Evaluation of a token economy in a school for disruptive children

Hawkins, Peter John

EVALUATION OF A TOKEN ECONOMY IN A SCHOOL FOR DISRUPTIVE CHILDREN

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Peter John Hawkins

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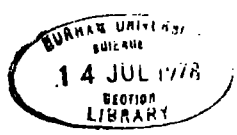

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CONTENTS

ABSTRACT

Evaluation of a token economy in a school for disruptive children.

The "medical" approach to the treatment of behavioural problems is first considered, and dismissed as being an inappropriate conceptual framework for applications in education. Behaviour modification is presented as a more appropriate approach to intervention, and the advantages that pertain to the classroom teacher are discussed. Controversial issues are summarily reviewed, and include a discussion of the ethics of behavioural intervention and the polemics of behaviour therapy. Further discussion of the literature is mainly concerned with the procedural aspects of implementing behavioural programmes, and includes reference to methodology, functional analysis, and techniques of accelerating/facilitating and eliminating behaviours in the classroom. Particular emphasis is placed on the application of token economies to improve social and academic behaviours.

The research report describes how a token economy was implemented in a classroom of six disruptive children. An intra-subject, reversal design was used within a phenomenal/behavioural framework. Points were given contingent upon appropriate targeted classroom behaviour, and these could be exchanged for back-up reinforcers at a later time. Inappropriate target behaviours decreased significantly during the token phases but increased again during reversal phases. Assignment and on-task behaviours increased significantly during the token phases. Data suggests that some generalization occurred from morning to afternoon sessions for assign-

ment behaviour, and from target behaviour to non-target behaviours. There was no evidence of generalization from token phases to non-token phases. Anecdotal evidence suggested that the students became very intransigent when the token system was removed; they "enjoyed" school more during the token phases. In the discussion a number of methodological and procedural aspects of the study are explored, and alternative strategies presented.

The study shows that it is possible to effectively implement a phenomenal/behavioural programme in a classroom of disruptive students for minimal cost and time, with maximal benefits accruing to both teachers and students.

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CHAPTER ONE

BEHAVIOURAL INTERVENTION - GENERAL CHARACTERISTICS and ISSUES

Introduction

Children whose behaviour is considered inappropriate have posed a problem to educators for centuries. A number of points of view have been proposed to account for such behaviour, and each position thrusts the teacher into a slightly different role. Hewett (I968) suggested that the three major frameworks within which behaviour problems are considered are the psychoanalytic, sensory - neurological, and behaviour modification approaches. These three positions put the causes of the mis - behaviour in altogether different areas of study. Thus, the psychoanalysts contend that such behaviour stems from faulty personality development. The sensory - neurological advocates look to structural damage to account for the behaviour, while the behaviour modifiers contend that such behaviour results from learning inappropriate behaviour, or the failure to learn appropriate behaviour.

These different views of the causes of the problem imply a different role for the teacher in dealing with behaviour problems. Hewett (I968) contended that the psychoanalytic approach places the teacher into the role of educational therapist and thereby relegates the teaching of academic tasks to a position of secondary importance. The sensory - neurological approach places the teacher in the role of diagnostician wherein the teacher attempts to identify sensory and/or neurological deficits and to programme his teaching in order to circumvent those areas of weakness. Finally, the behaviour modification approach places the teacher in the role of learning specialist, in which the teacher arranges consequences in order to facilitate the learning of appropriate behaviour and unlearning of inappropriate behaviour.

Historically speaking, the educator has conceptualised problem behaviour in frameworks borrowed from the medical profession. That is to say, when the child misbehaves the behaviour is seen as a symptom (behavioural manifestation) of some underlying problem. On this view treatment of the symptom alone is inadequate since this merely delays the necessity of treating the "cause" which underlies the problem. Treatment of one symptom will simply lead to the appearance of another symptom until at last the underlying "cause" is removed. Several of the approaches for working with children with behaviour problems reflect this medical model.

The Medical Model

Both the psychoanalytic and the sensory - neurological approaches are derived from medical approaches to the treatment of illness. The sensory - neurological model, and the broader biological model, would attempt to explain the physical disease that underlies a specific social - psychological problem. While no one would attempt to explain all deviant behaviour as a result of such processes, many investigators have focussed their research efforts on hypothesized biochemical explanations for such problem behaviours as "psychotic depression" or "schizophrenia" (Woolley, I962; Heath, I960). In the main these exclusively biological approaches both to aetiology and therapy have been focussed upon an extremely limited set of problem behaviours and have produced largely inconsistent findings.

The notion that problems in living are the result of energy systems, forces, or hypothetical personality structures of which the individual is often unaware, is very important

in the medical model. Early experiences within a person's life, particularly in the first five or six years, alter these underlying energy systems in ways that are beyond the control of the individual. Often, early stress, or "trauma", is deemed responsible for a "fixation" of "psychic energy" at a particular stage of psychological development (e.g. Freud, I955). Problem behaviour that an individual exhibits as an adolescent or adult is viewed as "symptomatic" of unresolved conflicts between hypothetical structures (such as "ego", "id", and "shadow"), which have resulted from early traumatic experiences. Merely treating these symptomatic behaviours would be viewed as counter - productive, since the real cause of his behaviour has not been dealt with.

Because such "forces" or "conflicts" (the causes) lie within the individuals "unconscious", this approach virtually demands that the individual seek a therapist so that this information may be uncovered or "worked through" within a relationship that promotes "insight". Often the therapist takes a parental role ("transference"), and treatment is directed at the past and is focussed on the "unconscious".

As noted by MacMillan (I969) the data collected from persons operating from such a perspective may be interesting and valid, yet typically these data are of little help to the educator in search of the educational prescription needed by a particular child. That is to say, the teacher may be pleased to know that a particular child is suffering from premature narcisstic dethronement, minimal cerebral dysfunction, dyslexia, or some other "illness", yet this information provides little direction to the teacher in determining how to get the child to read functionally or to solve mathematical

problems at the appropriate level. This is not meant to minimize the importance of these data or concepts for the psychiatrist or neurologist.

Ullman and Krasner (I965) discussed in some detail the impact of the concepts of the medical model on conceptualisation of maladaptive behaviour. The basic premise underlying the medical model is that the individual's behaviour is considered abnormal, diseased, or sick <u>because</u> of some underlying cause. There are several by - products of this notion:

i) one cannot deal with the maladaptive behaviours directly because they are simply manifestations of the cause;

ii) any change in the behaviour is insignificant because the real cause has gone untreated. Therefore, attempts to treat "symptoms" will simply mask the behaviour, but the fact that the cause still is untreated will result in symptom substitution, or the appearance of behaviours symptomatic of the existence of some underlying "pathology". These fears of symptom substitution seem unfounded. Whitman and Whitman (I970) cite research indicating little or no empirical evidence for symptom substitution. They point out that:

".....evidence exists, however, to show that improvement in one maladaptive behaviour tends to generalize to other maladaptive behaviours (Lang, I969); this positive generalization is opposite to that which would be predicted by the symptom substitution hypothesis. If, however, other maladaptive behaviours did replace the treated and "cured" symptomatic behaviour, explanations exist that are more compelling than that of symptom substitution. For instance, if behaviour is extinguished (i.e., ceases to be reinforced or rewarded

and therefore ceases to occur), it is likely that the behaviour with the next highest probability of being emitted in that situation is also a maladaptive behaviour. In this example, one maladaptive behaviour replaced another, but it was not necessary to postulate an underlying illness as the cause of this substitution" (I97I, p. I78).

Similar points are made by Krasner and Ullman (I965), and Eysenck (I959).

iii) it has led to a grouping of children on the basis of aetiology rather than on the basis of learning needs - for example, all children diagnosed as emotionally disturbed, brain injured, and socially disadvantaged. Yet, within each of these groups are children with vastly different learning needs, and the overlap between groups is considerable.

iv) almost all the labels and categories used by educators (with the exception of the gifted) imply a deficit or deficiency. The question that arises is how the deficit label affects the individual's feelings about himself and how the attachment of the label affects how others respond toward that individual. The expectancies of the child for success and failure and those of significant others in the environment (eg. parents, teachers, and peers) might well alter the levels achieved by a particular child (Rosenthal and Jacobsen, I968).

v) it takes the responsibility for treatment away from the teacher or parent and gives it to the "medical practitioner" or "clinician", who presumably has the diagnostic skills to assess the nature of the "disease" and provide a programme of treatment. The mental health professions have borrowed from the scientifically and technically based medical model

the attitude that the modification of behaviour must take place in a professional location (office or hospital) rather than in the natural environment (for further discussion of this point see Tharp and Wetzel, I969). The sophisticated individual in the natural environment is the one that recognises early symptoms, and refers the individual to the professional. The doctor and his helpers then exclude members of the normal environment from the treatment process.

Psychological Model

The past decade has seen more and more practice in education based on a psychological, rather than medical, model. Such practice has probably been most prominent in the field of special education; however,other subfields within education have also felt the impact, such as counselling, and regular classroom practice. The psychological model has come to be referred to as behaviour modification. Ullman and Krasner (I965) defined behaviour modification as, "the application of the results of learning theory and experimental psychology to the problem of altering maladaptive behaviour." Environmental forces are an integral part of behaviour modification which adopts the behavioural rather than the medical model discussed above. In his discussion of the behavioural model as a new alternative approach to diagnosis, Arthur (I969) stated:

".....the origin of this approach is in the behaviouristic psychology of Pavlov, Watson, Hull, Dunlap, and Skinner. Its application to the problems of diagnosis and assessment is recent and mainly associated with behaviour modification techniques... .....For Krumboltz (I966), the advantages of the learning approach to behaviour problems lie in the principles that

there is much evidence and knowledge on the problems of learning, and learning is integrated with the enterprise of modification, that the goals of learning can be defined and reached better than those of other techniques, that learning focusses more on action than on problems, and that patients can be expected to face an increased sense of responsibility for their actions when they become aware that they can learn effective ways of dealing with their problems" (1969, p. 187 - 188).

The behavioural model views man as the product of his previous experiences within the environment, limited by the cognitive and physical characteristics that he has inherited. Based primarily upon the training, or "conditioning", of infrahuman species, this model emphasises the consequences that follow an individual's behaviour and alter its probability at some future time. In addition, stimuli in the environment associated with such consequences often come to assume controlling properties. This model rejects the notion of unconscious processes or internal determinants of behaviour in its most extreme point of view; however, Skinner emphasised that thoughts, cognitions, or other internal phenomena could be affected by consequences in the same way as overt verbal and motor behaviours. The individual is consciously aware of all aspects of his behaviour and may self - design strategies for altering it; however, environmental contingencies are often beyond the person's control and may come to limit his choices.

Many behaviour therapists eschew internalised constructs such as motives and needs, and as the name implies, concentrate on the behaviour itself. Their view of personality is based upon models of learning and behaviour influence. For example,

Wolpe defines personality as the person's totality of habits or learned S - R bonds. Most behaviour therapists take the position that the behaviour indicates the real person and all we can really know about the person is his behaviour in the context of the situation. The focus of behaviour modification therefore becomes the systematic application of techniques that are based on learning theory and experimental research to change some observable behaviour. The rationale for insisting that the behaviour selected for modification be observable is based on the assertion that the behaviour modifier should be able to evaluate the effectiveness of his techniques, and that when the behaviour to be modified is not observable in a manner such that more than one person would agree to the frequency, rate, intensity, duration, or pattern of behaviour, evaluations become much less stringent. It is also very difficult to reinforce unobservable behaviour.

Skinner's radical behaviourist views on personality (1953, 1971) typify the ideal - type position that focusses on external contingencies of behaviour and eschews internal constructs. Skinner and most behaviour modifiers involved with the operant conditioning paradigm view genetic and cultural influences and the near environment as shaping forces of the individual. According to Evans (1968), ".....in Skinner's experimental analysis of behaviour he has integrated all these three conceptions into a purely empirical system in which generic bases of behaviour vis a vis biological, social, or self - determinism are less important than arranging contingencies of reinforcement in the organism's immediate environment so that the probability of a given response is heightened." (p.29). In the Skinnerian

orientation, the culture through parents, peers, and other socializing agents shapes the individual by reinforcing the behaviour that it desires and punishing behaviour it does not desire, conditioning anxiety reactions to some situations but not to others, teaching norms of acceptable social behaviour, shaping the person's standards of art and morality, and so forth. Attention is focussed on contingencies of reinforcement rather than individual dynamics of personality. He believes that a small number of learning concepts such as reinforcement, extinction, and counterconditioning can account for complex human behaviour.

In contrast to the Skinnerians, whose causal analysis of behaviour emphasises external contingencies, several influential behaviour modifiers take a social learning view which places greater importance on cognition, imitation, and self-reinforcement. Bandura (I97I) discusses several features of social learning theory which distinguish it from radical behaviourism and traditional learning theory. First, there is an emphasis on observational learning and modelling as an important basis, along with direct experience, for learning about consequences of behaviour and environment. Second, there is an emphasis on man's cognitive capacity which enables him to think about the consequences of alternative actions without actually having to perform them. This may be called insightful and foresightful behaviour. Third, there is an emphasis on creating self - regulating influences. Man can manipulate stimuli in order to produce certain consequences, thus allowing him to control his own behaviour to a certain degree. Bandura states (I97I): ".....in the social learning view, man is neither driven by inner forces nor buffeted

helplessly by environmental influences. Rather psychological functioning is best understood in terms of a continuous reciprocal interaction between behaviour and its controlling conditions. Behaviour partly creates the environment and the resultant environment, in turn influences behaviour." (p. 40). Nay (I976) refers to this view as a phenomenal/behavioural approach representing a merging of phenomenological and behavioural points of view. This approach is reflected in the procedures of a number of "behaviourists" including Kanfer and Phillips, I970; Karoly and Kanfer, I974; Meichenbaum, I97I; Goldfried and Merbaum, I973; and Mahoney, I974. While emphases upon extrinsic versus self - regulated control, upon learning, social learning, or cognitive supposed underpinnings, have varied considerably, those methods that have emerged have often been described as "behavioural".

In common with the radical behaviourist perspective, the phenomenal/behavioural approach does not view man as sick or "diseased". In describing the approach therapists take within the behavioural model, Whitman and Whitman (I97I) discuss the futility of labelling a person according to concepts found in the medical model. In a similar vein, Ullman and Krasner (I965) in presenting a psychological formulation of maladaptive behaviour within a behaviour modification paradigm noted the following:

".....maladaptive behaviours are learned behaviours, and the development and maintenance of a maladaptive behaviour is no different from the development and maintenance of any other behaviour. There is no discontinuity between desirable and undesirable modes of adjustment or between "healthy" and "sick" behaviour. The first major implication of this view

is the question of how a behaviour is to be identified as desirable, or undesirable, adaptive or maladaptive. The general answer proposed is that there are no disease entities involved in the majority of subjects displaying maladaptive behaviour, the designation of a behaviour as pathological or not is dependent upon the individual's society..... ...Behaviour that one culture might consider maladaptive, be it that of the shaman or the paranoid, is adaptive in another culture if the person so behaving is responding to all the cues present in the situation in a manner likely to lead to his obtaining reinforcement (rewards) appropriate to his status in that society. Maladaptive behaviour is behaviour that is considered inappropriate by those key people in a person's life who control reinforcers (p. 20)."

In the social learning view, "such terms as mental illness, maladjustment, and abnormality all refer to social judgements about a person's behaviour rather than to hypothesised diseases or to traits or states that reside in the person who displays the behaviour." (Mischel, I968, p. I98).

In summary, behaviour modifiers make the assumption that if an unadaptive habit or behaviour can develop through learning, it can be changes through learning. In this view, behaviour change does not merely remove the <u>symptom</u> without curing the <u>disease</u> as the medical model asserts. Rather, behaviour change removes the problem at it's actual sources: <u>behaviour</u>. The radical behaviourist approach emphasizes the positive and negative feedback each individual receives from his environment as the primary determinant of his behaviour. The phenomenal/behavioural approach suggests that a person is consciously aware of those intrinsic and extrinsic

events that come to control his environment. This approach also encourages the client to participate in defining goals and choosing from among potential treatments ie. self - directed control is seen as the optimal goal. The token economy programme described and evaluated in Chapter Four is firmly placed within the phenomenal/behavioural perspective. At a practical level this approach(s) has a number of important implications for the classroom teacher:

I. the teacher becomes the "specialist" in applied learning theory;
2. "treatment" can take place in the natural environment ie. the classroom, since there is no longer any need to refer to a medical professional;
3. the focus is on observable "here and now" behaviour, ie. the problem behaviour that is causing the teacher/child concern, and not some more basic internal hypothetical event(s) such as hostility, repressed wishes, minimal brain damage, learning disabilities, and so on;
4. there is <u>no negation</u> of a warm positive relationship between pupil and teacher; in fact, the relationship is seen as an important medium within which the pupil may divulge information to the teacher confidentially, and generally receive the active support of the teacher for his efforts;
5. the teacher is a resource for the child, a source of information, who may be of assistance in defining goals or suggesting alternative methods of achieving them;
6. both the teacher and the pupils take an active part in collecting, and collating data;
7. the teacher can view the behaviour of a pupil in terms of

environmental requirements and attempt to provide those programmes that will, in fact, influence behaviour;

8. the behaviour modification approach uses a general functional analysis of behaviour methodology which provides the teacher with a specific means of evaluating the effectiveness of the treatment programme (Baer, Wolf, & Risley, I968);

9. taken to its logical conclusion, teaching is behaviour modification.

In short, "all behaviour modification boils down to procedures utilizing systematic environmental contingencies to alter the subjects response to stimuli." (Ullman & Krasner, I965, p. 29).

General Issues - (I) Technology or Science ?

London (I972) states, "The early growth of behaviour modification as a professional speciality was largely polemical and political, not theoretical, and most of its scientific hoopla evolved to serve the polemical needs of the people who made it up - not all of it, however, and not only polemical needs. The study of learning for behaviour therapists was largely for the purposes of metaphor, paradigm, and analogy than for strict guidance about how to operate or about what it means." London favours the development of a technology of behaviour therapy and views theory with indifference or even open hostility. Several other psychologists including Arthur (I97I), and Lazarus (I97I) hold similar views.

London argues that behaviour modification is without theory and therefore it is reduced to a technology rather than a science. What they (the behaviour modifiers) had was an ideology or rallying point. London asserts that "the critical

point is that <u>good technology</u> always undermines bad theory, and theory has worn itself out in behaviour modification and .....technology, essentially of treatment, should now be a primary focus" (p. 9I9). "However interesting, plausible, and appealing a theory may be, it is techniques, not theories, that are actually used on people. Study of the effects of psychotherapy, therefore, is always the study of the effectiveness of techniques" (p. 33). The polemics used by behaviour therapists, according to London, included:

a) an attack on the "medical model";
b) an insistence that the origins of the disorder were in <u>learning</u> instead of biochemical or genetic events;
c) the proposition that effective therapies should treat symptoms instead of their causes, that is, that disorders are identical with their symptoms, and finally,
d) the demand that even the name of the game be changed from psychotherapy to behaviour therapy.

London believes that, "enormous time and space have been wasted in pious debates on irrelevant aspects of most of the popular polemic issues of psychotherapy," and that, "when you eliminate the polemics and politics and gratuities, however, what remains of theory to define the field and tell you what it is about ? Not a lot." The definition of the field either becomes very inclusive (Lazarus, I97I; Marston, I970; Paul, I969; Skinner, I97I), or very narrow (Eysenck, I960; Skinner, I963; Wolpe, I968). This probably makes no difference to anything. As Kuhn (I962) said, "can a definition tell a man whether he is a scientist or not (p. I60) ?"

Like London, Arthur (I97I) has strongly argued in favour of an engineering approach to behaviour modification and has

pointed out that it is a mistake to believe that applications of science derive from theories and are contingent upon theoretical advances. He points to the reluctance of clinical psychologists to be regarded as, or become, "engineers" of behaviour in the real sense, that is, by using machines, computors, and so on, because they think this may dehumanize them.

Lazarus represents the most extreme version of the technological approach, and is clearly illustrated in his book, Behaviour Therapy and Beyond (I97I), in which he says:

"the emphasis of this volume is upon techniques rather than upon theories.....Technical eclecticism does not imply a random melange of techniques taken haphazardly out of the air. It is an approach which urges therapists to experiment with empirically useful methods instead of using their theories as a priori predictors of what will and will not succeed in therapy." (p. xii).

Franks (I969) argued, to the contrary:

".....it would seem to be highly desirable for the therapist to aspire to be a scientist even if this goal were difficult to realise. To function as a scientist, it is necessary to espouse some theoretical framework. For reasons too obvious to detail here, this is true of the behaviour therapist..... .....How the behaviour therapist practices (including his choice of technique, his approach to the problems of general strategy, and his specific relationship with his patients) thus depends upon his explicit theoretical orientation and upon his implicit philosophical and cultural milieu" (p. 2I)

The viewpoints of London, Arthur, and in particular Lazarus

in his "multimodal behaviour therapy", have come increasingly to the fore in recent years. It was pointed out by Yates (I970) that four distinct positions could be discerned concerning the relationship between behaviour therapy and psychotherapy:

I) that there are fundamental differences between the two approaches that are irreconcilable;
2) that there are both similarities and differences that make the two approaches complementary;
3) that behaviour therapy, when it is successful, is so because of elements in it that are of the essence of psychotherapy;
4) that psychotherapy, when it is successful, is so because of elements in it that are of the essence of behaviour therapy.

Yates (I975) believes that it is the second viewpoint that has gained ground in recent years leading to the development of a phenomenal/behaviourism, discussed earlier. In a debate transcripted in Humanism and Behaviourism (edited by Wandersman, Poppen, and Ricks, I976), Rychlak and Mischel, representing humanistic and behaviourist points of view respectively, both point the way to understanding each human being as an active, aware problem solver, accomodating to his environment, but also assimilating it in his own way, influenced, but also influencing. The most popular synthesis continues to be one with a long history, the use of behaviourist techniques to reach humanistic goals. Token economies have often been seen as the purist form of Skinnerian behaviourism. Susan Curtiss (I976) used token economy techniques to enliven and

modify a traditional mental hospital ward. The goals set in this programme, "internalising controls" and "developing spontaneity", were thoroughly humanistic. And while the technology used was primarily behaviouristic, the method of individual contracts based on mutual decisions of patient and therapist shows the respect for individual choice that is the hallmark of humanism. Similarly, Burland (I975) has recently described, and filmed, a token economy programme in a residential school for maladjusted children in north Devon, which represents an exceptionally informed and sensitive use of the basic methodology.

Recent developments in social learning theory, which emphasise self - awareness and social effects of behaviour, put a strong emphasis on the person in the person - environment interaction. Equally there is clearly a movement toward the incorporation of cognition, fantasy, and affect into behaviour theory. This growth in the scope of behaviour theory is probably due to its current involvement in real life problems. It seems increasingly clear that a therapy based on human learning will have to make learning about human relationships a primary focus. Older learning theories based on rats or dogs or pigeons are not likely to be so relevant. And as learning theories focus on how relationships are learned they converge toward areas traditionally considered humanistic.

The arguments presented would suggest that psychologists and teachers should abandon theory and use any technique that "works". However, Yates (I975) argues, on the basis of Kuhn's (I962) analysis of what goes on in the preparadigm state of science, that it would not only be unnecessary to

abandon the scientific endeavour until a paradigm is found, but that such a decision would contradict what is known about the development of science. Yates puts it like this:

".....enough has been said to show that psychology is still in the preparadigm stage and that it highly likely that it will not advance significantly until a paradigm is found which will be accepted by all psychologists as valid, and that this paradigm will not appear if psychologists abandon theorising and merely concentrate on being empiricists." (p. I8)

Kuhn, in fact, is especially critical of the view that empiricism must precede theory. He has shown that, in the preparadigm state, both theory and practice proliferate rather than stagnate, the difference between pre- and post-paradigm states lying in the discipline with which the scientists work. Further more, the initial paradigm will arise only out of this undisciplined activity. It follows, therefore, from what has been said that behaviour modifiers need not rely solely on blind technology, "thrashing about multimodally in the dark until a technique is discovered by chance that appears to work." (Yates, I975)

What does all this mean for the classroom teacher ? London's observations are most acceptable simply because teachers are concerned about good technology, ie. techniques that work. By employing techniques that work it is obviously possible to compromise theoretical contradictions. The research reported in Chapter Four is considerably influenced by London's provocative essay, and as such the behaviour change strategies employed are not constrained by an artificial, and theoretically unitary viewpoint.

General Issues - (2) Ethics

At first glance, the ethics of therapy appear clear and straightforward: "therapy should provide the maximum benefit to the patient and to society, with careful consideration and resolution of conflicts when they occur." (Miron, I968). Or, as London (I969) has put it, "therapy and other behavioural influence procedures should strike a balance between personal liberty and the public interest." There are, however, many problems inherent in these views.

The definition of deviance

Who decides that the client's behaviour should be modified and in what direction it should be modified ? This general issue is mentioned first to emphasise that the most basic decisions made by the behaviour modifier - whether to modify and which response to modify - involve value judgements (Krasner, I962; Begelman, I973). In practice, behaviour therapists often let society's representatives define deviance by telling the professional which behaviour(s) needs changing. The behavioural programme is then set up either to alter the environmental contingencies to shape different behaviour, or to give the individual new learning experiences, again to shape different behaviour. Implicit in this approach are the assumptions that it is appropriate for society at large to define deviance, and that those who do not conform to that definition should change. Krasner and Ullman (I965, p. 363), for example, say that "the ultimate source of values is..... ....the requirements of the society" in which the patient and

therapist live."

Winett and Winkler (1972), however, have eloquently argued the other side of this issue. Noting that behaviour modifiers have typically worked to adjust people to existing institutions and social systems, they suggest that behavioural researchers must also consider creating new environments and changing the social system. According to this view, the deviance is not necessarily within the individual; it may be that the social system itself is inappropriate and in need of treatment. Ideally the client's preferences should be the deciding factor in deciding whether there should be treatment, and, if so, what the behavioural goals should be.

In choosing a programme goal the basic question is for whose benefit is the person's behaviour being changed ? Is the child's behaviour being changed for the benefit of the school, of the parent, of the experimenter, or of the child ? I myself feel that the child's benefit should be considered foremost. Control can be justified when the interventions will benefit the children, or whoever the clients are, in some way that they or their guardians want them to benefit, other things being equal. O'Leary and O'Leary (1977) believe that the teacher, headteacher, school governors, the Department of Education and Science, and the student all have some influence on the selection of classroom goals. However, the teacher and parents are almost universally the major determiners of the student's goals. As the student progresses through school, his or her input into the choice of goals should become greater. Parents should be involved in the determination of their child's educational goals wherever possible, because at least in primary school, parents appear to have a

very significant impact on a child's achievement (Coleman, I975).

Informed consent

O'Leary and O'Leary (I977) provide the following guidelines for behaviour modifiers working with children:

I) when children are able to understand the purpose of the intervention programme their permission should be obtained. With children who are less than I2 years of age or who are functioning below the I2 - year level, parental consent would seem sufficient;

2) where children are institutionalized, written permission should be obtained from the hospital or other institution. In cases where parents might object to a particular intervention, such as time-out from reinforcement, written consent should be obtained from both parents and the hospital administrator;

3) to be duly informed, consent should include a discussion of alternatives to the particular educational or psychological intervention being investigated. For example, it is incumbent upon a behaviour modifier evaluating psychological interventions with hyperactive children to alert the parents to the benefits and risks of pharmalogical treatment;

4) another important factor which should be discussed with parents in obtaining their informed consent is the likelihood of spontaneous remission for a particular problem;

5) finally, it must be apparent to the child and his or her parents that they can withdraw from a research programme without reprisal at any time.

Martin (1974) has summarised the basic issues regarding consent, as follows:

"Even if a subject does have the capacity to consent, the consent must be voluntary. A recent court decision suggested that prisoners were inherently in a coerced position and could not voluntarily consent to anything. A typical problem facing behaviour change programmes is whether the voluntary choice has been so engineered - a "choice" between entering the programme or suffering a state of intolerable deprivation - that it is not voluntary.

