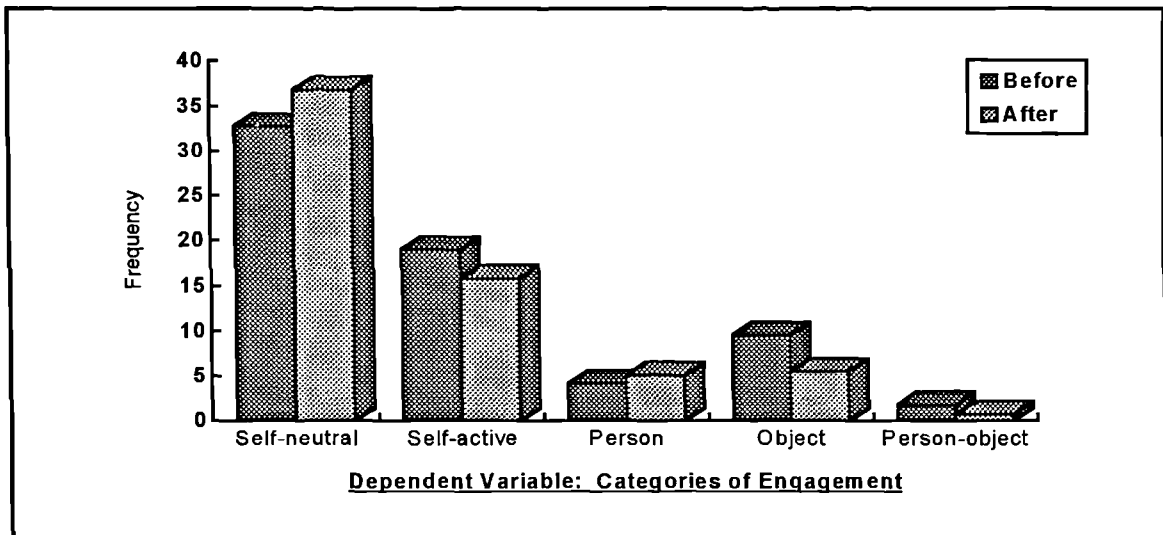


Figure 6.2.4.2: Graph to Show the Combined Effects

of the First A.P. Intervention for Both Groups (16 participants)

The initial decline in *self-active* engagement effected by a phase of A.P. scheduled first in the order of interventions has already been shown. However, when it is compared with the effects of I.S.E. intervention by examination of similar data points, its overall effect is non-significant.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & after first A.P. intervention phases;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

6.2.5 Hypothesis Seven

Hypothesis 7: The positive effects of the I.S.E. (Intervention A) will be maintained up to one month after the withdrawal of the intervention.

ANOVAs were performed on pairs of data from the two experimental groups in two parts: 1. from after the final phase of intervention to the first follow-up assessment, one month afterwards; 2. from baseline assessment to the first follow-up assessment. The first analysis was done to examine the rate of change after the withdrawal of therapy. The second analysis was done to see if engagement levels had reverted to their former levels at baseline assessment. One participant was unavailable at this stage of follow up assessment in each group. **Group 1** was left with six remaining participants. **Group 2** was left with eight remaining participants.

1. From After the Final Phase of Intervention to the First Follow-up Assessment:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	5	8.729	1.746		
a	1	3.234	3.234	5.517	.0656
Error	5	2.931	.586		
b	4	5635.097	1408.774	4.149	.0132
Error	20	6791.485	339.574		
ab	4	15.702	3.925	.181	.9457
Error	20	434.499	21.725		

Table 6.2.5.1: ANOVA Summary for Group 1 (6 participants)/Assessment (4) to (5)

From After the Final Intervention (I.S.E.) to After One Month Follow-up

One month after the withdrawal of therapy there is no significant interaction which suggests that previous gains from intervention have maintained relative stability. Initially encouraging, this must be viewed in conjunction with the second follow-up assessment.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	5.603	1	5	6.471	.866	.395
a at b2	1.442	1	5	51.657	.028	.874
a at b3	8.841	1	5	2.062	4.287	.093
a at b4	2.736	1	5	25.435	.108	.756
a at b5	.314	1	5	1.861	.169	.698
b at a1	664.169	4	20	191.484	3.469	.026
b at a2	748.531	4	20	169.815	4.408	.010

Table 6.2.5.1a: Simple Main Effects for Group 1 (6 participants)/Assessment (4) to (5)

The simple main effects are included in order to highlight the small, but non significant effect to the value of b3 (*person*) which shows the initial stages of decline. It is therefore expected that the second follow up point at four months post withdrawal of therapy, will reveal a significant decline to all values apart from, of course, the value of *self-active*, which should show a corresponding rise.

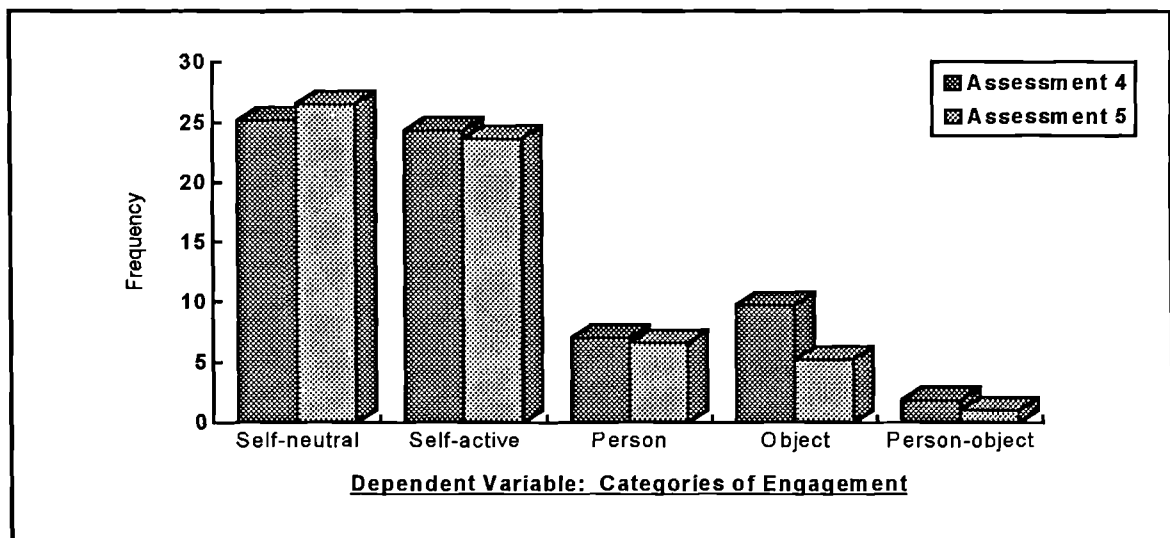


Table 6.2.5.1: Graph to Show Changes in Engagement Levels From After the Final Intervention (I.S.E.) to After One Month Follow-up for Group 1 (6 participants)

The early decline in the level of *object* engagement is shown whilst the other categories remain relatively stable at this point.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	7	21.575	3.082		
a	1	.055	.055	.174	.6890
Error	7	2.217	.317		
b	4	20842.150	5210.537	34.478	.0000
Error	28	4231.537	151.126		
ab	4	76.701	19.175	1.060	.3945
Error	28	506.360	18.084		

Table 6.2.5.2: ANOVA Summary for Group 2 (8 participants)/Assessment (4) to (5)

From After the Final Intervention (A.P.) to After One Month Follow-up

Again the overall interaction is not significant at the first follow up assessment. That is the levels of engagement have endured for a period of four weeks after the withdrawal of the final phase of intervention (A.P.).

