UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL SCIENCES

SOCIAL WORK

MASTER OF PHILOSOPHY

THE SHAPES OF CHANGE:

TOWARDS A MODEL AND A METHOD OF IDENTIFYING THE USE OF THOM'S CATASTROPHE THEORY IN FAMILY THERAPY

by David Ian Simon

A Thesis submitted in fulfillment of the requirements of the Master of Philosophy course, Social Sciences, 1988.

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF SOCIAL SCIENCES
SOCIAL WORK STUDIES

Master of Philosophy

THE SHAPES OF CHANGE: TOWARDS A MODEL AND A METHOD OF IDENTIFYING THE USE OF THOM'S CATASTROPHE THEORY IN FAMILY THERAPY

By David Ian Simon

A conceptual model was developed to organise and develop theories of change as used by BRIEF FAMILY THERAPY, using the modelling techniques of CATASTROPHE THEORY. A large variety of routes for change were defined for both problem aetiology and relief. Of particular use was the distinction between continuous and discontinuous change, which allows description of both gradual and dramatic change in either direction. Consequently, the expectations of rapid relief from previously persistent problems, as proposed by this therapy, can be shown to have a scientific legitimacy and rigour.

The resulting model had sufficient descriptive power to warrant the proposal that it should be considered the foundation of a CHANGE THEORY for personal and interpersonal therapies.

Empirical investigations were commenced, taking the form of PROCESS RESEARCH. An instrument and a data processing method were designed and utilised to develop a METHODOLOGICAL PILOT to explore longitudinal approaches to sampling for discontinuous change. Exploratory data techniques demonstrated a number of homeostatic patterns, but unfortunately the opportunity to find a discontinuous morphogenic was not presented.

THE SHAPES OF CHANGE

PART ONE.....7

INTRODUCTION

...in which the general area of the study is laid out to prepare for the meeting of two specific theories.

PART TWO.....21

TOWARDS A CONCEPTUAL MODEL

...in which Catastrophe Theory and Brief Family Therapy are described and then joined into a partnership to develop a rigorous conceptual model as the basis of a general 'Change Theory' for Social Work.

PART THREE.....161

TOWARDS AN EMPIRICAL STUDY

...in which a methodological pilot study is designed and implemented in order to pursue the testing of an aspect of the conceptual model.

PART FOUR.....286

CONCLUSION

...in which the conceptual and empirical parts are reviewed in order to conclude this exploration of 'Change Theory';

with reference list and appendices.

INDEX OF ILLUSTRATIONS

		page
1.	The Shapes of Change	38
2.	The Change Theory Concepts	51
3.	A Behaviour Surface	56
4.	A Bridge: Collapse and Rebuilding	58
5.	The Social Work 'Opening'	59
6.	Block Diagram of the Model's Axes	83
7.	The First Phase Construct	87
8.	The Second Phase Construct	88
9.	Homeostatic Change: Example Patterns	101
10.	Morphogenic Change: Continuous Routes (a-c)	104-106
11.	Morphogenic Change: Discontinuous Routes (a-c)	108-110
12.	The Smoothing Factor Effect	112
13.	The Bias Factor Effect	113
14.	The Butterfly Factor Effect	114
15.	A Precarious Family	115
16.	A 'Stuck' Family	116
17.	An Overdependent Family	117
18.	The Random Noise Effect	119
19.	The Reification Effect	123
20.	Ambivalence	124
21.	Two Paths when Need is Increased	133
22.	Simple Correction is Insufficient	156
23.	Family Patterns of Member's Changes	202
24.	Three types of Relationship Discontinuity	203
25.	The Rating Scale	211
26.	Possible Evidence of Discontinuity	218

27. School Attendence Problems 226

28. Table of Comparison: The Three Sample Regimes 233

29. The Diary Return Quantities 240

30. 'Golden Eagle', Raw Data 253

31. Cross-sectional Analysis: Examples 261

32. Ratings of Diary Completion Tasks 265

33. 'Harold Hedgerow', Raw Data 270

34. 'Joan Collins', Raw Data 271

35. 'I.S.', Raw Data 273

36. 'Postman Pat', Raw Data 274

37. 'Sharpeyed Eagle', Raw Data 274

38. 'Diane', Raw Data 276

39. 'Harold Hedgerow', 'Inside', Difference 277

40. 'Mousie', Raw Data 278

41. The H/4 Family, Subgroup vs 'Skins' 279

42. 'Joan Collins', All Data Averaged, Slope Analysis 282

41. The Model, Developmental Version 2 295

43. Table of the Subject's Data 324

44. Data Analysis: An example (Harold Hedgerow) 342

NOTE

All the raw data collected in this study is presented in graph form in the appendix. Also appended are copies of the various data collection instruments and listings of the computer programme modules.

Acknowledgements

This Research Project would not have been possible without the help of many, some of whom are:

The Isle of Wight Social Services Department, who sponsored the researcher through the course and through the writing of this thesis. Further, the use of various peices of equipment belonging to the Department made the empirical method possible.

James McDonald, copyfolder extrodinaire, who duplicated and made up many of the diaries used by the subjects. As a volunteer, his time was given freely, for which he has many thanks.

The Sinclair QL, a home computer capable (just about!) of coping with the strains placed upon it during the development of the scientific programme.

Many friends who supported me throughout this project, to whom owe my personal thanks.

P A R T O N E

INTRODUCTION

CONTENTS

1. Introduction

2. The Area of Study

3. General Methodological Issues

4. Discussion

1. INTRODUCTION

> When I seek out the sources of my thoughts, I find they had their beginning in fragile Chance; were born of little moments that shine for me curiously in the past. Slight the impulse that made me take this turning at the crossroads, trivial and fortuitous the meeting, and slight as gossamer the thread that first knit me to my friend. These are full of wonder; more mysterious are the moments that must have brushed me evanescently with their wings and passed me by: when Fate beckoned and I did not see it, when new Life trembled for a second on the threshold; but the word was not spoken, the hand was not held out, and the Might-have-been shivered and vanished, dim as a dream, into the waste realms of non-existence.
> (Logan Pearsall Smith, 1934)

Written of the novelist's difficulty with his own creativity, this thought is relevant to both the researcher and the therapist, as well as to the process of change experienced by the clients of Social Work. The fragility of the contributory elements that guide the difference between the opportunity seized and those unseen is as fascinating as it is frustrating. It is therefore apposite to what follows: an account of the development of a research study into the processes of family change.

2. THE AREA OF STUDY

The study of change, impermanence, transience, is unusual.

Where the physical sciences have started with the examination of the permanent aspects of 'reality' and have noted their changes somewhat in passing, the social sciences are focused the other way round by definition of the subject of study. It is the changes in a labile phenomenon - humanity - and its sub-divisions, that are the centre of interest. Because comparisons have favoured the definitiveness of the former, the latter have become known as the 'inexact sciences'.

However, this must be seen as a matter of degree: even the most solid block of steel vibrates, contracts and expands in response to pressure waves, temperature and gravity. Exactitude is not the prime criterion of rigour, as Heisenberg's now-famous Uncertainty Principle (1930) posits.

A further complication for some social sciences is the need to study the manner in which some types of change are initiated or halted. And since people are already changing, then this is an examination of accelerative changes, rather than of a simple steady trend or oscillation.