Similar to this issue of voluntariness is the necessity that the subject be sufficiently cognizant of what he is getting into so that there is informed consent. The most basic information needed is to know that you do not have to consent; that you also have the right to revoke consent at any time; and an explanation of the benefits and risks of undergoing that particular behaviour change strategy. Ethics should require, in addition, an explanation of alternative forms of therapy and some estimate of their relative effectiveness." (p. 8)

Most of what has been said above with respect to behaviour modification in the classroom applies to research rather than practice. However, when does an effort by a teacher or consultant to analyse the cause of a child's behaviour or to evaluate a new approach become a research rather than a normal teaching endeavour and therefore require parental consent ? O'Leary and O'Leary (1977) provide the following answer:

"If procedures have been well substantiated by past research, they can be viewed as acceptable practice, rather than research, and therefore may be implemented without parental consent.

However, teachers should seek rather than avoid parental consent regardless of whether the programme to be implemented is viewed as research, simply because involving parents and children is usually advantageous to any behaviour change programme. Consultants to classroom teachers, such as school and clinical psychologists, must also provide their clients with adequate information regarding treatment." (p. 301)

Research Design

In evaluating the effects of behavioural procedures, a researcher must be able to measure behaviour change and to compare that change with changes which occur naturally over time and with changes brought about by other methods. The control procedure most frequently employed by behaviour modifiers in the classroom has been the ABAB or reversal control. Children's behaviour is assessed prior to intervention (A), during the intervention (B), when the intervention is withdrawn (A), and finally when the treatment is reinstated (B). Unfortunately, there are two important disadvantages of this design. First, the reversal design almost certainly functions to foster discrimination rather than to produce generalization. For example, if a teacher repeatedly introduces and withdraws a token programme, the children may respond to any future fading attempts by increasing inappropriate behaviour in the hope that the teacher might reintroduce the full token programme. Second, and of greater importance to parents and teachers, the reversal design means that an effective treatment is discontinued. Even if the cessation is temporary, concerned parties should reasonably wonder if similarly significant treatment results could ever again be achieved.

O'Leary and O'Leary suggest that, "with alternative control procedures available which can answer research questions at least as well as the reversal procedures, if not as conveniently, investigators should be encouraged to use reversal designs less frequently where significant clinical and/or educational problems are being treated. Additionally, the method of control should be discussed as part of the informed consent procedure." (p. 305)

The "alternative control procedures" are discussed in Chapter Two.

Aversive therapy procedures

In the ethical context, the fundamental question is whether aversive methods are by definition inhumane. Krasner (1962) has argued that at least some of them are. Speaking of some treatments that he finds severely aversive, he says, "You cannot shape responsible behaviour in an individual while at the same time treating him inhumanely. You cannot build a new social environment with any chance of enhancing human dignity based on procedures inducing indignity." However, any proposed procedure, including aversive techniques, needs to be evaluated in terms of the risks and benefits associated with a specific use.

Several investigators have used aversive techniques to eliminate children's self - injurious behaviour (Bucher, 1969). Baer (1970) states, "In such cases, the risk of the child continuing the self - injurious behaviour is serious, alternative treatments appear to be ineffective, and potential benefits to the child from the treatment are great. This is the kind of situation in which the risks from the treatment itself,

unexpected side effects, and temporary discomfort, appear to be more than outweighed by the benefits."

In the past decade behaviour modifiers have been highly successful in developing and evaluating procedures for improving children's behaviour in school. With the increased use of behaviour modification procedures, concern over related ethical issues has arisen. Ethical concerns have been addressed by a number of behaviour modifiers (Davison & Stuart, I975; Goldiamond, I974; London, I969; Wood, I975), and ethical issues regarding behaviour modification in the classroom have been addressed specifically (O'Leary & O'Leary, I977; Winett & Winkler, I972). Guidelines are evolving regarding the research and practice of behaviour modification in the classroom, and cognizance of these have been taken in carrying out the research reported in Chapter Four.

CHAPTER TWO

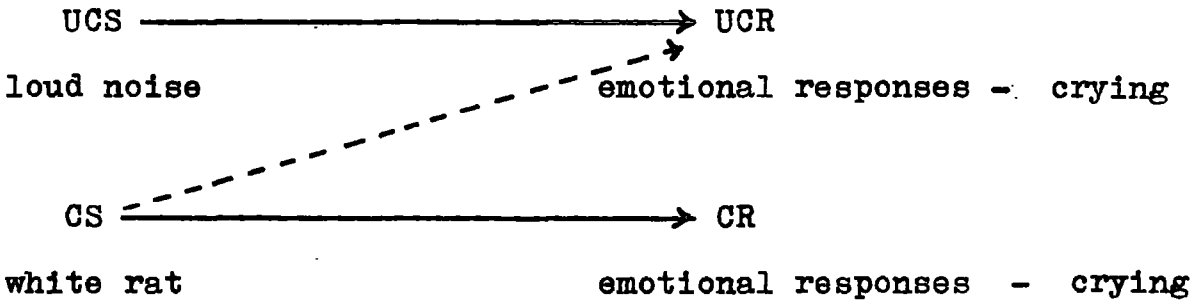
BEHAVIOURAL INTERVENTION - PROCEDURES, WITH PARTICULAR REFERENCE TO THE CLASSROOM.

Environmental determinants of behaviour

Historically, one can trace the development of the study of learning (the organism - environment relationship) to the work of Ivan Pavlov, and to Edward L. Thorndike, both working at around the turn of the century. Pavlov's classical conditioning experiments show how new or neutral stimuli (conditioned stimuli or CS) come to elicit innate responses (conditioned responses or CR) by virtue of their having been paired temporarily with eliciting stimuli (the unconditioned stimulus or US). Pavlov (I927, I928), whilst studying the digestive system of dogs, noticed that while the presence of food (the US) in the animal's mouth could reliably predict the flow of saliva (the innate response or UR), the sight of the experimenter who brought the food (and, who was paired with the food) soon came to elicit salivation (the CR). Pavlov and his co - workers set out to verify, quantify, and systematise their "casual" observations.

An array of involuntary responses may be classically conditioned in humans: eye - blink response to a puff of air; GSR to shock; pupillary response to light, and so on. Outside the formal laboratory situation there is a good deal of evidence to suggest that many of the autonomic responses within a client's report of "anxiety" or "fear" may have been learned through classical conditioning mechanisms (Rachman, I966; Rachman & Hodgson, I968). A number of investigators have induced certain deviant behaviours in subjects using classical conditioning procedures as a means of illustrating the manner in which such inappropriate behaviours may be learned (Watson & Raynor, I920; Krasnogorski, I925). In the case study by Watson and Raynor, an eleven - month - old boy,

was the subject. Like any other child, Albert startled at a sudden loud noise. Watson and Raynor paired a white rat, which Albert did not fear initially, with the loud noise. This was accomplished by presenting the white rat and when Albert touched the rat, the loud noise was presented by striking a large steel bar directly behind the child's head, which caused Albert to cry. Through pairing the white rat with the loud noise, it was found that the white rat had acquired the eliciting power that it originally lacked; that is, Albert learned to make the same response (crying) to the new stimulus (the white rat). This can be represented as follows:



This example illustrates how the classical conditioning model might potentially explain the development of childhood fears. Normally a large number of trials of pairing the UCS and CS are necessary to instigate classical conditioning, although a number of investigators have found that such conditioning can occur in just a few trials when the stimuli are very intensive, such as the noise in the example above (Lichtenstein, I950). The process whereby the child "unlearns" responses learned in the above manner is called "desensitization". Desensitization procedures will be discussed later in this chapter under "procedures for weakening behaviour".

The operations and measurements of the typical Pavlovian

experiment can be distinguished from those of the instrumental conditioning and operant conditioning paradigms developed by E.L. Thorndike (I898) and B.F. Skinner (I938). Thorndike's experiments with dogs, cats, and chicks, for example, differed in at least one very basic way from those of Pavlov; namely, Thorndike's animals were active in their engagement of the environment. Thorndike placed his experimental subjects in an enclosed "puzzle - box" from which they were required to escape, by the manipulation of the correct lever or pulley, in order to obtain a food reward. Through the process of "trial and error", Thorndike's subjects eventually "learned" (ie. their behaviour changed as a result of a situational encounter). Since the animal's behaviours were instrumental in affecting escape from the box and in obtaining food, the paradigm was labelled instrumental conditioning. Thorndike viewed the animal as learning through "selecting and connecting". That is, the animal in the puzzle-box selected a response from a variety of responses available to it, tried it out, and continued to sample response options until the solution (escape from the box) was discovered. The animal would eventually connect the correct response to a particular puzzle-box arrangement (stimulus). Learning came to be understood as obeying several basic laws of stimulus - response connectionism, the most important of which is the law of effect. Simply put, this law states that "behaviour is controlled by its consequences". Specifically, behaviour that is followed by a "satisfying state of affairs" is stamped in (strengthened), and behaviour that is followed by an "annoying state of affairs" is stamped out (weakened). Annoyers and satisfyers correspond to the more familiar terms punishment and reward.

Skinner (I937) referred to the Pavlovian model, built upon the pairing of two stimuli, as Type S conditioning, and to the Thorndikian operation of having a reward follow contingent upon the emission of a response as Type R conditioning. Skinner is credited with ushering in a science and technology built upon Type R or, as it is now called, operant conditioning. It is Skinner's basic position and elaborations of it that form the nucleus of the research programme described in Chapter Four.

Skinner's break with the traditions of learning and abnormal psychology was sharp and radical. Whereas many learning theorists had stressed the importance of the immediately preceeding stimulus, and clinical theorists (eg. Freud) had stressed the distant past as a critical antecedent of learning, Skinner (I938) sought to mount a research programme in which the stimulus would occupy "no special place among the independent variables". He concentrated his studies on operants, behaviours freely emitted which operate on the environment and which are, in turn, controlled by their environmental consequences (ie. their future probability of occurrence is either increased or decreased by the events that follow their emission). Operants are defined as behaviours which are "best understood as functionally related to their consequences in the environment" (Bijou & Baer, I96I). These are behaviours which are "goal directed", "purposeful", or "instrumental" in attaining goals. Antecedent stimulation may set the occasion for operants but the stimulus which controls emission of the operant is the consequent or reinforcing stimulus. Although the term "free operant" is often used to fully describe the absence of constraints on the organism's responding, most contexts actually

include limiting features that set "natural boundaries" on the quality and quantity of behaviours emitted. For instance, the youngster whose tantrum behaviour may be considered an operant (rewarded by parental attention) can only throw his toys about the room when those toys are available to him. This example simply underscores the interdependence of the individual and his environment - a recognition that is central to the Skinnerian perspective.

A key concept in operant analysis is the contingency relationship between an operant and the environmental events that follow it. The term contingency refers to the nature of the relationship between a response and subsequent environmental events. Specification of a contingency or schedule of reinforcement indicates when consequences are to be delivered for responses. Lindsley (1970) has pointed out that Skinnerians were at one time the world experts on contingencies. This arose from the fact that responses (pecking or lever pressing) and consequences (grain or rat pellets) were held constant and only contingencies allowed to vary in their studies. Interest in the applied area has broadened the scope of the approach to include greater concern with different types of response and consequence, and also concern with programmes involving many stimuli, responses, contingencies, and consequences. To the extent that behaviour modification is currently involved with shaping new responses, contingencies are often simplified to continuous reinforcement. Certainly the elaborate study of "schedules" is not evident in the applied field, almost to the point of suggesting that this parameter may not be as important in practice as the initial emphasis of the experimental analysis of behaviour would sug-

gest.

As we shall see later in this chapter, the majority of the therapeutic uses of operant conditioning has been aimed at some combination of the following objectives:

a) the development or establishment of a behaviour (eg. social interaction in a withdrawn child);
b) the acceleration or strengthening of a behaviour (eg. co-operative play in a group of nursery school children);
c) the elimination or weakening of a response (eg. reduction in classroom noise).

The operations of reinforcement, extinction, and punishment represent specialised response - environment relationships which produce changes in the probability of emission of operant behaviour. Before discussing how these basic procedures may be employed to modify classroom problem behaviour, let us examine each in more detail.

A reinforcer is a stimulus which, if it occurs contingent upon the emission of an operant response, will tend to maintain or increase the probability of that response in the future. Reinforcement refers to the operations involved in using reinforcers to maintain or increase the likelihood of a particular response. Skinner (1938) has distinguished between two kinds of reinforcing stimuli: positive reinforcers and negative reinforcers. A positive reinforcer is a stimulus which produces a reinforcing effect (response maintenance or acceleration) when presented, while a negative reinforcer is a stimulus which strengthens a response when contingently removed. Thousands of experiments have now been conducted to identify factors that influence the effectiveness of reinforcement operations. In general, reinforcers exert their greatest

effect on response acquisition and strengthening when they are delivered contingently, consistently, and immediately. The number of times a response is reinforced and the quantity of reinforcers per response are related to the strength of the behaviour in a negatively accelerated function. That is, small increases in number or magnitude of reinforcers will result in larger increases in response strength, until the response reaches a plateau (or asymptotic level), after which the net addition to response strength declines (Deese & Hulse, I967). Skinner and his colleages (eg. Ferster & Skinner, I957) have pioneered the study of reinforcement schedules. Reynolds (I968) explains that:

".....schedules of reinforcement have regular, and profound effects on the organism's rate of responding. The importance of schedules of reinforcement cannot be overestimated. No description, account, or explanation of any operant behaviour of any organism is complete unless the schedule of reinforcement is specified." (p. 60)

Excellent discussions of reinforcement schedules are provided by Reynolds (I968), Rachlin (I970), Williams (I973), and Blackman (I974). Blackman discusses four basic schedules of reinforcement:

I) fixed ratio, where reinforcement follows the operant response after a fixed (and invariant) number of responses have occurred. So with FRI5, every fifteenth response is followed by a reinforcer. Blackman notes that, "FR requirements may find an analogy in human behaviour in the method of payment in industry known as piecework", and "another superficial example of an FR schedule in human behaviour

may be found in writing "lines" as a punishment in school, where the consequences depend upon a specified amount of work being emitted." (p. 57);

2) variable ratio, where reinforcement occurs after an average, rather than a fixed, number of responses have been emitted. Thus, if the schedule is VRI5, this means that the overall ratio of responses to reinforcements will be I5:I. The operant behaviour generated by such schedules of reinforcement is typified by sustained high rates of response emission;

3) fixed interval, where a fixed period of time occurs between the delivery of one reinforcer and the availability of the next. Thus, for a FI I5 minute schedule the response which is followed by a reinforcer will be the first response to occur after I5 minutes have elapsed since the previous reinforced response;

4) variable interval, where an average minimum delay is specified between the delivery of one reinforcement and the time at which the next becomes available.

The importance of schedules in the experimental analysis of behaviour is summed up by Blackman (pages 66-67):

"It is of the upmost importance that the ways in which a reinforcer are made to occur can produce such great differences on the operant behaviour with which they are related. It is also important that intermittencies in reinforcement may exert powerful control over behaviour. It might also be mentioned that any schedule of intermittent reinforcement dramatically prolongs the extinction process in comparison to the effects of withholding reinforcement after an animal has been rein-

forced after each operant response. All these points have important implications for the experimental analysis of human behaviour, for although these schedules are experimental abstractions, they may have general analogies in the real world. The environmental events associated with our behaviour may not follow each occasion we behave in that way; yet, almost paradoxically, these intermittent relationships between our behaviour and those events may produce the more dramatic effects on behaviour."

However, it should be pointed out again, that the manner in which schedules of reinforcement affect the behaviour of humans has not been adequately determined (eg. Kazdin & Bootzin, 1972). The cognitive capacities of humans would suggest that such schedules might operate in a different manner from those of infrahuman organisms.

When negative consequences are employed, they are most frequently presented within a punishment paradigm. A punishment or punisher is any event that follows some behaviour that decreases the probability of the behaviour at some future time. An operant (x) may be weakened in any of three ways:

i) by making an aversive or noxious stimulus contingent upon it (punishment);

ii) by causing a positive reinforcer to be lost or removed contingent upon its emission ("time-out"; response cost);

iii) by presenting a neutral stimulus contingently and consistently after each instance of (x) (extinction).

Further discussion of these methods of weakening behaviour will occur in relation to specific problems in the classroom.

Stimulus Control

In the Skinnerian analysis of behaviour, stimuli do not act as "goads" to action, as in the case of a reflex. Yet, prior stimulation does influence subsequent behaviour. Antecedent conditions act as signals, cues, or more correctly as discriminative stimuli (S^ds) identifying the conditions as those in which a specific action will be reinforced. Animals as well as humans learn that responses are rewarded in context, and that the recurrence of the context is likely to signal the reintroduction of response-contingent reward (or punishment). This discriminative control of behaviour is termed stimulus control. Including the discriminative stimulus in the behavioural formula, along with the operant response and its contingent reinforcement, yields the basic Skinnerian "three-term contingency":

$$S^d \text{ ——— } R \text{ ——— } S^r$$

(I) discriminative stimuli (2) response (3) reinforcing stimulus

Contingency management refers to the manipulation of (3) relative to (2). Stimulus control refers to the control of (I) and its effects on (2). Behavioural engineering is a term used to describe the combined technologies of stimulus control and contingency management (Homme et al, I968). Ward (I976) suggests that:

".....with problems over generalisation, psychologists appear once again to be focussing their attention upon the analysis of antecedent and setting events, although it must be conceded that the better educational applications of BM

(eg. Bijou, I973; Staats et al, I974) have always used a balanced approach."

The above discussion has focussed on extrinsic controlling variables. It should be borne in mind though, that any evaluation of the extrinsic incentives/punishments that seem to control a client's behaviour must be augmented by an evaluation of the way in which the client cognitively construes them. The teacher/therapist can provide or remove some material consequences or employ an array of verbal or non-verbal communications as a means of altering behaviour, but success depends on how these events are construed by the client. As was mentioned in Chapter One there has been an increasing use of change procedures directed at covert behaviours (Goldfried & Merbaum, I973; Mahoney, I974). It is increasingly recognized that such intrinsic phenomena as self-instructions and self-mediated reward and punishment may come to exert important controls over a client's behaviour.

PRACTICAL IMPLICATIONS FOR AN APPLIED ANALYSIS OF BEHAVIOUR.

Behavioural assessment: the definition and measurement of problem behaviour.

For the behaviour modifier the assessment task involves, (a) precise measurement and a resulting description of the behaviour, and (b) searching for the critical variables which hold functional relationships to this behaviour. In this manner both behavioural deficits and assets can be identified and translated into programme components. The primary task, then, becomes one of describing an individual as he functions in various environments, and of identifying those environmental factors which influence behaviour. The goal is a function-

al analysis, the complete listing of all the relevant environmental events, subsequent and antecedent, to an identified behaviour problem. An event is relevant if it serves as an effective cue (discriminative stimulus) or reinforcer for the behaviour in question. And, controlling conditions are not confined exclusively to the external environment. Such covert behaviours as self-instructions, images, or self-reinforcements may also play a critical role. Such a functional analysis approach explains the behaviour by providing a precise description of the problematic behaviours and the factors that are known to control it. Such an approach also suggests means of changing behaviour. Ferster (1965) has indicated:

".....a functional analysis of behavior has the advantage that it specifies the cause of behaviour in the form of explicit environmental events which can be objectively identified and which are potentially manipulable.....Given an individual for whom money, social approval, control of other individuals, and various forms of social contact are reinforcing events, the environment available to the individual has a vast potential for selectively reinforcing those performances that would be effective in producing the reinforcing consequences." (p. II)

The behavioural analysis is an ongoing endeavour, ending only after behavioural goals have been accomplished. Kanfer and Saslow (1965) have suggested that, "in a functional approach it is necessary to continue evaluation of the patient's life pattern and its controlling factors, concurrent with attempted manipulation of these variables by reinforcement, direct intervention, or other means, until the resultant change in the

patient's behaviour permits rstoration of more efficient life experiences". (p. 533) Karoly (I975) summarises the behavioural analysis approach as follows:

".....it is helpful to think of five rudimentary components in the behavioural analysis: the prior environmental stimulation (S), the biological state of the organism (O), the problem response or responses (R), the contingency relationship of the behaviour and subsequent events (K), and the nature of the consequences themselves (C). This formula, S ——— O ——— R ——— K ——— C provides a crude guideline for areas of investigation."

Accounts of the conduct of functional analysis have been provided by Kanfer and Saslow (I969), Ferster and Perrott (I968), Gottman and Leiblum (I974), and Wolpe (I973).

There are three steps followed in functional analysis (Gardner, I97I; Kiernan, I973). These are, firstly, the description of behaviour; secondly, the analysis of discriminative stimuli supporting the behaviour; and thirdly, the analysis of reinforcing or consequating stimuli (Bijou et al, I968; Gardner, I97I; Kiernan, I973).

Step One: Selection and description of target behaviour

In the selection of behaviour, ethical questions immediately arise since behaviour modification, as such, provides no guidelines to the teacher in the determination of what constitutes "good" or "bad", "appropriate" or "inappropriate behaviour". Questions concerning ethics have already been discussed in Chapter One. However, some direction in selecting target behaviours is provided to the teacher by Birnbrauer et al (I97I), who specified the two concerns behaviour modi-

fiers should have: (I) will modification of the behaviour enable the child to adapt more effectively to his environment ? and (2) how can the occurrence of the behaviour be recorded reliably ? These concerns are qualified only by the requirements that behaviour modification conform to social standards and that it will lead to greater self-sufficiency. An additional caution was noted by MacMillan (I970): specifically, that the teacher be certain that the target behaviour is detrimental to the child's learning or well-being, and not simply something that is annoying the teacher. O'Leary and O'Leary (I972) suggest that a child requires some special attention if: (a) his social behaviour interferes significantly with his academic work; (b) he interferes with the social or academic work of other children; (c) he interferes with the teacher's ability to operate effectively; (d) the child is unusually withdrawn; (e) the child has a deficit in an essential skill e.g. attention, speech, social behaviour and so on.

The target behaviour must be precisely and explicitly described in order that reliable observations can be obtained. This implies that independent observers can with regularity agree on the presence or absence of the behaviour. Haring and Lovitt (I967) stated that indirect interpretations of behaviour do not suffice for a behavioural programme. For example, "aggressive", "hyperactive", "immature", although related to behaviour, are not specific enough to enable objective recording of occurrences of the behaviour. Buckley and Walker (I970) recommended that descriptions of <u>what</u> the child is doing are made, without implying motives or feelings from behaviour.

Recording target behaviour

After behaviour has been specified as it occurs in a described environment(s), some measure of the strength of the behaviour is obtained prior to changing the environment. Without assessment of behaviour, before, during, and after a particular intervention one cannot assess the effects of the intervention. Birnbrauer (I970, p. 3I) says, "How else can non - functional and harmful teaching and therapeutic practices be discarded and replaced by more effective ones ? It is not progress to use new techniques without evaluating them." It also provides the teacher or psychologist with accurate feedback as to whether any "change" is occurring. A usual method of recording in the classroom is time sampling. For instance, the initial five minutes of each 30 minute period during a 6 hour school day may be selected for continuous recording. In other instances, the observer may use a "glance and record" procedure. At designated times the teacher would note whether the child was engaging in the specified behaviour eg. on task. No further recording would be made until the next designated time. In this way a representative sample of the behaviour would be obtained. An example of a time sampling technique is exemplified by Madsen et al (I968, p. I4I):

"Each observer had a clip board, stopwatch, and rating sheet. The observer would watch for I0 seconds, and use symbols to record the occurrence of behaviours. In each minute, ratings would be made in five consecutive I0-second intervals and the final I0 seconds would be used for recording comments. Each behaviour category could be rated only once in a I0-second interval."

There are variations on this time sampling procedure. The intervals may be increased or decreased in length. A response may be recorded on the basis of a predetermined time criterion rather than simply on the basis of occurrence or non-occurrence. Recording may also be made on a continuous basis. For example, a teacher may keep a total count of the number of disruptive comments which a child makes in a social adjustment class that meets for 60 minutes daily. Some observers have found a wrist counter to be convenient for this purpose (Lindsley, 1968).

Achieving reliable measures is of upmost importance. Generally independent measurements are taken concurrently by someone other than the primary observer. On occasions a third observer is required as a reliability measurement of the first two observers. Additional independent observers provide valuable information on the consistency of the response definition used throughout the study. Without a reliability measure it cannot be stated with any degree of accuracy what was being measured. Generally, most experimenters report reliability measures for each experimental condition with acceptable reliability usually meaning the range 80 to 100% agreement between observers (Walker & Buckley, 1968; Hall et al, 1969). In an attempt to eliminate observer bias, Madsen et al (1968) instigated experimental changes without informing the observer.

The possibility that the teacher may also profit from these measuring techniques has been explored by Johnson (1967). Briefly, this investigation indicated that it is practical and informative for teachers to assess their student's performances in terms of daily rate, plotted graphically, for target subjects as well as for the entire class.

The recording of the baseline prior to the implementation

of the intervention constitutes baseline data. These data serve as the standard against which the effectiveness of the intervention can be determined. The question of an experimental design, that provides a demonstration that the treatment procedure was critical to the behaviour change, will be discussed later in the chapter (p. 46).

Step Two: Identification and recording of antecedents.

Forness (I970) noted that ".....after it is determined how often a behaviour is emitted, it becomes helpful to know when, or under what circumstances, the target behaviour increases in probability." However, it should be realised that some antecedent events are very difficult to identify since they are mediated by thought processes, and are idiosyncratic. Although research psychologists are aware of the high degree of control exerted over human behaviour by antecedent events behaviour modification techniques have not, as yet, involved them to a high degree, although as Ward (I976) states:

"In education the formulation of objectives is closely bound up with control of antecedent events and is, therefore, clearly of crucial importance; give children inappropriate curricula and the psychologist can have as much surplus behaviour as he or she likes to modify."

Step Three: Analysis of reinforcing or consequating stimuli.

It is a postulate of the behaviourist position that there are now, or have been in the history of the individual, reinforcing consequences to a given continuing behaviour. Some of these consequences (the maintaining reinforcing stimuli) are current in the interactions of focal behaviour and the environ-

ment. Some are not; they are lost in the history of habit formations. For purposes of assessment it is well to assume that there are currently rewarding consequences to the child's behaviours (and misbehaviours). For example, the influence of the teacher's attention in maintaining deviant as well as positive social behaviour in children has been repeatedly demonstrated (e.g. Becker et al, I967; Allen et al, I964; Harris et al, I964). The search for the maintaining stimuli has as it's goal the creation of a functional-analytic hypothesis. Tharp and Wetzel (I969) describe the process in the following way:

"During the period of naturalistic observation, the BA (behaviour analyst *) discovered that Case Pilot 3 underachieved enormously in fourth grade arithmetic. His papers were incorrect and incomplete. The teacher returned them to Pilot 3 who took them home. Each time, the boy's father, upset by his child's arithmetic "stupidity", worked with his son in the evening, carefully explaining the problems and techniques. These sessions occurred several times weekly, and lasted up to an hour. Functional analysis hypothesis: arithmetic underachievement is maintained by the reinforcement of paternal attention." (p. 70)

Once the hypothesis is created, the period of baseline recording can include the simultaneous recording of hypothesized maintaining stimuli. To quote Tharp and Wetzel again:

"Pilot 3' mother was instructed to record on a large calendar those days on which he brought home an unacceptable arithmetic assignment. She was also instructed to record whether or not the father worked with the child at his study-table, and the length of these sessions." (p. 7I)

*inserted by author

It is imperative that the functional relationship remain undisturbed during the baseline period. This requires that the environmental response to focal behaviours remain as it was prior to observation. However, this is difficult to achieve.

Prior to commencing the intervention programme the teacher/psychologist needs to: (a) select the goal behaviour(s), and (b) decide how to evaluate the programme.

Selection of goal behaviour

Hawkins (1975) suggests that selection of goal behaviour should be based on the following three criteria: (i) that it is functional, ie. behaviour that would be potentially reinforced in the natural environment; (ii) that it is observable, and capable of being measured; and, (iii) that it is attainable. Allyon and Azrin (1968) refer to the criterion of functionality as the "relevance of behaviour rule". They concluded that unless this rule is followed, generalization and transfer will not occur. Birnbrauer et al.,(1970) extended the relevance of behaviour rule to suggest that one teach behaviours that increase the child's opportunities to learn more.