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	17.851	1	7	35.545	.502	.501
a at b2	8.023	1	7	19.670	.408	.543
a at b3	4.040	1	7	6.401	.631	.453
a at b4	42.772	1	7	9.691	4.413	.074
a at b5	4.070	1	7	1.347	3.022	.126
b at a1	2775.600	4	28	61.407	45.200	.000
b at a2	2454.113	4	28	107.803	22.765	.000

Table 6.2.5.2a: Simple Main Effects for Group 2

(8 participants)/Assessment (4) to (5)

Interestingly, a small but non-significant increase is observed in the value of b4 (*object*). This means that for this group, the gains achieved after I.S.E. intervention which subsequently declined under the second placebo condition, continued to grow for one month after the withdrawal of therapy. It is unclear why such an effect should happen and it is suggested that other intervening variables from the environment may have been responsible, such as a changing timetable of activities offered to participants in their base groups. This will be addressed in more detail in the discussion of Chapter 7.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

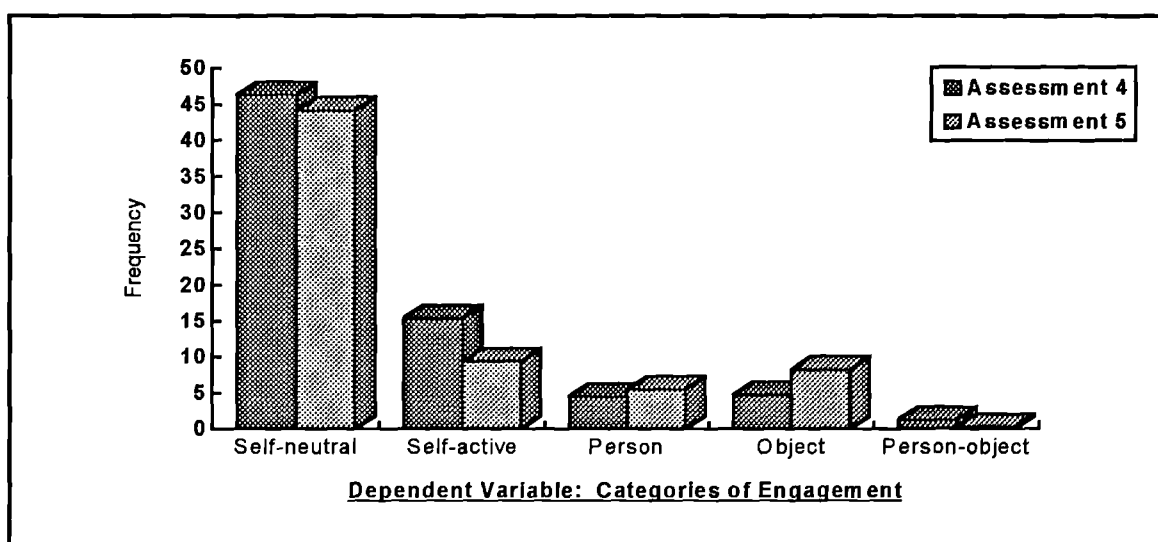


Figure 6.2.5.2: Graph to Show Changes in Engagement Levels One Month After the Withdrawal of Intervention for Group 2 (8 participants)

A reduction in the level of *self-active* is shown although it is reported to be non-significant.

2. From Baseline Assessment to the First Follow-up Assessment:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	5	3.454	.691		
a	1	3.253	3.253	2.178	.2000
Error	5	7.466	1.493		
b	4	10410.062	2602.516	13.267	.0000
Error	20	3923.173	196.159		
ab	4	1964.691	491.173	9.315	.0002
Error	20	1054.618	52.731		

Table 6.2.5.3: ANOVA Summary for Group 1 (6 participants)/Assessment (1) to (5)
From Baseline to One Month After the Withdrawal of Intervention

The overall interaction is significant ($p > .0005$), that is, change has occurred which has affected the levels of engagement behaviour assessed.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active, b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	201.720	1	5	88.154	2.288	.191
a at b2	1570.483	1	5	97.307	16.139	.010
a at b3	99.590	1	5	12.230	8.143	.036
a at b4	93.019	1	5	13.718	6.781	.048
a at b5	3.131	1	5	1.008	3.107	.138
b at a1	2345.158	4	20	79.074	29.658	.000
b at a2	748.531	4	20	169.815	4.408	.010

Table 6.2.5.3a: Simple Main Effects for Group 1 (6 participants)/Assessment (1) to (5)

Changes to the values of b2 (*self-active*: $p > .01$); b3 (*person*: $p > .05$); and b4 (*object*: $p > .05$) are revealed.

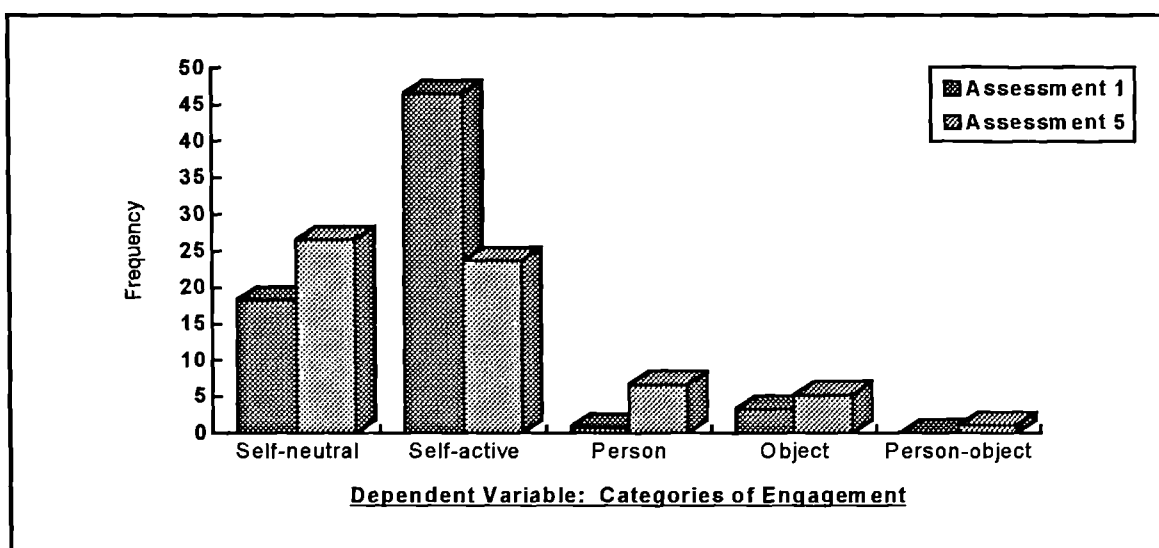


Figure 6.2.5.3: Graph to Compare the Engagement Levels of Baseline and

One Month After the Withdrawal of Intervention for Group 1 (6 Participants))