For Social Work, the family is a central social entity, facing as it does both inwards to the members and outwards to

society-at-large. Further, it is the basic unit of intervention: very few clients live in complete isolation. It is therefore clearly an important area for research, the general field being called family studies. However, too little has been done in this area as Kauder says (1980), a decade after Anthony and Koupernik warned:

> "The family is the most () studied of all human groups and yet our knowledge of it remains rudimentary." (1970)

This must inform our appreciation of the position of Family Therapy, the specific area of change-focused intervention with families.

The identification of these issues begins to set the scene for some important methodological points to the study to be described here.

3. GENERAL METHODOLOGICAL ISSUES

3.1 Introduction

3.2 Process Research

3.3 Epistemological Studies

3.4 Field Study Methodology

3.5 Naturalism in Family Studies

3. GENERAL METHODOLOGICAL ISSUES

3.1 Introduction

As a point of entry, it is necessary to make an early appreciation of a number of methodological issues for this study in relation to the general area of family studies and Family Therapy in particular. It can be difficult to attribute these issues to either the subject (i.e. arising within the field), or to a greater context (i.e. impacting upon the field). To a degree it is probably not important: they shape each other; and there is not the space here to enter into a discussion of the origins of these issues.

3.2 Process Research

It is important to state that the following is not an exercise in family therapy outcome research. This area is surrounded by sufficient methodological difficulties (e.g. Gale, 1979; Frude, 1980) to ensure that this study would founder quickly if any reader were expecting a rigorous evaluation of the results of therapy. And yet the essence of the questions asked in this study does concern the effects of therapy in the sense of being interested in the process by which these effects are produced. In outcome research, the description of the results of therapy are reduced to the definition of the measurement criteria for the eventual 'product'; it is not as concerned with the effects of therapy during the

process itself, tending to call this the 'method'. However, it is the sequence of events that may happen through the duration of the activity 'therapy' that is of central interest here, and this is termed process research.

This is a significant distinction with which to open, since the preoccupations of outcome research dominate the field. Pinsof, a prime mover in this area notes one of the methodological implications of this:

> "If the field of family therapy outcome research is in its infancy () the field of family therapy process research has just been born." (1981, p 700)

The benefits of process research are to allow the process of constructive change through therapy to be regarded as an event in a way often found difficult in social work. Put simply and in advance of the main development of this theme, a successful change of any type must have a start, middle, and end. Identifying this three-phase pattern must permit entry into discussions of cost-effectiveness.

Frude (1980) has appropriately pointed out that research into family therapy will inform the policy decisions taken by those social agencies able to bring to bear the relevant resources, and that this is an important consideration for research alongside the search for improvements in practice and training (see Smale, 1983; Sheldon, 1986, for instance). Outcome research attracts two sorts of

effectiveness question: the absolute productivity of family therapy, and the relative productivity of the different approaches. Process research addresses the question of the efficiency, which includes considerations of the costs of therapy.

Aside from a small capital expenditure on one-way window and sound equipment, the maintenance costs of such a resource are minimal. Indeed, this technology is not always made available to practitioners. The most expensive aspect of family therapy is the professional's time, particularly with the teamwork approach usually taken with this therapy. Thus the unit cost per session may appear high. However, being able to advance the argument that, say, five sessions is sufficient to obtain an alteration to the nature of the case so as to allow the closure of the file, or a much reduced future input, is important. The usual basis for this argument is that of practice experience together with enthusiasm generated by reading the literature. This may often contrast with the received wisdom that many cases are simply 'unchangeable', and the proposal may therefore be regarded as simply too idealistic. Even if a more liberal response is forthcoming, the tradition of slow careful and labour-intensive work will usually be assumed to be necessary.

But, if a coherent theoretical argument can also be brought in to support the logic behind a belief in the possibility of

rapid change, the case may be strengthened. The growth of this theory has lagged so far behind the practice of the techniques for initiating rapid change as to be invisible. The development of a body of such theory about accelerative change is the concern of this thesis.

3.3 Epistemological issues

A. Discontinuity: a new factor in the study of behaviour

One of the fundamental notions used in this study is that of discontinuities in the action-over-time of the phenomenon under study. A newcomer to the repertoire of concepts regarding the qualities of change, it has not been easily welcomed. While more easily demonstrable in the physical arena (for instance, the collapse of a bridge is a sharp discontinuity in its usefulness), human behaviour is less easy to imagine as showing stepwise movements. Consider, however, such common sayings as 'I had a flash of insight - completely out of the blue' and 'She was at the end of her tether and just snapped'.

There are temptations to ascribe such sudden events to magic, fate or chance. Scientific study of such phenomena is necessary, but it can be anticipated to be difficult, reflecting the situation in other fields as Stewert and Peregoy said:

> "New problems raised by nonlinear models of [behaviour] will tax the creativity of research psychologists. The concepts take time and energy to understand, but [this

approach] has considerable potential..." (1983)

B. Reductionism: an older factor to be considered

Systemic theories - the basis of family therapy - do not suit the Western/Cartesian/Newtonian approaches that much of science is founded upon (Auerswald, 1987). As Capra puts it:

> "It was Descartes' method [of analytic reasoning] that made it possible for NASA to put a man on the Moon. On the other hand, overemphasis on the Cartesian method has led to the fragmentation that is characteristic of both our general thinking and our academic disciplines, and to the widespread attitude of reductionism in science - the belief that all aspects of complex phenomena can be understood by reducing them to their constituent parts." (1983, p 44)

Systemic theories propose a duality in reality: the function 'and/both' replaces the 'either/or'. For instance, in therapy it might be very useful to indicate that a painful symptom is really very helpful, thus making it appear both 'good' and 'bad'. This clearly contrasts with Popperian notions of single falsefiable hypotheses, and is no nearer finding a home with later notions of competing hypotheses (Henkel, 1976). Aldridge (1985) found difficulties in gaining an acceptance of his research utilisation of the more inductive continuous hypothesis modification method used in Family Therapy practice (Palazzoli et al, 1980). It is interesting that Auerswald (1987) proposed that from the systemic

perspective, methodological problems in non-reductionist research would be minimal, although he acknowledged that the current juxtaposition of the two 'reality systems' has produced much confusion.

3.4 Field Study Methodology in Social Work

Against the backdrop of the above issues for methodological concern, a practical study had to be developed for this work. As an employed Social Worker attempting part-time research, a degree of 'realism' had to be taken in order to mount an achievable project. Calam and Elliott (1987) note quite appropriately that practice, particularly in family therapy, can appear much more attractive than research: it gives many a "better buzz" than research. They also find that pressures of work (enforced or voluntary) tend to result in research being "relegated to what would otherwise be leisure time".

Given the difficulties, a guideline was found to emerge in question form: What is 'good enough' research? This study has sought to offer a coherent and valid contribution from within a constrained opportunity where limitations on resources, precursors to the conceptual developments and measurement techniques were evident.

The study has a wide conceptual range and a narrow empirical focus, a predictable result of the context in which it was pursued. It has some, though not all, of the features of the

case study approach:

> "In general, case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on contemporary phenomena within some real-life context." (Yin, 1984, p 13)

In following this, it has aimed to demonstrate internal validity for the conceptual model, construct validity in the attempt to test part of the model, and reliability of the instrument designed, as Yin describes. Hopes for the final quality check, that of external validity and the location within a more general domain, were curtailed by the space and time available.

