PROGRAMMED GENERALIZATION OF REDUCED TANTRUM BEHAVIORS IN EPILEPSY WITH SEVERE INTELLECTUAL DISABILITY

Jo Meredith

Thesis submitted in partial fulfillment of the requirements of the degree of Master of Clinical Psychology, Australian National University, February, 1990.

DECLARATION

I declare that this thesis reports my original work, that no part of it has been previously accepted or presented for the award of any degree or diploma by any University, and to the best of my knowledge no material previously published or written by another person is included, except where due acknowledgement is given in the text.

Signed: Jo Meredith

Jo Meredith

February, 1990

ACKNOWLEDGEMENTS

To the parents of Mark: Thank you for trusting me with your son, and to Mark, thank you for presenting me with challenges to test my every skill.

To my academic mentors: Professor George Kearney, thank you for having the temerity to teach an undergraduate to think, and to Dr. Jacqueline Holman for providing, in the best behavioral tradition, positive reinforcement of that process. I wish to thank Dr. Holman also for her patient and helpful supervision, and for opening new doors for me.

To Dr. Roy Beran, Neurologist, Sydney: Gratitude is expressed for supplying the neurological reports and for co-operation and helpful discussions throughout the program.

To my colleagues of the South Eastern Developmental Disability Service, New South Wales: Special thanks are due to Mr. Bob Smith, Senior Charge Nurse; Mr. Laurie Heath, Charge Nurse; and Mr. Geoff Briggs, Principal Program Officer, all of the Strathallen Centre, Goulburn, for without their interest and co-operation this work could not have been carried out. Thanks are also due to the many other staff of the Strathallen Centre who assisted in carrying out the program procedures described herein.

To Dr. Michael Ryan, Paediatrician and Director of the Illawarra Developmental Disability Service, New South Wales: I owe a special debt for support and encouragement at a very critical period in the development of this program without which it may never have eventuated - thank you.

ABSTRACT

This study explores the relationship between epilepsy and aggression, reviews behavioral techniques used to decelerate aberrant behavior and/or aggression, and describes special considerations in using behavioral technology with persons diagnosed epileptic. It also describes methods of facilitating generalization within a punishment paradigm and in doing so integrates research findings from the fields of neurology, neuropsychology, electroencephalography, kindling and applied behavior analysis. This integrated approach is then developed and successfully applied in the treatment of a 15 year old severely intellectually disabled male subject with complex partial seizures with temporal lobe spiking on EEG whose problem behaviors included biting and aggressive tantrums. The design is a multiple baseline across five settings, involves seven categories of aberrant behavior and includes follow up data. There are three phases in the design consisting of baseline and intervention (Trial 1), reversal, and baseline and intervention (Trial 2). The behavioral intervention utilizes an aversive stimulus (facial screen), brief physical restraint, and secondary positive reinforcement. The intervention procedure successfully reduced targetted aberrant behaviors in all settings and widespread generalization occurred. Factors of difficulty in conducting research in applied settings are discussed and the study concludes by integrating some intriguing theoretical questions raised by the present results with directions for future research utilizing generalization responses as an experimental parameter.

TABLE OF CONTENTS

		Page
DECLARATION		(i)
ACKNOWLEDGEMENTS		(ii)
ABSTRACT		(iii)
LIST OF FIGURES		(vii)
LIST OF TABLES		(viii)
CHAPTER 1.	EPILEPSY AND AGGRESSION	1
	"Epileptic personality", aggression and behavior disorders	2
	Complex partial seizures, aggression, and behavior disorders	2
	EEG studies, aggression, and behavior disorders	4
	Distinction between lesion effects and kindling effects	6
	Kindling and the limbic system	7
	Implications	8
CHAPTER 2.	BEHAVIORAL TECHNIQUES USED TO DECELERATE ABERRANT BEHAVIOR AND/OR AGGRESSION	9
	Evaluation of techniques and individual differences	10
	Biting and punishment procedures	11
	Legislative restrictions and aversive stimuli	12
CHAPTER 3.	SPECIAL CONSIDERATIONS IN USING BEHAVIORAL TECHNOLOGY WITH PERSONS DIAGNOSED EPILEPTIC PARTICULARLY COMPLEX PARTIAL SEIZURES	14
	Consideration of types of stimuli	14
	Integration of data from the different fields	15
	Description of complex partial seizures	16
	Problems presented by transient nature of consciousness	17
	The problem of stress	18
	Difficulties with sensory stimuli	19
	The role of medication	19

CHAPTER 4. FACILITATING GENERALIZATION OF PUNISHMENT EFFECTS 21

Methods used to gain generalization 21
Difficulties in obtaining generalization of punishment effects 24
Applying generalization methods to punishment procedures 25
Obtaining compatibility with complex partial seizures 26

CHAPTER 5. INTEGRATING THE TECHNIQUES AND METHODOLOGY OF APPLIED BEHAVIOR ANALYSIS IN THE TREATMENT OF TANTRUM BEHAVIORS INCLUDING BITING IN AN INTELLECTUALLY DISABLED EPILEPTIC SUBJECT - THE PRESENT STUDY 30

Goals of this study 31
Method 32
- Subject 32
- Target behaviors 32
- Experimental design 34
- Settings 35
- Materials and behavioral consequences 39
- Staff 40
- Data collection and scoring 42
- Training of observers for recording and interobserver agreement purposes 46
- Social validation 47
- Procedures 48
- Intervention 51
- Recording, scoring and interobserver agreement 53
- Follow up 55
Results 55
Summary of results 68
Discussion 68
- Increasing the demand level on the subject 70
- Social validity 73
- Role of medication and testing the tolerance level for stress 75
- Generalization 76
- Possible additional effect of visual screening 82
- Side effects of punishment 82
- Summary statement 83

CHAPTER 6. FACTORS OF DIFFICULTY IN CONDUCTING RESEARCH IN APPLIED SETTINGS WITH SPECIFIC REFERENCE TO THE PRESENT STUDY 84

The facial screen 84
Administrative criticisms of cost 85
Handling the raw data 85
Interobserver agreement 86
The primary positive reinforcer 88
Value of research in applied settings 89

CHAPTER 7. IMPLICATIONS OF THE RESULTS OF THIS STUDY - FUTURE DIRECTIONS 90

REFERENCES 96

APPENDIX 'A' - Subject's history including neurological assessment (extract)

APPENDIX 'B' - Graph showing prior behaviors and drug trial resulting in bite free period

APPENDIX 'C' - Data recording sheet

APPENDIX 'D' - Tables 1-5 Percentage agreement between observers

APPENDIX 'E' - Neurological assessment (extract)

LIST OF FIGURES

Figure	Title	Page
1.	The three phases of the experimental design without data.	36
2.	Photograph showing the range of tasks used in the structured activities session.	41
3.	Frequency of average total aberrant responses per week in each setting across all conditions and phases.	56
4.	Frequency of average aberrant responses occurring at the table or chair per week in each setting across all conditions and phases.	58
5.	Frequency of use of the aversive stimuli (facial screen) in relation to the frequency of average total aberrant behaviors for each week of intervention in trials 1 and 2.	66
6.	Integration of potentially conflicting theoretical aspects of the intervention program.	78

LIST OF TABLES

Table	Title	Page
1.	Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Breakfast setting	Appendix 'D'
2.	Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Lunch setting	"
3.	Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Evening Meal setting	"
4.	Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Structured Activities setting	"
5.	Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Free-time (Television viewing) setting	"
6.	Cumulative Effects of Intervention in Each Setting for the First Intervention in that Setting	61
7.	Cumulative Effects of Intervention in Each Setting on the Other Settings	64

CHAPTER 1: EPILEPSY AND AGGRESSION

Aggressive behavior is the subject of growing community concern for a number of reasons. Firstly, there appears to be an alarming degree of violence prevalent in the community, tragically affirmed recently in Australia by massacres in Hoddle and Queen Streets, Melbourne. Secondly, the deinstitutionalisation of persons with psychiatric disorders and intellectually disabled persons has reawakened old fears and superstitions about this segment of the population. While not wishing to suggest that there are relationships between epilepsy and criminality (there are not) at least one of the above massacres was committed by a person with a mental disorder. It is important therefore that psychologists (and other professionals) explore the relationship of aggressive behaviors to the various pathologies as well as exploring creative and cooperative methods of treatment.

The question of a relationship between aggressive behavior and/or behavior disorders and epilepsy has been debated in the literature for well over 100 years with consensus on the subject still difficult as many of the reported studies are marred by sampling problems. Recent comprehensive reviews of the subject support the notion that there is no good evidence that aggressive acts are related to epilepsy in an epileptic population of normal intelligence (Lishman, 1987; Pritchard, 1983). However when one looks at the subpopulation of epileptics who have complex partial seizures the situation is rather different.

"Epileptic personality", aggression, and behavior disorders

Older studies, previously interpreted to support the idea of a general "epileptic personality", have been criticized on the grounds that they arose from close observation and selective reporting of persons who were residents of institutions for lengthy periods of time. In such studies epileptics were typically described in the following way "He (the epileptic) was liable to sudden explosions of affect, sometimes with dangerously aggressive behaviour as a result", but Lishman (1987) points out that the majority of patients from whom this picture was derived, were temporal lobe epileptics (p. 232). Temporal lobe epilepsy has been reclassified within complex partial seizures in the new international classification of epileptic seizures. To facilitate understanding of the varying terminology used in the papers reviewed here, it should be noted that "The classification of partial seizures with complex symptomatology encompasses those phenomena described previously as drowsy state, psychic fits, ictal automatisms, fugue state, psychic variants, psychic equivalents, psychomotor seizures, temporal lobe seizures, hippocampal seizures, amygdaline seizures and diencephalic seizures" (Penry, 1975, p. 3).

Complex partial seizures, aggression, and behavior disorders

Although in relation to the earlier studies it must be recognised that the effects of institutionalisation and other disorders encompassing diffuse brain damage are complicating factors (Lennox & Lennox, 1960), Stevens (1975) in a comprehensive review of interictal clinical manifestations of complex partial seizures is still able to conclude that " ... temporal lobe epilepsy makes a very small contribution to the pool of

psychiatric disturbances, including violence" (p. 103). In regard to this the results of some particular studies are very interesting. Falconer (1972) has reported that aggression, when present, is more common with mesial temporal sclerosis than any other pathology. Earlier Taylor (1969) in reporting data from 100 of Falconer's patients, noted that for those patients with temporal lobe epilepsy and manifesting interictal aggression, the following factors were significantly related:

- disturbed social and family background
- early onset of epilepsy
- male sex
- low IQ.

More recently Rodin (1973) in surveying 700 patients from the Michigan Epilepsy Centre also found that aggression was significantly associated with,

- male sex
- low IQ
- behavioral difficulty dating back to early youth
- lack of religious ties;

but psychomotor epilepsy was not a relevant variable. It may be that complex partial seizures per se are not related to aggression or behavioral disturbances, but if complex partial seizures is combined with any of the following: frequent seizures, increased medication, brain damage (especially if intellectual disability is present), impaired educational and occupational background, then behavior disorders are prevalent (Daly, 1982).

However Lishman (1987), quoting a 1952 study by Pond, says "Children with temporal lobe epilepsy showed behaviour disturbance to the most marked degree" (p. 232). In other studies reviewed by

Lishman (1987), Nuffield in 1961 concluded that " ... the temporal lobe epileptic child (showed) a great deal more aggression" (p. 232), and Sherwin in 1980 "found quite strong evidence that aggression was more commonly associated with left temporal lobe epilepsy than right, both in terms of side of EEG focus and side of temporal horn dilation on air encephalography" (p. 233).

Although there is a shortage of well-controlled studies on this topic it is clear that there is a great deal of presumptive evidence for a special association between complex partial seizures of temporal lobe origin and aggressive behavior particularly in males of low intelligence.

EEG studies, aggression, and behavior disorders

The relationship between abnormal EEG disturbance within the temporal lobes (as distinct from epilepsy) and aggressive behavior is somewhat clearer. In a well controlled study Treffert (1964) found that temporal lobe EEG abnormality, whether or not it was associated with epilepsy, was closely associated with aggressive behavior in psychiatric patients. The aggressive behavior included episodic rage, assault, and impulsive acting out. Furthermore Stevens (1975) says "EEG abnormalities are indeed found with greater frequency in individuals subject to irrational violent behaviour, schizophrenia, and behaviour disorders, and these EEG abnormalities are most frequently recorded over the temporal lobes" (p. 102). These EEG abnormalities may take many forms including Gibbs' bitemporal theta or sharp-wave discharge or diffuse delta dysrhythmia (Lishman, 1987; Stevens, 1975; Williams, 1969).

Consideration of the EEG abnormalities (with or without the presence of epilepsy) combined with increasing interest in the

anatomical substrate, that is, the deep structures of the temporal lobe and the connecting limbic structures, has given rise to two main theories about the common element in the displays of aggressive behavior in such persons. These are that:

(1) " ... in post-ictal confusional states associated with temporal lobe epilepsy aggression may be due to exclusion of cortical function by virtue of diffuse delta dysrhythmia which then permitted emotionally charged impulses originating within the temporal lobes to be directly expressed in behaviour" (Lishman, 1987, p. 226); while Stevens (1975) argues that in relation to persistent theta activity:

(2) " ... this might represent immaturity of the arousal system" (p. 99). Stevens (1975) continues "Bitemporal theta ... may not require postulation of pathology in the temporal lobe nor even of 'downstream' limbic structures. Persistence of bitemporal theta could indicate inadequate inhibition of the hippocampal theta response to stimuli normally habituated or filtered from consciousness and thus represent the electrical correlate of a low threshold for signals leading to arousal and affective response. The recording of temporal theta on the EEG could thus be characteristic of a fundamental disturbance in maturation or inhibition of cerebral arousal and recognition responses, release of which permits emergence of inappropriate response" (p. 100).

Stevens' (1975) argument is supported by the results of neurometric research with learning disabled children where the authors state that "The most salient features characterizing the epileptic children with school problems were excessive activity in theta and beta bands especially in the central, temporal and frontotemporal regions" (Prichep, John, Ahn, & Kaye, 1983, p.232).

These authors consider that "Excessive theta activity may be an EEG correlate of hippocampal activation during orientation reflexes to irrelevant stimuli" (Prichep, John, Ahn, & Kaye, 1983, p. 233).

Distinction between lesion effects and kindling effects

Stevens' (1975) hypothesis supports the notion that epileptic seizures per se may not be the cause of interictal disorders (such as violence, and high levels of irritability) but that such " ... psychological disturbance relates to interactions between environmental causes and the neurological disorder underlying the epilepsy" (p. 103). Support is lent to this hypothesis by the distinction which must now be made between lesion effects and the effects of pathological excitation of temporal structures. Bear (1979) in reporting an increase in aggressiveness, suggested that in temporal lobe epileptics there is enhanced association to previously neutral stimuli. He argues that epileptogenic focus in the temporal lobe leads to the converse of a lesion effect. Lesion effects are described by Bear (1979) as leading to placidity, flatness of affect, or the Kluver-Bucy syndrome where stimuli are dissociated from learned emotional associations. In support of this distinction there is an abundance of evidence from animal studies that disturbances within the limbic system are closely associated with aggressive behavior, and further, kindling studies indicate that kindling induces a variety of post-ictal behavioral changes (Goddard, 1983). Such behavioral changes have been shown to persist interictally and are not associated with epileptiform activity (Adamec, Stark-Adamec, Perrin, & Livingston, 1981).

Kindling and the limbic system

Kindling is an increase in epileptogenicity of brain tissue repeatedly exposed to brief trains of electrical stimulation. The changes in epileptogenicity are very long lasting and the limbic system structures are particularly susceptible to kindling. The limbic system is a term used to characterize the phylogenetically primitive cortical gyri that form a ring around the brain stem. This includes the underlying cortex of the hippocampal formation, parts of the hypothalamus and the amygdala. There are extensive and direct connections between the hippocampal formation, amygdala, and neocortical areas. The temporal lobes are richly connected to the limbic system. It is through the limbic system that the temporal lobes help to provide part of the anatomical substrate for the integration of the emotional and motivational aspects of the person with informational content coming from all sensory systems (Kupfermann, 1985).

Although there are no studies of kindling in human subjects (for obvious reasons) the phenomena observed in animals is important as some neuroscientists believe that since repeated electrical stimulation of the same neurophysiological pathway could cause a permanent change in its electrical properties then perhaps chronic epilepsy might alter the electrical activity of the brain in such a way as to increase or even perpetuate the problem (Polkey, 1982). Kindling has been proposed and investigated as an experimental model for epilepsy and the implications for learning and memory are beginning to be addressed in the research literature (for example see Martinez-Selva, 1987).

Implications

This research may have far reaching implications for those wishing to modify the aggressive or other behavioral responses of persons with concomitant diagnoses of epilepsy especially complex partial seizures of temporal lobe origin.

That the behavioral disturbances associated with complex partial seizures warrant the attention of applied behavior analysts is indicated by the following statements of J.K. Penry (1975), one of the most eminent neurologists of this time: "The non-convulsive seizures are poorly described and often inaccurately diagnosed" (p. 7), and "The treatment of complex partial seizures is one of the greatest challenges in neurology. Although some patients with complex partial seizures live successful and happy lives, with their seizures completely controlled, the proportion is relatively small in comparison to the many afflicted with this condition" (p. 9).

CHAPTER 2: BEHAVIORAL TECHNIQUES USED TO DECELERATE ABERRANT BEHAVIOR AND/OR AGGRESSION

Although interest in neurological and biological contributions to the manifestation of aggressive behavior has increased in recent years little of this research has been directed towards the intellectually disabled. Antisocial behavior, including physical assault, and severe behavior disorders such as self-injurious behavior and stereotypy, present major management problems to those charged with the care of the intellectually disabled whether they are parents or staff of service facilities. Such antisocial behaviors and severe behavior disorders frequently result in the person, if already institutionalized, being refused community placement or educational opportunities, or, if living in the community, often results in institutionalization (Mulick & Schroeder, 1980).

The commitment of applied behavior analysis to improving socially significant behavior (Baer, Wolf, & Risley, 1968) ensured that maladaptive behaviors of retarded persons became the focus of much single case experimental research (for example see Foxx, 1982). This has given rise to the development of a large range of aversive procedures used to suppress or reduce severe behaviors especially those which are physically damaging to the client or others. Despite controversy over the use of punishment procedures it is generally acknowledged that punishment can produce rapid and lasting suppression of a targetted behavior (Heron, 1987).

Evaluation of techniques and individual differences

In a review of behavioral techniques used to decelerate aberrant behavior among retarded individuals Forehand and Baumeister (1976) concluded that across behaviors " ... no technique is consistently effective or ineffective, and individual differences are as apparent and important here as they are elsewhere" (p. 270). This suggests that intervention procedures need to be tailored to the individual rather than based on a generalized response to a behavior pattern, for example, the "time-out for tantrums" syndrome prevalent in many treatment programs.