Of course, there are many problems inherent in choosing goals, a primary one being the question of institutional goals versus individual goals. McIntire (1974) offers the following guideline:

".....when there is a divergence between the goals of the institutions and of the individuals served by the institutions, goals should be selected that serve the individual. Obviously, when small sacrifices in individual goals are necessary for the survival of the institution, they should be made. However,

institutions should be prepared to sacrifice convenience, inertia, and inappropriate raisons d'etre when they do not serve the institution's true clientele." (p. 409)

The issue raised by Winett and Winkler (I972), mentioned in Chapter One, is relevant here. They state:

"Although teachers and school administrators have extensive training for their work (training that particularly emphasises the philosophy and purposes of education), when given training in applied behaviour analysis, they often apply their new technology only to the achievement of relatively trivial and perhaps even counter-productive objectives, such as sitting still, being quiet, and being obedient to the teacher's every whim." "Behaviour analysts have a genuine responsibility in the process of selecting objectives, even in the context of a system that should be competent in selecting its own objectives wisely, with appropriate priorities."

Certainly, many of the early studies were concerned with shaping up such "trivial" behaviours (eg. Becker et al, I967; Madsen et al, I968; McAllister et al, I969). However, more recent research has shown increasing concern for "functional" behaviours, eg. study behaviour (Darch & Thorpe, I977); academic achievement (Ferritor et al, I972; Hundert, I976; Clingman, I977; Breyer & Allen, I975).

Thoresen (I973) has attempted to show how the ideas of humanistically oriented writers can be "translated" into response terms. A prominent humanistic psychologist has observed that the most pressing problem facing society today is "to make the Good Person". (Maslow, I969, p. 732). Maslow, and others (eg. Allport, I963; Berne, I964; Perls, I969;

Rogers, I969; Assagioli, I975),have written extensively about the optimally developed person, using such terms as "self-actualising", and "fully functioning". But how would such an "optimally developed person" behave ? Thoresen offers a number of examples of both internal and external responses derived from an initial investigation of humanistic writers, eg. increasing the range and accuracy of self-observation and self-description of internal behaviour; increasing perceptual accuracy and variety; decreasing stress and tension responses within the body; increasing the frequency and variety of fantastic responses; increasing frequency and variety of empathic responses, and so on.

Wherever possible children should help to select their own goals. Studies have shown that they sometimes perform better than when they are not involved in the goal setting (Drabman, I973; Felixbrod, O'Leary, & Kent, I976).

Evaluation of the intervention programme

Throughout the intervention period the recording and charting of target behaviour must continue, in order to demonstrate that the programme is effective. This has been traditionally individual-based (Skinner, I938). Kiernan (I974) writes: "The type of law which has been of interest has concerned the effects of contingencies and consequences on the behaviour of the individual. This has led to a rejection of the concepts of Fisherian statistics and the development of an approach which has failed to make contact with experimental design in the rest of psychology (Sidman, I960; Skinner, I966)."

The technique of experimentation developed under the general rubric of applied behaviour analysis has mainly derived

from earlier established ones. The basic form of demonstration of the effects of a variable involves a baseline phase in which existent behaviour is assessed, usually over several successive periods. An experimental variable is then applied and its effects assessed by the extent and pattern of change from the baseline phase. This design suffers several faults, prime among which is the possibility that events other than those being manipulated may be changing at the same time as the shift from baseline to experimental operation. Two basic techniques have been developed to deal with this situation (Baer et al., I968). The first technique is commonly called a reversal or ABA design. This technique involves the withdrawal of the experimental variable either once or on several successive reversals during the experiment. If the variable is critical, behavioural measures should follow the direction of experimental manipulations. This technique makes the assumption that behaviour is "reversible", ie. that baselines can be recovered (Sidman, I960). There are many variations of an ABA design. The experimental variable might be reinstated after the second baseline (A) condition, resulting in an ABAB design, or additional variables may be added to the original experimental variable leading to an ABACA design. In the ABA design, condition (B) could be the removal of a variable involved in (A) rather than the addition of a new one. In a study by Birnbrauer et al.,(I965) tokens were given contingent on correct academic responses during (A). They were removed during (B) and reinstated during the second (A) condition; results during the (B) condition indicated a decrease in accuracy on the academic task. Because applied research in the classroom usually involves remedial or therapeutic aspects, any conditions which

bring about improvement in a pupil's behaviour are usually reinstated prior to termination of research efforts (ie. an ABAB design). It is obvious that the reversal technique presents problems in the school setting. When behaviours of a desirable educational nature are produced, teachers are reluctant to return to the past conditions (when the behaviour was either absent or disruptive). A second problem is the failure of the behaviour to return to previous levels when the experimental variable is changed. It appears that there may be times when the changed behaviour may come into contact with natural reinforcers in the child's environment, and the changes in behaviour may be maintained by these reinforcers. The question of the ethics of experimental design has already been discussed in Chapter One (p. 23-24).

When situational constraints or problems of irreversibility mitigate against a reversal technique, a relatively new technique may be used which allows a demonstration of control without the problems peculiar to a reversal. Risley and Baer (1969, pp. 5-6) called this a "multiple baseline" technique:

"With a multiple baseline design, two or more behaviours of a child are concurrently measured. After baselines are obtained, experimental procedures are applied, first to only one of the behaviours. Any change in the level of this behaviour is compared with the level predicted for that behaviour from the baseline measures. The accuracy of this prediction is assessed by comparing this prediction with the continuing measures of the other behaviour(s). If, in fact, the level of the other behaviour(s) remains relatively constant, and to the extent that it can be assumed that uncontrolled variables, if they had occurred, would have similarly effected all of the behaviours

measured, the baseline prediction of the first behaviour is supported. This is a somewhat weaker design than the A-B-A design, since it involves an additional assumption: that all the measured behaviours are susceptible to the same variables. This latter assumption is, however, supported by demonstrating that the other behaviours are also susceptible to the same experimental procedures as the first, by applying those procedures to the second behaviour, and so on."

Mention should also be made of the "probe" procedure used in behaviour modification methodology to assess the effects of transfer or generalization of learning. The technique involves the use of a "test" set of trials which is related in content to the training set, but on which the individual is never trained. Typical probes include "rate" measures, eg., the number of semtences read in two minutes; the number of arithmetic facts correctly used, and so on. It is thus an effective procedure for assessing progress in a standardised way within the classroom and other "natural" settings. This approach is characteristic of the use of "precision teaching" in behaviour modification (Tharp & Wetzel, I969; Lindsley, I97I; Gaasholt, I970).

Most reported classroom behaviour modification studies are "within-subject" designs employing a reversal, or a multiple baseline technique. However, some studies compare an experimental group of children, who receive the "treatment" variable (e.g., contingent positive reinforcement), with a control group of children who are not reinforced (e.g., Evans & Oswalt, I968).

Once the teacher has specified the target behaviour, goal behaviour, taken a baseline count of the target behaviour, and noted antecedent and consequent events that might effect the target behaviour, he is ready to initiate the intervention

programme. In general, all such programmes can be viewed as concerted attempts either to increase or decrease behaviour.

Strengthening behaviour

(I) Positive reinforcement

The research reports on the modification of behaviour in the classroom can be divided into four categories on the basis of the types of positive reinforcers used. There are those studies which employ social reinforcers (eg. Madsen et al., I969); those which utilize token or material reinforcers (eg. O'Leary et al., I969); thirdly, studies which ulilize activities as reinforcers (eg. Homme et al., I963), and fourthly, studies which combine the use of material and non-material reinforcers (Becker et al., I969). The focus of these studies has been on two major aspects of classroom behaviour, the modification of disruptive behaviours (Becker et al., I967), and the improvement of academic performance (Clarke & Walberg, I968; Kirby & Shields, I972).

Social reinforcement subsumes a variety of interpersonal responses to behaviour of which the most powerful are probably teacher attention and praise. Becker (I973) claims that probably 85% of all behavioural problems can be brought under control by social reinforcers, and the results of a great many studies would tend to support this. Teacher attention, in the form of praise, smiles, and reprimands, when made contingent upon the behaviours of students in the classroom, may serve to increase the rate of those behaviours emitted (eg. Madsen, Becker, & Thomas, I968; Kiesler & Bernstein, I974). The earliest published reports on the modification of inappropriate behaviour in a school setting appeared in I962

(Zimmerman & Zimmerman). Most of the early studies were concerned with the modification of behaviours in nursery school children (Harris et al., 1964; Allen et al., 1964), but studies have now been conducted with junior school children (Becker et al., 1967), and with secondary school children (McAllister et al., 1969). The main characteristics of these studies can be listed as follows:

(1) the contingent use of positive reinforcers, ie. the presentation of the positive reinforcers of teacher attention and praise is contingent upon the appearance of acceptable behaviour in the child;

(2) the use of non-reinforcement or extinction procedures to eliminate behaviours regarded by the teacher as being undesirable;

(3) the use of observers in the natural setting to record the frequency of occurrence of the "target" behaviour(s);

(4) the use of an A-B-A reversal design.

Probably the best known and most quoted paper employing social reinforcers in the classroom is that written by Madsen et al., (1968) entitled "Rules, Praise, and Ignoring; Elementary Classroom Control". In this study an attempt was made to systematically vary the behaviour of two junior school teachers to determine the effects on classroom behaviour of: stated rules, ignoring inappropriate behaviours, and showing approval for appropriate behaviours. Behaviours of two children in one class, and one child in another class, were recorded by observers, as were samples of the teachers' behaviour. Following baseline recording, "rules", "ignoring", and "approval" conditions were introduced one at a time. In one class a reversal of conditions was carried out. The main conclusions

were that: (i) rules alone exerted little effect on classroom behaviour; (ii) ignoring inappropriate behaviour and showing approval for appropriate behaviour (in combination) were very effective in achieving better classroom behaviour, and (iii) showing approval for appropriate behaviours is probably the key to effective classroom management.

Teacher social reinforcement can be supplemented or replaced by peer group social reinforcement (Tsoi & Yule, I975; Solomon & Wahler, I973; Evans & Oswalt, I968; Barrish, Saunders, & Wolf, I969; Surratt et al., I969).

Material and activity reinforcement

For some children teacher attention is not an effective reinforcer, and in this case "stronger" reinforcers are required. A useful "stronger" reinforcer is a preferred activity, eg. playing records, playing football, drawing, painting, and so on. These are all examples of what Premack (I965) called "high probability behaviours". The "Premack Principle" may be stated as follows: "a high probability behaviour may be used as a reinforcer for a low probability behaviour" (Premack, I965). In a study carried out by Hawkins (I975), a low probability behaviour (reading) in a maladjusted boy was followed by a high probability one (playing with coloured blocks). One way of using activity reinforcers is that described by Addison and Homme (I966), in which for a specified amount of a low probability behaviour the child selects from the reinforcing event menu an activity he would enjoy engaging in. Another way of making use of these activities entails scheduling activities in the day so that high probability behaviours alternate with low probability ones. As Ward (I976) notes, "Pre-

mack's (I965) generalization on reinforcement can be readily integrated into individual curriculum arrangements and it has considerable potential at all age levels, eg. its use in contract systems being an obvious example of self-regulated behaviour." However, Ward goes on to say, "......there are encountered a wide range of objections to the principle, varying from its possible clash with integrated day teaching methods to the excessive autonomy it may give to older pupils." The "Premack Principle" has been increasingly employed in clinical settings (Danaher, I974), particularly as a means of controlling certain covert events (Homme, I965; Todd, I972; Bernstein, I974). However, Knapp (I976), in a review of studies claiming support for the Premack Principle in human experimental and applied settings, found little evidence to support the claim that a high probability response will reinforce a lower probability response, nor was the reverse contention supported.

Natural reinforcers, such as those described above, are considered, along with suitable curricula, adequate for most normal classroom purposes. However, in many cases much more direct control may be required in the form of primary reinforcers, cash incentives, and other privileges. The token economy, which in its most developed forms has many characteristics of data-based systems, can be sufficiently flexible to use all of the above sources of control. In such a system acceptable behaviour is rewarded by the presentation of a token (a neutral object) which can be exchanged for a "back-up reinforcer". After a number of pairings the token begins to reinforce behaviour independently and takes on the characteristics of what Skinner (I953) has called a generalised reinforcer. Modified

token economies are now fairly common in North American public schools (eg., O'Leary & Drabman, I97I; McLaughlin, I975), but the most impressive examples are to be found in residential school settings where most behaviour can come under some form of contingency management (Cohen & Filipcjak, I97I; Burland, I975). The general design of such a system has been described by a number of authors (O'Leary & Becker, I967; Birnbrauer et al., I965; McKenzie et al., I968; Holt et al., I976). A full discussion of token economy research will be presented in Chapter Three.

This description of reinforcers is not meant to be either exhaustive or to suggest that children will respond to all reinforcers. As with other facets of behaviour modification, the question of applicability in the individual case is an empirical one. Reinforcers may be highly idiosyncratic. Kiernan (I974) reports a case of a child who was rewarded by being allowed to feed an adult with sweets; she herself would not eat them. In all cases the appropriate selection of a reinforcing event is critical to the success of behaviour modification.

Choosing reinforcers

One obvious way to define consequences that might be useful in treatment is to ask the child. Although verbal information is all too frequently gathered unsystematically it is nevertheless extremely useful. Information is usually best gathered by asking the child structured questions that systematically cover each important category of consequences. Nay (I974) reported the following approach to verbal reports in defining possible consequences for a population of II0 delin-

quent adolescents; Sixty girls selected randomly from the population at large met in small groups. A group mediator (consultant) structured this interview to assess possible reinforcers within the following general areas:

(I) privileges. Students were asked which current privileges they valued most and what privileges they would like to see instituted at some future time;

(2) activities. An assessment of desired current on-campus and off-campus activities was carried out. Students were again encouraged to suggest novel activities for possible future addition;

(3) material items. Within this area, group mediators assessed valued items by brand name within each of these areas: food/snack items; recreational/game items; cosmetic/dress items; any others offered by group members.

Observational procedures can be used to determine high rate behaviours that the child engages in. This is the approach taken by Premack (I965) to reinforcer selection, and involves observing the proportion of time spent engaged in different activities, when free choice is allowed in the natural or experimental environment. Premack argues that the longer the duration of time spent in an activity the higher its reward value.

Another way to obtain information from children about reward preferences is to present them with a questionnaire (eg., Dunn-Rankin, Shimizu, & King, I969). Perhaps the greatest value of the written survey approach is that it provides the child with a clear set for responding, allows for more specific comparison among reinforcement items, and provides a format for the translation of responses to numerical scores.

Dunn-Rankin et al., (I969) designed a questionnaire around five general categories of reward; these were "adult approval", "competitive approval", "peer approval", "independence rewards", and "consumable rewards". To assess the pupil's preference for one reward category over another, the method of paired comparisons was used. Dunn-Rankin et al., found that children did differ in the rewards that they preferred, both within schools and between schools. For example, in one junior school they found that the children of highest ability tended to express a preference for "independence rewards" as opposed to "adult approval" and "competitive rewards". These latter rewards were favoured by the less able children.

The ideal reinforcer

There are several defining features of the ideal reinforcer which can be deduced from the basic laws of learning taken in relation to the general aims of behaviour modification. Kiernan (I974) lists six main characteristics:

(I) it should be possible to deliver the reinforcer immediately following the defined response. Conditioned reinforcers, especially verbal social reinforcers are excellent in this respect;

(2) the ideal reinforcer should be easy to deliver and withdraw. Verbal social reinforcers and tokens have the advantage over edible ones;

(3) the reinforcer should not interfere with, or interrupt, appropriate behaviour but should still provide an ongoing reinforcement control;

(4) the reinforcer should not be subject to rapid satiation effects. However, little research on satiation has been

carried out within the operant framework. Food and drinks are obviously subject to satiation effects. The evidence provided by Gewirtz (I967) suggests that children may satiate for social reinforcement;

(5) the optimal reinforcer is one which, when presented, disappears quickly, eg. verbal social reinforcement. Tokens, points, or edibles which are accumulated during the session and exchanged (or eaten) at the end, also satisfy this requirement. In a study carried out by Hawkins (I975), reinforcers (smarties) were dropped into a glass jar which was on the desk in front of the child. The sweets were eaten at the end of the session; and,

(6) the reinforcer should be transituational, ie. usable in a wide variety of settings and by a wide variety of administering individuals.

Self-reinforcement

The efficacy of self-reinforcement procedures in the classroom setting has received little attention, yet there are a number of studies with children in experimental settings which bear on this issue (Bandura & Perloff, I967; Glynn, Thomas, & Shee, I973; Bolstad & Johnson, I972). Bandura and Perloff demonstrated that self-administered consequences can in fact serve a reinforcing function. A child was given complete control over tokens which were exchangeable for prizes; when the child made the tokens contingent upon his appropriate behaviour, the tokens served to maintain his behaviour. As will be seen in the next section, modelling plays a very important role in the transmission of self-reinforcing behaviour (Bandura & Kupers, I964). A more extensive discussion of self-reinforce-

ment will be provided in Chapter Three.

(2) Modelling (variously called vicarious reinforcement, and imitation).

In this section the term modelling will be used to refer to the process of observational learning in which the behaviour of one individual, or group, the model, acts as a stimulus for the thoughts, attitudes, or behaviour of another individual who observes the model's performance. While the role of imitation learning has been discussed at least since the time of Aristotle, onle in recent years have investigators turned their full attention to this topic. In psychology, the study of imitation was almost totally neglected until the pioneering work of Miller and Dollard (I94I). Twenty years later an important book by Bandura and Walters (I963) highlighted the importance of imitative learning for social learning and personality development. Since then a number of conflicting theories concerning the nature and operation of the modelling process have developed, the position adopted by Bandura appearing to be the most widely accepted. The experimental and theoretical literature is reviewed by Bandura (I969), and Kanfer and Phillips (I970).

Stated in simple terms, Bandura's account of the modelling process is as follows. In the first stage of the process, a model's behaviour is attended to by an observer. This is called the acquisition phase, in which the actions of the model are initially acquired by the onlooker observing the model. It is assumed that during the process of observation the observer acquires images and verbal representations of the model's behaviour, which are then "stored" in memory. The second stage of the process concerns the performance of the modelled

behaviour by the observer. Bandura states that it is primarily in the observer's performance of modelled behaviours that the role of reinforcement and punishment is of crucial importance. Whether or not a modelled response will increase or decrease in terms of the probability of subsequent performance will be determined by the action or reinforcement which follows the response at this point.

Bandura (I969) outlines three major effects of modelling:

(I) the learning of new or novel discrete behaviours, or newly integrated patterns of behaviour;

(2) its effects on behaviours which are under some form of existing inhibition or restraint for the observer. The effects can be inhibitory or disinhibitory. Many of the applications of modelling principles fall in the latter category (Bandura, I97I; Hawkins, I975b);

(3) an increase in behaviours which the observer has already learned, and for which there are no existing constraints or inhibitions.

In an early study an attempt was made to investigate the effect of reinforcing the appropriate behaviour of one student in a classroom upon the frequency of such behaviour on the other students (Carnine et al., I968). The study showed that there was little deceleration of inappropriate classroom behaviour in students, unless teacher praise, the independent variable, was made directly contingent upon a student's behaviour. Recognizing the inconclusive nature of their findings, Carnine et al. concluded that, "the results of the present investigation suggest, but not conclusively, that changes induced by such a procedure are either weak or short-lived. It is our best guess at this point that praising Tommy serves as a

discriminative stimulus for Johnny to behave in a similar way, but that unless some direct reinforcing consequence follows Johnny's improved behaviour it will not be maintained."

An experimental laboratory study by Mithaug and Burgess (I968) offers some support for this interpretation. These authors found that individual feedback was essential to accelerate an individual's rate in a group situation.

Broden et al., (I970) investigated the effects of teacher attention on the attending behaviour of two boys seated at adjacent desks. During the first experimental phase the teacher systematically increased the amount of attention for appropriate attending in one pair. This resulted in a dramatic increase in his attending rate and a lesser, though significant, increase in attending behaviour of the second boy. During the second experimental phase systematic contingent attention was switched to the other boy, with similar results. However, Broden et al., point out that the results could be explained in other ways, particularly the possibility that teacher proximity acted as a cue or discriminative stimulus (S^d) for appropriate attending. While Broden et al., demonstrated that this technique can be effective when two children are sitting in adjacent desks, Becker, Thomas, and Carnine (I969) cite evidence that the technique is not effective in all situations. They found that when half the class was praised for appropriate behaviour, their behaviour improved, but the half of the class that was not praised did not improve.

Csapo (I972) solicited the help of six normal primary school children to be models of appropriate classroom behaviour to six emotionally disturbed classmates. The target behaviours for each child were defined. Inappropriate behaviours to be

modified included such things as "speaking out of turn", "thumb sucking", and "poking others". Each emotionally disturbed child exhibited fewer inappropriate behaviours over the course of the programme. In addition, it is reported anecdotally, that peer models developed more positive attitudes toward their partners, and that peer relationships in general improved.

Because observation of filmed models is as effective in many cases as observation of live models, schools can make use of prepared film materials that apply to problems experienced by many school-aged children. Hosford and Sorenson (I969) took this approach to help shy students participate more readily in classroom discussions. Although the critical question of whether the observers of the film actually participated more in class discussions was not asked in this study, the students indicated in a questionnaire that they had learned something from watching.

Modelling has also been used extensively in the training of the mentally retarded (eg. Stephen et al., I973; Paloutzian et al., I97I; Bricker, I972).

Certainly some of the advantages of the planned use of modelling in school settings have been demonstrated in the examples cited above: (a) there are many models available in a school; (b) flexibility in planning a programme is maximal; (c) disruption to regular classroom procedures can be held to a minimum; and, (d) programmes can be planned for one child or many using a model or multiple models. Academic skills, appropriate classroom behaviours, and social interaction skills are the usual targets for school programmes. Additional ideas for school applications of modelling can be found in Sarason and

Sarason (I973).

(3) Shaping

Shaping is another procedure for developing behaviours that are "new" to a given child. Wenrich (I970) defined shaping as: "the process in which reinforcement is differentially applied to those responses that constitute closer and closer approximation to the ultimate response that one wishes to bring about."

While the early laboratory demonstrations of shaping were impractical but interesting - Skinner has taught pigeons to play ping-pong and to play musical tunes on a xylophone (Cohen, I969) - the procedure can be used to programme academic (reading), social (approaching, speaking, cooperation), and complex motor behaviours in normal and retarded children. The procedure for shaping has been described by Reynolds (I968),

".....this may be done by reinforcing any of its (organism's) responses; however, in order to shorten the shaping procedure a response somewhat similar to the desired response is chosen for reinforcement. Reinforcement is then withdrawn, and, as discussed above, the variability and force of behavior increases. Before the frequency of the behaviour decreases, a response closer to the desired behaviour is selected for reinforcement from the more forceful and variable behavior initially produced by extinction. This selective reinforcement increases the frequency of the variation and that is reinforced. After this behaviour has been firmly established and is occurring frequently, reinforcement is again discontinued, variation again increases for a short time, and a response still closer to the desired one is selected from the variation and is reinforced."

(pp. 28-29).

For teachers the shaping procedure is critical. Too often teachers assume that their reinforcement should be withheld until the goal behaviour is achieved, but learning theory indicates that such a tack is less efficient than moving in smaller steps toward that goal. Teachers can make use of shaping procedures in coping with seat sitting and with attending behaviour through gradual increases in the time required for the child to sit or attend in order to obtain the reinforcer. Hawkins (1975) shaped up "attending behaviour" in a severely retarded boy by reinforcing "where the behaviour is at" responses, in this case fifteen seconds attending, and then gradually extended the amount of attending required for the same amount of reinforcement.

Shaping is typically used to establish single behaviours. When the goal is the establishment of behaviour sequences (eg. getting dressed; toileting, and so on) shaping is used in conjunction with chaining.

(4) Chaining

Most operant behaviour encountered in the classroom is more complex than a single stimulus-response unit, or association. Instead, stimulus-response units get linked together and thereby form more complex behaviours in the form of verbal sequences or motor patterns. These more complex behaviours are called chains. The technology of establishing (teaching) adaptive behaviour chains with children whose performance is judged deficient is built solely upon the principles of shaping, stimulus control, and reinforcement. Reynolds (1968) describes how chains develop:

"A chain is composed of a series of responses joined together by stimuli that act both as conditioned reinforcers and as discriminative stimuli. A chain begins with the presentation of a discriminative stimulus. When the organism makes the appropriate response in the presence of this stimulus, a conditioned reinforcer is presented. The conditioned reinforcer is also a discriminative stimulus which occasions the next appropriate response. This response is reinforced with another conditioned reinforcer, which is also a discriminative stimulus for the next response, and so on. The last stimulus in the chain, on at least some occasions, is a primary, or innate, reinforcer."

Once these chains are learned and practiced, they operate so smoothly that partitioning of links is very difficult. Balcham and Silberman (I97I) noted the difficulty of performing chained responses in reverse order, such as reciting the alphabet backwards.

(4) Stimulus control

Thus far, we have concentrated largely on behaviour building by the manipulation of consequences, but there are methods of placing newly established responses under discriminative stimulus control. By controlling the antecedent conditions that set the occasion for reinforced behaviour, one can produce an increase in the likelihood of response emission. Four classes of antecedent events can be identified (Karoly, I975):

(I) discriminative stimuli that have been linked to response-contingent reinforcement in the past;

(2) verbal cues or "rules", the adherance to which have pre-

viously resulted in reinforcement;

(3) facilitating stimuli, the provision of which makes responding easier; and,

(4) motivational operations that heighten the effectiveness of reinforcement (such as prior deprivation).

Adequate adjustment to an ever changing environment calls for quick and accurate "tuning into" the cues (stimuli) that signal the expected forms of behaviour. Maladaptive behaviour is often the result of responding to an inappropriate stimulus (ie. the form of behaviour is correct, but it is emitted at the wrong time or place), or a failure to respond to the appropriate cues. If the responses of children in the classroom can be brought under the control of the teacher, and others, under the influence of verbal or non-verbal signals (hints, cues, prompts, directions, instructions, or rules), more efficient classroom management can be achieved, and the stage set for generalization and maintenance of change.

Prompts are behavioural interventions (verbal or non-verbal) which direct the learner's attention to the to-be-learned task and it's requirements. In shaping dressing behaviour, for example, the teacher may physically guide the child through a series of movements and administer reinforcement at appropriate intervals. In shaping speech behaviour, the teacher may utter the required sound first and direct the learner to repeat it. A close approximation to the sound will then be rewarded. Fading refers to the gradual elimination of aspects of the cuing stimulus, so that the learner is responding to the minimal cues that exist in the natural environment. In combination prompting and fading are used to develop discriminative control of behaviour.

In a study carried out by Schutte and Hopkins (I970) adult verbal control in a nursery classroom was achieved by training the teacher in the differential use of contingent attention (reinforcement). A list of ten instructions was drawn up, (eg. "Pick up the toys", "Come and get a pencil and paper",), and presented to a group of five girls between four and six years old. The teacher, equipped with a stop-watch and score sheet, recorded whether her instructions were followed (within I5 seconds). The teacher waited two minutes between instructions. During the first baseline the children had a mean daily instruction-following rate of 60%. However, when the teacher made a "natural verbal response" contingent on compliance to the instruction, the children followed the instructions 78% of the time. Removal of the contingencies led to a decline to 68.7%; and a second reinforcement phase produced instruction following between 80 and 90% (average = 83.7%). These results were accomplished in just 20 daily sessions of 20 minutes each.

The study carried out by Madsen, Becker, and Thomas (I968) showed that rules alone exerted little effect on classroom behaviour. Similar conclusions were reached by O'Leary et al., (I969). However, some children are aided by clear specification of the desired classroom behaviour (O'Leary & O'Leary, I972). The clear specification of classroom rules, and occasional reviews of such rules, can serve to prompt children to rehearse the rules themselves and, as observed in many classrooms, the children may remind others of the rules. When rules are made explicit, children must be reinforced for following them.

An example of the use of facilitating stimuli is provided

by Fullmer (1972). Fullmer designed a special education classroom in which there were three distinct work areas and a distinct play area. The children were reinforced for behaviours appropriate to each of the areas, so that eventually their behaviour came under stimulus control.