3.5 Naturalism in family studies

The family has been thought of as showing a 'rhythm' as it moves through its daily tasks:

> "This rhythm is the totality of patterns of interaction that, although not great for any segment of time and sometimes subtle and difficult to detect, are repetitive and pervasive." (Hansen, 1981, p 57)

The approaches to observing and analysing these rhythms have grouped into two camps: the 'experimental' and the 'natural'. The former has undertaken systematic observation, recording and coding of family members' behaviour in 'free' interaction or in the performance of a designed task often in a structured environment. The latter has attempted the observation task in the family's own environment, and has therefore focused

more on 'free' interaction as best as can be managed in the circumstances. Both methodologies have their fundamental difficulties in the trade-off between the underlying definitions of rigour on the one hand and the distance from the subject's natural state on the other. Experimental approaches can be seen as closer to traditional understandings of science, but more artificial to the practice of social intervention.

Research into family therapy, based as it is in systems theory, brings a difficulty. While wishing to be definitive, there is a clear reaction against "academic settings under laboratory conditions" (Auerswald, 1987). Bavelas reminds us again of the Heisenberg Uncertainty Principle:

> "The very act of observation must necessarily interfere with, and change, the nature of the phenomenon; therefore objective, experimental research is not possible." (1984).

Even so, we must let Gale (1979) remind us of the dangers of research being "sloppy and ill-controlled and characterised by a common bias that the outcome will be favourable."

4. DISCUSSION

So much appeared relevant to the development of this study that what remains written here is an extract derived from an attempt at elucidating as clear a picture as possible of the results of an evolving process. The conceptual model was developed within a matter of weeks of the initial idea. Although elaborated during the following months, it has remained essentially unchanged. The empirical study, although itself a pilot, took the bulk of the time. With this in mind, it is curious that the conceptual model addresses the general case of the shapes of change in families, whereas the empirical work held a very narrow area to practical test. This disproportionate weighting proved very hard to persevere with through the duration of the project. This was one of the unexpected hurdles of the fieldwork aspect.

In the end, it is the hope of the researcher that this work has been 'good enough' to provide a path both worthy and clear enough to follow for those stimulated by the ideas contained herein. Perhaps this is all anyone can wish for?

P A R T T W O

TOWARDS A CONCEPTUAL MODEL

CONTENTS

5. Brief Family Therapy

6. Catastrophe Theory

7. A Catastrophe Theory Model for Brief Therapy

8. Discussion

5. BRIEF FAMILY THERAPY

5.1 Introduction

5.2 Family Therapy and Social Work

A. Critisisms of Family Therapy

B. Confirmations for Family Therapy

C. Critisisms of Social Work as a Context

D. Contra-Indications

5.3 Brief Family Therapy

5.4 The Technical Basis

A. The Logical Problem-solving Approach

B. The Lateral Problem-solving Approach

5.5 The Theoretical Basis

A. Systems Theory

B. Communication Theory

C. Concepts of Change

5.6 Conclusion

5. FAMILY THERAPY

5.1 Introduction

Family therapy is now a recognised approach within the range of psychotherapies:

> "Quite young as approaches go () family therapy has, without the heraldry of best seller or cult, been steadily expanding ..." (Kovel, 1978, p 243)

It is difficult to define with precision due to the variety of theories and associated practices, but the main elements include a focusing upon:

i. the relationships rather than the individual;
ii. the 'here and now' patterns of behaviour, rather than the past;
iii. working directively, rather than reflectively.

It can been described as being currently in its 'third wave' of development. In turn, they could be called the 'innovators', the 'elaborators', and the 'professionals'. Hoffman (1981) has named Satir, Ackerman, Jackson, Erickson and Whitaker as amongst the American pioneers. She then goes on to recognise several schools of thought, differentiating: the historically oriented, the ecological, the structural, the stategic and the systemic models. The third wave of development seems to be filling in many of the gaps, pushing practice into new territories, and elaborating the movement into a profession.

Often thought to originate from America in the 1950's, there was already germinal work in England in 1948, where Bowlby was finding that:

> "...I had no doubts that family sessions were extremely important, but I couldn't persuade many other people to think so too." (Bowlby, 1987)

Skynner (1976) has offered a survey of the development of Family Therapy in Great Britain.

5.2 Family Therapy and Social Work

The relationship between Family Therapy and Social Work has been described in a number of ways, and the opinions offered can be found to fall into two main types. There are those criticising the usefulness of Family Therapy in Social Work which are often published in Social Work journals; and there are those supporting Family Therapy applications in Social Work, published in both the social work and Family Therapy journals. Two other relevant views include criticism of Social Work as a medium for Family Therapy and diagnostic approach toward contra-indications for Family Therapy.

A. Critisisms of Family Therapy

A recent paper by Triseliotis (1987) contrasts what is termed 'classical family therapy' with a notion of 'working with families' in a way reasonably typical of many of this type (see also Jordan, 1981; Nuttall, 1985). The main thesis of this approach is to suggest that Family Therapy cannot work with unmotivated families who do not attend clinic

sessions as a whole family, and who have quite clearly got sub-cultural reinforcements of problem behaviour and perhaps causes of the problems external to the family. In other words, (to deliberately over-simplify) Family Therapy does not help where change is not requested. This obviously by-passes some important ethical and practical issues.

Therefore, it is worth noting at this stage that Family Therapy is considered here to be useful in situations arising in Social Work where any other treatment would be thought applicable. It may offer help in a wider variety of situations than a specific treatment type (such as T-group or behaviour modification). But Family Therapy will not be useful in situations where behavioural change is not needed, or wanted: for instance, it will not investigate a child abuse allegation (though the assessment techniques may contribute productively). Thus, social work and Family Therapy are not interchangeable and cannot be compared as if competing practices.

Another issue raised by Whan (1983) is that of the directiveness of the techniques. Wright (1981) speaks of deception: "the quickness of the hand deceives the eye". As Watzlawick et al. (1974) say, they "fully expected to be attacked by some for the 'manipulative', 'insincere' nature" of the approach (p xv). However, it is difficult to see how any approach to helping people change cannot take control of some aspect of the work in order to facilitate what was not

previously possible (O'Hagan, 1986).

B. Confirmations for Family Therapy

Support for the usefulness of Family Therapy can be found in the social work literature, for instance Coulshed and Abdullah-Zadeh (1983), Dale (1984) and Smale (1983). More can be found in the Family Therapy literature, where Social Workers make clear points about their applications, for instance with 'under-organised' families (Jenkins, 1983), crisis intervention and emergency duty work (O'Hagan, 1984), complex child care cases (Dimmock and Dungworth, 1985), child sexual abuse treatment (Dale, et al., 1986). With the family as its focus, Family Therapy can, in theory, address any problem in any client group.

A useful summarising statement is found in Smale's questioning paper 'Can we afford not to develop social work practice?':

> "Family Therapy is a term which applies to a wide range of interventions. While it is true that some of these are akin to psychotherapy, most family 'therapists' are, in fact, social workers." (1983 p 258)

C. Social Work as Context

There are also writers who support Family Therapy and suggest that it is not amenable to use in the context of Local Authority Social Work. For instance, Adams and Hill (1983) take an apparently tongue in cheek look at this, but

remain with the observation that it may be impossible. Cade (1981) identifies the pyramidic bureaucracy as the source of the problem, as it stifles creative risk-taking.