A significant decline has occurred in the level of *self-active* engagement; which would seem to be commensurate with smaller rises, although still significant, in the levels of *person* and *object* engagement. It is therefore suggested that a reduction in *self-active* engagement does indeed effect a corresponding increase in purposeful interactions, defined as *person* or *object* engagements. In addition to which, these positive effects have been maintained for a period of one month after the withdrawal of intervention.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	7	11.774	1.682		
a	1	.072	.072	.042	.8438
Error	7	12.061	1.723		
b	4	19655.963	4913.991	25.256	.0000
Error	28	5447.910	194.568		
ab	4	291.845	72.961	2.027	.1177
Error	28	1007.605	35.986		

Table 6.2.5.4: ANOVA Summary for Group 2 (8 participants)/Assessment (1) to (5)

From Baseline to One Month After the Withdrawal of Intervention

The overall interaction is not significant, which indicates there has been no change to the levels of engagement behaviour assessed from baseline to first follow up point.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	4.111	1	7	58.328	.070	.798
a at b2	210.395	1	7	71.554	2.940	.130
a at b3	66.953	1	7	13.805	4.850	.064
a at b4	10.208	1	7	1.899	5.377	.053
a at b5	.250	1	7	.080	3.111	.121
b at a1	2532.839	4	28	122.751	20.634	.000
b at a2	2454.113	4	28	107.803	22.765	.000

Table 6.2.5.4a: Simple Main Effects for Group 2 (8 participants)/Assessment (1) to (5)

Inspection of the simple main effects reveals small but non significant effect to the values of b3 (*person*); and b4 (*object*), and this is represented as gains in the following Figure 7.2.6.12.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;
(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
b3 = person; b4 = object; b5 = person-object.

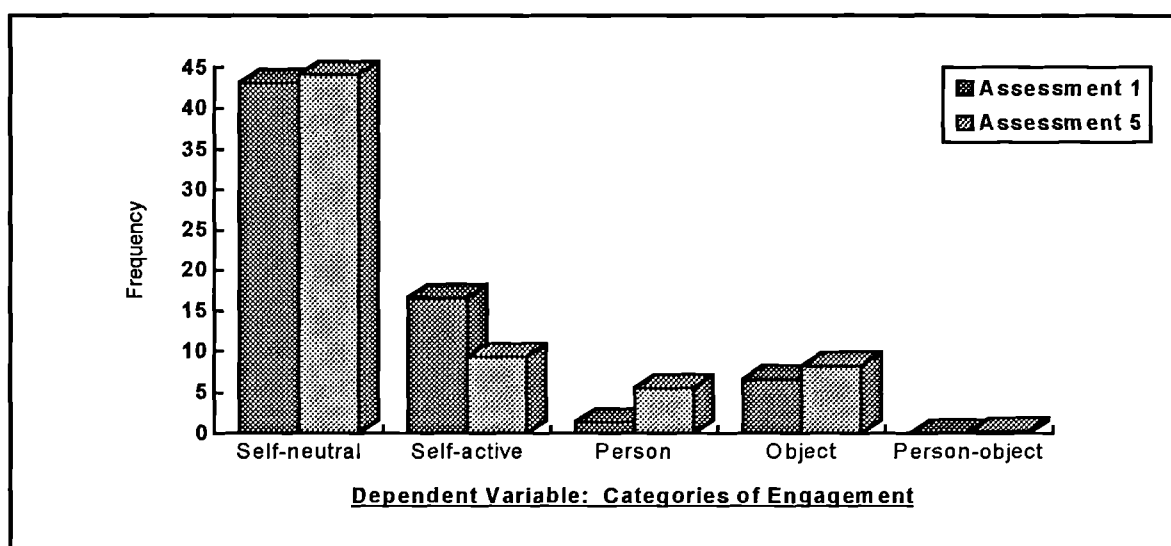


Figure 6.2.5.4: Graph to Compare Baseline with

One Month After the Withdrawal of Intervention (Group 2)

The decline in *self-active*, although not statistically significant, is noticeable. Similarly small rises in *person* and *object* engagements. It maybe that the areas of increase seen in this second group, whose last intervention was the placebo condition (A.P.), were not as robust as those of **Group 1** who latterly received **I.S.E.** intervention. This will be discussed in **Chapter 7**.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline, after final intervention & the first follow-up assessment;
 (b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active;
 b3 = person; b4 = object; b5 = person-object.

6.2.6 Hypothesis Eight

Hypothesis 8: The positive effects of the **I.S.E. (Intervention A)** will be maintained up to four months after the withdrawal of the intervention.

ANOVAs were performed on pairs of data from the two experimental groups in two parts:

1. from the first follow-up assessment to the second follow-up assessment, four months after the termination of therapy;
2. from baseline assessment to the second follow-up assessment.

The first analysis was done to examine the rate of change in the three months after the first follow-up. The second analysis was done to see if engagement levels had reverted to their former levels at baseline assessment four months after the withdrawal of therapy.

Two participants were unavailable at this stage of follow up assessment in **Group 1**, leaving five remaining participants. One participant was unavailable at this stage of follow up assessment in **Group 2** leaving eight remaining participants.

1. From the First Follow-up Assessment to the Second Follow-up Assessment:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	4	3.885	.971		
a	1	7.114	7.114	9.632	.0361
Error	4	2.954	.739		
b	4	6302.443	1575.611	2.992	.0508
Error	16	8425.844	526.615		
ab	4	346.039	86.510	2.760	.0641
Error	16	501.418	31.339		

Table 6.2.6.1: ANOVA Summary for Group 1 (5 participants)/Assessment (5) to (6)

From One Month After to Four Months After the Withdrawal of Intervention

There is no significant interaction reported here although the following examination of the simple main effects reveals some changes.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	1.170	1	4	72.629	.016	.905
a at b2	282.599	1	4	27.465	0.289	.033
a at b3	59.438	1	4	8.964	6.631	.062
a at b4	8.028	1	4	16.534	.486	.524
a at b5	1.918	1	4	.500	3.834	.122
b at a1	565.396	4	16	201.312	2.809	.061
b at a2	1096.724	4	16	356.642	3.075	.047

Table 6.2.6.1a: Simple Main Effects for Group 1

(5 participants)/Assessment (5) to (6)

This reveals a significant rise to the value of b2 (*self-active*: $p > .05$) which was predicted from the previous analysis, and a small decline, although not significant, to the value of b3 (*person*). It would therefore seem that the positive effects of therapy, i.e. a reduction in *self-active*; and increases in *person*, *object*, and *person-object*; are not strong enough to withstand a withdrawal of intervention up to four months.