Procedures to weaken or eliminate behaviours

Extinction of targeted behaviour may be brought about by terminating all reinforcement for that behaviour. Often this becomes difficult or impossible, because any one of an array of material, social, or intrinsic consequences might maintain the behaviour. For example, Becker, Madsen, Thomas, and Arnold (1967) found that when a classroom teacher systematically ignored inappropriate behaviours on the basis that her attention was maintaining them, there was an increase in these behaviours. The authors surmised that peer reinforcement maintained many of the behaviours. Among those behaviours that have been successfully extinguished are tantrums (Zimmerman & Zimmerman, 1962; Carlson et al., 1968; Wolf, Risley, & Mees, 1964); regressed crawling; vomiting (Wolf et al., 1965); and aggression in the classroom (Brown & Elliot, 1965). However, a pure extinction approach does not ensure that more appropriate behaviours will take the place of those extinguished. This problem is usually overcome by systematically reinforcing appropriate and incompatible behaviours, while targeted inappropriate behaviours are ignored to extinguish them. Early investigations by Allen et al., (1964), and Hart et al.,(1964) provide excellent examples of DRO ("differential reinforcement of other behaviour"). Hart et al., combined extinction - reinforcement procedures in the treatment of two pre-school boys who exhibit-

ed frequent crying episodes whenever mildly frustrated or thwarted by other children. Observation revealed that vociferous crying usually elicited comforting ministrations and concern from teachers. Consequently, teachers were instructed to pay no attention to the crying episodes, unless the child was actually hurt. On the other hand, when the child handled stressful situations more constructively he received prompt approving attention. Within five days after the introduction of the new contingencies the rate of crying declined from 5-I0 times per morning to practically zero level, and remained neglible thereafter. Etzel and Gewirtz (I967) achieved equally favourable results with persistent infant criers by combining extinction of crying with reinforcement of more cheerful behaviour. Similar DRO procedures have been employed in the typical classroom setting (Buell et al., I968; Brooks & Snow, I972). O'Leary et al., (I969) found that DRO in combination with rules and classroom structure did not provoke a significant decrement in targeted problem behaviour. Only when a token programme was incorporated did these behaviours decrease. Legum and Nay (I973) report on a teacher who was unsuccessful in using a DRO approach in the mangement of retarded adolescents. They concluded that, "...the attention from peers, avoiding classwork, and the reinforcement that accrues when a student is allowed to move freely were much more potent maintainers of behaviour than the teacher's attention."

In delineating a list of guidelines for dealing with inappropriate behaviour, Becker, Thomas, and Carnine (I97I) state: "ignore disruptive behaviours unless someone is getting hurt. Focus your attention on the children that are working well to prompt the correct behaviours in the children who are misbehav-

ing. Reinforce improvement when it does occur. Punishment is most likely to be required when the unwanted behaviour is very intense or very frequent so that there is little positive behaviour to work with."(p. I62-3)

In summary, DRO has the advantage of systematically reinforcing appropriate incompatible behaviour while concomitantly decreasing the frequency of inappropriate behaviour, when the teacher can control the locus of reinforcement. However, in many cases, the teacher does not have such control and must use some form of negative consequence. Of course, negative consequences are best employed in a programme in combination with procedures for positively reinforcing incompatible and appropriate behaviours. There are three main types of negative consequences that teachers can use: (i) response cost; (ii) time-out (from positive reinforcement); and, (iii) physical punishment.

Response cost

Response cost represents a form of punishment in which previously acquired primary reinforcers (such as food), or conditioned reinforcers are forfeited contingent upon an undesirable response. Usually, the "costs" involve the removal of reinforcers that have been established as part of a therapeutic contract (eg. points, tokens, check-marks etc.). The usefulness of cost procedures in the classroom was suggested by McIntire, Jensen, and Davis (I968) in an after-school programme for elementary and junior high school boys. Each child had a counter on which the teacher could add or subtract points. The child gained points for correct answers and lost points for disruptive classroom behaviour. The effectiveness of such

cost procedures in a classroom setting was also described by Kaufman & O'Leary (I97I); Hundert (I976); Sulzbacher & O'Leary (I972); Clarizio (I97I).

As stated earlier, any response cost procedure that is to be effective must be used in combination with some form of positive consequences for appropriate behaviour. Bandura(I969) commented that, "sole reliance upon response cost procedures puts the child in the unpleasant position of only being able to lose." For example, a teacher might reduce the amount of time a child could spend at recess whenever he behaved inappropriately. In addition, she would allow him extra minutes in the free activity corner whenever he completed an assignment on time. Response cost or loss of priveledges can also be combined with peer influence to decrease inappropriate behaviour (Barrish, Saunders, and Wolf, I969).

Time-out (from positive reinforcement)

Time-out is very similar to response cost except that the reinforcer that is removed contingent upon some inappropriate behaviour is the child's access to the environment itself. In other words, time-out involves removing the students from some environment they enjoy (although most classrooms do not usually meet this criterion), to a dull, non-stimulating (non-reinforcing or aversive) location within the school. Patterson and Gullion (I968) suggested that the school cloakroom might be an ideal location for time-out. LeBlanc, Busby, and Thompson (I974) removed the child from the play area after an act of aggression, and placed him on a chair at the back of the room for a period of one minute. A separate room is an ideal setting for time-out but few schools have sufficient

space for this. Also, when several children are sent out, additional rooms would be needed. For this reason, teachers often make use of a variety of creative means of isolating a child. Time-out areas might include a corner of the room hemmed in by book cases (Wilson, I973), or a specially designed cubicle (Hawkins & Hayes, I974).

Few conclusions can be reached regarding the optimum duration of time-out. Time-out durations that have been reported range from 30 seconds (McReynolds, I969), to 2 hours (Hamilton, Stephens, and Allen, I967). A few studies have systematically compared various intervals of time-out to determine the most effective duration. Pendergrass (I97I) found that durations of both 5, and 20 minutes did not differ in suppressing classroom misbehaviour; however, consistent application of one duration seemed superior to an intermittent schedule involving both durations. White, Nielson, and Johnson (I972) found that a I5, or a 30 minute time-out duration seemed to produce equal suppression of child deviant behaviour and was superior to a one-minute time-out.

The vast majority of investigators who describe the use of time-out employ the procedure with children between the ages of about 2 and I2 (eg., Porterfield et al., I976; Patterson, Cobb, and Ray, I973; Nay, I975; Kendall et al., I976; Tyler & Brown, I967). The use of time-out with older adolescents and adults is less frequently reported.

While time-out does provide a kind of response cost with as little attention to deviant behaviour as possible, it does have the drawback that it removes the child from the natural environment for a set period of time. During this period the child is not in a position to behave, make mistakes, and learn new

behaviours, or generally interact in a more natural fashion. However, time-out procedures need not imply a removal from the natural environment. For example, Nay et al., (I976) found that student loss of self-chosen and labelled "territories" was most effective in reducing two classes of problem behaviour. Territory loss meant that students were required to sit in a nondemarcated unlabelled desk chair located within the classroom. Porterfield et al., (I976) stopped the child from participating in an interesting activity but still allowing observation of that activity.

Physical punishment

While extinction, response cost, and time-out all involve the removal of positive reinforcement, physical punishment is characterised by the "administration of some aversive stimulus to the child contingent upon inappropriate behaviour." However, as with the reinforcer, the aversive properties of a punishing stimulus must be defined by the manner in which the child cognitively contrues that stimulus. Although the way that we cognitively label a stimulus is an important part of its aversive properties, there are stimuli that rather consistently hold punishing properties for most of us, eg. high levels of electric shock; nausea-provoking chemicals; criticism and other verbal reprimands from people we esteem, as well as many other forms of verbal and physical abuse.

Aside from legal and ethical considerations, punishment as a method of behaviour influence is an "aversive" topic for psychologists because of technical complexities. Reese (I966) succinctly points out that punishment is a complex process:

".....it can affect emotional respondent behaviour.....it

can affect operants other than the one punished; and its effects on the punished operant itself are a function of several variables, including the subjects' motivation, the severity of the aversive stimulus, the schedule on which punishment is delivered, and many more." (p.3I)

Much of the research on the effects of punishment have derived from Skinner's views that were presented in Science and Human Behaviour (I953). His criticism falls into three major categories:

(I) the effects of punishment are transient, producing no long-term suppression of punished behaviour;

(2) punishment is relatively ineffective when compared with positive reinforcement; and,

(3) there are many troublesome by-products of punishment, which may produce behaviour that is more inappropriate than the behaviour to be eliminated.

Investigations of the effects of punishment in the classroom have been meagre.The dearth of experimentation has been partly due to the ethical concern of researchers, and the practical limitations in the application of punishment to children. Also, until recently, psychologists have espoused the legend that punishment is an extremely ineffective means of controlling behaviour (Solomon, I964). However, results summarized by Bandura (I969) and Blackman (I974), from a large body of evidence with animals (Azrin & Holz, I966; Church, I963), children (Parke & Walters, I967), and adults (Powell & Azrin, I968), have demonstrated that punishment may indeed produce lasting and stable reductions in behaviour. The effectiveness of punishment is determined by factors such as the timing of

punishment, the presence of an alternative to the punished response, the scheduling of punishment, and the relationship of the punishing agent to the one being punished.

One of the most effective means of punishment in the classroom is soft reprimands (O'Leary & Becker, I968; O'Leary, Kaufman, Kass, & Drabman, I970). Both these studies found that loud reprimands (so that other children in the class could here) lead to an increase in disruptive behaviour, whereas soft reprimands (audible only to the child being reprimanded) proved very effective in reducing disruptive behaviour. It has also been found that it is probably best to reprimand a child just as he begins to display an undesired behaviour, rather than reprimanding him after he has been misbehaving for some time (Walters, Parke, & Cane, I965). Interesting alternatives to a verbal reprimand, such as taking away a slip of paper on which a child's name is written, are presented by Hall et al., (I97I), and LeBlanc et al., (I974).

In recent years aversive imagery, negative self-statements, and other covert aversive consequences have been employed in lieu of physical punishment (Cautela, I967). The term covert sensitization (Cautela, I966) describes a procedure whereby a client's imagination of some problem behaviour is followed by an aversive image. The assumption is that a covert punisher that immediately and contingently follows the imaginal target behaviour will lead to a decrease in the frequency of the latter. Of all the covert approaches covert sensitization has been the most carefully evaluated. However, this approach has not been demonstrated with classroom problems. It is mentioned here because of its potential use with children, particularly older children, in the classroom setting.

Desensitization

If a child has a fear of school, he may be placed in real life situations which are quite unlike, and distant from, the classroom, and then be brought closer and closer to the actual fearful stimulus, the classroom. The effectiveness of this procedure has been demonstrated by Lazarus, Davison, and Polefka (I965); Ayllon, Smith, and Rogers (I970); and Patterson (I965). Yates (I970) presents an excellent discussion of the various types of school phobia, and an evaluation of treatment results of various procedures designed to have the child returned to school.

A widely used technique, which is used with adults who have fears and anxieties, is desensitization with reciprocal inhibition. The usual procedure is to completely relax the client, and then ask him to imagine or visualize a series of scenes which he finds anxiety provoking. After many trials where the client visualizes the anxiety producing scenes in a relaxed state, the client finds that the instances in his daily life which he visualized while relaxed no longer produce anxiety (Paul, I966; Wolpe, I958). Obviously, it would be very difficult to expect very young children to visualize scenes that would make them anxious, so in this case in vivo presentations could be used.

The procedures described above represent the major approaches to facilitating, and eliminating behaviours in the classroom. Generally, the teacher is the major change agent in the school, although there is an increasing concern in behaviour modification approaches with self-management techniques (Thoresen & Coates, I976). Self-management techniques enable the client

to make changes in their environments and to practice procedures which lead to modification of their own behaviour. Relaxation training, or systematic desensitization (Wolpe, I973), for example, involves procedures which clients are encouraged to practice between therapy sessions in order to acquire the ability to relax "at will". Self-reinforcement (discussed on p. 57), thought-stopping, behavioural contracting, and other related procedures also invove attempts on the part of the therapist or teacher to teach clients a set of skills leading to self-control.

Summary

The roots of behaviour modification can be traced to early experimental studies of human and animal learning, most notably in the traditions of Pavlov and Skinner. A vast literature of more than 60 years' accumulation attests to the power of the quantitative experimental method which forms the basis of the applied behaviourist's practice (Hersen & Barlow, I976).

In application, functional behaviour analysis seeks to discover, through the experimental method, events preceeding behaviour (antecedents) and those following behaviour (consequences) which have demonstrable effects on such measurable dimensions as frequency, duration, intensity, and location of the behaviour in space and time (Lindsley, I964). Functional behaviour analysis applies to both the manipulation of already existing behaviours and the development (i.e., teaching) of new forms of responding (Barrett, I977, p.I5I). For example, the term reinforcement is applied to an event which follows a behaviour if it can be demonstrated that subsequent event actually increases

the frequency (i.e., functions as a reinforcer) of that behaviour as exhibited by the individual in question.

The applied behaviour analyst seeks to alter behaviour by manipulating antecedent and consequent events in such a way as to achieve an explicit behavioural objective - a specific, measurable behaviour change. Thus, clinical assessment, in the framework of behaviour analysis, always involves measurement of past and current behaviours, and the conditions under which they occur, either through direct observation (e.g., Lindsley, I964), or through the client's verbal report (e.g., Cautela, I977).

The frequent criticism that behaviour modifiers ignore subjective events has been blunted in recent years by an increasing interest in the manipulation and treatment of "covert processes" (Cautela, I973). Thoughts, sensations, and other private experiences now appear to be as open to functional analysis and modification as overt behavioural events.

The general approaches to behaviour modification that have been outlined, as well as some of the more specific aspects of contingency programming, consequation, and recording, will be discussed in more detail in Chapter Four. The next chapter will also make specific reference to the approaches that have been discussed in the current chapter.

CHAPTER THREE

THE TOKEN ECONOMY

Introduction

Within an institution it often becomes desirable to apply many of the procedures discussed in Chapter Two to groups of individuals in some consistent fashion. Following the early work of Staats et al., (I962), and Ayllon and Azrin (I965, I968), there has been a rapid increase in the number of token programmes in the classroom over the past decade.

In contrast to individual approaches, most classroom programmes do not rely upon any one reinforcer or class of reinforcement. Instead students are informed of behaviours for which they may earn tokens, which may be traded in for any one of an array of material, social, or other reinforcements, that have been chosen through careful survey procedures as suggested in Chapter Two (54-56). A programme employing tokens can ensure that each student finds some highly desirable reinforcement to "purchase" with the tokens earned. The term "token economy" is often used to describe such an approach, although the way in which group programmes are constructed varies considerably. Kazdin and Bootzin (I972) have presented a number of advantages in employing tokens within institutional treatment programmes:

(I) it makes it easier for teachers to provide an immediate and discreet consequence for targeted behaviours;

(2) it permits reinforcement ot occur at any time;

(3) they may be used to maintain performance of a behaviour over an extended period of time when the back-up reinforcer cannot be delivered;

(4) they are not dependent upon student deprivation to maintain their incentive properties;

(5) they do not lose their effectiveness due to student satiation; and,

(6) they provide an efficient means of reinforcement for children who have different preferences in "back-ups".

Although there are definite advantages of token economies over individual reinforcers, it must not be inferred that these should be undertaken as a first step with children. As a general rule, social reinforcers should be considered prepotent until proved otherwise. Only at this point, should the token system be instituted.

Following the general paradigm of the classic animal studies (Wolfe, I936; Cowles, I937; Smith, I939; Kelleher, I958), the initial token experiments with children were designed to assess whether tokens acquired secondary reinforcing value, and to see whether children's behaviour could be maintained over long periods of time utilizing token reinforcement. Experiments by Meyers (I960), and Meyers, Craig, and Meyers (I96I) suggested that tokens can be established as secondary reinforcers by shaping and maintaining the behaviour of children at an experimental task where tokens were exchangeable for sweets. However, both these experiments used the same response in training and extinction and thus, "the results may be attributed to the reinforcing and/or discriminative value of the tokens". (Bijou & Baer, I966, p. 778). Further more, the tokens were exchangeable for only one item, i.e., a <u>generalized</u> reinforcer was not established. Staats et al., (I964) established an extensive reinforcing system in which tokens were exchangeable for a wide variety of edibles and toys. These experiments demonstrated that a token reinforcement system could maintain reading

behaviour of four-year-old children for long periods of time. Since I964 many programmes have emerged, usually designed to improve social and academic behaviours of children who are only minimally influenced by normal classroom reinforcers such as stars (without back-ups), grades, and teacher attention. In a review of token economies in the classroom, O'Leary and Drabman (I97I) sum up the major effects of the use of tokens:

"A basic assumption in classroom token programmes is that tokens will acquire reinforcing value by association with a variety of back-up reinforcers. By having a large variety of back-up reinforcers it is likely that at least one "reward" will be desired by each pupil. It is also thought that the continual pairing of the teacher's praise with the token and back-up reinforcers will result in the enhancement of the teacher's praise as a positive reinforcing stimulus. Because of the assumed enhancement of the teacher's reinforcing value and increases in the child's academic and social repertoires, it is often assumed that a token reinforcement system can gradually be removed without a major loss of appropriate behaviour." (p. 38I)

Sattler and Swoope (I970) have suggested that there are eight procedural considerations necessary for implementing a token system in the classroom. These are presented below, and discussed with reference to the research literature.

(I) <u>Select the target behaviours</u>

This has already been discussed in Chapter Two (p. 38) since it forms the initial step in any behaviour modification programme. However, many investigators who use a token economy approach fail to explain why certain student behaviours are

chosen to be manipulated from the array of possibilties (eg., Kaufman & O'Leary, I972). In addition, says Nay (I974, p. 207), "the procedures used to assess the behavioural needs and resources of the institution are rarely described. Without this information it is difficult to determine whether the token programme has effectively dealt with the specific behavioural needs of that institution or has merely manipulated those behaviours which are less difficult, least costly to alter, or more suitable to a research methodology."

An essential requirement for establishing treatment goals in a token economy programme is the staff meeting. Nay (I976, p. 9I) says:

".....this data may be augmented by meeting with staff members in a small group so that they might together review their global observations and begin to define some goals for treatment. By allowing staff members to discuss informally and freely their own observations of clients, the BCA (behavioural change agent) not only provides them with an investment, but begins a new programme of intervention with a positive atmosphere of co-operation, and sets up a model for close communication as the programme is implemented and maintained over time."

Similarly, the students should be allowed to play a full part in the decision process to assure that the goals are representative of their needs and to encourage investment in the programme. One frequently used procedure is to allow the students to choose target behaviours while teachers provide guidance and clarification (Lovitt & Curtiss, I969).

Two broad classes of behaviour have been modified in classroom token economy programmes: (I) decreases in disruptive be-

haviour, and (2) increases in study behaviour, and academic achievement. Concurrent changes in non-target behaviours have also been reported (eg., Mulligan, Kaplan, and Reppucci, I973).

(i) Decreases in disruptive behaviour

The first use of a token reinforcement programme to control a large class (N=I7) of emotionally disturbed children was by O'Leary and Becker (I967). In this study a base rate of deviant behaviour (temper tantrums, crying, uncontrolled laughter, and fighting) was obtained for the eight most disruptive children in a third grade adjustment class. In the token reinforcement period the children received ratings placed in small booklets on each child's desk. The ratings were exchangeable for back-up reinforcers such as sweets and trinkets. With the introduction of the token reinforcement programme, an abrupt reduction in deviant behaviour occurred from 76% in the base period to an average of only I0% in the token period. Delay of reinforcement was gradually increased to four days without increase in deviant behaviour. The programme was equally successful for all children observed, and anecdotal evidence suggested that the childrens appropriate behaviour generalized to other school situations.

A replication of the above study was carried out by O'Leary et al., (I969). A base rate of disruptive behaviour was obtained for seven children in a second grade class of 2I children. Rules, educational structure, and praising appropriate behaviour while ignoring disruptive behaviour, were introduced successively. None of these procedures consistently reduced disruptive behaviour. However, a combination of rules, educational structure, and praise and ignoring, nearly eliminated the disruptive

behaviour of one child. When the token programme was introduced, the frequency of disruptive behaviour declined in six of the remaining children. Withdrawal of the token reinforcement programme increased disruptive behaviour in these six children, and reinstatement of the the tokens reduced disruptive behaviour. Follow-up data indicated that the teacher was able to transfer control from the token and back-up reinforcers to the reinforcers existing in the educational setting, such as stars and occasional sweets. Improvements in academic achievement during the year may have been related to the token programme, and attendance records appeared to be enhanced during the token phases. The token programme was utilized only during the afternoon, and the data did not indicate any generalization of appropriate behaviour from the afternoon to the morning. Many other studies have reported similar results (eg., Holt & Hobbs, I976; Robertson, DeReus, and Drabman, I976; Cohen & Filipczak, I97I; McLaughlin & Malaby, I97I; Breyer & Allen, I975; Ayllon & Roberts, I974; Drabman, Spitalnik, & O'Leary, I973; Meichenbaum, Bowers, & Ross, I968).

Many of the early studies focussed on the reduction of disruptive behaviour rather than on the acceleration of academic achievement. Hamblin, Hathaway, and Wodarski (I97I) provide a tentative explanation:

".....in our experience we have found it much easier to train teachers to modify and control disruptive behaviour than to accelerate academic achievement. In part, this is because disruptive behaviour is apparently of greater concern to most teachers and hence they reinforce behaviour more effectively than they do achievement. However, the logistics involved in disruptive behaviour modification are easier. In most class-

rooms only four or five children are disruptive enough to require much in the way of behaviour modification. In contrast, the teacher may need to accelerate the academic performance of at least half of the class."

However, once a problem behaviour is chosen for deceleration, an incompatible, adaptive behaviour should be defined as a target for acceleration, as suggested in Chapter Two (p. 67). Thus the focus of behavioural change efforts is not merely upon negative control, but upon positive reinforcement of incompatible events.

(ii) Increases in study behaviour and academic achievement

Bushell, Wrobel, and Michaelis (I968) investigated the effectiveness of token reinforcers in accelerating the study behaviours of pre-schoolers. Access to special events, such as a short trip, film, or story, was indirectly made contingent upon study behaviours by providing tokens required to purchase such events directly contingent upon study behaviours. During the second phase, tokens and praise were still dispensed for study behaviour, but the purchasing power of the tokens was eliminated by permitting all children to engage in special events regardless of the amount of study behaviour emitted. The contingent phase was then reinstituted. For IO of the I2 children studied, the results indicated that study behaviours were highest when special events were contingent, and lowest when they were not contingent. It should be noted that only the value of the tokens changed during the non-contingent phase, indicating that social reinforcement paired with tokens throughout all phases could not alone maintain or achieve the same rate of study behaviour reached by contingent redeemable

tokens plus social reinforcement. Other studies specifically concerned with increasing the rate of study behaviour include those by Walker, Mattson, and Buckley (I969); Broden et al., (I970); McKenzie et al., (I968); Darch and Thorpe (I977).

Many investigators have demonstrated that token systems can used to motivate students to work on academic assignments (Birnbrauer et al., I965; Lovitt & Esveldt, I970; Ferritor et al., I972; Campbell & Sulzer, I97I; Sulzer et al., I97I; Hundert, I976; McLaughlin & Malaby, I97I; Hamblin, Hathaway, & Wodarski, I97I). However, only a few of the reported studies on token reinforcement for academic achievement have included whole classes of students as subjects in the natural classroom setting (Birnbrauer et al., I965; Campbell & Sulzer, I97I; and McLaughlin & Malaby, I97I, for example). McLaughlin and Malaby (I97I) demonstrated that a single teacher without outside observers or recorders can manage all the features of a token economy by herself, with the addition of only an extra 20 - 25 minutes of work during the week. In this study the baseline period consisted of "traditional" teaching techniques. The teacher made whatever appeal or threat seemed relevant at the time. She urged the students to work; she counselled with them; she kept them in after school. Assignment completion, under traditional techniques, for all four subject areas (spelling, language, handwriting, and math) was quite variable, and showed considerable departure from the I00% completion rate for the whole class. In the Token I phase points were given for items correct, and points removed for failure to complete assignments. Results indicated that in each of the four subject areas there was a tendency for the class to approach a I00% completion rate; there was also a decrease in the varia-

bility of performance. Assignment completion in mathematics tended to remain more variable than the other subject areas, however. In token phase II the time for exchanging the points for back-up reinforcers was made variable; in Token I there was a set weekly time alloted for this. The effect of such a variable schedule was to remove variability rather convincingly, and for assignment completion rates to increase still further. In phase three (Quiet Behaviour phase) the students received as many points for being quiet as they had previously received for correct answers in their assignments. The percentage of assignments completed declined to around 60%. In the final phase Token II was re-introduced, and assignment completion again approximated 100%.

Similarly, Campbell and Sulzer (1971) showed that when tokens, backed-up by naturally available activities as reinforcers, were delivered contingent upon items correct, both reading and spelling rate and accuracy showed substantial increases over their respective baseline levels. Sulzer et al., (1971) implemented a token economy in a regular fifth grade classroom utilizing an individualized study programme. Summarized, the experimental sequence looked like this:

A_1 = Baseline; no systematic manipulation;
B = Points given for items correct; no back-ups;
A_2 = Baseline conditions;
C = Points given for items correct; back-up reinforcers; available;
A_3 = Baseline conditions;
D = Points given for on-task, non-disruptive behaviour; back-ups available;

Throughout all phases, whether experimental or reversal, several conditions were intentionally held constant: children kept the same seats except for group reading; individual and group praise was used lavishly for achievement as well as for good behaviour; children who seriously disrupted the work of the class were briefly removed from the room. All other disruptive behaviour was ignored. Results showed that the introduction of Condition B was accompanied by an abrupt increase in both percentage correct, and items per minute, in reading. With the return to baseline conditions (A_2) there was a sharp decline in the accuracy and rate of both spelling and reading. As soon as back-up reinforcers were made available (Condition C) performance rose to a consistent high level. With the introduction of Condition A_3, performance in spelling declined, but reading performance increased over Condition C. In the final phase (Condition D) students increased their rate of working on reading, but mean accuracy in both subject areas (ie., spelling and reading) dropped and became more variable. The conclusions presented by Sulzer et al., are as follows:

"First, it was demonstrated that a token system could be put into operation in a regular classroom setting. And in this case, the token system used with it's concomitant back-ups proved to be especially effective. These authors conclude that an effective point system requires strong back-up reinforcers if it is to maintain it's motivational properties for the students of the type used in this study. It appears that the greatest promise for an effective classroom and management system lies in delivering strong reinforcement contingent upon academic performance."

A study carried out by Clingman et al., (I977) investigated the effects of sweets, social, and token rewards on the IQ scores of children of above average intelligence. The Peabody Picture Vocabulary Test (PPVT) was used as a measuring instrument. Under the sweets reward condition the child was given a sweet, which had to be consumed immediately, for each correct answer. In the social reinforcement condition each correct response was followed by, "That's very good", or "Very good". When the child made an incorrect response the examiner said nothing. In the token reward condition the children were given a check mark every time a correct response was made. The check marks could be exchanged for prizes, which consisted of balsa wood planes, packs of cards, skipping ropes etc. Cost was determined prior to the study by having several children rate the value of the prizes. Results showed that substantial increases in IQ occurred only in the token reward group. Clingman et al., suggest that this was because a token system with a wide array of back-up reinforcers allowed the child to choose, and thus select the most potent reinforcer available.

(iii) Changes in non-target behaviours

There is an increasing body of evidence showing the beneficial effects of reinforcement programmes beyond specific response targets. In classroom token economies concurrent effects have been demonstrated by Mulligan, Kaplan, and Reppucci (I973); Kubany, Weiss, and Sloggett (I97I); Twardosz and Sajwaj (I972); and Horton (I970). Mulligan, Kaplan, and Reppucci evaluated the effects of token reinforcement in a special elementary school classroom. Tokens were delivered for appropriate classroom behaviour and completion of arithmetic and reading assign-

ments. Aside from changes in the target behaviours, gains were reported in IQ and arithmetic achievement scores. A slight decrease was also noted in anxiety. Kubany, Weiss, and Sloggett (I97I) reduced disruptive classroom behaviour of a six-year-old boy with combined token reinforcement and time-out procedures. The child's punctuality to class from recess improved even though this behaviour was not included in the contingencies. Similarly, Twardosz and Sajwaj (I972) reported that token reinforcement for in-seat behaviour of a hyperactive child increased appropriate social interaction and individual play behaviours. Horton (I970) demonstrated generalization of aggressive responses with delinquent boys in a home for emotionally disturbed children. The effects of token reinforcement for aggressive responses on one task generalized to other forms of aggressive behaviour.