D. Contra-Indications

While Family Therapy may be proposed as 'a good thing', there will be occasions when it cannot offer the treatment of choice: there will be contra-indications. Although it has been used with the most severe problems (e.g. schizophrenia: Palazzoli et al., 1978; anorexia nervosa: Minuchin, 1974), it cannot be regarded as 'the compleat cure'. Walrond-Skynner (1978) and Fisher et al. (1981) have listed relevant issues.

5.3 Brief Family Therapy

Of the various approaches to Family Therapy, there is a cluster of writers who clearly act to reduce the amount of time taken for the work, both in terms of the contact-time (i.e. the total time in sessions) and the duration of therapy (the period between the first and last sessions).

This concern arose in the field of psychotherapy, with Reid and Shyne (1969) being among the first to clearly state that time limited work had credibility after mounting a research programme short-term methods. They noted a parallel with the 'crisis intervention' approach of Parad and Parad (1968). Recently, Fisher (1984) surveyed the area and commented that while long-term work has seemed popular among psychotherapists for a long time, clients expect rapid improve-

ments. Further discussions of these approaches can be found in Ewing (1978), Malan (1976) and Wolberg (1965). Weakland et al. (1974), published at the same time as Watzlawick et al., (1974) (collectively known as the 'MRI group' after the Mental Health Research Institute, Palo Alto) brought the 'brief therapy' and communicational (i.e. social interaction) perspectives together, forming the springboard for much of the subsequent Brief Family Therapy movement.

The development of the body of theory upon which most Brief Family Therapy draws occurred through the "zigzag ladder of dialectic between forms and process" (Bateson, 1980, p 210). Each step taken forward in the theory was then used and elaborated through practice until the new aspects of this called for another theoretical formulation. As Watzlawick et al. have said:

> "...we seemed to be drawing on some underlying body of assumptions which at the time we were unable to define. () Only gradually were we () able to conceptualise our approach..." (1974, p xv)

This evolutionary nature of the process of development has been important, and indeed continues to be.

The author's approach to Brief Family Therapy can be found in Simon and Axford (1983) and Simon (1988a) by direct description, and by drawing some of the boundaries in Simon and Vine (1987).

Space does not permit a detailed historical survey, or a practice-based case example approach. Instead, summarising important theoretical and technical aspects of Brief Family Therapy will be sufficient here. These subdivide into two major technical approaches and three major contributory areas of theory. These are, of course, artificial distinctions.

5.4 Technical Basis

Brief Family Therapy is considered here to be linked very closely with the 'strategic' school of therapy (see for instance: Cade, 1980). This may be compared with other schools of family therapy as in the first chapter of Madanes' book on Strategic Family Therapy (1981), the relevant passages having been previously co-authored with the acknowledged father of the school, Jay Haley. The approach is described by Haley:

> "a way to view the approach is to give directions going to the goal ... For those families in which a direct approach is not effective, the therapist falls back on an alternative plan that will motivate the family toward the goal. If that alternative plan is not effective, fall back on yet another alternative plan." (1976, p 80)

The major tenet of the strategic approach is thus to remain flexible and manoeuvrable when difficulties in progress are encountered. Simple re-application of previous interventions is not considered worthwhile (considering these methods have not previously worked). If progress has been obtained,

repetition may not be appropriate to the new situation anyway.

The implication of this approach is that a wide variety of strategies must be collected to be available to the therapist, almost as a 'toolkit'. These are divided into two major categories:

A. The logical problem-solving approach

These strategies are the group of well-known approaches that are used by both lay and professional helpers, with differing levels of sophistication. They are the logical, 'common-sense' thing to do. For instance, a range of persuasive and coercive strategies are entirely logical within their contexts. A shy child may tempted with promises of sweets or toys, and then rewarded after a suitable contribution; an elective mute might be rewarded for the slightest sound with a high consistency, hopefully leading to an increasing vocalisation. A disobedient teenager might be threatened with loss of privileges for more cheekiness; ultimately a delinquent may have his freedom sanctioned by a Court.

If these strategies work productively, there is no need to go further. If they do not work, the logical thing to do is to strengthen the strategy: larger rewards or punishments, for instance. This is essentially a 'more of the same' approach, as Watzlawick et al. (1974) point out.

B. The lateral problem-solving approach

If logical approaches are not successful, another option is to take an entirely different direction, and instead of meeting the problem head-on, approaching it from the side, as it were. The term 'lateral' was used (Simon and Axford, 1983) in deference to de Bono's Lateral Thinking, which is based on a premise that:

> "No way of looking at things is too sacred to be reconsidered. No way of doing things is beyond improvement." (de Bono, 1967, p 77)

Thus Haley's dictum of "Change a loosing game" (1976) is a fundamental operational rule for the failure of a strategy. If a lack of progress is discerned, a new strategy must be used; the corollary being that any therapy that uses only one strategy in differing styles or strengths cannot be considered strategic (Simon, 1988a).

The strategic approach may commence work with a new family with a logical intervention, on the basis that little is known about the family. If it is not successful, lateral types may then be used, the practical and ethical test having been satisfied (Simon, 1988a). However:

> "Certain families indicate from the beginning that logical interventions will prove futile, for example families in which bizarre transactions take place, or in which a high degree of anxiety, defensiveness, denial, guilt, or anger prevents the family from 'hearing' the therapist ... a commonsense approach is unlikely to be

effective." (Papp, 1983, p 31)

There are a wide variety of types of 'lateral' strategy, and many dimensions can be used to tabulate them: for example see Fisher et al., (1981), Weeks and L'Abate (1978). At least one bibliographical compilation is available (Weeks, 1978). These strategies will all have in common a characteristic of appearing unconventional to the majority of therapists (who will be working within the 'logical' approaches). A number of theories about the under-lying mechanisms can be found: paradox (Cade, 1979), negative practice, (Dunlap, 1928 and 1942), logotherapeutic paradox (Frankl, 1973), ordeal (Haley, 1984), prokaletic challenge (Kraupl-Taylor, 1969), positive connotation (Palazzoli et al., 1978), self-fulfilling/denying prophecy (Smale, 1984), reframe (Watzlawick et al., 1974), etc.

All can be thought of as variations on a theme, seizing different aspects of a highly complex conceptual area. They hold the same theoretical ground (see 5.5 below), and seek explanations of unusual ways to alter meanings attached to problematic behaviour in order to influence the behaviour itself.

In terms of the practical implication of these techniques, the fundamental task in behavioural terms is that of symptom prescription. That is, the family is instructed to continue having the problem: no effort is allowed towards solving it.

Alternatives are to permit the problem 'for the time being', or to predict its course and implicitly expect its continuity. Other options include allowing it by arguing against change (e.g. the 'Go slow' instruction) and cautioning against hope. A family may even be instructed to pretend the problem, or further, to enhance its seriousness or frequency. At no point is the problem confronted with an overt aim of ridding it from the family by coercive or persuasive means.

Further material may be found in Palazzoli et al. (1980; sometimes known as the Milan Group), de Shazer (1985), Papp (1980), Cade (1979), Cade (1980), Penn, (1982) and Madanes (1981).

Strategies may be employed in four major phases in the contact with a family:

- Convening them to family sessions,
- Accommodating with them to enable them to stay in that session and return to the next session of what must be recognised as an anxiety-provoking situation,
- Intervening for symptom change,
- Termination of the sessions.