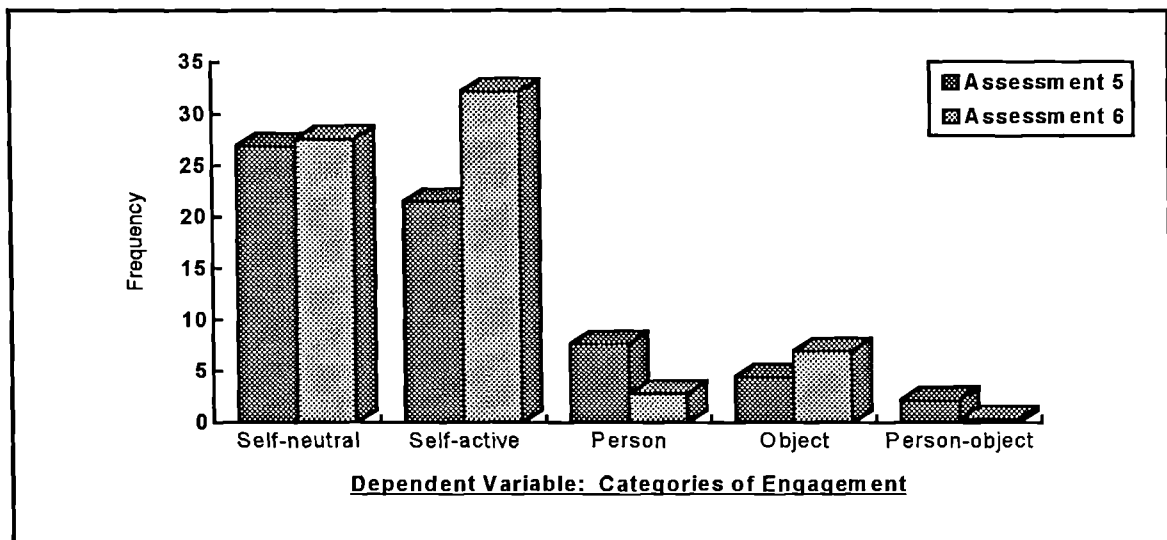


Figure 6.2.6.1: Graph to Show Changes in Engagement Levels From One Month to Four Months After the Withdrawal of Intervention for Group 1 (5 participants)

Reductions in *person* and *person-object* are shown. There is rise in *self-active* and less so in *object* engagement.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	7	117.224	16.746		
a	1	18.212	18.212	1.028	.3443
Error	7	123.983	17.712		
b	4	19816.014	4954.004	28.017	.0000
Error	28	4950.977	176.821		
ab	4	242.033	60.508	1.171	.3447
Error	28	1446.521	51.661		

Table 6.2.6.2: ANOVA Summary for Group 2 (8 participants)/Assessment (5) to (6)

From One Month After to Four Months After the Withdrawal of Intervention

Again the overall interaction is not significant although some changes are shown in examination of the simple main effects.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	5.893	1	7	59.446	.099	.762
a at b2	100.852	1	7	108.058	.933	.366
a at b3	46.274	1	7	6.349	7.289	.031
a at b4	107.226	1	7	50.353	2.129	.188
a at b5	.000	1	7	.152	.000	1.000
b at a1	2454.113	4	28	107.803	22.765	.000
b at a2	2560.399	4	28	120.679	21.217	.000

Table 6.2.6.2a: Simple Main Effects for Group 2

(8 participants)/Assessment (5) to (6)

A significant decline to the value of b3 (*person*: $p > .05$) is shown, similar to the small but non significant effect seen in the first group.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

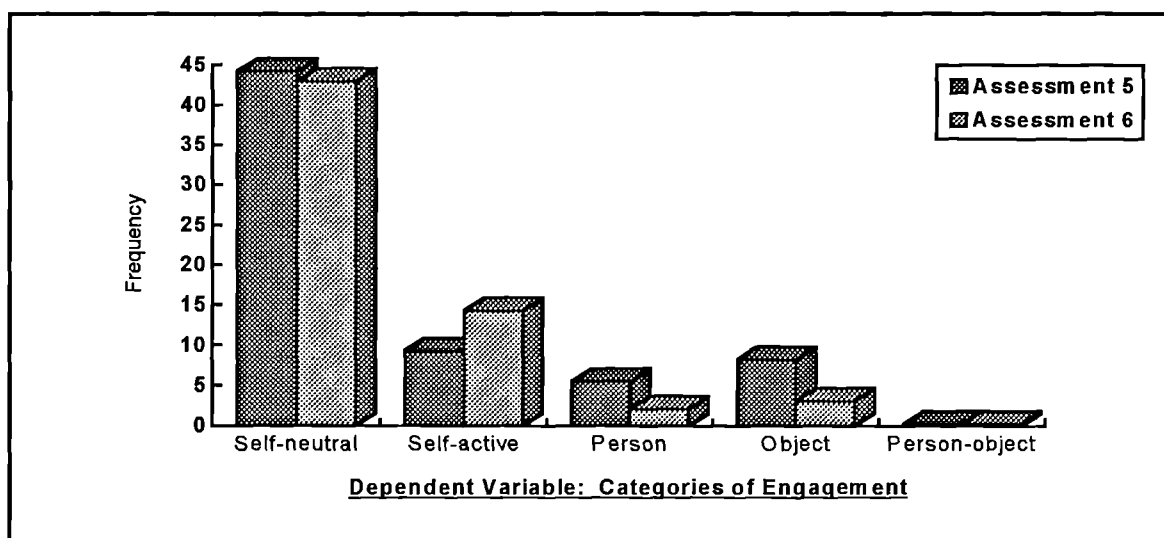


Figure 6.2.6.2: Graph to Show Changes in Engagement Levels

From One Month After to Four Months After the Withdrawal of Intervention
for Group 2 (8 participants)

The significant decline in *person* is shown here, together with observable reduction in the levels of *object*. A rise in the level of *self-active* engagement is also seen.

2. From Baseline Assessment to the Second Follow-up Assessment:

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	4	.604	.151		
a	1	.322	.322	1.426	.2983
Error	4	.902	.225		
b	4	10907.323	2726.831	8.525	.0007
Error	16	5117.976	319.873		
ab	4	499.240	124.810	1.114	.3841
Error	16	1792.018	112.001		

Table 6.2.6.3: ANOVA Summary for Group 1 (5 participants)/Assessment (1) to (6)

From Baseline to Four Months After the Withdrawal of Intervention

The overall interaction is not significant thereby indicating that engagement levels have reverted to their former baseline status four months after the withdrawal of therapy.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	125.104	1	4	216.832	.577	.490
a at b2	340.006	1	4	197.674	1.720	.260
a at b3	9.390	1	4	1.864	5.038	.088
a at b4	24.838	1	4	31.714	.783	.426
a at b5	.225	1	4	.147	1.532	.284
b at a1	1754.917	4	16	75.233	23.327	.000
b at a2	1096.724	4	16	356.642	3.075	.047

Table 6.2.6.3a: Simple Main Effects for Group 1 (5 participants)/Assessment (1) to (6)

It is perhaps disappointing to note that therapeutic gains were not maintained up to a four month follow up. However, this is an important result which may serve as commentary to the strategic input of professional therapy skills to adults with learning disabilities within adjacent provider services. Further discussion on this point will ensue.