Although all of the above studies demonstrate changes in non-target behaviour, the mechanism responsible for such change is not well understood. It should be pointed out that concurrent changes following reinforcement for a response target do not necessarily entail response generalization (Kazdin, I975). In some cases, the occurrence of one response is inadvertently associated with the presence or absence of another response. Although the investigator has not designed the consequences to follow this other response, the contingency is present nevertheless. Subsequent assessment may reveal behaviour change beyond the intended target. Yet these changes may represent the direct operation of the contingency (eg., Pendergrass, I972). In addition, alteration of one behaviour may place the individual under different reinforcement contingencies in the natural environment. New behaviours not originally selected as target

responses may be reinforced directly by individuals other than staff who administer the programmed contingencies.

A change in one response does not always result in changes in other responses which might seem to be related. For example, Ferritor et al., (I972) found that token reinforcement of attentive classroom behaviour was unrelated to academic performance. Similarly, improvement of academic performance did not improve classroom behaviour. It is suggested that if particular behaviour change is required then it is included in the contingencies.

(2) Select the kind of token to be awarded

Choice of token depends in large part upon teacher preference, since almost any kind of token that is convenient and inexpensive will do. Most programmes reported in the literature have used check marks or ratings given by the teacher. However, stars, rings, checks on a card which the child carries, interlocking chips, tags, and clothes pegs have served as tokens. Some programmes have even dispensed different coloured tokens for different behaviours, with each colour having a different value (Davis, Morris, & Price, I97I).

Perhaps any kind of tangible reinforcement for some appropriate student behaviour could be considered a token. Within such a broad definition everything from material items to forms of written feedback would all be considered within the token approach. In fact, within the literature this broad definition seems to have been adopted (O'Leary & Drabman, I97I; Kazdin & Bootzin, I972). One major differentiation among tokens is between physical objects (for example, poker chips, money, coloured tags etc.,), and those approaches that

provide some form of written feedback. Both approaches have been widely used.

Nay (1976) suggests that tokens should have the following eight properties:

(i) their value should be readily understood;

(ii) there ought to be some relationship between the number of tokens and the degree of reinforcement provided for some behaviour;

(iii) tokens should be easily transportable, particularly if the children are required to move about the school. Points, and other kinds of written feedback, written on a card the children carry with them, provide an easily transportable means of token feedback;

(iv) tokens should be constructed of durable material, and written token feedback should be on paper or card that is not apt to fall apart prior to spending;

(v) token dispensing should divert as little attention as possible from academic matters;

(vi) they should require minimal bookkeeping duties for the teacher. Written approaches can be constructed so that the record of performance is logged on the card as each child earns tokens. Nay (1976) reports using a punch card system for providing token feedback in an institution for "delinquent" adolescent girls. He writes:

"Each client's card lists each of the targeted behaviours, and points earned for a particular behaviour are punched on the card in the space designated for that behaviour. A punch system makes point awarding easy - cards can even be stacked and punched as a group. Clients are re-

quired to carry the card throughout the day, thus transporting their own records. Prior to bedtime all cards are turned into a night matron, who spends one to two hours recording point performances for the girls in her cottage in the record books provided. This system requires no writing or record keeping by any staff member except the night matron, who has time available while the girls are asleep."

It should be noted that points lost are also punched onto cards. The cards therefore enable the children to see how many points are earned, or lost, for specific behaviours. Such records increase the student's role in the programme as monitors of their own behaviour, possibly encouraging self-control (Kanfer & Marston, I963). The punch card system, described above, could easily be adapted to a normal classroom situation.

Tanner, Parrino, and Daniels (I975), working in a hospital setting, provide a thorough description of a "punch" record-keeping system that employs automated data summaries. All token data is coded weekly, keypunched, and fed into the hospital computor. The unit psychologist then receives a printout for each client (eg., amount earned for each behaviour; amount spent for specific categories of "back-ups"; negative point totals, etc.,). Similar summary data is printed out for the entire ward unit;

(vii) they should have some relevance to real currency if one's desire is to teach mathematical or economic skills which will be functional outside the classroom;

(viii) tokens should be nonduplicable and unique so that the

teacher may be assured that they are received only in the authorized manner (Ayllon & Azrin, I968; Tanner et al., I975). Tokens should be identifiable as the property of a particular child.

Probably the most important consideration in the choice of tokens for different populations is the mental age of the child, and the ease with which the child can comprehend various aspects of the token system (O'Leary & Drabman, I97I). For example, with retarded children one may first have to establish the value of the token by repeatedly exchanging the token for a reinforcer such as a sweet. Also, a rating for a retarded child, or a very young child, might have less significance than a number of stars, check marks, or plastic tokens which he can always see, or retain in his possession. However, a rating placed on a removeable sheet in a booklet on the child's desk is more readily administered by a teacher than plastic tokens, and the child would probably spend less time attending to, or playing with, the rating than with plastic tokens. Consequently, with children who can understand and remember the significance of ratings, ratings would probably be preferable to plastic chips. Where stealing, playing with plastic tokens, or tearing up a rating sheet is a problem, one might even place a rating for each child in a visible place in front of the class. Check marks may be particularly suitable for reinforcing academic behaviours, for example, number of answers correct or number of items completed. Ratings are preferable to check marks for reinforcing social behaviours which are not as easily divided into discreet units.

(3) Construct a master control sheet for recording tokens

The teacher initially needs to maintain a cumulative record of the number of tokens awarded to each child for the following three reasons:

(i) the record allows the teacher to avoid having only a few children earn all the points, while others are excluded from the system;

(ii) the record affords the teacher a check on the number of points she is awarding each day, and thereby she can monitor her own performance; and,

(iii) the teacher's record of the number of tokens earned and exchanged for back-up reinforcers by each child will be useful when a child loses his token card. Children will also be less likely to acquire tokens by illegal means.

(4) Choose back-up reinforcers for which tokens can be exchanged

Choosing back-up reinforcers that are valuable to the student is one of the most important aspects of any reinforcement programme. Methods for choosing reinforcers have already been discussed in Chapter Two (p. 54). Most reports of token programmes within the literature have been heavily weighted to using material items as back-ups available from a "store". Because of the frequent use of such material incentives (Ayllon & Azrin, I968; Holt & Hobbs, I976; Sulzer et al., I97I) it is important to carefully define the items that are most highly valued by the particular class of children. Sulzer et al., used a wide range of material back-ups including dominoes, marbles, plastic balloons, models, beads, modelling clay, comics, jewelry (earrings, rings, bracelets, necklaces), and

sweets. These are fairly representative of material reinforcers used in classroom environments. However, it should be firmly stated that there are many enjoyable activities available in the classroom that make excellent back-up reinforcers and involve no additional expense. McLaughlin and Malaby (I97I) asked fifth and sixth grade students to rank privileges within the classroom. These privileges were then provided for certain point costs, with the most desirable costing the most, and the least desirable costing very few points. Among the back-ups were sharpening pencils, seeing animals, taking out balls, sports activities, engaging in special writing assignments, serving on a committee, playing games, listening to records, as well as many projects. McLaughlin and Malaby feel that:

".....our data, obtained under cost-free back-up reinforcers with students collecting most of the data and managing most of the economy, is comparable with that obtained in other places with greater cost and inconvenience."

Osborne (I969) found that "free time" served as an effective back-up reinforcer to eliminate out-of-seat responses in a classroom of six students. In a study carried out by Darch and Thorpe (I977) the principal's attention was used as a back-up reinforcer in exchange for points earned for on-task behaviour. If a team of students collected 5 points during a lesson then the school principal would come into the room immediately after class and request that winning teams (ie., all those teams with 5 or more points) stand. The principal would then acknowledge their performance and engage in conversation with them.

A general rule for choosing back-up reinforcers is that they be in line with the goals of treatment. For instance, in working with a group of retarded children deficient in social skills, games, outings into the community, privileges realating to group activities, as well as any activity or privilege in which a child came into contact with others might be preferable to incentives that required only individual participation. Material items such as arts and crafts kits, which require careful task planning, motor coordination, and some measure of creative thinking, might be preferable to sweets and snack items for children for whom these skills are relevant to treatment goals. Blackham and Silberman (I97I) provided a list of potential back-up reinforcers which are broken down by age, sex, objects, and activities.

(5) Decide how the tokens will be distributed

(a) When ?

Teachers should be consistent in the manner in which tokens are given. They must know exactly the number of tokens earned by different behaviours. Whenever possible, the behavioural requirements for token earning, the number of tokens earned for some specific behaviour, as well as the list of back-up reinforcements should all be posted in prominent locations within the school or classroom. The basic principles for delivering reinforcers have already been discussed in Chapter Two, but some further discussion is presented below.

No strict comparison of classroom dispensing of token and back-up reinforcement to classical studies of schedules of reinforcement can be made, since few contingency operations in the classroom meet classical scheduling conditions. Those

investigators who have described various "scheduling" operations in their token programmes may have fallen into the trap of attempting to associate their work with the prestigious field of learning, and utilizing scientific sounding terminology in order to make their work appear scientifically respectable (Breger & McGaugh, I965). O'Leary and Drabman (I97I), in their excellent review of token economy research in the classroom, write:

"Distinctions about schedule specifications should not be taken lightly, for even under tightly controlled conditions some scheduling effects with humans are not well understood, and the failure of "scheduling" effects in field-experimental settings to mimic laboratory results may reflect not only methodological difficulties in meeting precise scheduling execution but also the rationale that schedule control from token and back-up reinforcement is mitigated by numerous other reinforcers provided by teachers and peers."

It should be pointed out that schedules are seldom varied in token economies. Partly, this is due to the fact that it would be uneconomical to monitor the schedules so closely. In addition, intermittent schedules may only delay extinction, rather than prevent it. Investigators who have monitored the effects of different schedules report somewhat inconsistent results (Haring & Hauk, I969; Meichenbaum, I97I), and a study of schedule effects is an obvious next step for research in the token area.

Another way to increase the amount of effort a client must engage in prior to reinforcement involves <u>delay of reinforcement</u>. Here, the delay between the response the student makes

and the delivery of tokens is gradually increased. O'Leary and Becker (1967) systematically increased the number of days prior to point pay-off in a classroom token economy, thus increasing the amount of work engaged in prior to reinforcement. Kazdin and Bootzin (1972) state that:

"Numerous rewards in the natural setting (e.g., grades, money) are delayed. Thus, it seems desirable to train subjects so that they could perform without receiving rewards immediately for performance. It is assumed that training under delayed reinforcement in the treatment setting would generalize to performance in non-treatment settings. It is also hoped that in the treatment setting when extrinsic reinforcement is delayed, behaviours will come under the control of naturally occurring reinforcers, such as praise and attention. Evidence supporting these assumptions is not available." (p. 363)

Following up this idea, Jones and Kazdin (1975) found appropriate classroom behaviour was maintained when the following was administered within a token programme:

"To further reduce reliance upon the token system, the exchange of tokens for back-up reinforcers was only intermittent. Back-up reinforcers were accessible on only 3 of the 5 days. On days 1, 3, and 5 back-up reinforcers were available contingent upon criterion performance. The initial criterion consisted of earning a total of four tokens in the morning or afternoon. On the next day of token exchange students had to earn at least one more token than the previous day to obtain the back-up reinforcers. This strategy was employed to shape increasingly attentive behaviour. On days when there was no exchange of tokens, the tokens were merely collected and had no actual

back-up value." (p. I57).

In most token systems the teacher pairs social reinforcement with the material token reinforcement in the hopes that it will take on value for the children. In this respect it is considered important that the teacher carefully labels why the tokens have been earned (Madsen, Becker, & Thomas, I968). Social reinforcements may promote generalization from token to the more ordinary social reinforcement conditions, and may be necessary if the programme is to move to a more natural basis (Kazdin & Bootzin, I972; Jones & Kazdin, I975). The question of generalization is critically important in the development of token economy programmes, and will be discussed later in the chapter (p. I06).

(b) By whom ?

Although teachers and other staff normally dispense tokens there has been increasing reference in the literature to the use of self-reinforcement (see Chapter Two, p. 57). The only conceptual and practical requirement for self-reinforcement is the freedom of a student to reinforce himself at any time whether or not he performs a particular response (Skinner, I953).

Applications of self-reinforcement may involve two different procedures. First, the student can determine the response requirements for a given amount of reinforcement (i.e. when to deliver reinforcement, and the amount to be delivered). When the individual determines the criteria for reinforcement this is referred to as self-determined reinforcement (Glynn, I970). Second, the individual can dispense reinforcement depending upon achieving a particular performance criterion

which may, or may not, be self-determined. When the individual administers reinforcers to himself, this is referred to as self-administered reinforcement. Who administers the reinforcers (oneself or someone else) is not crucial. The crucial elements are determining when to deliver the reinforcer and for what behaviours.

A number of classroom studies have demonstrated the efficacy of self-reinforcement (Lovitt & Curtiss, I969; Glynn, I970; Kaufman & O'Leary, I972; Bolstad & Johnson, I972; Glynn, Thomas, & Shee, I973; Frederickson & Frederickson, I975). Kaufman and O'Leary (I972) showed that students maintained low rates of deviant behaviour while self-assigning points. Glynn, Thomas, and Shee (I973) required elementary school students to record whether they were paying attention in class whenever a "beep" sounded (at randomly selected intervals) from a tape recorder. Each time a child recorded "paying attention", he earned one minute of free time. When students recorded their own behaviour, and thereby determined their own reinforcement, the rate of paying attention was higher than in baseline.

An obvious concern with self-reinforcement is that individuals will provide consequences to themselves independently of their actual behaviour. There is justification for this concern. Santogrossi et al., (I973) evaluated the effects of teacher determined points versus self-determined points on the disruptive behaviour of a class of emotionally disturbed children. When the teacher administered points disruptive behaviour decreased. However, when the students were given the opportunity to reward themselves, they did so non-contingently and disruptive behaviour increased. Self-reinforce-

ment led to administration of rewards for undesirable behaviour. Other studies of self-reinforcement have demonstrated that individuals who self-determine reinforcement tend to become increasingly lenient over time (Felixbrod & O'Leary, 1973; McReynolds & Church, 1973). Felixbrod and O'Leary compared self-determined, and externally determined point earning in inducing a class of 24 second grade children to solve arithmetic problems correctly. They found that, although there seems to be no difference in number of problems solved correctly between the self-determined and the externally determined groups, the students in the former group imposed increasingly lenient standards upon their problem solving performance over time. At the start of the final training session six of the seven children in the self-determined condition selected the most lenient standard. Thus, self-reinforcement may result in non-contingent reinforcement, a procedure that is not usually associated with target behaviour change. Two related solutions to the problem of non-contingent self-reinforcement are: (i) reinforcing the students on the basis of how accurately they assess their own behaviour (Bolstad & Johnson, 1972), and (ii) reinforcing individuals for reinforcing themselves contingently (Drabman, Spitalnik, & O'Leary, 1973). Although these solutions ameliorate non-contingent self-consequation, they also grossly distort the notions of "self-control" and "self-reinforcement" (Kazdin, 1975; Morgan & Bass, 1973; Stuart, 1972).

It should be remembered that in many self-reinforcement programmes the clients observe their own behaviour and base their self-administered consequences on the extent to which these data meet some criterion. Since self-observation alone

can account for behaviour change (Kazdin, I974), the precise role of self-consequation is sometimes obscured.

There is little doubt that self-control procedures will be increasingly incorporated into token economies. However, the procedures used to successfully achieve the transition from external to self-control remain to be perfected. Further implications for research and practice are discussed in an excellent paper by Goldiamond (I976)

(6) Select the appropriate type of contingency to be used when awarding tokens: individual versus group contingencies.

Tokens may be made contingent upon individual or class behaviour. Unfortunately, there is little evidence concerning the comparative effectiveness of these two types of contingency. Most investigators who have employed group contingencies have done so within the classroom context (Barrish, Saunders, & Wolf, I969; Sloggett, I97I; Axelrod, I973; Drabman, Spitalnik, & Spitalnik, I974; Medland & Stachnik, I972; Wolf et al., I970; Hamblin, Hathaway, & Wodarski, I97I; Harris & Sherman, I973; Darch & Thorpe, I977). Medland and Stachnik (I972) devised a group contingency to control disruptive classroom behaviour. The class was divided into two groups. Points were given to the group when a member violated a class rule. Either or both group(s) earned extra play-time if there were fewer than a certain number of points "earned". Disruptive behaviour decreased substantially under the group contingency. In another variant, children in a particular group received back-up reinforcement based upon the behaviour of certain "problem" students who displayed the most inappropriate behaviour within the group (Barrish, Saunders, & Wolf, I969; Wolf et al., I970;

Greenberg & O'Donnell, 1972).

Barrish, Saunders, and Wolf (1969) divided a fourth grade class into two teams to "play a game". Certain defined problem behaviours resulted in a mark being placed on the blackboard for the team with the offending member, and his inappropriate behaviour resulted in a possible loss of reinforcement for all members of his team. The team with the fewest marks were permitted to wear victory tags, put a star by each of it's members' names on the winners' chart, line up first for lunch, and take part in a 30-minute "free time" for special projects. The team that lost did not receive these privileges and would continue working on an assignment during the last half-hour of the day. Students would have to stay after school if they did not do their work during this half-hour period. If both teams earned fewer than five marks then both received the privileges. The introduction of the "group game" led to a decrease in disruptive behaviour.

In the research carried out by Wolf et al., (1970) the behaviour of one child was controlled by dividing the tokens that he earned among his peers. His behaviour improved markedly when the tokens were shared. A number of studies have shown that group contingencies, and reinforcer sharing control the behaviour of individuals (Axelrod, 1973; Walker & Buckley, 1972).

Programmes using group contingencies rarely systematically assess the precise peer interaction that purportedly occurs. Some anecdotal reports suggest that peers encourage and praise (Patterson, 1965), whereas others note an increase in peer pressure and reprimands (Axelrod, 1973; Schmidt & Ulrich, 1969). Certainly, a great deal of systematic research is required

to evaluate the specific peer contingencies (both reinforcing and punishing) that contribute to the efficacy of group contingencies and consequence sharing.

Some studies have compared the performance of children in a classroom situation under a group contingency with that under individual contingencies (Hamblin, Hathaway, & Wodarski, I97I; Sloggett, I97I; Phillips et al., I973; Drabman et al., I974; Rosenbaum, O'Leary, & Jacob, I975; Darch & Thorpe, I977). Hamblin, Hathaway, and Wodarski produced data that consistently suggested that group contingencies may have some advantage over individual contingencies in accelerating academic performance. Similar findings were reported by Sloggett (I97I). However, Phillips et al (I973) clearly found that group consequences were not nearly as effective as individual consequences in maintaining appropriate behaviour (eg., sweeping, dusting, cleaning the residential cottage) for a group of delinquent adolescents. The subjects seemed to prefer conditions where <u>their</u> specific behaviour resulted in an <u>individual</u> consequence, as opposed to a group consequence. Two studies reported in the literature found no differences in effectiveness between individual contingencies and group contingencies (Drabman et al., I974; Rosenbaum, O'Leary, & Jacob, I975). With the present lack of consistency in the findings it would make sense for the teacher to employ group contingencies along with individual contingencies, perhaps thus achieving the best of both worlds. Sattler and Swoope (I970) make the following suggestions:

"When every member of the group is already capable of performing the desirable behaviour so that the group as a whole can earn tokens, group contingencies work well. When a child has

rather extensive behavioural deficits and is incapable of meeting absolute group standards, the teacher needs to work with the child as an individual. She can award individual pupils tokens for improvements in particular behaviour problem areas. In such cases, establishing individual contingencies ensures that every child is included in the system. Difficulties are avoided that may be encountered when a child is at least temporarily incapable of criterion performance and prevents the group effort from succeeding."

(7) Select a cuing method for informing children which behaviours will be reinforced.

This procedure involves making the behavioural goals clear to the students. It also provides the teacher with a reminder to provide positive consequences when students work towards goals rather than attending to problem behaviours. Teachers may find it convenient to put at least some of the goal behaviours on a chart, or on the blackboard, in clear view of the class. In addition, the teacher can remind students of the desirable behaviours by verbally indicating why they are receiving a point each time she awards a token.

(8) Schedule a time for exchanging tokens for back-up reinforcers.

Twenty or thirty minutes at the end of the school day works well for many teachers. Other teachers have included additional times extemporaneously through-out the day when students can elect to exchange tokens for such activities as being a monitor, or helping other children with their work.

It should be remembered that token systems are only vehicles for the implementation of operant principles in the remediation of classroom problems. To this extent, most of the principles of intervention discussed in Chapter Two are also relevant to classroom token economies. Most important is the fact that on many occasions operant principles can be used effectively outside the framework of a token system.

ISSUES

(A) Generalization

Since the efficacy of token programmes has been firmly demonstrated, the major issue is achieving long-term maintainance of responses following programme termination, and transfer of these responses to extra-treatment settings. However, considering the manner in which most token programmes have been conducted, generalization of appropriate behaviour should not have been expected. O'Leary and Drabman (I97I) make the following points:

".....since children do not spontaneously acquire self-control techniques as a function of their exposure to the token programme, since children's behaviour seems to be quite situation specific, and since children's natural environments outside the token classroom do not ordinarily reinforce the children's appropriate behaviour in a systematic manner, when the token programme is removed it is likely that the children's appropriate behaviour will decline."

When behaviours are maintained the reasons are frequently unclear. Three explanations are usually offered to account for

unplanned response maintenance. First, it is possible that behaviours developed through token reinforcement come under the control of extra-experimental reinforcers (Baer, Wolf, & Risley, 1968; Bijou et al., 1969). Events associated with tokens may acquire conditioned reinforcement value and serve to maintain behaviours following token withdrawal (Medland & Stachnik, 1972). For example, investigators working in a classroom setting have suggested that teachers may more readily function as secondary reinforcers after being associated with a token economy (Chadwick & Day, 1971). A second interpretation of unplanned maintenance is that after tokens are withdrawn, reinforcing consequences which are derived directly from the activities themselves maintain behaviour. For example, token reinforcement for social interaction may be unnecessary to maintain behaviour because of the "natural" reinforcement which follows (Kazdin & Polster, 1973). A third interpretation is that a token programme alters staff behaviour in some permanent fashion so that they continue desirable response consequation after tokens are discontinued. Even though tokens are withdrawn, staff utilize contingent reinforcement, prompting, "ignoring" deviant behaviour, as well as other techniques, developed in their repertoires during the token programme. But as Kazdin (1975) remarks, "in spite of the reasonable nature of each of these explanations, and partial support which might be provided for each, it is usually a matter of conjecture why a response is maintained without specific programming." And, as Baer, Wolf, and Risley (1968) aptly emphasized, "Generalization should be programmed rather than expected or lamented." (p. 97).

Typically, programming response maintenance is required

because removal of the contingencies frequently results in a decrease in appropriate performance. Kazdin (I975) provides a list of procedures, detailed below, which might be useful in achieving maintenance.

(I) Systematically substituting social reinforcers.

Behaviour can be maintained after tokens have been withdrawn by substituting social reinforcers for tokens. Praise alone has been effective in maintaining behaviour changes in token programmes (Chadwick & Day, I97I), although it may not be effective initially. However, after being paired consistently with token delivery, praise effectively maintains behaviour after tokens are withdrawn (Wahler, I968).

(2) Withdraw the token and back-up reinforcers gradually, and utilize other "natural" reinforcers existing within the classroom, such as privileges (O'Leary et al., I969; Osborne, I969).

(3) Involve the parents

Since target responses often are readily modified in the natural environment (eg., the home), paraprofessionals can be trained to carry out the entire programme (see Ayllon & Wright, I972, for a review). Some studies have involved the use of contingency contracting between parents and their children to facilitate and support school behaviours by home-based reinforcement (Cohen et al., I97I; MacDonald et al., I970; Todd et al., I976; Walker et al., I969; Herbert & Baer, I972).

(4) Schedule intermittent reinforcement

As is widely demonstrated in laboratory studies, resistance to extinction can be increased by intermittent reinforcement. In some token programmes, an extremely "thin" schedule has

been effective in maintaining high levels of performance (Phillips et al., 1971). In other studies, intermittent reinforcement is used to develop resistance to extinction after the tokens have been withdrawn entirely (Kazdin & Polster, 1973). Although intermittent reinforcement increases resistance to extinction, it is unclear to what extent this is so.

(5) Vary the stimulus conditions of training

While a token system is in operation, behaviour should be reinforced in a wide range of situations and settings to broaden the stimulus control over the behaviour. When behaviour is established in the presence of varied cues, it may be less likely to revert to baseline, or near baseline, levels when the programme is withdrawn. One way to increase the conditions under which behaviour is "trained" is to expose the individual to extra-treatment settings while the programme is in effect (Kelley & Henderson, 1971). Presumably, this procedure develops stimulus control of the target responses in the setting where the individual will ultimately function.

(6) Self-reinforcement training

If the individual can be trained to monitor and reinforce his own behaviour, behaviour may be maintained across a variety of settings and situations. As noted earlier (p. 57), self-reinforcement has been restricted to a limited range of applied settings. Preliminary results suggest that the value of self-reinforcement is dubious in ensuring response maintenance in classroom settings (Bolstad & Johnson, 1972; Johnson, 1970). Self-regulation and self-control procedures appear to be useful in maintaining a variety of behaviours (Kanfer, 1975). Although such techniques might have some limitations with

populations that often receive token reinforcement procedures (e.g., retarded children), such limitations cannot be determined on a priori grounds.

(7) Manipulating reinforcement delay

Two separate procedures have been employed in delaying reinforcement. One procedure used is to increase the delay between the response and token reinforcement. For example, in the token economy described by Atthowe and Krasner (I968), a number of behaviours earned tokens that were paid at the end of the week, rather than upon each performance of the response. Atthowe and Krasner utilized a number of different delay periods for various behaviours. Another delay of reinforcement procedure involves the manipulation of the delay between token reinforcement and the exchange of tokens for back-up reinforcers (O'Leary & Becker, I967; Cotler et al., I972). O'Leary and Becker gave points for "instruction following" behaviours. Gradually the number of reinforcement periods decreased and the delay between token reinforcement and exchange of tokens increased up to a four-day period.

(8) Simultaneously manipulating several reinforcement parameters

Simultaneously altering a number of aspects of reinforcement delivery, such as magnitude, delay, place, quality, and schedule, may effectively enhance resistance to extinction. Laboratory evidence suggests that the greater the sources of variation, the greater the resistance to extinction (McNamara & Wike, I958). This technique, or perhaps combination of techniques, has not been reported in the token economy literature.

A great deal of additional work is required to determine which procedures can be used to maintain behaviour. One solution is to substitute other behaviour modification programmes after token reinforcement has been withdrawn (e.g., Walker & Buckley, I972). However, in many settings where programmes are not continued in any form, resistance to extinction must be enhanced with little or no aid from a specifically designed and carefully executed programme in the new environment.

Generally, the above comments are restricted to building resistance to extinction. Response maintenance is often a prior issue to that of transfer of behaviour to non-treatment settings. A child's behaviour needs to be maintained in the school when the programme is withdrawn before considering transfer of the behaviour to a non-school setting.

Stimulus generalization

There are numerous reports of token programmes showing behaviour change only while contingent reinforcement is being delivered. Generally, removal of token reinforcement results in decrements in desirable responses, and a return to baseline, or near-baseline, levels of performance. This led Lindsley (I964) to conclude that token economies were prosthetic rather than therapeutic. Prosthetic environments show changes only during treatment, whereas removal of these conditions results in a loss of treatment effects. Therapeutic environments show changes that are maintained beyond the treatment conditions themselves. However, it may be premature to identify token economies as only prosthetic environments.