These strategies may be implemented in two main ways, as:

- Major interventions, usually offered very near the end of the session, with many explicit and non-verbal signals to enhance the importance ascribed to the delivery,
- Minor interventions, presented quietly and often with rep-

etition through the session, possibly by implication rather than overtly.

The intervention may be in the form of a task or a message. It may be addressed to one, several or all family members. It may be followed up by letter confirming what was said in order to emphasise it, or it may be delivered 'sideways', to the extent that it is later qualified or denied.

5.5 The Theoretical Basis

Three theoretical building blocks useful for this exploration will be presented. In providing such an overview, some concepts will be excluded, and general reference to Hoffman (1981) or Chasin and Grunebaum (1980) may help with some of the background.

A. Systems theory

A basic assumption for all family therapy is that although the individual members are physically discrete, the family is psycho-socially a single unit of function. This notion is founded on what is generally known as Systems Theory, which springs from von Bertalanffy's General System Theory (1968). Three general properties are defined:

i. Each element's behaviour has an effect on the behaviour of the whole system;

ii. Each element's behaviour depends upon the behaviour of at least one other element of the system in its effects upon the whole system;

iii. Every possible subgroup of elements has the above two properties.

Sometimes appearing as if it were only a dry and academic contribution to mechanics, von Bertalanffy was concerned to have Systems Theory known as being useful for describing human situations:

> "The proper study of Mankind as systems was, of course, assiduously promoted by Ludwig von Bertalanffy (1953), and his aphorism that 'the organism should be likened not to a crystal nor to an atom but to a flame' is intended to emphasise the ever-changing form of a system under the influence of external forces and internal processes, which he considered a better starting point for the biological sciences than the static, frozen-outside-time, models of physics or of stimulus response psychology." (Blauberg et al., 1977, p 406)

A family, the 'system' under consideration here, is thought of as indivisible as a functioning psycho-social group that has a 'life of its own'. In practical terms, this means that transactions occurring in the family member's day-to-day relating have a crucial role in forming the identity of the family. If there were no such identifiable patterns, the family would not be a recognisable entity, merely a collection of individuals. These transactions have a mutual influence on the two people involved, and an important influence on any observers to the interaction. This mutual

influence is one of 'checks and balances' on the relationship, continually guiding, shaping and defining it into the familiar pattern that is the long-term relationship. Each spoken word, hesitation, or silence; each smile, grimace, or ignoring: they are all important events in this reciprocal defining of positions.

This is a description of a distinct sequence of events, a process, whereby messages from the results of the behaviour have a controlling influence upon this process which shapes the ensuing behaviour. This is not to deny any concepts of self-actualisation so much as to describe the environment within which the individual may initiate his actions. These messages are nowadays termed 'feedback'. The ability to describe this process allows a distinction from the component parts of each message: the words, gestures and facial expressions. The process is a stable pattern, the content is different each minute. These concepts of process and content can be laid beside that of form (or structure) as fundamental tools for the analysis of the system (Nadel, 1951; Sluzki 1983).

Systems Theory has had an impact on Social Work for some time as it encourages the practice of interventions that bear in mind the context of the work. Different aspects of the social system may include definitions of target groups, action groups, client groups, etc. and therefore prompt a careful approach to considering the most appropriate method to use.

However, the Unitary Method, the most well-known approach to spring from this theory (Pincus and Minahan, 1973) remains linear and logical, which brings distinctions with Family Therapy approaches.

Systems theory has also given insight into the iatrogenic - that is, counter-productive - effects of professional intervention (Illich, 1976). Auerswald has described the change-nullifying effects of several welfare systems "inadvertently combining in such a way as to frustrate each other's activities..." (1969). This indicates the complexity possible for Social Work when a family is functionally identifiable as a part of a larger social system.

B. Communications Theory

Analyses of the patterns of communication between people have given rise to an understanding of the possible complexities within single messages. In 1956, Bateson et al. published what is regarded as a seminal paper concerning the effects of a particular communicational pattern known as the 'double bind' on schizophrenic patients. Later, Watzlawick et al. (1967) elaborated on this with "a Study of Interactional Patterns, Pathologies and Paradoxes". While there has been difficulty over the specific concept of the double bind (especially for operational terms for the research: Olson, 1972) the general notion that confusing communication can 'cause' problems gained credibility against the physical explanations (see Sluzki and Ransom, 1976).

An important qualification on the idea that particular communicational patterns 'cause' problems arises from the Systems Theory base. As the problem is formed, feedback patterns emerge in which the problem 'causes' double binding communication which in turn 'causes' the problem to continue to 'cause' double binds, etc., etc. This is identified as a circle in an abstract sense: the transactional pattern, once established, has no identifiable start and finish. The term 'circular causality' has come to mean that the mutual definition involved in any relationship is a powerful force in maintaining the quality of that relationship, and also in altering it. Third parties may also become involved in the double bind (Weakland 1976), allowing for triangular and yet more complex relationships.

Structurally, this pattern has been identified as a self-fulfilling prophecy (Merton, 1948; Smale, 1977; Watzlawick, 1984). As Smale (1984) has described, there are three stages:

> "first, the prediction is formed; second, action is then taken as a result of this prediction; finally this behaviour then brings about, or significantly contributes to the prophesied outcome. It is the middle 'behaviour' stage, of course, which is crucial in distinguishing a 'self-fulfilling' from an accurate prophecy." (p 421)

In a sense, then, the behaviour both communicates the expectation and completes it. Self-fulfilling prophecies may

have benign or malign results depending on the nature of the expectation. The impact and pervasiveness of this phenomenon is thought to be substantial (Rosenthal and Rubin, 1978).

Communications theory allows a line to be drawn between the highly directive behaviour therapists and the directive family therapists (Jacobson and Margolin, 1979). The former assume that behaviour has a literal effect - that is, that if a person reports a dislike of a stimulus, they actually find it aversive and seek to reject it. On the other hand, family therapists allow that stimuli may have metaphoric meanings also, that although complained of, a stimulus is accepted for some reason (for instance, by way of a sacrifice).

C. Concepts of Change

There are four concepts concerning various views of the fundamental aspects of change, three of which are considered as sets of pairs. There are, however, complex relationships between them.

(1) Abstract treatment: mathematical concepts

At a very simple level, mathematical approaches to change show in the terminology applied to the sorts of shapes plotted on graphs. The point, line, curve and step-shaped features may often be identified. These descriptions are useful in drawing distinctions between the different characteristics: a 'stable trend' is not the same as a 'growth curve' (see Figure 1). The shapes drawn on a graph illustrate

with fair precision these features. Thus visual aids can be very useful in demonstrating a concept of change in a field predominantly verbal. At this stage, no other point will be made.