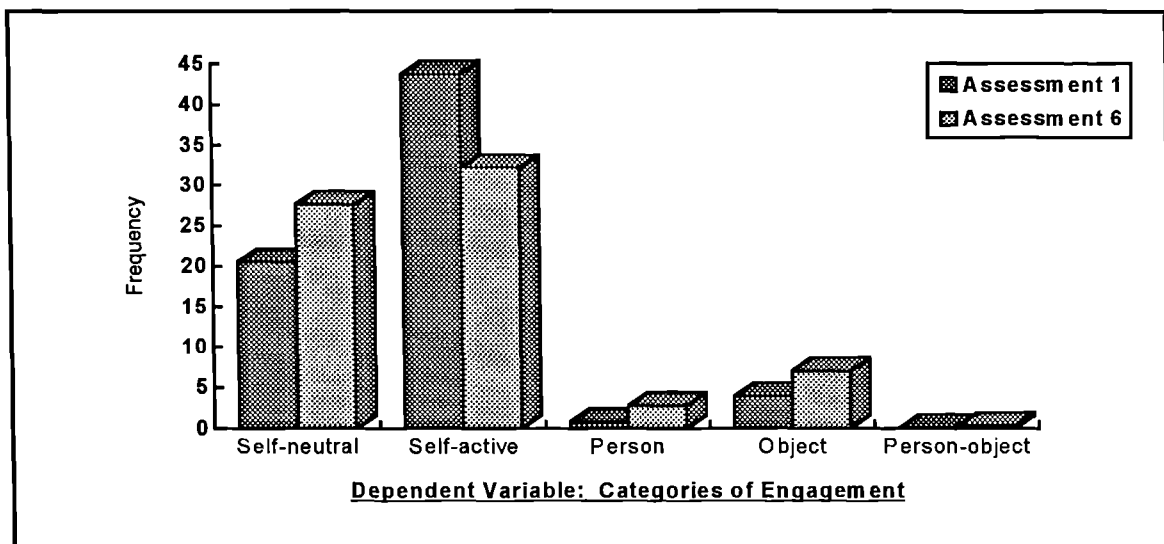


Figure 6.2.6.3: Graph to Show Changes in Engagement Levels From Baseline to Four Months After the Withdrawal of Intervention for Group 1 (5 participants)

Although not statistically significant, rises in *self-neutral*, *person* and *object* can be observed here. A reduction to the level of *self-active* engagement also is apparent.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Participants	7	109.921	15.703		
a	1	20.574	20.574	1.071	.3351
Error	7	134.438	19.205		
b	4	20320.035	5080.009	23.595	.0000
Error	28	6028.416	215.301		
ab	4	52.920	13.230	.470	.7570
Error	28	787.606	28.129		

Table 6.2.6.4: ANOVA Summary for Group 2 (8 participants)/Assessment (1) to (6)

From Baseline to Four Months After the Withdrawal of Intervention

Again, not surprisingly, the overall interaction is not significant and no significance is shown in the simple main effects tabulated below, thereby indicating that all engagement levels have reverted to their former baseline status four months after the withdrawal of therapy.

Effect	MSn	DFn	DFe	MSe	F	p
a at b1	.160	1	7	52.292	.003	.957
a at b2	19.914	1	7	23.913	.833	.392
a at b3	1.904	1	7	3.131	.608	.461
a at b4	51.266	1	7	52.197	.982	.355
a at b5	.250	1	7	.188	1.333	.286
b at a1	2532.839	4	28	122.751	20.634	.000
b at a2	2560.399	4	28	120.679	21.217	.000

Table 6.2.6.4a: Simple Main Effects for Group 2/Assessment (1) to (6)

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

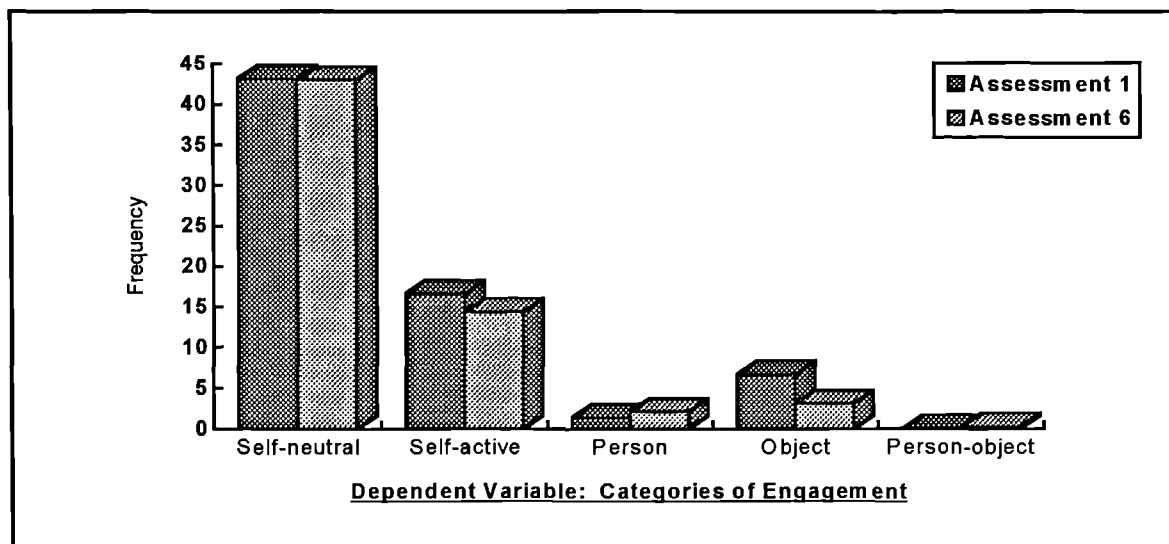


Figure 6.2.6.4: Graph to Show Changes in Engagement Levels From Baseline to Four Months After the Withdrawal of Intervention for Group 2 (8 participants)

Little difference between baseline measurements and the second follow-up assessment is revealed, apart from a small drop in the levels of *self-active* and *object* engagement, neither of which are significant.

KEY FOR TABLES AND FIGURES

(a) = assessments, i.e. over time - baseline & the two follow-up assessments;

(b) = measures of the dependent variable, i.e. categories of engagement: b1 = self-neutral; b2 = self-active; b3 = person; b4 = object; b5 = person-object.

6.3 Summary of Individual Cases

The second part of the results Chapter focuses on the single cases. The main issues emerging from this level of analysis are summarised in tabular form. The data presented here are largely descriptive of the changing engagement levels over time. A more detailed account and the complete raw data are to be found in Appendix E1. Participant data are presented by Experimental Group and by Therapy Group.

6.3.1 Summary of Experimental Group 1: Therapy Group 1.1

An initial summary of the main characteristics of the participants is provided. Due to a lack of recent and accurate assessment data available to the researcher, information regarding visual impairment is not presented in the tables.