In a later and more comprehensive review of techniques for decreasing aberrant behavior Johnson and Baumeister (1981) examined the results of papers published on the following behaviors: Aggression, destruction of property, noncompliance, pica, regurgitation and rumination, screaming and crying, self-injurious behavior, stereotyped behavior, and tantrums. Several general conclusions were arrived at, viz:

1. Extinction techniques were the least effective.
2. Time-out and differential reinforcement were about equally effective.
3. Overcorrection and aversive stimulation, if combined with positive reinforcement, were more effective than reinforcement alone, and adding reinforcement to overcorrection or aversive stimulation enhanced the effectiveness of either procedure.
4. Overcorrection or punishment techniques (other than time out) were more effective than time out.
5. It was not possible to evaluate overcorrection against

other aversive stimulation as no studies compared these procedures.

6. Electric shock was shown to be an advantageous method of treatment used alone or in combination with other methods however other more acceptable aversive methods such as contingent oral administration of lemon juice and verbal reprimands appeared to be effective only when combined with other approaches.

Again it was stressed that techniques found successful by some researchers were not found to be so by others. This seems to raise the issue of individual variability among the subjects, and, as well as taking into account their learning history as suggested by Johnson and Baumeister (1981), it may indicate that consideration of other matters, such as their neurological status, should also be taken into account when designing intervention programs.

Biting and punishment procedures

Of all the aberrant behaviors found among the intellectually disabled biting is among the more obnoxious. It is extremely painful for the victim, can be a source of infection, in institutions can spread diseases such as Hepatitis B, and severely limits the life style and freedom of the offender thereby limiting his learning opportunities.

Foxx and Azrin (1972) used an overcorrection procedure consisting of a combination of positive practice and restitution to effectively eliminate biting in a profoundly intellectually disabled adult. The biter was required to wash her mouth with antiseptic, apply medication to the victim, give comforting rubs on the back to the victim, apologize and offer reassurance. The

procedure took 30 minutes to perform. Despite questions posed by Johnson and Baumeister (1981) as to the methodological purity of the evaluative techniques used in claiming superiority for overcorrection as a treatment procedure it seems that there is sufficient evidence to suggest that overcorrection is indeed an effective method of controlling aberrant behavior in institutional settings (Bornstein, Hamilton, & McFall, 1981). However one issue raised by Johnson and Baumeister (1981), that of probable resistance to the procedure by the client, cannot be overlooked particularly if one is dealing with a large and physically strong client.

Johnson and Baumeister (1981) concluded that aversive stimulation methods involved less time and effort and usually yielded equally impressive results (p. 139). In this vein various substances have been used as contingent aversive gustatory stimulation including lemon juice, shaving cream, and tabasco sauce in the treatment of self-injurious and other problem behaviors (Altmeyer, Williams, & Sams, 1985).

Legislative restrictions and aversive stimuli

Despite the documented efficacy of these procedures legislative restrictions make it increasingly difficult to treat aberrant behaviors within an aversive stimuli paradigm. Since Australian citizens have no Bill of Rights there is no avenue of appeal for right to effective treatment via the court system. In any event serious consideration must be given to the use of aversive stimuli if considering the treatment of behaviorally disturbed epileptics for several reasons which will be expanded upon in the chapter devoted to difficulties in using behavioral technology with persons diagnosed epileptic.

Problems such as those mentioned above lead one to consider the use of mildly aversive response suppression procedures such as visual or facial screening. This procedure usually involves the use of a piece of cloth or towelling to briefly cover the subject's face, or the use of an eye screen to prevent visual stimulation. This procedure has been found to be acceptable to both nurses and teachers when used alone, but increased in acceptability as a treatment technique when used in combination with a positive reinforcement procedure (Mudford, 1987). Furthermore visual screening (and variants of the procedure) has been found to be effective in reducing self-stimulatory and stereotypic behaviors among retarded subjects (McGonigle, Duncan, Cordisco, & Barrett, 1982; Rincover, Cook, Peoples, & Packard, 1979).

Another mildly aversive procedure which has been used with effect is brief physical restraint (Barkley & Zupnick, 1976) although there is a possibility that under certain circumstances this procedure can be positively reinforcing (Favell, McGimsey, Jones, & Cannon, 1981). This is likely to occur if restraint also allows escape or avoidance by the client from a required task or behavior. Recently, Swerissen and Carruthers (1987) have demonstrated that this problem can be offset by an immediate return to task behavior and subsequent differential reinforcement. In any case, differential reinforcement for appropriate or incompatible behaviors should be part of any treatment package aimed at reducing aberrant behavior, for developmental reasons, as well as increasing the acceptability of the treatment package.

CHAPTER 3: SPECIAL CONSIDERATIONS IN USING BEHAVIORAL TECHNOLOGY WITH PERSONS DIAGNOSED EPILEPTIC PARTICULARLY COMPLEX PARTIAL SEIZURES

Most behavioral interventions in relation to epilepsy reported so far, have concentrated on the reduction of seizure rate in convulsive epilepsy (Parsonson & Smith, 1986). There is not to this author's knowledge any report of applying behavioral techniques specifically to problem behaviors associated with complex partial seizures.

The large number of studies reporting reductions in rates of aberrant behaviors have not generally reported on concomitant conditions of clients. Yet the severely intellectually disabled and autistic frequently have associated nervous system, endocrine and metabolic diseases/disorders which often are causal agents of the disability (Matson & Mulick, 1983). These disorders may well be a large source of individual variability in treatment effects.

Consideration of types of stimuli

If the effect of the neurological condition of the client is such that the normal processes of reaction to stimuli are altered, such as in complex partial seizures where there may be enhanced association to neutral stimuli, or where there may be increased neural inhibition with consequent behavior change, or inadequate inhibition to stimuli normally habituated, then logically this should be taken into account if the effects of any treatment program are to be optimized. This may be particularly important in relation to the types and amount of stimuli that may be used in

individual treatment programs and in planning structured environments.

In addition, in relation to the use of aversive stimuli, it should be noted that perceptual distortions in all sensory modalities have been documented in persons with complex partial seizures (Robb, 1975). It would therefore be very difficult to ascertain the strength of the perception by the subject of an aversive stimulus such as electric shock with any degree of reliability.

In relation to techniques such as verbal prompting, or verbal instruction, attention may need to be paid to neuropsychological evidence that persons with temporal lobe dysfunctions have difficulty in processing auditory information (Lezak, 1976). Another common neuropsychological finding which may have consequences for cue giving, both verbal and gestural, is inability to integrate information in a logical sequence, for example, as evidenced by poor performances on the Picture Arrangement subtest of the Wechsler Scales (Rodin, Schmaltz, & Twitty, 1986).

Integration of data from the different fields

Each of the fields, viz, electroencephalography, kindling (albeit indirectly), and neuropsychology all provide data which indicate that the epileptic process of complex partial seizures produces effects on neural pathways which not only influence behavior directly, but also influence the way in which stimuli are processed. The research from these fields is not usually integrated but when one considers the implications of each it appears that there may be an increased inability to deal with

external stimuli in persons with epileptogenic foci of the temporal lobes.

Since in behavioral interventions one is generally using stimuli in a controlled fashion to produce a desired behavior change it would seem logical that these aspects of temporal lobe pathology should be accounted for in the process of intervention. For example, in view of a possible sensitivity to, and inability to process, external stimuli it may be that visual screening (i.e., visual sensory extinction) would be a particularly suitable treatment technique in cases of complex partial seizures since it provides a blocking of incoming visual stimulation as well as having a mildly aversive function.

Description of complex partial seizures

Complex partial seizures, as the name suggests, are partial seizures with complex symptomatology, and may be convulsive or non-convulsive. The seizure may begin as a partial disturbance and subsequently generalize or may present as temporal lobe spiking on EEG within generalized epileptic activity. They are commonly characterized by limb extension, finger flicking, pupillary dilation, pilo-erection, and gustatory phenomena including grimacing, lip-smacking, and jaw snapping (Ajmone-Marsan & Ralston, 1957; Daly, 1975, 1982). It has also been observed that some patients make stereotyped rhythmic movements (Daly, 1982).

The precise aetiology is unknown, thought to be multifactorial, and the only common denominator besides symptoms and signs, is the anatomical substrate (the temporal lobe and the connecting limbic structures) for the seizure discharges (Penry, 1975). Mesial temporal sclerosis has been identified in a high

percentage (47%) of patients who underwent temporal lobectomy (Falconer, Serafetinides, & Corsellis, 1964). Later it was found that significant factors in the aetiology of mesial temporal sclerosis are febrile convulsions and status epilepticus (Corsellis, 1970; Ounsted, Lindsay, & Norman, 1966). Falconer (1972) later found that mesial temporal sclerosis is associated with aggression more than any other pathology.

Complex partial seizures have been described as consisting of such complex and essentially psychic symptoms as mental confusion, behavioral automatisms, illusions, hallucinations, changes in affect and memory or ideational disturbances (Gastaut & Broughton, 1972). In an extremely detailed and comprehensive review of the ictal clinical manifestations of complex partial seizures Daly (1975) expands on Gastaut and Broughton's description "Thus ... complex partial seizures consist of an alteration in the content of consciousness which, as the seizure evolves, may lead to an alteration in the level of consciousness manifested by unresponsiveness, confusion, and amnesia" (p. 57). Further, Ajmone-Marsan and Ralston (1957) noted that at least 50% of automatisms begin with a failure to respond. No universal agreement exists on the classification of behavior during automatisms because of their complexity and the small number of cases reported. However it has been noted that violent or angry behavior may occur in automatisms but that in most instances it is probably the result of the confused reaction of the patient to attempts at restraint by observers (Daly, 1975).

Problems presented by transient nature of consciousness

It is often very difficult to determine when a person is having, or has had a seizure, and the level of consciousness may

range from non-responsiveness to verbal stimuli, a glazed look in the eyes, to full loss of consciousness. In addition these phenomena may be transitory or more longer lasting (Murray, 1981). This is further complicated if one's client is non-verbal and severely to profoundly intellectually disabled, leaving one to rely on observations of fleeting pupillary dilation to establish whether seizures are occurring.

The transient nature of the level of consciousness in non-convulsive complex partial seizures presents problems in using conventional behavioral methods of treating biting for instance with aversive gustatory stimulation. The use of such stimulation may be dangerous due to the risk of choking or of fluid lodging on the lungs if the client is not fully conscious. As well, aversive stimuli are undoubtedly stressful to the recipient and increases in stress can precipitate seizures in any type of epilepsy (Lishman, 1987; Marsden & Reynolds, 1982).

The problem of stress

It is extremely important to avoid any situation that may give rise to undue emotional stress in persons with complex partial seizures as 21% of such a client group have been shown to respond to stress with seizures (Currie, Heathfield, Henson, & Scott, 1971). An increase in seizure rate increases the risk of status epilepticus, an ever present possibility when a diagnosis of epilepsy exists. Status epilepticus is the occurrence of seizures without recovery of consciousness. It is a medical emergency, and, without expert medical treatment, can rapidly result in death. Even complex partial status epilepticus, where total loss of consciousness may not be present, can result in brain damage (Stores, 1986).

Difficulties with sensory stimuli

Although presenting challenges in choice of treatment method it is critical that applied behavior analysts working with epileptics understand that great care must be taken in the choice of stimuli presented especially if considering the use of aversive stimuli. Most aversive stimuli is sensory in nature, i.e., affects receptors for pain, sound, taste, and generally causes a degree of discomfort. It is well documented that sensory stimulation in susceptible persons can precipitate seizures (Booker, 1975; Marsden & Reynolds, 1982).

In addition to challenging the creativity of applied behavior analysts in finding appropriate and safe treatment methods, cases involving epilepsy also present an opportunity for cooperative and consultative professional interactions with neurologists specializing in the treatment of epilepsy.

The role of medication

When considering the treatment of behavior disorders in persons with epilepsy the role of medication must be included. Where complex partial seizures are suspected, an accurate diagnosis and appropriate medication are essential as the pharmacological agent is quite specific, and in many cases very effective. The non-convulsive seizures are often inaccurately diagnosed and in children often confused with absence seizures. It is imperative to differentiate absence seizures from complex partial seizures because the prognosis and medication are different (Penry, 1975). The primary anti-epileptic for use in complex partial seizures is carbamazepine (Gamstorp, 1975). Although the partial seizure may not be manifested in a convulsion, it is just as important that medication be used for

seizure control as there is now accumulating evidence that uncontrolled complex partial seizures as well as complex partial status epilepticus result in brain damage (Stores, 1986). Carbamazepine is also thought to check possible kindling in the limbic system (Ayd, 1979). It is also important that reasonable time be allowed for the therapeutic trial of adequate amounts of medication until the optimum regime for the client is reached. This allows behavior to stabilize and also minimizes the risk of medication changes during behavioral programming thereby confounding the results.

CHAPTER 4: FACILITATING GENERALIZATION OF PUNISHMENT EFFECTS

Generalization of successful intervention effects is a matter which must be given serious consideration in a clinical treatment program especially if a person's future liberty is dependent not only on the success of an intervention in an institutional setting but also on the effects carrying over to the natural environment such as home and school settings. This is especially important in rural areas where a subject's home may be 100 kilometres from the treatment setting or where home, school, and treatment settings traverse Federal/State boundaries with consequent difficulties in staff from one facility gaining access to the other. As well, in these days of economic austerity, administrators are reluctant to release staff for training purposes in another facility. If anything, economic considerations lead to the jealous guarding of staff and skills as institutions vie for clients. Such matters frequently operate to the detriment of a client's ultimate well being and they certainly impinge on the clinical process and must be considered when deciding upon programming for generalization.

Methods used to gain generalization

Stokes and Baer (1977) provide a pragmatic definition of generalization, viz: "The occurrence of relevant behavior under different, non-training conditions (i.e., across subjects, settings, people, behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (p. 350). Stokes and Baer (1977) reviewed the techniques utilized for the promotion of generalization. Briefly these were categorized as:

"1. Train and hope

2. Sequential modification

3. Introduce to natural maintaining contingencies

4. Train sufficient exemplars

5. Train loosely

6. Use indiscriminable contingencies

7. Program common stimuli

8. Mediate generalization

9. Train 'To generalize'" (pp. 350-351).

In dealing with behavior that is extremely injurious to others, such as biting, or behavior that is very disruptive, such as tantrums, it is obviously necessary to do more than train and hope for generalization. Sequential modification in the form of a multiple baseline design across settings can be utilised clinically but is impractical in an extended model where one does not have access to the settings outside the experimental parameters (for example, home and school).

The transfer of behavioral control from experimenter to natural contingencies is a desirable and admirable goal but as noted by Stokes and Baer (1977) this can be difficult in the case of intellectually disabled persons (p. 354). It is particularly difficult to institute natural contingencies when dealing with severely or profoundly intellectually disabled persons with no functional communication skills. Seymour and Stokes (1976) found it necessary for their subjects to solicit reinforcement via verbal communication in order to establish a natural contingency. It is also unlikely that reducing a problem behavior will be as successful in eliciting reinforcement, as say, learning a new skill. Staff do not as a matter of course dispense reinforcement

to residents for not biting or throwing tantrums unless such reinforcement is part of a structured program, nor can a low functioning non-verbal resident draw attention to the non-performance of a problem behavior. Train 'To generalize' also seems to be difficult to apply in the case of a severely to profoundly intellectually disabled person since it involves reinforcing instances of generalization as though it were a response. In this case (decreasing aberrant behaviors), the result of training to generalize would be very close to using natural contingencies; i.e., movement along the generalization gradient desired would be in the direction of normally anticipated behavior and unlikely to elicit reinforcement for the same reasons as using natural contingencies.

Although the four methods of obtaining generalization mentioned above do not appear to be particularly fruitful in relation to severely to profoundly intellectually disabled subjects they are useful in terms of demonstrating the necessity for careful planning and programming for generalization in such cases. Training sufficient exemplars (of stimulus conditions and responses) has been a successful avenue of obtaining generalization and is one technology which is able to be exploited in the face of severe to profound intellectual disability combined with epilepsy. As well, successful use of the technique in reducing bizarre behaviors has also been reported (Allen, 1973). Stokes and Baer (1977) point out that " ... frequently a sufficient number of exemplars is a small number of exemplars" and is sometimes as few as two (p. 356). While emphasizing that little research has been carried out on generalization programming by training in a number of settings, Stokes and Baer (1977)

nevertheless recommend that " ... to program the generalized performance of certain responses across various setting conditions or persons, training should occur across a (sufficient) number of setting conditions and/or with various persons" (p. 357).

Difficulties in obtaining generalization of punishment effects

One of the difficulties in attempting to program for generalization when the intervention goal is the reduction of aberrant behavior, is that most analyses of generalization published so far appear to have concentrated on the generalization of a newly acquired skill. Indeed a very significant technology has developed around this issue with published research on the systematic selection of stimuli involved in the teaching examples (for example see Sprague and Horner, 1984). Parallel avenues of research in obtaining generalization when using punishment techniques do not exist. Major reviews of treatment techniques used with aberrant behaviors all report that a lack of generalization is a limitation of punishment procedures and that a technology of generalization in relation to the reduction of aberrant behaviors is urgently needed (Baumeister & Rollings, 1976; Cushing, Adams, & Rincover, 1983; Forehand & Baumeister, 1976; Johnson & Baumeister, 1981).

One paper which does address the issue of generalization of punishment effects, where the target behaviors were the unpredictable biting and destructive acts of a profoundly intellectually disabled adolescent failed to achieve generalization and indeed warns of the specificity of punishment effects (Birnbrauer, 1968).

Applying generalization methods to punishment procedures

There appears to be no logical reason to assume that one cannot take the procedures known to produce generalization in skill building and apply them to the reduction of aberrant behavior. Although in doing this it would seem that one would need to pay particular attention to the documented specificity of punishment effects. Paradoxically this may assist in obtaining generalization to non-trained environments. If one is already aware that one cannot obtain generalization by sequential modification then one may be able to effect generalization by mimicking the natural environments within the intervention settings using a multiple baseline design. This would facilitate the training of sufficient exemplars and if one also incorporated within that framework the programming of common stimuli one may be able to utilise the specificity of punishment effects to obtain generalization of such effects to non-trained/natural environments. The programmed common stimuli in the training environments would need to be stimuli found occurring naturally in the natural environment.

Programming common stimuli may also assist in obtaining intervention effects in that it has been suggested previously that persons with complex partial seizures have difficulty in the neural inhibition of irrelevant stimuli. It would seem then that one would need to make use of highly discriminable and highly organized stimuli in an intervention environment. Provided that the stimuli programmed during intervention have sufficient saliency from environment to environment it should be possible to satisfy two major technical "givens" of punishment procedures and generalization, that is, the known specificity of punishment

effects and the efficacy of programming common stimuli to obtain generalization. This could be done by making some of the programmed common stimuli the discriminative stimuli for the occurrence of punishment.