For token economies implemented in a classroom setting,

generalization refers primarily to the transfer of performance within the same setting. With some exceptions (Wahler, I969), behaviour in non-school settings is not monitored for evidence of generalization. Instead, the goal is to maintain improved classroom behaviour when the token economy is withdrawn, and in classes not associated with the token programme. Reinforcement programmes that have been implemented in either the mornings or the afternoons have not found evidence of generalization to the part of the day in which tokens were not dispensed (Becker et al., I967; Broden et al., I970; Kazdin, I972). Also, studies that have examined resistance to extinction have generally found that behaviour changes are not maintained (Barrish et al., I969; O'Leary et al., I969; Walker & Buckley, I968).

Response generalization

There has been a paucity of reports of response generalization in the literature on token reinforcement. Primarily, this is due to the fact that both treatment and the assessment of treatment effects focus directly on the target behaviour. Usually, concomitant changes in non-target behaviours are not measured. However, a number of studies have demonstrated changes in non-target behaviour (Mulligan, Kaplan, & Reppucci, I973; Kubany, Weiss, & Sloggett, I97I; Twardoz & Sajwaj, I972; Horton, I970). For a discussion of these studies see Page 88.

(B) Punishment

While the emphasis of most token programmes is on positive reinforcement of appropriate behaviour, many programmes include some means of providing punishment for problem behaviours that occur at a high rate. Most frequently there is some

form of token cost, or loss of tokens contingent upon inappropriate behaviour (Kaufman & O'Leary, I972; Phillips et al., I97I; Nay, I974; Burchard & Barrera, I972; Bucher & Hawkins, I973; McLaughlin & Malaby, I972). The other form of punishment that is used is time-out (Burchard & Barrera, I972; Kubany et al., I97I).

Burchard & Barrera (I972) evaluated response cost (fines) and time-out in a token economy for mildly retarded antisocial boys. Punishment was used to suppress swearing, personal assault, damage to property, and similar acts. Four experimental groups were exposed to different time-out/response cost combinations. Variations were made in the duration of isolation (from 0 to 30 minutes), and amount of fine (from 0 tokens to 20 tokens). Larger fines and longer time-out periods led to greater response suppression. Unexpectedly, low magnitude time-out durations or fines led to increased instances of deviant behaviour.

There is no doubt that punishment (point loss or time-out) can be an effective way of gaining control of targeted behaviours, but there is always the possibility of abuse when any system of punishment is built into an institutional treatment programme. Nay (I976) says:

"Because many institutions have functioned on a punitive basis prior to programme implementation and because of the general emphasis upon punishment as opposed to reinforcement within society at large, many staff members find it easier to punish clients in an array of creative and sometimes astonishing ways than to provide even the simplest rewards for appropriate behaviour. Positive reinforcement often leads staff members to talk of "bribery" and "mechanical and artificial situations",

but they may find it very easy to employ a diverse array of punishments at the slightest instance of negative client behaviour." (p. I27). "Thus, in employing any form of token loss, time-out, or other punishment, the behavioural change agent must carefully assess the possibility of staff overuse of such punitive approaches, and perhaps limit the manner in which the approaches are employed within the programme." (p. I28).

This chapter has considered the major procedural steps necessary for setting-up and implementing a token programme in the classroom. These general guidelines formed the basis for establishing the token economy programme described in Chapter Four.

CHAPTER FOUR

EVALUATION OF A TOKEN ECONOMY PROGRAMME IN A SCHOOL FOR DISRUPTIVE CHILDREN.

Introduction

The goal of the research presented below was the development and evaluation of a workable treatment model which can be implemented by regular school personnel. This is not to state, however, that it is expected that such a system be directly replicated by a classroom teacher all by herself. Elaborate data collection requires additional personnel, as does a completely personalized curriculum. But with the demonstration of the programme's effectiveness, a next logical step is to begin to design systems that can be tailored to the needs of the classroom teacher functioning with an aide, or alone in the typical school setting.

A second purpose relates to the exploration of the amount of generalization to other settings and times. In the case of assignment completion points were awarded in the morning but not in the afternoon. However, the students work was monitored in both the morning and the afternoon to assess the amount of change occurring in both these periods. Follow-up assessments were also made five weeks after the withdrawal of the token system to see whether any generalization had occurred.

Another frequently asked question of classroom behaviour modifiers is the effect of a contingency management system upon behaviours that are not being directly manipulated. This study, like the Ferritor et al., (I970) study, was designed to explore this issue.

The data presented below was generated by an intra-subject reversal design. The token economy was established following the general guidelines provided by Sattler and Swoope (I970).

The School (referred to in this report as EF School)

EF School was chosen for study for a number of reasons. Firstly, it was in many ways an "experimental" school in as much as it was only given a "licence" to operate for an initial period of two years. This was later extended for a further two years. EF School was closed in July, 1977. It was expected that the school would implement educational training programmes that would enable the children to return to their normal comprehensive schools after a relatively short time. For a number of reasons this did not often happen. However, the staff were actively encouraged to try out new ideas in order to promote this aim, and were fairly generously funded by the Local Authority. The school was well provided with facilities, equipment (including a mini-bus), and staff (one teacher-in-charge, and two assistants). The staff were given considerable freedom in planning the academic and social life of the school. Secondly, I had met all the staff in a behaviour modification course that I had organized and taught during 1975. The staff were therefore knowledgeable about behaviour modification techniques, and were enthusiastic about implementing them at EF School. I was given completely free access to the school, and was actively encouraged to initiate a behaviour modification programme. Thirdly, the school had a very small number of children in it at any one time, which made the task of setting-up a token economy less difficult.

The EF School was officially designated a "school for disruptive children". This meant that secondary schools, within the area administered by the Borough, could refer children with "uncontainable" behaviour problems to the edu-

cational psychologist, who, after appropriate assessment and consultation, would place the child at EF School. As already mentioned, the main objective of the school was to provide a therapeutic environment that was conducive to learning both academic and social skills, in order to facilitate a return to a normal classroom.

Subjects

At the time of the study there were only six students attending the school, and it was decided that it would be possible to implement a token programme invoving all the students. The students, four males and two females, were mainly taught in the same classroom, although for certain lessons, e.g., craft, the girls and boys were divided. Two teachers were usually present in the classroom during a lesson where the students were together.

The children were referred to EF School because of their socially deviant behaviour. They were all of average intellectual ability but demonstrated poor academic performance in their respective comprehensive schools. All the students possessed a number of behaviours which made them poor candidates for learning; teacher defiance, distractability, hyperactivity, and tantrum behaviour were attributed to the group as a whole. Relevant details for each individual student is as follows:

S_1 David G. Age: I3.7. Referred to EF School for assaulting a teacher. Recently in trouble with the police, and consequently on probation, but has since managed to keep out of trouble. In the classroom (at EF School) he was verbally abu-

sive to the teachers, e.g., answered back, refused to carry out instructions. He was often absent from school, and was almost always late; he would often leave school during the day and not return, usually after an argument with a teacher or another student. However, he was interested in craft (e.g., woodwork, and metalwork), and his behaviour in the craftroom was usually exemplary. In other lessons he would shout across the classroom, and throw "missiles" at other children. If allowed, he would wander around the classroom disturbing the other students.

S_2 Robert C. Age: I2.II. The report from his normal comprehensive school said that he was, "physically and verbally abusive toward his peers", and, "showed excessive verbal outbursts (swearing, loud noises, etc.,) during lessons." At EF School he refused to carry out instructions, and was extremely retiscent during lessons. He was easily distracted by the other children. He had an early morning job and often arrived late at school.

S_3 John R. Age: I4.I. Prior to being referred, John had been in trouble with the police for stealing and glue sniffing, and was currently on probation in this connection. In the classroom he often refused to work on assignments, and would just "sit and daydream". He was

rather withdrawn, and had little interaction with his peers.

S_4 Peter J. Age: I5.IO. Referred to EF School for disruptive and unruly behaviour, and refusal to cooperate with teachers. Presently, he is very apathetic to school work, although he is studying for two CSE subjects (English Language, and Geography). He left EF School on attaining his sixteenth birthday, although legally he should have attended until the end of term (this was six weeks before the termination of the token economy).

S_5 Linda C. Age: I4.3. Generally uncooperative in school, often blatently refusing to attempt assignments, or to engage in discussion. She spent a good deal of her time talking to her freind. She would often argue with teachers, resulting in her walking out of the school. She enjoyed cookery classes.

S_6 Joanne D. Age: I5.2. Referred to EF School for persistent swearing at teachers, and refusal to obey instructions. In present school the swearing persisted. She was often very late arriving at school, and blamed her mother for this. If antagonised by other children she would become very upset and leave school without permission.

The children travelled to school by bus, and in all cases lived in the socially deprived areas of the town. Little information regarding the home background was available, although

some limited contact was made with the parents. Access to school reports, past and present, was possible but the reports of the educational psychologist were not. The information presented above, regarding the students, has been gleaned from the school reports, and supplemented by discussions with the teachers, as well as personal observation.

Teachers

T_1 R.L. Age: 29; Male; Certificate of Education. Seven years teaching experience in secondary schools, mainly with less-able students. Attended in-service course in behaviour modification in Summer Term, I975. Appeared both enthusiastic and competent.

T_2 M.V. Age: 35; Male; B.Ed (I976); teacher-in-charge. Fourteen years teaching experience in secondary schools with responsibility for the teaching of geography. Attended in-service course in behaviour modification, and as part of the course-work carried out a small-scale study at EF School. Enthusiastic about the setting up of a token economy programme.

T_3 D.J. Age: 32; Female; Certificate of Education with specialisation in home economics. Taught home economics for eight years in a secondary school for girls. Attended in-service course in behaviour modification, and keen to implement these techniques at EF.

Setting

There were two general-purpose classrooms in the school, a craft room, and a cookery/games room, each equipped with appropriate furniture and materials. All the observations were carried out in one or other of these three rooms. No special observation facilities were available. The students followed a fairly conventional curriculum during the morning sessions, but were allowed a moderate amount of freedom in the afternoons when they could follow a number of activities, including craft, cookery, typewriting, and games (at a local youth centre). Every Thursday morning a visit was made in the school mini-bus to some local place of interest. Project work was a central feature, and a wide range of books and other materials was available for this. School started at 9.00a.m. and finished at 3.30 p.m. The students and staff had lunch at school.

Procedures

Staff Meetings

A regular staff meeting (including myself) was held every Friday afternoon at 3.30 p.m. The first two meetings, in November, I975, were concerned with very general issues regarding the possibility of setting up a token programme. At these meetings numerous ideas were discussed and their implications explored. As a result of these exploratory meetings it was generally agreed that a formal token system be established in the school, and that this be appropriately monitored and evaluated. At the third meeting it was decided that each member of staff, including myself and the education-

al psychologist, who was present on this occasion, would carry out a modified form of functional analysis (see Chapter Two, pages 36-44). This involved selecting possible target behaviours, and assessing their frequency of occurrence in the classroom over a two week period. Identification and recording of antecedents, and reinforcing or consequating stimuli was only done at a very superficial level. The main reason for this was lack of time, since it had been agreed that the study be carried-out during the Spring Term, I976. At the fifth meeting each member of staff presented their selection of target behaviours with details of frequency of occurrence, as well as an indication of the possible antecedent stimuli and consequent events. After some discussion, a number of target behaviours were selected for the programme (see target behaviours, below), but before being adopted they were discussed with the students. Later meetings were concerned with choosing tokens and back-up reinforcers, presenting and discussing data generated during the week, and reviewing the progress of the programme. These meetings were considered to be an essential part of the token economy programme.

Staff/Student Meetings

Staff-Student meetings were arranged for most Monday mornings between 9.I5. a.m. - I0.00. a.m., and on Fridays at 3.00. p.m. One of the major tasks of the Monday meeting was for students to plan their time-table for the week. Outside of certain formal requirements that the student had to meet, such as English Language and mathematics, the informal and flexible nature of the curriculum allowed for considerable choice. During the operation of the token programme the

range of options was enhanced, and tokens could be used to "purchase" these. The students were also reminded of the various experimental contingencies operating during that week. During the Friday meetings, the students were involved in discussions concerning the management of the token economy, such as selection of target behaviours and back-up reinforcers, the cost of back-up reinforcers, as well as reviewing the data collected during the week. Students were allowed to make suggestions concerning the running of the token programme, and often these were considered to be worth acting upon. In all, the students were allowed maximum participation in the formulation and operation of the programme, thus supporting the principle of a phenomenal/behavioural approach to intervention (Chapter One, p. IO).

Target Behaviours

All six students were observed for two weeks to ascertain the general occurrence rates of various problem behaviours. At the end of this period the staff and myself discussed these and selected the programme target behaviours. Discussions also took place with the students. The selected target behaviours were applicable to all six students.

Response definitions

We defined "appropriate classroom behaviour" in terms of behavioural categories believed to be critical to academic progress and classroom order. These behaviours were believed to be "functional" to the student in order to facilitate progress to a return to the normal school setting. The operational definitions were:

A. On-Time: student should arrive in school by 9.00 a.m.;

B. Assignment Completion: completion of assigned material according to criterion established by the teacher and the student prior to the commencement of the lesson;

C. On-Task: student must be:

(i) looking at assigned material;

(ii) looking at the teacher/or another student during a lesson, or discussion period;

(iii) following instructions, i.e., engaged in an activity assigned by the teacher, such as a special project.

Behaviours considered to be incompatible with learning

D. Disturbing others directly and aggression: grabbing objects or work; destroying another's property; hitting; shoving; striking with object; throwing object at another person;

E. Gross Motor Behaviour: getting out of seat; walking around;

F. Vocal Noise: shouting out remarks to the teacher or another student; singing; whistling; calling teacher's name to gain attention.

Non-target Behaviours

I. Meal-time behaviour: getting-up from the table before the end of the meal; shouting across the table to another student, or the teacher; throwing or flicking food.

Observations

(I) On-task; Disturbing others; Gross Motor; Vocal Noise

All six students were observed in the morning sessions only, on three days a week - Mondays, Wednesdays, and Fridays. Observations were made between 9.I5 a.m. and II.30 a.m. by a regular observer. Reliability checks were made by myself during two of the weekly sessions. The regular observer was a I7-year old student employed on a Job Creation scheme whilst awaiting to enter University. Before the baseline data was collected the observer was trained to observe the students over a two week period in the classroom. He was instructed never to talk to the students, or make any differential response to them in order to minimize the effects of the observer's presence on the children's behaviour.

Each student was observed twenty times during the course of the two hour period (9.I5 - I0.I5a.m., I0.30 - II.30 a.m.), giving a total observation time for each student of approximately I6 minutes (this excludes the time spent recording). The students were assigned randomly at given periods of time prior to the start of the lesson, this being marked on the recording sheet (see Fig. I. Page, I26). Incidence of occurrence of a particular behaviour was recorded by putting a mark through the relevant letter code. Observations were made on a 50 second observe, I0 seconds record basis. Each observer had a clipboard with a stop watch, and a recording sheet.

The percentage of deviant behaviour, and on-task behaviour, was calculated by dividing the total behaviour occurrences in the respective category by the number of scoring intervals, and multiplying by I00.

DATE February 13th. '77

STUDENT

C = on-task behaviour

D = disturbing others directly & aggression

E = gross motor behaviour

F = vocal noise

DG	CDEF	JR	CDEF	LC	CDEF	PJ	CDEF
DG	CDEF	RC	CDEF	RC	CDEF	JR	CDEF
RC	CDEF	PJ	CDEF	RC	CDEF	PJ	CDEF
LC	CDEF	JD	CDEF	JD	CDEF	RC	CDEF
JD	CDEF	DG	CDEF	LC	CDEF	DG	CDEF

SIGNED P. J. Hawkins
OBSERVER

Figure I. Time-mark score sheet - 20-minute block.

Reliability

Reliability was checked, on average, twice a week according to the following procedure: an agreement was scored if both observers recorded one or more disruptive behaviours (or on-task behaviours) within the same 50-second interval; a disagreement was scored if one observer recorded a disruptive behaviour (or on-task behaviour), and the other observer recorded none. The reliability of the measure of disruptive behaviour (or on-task behaviour) was calculated for each student, each day, by dividing the number of intervals in which there was agreement by the total number of agreements plus disagreements.

The average interobserver reliabilities are presented below (Table I).

S	BL	EI	RI	E2	R2
S_1	85	84	87	97	88
S_2	77	87	70	93	92
S_3	79	94	84	88	90
S_4	8I	96	92	9I	87
S_5	84	93	97	93	9I

BL = Baseline
EI = Tokens I
RI = Reversal I
E2 = Tokens 2
R2 = Reversal 2

Table I. Average interobserver reliabilities during Experimental Phases: % of perfect agreement.

N.B. The data for S_6 has been excluded from all the analyses because he left school six weeks before the termination of the study.

The reliabilities obtained concur with those reported in the literature, being in the general range of 80 - I00% agreement

between observers (see Chapter Two, p. 4I).

(2) Time of arrival

During the first half-hour in the morning all the students were observed with respect to their time of arrival at school. This was recorded as the number of minutes late after 9.00 a.m.

(3) Assignment completion

Completion of assignments was assessed at the end of each lesson on the basis of a set of criteria established at the beginning of the class. The student was encouraged to grade his own work with respect to (i) degree of completion, and (ii) accuracy/neatness. A final "score" was worked out between the student and the teacher. This is another example of the phenomenal/behavioural approach discussed earlier. A fuller description of the procedure involved is presented on page I36.

(4) Meal-time behaviour

Recording was made on a continuous basis for the group as a whole. That is, everytime a student shouted across the table, or flicked a piece of food, a behaviour occurrence was scored, resulting in a group score for inappropriate meal-time behaviour. No attempt was made to check for reliability.

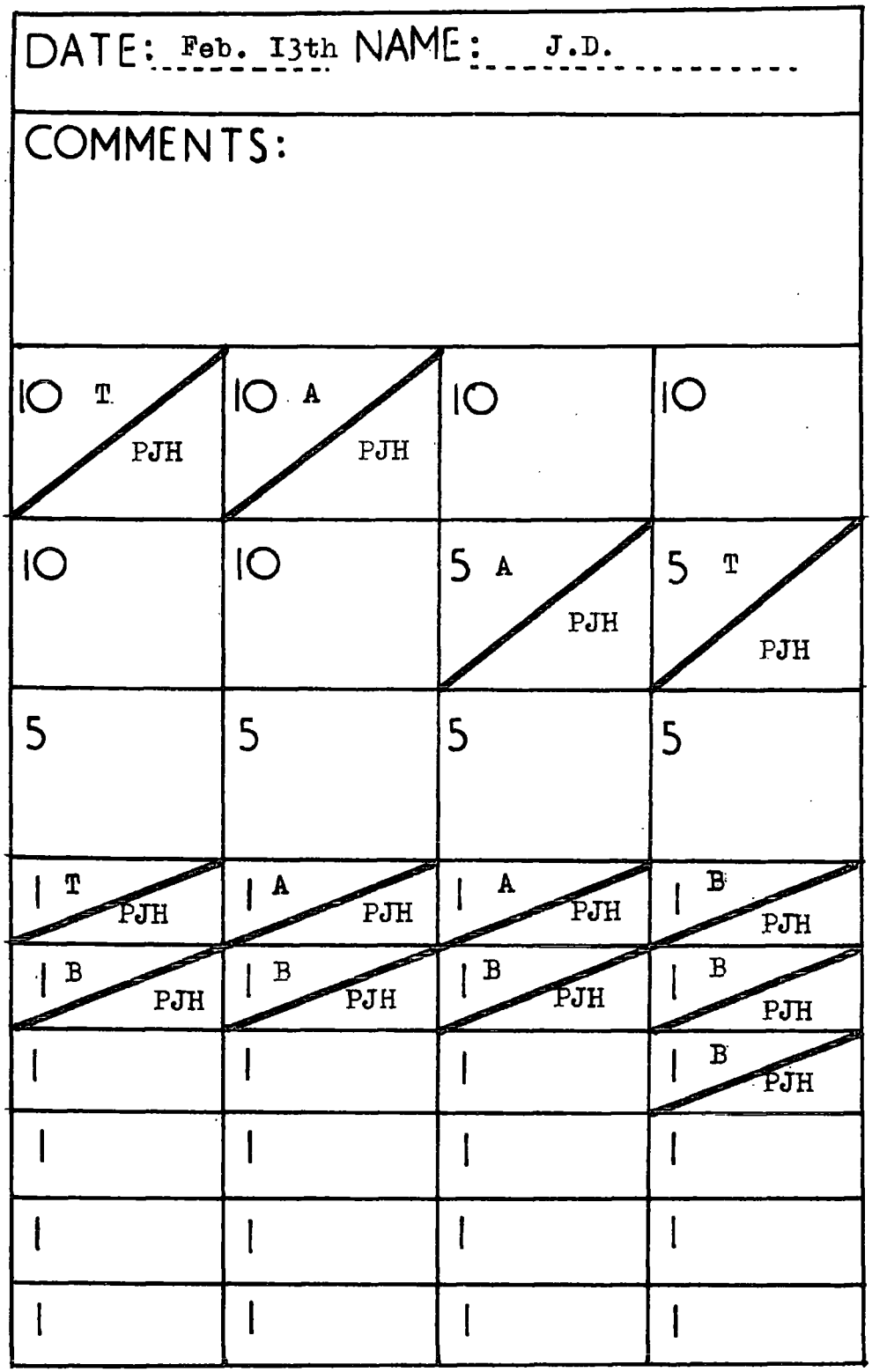
Choice of tokens

It was decided not to use physical objects, e.g., washers, plastic counters, as tokens because of the problems associated with keeping these, and transporting them from one class-

room to another. Instead, each student had a note-book (5 inches X 8 inches) that he carried around with him. Each page was divided up into sections, each section carrying a certain value with respect to number of points (tokens). The teacher could enter points for appropriate behaviours, assignment completion, and arriving on-time, by putting his signature in the box of the appropriate value. The points could be cancelled, when exchanged for a back-up reinforcer, by crossing through the box. A sample page is shown on Page I30 (Fig. 2). The teacher also carried a small note-book to record the same information. This information, i.e., the number of points awarded to each student and the behaviours that they were awarded for, was later transferred to a master control sheet. These records provided the necessary information required for making any changes in the schedule for awarding points.

Delivery of points/Exchange of points

The points booklet, described above, was placed on the student's desk during a lesson, and opened at the appropriate day. The teacher initialled the appropriate box in the booklet whenever the student reached criterion level with respect to the specific target behaviours. Points were awarded every ten minutes during the first two weeks of the experimental programme, and thereafter every fifteen minutes. Delivery of points was always accompanied by social reinforcement, as well as some explanation as to why the points had been awarded, e.g.,"this point(s) is for behaving yourself in the past fifteen minutes"; "I'm pleased to see that you've been getting on with your work, and haven't been wandering around



T = on-time

B = appropriate behaviour

A = assignment

Figure 2. Sample page of a points-booklet.

the classroom disturbing others." All students received points in the same manner. The teacher determined whether or not to award points, but received feedback regarding her judgement from the observer's records that were available later on. Points awarded for time of arrival were entered in the booklet by the teacher as soon as the student arrived at school. The student was responsible for the safe-keeping of the booklet during the day, but it was kept in school overnight. The maximum number of points that a student could earn during the day was approximately one hundred (see p. 134 for a discussion of the specific experimental phases).

The number of points awarded during each week stayed approximately the same throughout the study (Table 2).

	E1 (Wks. 3-8)						E2 (Wks. II-I3)		
S_1	3I0	364	334	297	32I	3I9	292	30I	306
S_2	234	248	252	24I	267	282	285	279	286
S_3	24I	239	262	257	248	25I	292	26I	235
S_4	3I7	324	344	327	34I	338	282	26I	235
S_5	I94	235	262	257	284	30I	27I	277	262

Table 2. Number of points awarded weekly during the token phases.

Also, the number of points required to obtain specific back-up reinforcers remained farly constant (Table 3). However, the students had to work harder, achieve more, and behave more appropriately in order to earn the same number of points. No attempt was made in this study to fade-out the points.

During the first two weeks of the token system, the points were exchanged for reinforcers every day, at lunchtime. For the remainder of the programme (i.e., weeks 6-8, and II-I3) points could be exchanged during morning and afternoon "breaks" as well as at lunchtime. This was a decision made by the staff/student meeting at the end of the second week of the token programme. This arrangement for the exchange of points was considered more appropriate given that there were a large number of activities/snack items offered as back-ups. The points could be saved-up for a week but had to be completely "spent", or "banked", by Friday lunchtime. Up to a maximum of 50 points could be spent on Friday; any points remaining unspent had to be banked, and exchanged later-on for a special privilege or item. This procedure was adopted to avoid the possible situation of a student "purchasing" a whole afternoon of television viewing, for example. Points could not be carried over to the following week, except through the banking system. However, only one student "banked" her points, which she eventually exchanged for a record. The remainder of the students "spent as they earned".

Back-up reinforcers

As far as possible it was arranged to use reinforcers that were cost-free and readily available in the school. Initially, the students were asked what they would like to do at school given a free choice; some time was spent discussing this at the staff-student meetings. A list of potential reinforcers was drawn up, and the students then ranked them in order of preference. This ranked list was used as a basis for determining the initial costs of each activity/item relative to

each other. The system of back-up reinforcers and their points value, was devised so that all the students were able to earn the least expensive items during a day. The "price list" was reviewed each week, and adjusted according to a number of factors. These were: (I) items not chosen very often during the week were reduced in price, and occasionally "advertised" as a "bargain offer"; and, (2) if students earned more points than usual in any week then an increase in the price of some items was implemented, particularly on the most popular items. For example, the price of a game of football increased by I5 points at the beginning of Week Five. However, as can be seen in Table 3, there was little overall change in the price list during the operation of the programme.

Design

Each student acted as his own control, and each experienced all the various phases of the study. In order to screen out variables such as maturational factors, difficulty of material, and so on, a design with reversals was used (see Chapter Two, pages 46-49, for discussion). Throughout all phases, experimental and reversal, several conditions were held constant: the students kept the same seats during the "formal" lessons in the morning; individual and group praise was used lavishly for achievement as well as for good behaviour; students who seriously disrupted the work of others (e.g., very loud shouting, fighting etc.,) were briefly removed from the room; all other disruptive behaviour was ignored, neither scolding nor nagging being used; and errors were corrected but students were not criticised for mistakes.

Items	Price (Week 4)	Price (Week I3)
Coffee (cup)	I5	I5
Biscuits	I0 (limited to one packet)	I0
Crisps	I0 (limited to one packet)	I2
Tea (cup)	I0	I0
Toast	I5	20
Activities		
Playing a record	5	I0
Table tennis	30 for half-hour	20
Listening to radio	30 for half-hour	45
Town	40 for half-hour	50
T.V. viewing	30 for half-hour	35
Local 'phone call	I0 (6 minutes max.)	I0
Football	30 for half-hour	45
Negotiated activity	price by arrangement	
Special privilege	price by arrangement e.g., swimming I20	
Special item	price by arrangement e.g., record 350	

Table 3. Back-up reinforcer "menu", with prices for Weeks 4 and I3.

Experimental Phases for each Target Behaviour(s)

(I) On-time

Baseline (BL) During the baseline phase the teachers were asked to respond to lateness in their usual manner. This usually consisted of a reprimand, with instructions to turn up on time the following day (this was a casual

observation made by myself). It was also noted that all three teachers rewarded any improvement in punctuality by praising the students. Records were made of the number of minutes late for each student. If a student arrived before 9.00 a.m. this was recorded as zero.

Token reinforcement I (EI) The following instructions were given to the students in their "points" booklets:

"At the beginning of each day you will have the opportunity of earning 30 points. If you arrive at school before, or at, 9.00 a.m. you will be awarded 30 points, but for each minute late after that time one point will be subtracted. The points can be exchanged at the normal times ("breaks" and lunchtimes), or they can be exchanged immediately for coffee or tea, and toast."

These instructions were discussed at the staff-student meetings, and students were reminded of them every Friday afternoon at 3.00 during the operation of this phase, as well as during token reinforcement 2.

Reversal I (RI) The token system was withdrawn for two weeks and baseline conditions reestablished. The students were simply informed, "no more points".

Token reinforcement 2 (E2) This condition was similar to EI, and lasted until the end of the Spring Term (i.e., Weeks II-I3).

Reversal 2 (R2) Observations and recordings were made during the first two weeks of May, five weeks after the termination of the programme.

(2) Assignments

Baseline (BL) No points or tangible reinforcers were delivered contingent upon the completion, or near completion, of an assigned task, although social reinforcement was given to students who had obviously made an effort during the lesson. However, the teacher assessed the assignment and recorded the number of points that would be earned in the token phase. The student was not informed of the assessment.