Participant	Sex	Upper Limb Mobility	Lower Limb Mobility	Hearing Impairment	Epilepsy
D.B	M	1	2	3	0
J.C	F	0	0	0	0
T.M	F	0	0	0	0
R.A.	F	0	0	0	0

Table 6.3.1.1: Summary of Characteristics for Group 1.1

KEY: 0 = no problem; 1 = mild difficulty; 2 = moderate difficulty; 3 = severe difficulty;
/ = no information available.

One participant (D.B.) was described as having multiple disabilities with visual impairment suspected in two participants (D.B. and R.A.). Two of the participants had known aetiologies of learning disability: D.B.: pre-natal infection, i.e. rubella; T.M.: Turner's Syndrome. Self-injurious behaviour causing tissue damage occurred in two participants (D.B. and T.M.).

The second table is annotated in summary of the critical issues. The first symbol is a directional arrow ($\uparrow, \downarrow, \rightarrow$) that informs whether a change has occurred or not and the direction of that change. A change in terms of a rise (\uparrow) or a decline (\downarrow) is defined as a difference to the engagement level of more than 5% ($n \geq 3.5$). The symbol (\rightarrow) represents no or minimal change to the engagement level (less than 5%). This is followed by a percentage figure to represent the level of engagement within a defined range. The ranges

have been provided in the key at the base of each table. It is possible for an engagement level to rise (↑) or fall (↓) but to remain within the same overall percentage range of total engagement time. Therefore the first line of the table below (D.B.: Self-Neutral) would read as follows: At baseline D.B. spent 19% or less of his total engagement time in Self-Neutral; at (2) after the first I.S.E. intervention, there was no change in this level; at (3) after the A.P. intervention Self-Neutral increased by at least 5% (↑) and was at a level of 20% or more; at (4) after the second I.S.E. intervention Self-Neutral decreased by at least 5% (↓) and was at a level of 19% or less; at (5) one month after the withdrawal of therapy Self-Neutral increased by at least 5% (↑) but remained at a level of 19% or less; at (6) four months after the withdrawal of therapy Self-Neutral remained at this level.

Participants and Engagements	ASSESSMENT POINTS					
	(1) Baseline Level	(2) After I.S.E.	(3) After A.P.	(4) After I.S.E.	(5) After One Month	(6) After Four Months
D.B.						
Self-Neutral	≤ 19%	→ ≤ 19%	↑ ≥ 20%	↓ ≤ 19%	↑ ≤ 19%	→ ≤ 19%
Self-Active	≥ 80%	↓ ≥ 40%	→ ≥ 40%	↑ ≥ 60%	↓ ≥ 40%	↑ ≥ 40%
Person	≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	↑ ≥ 40%	↓ ≤ 19%	↑ ≥ 20%	↑ ≥ 20%	↑ ≥ 20%
Person-Object	0%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
J.C.						
Self-Neutral	≥ 20%	→ ≥ 20%	↑ ≥ 20%	↓ ≤ 19%		
Self-Active	≥ 60%	↓ ≥ 20%	→ ≥ 20%	↑ ≥ 20%		
Person	≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%		
Object	≤ 19%	↑ ≥ 40%	↓ ≤ 19%	↑ ≥ 20%		
Person-Object	0%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%		
T.M.						
Self-Neutral	≥ 20%	↓ ≥ 20%	↑ ≥ 20%	↑ ≥ 20%	→ ≥ 20%	↓ ≥ 20%
Self-Active	≥ 60%	↓ ≥ 20%	↑ ≥ 40%	↓ ≥ 20%	↑ ≥ 40%	↑ ≥ 60%
Person	≤ 19%	→ ≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	↑ ≥ 20%	↓ ≤ 19%	↑ ≥ 20%	↓ ≤ 19%	→ 0%
Person-Object	0%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	↓ ≤ 19%	→ 0%

**Table 6.3.1.2: Summary of Types of Change in Engagement Levels
for Individual Participants in Group 1.1**

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n = 56); 2. ≥ 60% (n = 42); 3. ≥ 40% (n = 28); 4. ≥ 20% (n = 14);

5. ≤ 19% (n = 14); 0% (n = 0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n = 3.5) = →.

R.A.						
Self-Neutral	≥ 40%	↓ ≥ 20%	↑ ≥ 60%	↓ ≥ 40%	→ ≥ 40%	↑ ≥ 60%
Self-Active	≥ 20%	↓ ≤ 19%	↓ 0%	→ 0%	→ 0%	→ 0%
Person	0%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ ≤ 19%	↓ ≤ 19%
Object	≤ 19%	→ ≤ 19%	↓ ≤ 19%	↑ ≥ 20%	→ ≥ 20%	↓ ≤ 19%
Person-Object	0%	↑ ≥ 20%	↓ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%

Table 6.3.1.2: (continued from previous page)

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n=≥56); 2. ≥ 60% (n=≥42); 3. ≥ 40% (n=≥28); 4. ≥ 20% (n=≥14);

5. ≤ 19% (n=≤ 14); 0% (n=0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n=3.5) = →.

One participant (J.C.) received no follow-up assessments due to lack of access. Levels of *self-active* greater than or equal to 60% prevailed for all participants at baseline assessment. The first episode of I.S.E. intervention appears to have facilitated the most desirable changes: rises in purposeful engagement (*person*, *object* and *person-object*) and reductions in non-purposeful behaviour (*self-neutral* and *self-active*).

The notations used in the previous table are employed throughout this level of analysis.

6.3.2 Summary of Experimental Group 1: Therapy Group 1.2

Participant	Sex	Upper Limb Mobility	Lower Limb Mobility	Hearing Impairment	Epilepsy
V.K.	F	2	2	1	2
P.R.	M	0	0	3	2
G.C.	F	0	0	0	0

Table 6.3.2.1: Summary of Characteristics for Group 1.2

KEY: 0 = no problem; 1 = mild difficulty; 2 = moderate difficulty; 3 = severe difficulty; / = no information available.

One participant was described as having multiple disabilities (V.K.) and experienced frequent petit-mal attacks of epilepsy characterised by minor absences in attention. One participant had a severe hearing impairment for which amplification had not been prescribed. Two participants were known to engage in self-injurious behaviour on a regular basis (G.C.

and V.K.) thereby causing tissue damage to the individual, and the other participant (P.R.) less so. Aetiology of learning disability was unknown for all three participants.