Obtaining compatibility with complex partial seizures

This approach is compatible with the neuropsychological requirements of epileptics with complex partial seizures (i.e., temporal lobe dysfunction) in that it seems logical to present highly discriminable and organized stimuli to persons who may be experiencing difficulty in processing and integrating information. In addition, when dealing with a subject who is severely or profoundly intellectually disabled it may be of assistance to consider the literature pertaining to transfer and generalization in relation to task-specific cognitive strategy training in the intellectually disabled.

Some important points emerge from a review of generalization training in the educable intellectually disabled by Blackman and Lin (1984). Essentially those that seem most relevant to the task at hand are that (1) failure to generalize strategy on serial recall tasks may have been due to " ... inability to organize stimulus input spontaneously"; and (2) in comparing training packages "The superiority of the explicit over the general instruction group again demonstrated the importance of task analysis as the basis for specific strategy selection" (Blackman & Lin, 1984, pp. 243-244).

It may be that presenting cues which virtually task analyse a situation (i.e., a setting where the desired behavior is to occur) will sufficiently structure and organize the client's perception of the environment to allow the subject to respond appropriately

(i.e., to adopt the correct strategy). In such a situation the addition of an operant consequence (e.g., punishment) would function to enhance the saliency of the stimuli, and to ensure selective attention to that stimuli.

Again this approach is consistent with both the neuropsychological data in relation to temporal lobe dysfunction and the EEG data. In particular since the EEG data suggests that persons with epileptogenic foci of the temporal lobes may have an increased inability to deal with stimuli (especially inhibition of irrelevant stimuli) it seems logical to train attention to certain well-defined stimuli by adding an operant consequence for failure to respond to that stimuli.

However the neuropsychological data in relation to persons with temporal lobe dysfunctions presents another problem in that it provides evidence that such persons have difficulty in processing auditory information. It is obviously desirable for problem behaviors if not totally eliminated from a subject's repertoire to be under verbal control. Stokes and Baer (1977) in discussing mediated generalization state that " ... the most commonly used mediator is language" and that " ... it (language) meets perfectly the logic of a salient common stimulus, to be carried from any training setting to any generalization setting" (p. 361).

The use of language as a mediator may be important in terms of maximizing the possibility of generalization since language may predispose towards self-control and according to Stokes and Baer (1977) research on behavioral techniques involving self-control or self-management has shown promising maintenance and generalization of behavior change. It may be that difficulties in processing

auditory information could be offset by the use of highly emphasized and repetitive language accompanied by gesture within a highly structured environment.

Stokes and Baer (1977) also recommend the use of indiscriminable contingencies. This presents some difficulty if one is considering the use of a punishment technique since it is well established that punishment effects are enhanced if a continuous schedule is used for the delivery of an aversive stimuli (Heron, 1987). However if one were prepared to sacrifice immediacy and strength of the effect for a slower reduction in problem behaviors but with hopefully better prospects of long term maintenance and generalization it may be possible to combine a form of indiscriminable contingency using language as a stimulus for mediation. This could be done by providing a verbal cue for desired behavior contingent on occurrence of a target behavior. The subject's response to that verbal cue could then be punished (contingent upon failure to respond) or positively reinforced (contingent upon the occurrence of the desired response). This would seem to provide some opportunity for the development of self control, as well, each occurrence of target behavior is not on a continuous, therefore easily discriminable, schedule of punishment. The subject determines the contingency for punishment or positive reinforcement by his own response to the verbal stimuli. That the rate of responses both punishable and positively reinforcable is likely to be highly variable is fairly predictable in a subject of low intelligence and with the additional cognitive processing problems attributable to complex partial seizures and/or temporal lobe dysfunction.

Fulfilling Stokes and Baer's (1977) criteria for training loosely is somewhat more difficult since it would appear that to maximize the possibility of learning appropriate behavior and reducing aberrant behavior in an intellectually disabled subject with complex partial seizures would require a high level of control over the stimuli presented versus the little control required for training loosely. Perhaps this degree of control could be offset by keeping the stimuli tightly controlled but by having it delivered by a number of different persons across a number of settings and in the presence of a variable number of other people. This would also be consistent with minimizing the contextual specificity of punishment effects.

After considering the techniques recommended to enhance the possibility of obtaining generalization in conjunction with problems of obtaining generalized punishment effects it appears that successful programming for generalization of punishment effects, that is reducing aberrant behaviors, would be the result of a careful balancing of the known effects of each technique against the desired outcome. This would indeed be a more challenging process in a subject with a severe to profound level of intellectual disability complicated by complex partial seizures of temporal lobe origin.

CHAPTER 5: INTEGRATING THE TECHNIQUES AND METHODOLOGY OF APPLIED BEHAVIOR ANALYSIS IN THE TREATMENT OF TANTRUM BEHAVIORS INCLUDING BITING IN AN INTELLECTUALLY DISABLED EPILEPTIC SUBJECT - THE PRESENT STUDY

Among the severely intellectually disabled some 20% of that population are epileptic (Krafft & Poling, 1982). Complex partial seizures of temporal lobe origin are the most prevalent of any single seizure type constituting 42% of the partial seizures and 26% of all seizures versus generalized tonic-clonic seizures which constitute only 20% of all seizures. Complex partial seizures are the most resistant of seizures to medical treatment, the most frequent type of seizure treated surgically and it is reported " ... the greatest need for medical treatment is in adult patients with complex partial seizures who fail to respond to existing medications" (Penry, 1975, p. 4).

If one accepts that aggression may be associated with complex partial seizures of temporal lobe origin and note that the intellectually disabled are frequently characterized by behavioral excesses such as aggression, disruption, and stereotyped movements (Forehand & Baumeister, 1976; Johnson & Baumeister, 1981), and then take into account the statistics relating to the prevalence of epilepsy among the severely intellectually disabled it would seem timely that the efficacy of behavioral techniques in the treatment of behavior problems associated with complex partial seizures be addressed.

From the information available on the phenomena and treatment of complex partial seizures and from what is known of efficacious behavioral techniques in the treatment of aggression and

stereotypy in the retarded, it would seem appropriate that a treatment package aimed at eliminating aggressive tantrums (including biting) and stereotypic behaviors in a severely to profoundly intellectually disabled adolescent male with complex partial seizures of temporal lobe origin should include:

(1) Accurate diagnosis.

(2) Appropriate medication.

(3) Behavior intervention program ideally including:

(a) an aversive element preferably one which will reduce the amount of stimulation available when the client is highly aroused; and one which will be safe to use in view of the client's epilepsy.

(b) a response prevention element because of the risk of injury to other clients and staff.

(c) differential reinforcement of appropriate/other behavior.

(d) facilitation of generalization of intervention effects.

A single case study utilizing a multiple baseline design across five settings and involving seven categories of aberrant behavior will now be presented to demonstrate the successful use of the previously described principles and procedures.

Goals of this study

(1) To reduce a wide variety of tantrum behaviors which frequently culminated in biting;

(2) To teach the client to respond to verbal instructions;

(3) To maintain reduction of those behaviors under increasing levels of demand on the client;

(4) To gain verbal control of any residual behaviors that

may occur depending on the success of goals 1 and 3.

(5) To obtain sufficient generalization and verbal control of the subject's behavior to allow him to return to his family home and attend a special school for handicapped children.

Method

Subject.

The subject "Mark" is a 15 year old, severely to profoundly intellectually disabled male with complex partial seizures with temporal lobe spiking on EEG (see Appendix 'A').

It is not possible to assess his IQ formally but his cognitive skills are such that his educational assessment reports that he has difficulty with one to one relationships. He has no speech. He can produce some simple signs, for example, "Thank you" but usually only in response to demand. He requires assistance in all facits of daily living and is toilet timed rather than toilet trained. He is physically normal, fully ambulant, and at the commencement of the program was 179 cms. (6 ft.) tall and weighed 69 kgs. (nearly 11 stone). He is still growing and is very strong.

Permission from the subject's parents to carry out the program procedures reported herein was obtained as well as permission from the State Department of Health.

Target behaviors.

Target behaviors were tantrums which consisted of many elements and which frequently culminated in biting. These bites were very serious with the teeth piercing the flesh on most

occasions. On one occasion Mark bit his father repeatedly down the arm almost severing his thumb. Several stitches were required to repair the wound.

These tantrums appeared to be unprovoked in that no direct, immediate, antecedents could be established. However there did seem to be a higher frequency of tantrums occurring on days when Mark was not able to move around freely outdoors such as in rainy weather.

Tantrums and/or biting would be preceded by periods of increased activity consisting of:

- running
- twirling
- loud vocalising
- bouncing up and down on the spot with limbs extended
- foot stamping and repetitive leg movements if seated
- finger flicking and repetitive hand movements of tapping, drumming and clapping
- lip smacking
- jaw and/or teeth snapping
- pupillary dilation.

If approached during these tantrums Mark would scratch, kick, and bite. At times during tantrums Mark would clutch his head, appear to be in pain, and sometimes bang his head.

Since it was thought that some of these behaviors may be related to the complex partial seizures a drug trial was conducted under the supervision of a neurologist specialising in epilepsy. Medication was stabilized at 1,200 mgs. of carbamazepine daily and an extended bite free period was maintained (see Appendix 'B').

Although biting ceased all the other behaviors were still present and tantrums still occurred. It should be noted that it is not certain whether these behaviors are simply the stereotypic behaviors of a severely intellectually disabled individual or whether they are seizure prodromata. Many of them are consistent with behaviors characterizing complex partial seizures as described by Ajmone-Marsan and Ralston (1957) and Daly (1975, 1982). These behaviors were observed to follow a sequence which happened very quickly and could also be simultaneous at times. Therefore it was decided for recording purposes that the occurrence of any of these behaviors, with the exception of pupillary dilation, would be recorded as a target behavior.

Experimental design.

Since a major purpose of this study was to assess generalization (if any) a multiple baseline across settings design was chosen. There are five settings consisting of three mealtimes, a structured activity session, and a free-time (television viewing) session. The program occurred over a period of 26 weeks.

Due to the stress previously experienced by the family of the subject a reversal was not originally planned for ethical reasons. However after 14 weeks the program had been so successful the family requested that Mark return home for the Christmas holidays. This resulted in a 7 week program free period providing a naturally occurring reversal in the design.

The design is therefore divided into 3 phases. Phase I consists of 14 weeks of baseline and intervention (Trial 1) across the five settings. Phase II consists of 7 weeks reversal, and

phase III consists of 12 weeks of baseline and intervention (Trial 2) across the five settings.

The order of intervention across settings differed in phase I and phase III. The order of intervention in phase I was:

- lunch meal setting
- evening meal setting
- breakfast meal setting
- structured activities setting
- free-time (television viewing) setting.

The order of intervention in phase III was:

- breakfast meal setting
- structured activities setting
- lunch meal setting
- free-time (television viewing) setting
- evening meal setting.

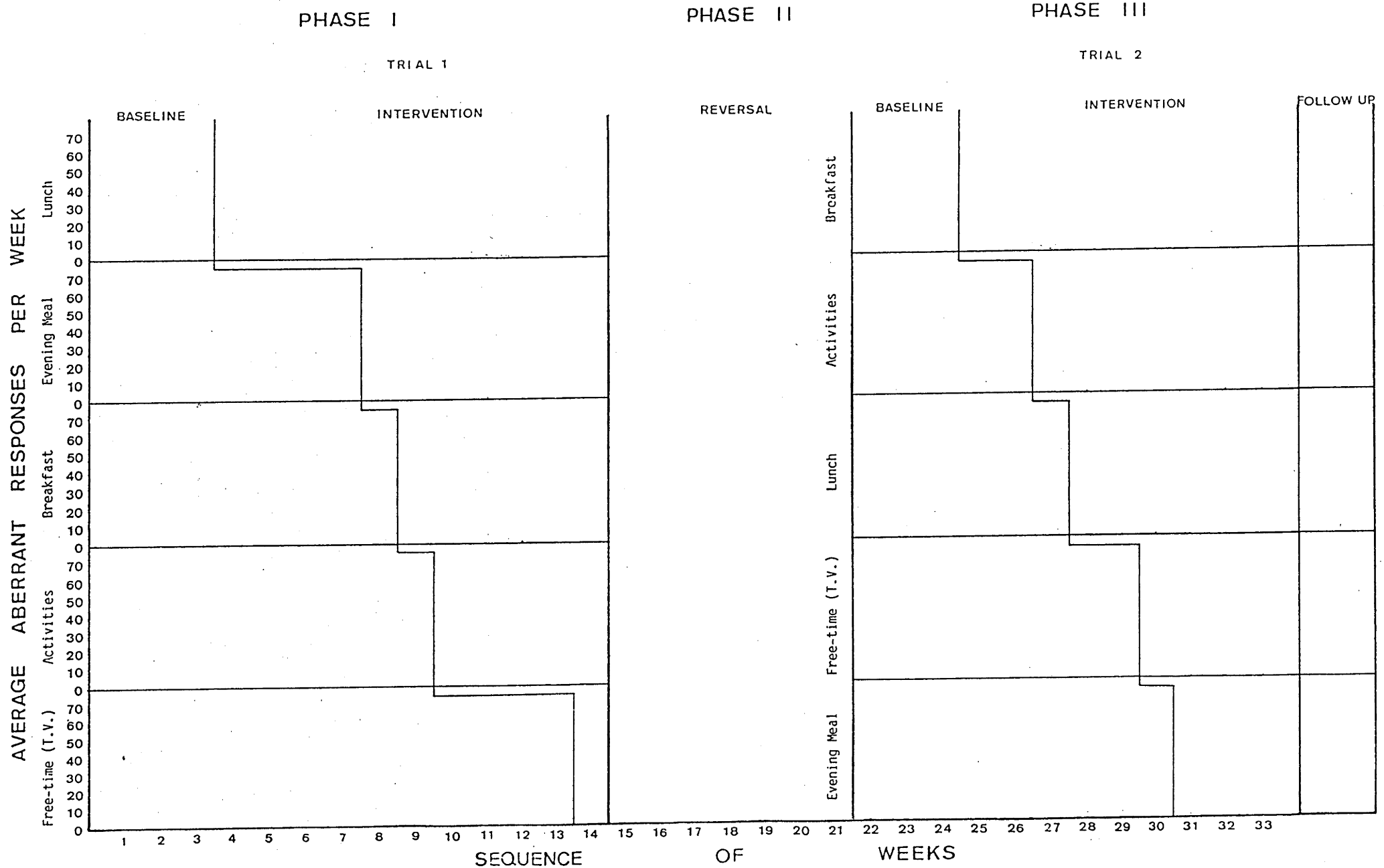
The behaviors recorded, all procedures during baseline and intervention, and recording, were the same in phases I and III. Figure 1 shows a diagram of the experimental design, without data, for the purposes of clarity.

Settings.

Meals

Experimentally the three mealtimes were treated as independent sessions as they occurred at different times of the day even though they took place in the same dining room. Different staff were also present at each meal due to variations in staff meal rosters which were outside of possible experimental control.

Figure 1. The three phases of the experimental design without data.


PHASE I
PHASE II
PHASE III
TRIAL 1
TRIAL 2
BASELINE
INTERVENTION
REVERSAL
BASELINE
INTERVENTION
FOLLOW UP
AVERAGE ABERRANT RESPONSES PER WEEK
Lunch
Evening Meal
Breakfast
Activities
Free-time (T.V.)
Breakfast
Activities
Lunch
Free-time (T.V.)
Evening Meal
0 10 20 30 40 50 60 70
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
SEQUENCE OF WEEKS

The dining room was a typical cafeteria style institutional dining room with complete meals from a bain-marie (a heat retaining food storage device) served over a counter to residents who were required to stand in line to receive same. Meals were then carried by residents to their designated place at the same table every day. As each course was finished each resident was required to scrape his plate and return it to the counter. They were then required to sit down in their places and wait quietly until the next course was served. Residents unable to perform any of the required tasks independently were assisted by staff. All residents were required to remain seated in the dining room until all plates from the last course were returned to the counter. Residents were then thanked by the staff person in charge and given permission to leave the dining room.

Structured activities

Structured activities were carried out in a recreation room in a different building from the residential. No persons other than the subject and those involved in the program were present. The room contained tables of varying sizes, straight back chairs, lounge chairs, a television set, stereo equipment, pictures and posters on the walls, and pinball machines. Training was carried out in varying positions and at different sized tables but always with the subject seated at a table. The subject was required to help carry the activity material from another room to the recreation room and at the end of the training session to help pack up the material and carry it back before being allowed to return to the residential unit.

Free-time (television viewing)

This session was conducted in the day room of the residential facility. It contained lounge chairs, a television set, and poster decorations attached to the walls. Access to this room was freely available and residents were able to come and go at will consequently those present varied from day to day. The subject was required to choose a seat in front of the television and remain seated while viewing.

Materials and behavioral consequences.

Facial screen

The facial screen consisted of an ordinary black drill (thick cotton) washable hat with black non-see-through material sewn around the brim. The material was of sufficient length to fall just below the subject's chin, and was sewn far enough around the brim to cover the ears so that even if the subject attempted to turn his head around he could not see out.

Use of a hat allowed for rapid placement, ensured that the screen could not be shaken off easily as a piece of towelling might be, and minimised the risk of being bitten for the person performing the intervention.

Primary positive reinforcer

The primary positive reinforcer consisted of pieces of cooked cold chicken chopped into approximately half inch cubes. Chicken was established as a highly preferred food for the subject. Use of a primary positive reinforcer proved to be unnecessary after one week of intervention.

Secondary positive reinforcer

The secondary positive reinforcer consisted of social praise, which consisted of statements such as "Good Mark", "Very good Mark", coupled with smiling very purposefully at the subject.

Brief physical restraint

Brief physical restraint consisted of one person standing on each side of the subject and holding his arms by his sides while he was seated. Excessive force was not used.

Structured activities

A large range of materials was used in these sessions from very large blocks to picture books and lego sets. The range of tasks is shown in Figure 2. The tasks were presented in a developmental sequence and commenced with the subject successfully building a tower from the large blocks.

Staff.

Other than the author (a State Registered Psychologist) all staff directly involved in this program were State Registered Nurses with Certificates in Mental Retardation or Psychiatric nursing. In addition 3 of the Registered Nurses had been trained as Program Officers (a further certificate course which involves training in behavioral principles, data collection and task analysis) and 1 of the Program Officers and 5 of the other Registered Nurses had successfully completed a 30 hour training course in behavior modification principles and practice conducted by the author.

Figure 2. Photograph showing the range of tasks used in the structured activities sessions.

Twenty-one people were involved in the program in the following roles:

- 14 as either observer recorders or reliability raters
- 12 as cue-givers during baseline phases
- 9 as activity trainers/cue-givers
- 9 as persons applying the intervention procedure, working in 3 rotating teams of 3 consisting of a team leader/cue-giver and two persons to apply brief physical restraint.

Data collection and scoring.