Token reinforcement I (EI) The students were informed at the end of Week Two that they would have the opportunity of earning IO points for a correct, completed assignment during lessons commencing the following week. They were reminded of this at the beginning of every morning, and a note was also inserted in the "points book". The assessment was made at any time during the course of the lesson, and not necessarily at the end. If the work was not complete at the end of the lesson, or was inaccurate and untidy, the teacher and the student concerned negotiated the number of points (less than IO) to be awarded. In cases of dispute the teacher-in-charge was asked to arbitrate. However, this situation only arose on one occasion. The students were informed at the beginning of the lesson as to what was expected during the time available, i.e., what constituted a completed assignment. In some lessons e.g., project work, craft work, the teacher negotiated with individual students as to what would constitute an appropriate and acceptable amount of work for the lesson. In some cases where, for example, the student was reading

up background information for a project the teacher checked, at the end of the lesson, to make sure that the work had been done. Points were exchanged according to the general procedure. The criteria for successful completion of assignments was made more difficult over the six week period. The students were informed of this at the weekly staff-student meeting, and they were, of course, fully involved in target setting. Points were awarded in the morning sessions only.

Reversal I (RI) The token system was withdrawn for two weeks and baseline conditions reestablished. The teacher continued to assess asignments and noted the number of points that would have been earned in a token phase. Students were simply informed "no more points".

Token reinforcement 2 (E2) During the last four weeks of the Spring Term the token system was reintroduced.

Reversal 2 (R2) During this phase the teacher assessed the student's work, and made a note of the number of points that would have been earned. The students were still involved in helping to set targets for any particular lesson.

(3) On-task; Disturbing others; Gross Motor; Vocal Noise

Baseline (BL) No points were awarded during this phase. Students who showed inappropriate behaviour were ignored unless damage was being done to property or another student, when he/she was asked to stop. Sometimes physical intervention was necessary. When students were behaving appropriately they were reinforced socially.

Token reinforcement I (EI) During this phase students had the opportunity of earning points for engaging in appropriate behaviour. Initially, the teacher(s) awarded points approximately every ten minutes, accompanying point delivery with social reinforcement (e.g., praise). Later, points were delivered every fifteen minutes. The criterion for the earning of points was the absence of inappropriate behaviour (i.e., gross motor, disturbing others and aggression, and vocal noise; see p. I24 for operational definitions of these) during the preceeding ten, or fifteen minutes. This was a subjective judgement on the part of the teacher concerned, although she was able to obtain some check on her accuracy by inspecting the records pertaining to deviant behaviour (N.B. these observations were only made on Mondays, Wednesdays, and Fridays). Students were informed that they could earn points for good behaviour at the end of Week Three, and were reminded of this at the beginning of every morning session. Observations,and the opportunity to earn points, were only made during the morning session.

Reversal I (RI) The token system was withdrawn for two weeks and baseline conditions reestablished. Observation and recording continued as in the previous two phases (i.e., BL and EI).

Token reinforcement 2 (E2) The conditions in this phase were the same as EI.

Reversal 2 (R2) During this phase observations and recordings were made of inappropriate behaviour, but no points were awarded. As far as was possible, the condit-

ions were the same as those for the baseline phase and RI.

Throughout all the phases, appropriate on-task behaviour was socially reinforced.

(4) Meal-time behaviour

Inappropriate behaviours occurring during lunch were not specified as target behaviours and were not, therefore, part of the systematic change programme. Teachers were asked to respond to these behaviours (i.e., getting-up from the table before the end of the meal; shouting across the table; throwing food) in their usual manner. This consisted of reprimands, with instructions, "not to do it again". Appropriate meal-time behaviours were socially reinforced. These contingencies operated throughout the programme.

Results **

On-time

The data for all students combined is presented in Figure 3; some of the variability between conditions can be seen. Table 4 (page I4I) presents the mean scores for each of the treatment conditions for every student. An analysis of variance for repeated measures (Winer, I962, p. III) was performed on this data, which indicated differences among the five experimental conditions ($F = 14.69$; $df = 4,16$; $p < 0.01$). See Table 5.

** all raw data is presented in Appendix A.

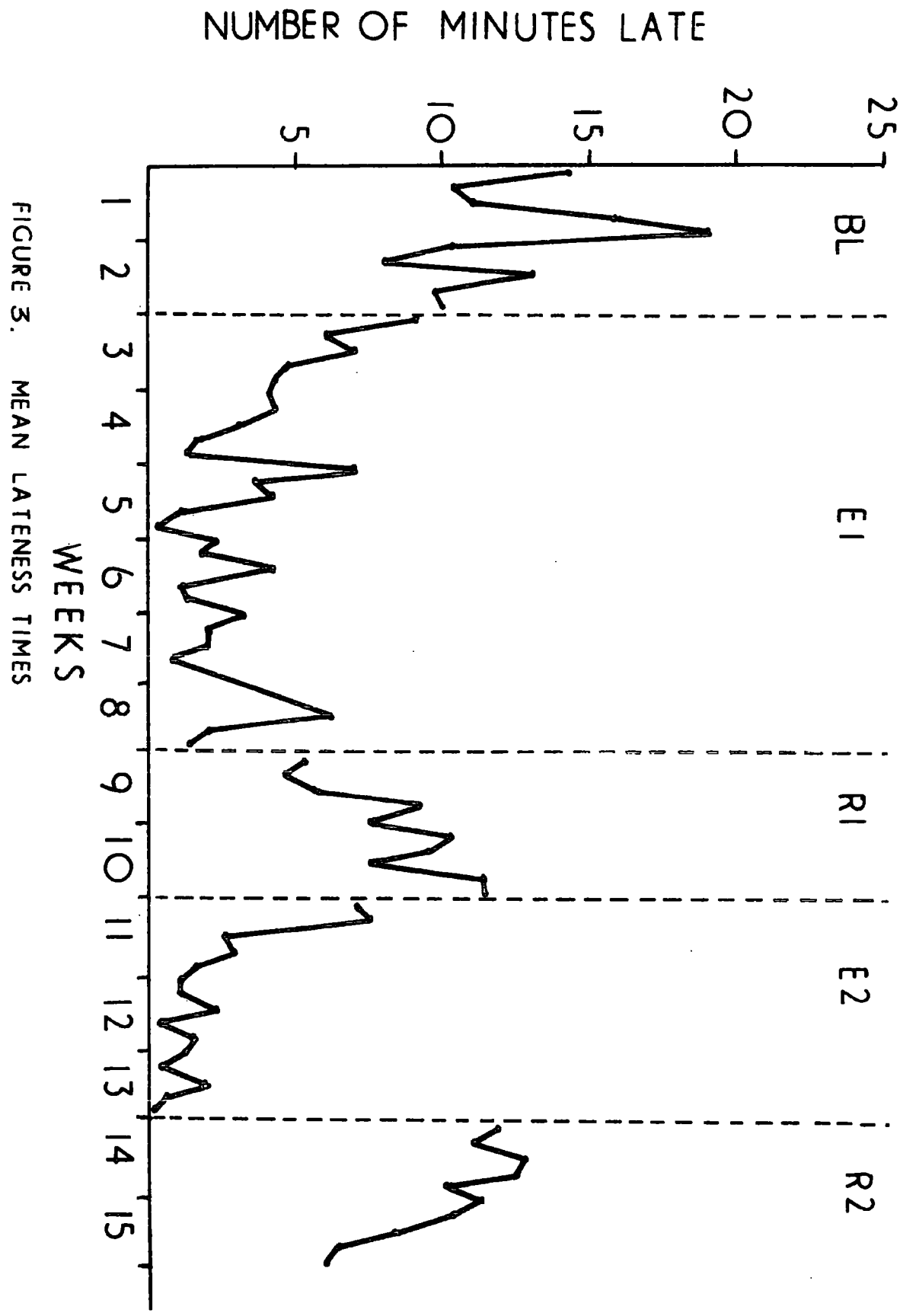


FIGURE 3. MEAN LATENESS TIMES

	BL	E1	R1	E2	R2
S_1	18.4	3.6	10.8	2.76	16.55
S_2	7.2	1.4	5.9	2.6	8.5
S_3	4.1	1.8	5.7	1.0	3.6
S_4	6.2	0.87	6.1	0.91	6.0
S_5	16.5	3.4	11.9	2.7	16.2
all S's	10.5	2.21	8.08	2.01	10.02

Table 4. Mean times of arrival (minutes late) for each treatment.

	df	SS	ms	F
Total	24	4234.83		
Tss	4	2827.07	706.77	14.69**
Sss	4	638.17	159.54	
Ess	16	769.59	48.10	

**p < 0.01

Table 5. Summary table showing analysis of variance of mean times of arrival (minutes late).

A number of selected t-tests were performed on the data (see Table 6).

Significant		Non-significant	
BL v E1	t = 3.43*	BL v R2	t = 0.754
E1 v R1	t = 6.65**		
R1 v E2	t = 5.40**		
E2 v R2	t = 3.12*		

** p< 0.01 * p< 0.05

Table 6. Values of t for selected comparisons between treatments

From a general inspection of the graph (Fig. 3. p. I40) it can be seen that students tended to arrive earlier during the token phases of the programme, and to arrive comparatively later during the non-token (i.e., reversal) phases. The average number of minutes late during the token periods was 2.II minutes late compared with 9.3 minutes during the baseline and reversal phases. The analysis of variance indicated that there were significant differences among the five experimental conditions ($F = I4.69$; $p < 0.0I$). Further selected t-tests indicated that there were significant differences between token phases and baseline/reversal phases, thus demonstrating that the introduction of the token system did have a positive effect upon the arrival times of students. However, the improvement was not maintained after the termination of the programme. In fact, there were no significant differences between arrival times prior to the start of the programme, and arrival times after it's termination ($t = 0.754$ NS).

Assignments

Figure 4 (p. I43) presents the data, for both morning and afternoon sessions, combined for all students. Table 7 (p.I44) presents the mean scores for each student for each phase for the morning and afternoon sessions.

An analysis of variance (repeated measures) was performed on the data. Differences were indicated among the five experimental conditions for both the morning sessions ($F = 33.32$; $df = 4,I6$; $p < 0.00I$), and the afternoon sessions ($F = 7.4$; $df = 4,I6$; $p < 0.0I$). Refer to Tables 8 and 9 (p. I44).

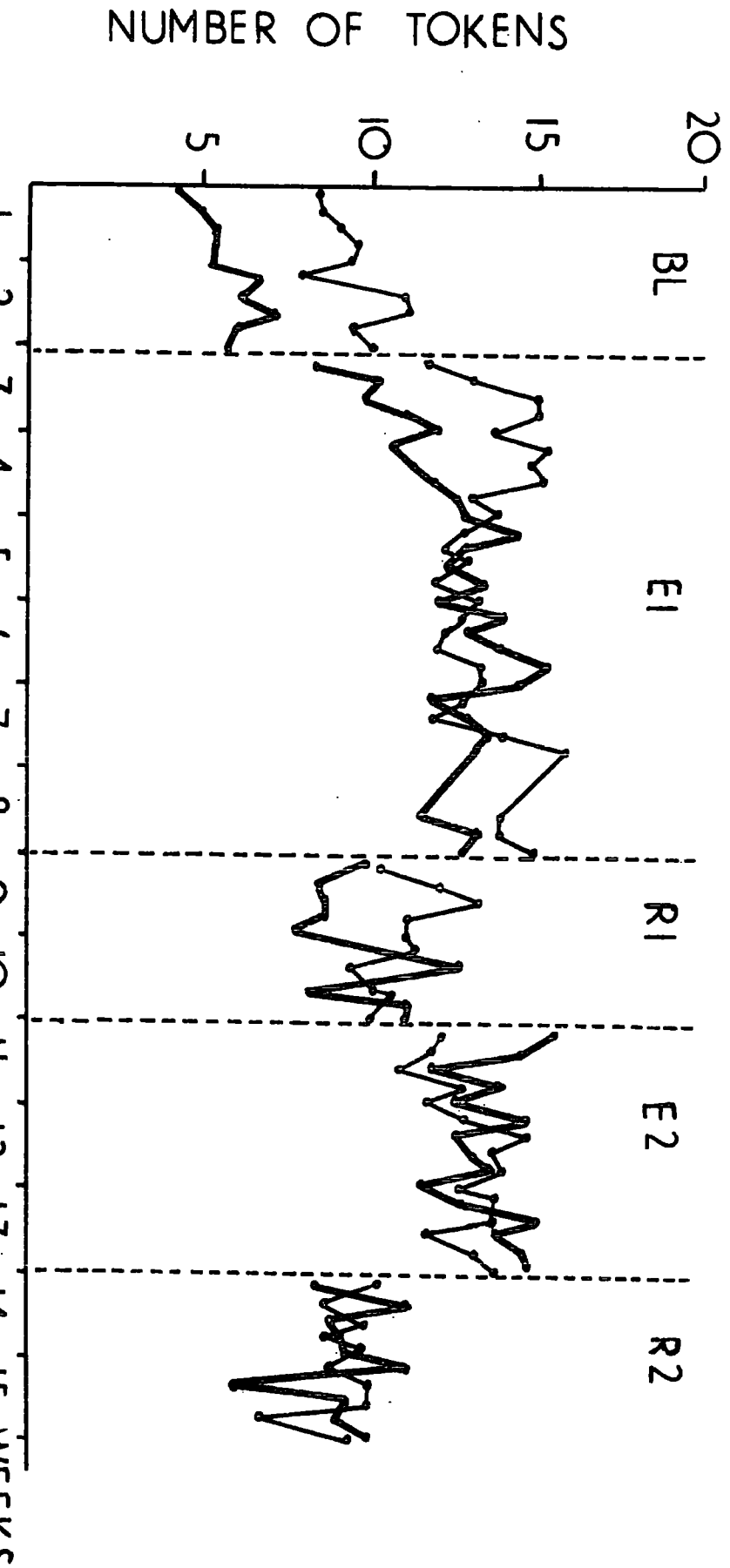


FIGURE 4. MEAN NUMBER OF TOKENS AWARDED FOR ASSIGNMENTS

	BL		EI		RI		E2		R2	
	am	pm	am	pm	am	pm	am	pm	am	pm
S_1	3.3	8.5	13.2	13.9	11.1	12.9	14.5	13.9	10.2	11.1
S_2	5.7	6.5	12.7	14.1	10.9	10.1	14.1	12 8	10.1	9.4
S_3	5.6	14.4	11.8	14.3	8.7	14.4	12.4	15.6	8.2	13.1
S_4	9.6	12.3	13.5	14.4	10.1	11.9	15.4	14.0	10.3	7.2
S_5	6.5	5.3	12.3	13.2	9.1	6.1	13.5	10.2	9.5	7.2
All	5.9	9.6	12.6	13.3	9.8	11.2	13.9	13.2	9.6	9.6

Table 7. Mean scores for each treatment condition in morning and afternoon sessions - assignments.

	df	SS	ms	F
Total	24	218.01		
Tss	4	181.23	45.31	33.32**
Sss	4	15.01	3.75	
Ess	16	21.77	1.36	

** $p < 0.001$

Table 8. Summary table showing analysis of variance of mean number of points awarded for assignments (am).

	df	SS	ms	F
Total	24	231.39		
Tss	4	88.22	22.05	7.47*
Sss	4	95.86	23.96	
Ess	16	47.31	2.95	

* $p < 0.01$

Table 9. Summary table showing analysis of variance of mean number of points awarded for assignments (pm)

Differences among both afternoon and morning conditions were assessed by selected t-tests. Significant and nonsignificant differences are grouped individually in Tables IO and II.

Significant		Nonsignificant	
BL v EI	t = 6.65**		
EI v RI	t = IO.32**		
RI v E2	t = II.I**		
E2 v R2	t = 2I.23**		
BL v R2	t = 3.34*		

**p < 0.0I *p < 0.05

Table IO. Values of t for selected comparisons between treatments - assignments (am)

Significant		Nonsignificant	
BL v EI	t = 2.93*	EI v RI	t = 2.06 NS
E2 v R2	t = 4.47**	EI v R2	t = 0.I3 NS
RI v E2	t = 3.65*		

**p < 0.0I *p < 0.05

Table II. Values of t for selected comparisons between treatments - assignments (pm)

Inspection of the graph (Fig. 4. page I43) indicates a difference between the baseline/reversal phases and the token periods. For the morning period the analysis of variance revealed highly significant differences ($p < 0.00I$) between the five conditions (Table 8). Further t-tests revealed significant differences exist between baseline/reversal phases and token

phases (Table IO). The average scores for assignments increased from an average of 8.4 points during baseline and reversal phases to an average of I3.2 during the token phases. An interesting finding is the significant difference ($t = 3.34$; $p < 0.05$) between the baseline condition and the second reversal. The average score increased from 5.9 to 9.6. This would suggest that the token system did have some carry-over effect, at least for a few weeks after the termination of the programme.

The introduction of the token programme in the morning does appear to have had an effect upon the students' performance in the afternoon ($F = 7.47$; $p < 0.0I$), although no tokens were awarded during these sessions. However, no significant difference was found between baseline scores and the second reversal ($t = 0.I3$; NS). During the afternoon session the average scores for assignments in the baseline/reversal phases increased from I0.I5 points to an average of I3.2 during the token phases.

Deviant behaviour (disturbing others; gross motor; vocal noise)

For the purposes of analysis the three categories of inappropriate behaviour (i.e., disturbing others; gross motor; vocal noise) have been combined together. Figure 5 presents the data, combined for all students. The mean scores for each of the treatment conditions is presented in Table I2 (p. I48).

An analysis of variance was performed on this data indicated differences among the five experimental conditions ($F = 6.72$; $df = 4,I6$; $p < 0.0I$). See Table I3 (p. I48).

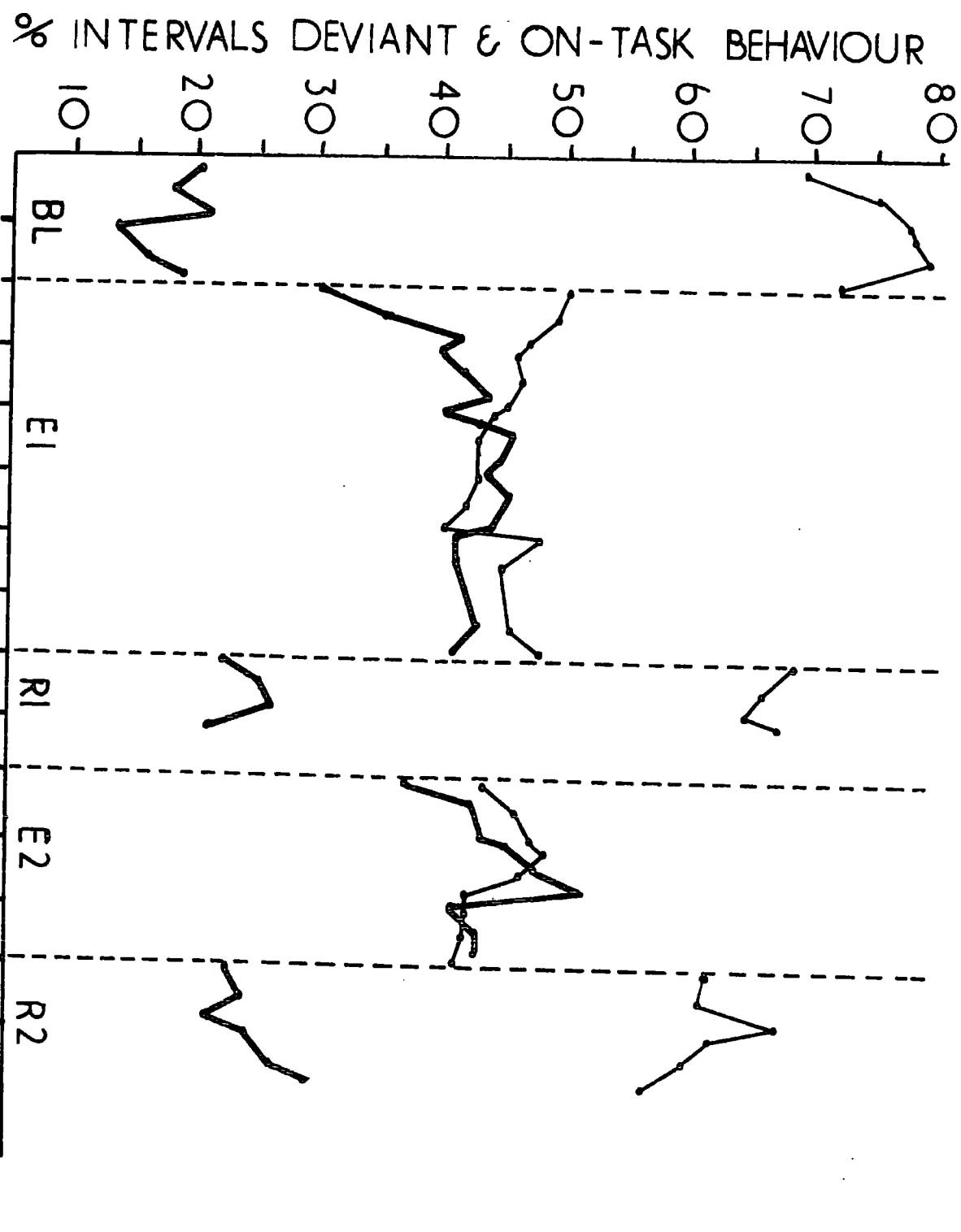


FIGURE 5. % INTERVALS OF DEVIANT & ON TASK-BEHAVIOURS

	BL	EI	RI	E2	R2
S_1	60.6	37.98	56.0	42.5	44.2
S_2	59.0	46.1	50.0	47.75	55.6
S_3	80.0	51.76	59.8	50.0	75.5
S_4	83.0	45.03	76.75	43.75	42.5
S_5	84.3	42.43	87.7	40.22	42.5
all	75.8	44.53	66.0	44.84	60.3

Table I2. Mean % intervals for each of the treatments - deviant behaviour.

	df	SS	ms	F
Total	24	6426.15		
Tss	4	3286.81	821.70	6.72*
Sss	4	1183.14	295.78	
Ess	16	1956.18	122.26	

* $p < 0.01$

Table 13. Summary table showing analysis of variance of % intervals deviant behaviour.

t-tests were performed to test for significance between selected treatment conditions (Table I4).

Significant		Non-significant	
BL v EI	t = 5.49**	RI v E2	t = 2.55
EI v RI	t = 2.79*	E2 v R2	t = 2.07
		BL v R2	t = 1.70

** $p < 0.01$ * $p < 0.05$

Table I4. Values of t for selected comparisons between treatments.

Inspection of the graph (Fig. 5, page I47) reveals that the introduction of the token system led to decreases in deviant behaviour from an average of 75.8% to an average of 44.53%. Removal of the token system led to an increase in deviant behaviour by 21%. However, the % deviant behaviour occurring during the reversal phases was 9.8% below that existing during the baseline period. Significant differences were found to exist between the five experimental conditions ($F = 6.72$; $p < 0.01$). Further t-tests (Table 14) revealed that introduction of the token system (EI) did lead to significant reductions in deviant behaviour ($t = 5.49$; $p < 0.01$), and removing the token system (RI) led to increases in deviant behaviour ($t = 2.79$; $p < 0.05$). However, when the token system was reintroduced (E2) no significant reductions in the % of deviant behaviour occurred ($t = 2.55$; NS).

On-task behaviour

Combined data for all students is presented in Figure 5 (p. 147). Mean percentage intervals of on-task behaviour are shown in Table 16 (p. 150).

An analysis of variance indicated differences among the five treatment variables ($F = 14.69$; $df = 4, 16$; $p < 0.01$). See Table 15, below.

	df	SS	ms	F
Total	24	4234.83		
Tss	4	2827.07	706.77	14.69**
Sss	4	638.17	159.54	
Ess	16	769.59	48.10	

** $p < 0.01$

Table 15. Analysis of variance of mean % intervals - on-task.

	BL	EI	RI	E2	R2
S_1	25.0	44.87	3I.25	49.75	34.0
S_2	23.I	53.8	35.75	43.37	27.5
S_3	I7.I7	40.5	3I.5	4I.33	I5.3
S_4	I4.5	36.I8	I3.25	43.87	II.83
S_5	I3.83	42.8	8.25	4I.77	36.I
all	I9.2I	40.49	24.0	44.02	24.9

Table I6. Mean % intervals for each of the treatments for all students - on-task.

The results of selected t-tests are presented in Table I7, below.

Significant		Nonsignificant	
BL v EI	t = II.85**	BL v R2	t = I.36
EI v RI	t = 4.47**	EI v E2	t = 0.29
RI v E2	t = 3.59*		
E2 v R2	t = 4.58**		

** $p < 0.0I$

* $p < 0.05$

Table I7. Values of t for selected comparisons between treatments.

The introduction of the token programme led to significant increases in on-task behaviour ($t = II.85$; $p < 0.0I$), from an average of I9.2I% intervals to 40.49% intervals. The average for combined token phases was 42.25% intervals compared to 22.7% for baseline and reversal phases. Significant differences were found to exist among the five experimental

conditions ($F = 14.69$; $p < 0.01$).

Meal-time behaviour

Mean scores for frequency of occurrence of inappropriate meal-time behaviours are plotted in Figure 6 (page I52), and the mean scores for each treatment phase of the programme are shown below (Table I8).

BL	E1	R1	E2	R2
6.1	2.8	4.32	2.58	2.7

Table I8. Mean scores for each treatment phase - inappropriate meal-time behaviour.

An analysis of variance indicated that significant differences existed among the five experimental conditions ($F = 10.04$; $df = 4, 67$; $p < 0.01$). t-tests were performed to test for differences between selected treatments (Table 19).

Significant		Nonsignificant	
B1 v E1	$t = 5.036^{**}$	E2 v R2	$t = 0.22$
E1 v R1	$t = 2.3^{*}$		
R1 v E2	$t = 2.748^{*}$		
BL v R2	$t = 4.962^{*}$		

** $p < 0.01$ * $p < 0.05$

Table 19. Values of t for selected comparisons between treatments - meal-time behaviour.