Participants and Engagements	ASSESSMENT POINTS					
	(1) Baseline Level	(2) After I.S.E.	(3) After A.P.	(4) After I.S.E.	(5) After One Month	(6) After Four Months
V.K.						
Self-Neutral	≥ 20%	↑ ≥ 80%	↓ ≥ 60%	→ ≥ 60%	→ ≥ 60%	↑ ≥ 80%
Self-Active	≥ 60%	↓ 0%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↑ ≤ 19%
Person	≤ 19%	→ ≤ 19%	↑ ≤ 19%	↑ ≥ 20%	→ ≥ 20%	↓ ≤ 19%
Object	0%	→ ≤ 19%	→ 0%	→ 0%	→ ≤ 19%	→ 0%
Person-Object	0%	→ 0%	→ 0%	→ 0%	→ 0%	→ 0%
P.R.						
Self-Neutral	≤ 19%	↑ ≤ 19%	↓ ≤ 19%	↑ ≥ 20%	↑ ≥ 20%	
Self-Active	≥ 80%	↓ ≥ 40%	↑ ≥ 60%	→ ≥ 60%	↓ ≥ 40%	
Person	≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	
Object	≤ 19%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	↑ ≤ 19%	
Person-Object	0%	→ ≤ 19%	→ 0%	→ ≤ 19%	→ ≤ 19%	
G.C.						
Self-Neutral	≥ 20%	→ ≥ 20%	↑ ≥ 20%	→ ≥ 20%	→ ≥ 20%	↓ ≤ 19%
Self-Active	≥ 60%	↓ ≥ 40%	↓ ≥ 20%	↑ ≥ 40%	→ ≥ 40%	↑ ≥ 80%
Person	≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ ≤ 19%
Object	0%	↑ ≤ 19%	→ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	↓ 0%
Person-Object	0%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ 0%

Table 6.3.2.2: Summary of Types of Change in Engagement Levels for Individual Participants in Group 1.2

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n = 56); 2. ≥ 60% (n = 42); 3. ≥ 40% (n = 28); 4. ≥ 20% (n = 14);

5. ≤ 19% (n = 14); 0% (n = 0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n = 3.5) = →.

Levels of *self-active* behaviour greater than or equal to 60% were encountered for all participants at baseline assessment. All three participants showed a reduction in *self-active* engagement after the first I.S.E. intervention. This was maintained at the second follow-up by one participant (V.K.) where a rise in *self-neutral* engagement was observed. Small gains in *person* were shown for all participants. The second follow-up assessment was not completed on one participant (P.R.) due to lack of access.

6.3.3 Summary of Experimental Group 2: Therapy Group 2.1

Participant	Sex	Upper Limb Mobility	Lower Limb Mobility	Hearing Impairment	Epilepsy
M.W.	M	0	0	/	0
G.B.	M	0	0	0	0
L.C.	F	0	0	/	3
S.M.	M	0	0	0	0

Table 6.3.3.1: Summary of Characteristics for Group 2.1

KEY: 0 = no problem; 1 = mild difficulty; 2 = moderate difficulty; 3 = severe difficulty;
/ = no information available.

Although all four participants met the candidacy criteria, additional sensory and motor impairments were less in this group than for the two previous groups. Incomplete information on audiometric assessments meant the presence of a hearing impairment was unknown for two participants. One participant had Down's Syndrome (M.W.) with a lack of specific aetiological information for the other three participants.

Participants and Engagements	ASSESSMENT POINTS					
	(1) Baseline Level	(2) After A.P.	(3) After I.S.E.	(4) After A.P.	(5) After One Month	(6) After Four Months
M.W.						
Self-Neutral	≥ 20%	→ ≥ 20%	↓ ≥ 20%	↑ ≥ 40%	→ ≥ 40%	↓ ≥ 40%
Self-Active	≥ 40%	→ ≥ 40%	→ ≥ 40%	↓ ≥ 40%	↑ ≥ 40%	↑ ≥ 40%
Person	≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	→ ≤ 19%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Person-Object	0%	→ 0%	→ ≤ 19%	→ ≤ 19%	→ 0%	→ 0%
G.B.						
Self-Neutral	≥ 60%	↓ ≥ 60%	→ ≥ 60%	↑ ≥ 80%	↓ ≥ 60%	↑ ≥ 80%
Self-Active	≤ 19%	→ ≤ 19%	→ ≤ 19%	↑ ≤ 19%	→ ≤ 19%	↓ ≤ 19%
Person	≤ 19%	↓ ≤ 19%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	↑ ≤ 19%	→ ≤ 19%	↓ 0%	→ ≤ 19%	→ ≤ 19%
Person-Object	0%	↑ ≤ 19%	↓ ≤ 19%	→ 0%	→ 0%	→ 0%
L.C.						
Self-Neutral	≥ 60%	↑ ≥ 80%	↓ ≥ 60%	↑ ≥ 60%	↑ ≥ 80%	↓ ≥ 60%
Self-Active	≥ 20%	↓ ≤ 19%	↑ ≥ 20%	→ ≥ 20%	↓ ≤ 19%	↑ ≥ 20%
Person	0%	↑ ≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	→ ≤ 19%	→ 0%	→ 0%	→ 0%	→ 0%
Person-Object	0%	→ 0%	→ 0%	→ 0%	→ 0%	→ 0%
S.M.						
Self-Neutral	≥ 80%	→ ≥ 80%	→ ≥ 80%	→ ≥ 80%	↓ ≥ 60%	↑ ≥ 80%
Self-Active	0%	→ 0%	→ 0%	→ 0%	→ 0%	→ 0%
Person	≤ 19%	→ ≤ 19%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ ≤ 19%
Object	0%	→ 0%	→ 0%	→ 0%	→ ≤ 19%	→ 0%
Person-Object	0%	→ 0%	→ 0%	→ 0%	→ 0%	→ 0%

**Table 6.3.3.2: Summary of Types of Change in Engagement Levels
for Individual Participants in Group 2.1**

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n= ≥56); 2. ≥ 60% (n= ≥42); 3. ≥ 40% (n= ≥28); 4. ≥ 20% (n= ≥14); 5. ≤ 19% (n= ≤ 14); 0% (n= 0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n = 3.5) = →.

Interestingly, *self-neutral* engagement was lower at baseline for the participants in this group. Only one participant (M.W.) exhibited *self-active* behaviour at a 40% level or above. This is in direct contrast with the two previously mentioned therapy groups. This is viewed as chance as group allocation for the empirical phase of the project was based on already established, geographical team bases within the Day Centre. Small gains in purposeful engagement were made after the I.S.E. intervention by three of the participants. The

remaining participant (G.B.), seems to have made little significant change over the assessment points.

6.3.4 Summary of Experimental Group 2: Therapy Group 2.2

Participant	Sex	Upper Limb Mobility	Lower Limb Mobility	Hearing Impairment	Epilepsy
T.T.	M	0	0	0	0
A.B.	F	0	2	0	0
P.G.	M	0	0	1	0

Table 6.3.4.1: Summary of Characteristics for Group 2.2

KEY: 0 = no problem; 1 = mild difficulty; 2 = moderate difficulty; 3 = severe difficulty;
/ = no information available.

One participant (A.B.) was an independent wheelchair user with a known aetiology of spina bifida and hydrocephalus. The other two were fully mobile. Their aetiology of learning disability was unknown.