As a large variety of high frequency behaviors were involved, three days of observation and experimentation in data collection in the meal and structured activities settings was carried out prior to baseline to develop a data collection protocol. These observations were carried out by the author and the Principal Program Officer of the facility.

During this time behavioral definitions were refined and it also became obvious that procedures in the dining room needed to be standardised so that, firstly, the staff knew what to do; and secondly, the demands on the client were consistent from session to session. All meals during this observation period were timed so that an average comparable length of time for data collection in the other settings could be established. The author and the Principal Program Officer also practiced reliability recording during this period. To facilitate collection of data the large variety of observable aberrant behaviors were categorised as follows:

Category	Behaviors
Leaving table (other than when required).	Standing up at the table (bottom off seat of chair). Failure to be seated when instructed if subject moved past the corner of the table into the aisle. Leaving the designated chair when watching television.
Behaviors while up from the table (without permission).	
- Bouncing	Jumping up and down either on the spot or with movement forward or backward (not walking). Literally bouncing. Includes twirling with or without bounces.
- Noise	All loud inappropriate vocalisations: - roaring - laughing - humming and other 'oral' noises: - tongue clacking - jaw/teeth snapping - lip smacking.

- Repetitive hand movements and clapping	All repetitive (defined as more than 3 instances) hand movements: - clapping - finger flicking/finger flexing - using hands to rub or pat thighs - banging or drumming hands on any surface or self - using hands to bang any implements (e.g. cutlery) against any other surface or self - using hands to pick (? imaginary things) off self, clothes, or others.
Behaviors at the table or chair	
- Repetitive leg movements and foot stamping	All repetitive (defined as more than 3 instances) leg movements: - running on the spot while seated with foot movement and moving knees in the same motion without moving foot/feet - stamping one or both feet - banging knees together (sideways motion)

- Noise	Same behaviors as "noise while up from the table/chair".
- Repetitive hand movements and clapping	Same behaviors as this category in behaviors while up from the table.

The data collection form which resulted from these observations is shown in Appendix 'C' attached hereto.

Because there was such a large number of repetitive behaviors it was not feasible to count each instance of each behavior, that is, say each single hand clap. It was also not possible to record the duration (time) of each behavior either because of the simultaneous occurrence of behaviors. To solve this difficulty it was decided to count each 'run' of behavior as one instance. The problem then became one of determining when one behavior ceased and another commenced. As the behaviors tended to occur in short bursts it was decided that an interval of 5 seconds or longer between bursts of the same behavior constituted a new occurrence of that behavior. Therefore a behavior which stopped and started again within 5 seconds was deemed to be the one occurrence of that same behavior. Staff were taught to time the 5 second intervals by using the system of counting - one thousand and one, one thousand and two, etc. It was impossible to use a stop-watch or clock for these intervals as the observer had to watch the subject constantly and sometimes had to time intervals for more than one behavior.

A standard set of exclusion cues was developed which enabled observers to distinguish when the subject was away from the table

with permission in the meal settings. Behaviors were not recorded while the subject was away from the table with permission because:

(1) He was under close supervision (shadowing) of a staff person. This was necessary to prevent food stealing and finger stuffing of his own food in his mouth before being seated;

(2) They were very brief periods of time, for example, taking a plate to the counter and returning to the table;

(3) The data collection already consisted of seven categories of behavior and two contexts. The addition of a further context would have unnecessarily complicated matters;

(4) The nature of the tasks, and level of supervision, while away from the table virtually ensured response prevention, for example, the subject could not finger flick while holding a plate in both hands.

Training of observers for recording and interobserver agreement purposes.

The staff in the residential unit work a 38 hour week on 12 hour shifts with 3 meal breaks per shift each consisting of 3 times (for example, early, mid and late lunch). This means a large number of people would necessarily be involved in the program and as staff are not rostered consistently to one unit in the facility a method had to be developed to ensure consistency of procedures. Theoretically it was also desirable to have a large number of people involved to facilitate generalization. A system of training observers was therefore embarked upon.

The experimenter and the Principal Program Officer had worked together on behavioral projects previously and were practised at recording behaviors from definitions. The behaviors displayed by the subject were gross and extremely aberrant and once defined and categorized it was not difficult to recognize occurrence. During the three day observation period prior to baseline the experimenter and the Principal Program Officer established consistently reliable interobserver agreement of at least 95%.

The initial baseline observations were carried out by the experimenter and the Principal Program Officer. After studying the behavioral definitions new observers were introduced to recording by being trained. This was done by recording with either the experimenter or the Principal Program Officer and only when the new observer could demonstrate at least 90% agreement simultaneously and independently with their trainer were they allowed to record as independent observers. Potential observers who were not able to achieve this level of agreement were excluded from the program. The experimenter and the Principal Program Officer also carried out agreement checks with each other throughout the program to ensure their continued reliability.

Social validation.

The social significance of the target behaviors were such that it was extremely difficult for the subject's family to include him in social outings particularly those involving meals. As a result of his tantrums and biting the subject had been refused transport on the special school bus system, and was to be refused access to special school once he attained the age of 15 years. In Australia the government school system is compelled to

educate all children until they are 15 years old (i.e., he could not be expelled until age 15). It is common practice for intellectually disabled children to attend special school until they are 18 to 20 years of age in this country.

This information established that the target behaviors were of serious social significance for the subject and if allowed to continue would be detrimental to his future development and quality of life.

The major intervention procedure (facial screening) had previously been demonstrated to be acceptable to institutional staff (Mudford, 1987) and parental and State permission was obtained.

The social importance of any resulting behavior changes due to the intervention would be assessed by whether the subject was acceptable to return to school and the duration of that return.

Procedures.

Baseline - meal settings

The standard set of cues developed for use in the meal settings was employed during baseline.

The subject was required to wait in line with other residents and when being handed his meal the cue-giver would say loudly: "Say thank-you Mark" whereupon he was required to sign 'thank-you' to the diet-maid before being allowed to receive the plate.

Upon receiving the plate the cue-giver would say (with emphasis on the words underlined): "Take your plate to the table Mark" and gesture in the direction of the table, then walk beside the subject with the palm of one hand in the middle of his back to provide guidance. At the table the cue-giver would say "Put your

plate on the table Mark" and gesture to the place on the table to sit the plate. Then the cue-giver would say "Sit down Mark" while gesturing to the chair. This cue functioned as a signal to the observer/s to commence recording behaviors. If Mark failed to be seated when directed this was then rated as leaving the table without permission, and subsequent behaviors rated accordingly.

No further cues were given until the course was finished. The next instruction was: "Take your plate up Mark" (with simultaneous gesture to the counter). The cue-giver again shadowed Mark to the counter, supervised/assisted plate scraping, then guided Mark back to the table and said "Sit down Mark," while gesturing to the chair. This cue again functioned as a signal to the observers to commence rating behaviors.

When the diet-maid signalled to the cue-giver that the second course was ready to be served the cue-giver said to Mark: "Go get your (second course, if breakfast)/(desert, if lunch)/(second course, if the evening meal), again gesturing to the counter. The cue-giver again shadowed Mark until he received his second course and then the same procedure including gestural and verbal cues were repeated as for the first course.

When the second course was finished the cue-giver used the same instructions beginning with "Take your plate up Mark" and the same procedure was repeated until Mark was seated again.

During baseline these were the only instructions given by the cue-giver, and, when not giving cues or shadowing Mark when he was up from the table with permission, the cue-giver withdrew to carry out other duties, usually feeding another resident.

Meals occurred at the same time of day each day. Breakfast began at 8:45a.m. and finished at approximately 9:05a.m. Lunch

began at 12:50p.m. and finished at 1:10p.m. approximately and the evening meal commenced at 4:50p.m. and finished at 5:10p.m.

Baseline - structured activities

When the materials were set out on the table Mark was instructed "Sit down Mark" by the cue-giver/trainer with simultaneous gesture to the appropriate chair. This cue served to signal the observers to begin recording. Failure to obey this instruction was recorded as leaving the table without permission and subsequent behaviors recorded accordingly. The cue-giver/trainer then proceeded to work on tasks with Mark. The cue-giver/trainer provided appropriate verbal cues, gestures, and physical guidance or assistance to enable task completion or approximation. The cue-giver/trainer stood beside and slightly in front of Mark (around the corner of the table) during baseline and was careful not to restrain him so that he was free to leave the table if he desired in order to parallel the situation in the meal setting.

The activity session was carried out between 10:40a.m. and 11:00a.m. each day.

Baseline - free-time (television viewing)

Mark was escorted to the day room by a cue-giver and instructed "Sit down Mark" with simultaneous gesture to an appropriate chair. Once seated he was instructed "Watch television Mark." The cue "Sit down Mark" again served to signal the observers to commence recording. Other than the occasional reminder to watch the television no further cues were given during television watching in the baseline phase.

This session began at 3:30p.m. and continued until 3:50p.m. Television programs considered likely to interest Mark began at 3:30p.m.

In all settings during baseline when Mark was away from the table or chair (during television viewing) without permission, aberrant behaviors were recorded. He was physically guided to return to the table or chair by the cue-giver as soon as expedient.

Intervention.

The intervention procedure was the same in each setting. The team leader in charge of the use of the facial screen became the cue-giver. The intervention required one cue-giver (team leader), and two persons to provide brief physical restraint as the facial screen was applied. These instructions were learned and carried out by all persons involved in the intervention:

"WHEN Mark
- goes to get up without permission/fails to be seated (by moving past the corner of the table in the dining room) when instructed
- OR -
- moves repetitively (more than 3 movements) his hands, feet, legs
- OR -
- makes loud vocalisations

WHAT TO DO:

Team leader gives VERBAL CUE:

"Sit down Mark" (for getting up/failing to be seated)

"Sit still Mark" (for movements)

OR

"Be quiet Mark" (for noises)

IF MARK OBEYS AND BEHAVIOR CEASES IMMEDIATELY DO NOTHING ELSE BUT GO TO*

IF HE DISOBEYS and behavior continues OR he immediately starts another behavior THEN SIMULTANEOUSLY

Team leader applies facial screen

Second and third team members apply physical restraint

Team leader again gives verbal instruction VERY FIRMLY

"Sit down Mark" OR "Be still Mark" OR "Be quiet Mark" OR "Still and quiet Mark" as appropriate to the behavior.

WHEN MARK BECOMES COMPLIANT i.e., STILL/QUIET/SEATED Team leader COUNT 20 SECONDS then take screen away and signal to remove physical restraint. The team leader says "Be good Mark" and gives the appropriate instruction to return to task.**

*THEN Team leader WAIT 5-10 seconds and SAY with SMILE "That's good Mark. You are quiet/still (as appropriate). That's very good Mark" and GIVE cooked chicken while talking. If Mark not on task give appropriate instruction to return to task.
THEN Team leader WAIT another 30 seconds and repeat social praise if still behaving appropriately and still on task. GIVE cooked chicken while talking.

**BE READY to act in case the same target behavior starts again. IF SO repeat procedure WITH NO WARNING. Also if any target

behavior occurs while Mark is under the screen give verbal instruction and 20 second count begins from that occurrence.

FOLLOW ORDER OF PROCEDURE EXACTLY"

During intervention the cue-giver stood to the side but in front of the subject so behaviors could easily be observed and the facial screen applied. The second and third members of the team stood behind Mark's chair ready to apply physical restraint as soon as the team leader moved with the facial screen. Once intervention commenced in each setting it functioned to prevent the subject getting up and running away from the table or chair.

The standard set of cues developed for use in the meal settings was employed during the intervention in exactly the same way that it was during baseline. The same cues used during baseline in the structured activities and free-time (television viewing) settings were also used during intervention in these settings.

Recording, scoring and interobserver agreement.

Recording

During baseline and intervention, recording was carried out in the same manner. An observer sat at one end of a staff dining room table which was centrally situated in the dining room and from where a clear view of the subject could be obtained. The observer was in sufficient proximity to the cue-giver to be able to hear the verbal cues.

The observer completed the details on the form prior to the commencement of recording. During recording the observer noted the occurrence of target behaviors by placing a tick or stroke in the appropriate column on the form. During intervention the

observer also noted how many times the facial screen was applied. Recording was carried out for the duration of each session. Totals for each column were tallied at the end of each session.

Scoring

The column totals were summed giving a total of target behaviors per session. This total per session was then summed and averaged for each setting over a five day week (Monday to Friday) to give an average total aberrant response score per week for each setting.

As the behaviors of leaving the table without permission and consequently the behaviors occurring away from the table were largely suppressed by the nature of the intervention, behaviors occurring at the table were also summed separately (out of the total behaviors) by summing only those column totals for behaviors at the table. These were then summed and averaged for each setting over a five day week Monday to Friday) to give an average aberrant response score per week for each setting for behaviors occurring at the table.

The average frequency of use per week per setting of the aversive stimuli (facial screen) was obtained in the same manner.

Interobserver agreement

The second observer sat at the opposite end of the table when recording for interobserver agreement purposes. The second observer followed the same procedures as the first observer.

Interobserver agreement for each category of behavior in a session was established by comparing the scores of the first observer with the scores of the second observer using the event recording method to establish the percentage agreement. Agreement

was calculated over a whole session but within each category of behavior.

Interobserver agreement was assessed during each condition (i.e., baseline and intervention) in each setting in each of phases I and III and constituted 57% of all observation sessions recorded. The range of agreement was from 75-100% with an overall mean across settings of 97.8%. The percentage agreement for all such observations for each setting are set out in Tables 1-5 in Appendix 'D' hereto.

Follow up.

Data was collected under baseline conditions in each setting over one day, seven days after the termination of trial 2.

Results

Figure 3 shows that the introduction and continuation of the intervention procedure successfully reduced the frequency of average total aberrant responses per week in each setting in phases I and III when compared to the baselines. Figure 3 also shows that intervention in the first setting in each of phases I and III resulted in considerable generalization to the remaining settings.

A recovery of rate of average total aberrant responses in the phase III baselines (although not to the extent of baselines in phase I) following the reversal of phase II is also shown in Figure 3.

Figure 4 shows that the pattern of rate of responses is strikingly similar when only considering the behaviors that occur at the table or chair once those responses which are suppressed

Figure 3. Frequency of average total aberrant responses per week in each setting across all conditions and phases. Follow up occurred seven days after the termination of trial 2. Data were not collected for the first two weeks of baseline in phase III in the structured activities and free-time (T.V.) settings due to lack of availability of trained observers.

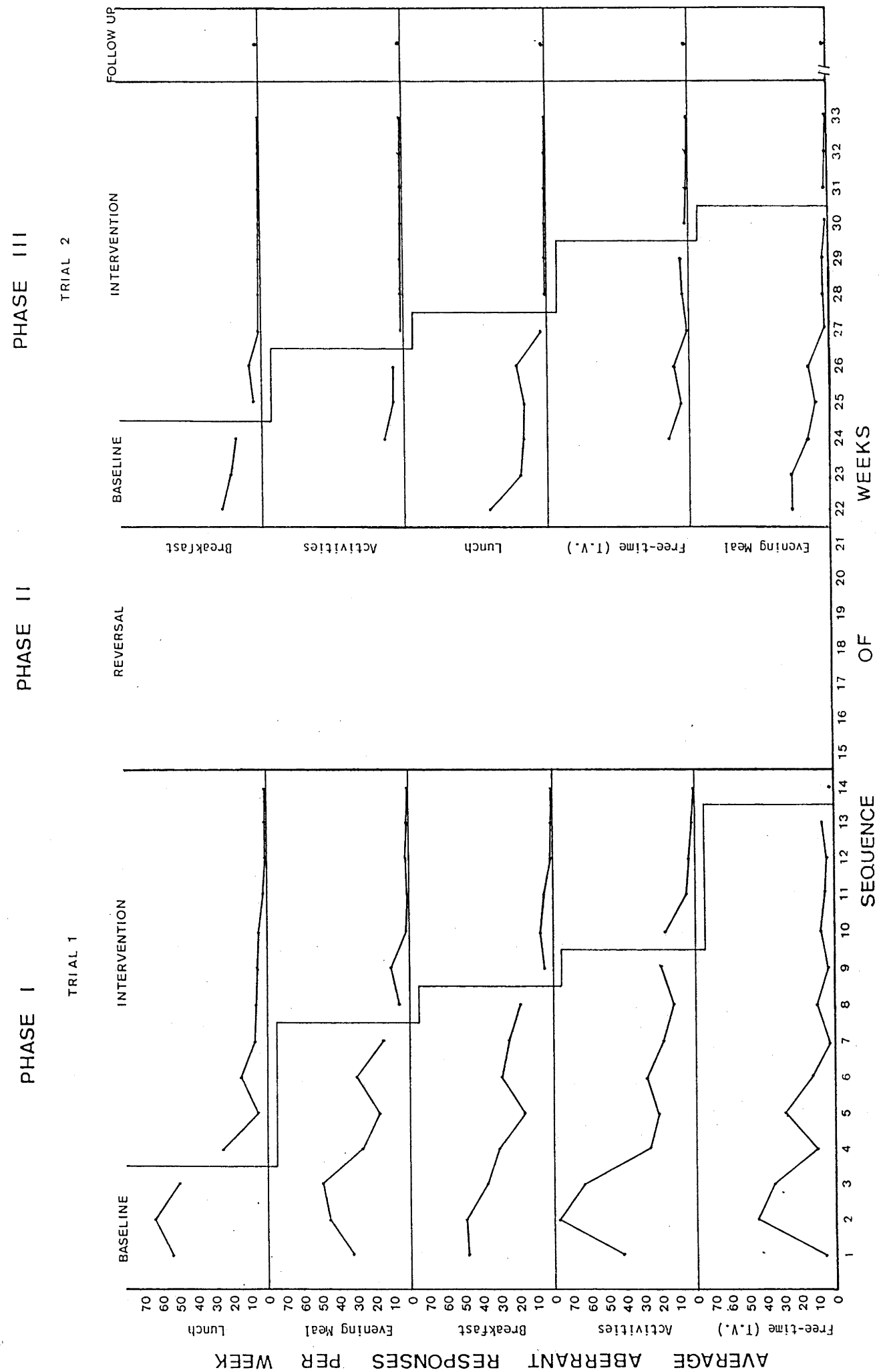
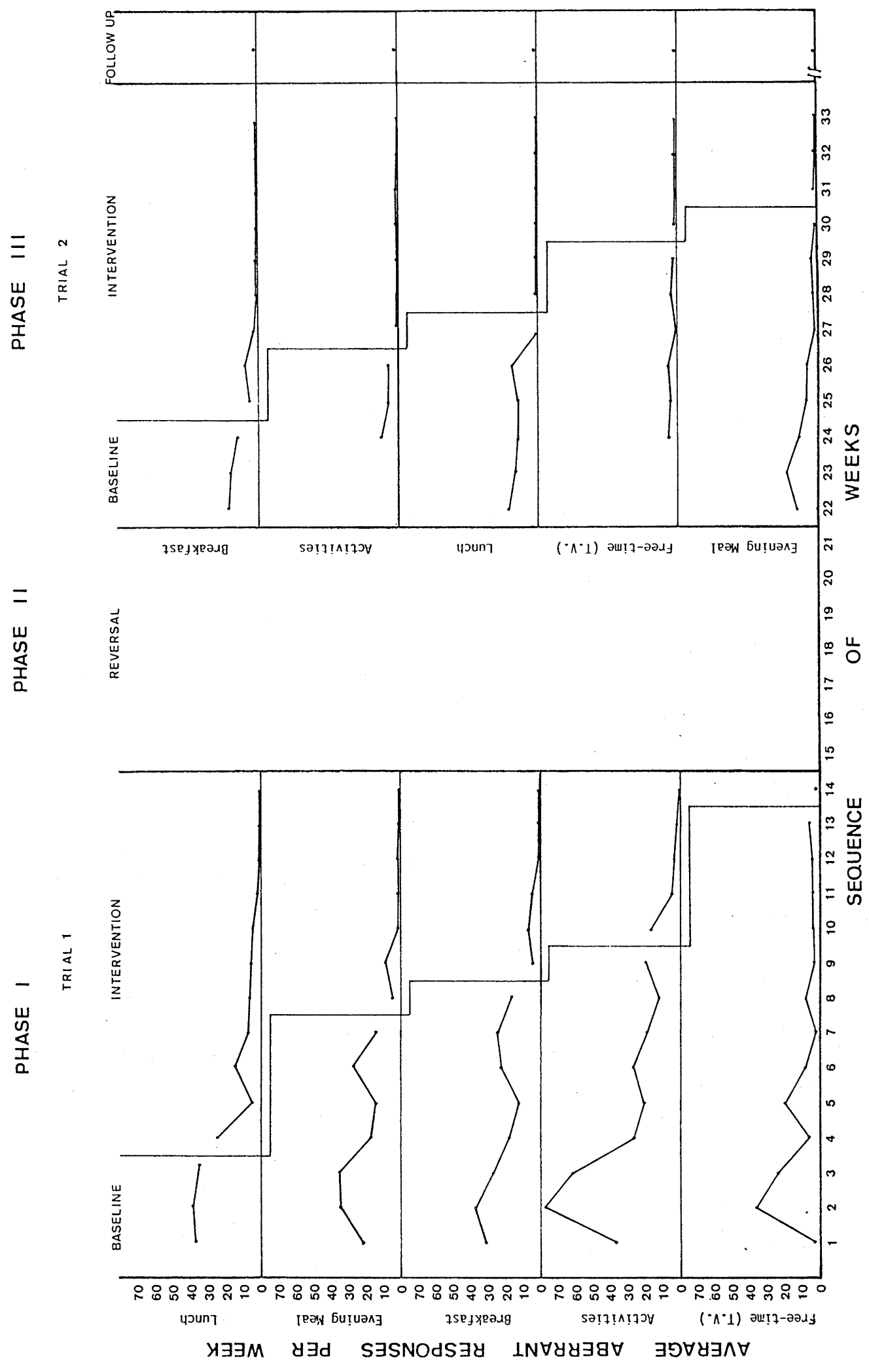