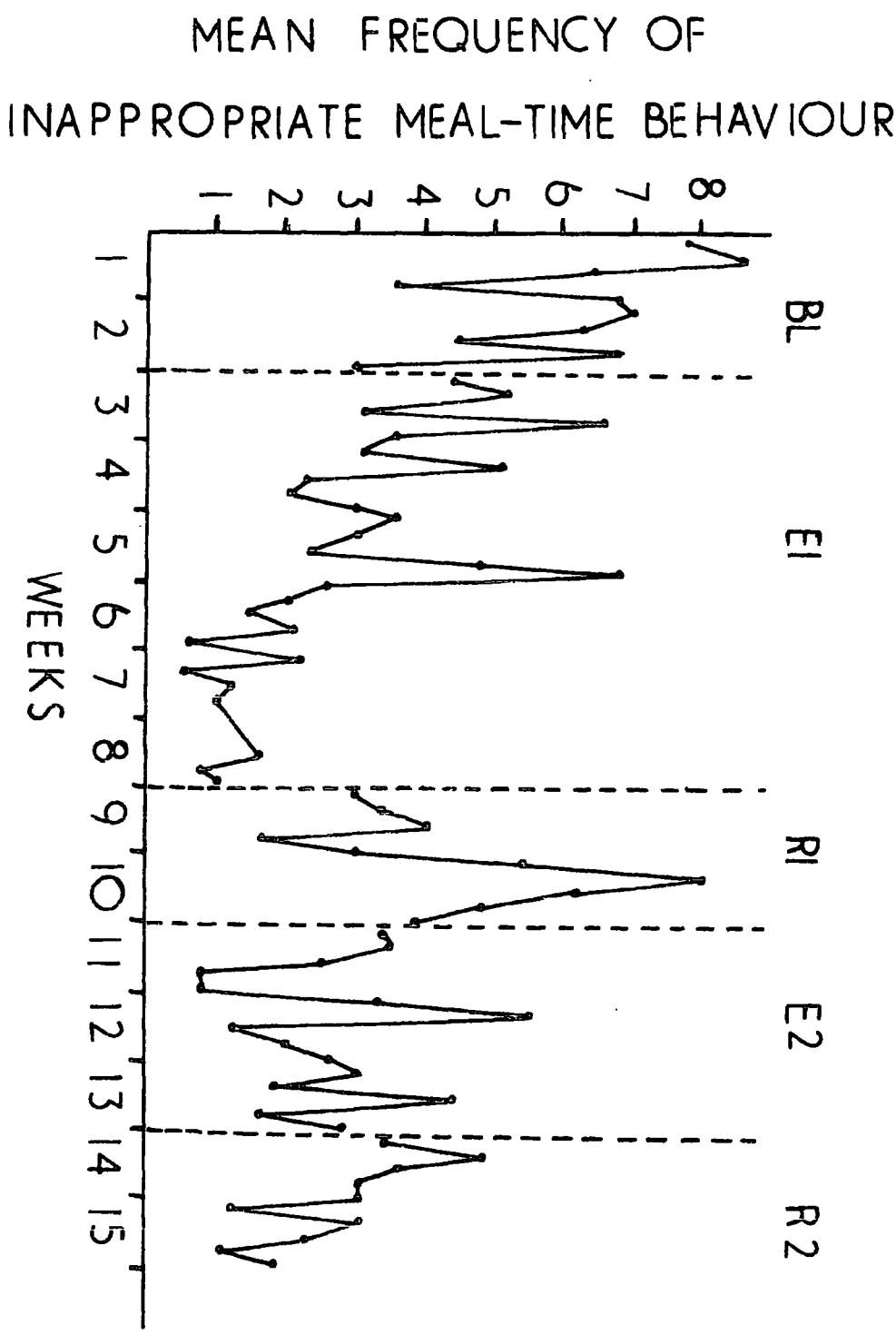


FIGURE 6. MEAN FREQUENCY OF OCCURRENCE — INAPPROPRIATE MEAL-TIME BEHAVIOUR

Discussion

The results indicate quite clearly that the introduction of the token economy had consistent effects on all the target behaviours that were observed. Levels of disruptive behaviour significantly decreased whilst on-task and other appropriate behaviours significantly improved. That the token economy programme was, in fact, responsible for the observed modifications in behaviour was demonstrated through the ABAB (reversal) design in which the target behaviours changed in a positive direction when the token programme was in operation. When the token programme was withdrawn (R1 & R2) the target behaviours changed in a negative direction and approximated baseline frequencies. This finding can be accepted with some confidence due to utilization of procedures which resulted in very frequent reliability estimates and consistency of response definitions.

Token reinforcement control was clearly established for all the component classroom behaviours, including social and academic behaviours. This finding is the opposite of that found by Holt and Hobbs (1976). They found that considerable variablity existed in the amount of token reinforcement control over component behaviours. In particular, social interaction behaviour showed substantial variability which seemed unrelated to reinforcement contingencies. Holt and Hobbs suggested that their results could be explained by "differential teacher responding", where the teacher appears to place more emphasis on students' academic behaviours, such as on-task and assignment behaviours, than on social behaviours. In the present study the teachers did not appear to place

more emphasis on one behaviour than another. However, there is no objective evidence for this statement since teacher behaviour was not monitored. Future studies might monitor teacher behaviour concurrently with student behaviour.

As is evident from the data presented earlier little maintenance of appropriate behaviour occurred during the Reversal phases of the programme. This was probably due to the fact that maximal cues differentiated Token and Reversal phases, i.e., students were informed that points would no longer be available for all appropriate behaviours. Although there was no evidence of generalization or response maintenance over time, there appeared to be some generalization across settings, and from one behaviour to another. In the case of assignment behaviours the data suggests that the effects of the token system, applied during the morning sessions, generalized to the afternoon. This occurred despite the fact that the afternoon sessions were conducted in a different room to those in the morning. However, it is suggested that the teacher's behaviour might have altered concurrently with the introduction, and withdrawal of the token system. Again, the necessity to observe and record the teacher's behaviour is demonstrated. Generalization to behaviours beyond the specific response targets i.e., to non-target behaviours, was clearly demonstrated in the case of inappropriate meal-time behaviour. However, reliability scores were not obtained for these behaviours. The teacher who was observing and recording the frequency of occurrence of inappropriate meal-time behaviour was aware of the purpose of this part of the study, and might therefore have been expecting the in-

appropriate behaviour to decrease in frequency during the Token phases. The possibility of keeping the teacher (observer) ignorant of the changes in the experimental contingencies is obvious, and applies to all the behaviours monitored in this study. An interesting result relating to meal-time behaviours is the fact that the frequency of inappropriate behaviour during Reversal 2 is significantly lower than Baseline ($p < 0.05$), and only minimally higher than E2 ($t = 0.22$; $df = 23$; NS). A tentative explanation is that the teachers had learned to consistently socially reinforce appropriate behaviour, whilst ignoring or quietly reprimanding inappropriate behaviour. Such consistency might have occurred during the normal classroom during lessons throughout the study, because these aspects of classroom management were stressed and practiced during the in-service course on behaviour modification. However, such consistency might have been absent outside of "formal" teaching, i.e., the teacher was differentially responding to the classroom and the dining room. Of course, there is no evidence for these suggestions, and, once again, the monitoring of teacher behaviour is considered to be absolutely essential.

Apart from meal-time behaviour there was also some anecdotal evidence of generalization to other non-target behaviours. The teachers reported that the general behaviour of the students improved in the youth club (visited on two afternoons during the week, after school), and on the occasional weekend outing in the school mini-bus. It was also suggested that general behaviour deteriorated during Reversal phases, with considerable student intransigence. Parents reported

that their children showed improved behaviour at home, and were generally "happier" to attend school, during the token phases of the programme. When the token programme was removed inappropriate behaviour increased and the children appeared more reluctant to attend school. Future studies might monitor students behaviour away from the school setting to see whether any generalization does, in fact, occur.

Apart from systematically collecting data for the various target- and non-target- behaviours, both students and teachers were asked about their reactions to the programme. No attempt was made to systematize the collection of subjective opinions. All three teachers were considerably impressed by the effectiveness of the token economy programme. Not only did they feel that teaching was more pleasant and enjoyable, but that general classroom "atmosphere" improved, and relationships with the students were enhanced. However, there was some disquiet regarding the reversal design. They were of the opinion that the students became extremely retiscent and intransigent during reversal phases, even more so than during the Baseline phase. Objective data suggests that the frequency of inappropriate behaviour during the Reversal phases was not significantly different than that of the Baseline phase, however. Nevertheless, student reaction to the withdrawal of the token system supports the teachers contention that considerable resentment was generated. Students expressed some annoyance at being able to earn points in some weeks but not in others. In retrospect, both the teachers and myself consider that the reversal design was inappropriate, and that a multiple baseline would have been preferable. The use of a multiple baseline design was discussed during the early

stages of programme formulation but was rejected on the grounds that it would be more difficult to implement. On reflection it was felt that the advantages accruing from the use of a multiple baseline technique would have far outweighed the disadvantages. The views of O'Leary and O'Leary (1977), discussed in Chapter One (page 24), are relevant to this discussion. Experience of using a reversal design would now lead us to support their contention that, "investigators should be encouraged to use reversal designs less frequently where significant clinical and/or educational problems are being treated."

The students expressed the view that school was more enjoyable during the token programme, and that they were treated more like adults and less like "school-children". They felt that many positive benefits were to be gained from involving them in course planning, target setting, and evaluation of their own work during a lesson. Giving them some measure of responsibility for their own behaviour in the classroom appeared to generate an increase in self-esteem. Two students were concerned about the limited range of back-up reinforcers.

One method of increasing the range of back-up reinforcers would be to utilize the potential reinforcers existing in the home through home-school reinforcement contracting. In this method the students would earn points at school in the manner described above and would exchange them for various reinforcers at home, for example, television viewing, pocket money, "treats", and so on. However, it is recognized that some parents might not have the inclination to take part in such a programme.

Several comments may be made regarding the practical aspects of the present approach. The drawbacks of using a reversal design were very apparent, and these have already been discussed. A related issue concerns the problem of "fading the token programme out". In the token phases the number of points awarded during each week stayed approximately the same (see Table 2, page 131), and there was no attempt to fade-out the points. A better method might have been to gradually decrease the number of points earned, whilst at the same time asking for improvements in the level of appropriate behaviour. Careful monitoring of the frequency of appropriate behaviour would have insured that deterioration in behaviour did not occur.

A significant practical aspect of this study was the amount of difficulty encountered by the teachers in delivering contingent praise and awarding points appropriately, and ignoring inappropriate behaviours. Praising and ignoring behaviours continued throughout the programme irrespective of whether the token system was in operation. All three teachers found it difficult at first to ignore deviant behaviour since it was contrary to their customary use of reprimands. However, considerable improvement in this aspect of teacher behaviour did occur throughout the programme, although this is only a subjective evaluation. Some difficulty was also experienced in deciding whether or not to award points for appropriate behaviour. The teacher was not engaged in recording the students behaviour and therefore did not have access to objective records of their behaviour. Checks made after the lesson, i.e., by inspecting

the records made by the observer (available for Monday, Wednesday, and Friday only), revealed that considerable improvement was made during the first week of the token programme.

A decision was made before the programme commenced to use an "outside" observer, because it was generally felt that the teachers would be unable to cope with this extra burden, although a number of reports suggest that this burden is negligible (e.g., McLaughlin & Malaby, 1971). Subsequent discussions considered the possibility of having the students do their own recording, and perhaps even awarding themselves points. This conception certainly fits in with the phenomenal/behavioural approach adopted throughout this study. Further studies embracing these ideas are planned, and discussions have already taken place with teachers in another school. Different techniques of recording that would allow the teacher to be involved without interrupting her teaching are also being investigated.

Conclusions

The research has demonstrated the effectiveness of a token system in improving both the social and academic behaviours of disruptive children. More importantly it has shown that the students themselves can become actively involved in the programme to the extent that they become <u>responsible</u> for their own behaviour. The programme was implemented with minimal cost and, in fact, made more effective use of existing resources. Anecdotal reports suggested that there were improvements in student behaviour in settings outside of the

school. During the token phases of the programme the "atmosphere" in the school appeared to improve, and the students certainly enjoyed school more. Considerable resentment was expressed when the token system was removed. In general, the study confirms the view that a phenomenal/behavioural approach to intervention is an effective strategy for altering the classroom behaviour of disruptive children.

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APPENDIX A - RAW DATA

Daily arrival times for each student during baseline/reversal and experimental phases - number of minutes late.

	Wk. 1.					Wk. 2.					Wk. 3.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
S_I	28	I7	I2	2I	42	I7	I5	I4	I2	6	II	8	I5	6	5
S_2	I2	4	6	I0	I7	8	5	7	0	3	-	-	5	0	2
S_3	5	2	0	I	6	0	0	8	7	I2	4	7	2	4	I
S_4	0	2	8	I	I8	3	0	I5	II	4	0	0	3	0	5
S_5	24	I6	I7	I0	9	I8	I7	2I	I9	I4	I6	7	7	9	4
S_6	I8	2I	23	52	I6	I6	II	I3	9	2I	I4	8	I0	I0	8

	Wk. 4.					Wk. 5.					Wk. 6.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
S_I	I2	4	8	4	0	0	2	5	0	0	0	2	I	I	0
S_2	0	0	2	0	3	0	0	0	0	0	3	I	5	0	2
S_3	2	0	I	0	0	0	I	I5	0	I	0	I	3	0	0
S_4	0	0	0	2	0	2	0	I	0	0	5	0	I	0	0
S_5	6	5	0	I	3	I0	4	0	2	0	4	2	0	I	I
S_6	4	I6	5	-	-	20	I5	4	4	I	2	5	7	8	2

	Wk. 7.					Wk. 8.					Wk. 9.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
S_I	5	3	I	0	-	-	-	3	0	0	4	4	8	I0	8
S_2	6	2	I	I	-	-	-	I	I	0	3	6	6	5	4
S_3	0	0	0	0	-	-	-	6	0	I	3	I	I	2	5
S_4	0	0	3	I	-	-	-	3	I	I	0	0	4	II	I2
S_5	3	0	0	I	-	-	-	5	0	0	I6	I2	9	I3	8

	Wk. IO.					Wk. II.					Wk. I2.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
S_I	I2	I4	IO	I7	2I	8	6	4	5	I	-	-	8	I	0
S_2	4	8	8	IO	5	II	9	3	2	4	I	I	2	0	0
S_3	5	2	0	0	I	0	I	2	0	0	I4	9	8	7	7
S_4	II	9	5	8	I	I	-	-	-	0	I	I	0	0	4
S_5	IO	7	6	I5	23	IO	I3	3	4	I	2	I	0	0	3

	Wk. I3.					Wk. I4.					Wk. I5.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
S_I	I	0	2	0	0	I5	I8	23	I9	-	2I	I8	I4	II	9
S_2	0	0	3	0	-	8	IO	I2	IO	6	I5	4	8	IO	2
S_3	0	0	3	I	0	0	I	3	7	4	3	II	5	0	2
S_4	3	I	0	0	0	I8	4	II	I3	2	6	0	3	I	2
S_5	2	0	I	I	0	I8	22	I5	I4	28	I2	I8	II	9	I5

Number of points awarded to each student during the morning and afternoon sessions - assignments.

	Wk. 1.					Wk. 2.					Wk. 3.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
am S1	4	3	7	2	2	3	I	3	3	5	6	6	I2	I2	I4
pm	8	6	I0	I2	5	6	I0	I4	6	8	7	8	I6	8	I6
am S2	2	2	I	4	6	6	8	II	8	9	-	-	9	8	II
pm	5	6	6	8	4	5	5	6	I0	I0	-	-	I5	I0	I0
am S3	I0	I2	II	4	7	8	9	9	I4	I2	I2	I4	I4	II	I2
pm	I4	I2	I2	6	I8	9	I7	II	II	I3	I4	I4	I8	I8	II
am S4	6	7	7	I2	7	6	4	3	I	5	5	8	8	I3	I2
pm	I5	I6	I3	I2	I6	I2	I4	I4	I6	I6	I7	I8	I3	20	I5
am S5	8	3	4	7	7	I0	I0	8	4	4	8	9	7	I3	I5
pm	4	3	2	5	I	6	I0	7	I	I2	I5	II	II	8	I
am S6	6	7	4	4	4	8	6	I0	7	I	I2	I5	II	I7	I3
pm	5	9	I3	I6	I3	II	II	9	9	I3	I3	I6	I7	I3	I7

	Wk. 4.					Wk. 5.					Wk. 6.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
am SI	5	I3	II	I2	I6	I5	I2	I4	I6	II	I2	I8	I6	I9	20
pm	I6	I7	I4	9	I3	I6	I2	I8	I9	I5	I0	9	20	I7	I4
am S2	4	II	I2	I3	I2	I5	I2	I8	9	II	I3	I3	I5	I7	I6
pm	I6	I6	I7	I4	I4	I6	I4	I3	I5	I5	I6	I3	I4	I4	I3
am S3	9	II	I4	I4	II	I3	I3	I2	I5	I0	9	9	II	I2	I5
pm	I5	I4	I4	I6	I3	I8	I9	I7	II	I3	I4	I4	II	I5	I7
am S4	I7	8	I0	I3	I5	I6	I2	I5	I3	II	I7	I5	I4	I6	II
pm	5	I2	I7	I6	I6	I7	I8	I3	I7	I8	I5	9	9	I4	II
am S5	I5	I4	I4	I2	II	I4	I4	I2	I2	I6	I7	I3	I5	I5	I4
pm	I6	I6	I3	I7	I2	I2	I4	I4	8	I0	I0	II	9	9	II
am S6	I5	I2	I2	-	-	I5	I5	9	I2	I5	I8	II	I4	I4	I2
pm	I6	I2	I6	-	-	I4	I3	I7	9	I3	I3	I9	I7	I3	I5

	Wk. 7.					Wk. 8.					Wk. 9.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
am S1	I4	I8	I3	I2	-	-	-	I0	I3	I5	I4	II	II	8	8
pm	I5	I6	I6	I6	-	-	-	I2	I4	I4	I5	I7	I7	I3	I2
am S2	I3	I4	I5	I3	-	-	-	II	I7	I5	8	8	I2	II	9
pm	I3	I4	I5	I3	-	-	-	I4	I3	I5	5	I4	I2	II	9
am S3	II	I6	I6	I7	-	-	-	9	I2	I5	6	6	9	7	3
pm	4	II	I4	I3	-	-	-	II	I2	I8	I5	I4	I9	I3	I4
am S4	I4	I4	I7	I8	-	-	-	I5	I0	II	II	8	8	I0	I2
pm	I8	I7	I2	I4	-	-	-	I6	I6	I4	I2	I2	I4	II	I0
am S5	9	II	II	8	-	-	-	I3	I2	9	I2	II	5	9	9
pm	I5	I7	20	I8	-	-	-	I6	I3	I5	5	5	6	8	8
am S6	I3	9	II	I4	-	-	-	I3	I7	I3	-	-	-	-	-
pm	II	I4	I2	I9	-	-	-	I7	I8	I5	-	-	-	-	-

	Wk. I0.					Wk. II.					Wk. I2.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
am S1	I0	I4	I2	I2	II	I5	I5	I2	I7	I3	-	-	I4	I7	II
pm	I3	8	I4	I2	I0	I3	I8	I4	I2	I2	-	-	8	I5	I5
am S2	I4	I6	II	I0	I0	II	I8	I2	I8	I4	I4	I8	I7	II	9
pm	I3	8	5	I0	9	I3	8	I0	I4	8	9	I8	I3	I4	I3
am S3	I5	I4	8	8	II	20	I4	II	II	I2	I5	8	9	9	II
pm	II	I3	I3	I5	I7	I7	I9	I5	2I	I6	I7	I4	I5	I8	I7
am S4	9	9	7	I3	I4	I7	-	-	-	I6	I3	I3	I5	I8	I4
pm	I4	I6	8	I0	I2	I5	-	-	-	I7	I5	I4	I9	I3	I3
am S5	8	I3	4	9	II	I6	I3	I4	II	9	I8	I2	I2	I4	I4
pm	7	3	7	7	5	4	4	6	7	7	I2	I4	I4	II	7

	Wk. I3					Wk. I4					Wk. I5				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
am SI	I4	I4	I3	I7	I6	I0	I2	I2	8	-	I0	9	9	II	II
pm	I7	I4	I3	I5	I5	8	I3	I3	9	-	I4	II	II	8	I3
am S2	I4	I2	I2	I8	-	8	I4	II	II	9	I3	8	6	9	I2
pm	I5	I7	I4	I4	-	I3	9	9	I0	I2	5	8	8	I0	I0
am S3	I2	I4	I3	II	I6	8	I0	4	8	8	I0	3	I4	9	8
pm	I4	I4	I2	II	I0	I4	I3	I6	II	I4	II	I4	I5	I0	I3
am S4	I3	I8	I8	I4	I6	I0	II	I0	I2	9	I3	8	II	9	I0
pm	I3	I2	I2	II	I4	8	6	6	8	7	9	I2	4	4	8
am S5	I2	I8	I4	I4	I2	8	II	9	9	I3	I2	4	9	9	II
pm	I2	I4	8	I6	I8	I0	4	8	8	6	7	7	I4	3	5

% Intervals for "disturbing others and aggression".

	Wk. I.			Wk. 2.			Wk. 3.			Wk. 4.			Wk. 5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	I9	I8	I6	22	I2	I5	I4	I7	I3	I3	I2	I9	II	IO	I3
S2	I2	I3	I8	I5	25	2I	-	I4	II	-	II	I5	9	9	I2
S3	28	23	3I	23	26	I9	2I	I5	I7	I2	I9	20	I5	i2	I4
S4	I9	2I	28	27	25	30	I6	I7	2I	I9	I5	I4	I5	I6	I2
S5	22	20	2I	I8	23	I9	IO	IO	I3	9	7	8	IO	IO	9
S6	22	20	I9	23	25	20	I2	I4	I4	I3	II	IO	I5	I8	I2

	Wk. 6.			Wk. 7.			Wk. 8.			Wk. 9.			Wk. IO.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	II	I3	9	20	I5	-	-	I2	I8	24	2I	I5	I8	-	-
S2	II	9	I5	I3	II	-	-	II	II	I9	I7	I6	2I	-	-
S3	I7	I3	I5	I9	I4	-	-	I5	I8	I7	22	I6	2I	-	-
S4	I3	I3	II	I5	I9	-	-	I9	I8	3I	27	23	26	-	-
S5	I3	II	I2	I9	I8	-	-	I5	I4	2I	2I	28	23	-	-
S6	I9	I7	I7	20	I5	-	-	I5	I7	-	-	-	-	-	-

	Wk. II.			Wk. I2.			Wk. I3.			Wk. I4.			Wk. I5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	I2	II	I4	-	I5	IO	I4	9	II	I6	IO	-	IO	I5	I2
S2	I4	II	I3	I8	I7	II	I8	I9	-	I2	I7	I3	IO	I9	I5
S3	I4	I8	I7	2I	I7	I7	I4	I4	I3	25	3I	22	26	22	23
S4	I2	-	I2	I3	20	I8	I6	I6	I3	38	4I	29	25	28	26
S5	I4	I7	I9	I3	I3	I5	I2	I2	I6	I4	I2	I2	I3	II	I3

% intervals for vocal noise

	Wk. 1.			Wk. 2.			Wk. 3.			Wk. 4.			Wk. 5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	11	22	20	19	26	20	10	20	14	17	11	13	12	9	15
S2	24	26	21	28	31	23	-	22	19	-	20	25	21	19	19
S3	18	21	27	30	27	24	14	19	16	20	17	16	21	22	19
S4	29	26	20	22	21	28	13	12	11	15	14	10	15	18	17
S5	21	30	29	35	28	28	18	18	13	15	14	12	15	18	19
S6	30	31	29	33	30	24	16	17	12	9	12	12	8	14	10

	Wk. 6.			Wk. 7.			Wk. 8.			Wk. 9.			Wk. 10.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	14	12	8	13	11	-	-	11	14	22	19	19	25	-	-
S2	13	11	10	14	12	-	-	13	19	18	18	15	20	-	-
S3	17	24	17	20	19	-	-	18	16	29	25	26	30	-	-
S4	13	16	16	14	13	-	-	17	17	28	21	25	25	-	-
S5	14	20	16	17	17	-	-	12	13	31	29	29	27	-	-
S6	11	11	12	10	11	-	-	11	13	-	-	-	-	-	-

	Wk. 11.			Wk. 12			Wk. 13.			Wk. 14.			Wk. 15.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	19	18	22	-	14	11	16	19	15	21	19	-	17	15	11
S2	19	19	20	18	21	15	14	18	-	22	18	25	18	19	21
S3	14	17	16	16	14	13	20	19	21	20	19	24	25	23	29
S4	13	-	14	14	13	13	12	10	10	25	25	31	21	19	19
S5	8	12	12	15	13	10	14	13	10	15	16	16	12	12	14

% Intervals for gross motor behaviours

	Wk. I			Wk. 2.			Wk. 3.			Wk. 4.			Wk. 5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	22	25	34	I9	24	20	I2	I4	6	I5	I7	I2	I4	7	8
S2	3I	24	22	25	23	I9	-	2I	20	-	I9	2I	20	I8	I4
S3	3I	29	30	33	38	22	24	I8	20	I9	25	I6	I7	2I	24
S4	29	36	32	33	40	32	2I	I8	24	I8	I8	I7	I4	I6	I5
S5	3I	32	38	4I	40	40	27	I4	I7	I2	I2	I7	I2	I2	I4
S6	40	44	43	38	4I	39	2I	I9	I9	I4	I7	2I	2I	23	I9

	Wk. 6.			Wk. 7.			Wk. 8.			Wk. 9.			Wk. I0.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	I2	5	4	I5	I4	-	-	9	I3	I9	I7	I3	I2	-	-
S2	I9	I7	I6	20	I5	-	-	I2	I8	24	2I	I5	I8	-	-
S3	I9	20	I9	I7	I5	-	-	20	I9	2I	I6	20	20	-	-
S4	I5	I5	I8	I8	I7	-	-	23	27	27	24	I7	I6	-	-
S5	I8	I3	I5	I9	I9	-	-	I5	I4	27	38	36	4I	-	-
S6	I8	20	I6	2I	20	-	-	20	I9	-	-	-	-	-	-

	Wk. II.			Wk. I2.			Wk. I3.			Wk. I4.			Wk. I5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	I4	I5	I6	-	I7	I9	II	9	9	I5	I4	-	I8	I3	I5
S2	I5	I5	I9	I4	I6	I6	II	II	-	I9	20	I9	3I	I8	I7
S3	I9	I9	I8	22	I5	I6	I5	I5	I6	28	28	27	26	3I	24
S4	I8	-	I4	I4	I7	I6	I6	I8	I8	22	22	34	3I	36	29
S5	I2	I2	I2	I5	I0	II	I0	II	I4	I7	I4	I4	I8	I6	I6

% Intervals for on-task behaviour.

	Wk. 1.			Wk. 2.			Wk. 3.			Wk. 4.			Wk. 5.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	20	23	25	20	29	33	4I	46	5I	45	39	54	46	5I	48
S2	25	22	22	2I	24	25	-	42	41	-	49	43	38	50	48
S3	19	21	18	14	12	19	33	31	40	45	38	37	47	41	43
S4	21	16	17	12	11	10	28	27	31	32	35	38	31	41	40
S5	20	14	19	3	4	9	24	30	44	42	50	48	42	48	46
S6	5	4	9	3	2	6	19	18	17	27	30	24	36	26	34

	Wk. 6.			Wk. 7.			Wk. 8.			Wk. 9.			Wk. IO.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	47	54	46	35	41	-	-	36	38	24	32	37	32	-	-
S2	42	44	42	52	51	-	-	56	48	36	41	38	28	-	-
S3	48	39	42	44	42	-	-	41	37	30	32	34	30	-	-
S4	44	40	42	36	34	-	-	40	40	12	16	14	11	-	-
S5	43	49	51	42	40	-	-	42	44	11	8	8	6	-	-
S6	20	21	25	19	23	-	-	27	31	-	-	-	-	-	-

	Wk. 11.			Wk. 12.			Wk. 13.			Wk. 14.			Wk. 15.		
	M	W	F	M	W	F	M	W	F	M	W	F	M	W	F
S1	42	51	42	-	48	54	49	57	55	32	30	-	36	33	39
S2	34	41	44	48	43	54	40	43	-	22	28	27	24	30	34
S3	38	39	37	40	48	49	36	41	44	19	17	14	15	13	14
S4	41	-	48	50	49	51	40	33	39	12	9	8	11	13	18
S5	34	39	44	44	52	50	38	41	34	29	34	37	35	40	42

Frequency of occurrence of inappropriate meal-time behaviour.

	Wk. 1.					Wk. 2.					Wk. 3.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
T	47	52	39	22	41	42	38	27	41	18	22	26	19	40	22
A	7.8	8.7	6.5	3.6	6.8	7.0	6.3	4.5	6.8	3.0	4.4	5.2	3.1	6.6	3.6

	Wk. 4.					Wk. 5.					Wk. 6.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
T	19	31	14	10	15	22	18	14	29	41	16	12	9	13	4
A	3.1	5.1	2.3	2.0	3.0	3.6	3.0	2.3	4.8	6.8	2.6	2.0	1.5	2.1	0.6

	Wk. 7.					Wk. 8.					Wk. 9.				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
T	13	3	7	6	-	-	-	10	4	6	15	17	20	8	15
A	2.1	0.5	1.2	1.0	-	-	-	1.6	0.7	1.0	3.0	3.4	4.0	1.6	3.0

	Wk. 10					Wk. 11					Wk. 12				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
T	27	40	31	24	19	17	14	10	3	3	13	22	6	10	13
A	5.4	8.0	6.2	4.8	3.8	3.4	3.5	2.5	0.7	0.7	3.3	5.5	1.2	2.0	2.6

	Wk. 13					Wk. 14					Wk. 15				
	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
T	15	9	21	8	11	17	24	18	15	12	6	15	11	5	9
A	3.0	1.8	4.2	1.6	2.8	3.4	4.8	3.6	3.0	3.0	1.2	3.0	2.2	1.0	1.8

T = total frequency of occurrence (all students)

A = average frequency of occurrence