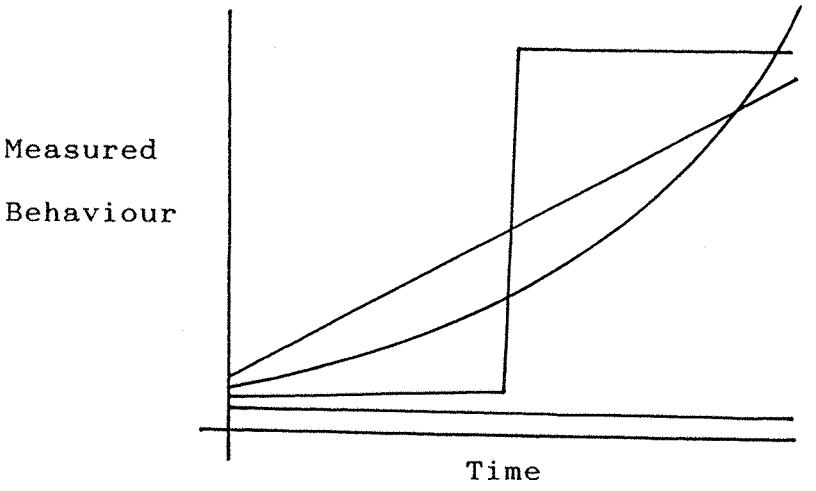


FIGURE 1: THE SHAPES OF CHANGE

(2) Abstract treatment: hierarchical concepts

Treating the subject of 'change' in an abstract perspective, two classes of change have be defined by Watzlawick et al. (1974). They find these to be related to Whitehead and Russell's Theory of Logical Types (1910), describing change within a Logical Type and between Logical Types. They may both be used in any context: micro and macro, simple and complex, animate and inanimate. They are 'pure' concepts, neutral to the subject they are applied to.

i. First Order Change. This is described as those movements that occur "within a given system which itself remains unchanged." (Watzlawick et al., 1974, p 10). That is, the system may alter in its behaviour - the

patterns may fluctuate, switch or evolve - but the system is not disrupted. Its identity continues to be recognisable. These authors offer an example of a nightmare, in which the person may run, hide, fight, scream, jump off a cliff, and so on, but none of this will itself bring the dreamer out of his sleep. Waking becomes a different sort of change: the dream vanishes, it's presence and continuity cease. This is a change of a different order.

ii. Second Order Change. This is defined as those movements which do change this identified system, regardless of the component behaviours. There is an alteration in the quality of the first order changes. Waking from a dream is a second order change with regard to the continuity of that mental experience. Death is a second order change in relation to life's variations. It is thus a 'change of change', an alteration in the rate or continuity of a fluctuating behaviour pattern. Less irrevocable examples also pertain, for instance the onset and cessation of an illness both substantially influence the normal 'ups and downs' of an individual's life.

The first and second order conceptual pair seems not to have been examined critically very much in the family therapy literature. Whilst not used universally, they appear to have a reasonable credibility and will be used here as described.

(3) Natural process concepts

Life, at biological and social levels, is an endlessly ageing process. Although machines can be considered out of the context of time, people are not so easily considered so.

i. Family Homeostasis. This idea was introduced by Jackson in 1957, being borrowed from the biological concept proposed by Cannon (1932). The pattern of behaviours that go to make up the interaction of a family's members is thought to maintain the stability of that psychosocial system to a degree. This is based on the argument that if no underlying repetition or familiarity were detectable, the ensuing chaos could hardly be called a family regardless of legal or blood ties. Within a range of flexibility, the family will show some counter-balancing effect so that one member's excursions may bring another to be more central for a time.

In families able to admit to having problems, Jackson and Weakland (1961) observed that:

> "...the characters of the members and the nature of their interaction - including any identified patient and his sick behaviour - are such as to maintain a status quo typical of the family, and to react toward the restoration of this status quo in the event of any change, such as is proposed by the treatment of any member." (p 32).

This is described as a 'dynamic steady-state system'.

This type of idea has been recognised for some time: Freud described the interventions of patient's relatives as "a positive danger" to the analysis and he knew that:

> "...the neurosis is related to conflicts between members of a family ... [and] the patient's closest relatives sometimes betray less interest in his recovery than in his remaining as he is."
> (1971, p 459).

However, it is important to note that this concept of family homeostasis is not regarded as inherently destructive. As a survival mechanism it will appear to maintain the stability of the family at whatever level of functioning they are showing: 'healthy' or 'collapsed'.

> "Marriages and families need to be thought of as interactive milieus in which transactions between component parts are continually taking place. Thus the action of one member will affect the entire family. A ripple set off anywhere internally or externally that impinges on the family will reverberate throughout. There is a basic, underlying consistent homeostasis in every family that is used to maintain each member's identity, defined as the sum of the individual's internal and external patterns of adjustment to life. The family is a system in dynamic equilibrium. Stresses and strains of family existence inevitably affect each family

member." (Glick and Kessler, 1980, p 32)

The concept of homeostasis has been critically explored in detail by Dell (1982) in its application to family systems.

There have been some difficulties found with the homeostasis concept. There are two basic areas:

a) Homeostasis: a Dynamic Process?

The literal translation of homeostasis as 'steady state' or 'same state' seems to have caused some difficulty. It has been thought ridiculous that a living system could be thought to show any invariant properties (Speer, 1970). Cadwallader (1959) shows that this is not a recent preoccupation:

> "Many [investigators] of social change object to the use of all concepts of equilibrium, homeostasis or stability, arguing that to include such ideas as a central part of social theory is to preclude the possibility of dealing with change." (p 154)

This is easily responded to with an adjusted definition that reads 'same path' in relation to a process of behaviour. This is the translation of the term 'homeorhesis' which was used by Waddington (1977) to take a clear account of the effects of time. To avoid confusions, the terms will not be substituted here. As

homeostasis will be the more familiar word it will be held to, although the latter meaning should be taken where homeostasis is written. Thus, it is intended to describe a stable pattern of ever-moving behaviours. In the logic of Whitehead and Russell's Theory of Logical Types (1910), the pattern and the behaviours are at different levels of description. It is the pattern that is 'homeostatic', rather than the behaviours. This returns to the Systems Theory notion that it is the function that is the indivisable aspect of the system.

b) The 'self-control' issue

Difficulties can be encountered when a behaviour called homeostatic is imagined to be controlling it's own destiny by the self-disciplined following of a predetermined path. Stated thus, the difficulty clearly disintegrates into a reduction to absurdity.

The argument has then moved to "if it does not control itself, then what does?" Simon (1952) has commented that the complexity of natural phenomena can be understood as a set of layers or "nests of Chinese blocks" in ever-inclusive circles. This may make sense at a local level, but globally it becomes an expansion to absurdity. Keeney (1983) has helped with a concept of 'negative' feedback being likely to be a part of a 'positive' feedback at another level of the system. The

sign is thus arbitrary in absolute terms: it is the dynamic interaction of the feedback network that guides the eventual behaviour.

The concept of control is itself difficult in these areas. In Western technical society, we consider an element of prediction and planned guidance in a controlling action. This is clearly inappropriate for any unintelligent system, and contradicts experience in intelligent systems: we survive on 'habits' - intellectual, behavioural, social, biologically. As Dell says, (1982) it is the linear causality descriptions of homeostasis that create the difficulty.

ii. Family Morphogenesis. These are "those processes which tend to elaborate or change a system's given form, structure, or state" (Buckley, 1980, p 39). Homeostatic patterns are altered beyond their range of variation, and a new set of homeostatic behaviours settle in. These changes may be periodic, episodic or even once-only.

In the family therapy literature, the idea of the morphogenesis has not been set down with much clarity. It can be seen to figure behind criticisms of the application of the homeostasis concept to families (Speer, 1970; Elkaim, 1981). Allied to the notion of non-change being unsuitable for describing living things has been a feeling that a dynamic concept of homeostasis

is essentially the same as that of morphogenesis. De Shazer (1982b) identifies this as a muddle of logical types: homeostatic pattern stability is different from morphogenic pattern change.