PHASE I
PHASE II
PHASE III
TRIAL 1
TRIAL 2
BASELINE
INTERVENTION
REVERSAL
FOLLOW UP
AVERAGE ABERRANT RESPONSES PER WEEK
Free-time (T.V.)
Activities
Breakfast
Evening Meal
Lunch
0 10 20 30 40 50 60 70
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
SEQUENCE OF WEEKS

Figure 4. Frequency of average aberrant responses occurring at the table or chair per week in each setting across all conditions and phases. Follow up occurred seven days after the termination of trial 2. Data were not collected for the first two weeks of baseline in phase III in the structured activities and free-time (T.V.) settings due to lack of availability of trained observers.


PHASE I
PHASE II
PHASE III
TRIAL 1
TRIAL 2
BASELINE
INTERVENTION
REVERSAL
INTERVENTION
FOLLOW UP
AVERAGE ABERRANT RESPONSES PER WEEK
Free-time (T.V.)
Activities
Breakfast
Evening Meal
Lunch
0 10 20 30 40 50 60 70
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
SEQUENCE OF WEEKS

due to the nature of the intervention are eliminated from the data.

A follow-up carried out 7 days after trial 2 ended resulted in nil occurrences of target behaviors in all settings and this is shown on Figures 3 and 4.

Table 6 shows the percentage reduction in average aberrant responses per week as intervention occurred in each setting. Percentage reduction in aberrant responses for the week following intervention in each setting is given for total behaviors and behaviors at the table when compared with both the baseline average as well as the average aberrant response in that setting for the week prior to intervention in that setting. It should be noted that the interventions are cumulative (i.e., evening meal figures in phase I, trial 1 contain the accumulated effects of intervention in the lunch setting as well as the evening meal setting).

Examining Table 6 it can be seen that the first week of intervention (lunch meal setting) in phase I, trial 1 resulted in a 50% reduction of average total aberrant behaviors when compared with the average total aberrant behaviors the week prior to intervention and a 55% reduction when compared with the baseline average. In phase III, trial 2, intervention in the first setting (breakfast meal setting) resulted in a 67% reduction in average total aberrant behaviors when compared with the average total aberrant behaviors the week prior to intervention and a 74% reduction when compared with the baseline average.

Taking behaviors occurring at the table it can be seen that in phase I, trial 1, intervention in the lunch meal setting resulted in a 29% reduction in average aberrant behaviors

Table 6

Cumulative Effects of Intervention in Each Setting for the First Intervention in that Setting

PHASE I - TRIAL 1					PHASE III - TRIAL 2				
INTERVENTION IN SETTING	PERCENTAGE REDUCTION IN AVERAGE ABERRANT RESPONSES FOR WEEK FOLLOWING INTERVENTION				INTERVENTION IN SETTING	PERCENTAGE REDUCTION IN AVERAGE ABERRANT RESPONSES FOR WEEK FOLLOWING INTERVENTION			
	COMPARED WITH BASELINE AVERAGE		COMPARED WITH AVERAGE FOR WEEK PRECEDING INTERVENTION			COMPARED WITH BASELINE AVERAGE		COMPARED WITH AVERAGE FOR WEEK PRECEDING INTERVENTION	
	Total	At table	Total	At table		Total	At table	Total	At table
LUNCH	55	34	50	29	BREAKFAST	74	67	67	58
EVENING MEAL	81	75	60	54	ACTIVITIES	87	86	83	83
BREAKFAST	84	79	74	71	LUNCH	94	91	67	50
ACTIVITIES	50	50	15	15	FREE TIME (TV)	67	50	60	33
FREE TIME (TV)	86	90	71	80	EVENING MEAL	0	0	0	0

occurring at the table at lunchtime when compared with the average aberrant behaviors occurring at the table the week prior to intervention and a 34% reduction when compared with the baseline average. In phase III, trial 2, intervention in the breakfast meal setting resulted in a 58% reduction in average aberrant behaviors occurring at the table when compared with the average aberrant behaviors occurring at the table the week prior to intervention and a 67% reduction when compared with the baseline average.

Similar statements can be made in relation to each cell in Table 6 for example, the first week of intervention in the lunch meal setting, combined with the effects of intervention in the breakfast meal and activities settings, in phase III, trial 2, resulted in a further 67% reduction in average total aberrant response rate when compared to the average total aberrant response rate the week prior to intervention in the lunch meal setting and a further 94% reduction when compared with the baseline average for the lunch meal setting.

The data in Table 6 for the evening meal setting in phase III, trial 2, show a nil% reduction in response rate. In fact there was an increase in average aberrant behaviors (both total and at the table) but this is an artefact of the rate of response prior to intervention. Since it was already very low (an average of 1) any slight change in behavior (an average of 2) shows up as an increase when clinically it is of no significance.

From examination of Table 6 it can be seen that intervention in a setting resulted in a further considerable reduction in the average frequency of response for that session, both for total aberrant behaviors and aberrant behaviors at the table. The low

percentage of reduction for the activities setting (15% reduction following intervention the first week) was most likely an artefactual result of difficulties with technique of the intervention procedure when used in this setting which will be addressed elsewhere (see Chapter 6).

Table 7 shows the effect of intervention in each setting on the behavior in the other settings when compared with the week prior to the intervention. Again it should be noted that except for the first line in the Table (lunch in phase I, breakfast in phase III) the interventions are cumulative. For example, in phase I trial 1: Intervention in the lunch meal setting while resulting in a 50% reduction, and a 29% reduction, in average total aberrant behaviors and average aberrant behaviors at the table, respectively, in the lunch meal setting was accompanied by a 45% reduction, and a 42% reduction, in average total aberrant behaviors and average aberrant behaviors at the table, respectively, in the evening meal setting; 16% and 33% respectively in the breakfast setting; 57% and 56% respectively in the activities setting; and 71% and 75% respectively in the free-time (television viewing) setting. Adding another intervention (the evening meal setting) resulted in a 60% and 54% reduction in average total aberrant behaviors and average aberrant behaviors at the table, respectively, in the evening meal setting. This was accompanied by 24% and 32% reductions respectively in the breakfast setting and 32% reductions in both categories of behavior in the activities setting.

It can be seen that intervention in the lunch (trial 2) and evening meal (trial 1) settings was accompanied by a nil% reduction in both categories of behaviors in the free-time

Table 7

Cumulative Effects of Intervention in Each Setting on the Other Settings

PHASE I - TRIAL 1											PHASE III - TRIAL 2										
INTERVENTION IN SETTING	PERCENTAGE REDUCTION IN AVERAGE ABERRANT RESPONSES FOR WEEK FOLLOWING INTERVENTION										INTERVENTION IN SETTING	PERCENTAGE REDUCTION IN AVERAGE ABERRANT RESPONSES FOR WEEK FOLLOWING INTERVENTION									
	LUNCH		EV. MEAL		B'FAST		ACT'S		F.T.TV			B'FAST		ACT'S		LUNCH		F.T.TV		EV. MEAL	
	Tot.	Tab.	Tot.	Tab.	Tot.	Tab.	Tot.	Tab.	Tot.	Tab.		Tot.	Tab.	Tot.	Tab.	Tot.	Tab.	Tot.	Tab.	Tot.	Tab.
LUNCH	50	29	45	42	16	33	57	56	71	75	BREAKFAST	67	58	45	40	0	0	58	20	33	36
EVENING MEAL			60	54	24	32	32	32	0	0	ACTIVITIES			83	83	83	87	89	80	83	71
BREAKFAST					74	71	15	15	60	62	LUNCH					67	50	0	0	75	75
ACTIVITIES							15	15	0	0	FREE TIME (TV)							60	33	75	75
FREE TIME (TV)									71	80	EVENING MEAL									0	0

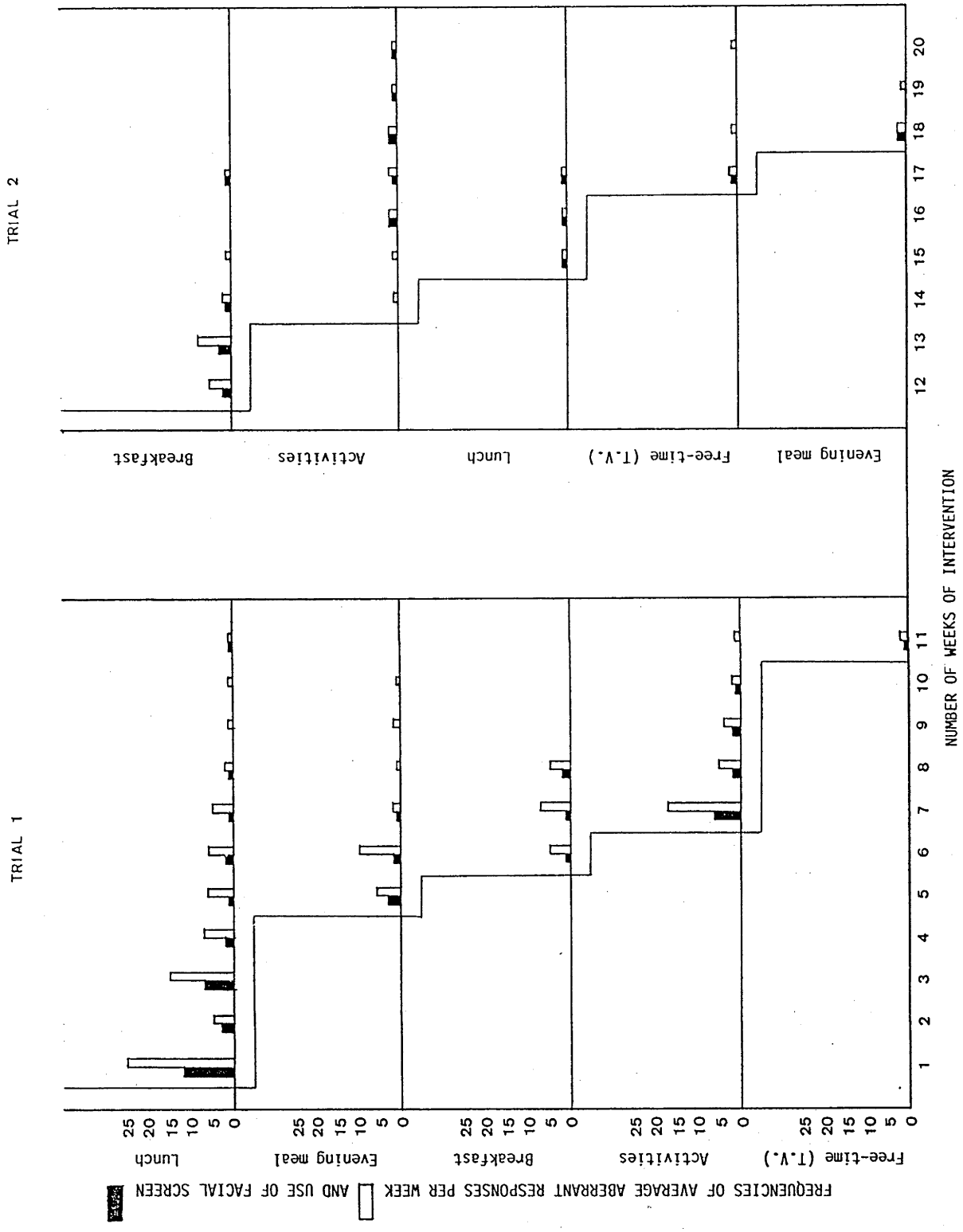
Note. Tot. = Average total aberrant responses.
Tab. = Average aberrant responses at the table.

(television viewing). There was an increase in average aberrant behaviors in both categories but it can be seen that intervention in the third setting, breakfast, in trial 1, is accompanied by a substantial decrease in the average aberrant behaviors occurring in both categories in the free-time (television viewing) setting. Intervention in the free-time (television viewing) setting in trial 2 then substantially decreased the behaviors in that setting.

Similar statements can be made about each cell in Table 7. Increases in behavior in any cell can be seen to be transitory and well below baseline by referring to Figures 3 and 4.

Figure 5 shows the frequency of use of the aversive stimuli (facial screen) in relation to the frequency of average total aberrant behaviors in trials 1 and 2. It should be noted that this cannot be interpreted as a direct ratio because one facial screening can account for one or more behaviors given that if a target behavior occurred while the screen was in place the screen remained in place and timing started anew from the occurrence of the most recent target behavior. This was counted as one application of the facial screen but each behavior was recorded individually as they may have been in separate categories. This is especially true for the earlier part of the intervention in trial 1. However Figure 5 illustrates that aberrant behavior occurred on many occasions (right hand column of bar) and the aversive stimuli was not applied (left hand column of bar) demonstrating that the subject was able to comply with verbal instructions.

Figure 5. Frequency of use of the aversive stimuli (facial screen) in relation to the frequency of average total aberrant behaviors for each week of intervention in trials 1 and 2.


TRIAL 1
TRIAL 2
FREQUENCIES OF AVERAGE ABERRANT RESPONSES PER WEEK
AND USE OF FACIAL SCREEN
Free-time (T.V.)
Activities
Breakfast
Evening meal
Lunch
0
5
10
15
20
25
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
NUMBER OF WEEKS OF INTERVENTION

Summary of results

The intervention procedure successfully reduced targetted aberrant behaviors in all settings and widespread generalization occurred.

Discussion

The results indicate that the study's goals have been achieved. Following stabilization of medication an extended bite free period was maintained. There were no incidents of successful biting during the period of the study but there were a few episodes of teeth snapping quasi bites which were scored under the category of noise and consequated accordingly.

The wide variety of tantrum behaviors displayed by the subject were successfully reduced by the intervention procedure in all settings in both programming phases of the study. Removal of the intervention procedure during the reversal phase resulted in restitution of the behaviors although not at the frequency seen prior to intervention. This failure to return to previous baseline may be due to three reasons: Firstly, some permanent learning may have taken place; secondly, return to the institutional environment may have served as a discriminative stimulus for lowered rates of behavior; or, thirdly, the level of structure in the environment may have produced the effect. All these reasons are entirely feasible but further exploration of the third reason is particularly warranted given Blackman and Lin's (1984) findings related to the efficacy of explicit instructions.

Because of the chaotic nature of mealtimes in a dining room where 17 behaviorally disordered dual-diagnosed individuals took their meals it was necessary to introduce some structure in order

to be able to take a baseline under consistent conditions. Since one of the major complaints about the subject at meal times was that he frequently left the table and ran around the dining room disrupting other residents and stealing food, but was required at times to leave the table, for example, to return plates to the counter, it was necessary for recording purposes to introduce some procedures so that observers would know when his absence from the table was legitimate. During the first of the 3 days of observation and experimentation in data collection the author and the Principal Program Officer were not able to distinguish legitimate absences from the table during the normal procedures employed by the staff and therefore the cue procedure was instituted.

Unfortunately the introduction of the cue procedure prior to baseline (and which was present for the duration of the program) may have sufficiently structured the situation, that is task analysed the mealtime situation (or, alternately, organized the available stimuli) sufficiently to allow the subject to integrate the available stimuli to enable a greater degree of appropriate responding. This is particularly likely in view of the difficulties with processing and integrating information experienced by persons with temporal lobe dysfunctions reported from the the EEG and neuropsychological fields of study. It may also indicate that at least some of the behavior problems observed in these persons are due to difficulties in dealing with the level of stimuli available in the environment.

This cue procedure during baseline may also be responsible for the descending baselines in 3 of the 5 settings in the first phase of the program. However, it is unlikely that continuing

with the cue procedure alone would have resulted in eliminating the wide variety of inappropriate behaviors given that even with the introduction of the intervention procedure it took 8 weeks as well as intervention in 4 of the 5 settings in the first phase of the program to achieve and maintain consistently low rates of the problem behaviors. In addition the first intervention setting's baseline could be considered relatively stable (taking reactivity effects into consideration) while the second setting, evening meal, at the time of the first intervention, was ascending. That the introduction of the intervention procedure was warranted is indicated by the size of the reduction in problem behaviors following intervention, viz, by half, and the subsequent generalized reduction in the other settings. Further, the reintroduction of the intervention procedure in trial 2, results in rapid reduction and elimination of the problem behaviors with generalization occurring most markedly after the intervention is introduced in two settings.