Participants and Engagements	ASSESSMENT POINTS					
	(1) Baseline Level	(2) After A.P.	(3) After I.S.E.	(4) After A.P.	(5) After One Month	(6) After Four Months
T.T.						
Self-Neutral	≥ 20%	→ ≥ 20%	→ ≥ 20%	↑ ≥ 40%	→ ≥ 40%	→ ≥ 40%
Self-Active	≥ 40%	↓ ≥ 20%	↓ ≥ 20%	↓ ≥ 20%	→ ≥ 20%	↑ ≥ 40%
Person	≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↑ ≤ 19%	↓ ≤ 19%
Object	≥ 20%	→ ≥ 20%	↑ ≥ 40%	↓ ≥ 20%	↑ ≥ 20%	↓ 0%
Person-Object	0%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ 0%
A.B..						
Self-Neutral	≥ 40%	↑ ≥ 60%	→ ≥ 60%	↑ ≥ 60%	↓ ≥ 60%	↓ ≥ 40%
Self-Active	≥ 20%	↓ 0%	→ 0%	→ 0%	→ 0%	→ 0%
Person	≤ 19%	→ ≤ 19%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	→ ≤ 19%
Object	≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ ≤ 19%	↑ ≥ 20%	↑ ≥ 20%
Person-Object	0%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%
P.G.						
Self-Neutral	≥ 40%	→ ≥ 40%	→ ≥ 40%	→ ≥ 40%	↓ ≥ 40%	→ ≥ 40%
Self-Active	≤ 19%	↓ ≤ 19%	↑ ≤ 19%	→ ≤ 19%	↑ 20%	↓ ≤ 19%
Person	≤ 19%	→ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ 0%	→ 0%
Object	≥ 20%	↓ ≤ 19%	↑ ≥ 20%	↓ ≤ 19%	↑ ≥ 20%	↓ 0%
Person-Object	0%	→ 0%	→ 0%	→ ≤ 19%	→ 0%	→ ≤ 19%

Table 6.3.4.2: Summary of Types of Change in Engagement Levels

for Individual Participants in Group 2.2

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n = ≥56); 2. ≥ 60% (n = ≥42); 3. ≥ 40% (n = ≥28); 4. ≥ 20% (n = ≥14); 5. ≤ 19% (n = ≤ 14); 0% (n = 0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n = 3.5) = →.

Only one of the participants (T.T.) displayed a 40% level of *self-active* engagement at baseline assessment, the other two exhibiting 40% levels in *self-neutral* behaviour. Small rises in purposeful engagement (*person* and *object*) were observed for two of the participants following the I.S.E. intervention phase. The attention-placebo condition (A.P.) appears to have effected an initial reduction in *self-active* behaviour for all three participants, but particularly the participant T.T. This same participant displayed a 40% level of *object* engagement at baseline which showed growth after the I.S.E. intervention, but unexpectedly, if sharply, declined at the second follow-up assessment point.

6.3.5 Summary of Experimental Group 2: Therapy Group 2.3

Participant	Sex	Upper Limb Mobility	Lower Limb Mobility	Hearing Impairment	Epilepsy
J.G.	F	1	3	/	3
P.O.	M	0	0	/	2

Table 6.3.5.1: Summary of Characteristics for Group 2.3

KEY: 0 = no problem; 1 = mild difficulty; 2 = moderate difficulty; 3 = severe difficulty; / = no information available.

One participant (J.G.) suffered from multiple disabilities. She was a wheelchair user dependent on others for her mobility. Information on hearing status was unavailable. Both participants were on the waiting list for audiometric assessment by electro-physiological means. The participant J.G. had Rett's Syndrome and displayed associated 'hand wringing' behaviour and 'breath holding'. The participant P.O. was suspected of having a hearing loss by the researcher. Both suffered from epilepsy which was controlled by anti-convulsant medication.

Participants and Engagements	ASSESSMENT POINTS					
	(1) Baseline Level	(2) After A.P.	(3) After I.S.E.	(4) After A.P.	(5) After One Month	(6) After Four Months
J.G.						
Self-Neutral	≥ 60%	↑ ≥ 80%	↓ ≥ 20%	↑ ≥ 60%	↑ ≥ 60%	↓ ≥ 60%
Self-Active	≥ 20%	↓ ≤ 19%	↓ ≤ 19%	↑ ≥ 20%	↓ ≤ 19%	↑ ≥ 20%
Person	0%	↑ ≤ 19%	→ ≤ 19%	→ ≤ 19%	↑ ≤ 19%	↓ ≤ 19%
Object	0%	→ 0%	↑ ≤ 19%	↓ ≤ 19%	→ ≤ 19%	→ 0%
Person-Object						
P.O.						
Self-Neutral	≥ 40%	↑ ≥ 80%	↓ ≥ 60%	↑ ≥ 60%		
Self-Active	≥ 20%	↓ 0%	→ 0%	→ ≤ 19%		
Person	≤ 19%	→ ≤ 19%	↑ ≥ 20%	→ ≥ 20%		
Object	≤ 19%	→ ≤ 19%	→ ≤ 19%	↓ ≤ 19%		
Person-Object	0%	→ 0%	→ 0%	→ 0%		

Table 6.3.5.2: Summary of Types of Change in Engagement Levels

for Individual Participants in Group 2.3

KEY FOR DEFINITION OF TERMS

≥ = greater than or equal to; ≤ = less than or equal to.

Level of Engagement: 1. ≥ 80% (n = 56); 2. ≥ 60% (n = 42); 3. ≥ 40% (n = 28); 4. ≥ 20% (n = 14);

5. ≤ 19% (n = 14); 0% (n = 0).

Type of Change: Rise = ↑; Decline = ↓; Virtual stability maintained or no change (5% or less; n = 3.5) = →.

Both participants in this group displayed high levels (greater than 60%) of *self-neutral* than *self-active* engagement at baseline assessment. The latter appears to reduce after the initial phase of intervention (A.P.). Small gains may be seen in *person* and *object* engagement after the I.S.E. intervention. there was no follow-up assessment completed on the participant P.O. due to lack of access, however, J.G. appears to have reverted to her former baseline by the second follow-up assessment point.

6.3.6 Summary of Differences Between Experimental Groups

Group	Sex males: females	Impaired Upper limb Mobility	Impaired Lower limb Mobility	Hearing Impairment	Epilepsy
1	2 : 5	2	2	3	2
2	5 : 4	0	2	1	3

Tables 6.3.6.1: Summary Comparison of Characteristics in Groups 1 and 2.

(n = number of participants)

A higher incidence of additional sensory and motor impairments is to be seen in the Group 1 compared with Group 2. Although unplanned, this may have a bearing on the levels of *self-active* engagement seen in Group 1. This will be discussed in full in the next Chapter.

It should be stressed that the groups were not planned on the basis of present disabilities but on their staffed groups within the Day Centre, which were organised on the basis of the residential location within the borough. This was for the stated purpose of the social services bus-run. Therefore variations between groups were considered to be coincidental.

6.4 Summary of Chapter

This chapter has presented the results of the empirical phase of the research in two parts. The first part has provided a summary of the results from the statistical analysis applied to the mean group data. The results have been ordered in relation to the original research hypotheses. The second part has concentrated on an examination of the single cases. The key issues arising from this level of analysis have been summarised. The raw data and a full account of the single cases is provided in **Appendix E1** and **E2**. In addition, there is a

summary of the critical issues that arose within each participant's **I.S.E. Programme** in **Appendix E2**, based on the Decision-Making Schedule to be found in **Appendix C4**.

The next Chapter is to be found in **Volume II**. It proceeds to discuss the research findings in relation to the eight experimental hypotheses.