There are two basic dimensions of morphogenic change relating to the speed and scale of the change. Of the former, the two types are:

a) Additive Morphogenic Change

The slow and measured type of growth, in the ordinary sense of the development along an expected and 'normal' path is one form of this process. A relatively smooth increase (or decrease) in the value of the average of the range of variation of a homeostatic behaviour pattern which would be simply identified as a 'trend' in other fields of study.

b) Accelerative Morphogenic Change

The relatively sudden growth spurts of puberty and menarche as well as their 'opposites' (such as menopause) are also morphogenic. That is, an increase in the average value which continues to increase at a 'snowballing' rate (or the opposite).

These two types must be considered as separate categories within the class of morphogenic change: their difference will be significant later.

The scale dimension concerns the difference between the discontinuous transformation of patterns and their gradual and progressive modification, and will be described later (see 7.5.C)

(4) Cybernetic control concepts

Patterns of 'discipline' can be elucidated in processes of change. The study of these processes, which can sometimes (in the physical world, at least) be controlled, is called cybernetics. Created by Weiner (1961), it has concentrated on mechanisms that allow or follow changes in a smooth and precise manner, excluding random and extraneous 'wobbles' as much as possible. In complex processes, as all social systems must be regarded, the variety of disciplined actions must be considered. Two important sets of concepts relate to the stability of dynamic patterns in their responses to perturbation, firstly in the mechanisms found and secondly in terms of the eventual results.

i. The Mechanisms of Movement

There are two basic forms of immediate response to a perturbation, which are characterisitcs of the system.

a. Homeostatic patterns can be identified as examples of the deviation-counteracting mechanism (Maruyama, 1963; Wender, 1969). This type of discipline has clear links with the concept of negative feedback: a form of surge-damping messages as described in systems theory as a correcting force that is informed by the

resulting behaviour.

b. Morphogenic change is based on a mechanism of positive feed-back, a deviation-amplifying process (Wender, 1969). As Maruyama (1963) says, these processes are those:

> "...of mutual causal relationship that amplify an insignificant or accidental kick, build up deviation and diverge from the initial condition." (p 164)

This, in its pure form, will lead to a 'runaway' situation: a continuously accelerating deviation - such as an out-of-control train on a downhill track or a steam engine 'racing' without a governor. In the real world a threshold is reached where something will break, interrupting the process; however, this stage is not described in the deviation-amplification notion.

ii. Perturbation Products

Two concepts here relate to the different types of eventual outcome that may follow the perturbation of a system. These will be shaped by the variety of options open to the system.

a. The 'equi-finality' concept proposes that when a system is perturbed, it will return to the equilibrium point by any of a number of routes. Regardless of the variety of intermediate stages, the final resting state will be the same. Thus a stable pattern must show a single baseline behaviour and one or more return paths,

by means of deviation-counteract mechanisms.

b. The companion notion of 'multi-stationarity' suggests that from a given starting point, a system in morphogenic change may reach a variety of eventual resting point equilibria. All, in their own way, are as attractive and as likely to be the final situation, and small influences may determine the outcome. Thus, a complex and flexible system will show a number of semi-stable resting points, or modes of operation. The structure can re-organise non-destructively - showing bistable or bimodal properties, or higher orders of multi-stationarity. Moves between modes must be initiated by deviation-amplifying mechanisms (whereas in moves within modes deviation must be counteracted).

(5) Relating the Concepts

The major difference between the first/second order and the homeostasis/morphogenesis pairs of concepts is that while the former are 'pure', the latter relate clearly to living systems only. Since living systems obviously alter with the passage of time but (say) an electrical circuit does not change to the same extent, the implications of considering the concepts as equally applicable may carry subtle confusions. There is, then, the option of taking them as either distinct or as equivalent in each case (i.e. first order and homeostatic change, second order and morphogenic change).

If the field of interest is defined as being that of social

interaction, the first order change concept appears quite equivalent to the homeostasis concept. Both concern the relatively small adjustments and perturbations of an established pattern, and can be used interchangeably. Both deviation-counteraction and equi-finality are considered to apply.

The second order change and morphogenesis concepts can be seen to have some similarity, particularly in relation to the first order/homeostasis pair, with the qualification above noted. However, further qualifications must be made:

i. Because of the two types of morphogenic change possible, their relationship to second order change must be taken carefully in exploring the implications. The additive type appears more akin to an 'on-going process' than an event. This does not fit well with the concept of second order change as an identifiable incident as such, but does fit with the idea of patterns changing gradually in responses to slowly altering contextual features: i.e. an ecologically-atuned evolution. The accelerative type is a more recognisable structured event than the additive type. This suggests a relatively good fit with the concept of second order change.

ii. The cybernetic phenomenon of the 'runaway' - an endless accelerating snowballing due to deviation-amplification - does not fit well, either. Natural processes do not

easily get hooked into this type of process. Morphogenic changes in social systems must therefore exhibit a shape that shows a plateau-ing of the runaway, which indicates that more than a simple accelerative growth pattern is required to complete the description.

Thus, the useful contribution here is the common area between the morphogenesis and second order concepts where a definite change-of-change occurs, excluding slow-but-sure and explosive types of change.

For the purposes of this study, the complete morphogenic process was therefore defined as:

a) A first order (homeostatic) behaviour pattern.

b) A second order change in this pattern.

c) A new 'baseline' pattern being established.

This area of complexity can be seen to have led to a preference to use the second order change concept in its purer form: that is, as <u>one part</u> of the morphogenic change. Similarly, the deviation-amplification concept can only apply to the second order phase, as the new first order baseline will be deviation-counteracting.

The overall process of a morphogenic change is termed a 'flightpath' (Simon, 1987a). Thus, the various concepts will hereafter be considered related as shown in Figure 2, which illustrates a simple form of morphogenic change (the more

complex ones to be explored later). In this diagram, '1°' represents a first order change, with deviation-counteraction and equi-finality; '2°' represents second order change, with deviation-amplification and multi-stationarity.

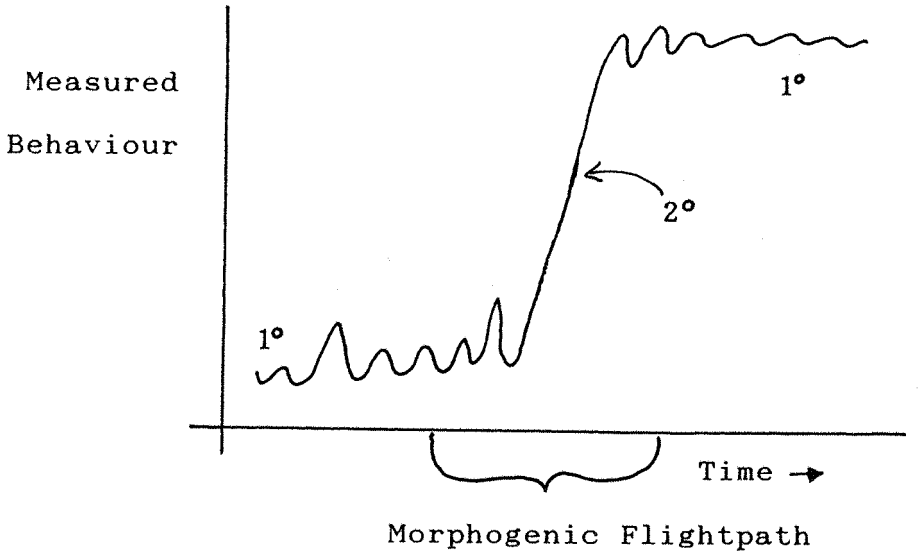


FIGURE 2: THE CHANGE THEORY CONCEPTS

5.6 Conclusion

It can be seen that Family Therapy theory is a complex area with an uneven texture. While some concepts overlap uncertainly, there are also gaps that require filling. One such concerns the time element of the processes of the relationships described by these concepts. Implicit in the 'flightpath' term lies the identification of three phases: launch, flight and landing. Therapy must be concerned to prepare for launch, navigate the route, and ensure a safe landing. In particular, it is the middle section, navigation, that forms the central interest for the following.