Increasing the demand level on the subject

During the whole program the level of demand placed on the subject for performance of other behaviors (that is adaptive behaviors other than the cessation of the target behaviors) in all settings except free-time (television viewing) was steadily increased although not formally documented as part of this program. Although such documentation would have been desirable it was not possible due to the increased demand it would have placed on staff members and time.

In the meal settings there was initially no requirement on the subject in relation to eating behavior at the table. The subject had a number of undesirable meal time behaviors, for

example, rapid stuffing of food in his mouth with his fingers, stealing other resident's food, refusing to eat vegetables, and guzzling drinks. However as the target behaviors reduced during the intervention phases in each meal setting the cue-giver introduced an informal (not recorded) program for eating behaviors. This consisted of a physical prompt to use a spoon/fork by pointing to the cutlery as soon as the subject was seated. Rate of food consumption was controlled by a verbal prompt "Eat slowly" and the cue giver contingently placing his/her hand over the subject's hand thereby preventing food being lifted to the mouth. Again the physical act of prevention did not occur unless the subject failed to respond to the verbal cue. Food stealing was prevented by a loud "No Mark" as soon as movement was made to steal and in the event of a successful theft the food was physically removed. Compliance in eating vegetables was obtained by withholding dessert until the vegetables were eaten. Guzzling of drink was controlled by removal of the cup for non-compliance with the request to "Drink slowly." Social praise was given liberally for compliance. As well when Mark ate and/or drank appropriately without verbal prompting liberal praise was given via comments such as "You are a good boy for eating nicely Mark," and "That's right you are eating/drinking nicely today".

On one occasion non-compliance with requests to eat slowly and struggling to remove his hand to continue stuffing food resulted in the food being removed by the cue-giver. This precipitated the occurrence of tantrum behaviors which were consequated in the manner required by the program. Despite the increasing standard of meal time behavior required at the table

overall the tantrum behaviors gradually reduced and were eliminated in all meal settings.

The difficulty level of the task was also increased during the structured activities. Since the subject's educational report indicated that he had difficulty with one to one relationships and was non-compliant with verbal instruction, the activity sessions commenced with the task of tower building using the large blocks shown on the left in the photograph in Figure 2. Again the tactic of using very simple, structured verbal cues was used in conjunction with physical guidance to teach a task. For example, to obtain completion of a tower using the large blocks the following verbal cues were used: "Pick up a block Mark"; "Push" (meaning the pressing action required to fit the blocks together), and "Fix it" (meaning balancing the block properly square over the one beneath it). Non-response to verbal stimuli resulted in physical guidance, that is the cue-giver trainer taking Mark's hands and guiding task completion while repeating the verbal instructions. Social praise was given liberally for compliance with verbal instructions and for successful completion of each step. As Mark learned to complete each task on verbal cues only a new task was introduced. A varying number of residual verbal cues were required depending on the difficulty level of the task. As can be seen from Figure 2 a large range of activities were worked through including Mark learning to sort 5 colours. The tasks were presented in a developmental sequence, the final task being a prevocational task requiring the screwing and unscrewing of plastic bolts into a board. Despite the changing difficulty level of the tasks and the level of demand therefore placed on the

subject the tantrum behaviors were reduced and eliminated in the structured activity session.

As no task other than sitting was required in the free-time (television viewing) setting there was no increase in performance required in this setting. It would seem reasonable to assume that requiring appropriate eating behavior at meal times and increasing the complexity of tasks in the structured activity session was increasing the level of demand on the client and therefore likely to result in frustration for the client, thereby increasing the likelihood of the occurrence of tantrums and/or biting. It was important to do this within the context of reducing such tantrum behaviors as when the client returned to school the demand level was likely to be much higher for more extended periods of time than the daily demand level in the institution. The experimenter needed to be sure that the intervention procedures were robust under increasing demand levels and that reduction or elimination of the tantrum behaviors was stable. Although no formal data were kept on performance levels on these tasks reduction or elimination of the target behaviors occurred over a lengthy period of time.

Social validity

Some mention must be made of the social validity of the long term outcome of this research. The subject was admitted to the facility in January of the year in which the program commenced. Drug trials, stabilization of medication regime, and the allowance of a sufficient period of time to pass to establish that biting was not going to spontaneously recur in the institutional environment took until September. Baseline in Phase I commenced early in September and Phase II began in mid-December when the subject returned home for the Christmas holidays. Due to staff

shortages recommencement of the program, Phase III, was delayed until early the following year. Phase III ran for 12 weeks and the program was terminated for 2 reasons. One was that the behaviors had been eliminated in all settings for the second time, and the second reason was that the experimenter was due to depart for a prolonged period overseas. Unfortunately, the delayed commencement of Phase III meant that a period of only 7 days was able to elapse before collecting follow-up data. After the collection of follow-up data the subject returned to his family home some 100 kilometres from the facility for 2 nights a week. He spent Sundays at home and attended the special school for handicapped children during the day on Mondays and Tuesdays, returning to the facility on Tuesday evening after school. This continued from June until December when he returned home full time on a permanent basis with respite care being offered by the institution if needed. Two years after his initial admission he now resides again in his family home. His behavior is now acceptable to a day activity centre and a respite care house in the community which previously would not accept him for respite care because of his biting and tantrums. His attendance at school has been increased successfully to 5 days a week.

Although it has not been possible to collect data in the school or home setting his behavior is reported to be very much improved overall and he is also said to be much more responsive to verbal instruction or direction than previously. There have been no episodes of biting or tantrums over a 6 month period and his continued attendance at a school which had threatened expulsion must attest to the lasting improvement in his behavior.

Role of medication and testing the tolerance level for stress

That such prolonged improvements in behavior are due to the effects of the behavioral intervention rather than accumulated effects of a long period of medication (1200mg. of carbamazepine daily) is evidenced by the persistent occurrence of the tantrum behavior over a long period of time on a stable dosage of medication prior to the commencement of the program. Undoubtedly, however, the medication played an important role behaviorally (as well as its essential medical role) in that it appeared to reduce the severity of the tantrums and eliminated biting attacks within the normal institutional environment. In addition the cessation of biting meant that more staff were willing to work in close proximity to Mark. It is difficult to convey in a study such as this the terrifying effect of Mark's behavior during a tantrum but if one can imagine a large person 6 feet tall bouncing vertically up to three feet off the floor with teeth gnashing some approximation may be conjectured. Suffice it to say that some very experienced staff were quite afraid of him.

However one always had to be conscious of the risk of recurrences of biting as no guarantee could be given that this would not occur under the additional stress of behavioral programming. Intensive programming of this nature must be stressful to a certain extent even when purposefully designed to be as minimally stressful as possible as in this case. Since increased stress is known to precipitate seizures as discussed in Chapter 3 it was theoretically feasible that biting may well have recommenced particularly when the demand level of the tasks in the meal settings and structured activities was increased. As the overall goal of the intervention was to obtain sufficient

generalization of intervention effects to allow the client to resume a normal life style, that is, living at home and attending school, it was important to test the tolerance level for stress within the medication range and the varying demand levels of the tasks, while maintaining the intervention and reduced or eliminated rates of tantrum behavior. That it was possible to do this with confidence is directly attributable to the cooperation and interest of the neurologist supervising and monitoring the anti-convulsant medication. The overall success of the program also provides evidence of the potential fruitfulness of collaboration between the fields of applied behavior analysis and neurology.

Generalization

In addressing the widespread generalization evident in this study it is necessary to bear in mind that the issue of generalization has been one of the most vexatious in the field of applied behavior analysis. Failure to demonstrate the occurrence of generalization, and in some cases to even acknowledge that it is an issue which should be addressed, has resulted in skepticism about the value of applied behavior analysis techniques outside institutions, and has contributed to the field becoming a prey of the normalization movement, at least in this country. This is rather a paradoxical situation as applied behavior analysis has the potential to contribute a great deal to the normalization movement particularly in view of its emphasis on behavior change of social significance.

The literature published to date, and briefly reviewed in the introductory chapters hereto, does not give one reason to be optimistic in relation to obtaining generalized behavior change

when working within a punishment paradigm with a severely to profoundly intellectually disabled subject with neurological complications. That widespread generalization did occur may be due to the careful analysis of information about the pathological condition of the subject on three levels, viz: affective components; electroencephalographic evidence related to arousal and processing of stimuli at the neural level; and neuropsychological evidence regarding processing and integration of external stimuli; combined with the application of that information to programming principles found to enhance generalization. The system adopted in carrying this out may best be illustrated by the use of a diagram (Figure 6) to show how the potentially conflicting elements were combined.

The specific settings were chosen for beneficial maximum impact of reduced tantrum behaviors whether generalization occurred or not. The meal settings were chosen for the very practical reason that this was a particularly distressing time for the subject's family in that meal time, which should be an occasion for "family togetherness" had become a battleground. Also the subject's behavior around food meant it was impossible for the family to eat out or attend family barbeques. This had considerable social consequences for his two siblings. For example, they were not able to have birthday parties unless respite care was available for Mark and he was not able to share in these important family events. Significant improvement in meal time behavior would not only increase quality of life for the subject and his family at home but also contribute to improved social opportunities for the other children in the family. As well, meals are settings that are common to all environments

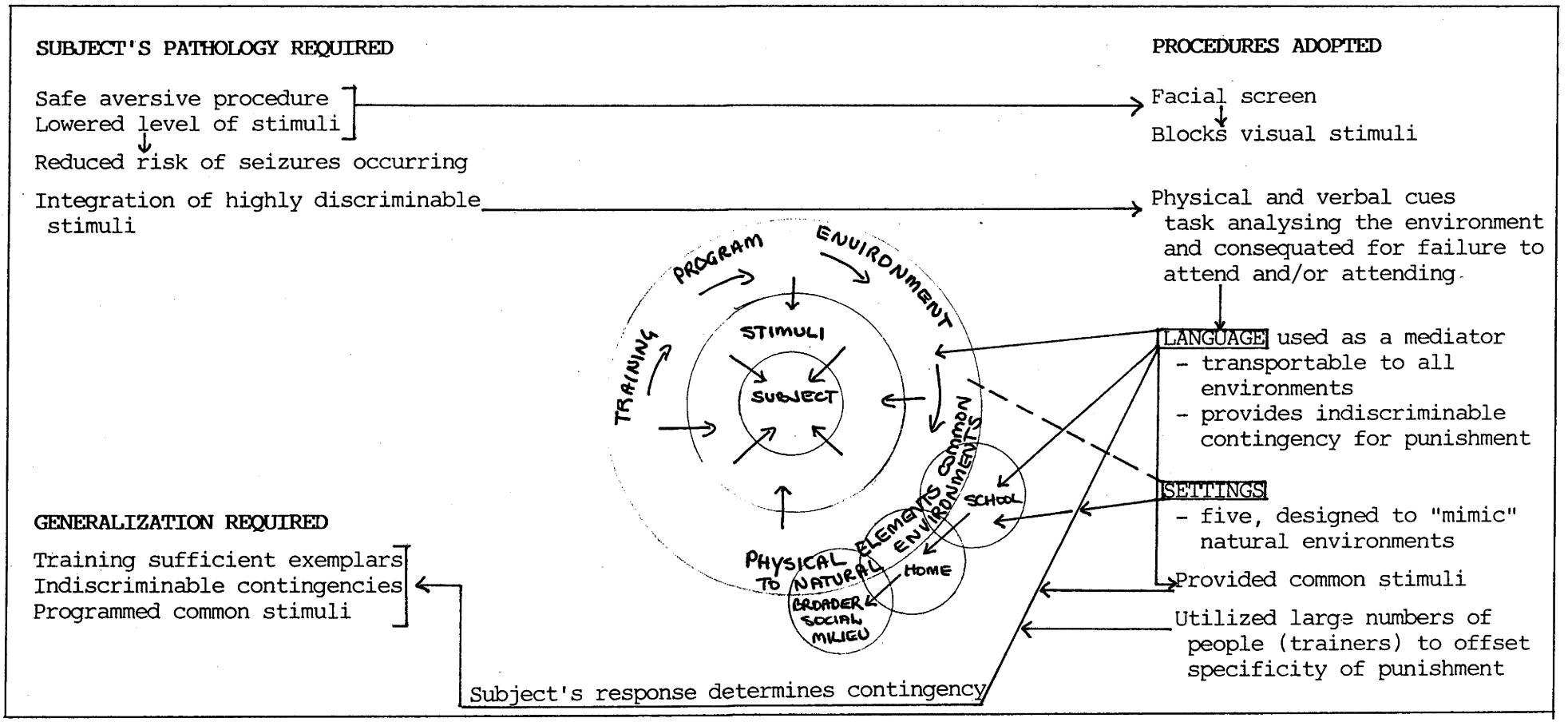


Figure 6. Integration of potentially conflicting theoretical aspects of the intervention program.

therefore if generalization occurred it would have a maximal effect on this young man's social future and would maximize any natural contingencies that may be available across a maximum number of environments. Meals also have many naturally occurring common stimuli, for example: the physical elements such as tables, chairs, plates, cutlery; sensory elements such as stimulation of the olfactory and gustatory senses by aroma and taste of food; motor behavior preparation to be performed by the subject such as sitting on a chair and pulling it into the table; and the presence of other people. All of these could serve as discriminatory stimuli for appropriate social behavior across environments.

In addition it is not difficult to establish and teach a routine at meal times and it was thought that if generalization did not occur, the family and school staff could learn the cue procedure used in the meal setting. A further consideration was that the experimenter was interested in comparing the extent of generalization effects across environments with a higher degree of similarity (the 3 meal settings) with effects across environments closer together in time but with lesser degrees of similarity (the meal settings compared with the other two settings). However the widespread generalization which occurred rendered these comparisons meaningless.

The structured activity session was developed because it was the only way a school setting could be simulated in an adult institution devoid of educational services. The experimenter was also conscious of the amount of school time the subject was missing and wished to provide some compensation. In addition the experimenter was intrigued to learn that after 7 years of special

education the subject was reported to not understand a one to one relationship. This level of skill did not accord with the experimenter's observations of the skills displayed by the subject particularly when stealing food. Further, the experimenter was interested to see if eliminating problem behaviors and task analysing tasks to be taught would improve the educational achievement level of this severely to profoundly intellectually disabled young man. The tasks chosen were similar to the type of tasks used in special education settings and verbal instructions were purposefully used prior to physical guidance because most teaching in classrooms is verbally based. A setting to mimic the school environment was very important because of his threatened expulsion from the educational system, and being the most difficult to simulate in the treatment environment would also be the most difficult from which to effect generalization to the natural environment. Accordingly a great deal of attention was paid to simulating the internal physical surroundings of a classroom. For instance, art work from other patients' activity sessions which resembled that found in special education schools was hung on the wall and tables and chairs were arranged as they may be found in classrooms.

The free-time (television viewing) setting served two important functions. This setting, where minimal demand levels operated, was initally to be used to monitor any increases in aberrant behaviors occurring as a side effect of intervention in other settings and for this reason was ordered last in the first treatment phase. When it became obvious that there was no increase in aberrant behaviors as a result of the intervention being put into effect it was decided to use the free-time

(television viewing) as an intervention setting also. The context of this setting was chosen because television viewing is an activity which is carried out by most families and if Mark could be taught to behave appropriately while watching television this would create a situation where positive natural contingencies may also operate.

The language used in all the verbal cues and instructions was deliberately simplified and accompanied by gesture in order to facilitate processing by the subject in recognition of likely auditory information processing problems. The cues were repetitive and the same words and phrases were used by all staff for the same required actions. In addition key words were given emphasis vocally. The repetitive use of key words was aimed at minimising confusion for the subject. The cues were also deliberately constructed to task analyse what was required, especially in the structured activities session, to offset possible problems with sequencing and integrating stimuli which may have been experienced by the subject. It may have been that the use of such structured procedures with language facilitated the subject's responding to verbal instructions and combined with the use of an aversive stimulus for failure to respond could have contributed to the subject's ability to cease aberrant behaviors on command thereby rendering the use of the facial screen unnecessary on many occasions. In the event that generalization was not forthcoming a list of the verbal cues could have been supplied to persons working with Mark in his natural environments of home and school. When he returned home and to school his caregivers were advised to use verbal cues and gestures based on

the same principles as had been used in the program when wanting Mark to do something.

Possible additional effect of visual screening

The use of a facial screen also served a number of important purposes. Besides providing an effective safe aversive stimulus within a punishment paradigm it also served to reduce stimuli (by eliminating all visual stimuli in the environment) when the subject was highly aroused and therefore more susceptible to seizures occurring. This may not only have had a punishing effect on the subject but also may have served to decrease his seizure rate since overstimulation may increase seizure rate. Although the experimenter had no way of being able to monitor seizure rate it is noteworthy that a later EEG reveals a more settled reading (see Appendix E hereto). This may of course be due to several factors including reduced stress on the client as a result of improved behavior and long term effects of medication, but is interesting nonetheless.

Side effects of punishment

In relation to side effects of using a punishment procedure, surprisingly, there appeared to be none. Rates of aberrant behavior did not rise in the monitoring session (free-time television viewing) and there were no reports of increases in aberrant behavior at any other time outside of the experimental sessions. Indeed the nursing note records indicated that his behavior overall was considerably more settled. Also there was no development of other problem behaviors (i.e., substitution) as is occasionally reported as a side effect of using punishment techniques. Further, use of the procedure did not appear to generate dislike for any of the team leaders/cue givers. The

experimenter's experience was that the subject had developed the habit of resting one foot (he was often barefoot) on hers as she was working with him. This was interpreted as a friendly gesture as it was often accompanied by holding one of her hands or smiling, and using the facial-screen did not have any effect on this social contact. The subject would also voluntarily approach and follow around several members of the team for whom he seemed to have a preference.

Summary statement

The success of the intervention procedures used in this study demonstrate that it is possible to obtain generalization of intervention effects to a desired level of social significance within a punishment paradigm. If it were ethically possible it would be desirable to establish by experimentation which of the procedures in such a multi-modal intervention package contributes most to effectiveness. However one of the penalties of applied research is that one must aim for clinical effectiveness in all situations. Difficulties experienced in carrying out this program in an applied setting are discussed in the following chapter.

CHAPTER 6: FACTORS OF DIFFICULTY IN CONDUCTING RESEARCH IN APPLIED SETTINGS WITH SPECIFIC REFERENCE TO THE PRESENT STUDY

The facial screen

Despite Mudford's (1987) research demonstrating the acceptability of facial screening to nursing staff, the introduction of this procedure generated much opposition from nursing staff who initially were not involved directly in the program procedures. It is thought that the appearance of the facial screen, which when applied resembled a black hood, was responsible for the negative reaction. It is unfortunate that the time of use of the facial screen immediately followed a mass advertising campaign in the media for the prevention of AIDS which relied heavily on visual imagery of death in the form of the hooded "grim reaper". However as the effectiveness of the procedure became evident the negative reactions disappeared and one of the most outspoken "members of the opposition" became one of the most ardent supporters of the program.

The facial screen proved difficult to use when first introduced in the structured activities setting in phase I, trial 1. The level of concentration required to provide cues for the tasks to be completed by the client, interfered greatly with observing his problem behaviors and providing the appropriate verbal instruction required by the formal program, and then consequating his response to that instruction with application of the screen for non-compliance with the verbal instruction. It took some practice to develop skill at concentrating on both procedures and this difficulty is thought to be responsible for the low rate (15%) of reduction of problem behaviors in the first

week of intervention in this setting. Ideally these tasks should have been done by two different team members but it was impossible to provide this level of staffing.

Administrative criticisms of cost

The program was criticized at administrative level within the institution because of the demand made on staffing numbers over the duration of the program. The program actively occupied staff time over a period of 26 weeks of baselining and intervention excluding the reversal phase. When one considers that this is 6 months or half a year it does seem a long time and such criticism prima facie would seem to be justified. In order to offset such criticism it must be recognized that applied behavior analysis procedures are labor intensive and it may be that formal cost benefit analyses should become part of the overall evaluation of programs. In this particular case the cost of even such a large number of staff over a 6 month period would pale into insignificance when compared to the cost of caring for such a young person for the rest of his life in an institutional setting. However this author believes that until such analyses appear in the literature it is easy for administrators to ignore this aspect and to criticize the required labor intensiveness instead. Such analyses may also prompt tolerance of procedures aimed at increasing the possibility of achieving generalised behavior change.

Handling the raw data

The large number of behaviors monitored, (7), over the number of settings, (5), for the 26 weeks, generated an enormous amount of raw data. In order to present the data in some manageable form it was necessary to collapse the data, and a five day week block

average was chosen for convenience of presentation although such averaging obviously loses the richness of the day to day variations in behavior. While this problem could have been avoided by targetting fewer behaviors, it was theoretically sound to work on all behaviors which were observed to culminate in tantrums given that there was no way of knowing whether these behaviors were seizure prodromata or the residual stereotypical behaviors of a severely to profoundly intellectually disabled person.

Interobserver agreement

A further major difficulty evolved around data collection to ensure an acceptable level of interobserver agreement. Page and Iwata (1986) recommend that applied researchers consider four interrelated decisions in assessing and reporting interobserver agreement. These involve deciding upon: (1) Which agreement index to report with shorter time intervals allowing exact block-by-block agreement to be calculated being the method recommended; (2) The unit score to be presented, for example, a composite score or scores for specific behaviors, with precedents having been set for both; (3) The time span, for example, session or trial, with the recommendation that agreement be assessed over the period for which the dependant variable is calculated and reported but with the proviso that the molecular level of trial reliability is preferable; (4) Whether to co-plot the data collected by the second observer. Various arguments are offered by the authors on the advantages and disadvantages of this procedure and they conclude that the strategy has seen only very limited application (Page & Iwata, 1986, pp. 122-123).

In dealing with each of these decisions in relation to the data collected in this study it is necessary to recall that data was being collected on seven separate categories of behavior some of which could occur simultaneously. It has already been stressed that the experimenter considered it not only theoretically sound, but indeed necessary, to collect data and intervene in all occurrences of these behaviors. Collecting this amount of data across five settings meant that the data collection was already complicated (recall that an observer also had to count to establish the end and beginning of a new occurrence of behavior in each category). Event recording was therefore chosen as the agreement index as the experimenter considered that it would have been too complicated, indeed impossible, to add recording of non-occurrences of the behaviors in order to allow the use of a permanent products type exact index of agreement. The same reasoning operated in relation to choosing the time span used, in this case, each session of approximately 20 minutes duration. The experimenter felt that dividing the session into smaller units would have complicated matters further and probably contributed as much error as not using smaller intervals. Using smaller units of time would have required synchronization of watches, specification of time periods in advance, and another person to supervise that it was done, bearing in mind that there were 14 observers involved. It was therefore not considered practical in the context of the applied research environment and resources available.

The large number of observers involved also rules out co-plotting the data from the reliability observer. Rotating rosters ensured that consistency of first and second observer

could not be maintained and observers were virtually random pairs each session. The observers were not aware who was designated observer 1 or observer 2. The unit score presented in the analysis is a composite score (total aberrant behaviors) but it was necessary to record data on each behavior seperately in case of extreme variations in frequency within a category, particularly once intervention commenced. Percent agreement was therefore calculated within each category of behavior in an attempt to ensure the accuracy of recording.

Although the experimenter acknowledges that smaller time intervals would have been preferable it is considered unlikely that gross errors of observation were occurring in the data presented in that it is unlikely (although acknowledged theoretically possible) that a large number of observers would report consistently high agreement across seven categories of behavior for the duration of the program. If gross inaccuracies were involved, one would expect that with 57% of all observation sessions dual recorded, there should have been some grossly discrepant percentages agreement forthcoming. That there were not may be due to the efficiency of the training system for observers, and it is also possible that the rostering of staff inadvertently provided protection against observer drift. Some persons who acted as observers early in the program did not act as observers again until late in the program so were not subjected to the usual problems of "changing criterion" when the observers are constants.

<u>The primary positive reinforcer</u>

The primary positive reinforcer (pieces of cold cooked chicken) was found to be unnecessary after the first week of intervention. The subject responded much better than anticipated

to social praise and it was unnecessary to use a primary reinforcer. The experimenter considered that continued use of the primary reinforcer may have created additional problems in that it appeared that the "economy" of chicken may have held an inflated value (i.e., worth a punishment to get the goodies). It was also difficult to prevent other residents from stealing the chicken while the procedure was in progress.

Value of research in applied settings

Although conducting behavioral research in an applied setting presents some problems in relation to conformity with rigorous experimental methodology, the richness of the experience and the wealth of material gained must surely contribute to our understanding of the psychobiology of pathological conditions and their interaction with environmental variables. It is only through application and experimentation in the real world that we will be able to approach solving the problems of daily living of such individuals who present great management challenges for their caregivers. The implications of the results of this study in connection with future research and methodology are considered in the final chapter.

CHAPTER 7: IMPLICATIONS OF THE RESULTS OF THIS STUDY - FUTURE DIRECTIONS

The outcome of this study, besides providing evidence that generalization of punishment effects can be achieved, raises issues relating to methodology as well as some intriguing theoretical questions.

In relation to methodology it is obviously desirable to identify those variables which contributed most to the intervention effects. In an environment more tolerable of research requirements it may have been possible to do that by using a dismantling procedure. However in the environment where this study was carried out that would have been impossible. Identifying the more efficient variables is very important for two major reasons. One is that related to greater efficiency, and therefore clinical parsimony, which is congruent with behavioral methodology and highly desirable for economic reasons as well. The second reason is that studying the relative effects of the stimuli and consequences may yield very important information contributing to an understanding of the psychobiological and behavioral mechanisms involved in epilepsy especially complex partial seizures.

By way of further explanation: Applied behavior analysis as a field, through adherence to rigorous experimental standards, has amassed a body of knowledge from which statements predicting the behavior of organisms under certain conditions can be made. It

may be that this information can be used to establish the case to pursue research from the applied setting back to the laboratory rather than vice versa. In the case of epilepsy, interest in establishing kindling as an experimental neurobiological model for complex partial seizures has heightened during the decade of the eighties. This interest has come about since Goddard developed a kindling preparation allowing new directions in epileptological research (Goddard, 1981; Mostofsky & Myslobodsky, 1982). If kindling can be established as a model applicable to human complex partial seizures then a wealth of information from animal studies would become relevant. As well clarification of some of the current confusion in the literature regarding the interictal behavioral manifestations of persons with complex partial seizures may be forthcoming.

Experimental operant conditioners are able to condition behaviors and manipulate degree of generalization by manipulating environmental stimuli and consequences. Applied behavior analysts would ordinarily be interested in such manipulations to increase or decrease behaviors of social significance and to ensure that they occurred in non-trained environments. Perhaps the predictability of the occurrence of generalization under certain circumstances could be used to investigate the behavioral sequelae of kindling in both animals and humans thereby providing a much needed link in the research. Investigation of generalization after kindling in animals, and if the results were consistent with studies of generalization in humans with complex partial seizures, may shed a great deal of light on some of the complex anomolies of behavior in these persons.

Since it is the inappropriate behaviors of such persons which create the problems clinicians are called upon to solve this leads one to speculate about the basis for those behaviors. It could be argued that the expression of inappropriate behavior across many environments may be the result of generalization (or conversely failure to discriminate). Such a view would be entirely consistent with the neuropsychological literature for which there is increasing support from EEG studies. A failure to adequately deal with or process external stimuli could well be explained as failure to discriminate. One could therefore posit an argument that persons with complex partial seizures have a propensity for generalization. This may explain why, when attempting to perform a functional analysis of the behaviors of such persons it is often difficult, if not impossible, to establish satisfactory consistent antecedents and consequences for the responses. In applied settings this usually results in the conclusion being drawn that the behavior is attributable to the epilepsy alone in some mysterious way and is seen to be outside the ambit of behavioral control techniques. It is possible that clinicians fail to see antecedents because if the client is predisposed to generalization then the level of stimuli across environments would need to be at very minimal levels only and not as obvious to observers since one tends to look for common discriminatory antecedents across environments. One anticipates that the lower level common elements in environments would be habituated but since there is evidence that habituating stimuli may be a problem for people with complex partial seizures then it may be that their grossly inappropriate behaviors are the result of 'wild' responding to subtle cues in the environment i.e., generalization.

Such an argument may be advanced as an adjunctive explanation for the rampant generalization seen in this study. One would not expect such generalization so one is left with two explanations. Either the procedures used are extraordinarily efficient for the reasons advanced in the formal analysis of the results or there are other additional factors operating. In any case suggesting that complex partial seizures may predispose a person to generalize is not inconsistent with the analysis offered in this study if one considers that a propensity to generalize to low intensity stimuli would surely be enhanced by increasing the saliency of programmed stimuli which is exactly what was done in this study. In this schema, training generalization of appropriate behavior to selected stimuli (the saliency of which is reinforced by the operant consequence) would have an overriding effect on generalization (in this case, of inappropriate behaviors) to low intensity stimuli. One could hypothesize that appropriate behavior would replace inappropriate behavior (i.e., generalize) as such reinforced selective attention to stimuli allowed the subject to make sense of his environment and the demands present in it. This would be consistent with Blackman & Lin's (1984) results in relation to the superiority of explicit instructions.

Exploring generalization responses as an experimental parameter in kindled animals and in a human population with complex partial seizures is not as strange an idea as it may first seem. Kindling itself has been considered as an instance of conditioning phenomena and attempts to establish "a conditioned kindling response" utilizing the Pavlovian conditioning model have been reported (Mostofsky & Myslobodsky, 1982). Interest in

learning theory explanations of the spread of kindling (for which a satisfactory explanatory mechanism has yet to be discovered) has been fuelled by the conditionability of neural discharge at the single cell level, subcortical activity level, and cortical EEG level (Kandel, 1985; Mostofsky & Myslobodsky, 1982). In addition the well known, and long standing, problem that surgery removing the foci often does not result in removing behaviors associated with the epilepsy points to a role for operant learning theory in attempts to piece this puzzle together (Adamec, Stark-Adamec, Perrin, & Livingston, 1981; Williams, 1969).

Recently Anninos (1987) proposed a neural model theory utilising neural nets leading to the kindling effect of epilepsy in humans. Anninos (1987) was able to demonstrate that this neural model behaved in a way " ... consistent with the observation of powerful recurrent inhibition in the hippocampus" and that the time course in activity demonstrated in his study was " ...in good agreement with the clinical observation that periodic photic or acoustic stimulation may induce epileptic onsets" (p. 195). This augurs well for the relevance of kindling as established in animal studies to the development of epilepsy in humans.

Mostofsky and Myslobodsky (1982) state that "Considerably less attention has been paid to the behavioral and environmental variables which might modulate the course and development of kindling and the subsequent spontaneity, resistance, and persistence of seizures in the experimentally created seizure-prone organism" (p. 75). Indeed these authors continue further with " ... the shifting emphasis by neurophysiologists towards a 'plasticity' in CNS functioning has been met by a

corresponding interest by clinicians in the manifestations of symptoms and sickness which, rather than being seen as fixed and 'hard-wired' organic cause and effect, are understood to reflect the influences of environment and their consequences" (Mostofsky & Myslobodsky, 1982, p. 75).

It would seem timely therefore, that the effects of epilepsy be investigated from an operant conditioning perspective. The investigation of discrimination and generalization would be a practical and useful place to begin. This is particularly important in view of the role of stimuli given that most special education facilities operate on providing enriched stimuli to promote development. If the argument put forward above held experimentally, then it would be obvious that such special education environments would not only not benefit such children but would indeed be detrimental to their learning. It is interesting to note that the subject of this study was able to learn far more than was previously thought possible when the conditions for learning were structured in accordance with principles derived from neuropsychological, neurological, and behavioral evidence regarding temporal lobe dysfunction which is not usually integrated in applied behavior analysis programs.

In addition to the contribution to special education environments, research such as that proposed above may have considerable effects on the techniques utilized for behavior management of the violent and very disturbed sector of the complex partial seizure population which given Penry's comments quoted in Chapter 1 of this study would be of profound social significance to those afflicted.

REFERENCES

Adamec, R.E., Stark-Adamec, C., Perrin, R., & Livingston, K.E. (1981). What is the relevance of kindling for human temporal lobe epilepsy? In J.A. Wada (Ed.), Kindling 2 (pp. 303-313). New York: Raven Press.

Ajmone-Marsan, C., & Ralston, B.L. (1957). The epileptic seizure: Its functional morphology and diagnostic significance. Springfield, Ill: Charles C. Thomas.

Allen, G.J. (1973). Case study: Implementation of behavior modification techniques in summer camp settings. Behavior Therapy, 4, 570-575.

Altmeyer, B.K., Williams, D.E., & Sams, V. (1985). Treatment of severe self-injurious and aggressive biting. Journal of Behavior Therapy and Experimental Psychiatry, 16, 159-167.

Anninos, P.A. (1987). A neural model theory leading to kindling effect of epilepsy. International Journal of Neuroscience, 36, 177-198.

Ayd, F.J. (1979). Carbamazepine: A potential alternative for lithium therapy for affective disorder. International Drug Therapy News, 14, 29-31.

Baer, D.M., Wolf, M.M., & Risley, T.R. (1968). Some current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis, 1, 91-97.

Barkley, R.A., & Zupnick, S. (1976). Reduction of stereotypic body contortions using physical restraint and DRO. Journal of Behavior Therapy and Experimental Psychiatry, 7, 167-170.

Baumeister, A.A., & Rollings, J.P. (1976). Self-injurious behavior. In N.R. Ellis (Ed.), International review of research in mental retardation (Vol. 8). (pp. 1-34). New York: Academic Press.

Bear, D.M. (1979). The temporal lobes: An approach to the study of organic behavioral changes. In M.S. Gazzaniga (Ed.), Handbook of behavioral neurobiology: Vol. 2 (pp. 75-95). New York: Plenum Press.

Birnbrauer, J.S. (1968). Generalization of punishment effects - A case study. Journal of Applied Behavior Analysis, 3, 201-211.

Blackman, L.S., & Lin, A. (1984). Generalization training in the educable mentally retarded: Intelligence and its educability revisited. In P.H. Brooks, R. Sperber, & C. McCauley (Eds.), Learning and cognition in the mentally retarded (pp. 237-263). Hillsdale, N.J: Lawrence Erlbaum Associates.

Booker, H.E. (1975). Management of the difficult patient with complex partial seizures. In J.K. Penry & D.D. Daly (Eds.), Advances in neurology: Vol. 11. Complex partial seizures and their treatment (pp. 369-382). New York: Raven Press.

Bornstein, P.H., Hamilton, S.B., & McFall, M.E. (1981). Modification of adult aggression: A critical review of theory, research, and practice. In M. Hersen, R.M. Eisler, & P.M. Miller (Eds.), Progress in behavior modification (Vol. 12). (pp. 299-350). New York: Academic Press.

Corsellis, J.A.N. (1970). The neuropathology of temporal lobe epilepsy. In D. Williams (Ed.), Modern trends in neurology: Vol. 5. (pp. 254-295). London: Butterworths.

Currie, S., Heathfield, K.W.G., Henson, R.A., & Scott, D.F. (1971). Clinical course and prognosis of temporal lobe epilepsy: A survey of 666 patients. Brain, 94, 173-190.

Cushing, P., Adams, A., & Rincover, A. (1983). Research on the education of autistic children. In M. Hersen, R.M. Eisler, & P.M. Miller (Eds.), Progress in behavior modification (Vol. 14). (pp. 1-48). New York: Academic Press.

Daly, D.D. (1975). Ictal clinical manifestations of complex partial seizures. In J.K. Penry & D.D. Daly (Eds.), Advances in neurology: Vol. 11. Complex partial seizures and their treatment (pp. 57-83). New York: Raven Press.

Daly, D.D. (1982). Neurology: Part 2. Complex partial seizures. In J. Laidlaw & A. Richens (Eds.), A textbook of epilepsy (2nd ed.). (pp. 131-146). Edinburgh: Churchill Livingstone.

Falconer, M.A. (1972). The pathological substrates of temporal lobe epilepsy and their significance in the surgical treatment. In E. Hitchcock, L. Laitinen & K. Vaernet (Eds.), Psychosurgery (pp. 46-54). Springfield, Ill: Charles C. Thomas.

Falconer, M.A., Serafetinides, E.A., & Corsellis, J.A.N. (1964). Etiology and pathogenesis of temporal lobe epilepsy. Archives of Neurology, 10, 233-248.

Favell, J.E., McGimsey, J.F., Jones, M.L., & Cannon, P.R. (1981). Physical restraint as positive reinforcement. Journal of Applied Behavior Analysis, 11, 225-241.

Forehand, R., & Baumeister, A.A. (1976). Deceleration of aberrant behavior among retarded individuals. In M. Hersen, R.M. Eisler, & P.M. Miller (Eds.), Progress in behavior modification (Vol. 2). (pp. 223-278). New York: Academic Press.

Foxx, R.M. (1982). Decreasing behaviors of severely retarded and autistic persons. Champaign, Ill: Research Press.

Foxx, R.M., & Azrin, N.H. (1972). Restitution: A method of eliminating aggressive-disruptive behavior of retarded and brain damaged patients. Behavior Research and Therapy, 10, 15-27.

Gamstorp, I. (1975). Treatment with carbamazepine: Children. In J.K. Penry & D.D. Daly (Eds.), Advances in neurology: Vol. 11. Complex partial seizures and their treatment (pp. 237-248). New York: Raven Press.

Gastaut, H. & Broughton, R. (1972). Epileptic seizures: Clinical and electroencephalographic features, diagnosis and treatment. Springfield, Ill: Charles C. Thomas.

Goddard, G.V. (1981). The continuing search for mechanism. In J.A. Wada (Ed.), Kindling 2 (pp. 1-14). New York: Raven Press.

Goddard, G.V. (1983). The kindling model of epilepsy. Trends in Neurosciences, 6, 275-279.

Heron, T.E. (1987). Punishment by contingent presentation of a stimulus. In J.O. Cooper, T.E. Heron, & W.L. Heward (Eds.), Applied behavior analysis (pp. 410-426). Columbus, Oh: Merrill.

Johnson, W.L., & Baumeister, A.A. (1981). Behavioral techniques for decreasing aberrant behaviors of retarded and autistic persons. In M. Hersen, R.M. Eisler, & P.M. Miller (Eds.), Progress in behavior modification (Vol. 12). (pp. 119-170). New York: Academic Press.

Kandel, E.R. (1985). Cellular mechanisms of learning and the biological basis of individuality. In E.R. Kandel & J.H. Schwartz (Eds.), Principles of neural science (2nd ed.). (pp. 816-833). New York: Elsevier.

Krafft, K.M., & Poling, A.D. (1982). Behavioral treatments of epilepsy: Methodological characteristics and problems of published studies. Applied Research in Mental Retardation, 3, 151-162.

Kupfermann, I. (1985). Hypothalamus and limbic system I: Peptidergic neurons, homeostasis, and emotional behavior. In E.R. Kandel & J.H. Schwartz (Eds.), Principles of neural science (2nd ed.). (pp. 611-625). New York: Elsevier.

Lennox, W.G., & Lennox, M.A. (1960). Epilepsy and related disorders. Boston: Little Brown & Company.

Lezak, M.D. (1976). Neuropsychological assessment. New York: Oxford University Press.

Lishman, W.A. (1987). Organic psychiatry: The psychological consequences of cerebral disorder (2nd ed.). Oxford: Blackwell Scientific Publications.

Marsden, C.D., & Reynolds, E.H. (1982). Neurology Part 1. In J. Laidlaw & A. Richens (Eds.), A textbook of epilepsy (2nd ed.). (pp. 97-131). Edinburgh: Churchill Livingstone.

Martinez-Selva, J.M. (1987). The kindling effect as a model system of sensitization and arousal. International Journal of Neuroscience, 36, 131-137.

Matson, J.A., & Mulick, J.A. (1983). Handbook of mental retardation. New York: Pergamon.

Mostofsky, D.I., & Myslobodsky, M.S. (1982). Conditioning and the kindling model of epilepsy. International Journal of Neuroscience, 16, 75-82.

Mudford, O.C. (1987). Acceptability of a visual screening procedure for reducing stereotypy in mentally retarded children: Evaluation by New Zealand institutional staff. Behaviour Change, 4, 4-13.

Mulick, J.A., & Schroeder, S.R. (1980). Research relating to management of antisocial behavior in mentally retarded persons. The Psychological Record, 30, 397-417.

Murray, G.B. (1981). Complex partial seizures. In T.C. Manschreck (Ed.), Psychiatric medicine update (pp. 103-118). New York: Elsevier.

McGonigle, J.J., Duncan, D., Cordisco, L., & Barrett, R.P. (1982). Visual screening: An alternative method for reducing stereotypic behaviors. Journal of Applied Behavior Analysis, 15, 461-467.

Ounsted, C., Lindsay, J., & Norman, R. (1966). Biological factors in temporal lobe epilepsy. Clinics in developmental medicine No. 22. London: William Heinemann Medical Books.

Page, T.J., & Iwata, B.A. (1986). Interobserver agreement: History, theory, and current methods. In A. Poling & R.W. Fuqua (Eds.), Research methods in applied behavior analysis: Issues and advances (pp. 99-126). New York: Plenum.

Parsonson, B., & Smith, J.F. (1986). Seizures. In N.J. King & A. Remenyi (Eds.), Health care: A behavioral approach (pp. 125-132). Sydney: Grune & Stratton.

Penry, J.K. (1975). Perspectives in complex partial seizures. In J.K. Penry & D.D. Daly (Eds.), Advances in neurology: Vol. 11. Complex partial seizures and their treatment (pp. 1-14). New York: Raven Press.

Polkey, C.E. (1982). Neurosurgery: Part one. In J. Laidlaw & A. Richens (Eds.), A textbook of epilepsy (2nd ed.). (pp. 399-422). Edinburgh: Churchill Livingstone.

Prichep, L., John, R.E., Ahn, H., & Kaye, H. (1983). Neurometrics: Quantitative evaluation of brain dysfunction in children. In M. Rutter (Ed.), Developmental neuropsychiatry (pp. 213-238). New York: Guilford.

Pritchard, P.B., III. (1983). Personality and emotional complications of epilepsy. In K.M. Heilman & P. Satz (Eds.), Advances in neuropsychology and behavioral neurology: Vol. 1. Neuropsychology of human emotion (pp. 165-192). New York: Guilford.

Rincover, A., Cook, R., Peoples, A., & Packard, D. (1979). Sensory extinction and sensory reinforcement principles for programming multiple adaptive behavior change. Journal of Applied Behavior Analysis, 12, 221-233.

Robb, P. (1975). Focal epilepsy: The problem, prevalence, and contributing factors. In D.P. Purpura, J.K. Penry, & R.D. Walter (Eds.), Advances in neurology: Vol. 8. New York: Raven Press.

Rodin, E.A. (1973). Psychomotor epilepsy and aggressive behavior. Archives of General Psychiatry, 28, 210-213.

Rodin, E.A., Schmaltz, S., & Twitty, G. (1986). Intellectual functions of patients with childhood-onset epilepsy. Developmental Medicine and Child Neurology, 28, 25-33.

Seymour, F.W., & Stokes, T.F. (1976). Self recording in training girls to increase work and evoke staff praise in an institution for offenders. Journal of Applied Behavior Analysis, 9, 41-54.

Sprague, J.R., & Horner, R.H. (1984). The effects of single instance, multiple instance, and general case training on generalized vending machine use by moderately and severely handicapped students. Journal of Applied Behavior Analysis, 17, 273-278.

Stevens, J.R. (1975). Interictal clinical manifestations of complex partial seizures. In J.K. Penry & D.D. Daly (Eds.), Advances in neurology: Vol. 11. Complex partial seizures and their treatment (pp. 85-112). New York: Raven Press.

Stokes, T.F., & Baer, D.M. (1977). An implicit technology of generalization. Journal of Applied Behavior Analysis, 10, 349-367.

Stores, G. (1986). Psychological aspects of nonconvulsive status epilepticus in children. Journal of Child Psychology and Psychiatry, 27, 575-582.

Swerissen, H., & Carruthers, J. (1987). The use of a physical restraint procedure to reduce a severely intellectually disabled child's tantrums. Behaviour Change, 4, 34-38.

Taylor, D.C. (1969). Aggression and epilepsy. Journal of Psychosomatic Research, 13, 229-236.

Treffert, D.A. (1964). The psychiatric patient with an EEG temporal lobe focus. American Journal of Psychiatry, 120, 765-771.

Williams, D. (1969). Temporal lobe syndromes. In P.J. Vinken & G.W. Bruyn (Eds.), Handbook of clinical neurology: Vol. 2 (pp.700-724). Amsterdam: North Holland.

APPENDIX 'A'

Subject's history:

Birth

The subject was born in a country city hospital. It was an instrument birth following an uncomplicated pregnancy. There were no immediate complications but when he was 3 days old he appeared to be holding his breath and was cyanosed. He was taken by air ambulance to a city children's hospital where he was kept under intensive care for some weeks. No reason was identified for the cyanotic episodes.

Development

The subject's mother reported that he seemed normal but he did not begin to speak until 18 months to 2 years of age. She says his first speech was fairly easy to understand but that it suddenly stopped aet two and a half years of age. The subject attended preschool at 3 years of age and from there was referred to a specialist diagnostic unit for the developmentally delayed. There he was diagnosed as autistic.

Significant illnesses

The subject has had the usual childhood illnesses but other than those no serious illness. Approximately 18 months before this study commenced he was home from school with a sore throat when he had what appeared to be a convulsion while in bed and was unconscious for a short period.

Neurological assessment (extract)

"The EEG on this fourteen year old lad was done in the sleep deprived state. The patient did not fall asleep at the time of

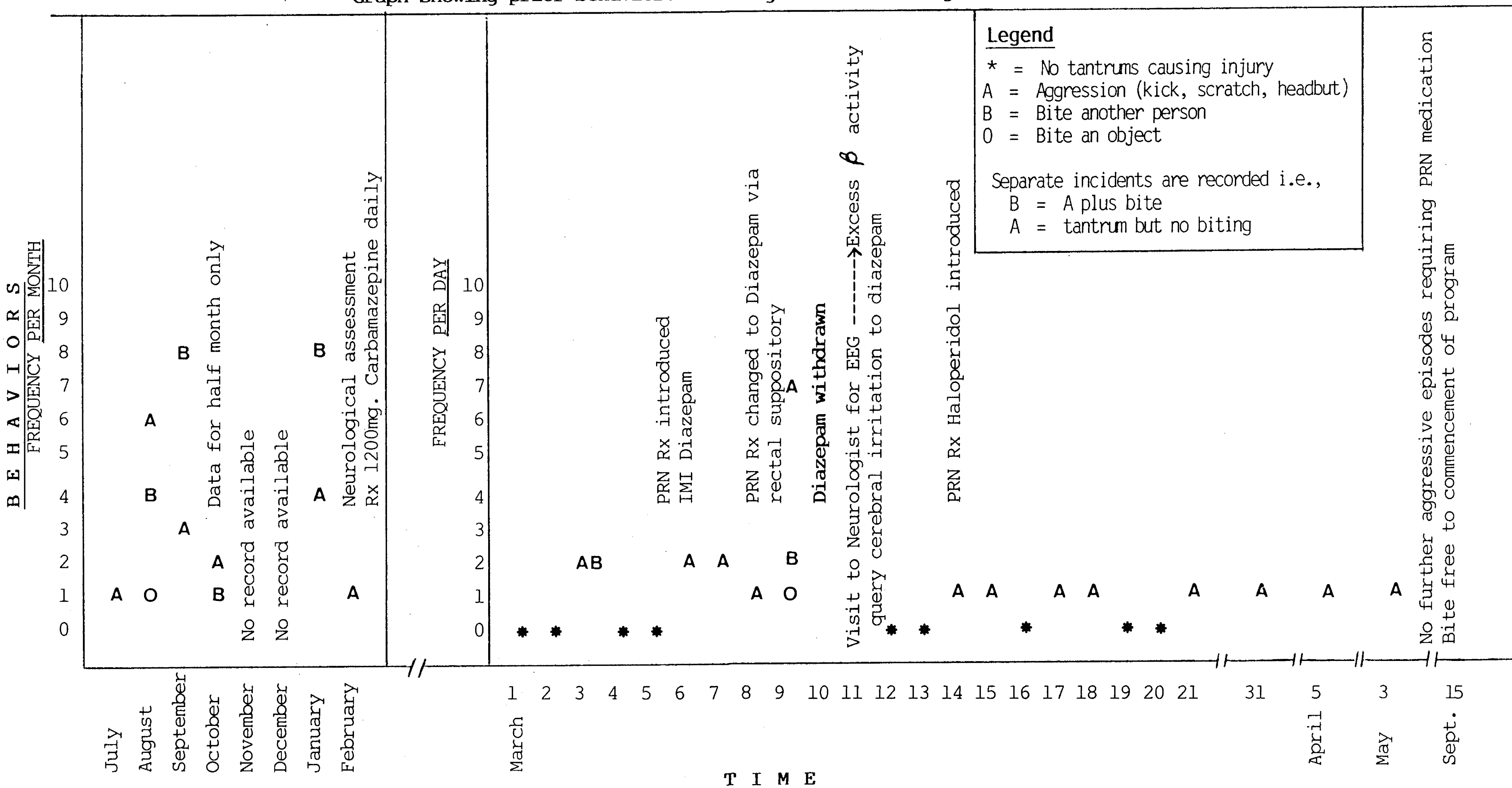
the study. He was on Tegretol (carbamazepine) at the time. At times there were 6-7 Hz. theta activity but there was a definite unequivocal paroxysm of spike and wave activity of generalised configuration seen during the recording. At other times in the recording there was a definite 10 Hz. alpha post centrally disposed and normally responsive. He had a variety of spike and wave discharges during the study of unequivocal epileptiform nature. At times the spike and wave activity seemed more positive over the left hemisphere. The left hemisphere predominance was more pronounced as the EEG continued. Photic stimulation was given and did not add to the diagnostic process. No concurrent ECG was performed due to difficulties with the patient.

The above tests vindicate our stand at doing a sleep deprived EEG and was read in front of the staff and shows unequivocal evidence of epilepsy more pronounced from the left temporal lobe and hence Tegretol should be effective."

This EEG was carried out prior to medication trials at the beginning of the program reported herein.

APPENDIX 'B'

Graph showing prior behaviors and drug trial resulting in bite free period



APPENDIX 'C'

NAME OF CLIENT:_____ RECORDER:_____ 01/02

SESSION: BASELINE/INTERVENTION DATE:

SETTING:_____

LEAVING TABLE OR CHAIR (Other than when required)	BEHAVIORS WHILE UP FROM TABLE OR CHAIR (Other than when required)			BEHAVIORS AT TABLE OR CHAIR		
	Bouncing	Noise	Repetitive hand movements & clapping	Repetitive leg movements & foot stamping	Noise	Repetitive hand movements & clapping

APPENDIX 'D'

Table 1

Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Breakfast setting

Observation session no.	Leaving table	Behaviors up from Table/Chair			Behaviors at Table/Chair		
		Bounce	Noise	Rep. hand movements	Rep. leg movements	Noise	Rep. hand movements
1	100	100	100	100	91	100	83
2	100	100	100	100	80	100	89
3	100	100	100	100	97	100	100
4	100	100	100	100	91	100	75
5	100	100	100	100	95	100	100
6	100	100	100	100	89	100	100
7	100	100	100	100	89	100	89
8	100	100	100	100	100	100	100
9	100	100	90	100	96	100	94
10	100	100	100	100	100	100	100
11	100	100	100	100	100	86	100
12	100	100	100	100	91	100	100
13	91	100	100	100	92	100	100
14	100	100	100	100	100	100	100
15	100	100	100	100	91	100	100
16	100	100	100	100	100	100	100
17	75	100	100	100	100	100	100
18	100	100	100	100	100	100	100
19	100	100	100	100	100	100	100
20	100	100	100	100	100	100	100
21	100	100	100	100	92	86	75
22	100	100	80	100	89	88	95
23	100	100	100	100	100	86	92
24	100	100	100	100	100	100	100
25	100	100	100	100	100	100	100
26	100	100	100	100	97	100	95
27	100	100	100	100	100	100	100
28	100	100	100	100	100	100	88
29	100	100	100	100	100	100	100

Table 2

Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Lunch setting

Observation session no.	Leaving table	Behaviors up from Table/Chair			Behaviors at Table/Chair		
		Bounce	Noise	Rep. hand movements	Rep. leg movements	Noise	Rep. hand movements
1	100	100	75	100	92	100	83
2	100	100	100	100	100	100	100
3	100	100	100	100	100	100	100
4	100	86	88	100	83	83	90
5	100	100	100	100	94	86	100
6	100	100	100	100	92	100	100
7	93	100	100	100	96	100	88
8	100	100	100	100	100	100	100
9	100	100	100	100	96	100	100
10	100	100	100	100	100	100	100
11	100	100	100	100	100	100	100

Table 3

Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Evening Meal setting

Observation session no.	Leaving table	Behaviors up from Table/Chair			Behaviors at Table/Chair		
		Bounce	Noise	Rep. hand movements	Rep. leg movements	Noise	Rep. hand movements
1	100	100	100	100	88	100	86
2	80	100	100	100	100	100	100
3	100	100	100	100	79	91	79
4	100	100	100	100	95	100	96
5	100	100	100	100	100	94	100
6	100	100	100	100	90	100	75
7	100	100	80	100	83	100	100
8	100	100	100	100	92	100	100
9	100	100	100	100	100	90	100
10	100	100	100	100	100	100	100
11	100	100	100	100	100	100	100
12	100	100	100	100	100	100	100
13	100	100	100	100	100	100	100
14	100	100	100	100	100	100	100
15	100	100	100	100	100	100	100

Table 4

Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Structured Activities setting

Observation session no.	Leaving table	Behaviors up from Table/Chair			Behaviors at Table/Chair		
		Bounce	Noise	Rep. hand movements	Rep. leg movements	Noise	Rep. hand movements
1	100	100	100	100	80	88	79
2	100	100	100	100	91	78	94
3	100	100	100	100	100	100	100
4	100	100	100	100	95	88	93
5	100	100	100	100	97	91	95
6	100	100	100	100	100	100	92

Table 5

Percentage Agreement between Observer 1 and Observer 2 for each Category of Behavior recorded during the Free-time (Television viewing) setting

Observation session no.	Leaving table	Behaviors up from Table/Chair			Behaviors at Table/Chair		
		Bounce	Noise	Rep. hand movements	Rep. leg movements	Noise	Rep. hand movements
1	100	100	100	100	100	100	100
2	100	100	100	100	100	100	100
3	100	100	80	100	100	78	89
4	100	100	100	100	100	100	80
5	100	100	100	100	80	90	93
6	100	100	100	100	100	100	100
7	100	100	100	100	100	100	100
8	100	100	100	100	100	100	100
9	100	100	100	100	100	100	100
10	100	100	100	100	100	100	100
11	100	100	100	100	100	83	89
12	100	100	100	100	100	100	100
13	100	100	100	100	100	100	100
14	100	100	100	100	100	100	100

APPENDIX 'E'

Neurological assessment (extract)

"The EEG on this sixteen year old ambidextrous man was done in the sleep deprived state. He was on carbamazepine at the time of the study.

The background was a mixture of 10 Hz. alpha with significant amounts of theta activity interspersed. The EEG was not particularly responsive to visual fixation.

Hyperventilation could not be performed, due to lack of co-operation.

As the EEG continued there was attenuation of the background rhythm and in that time epileptiform discharges were seen, maximal in the left hemisphere, though seen bilaterally in the mid-temporal regions.

The patient drifted off to sleep and in sleep there was vertex sharp activity, sleep spindling and attenuated background.

Photic stimulation was given and did not add diagnostic yield.

The concurrent ECG rhythm strip revealed sinus rhythm at 54 beats per minute.

IMPRESSION

The EEG is still abnormal with slowing of the background rhythm and some epileptic spike and wave paroxysms but only very few of same."

This EEG was carried out approximately 4 months after the program ceased.