6. CATASTROPHE THEORY MODELS

6.1 Introduction

6.2 Catastrophe Theory

A. The Basic Concepts

B. Examples of Models

6.3 The Potential of such Models

A. Social Sciences Models

B. A Brief Family Therapy Model

6.4 Conclusion

6. CATASTROPHE THEORY MODELS

6.1 Introduction

Ever since the Egyptians drew in the sand to plan their pyramids, graphs have been used to illustrate relationships between measurable phenomena. The co-ordinate system was invented, and followed by the recognition of the one to one correspondence between algebra and geometry. Descartes brought this to a precision method (Smith, 1925). Most often, two dimensions have been portrayed on a flat sheet diagram using the 'x' and 'y' axes to scale the values measured. The graph might show changes in some phenomenon on one axis, with the passage of time shown on the other. Alternatively, the changes might be shown as being the subject of the variations of an influence scaled on the other axis.

Not all relationships thus plotted are simply straight or curved lines. Some have breaks, or sharp deviations from the general trend of the curve. For instance, Hooke's Law of Elasticity shows that the harder one pulls on an elastic material the more it stretches, until the breaking point. Some materials will stretch a good way, but will 'sag' or 'give' just before breaking. Others will show a 'plastic' nature, with very little true elasticity. Some will stay partly stretched for a while, before resuming the original shape. Steel, rubber and putty all show very different properties.

The breaking point introduces a discontinuity in the curve, and the delay in 'snapping back' is another feature of the non-linear relationship between the applied force and the length of the material.

Instead of using a flat sheet to draw these graphs on, other shapes can be used as a foundation. The usefulness of this may be seen from the differences in the drawing of geographical maps: the atlas and the globe are different representations of the same geographical features. Some situations can only be represented if the correct foundation is used. Suitable surfaces can be found to portray a number of types of curves with breaks or jumps, and the study of such shapes is known as topology.

6.2 Catastrophe Theory

A branch of topology created by Thom (1975) offers a method of modelling non-linear phenomena that allows a rigorous mathematical approach to be taken with highly complex situations. It's principles can also be used to draw putative non-linear relationships in a purely illustrative medium. It "sometimes provides the deepest level of insight, and lends a simplicity of understanding." (Zeeman, 1977, p 65), and can "reduce the arbitrariness of description" (Thom, 1975). It is this diagrammatic property of Catastrophe Theory that will be capitalised upon here.

A. The Basic Concepts

Catastrophe theory graphs are 'drawn' on a paper that is shaped into more than two dimensions. The simplest uses three dimensions, and rather than being called 'paper', it is called the behaviour surface. There are five basic characteristics of the particular non-linear phenomena charted on these surfaces:

i. Discontinuity - sudden jumps or breaks in the behaviour of interest in response to smoothly changing influences. The proverb of the 'last straw that breaks the camel's back' is an example of a very small addition to the load that finally goes too far.

ii. Hysteresis - the delay introduced by a feature that jumps in one direction and then returns by a different (or slower) path. The recovery from a psychological shock or trauma may show a very different speed to the process by which it is precipitated.

iii. Bimodality - two entirely different types of behaviour might be possible in the same situation. This allows a small difference in one of the influences to switch the behaviour from one to the other. The fight-flight options show the alternative behavioural responses to a frightening situation.

iv. Divergence - a very small change in one dimension at the critical point in the development of a behaviour may significantly alter the eventual results. Going to a party on a whim might lead through courting to a marriage and children, or through drug abuse to death.

v. Inaccessibility - a region of the behavioural axis is not available as a possibility in the area in which a jump can be made: the discontinuity involves a gap across which the jump is made. The two 'versions' that can be seen of a Necker cube illusion are the only possible perceptions: there is no compromise interpretation.

These characteristics can be seen in Figure 3, where the shapes of Figure 1 have been transposed. Certain conventions for the diagrams will be used throughout, as shown in the key here. These will be a line to show the travel over the Behaviour Surface, a dot to show the starting point and an arrow to indicate a 'jump' over the edge' in the direction pointed.

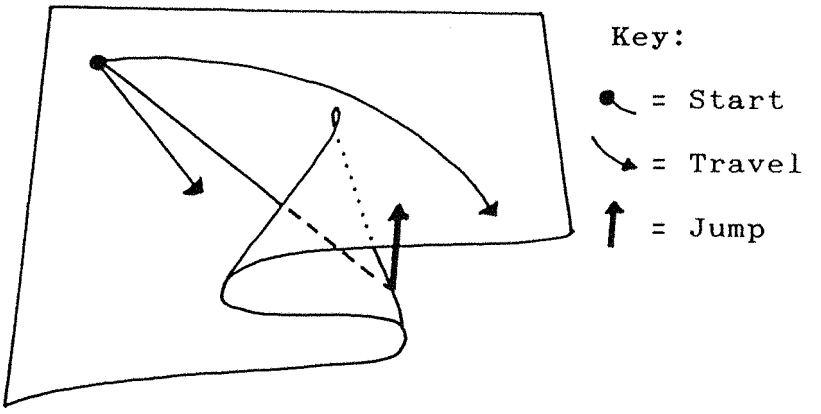


FIGURE 3: A BEHAVIOUR SURFACE

6.3 Examples

Two very different phenomena, one from the physical universe, the other from the psychosocial arena will help describe the illustrative method.

i. A bridge: collapse and rebuilding

Most of these characteristics can be exemplified by considering the behaviour of a bridge. This is a man-made structure with a particular purpose. Architects allow for the stresses of load, wind, ice and snow, subsidence, etc., so that considerable flexibility is built in along with the strength required. However, if all the imaginable stresses were placed upon an ageing bridge, the flexibility might be tested to its limits. At this point a lightening strike could prove the 'last straw': the structure would collapse suddenly. After this it could only be considered the remains of a 'bridge', even though all the materials would still exist. No intermediate state of affairs could exist: the bridge either fulfils its purpose (safely!) or it does not. Rebuilding work could only be slow and painstaking in comparison to the collapse.

Thus the bimodality can be shown (bridge or remains), the discontinuity (collapse), the hysteresis (rebuilding), the inaccessibility (no intermediate option). The catastrophe is shown most dramatically by the fact that the lightening strike adds a comparatively negligible stress on its own, but following on the other loads will 'tip the balance'.

Figure 4 shows a brand new bridge prior to opening at A, an ageing and heavily loaded state at B, the collapsed remains at C, and the empty site after the rubble has been cleared away at D. The process of collapse is shown by the arrow.

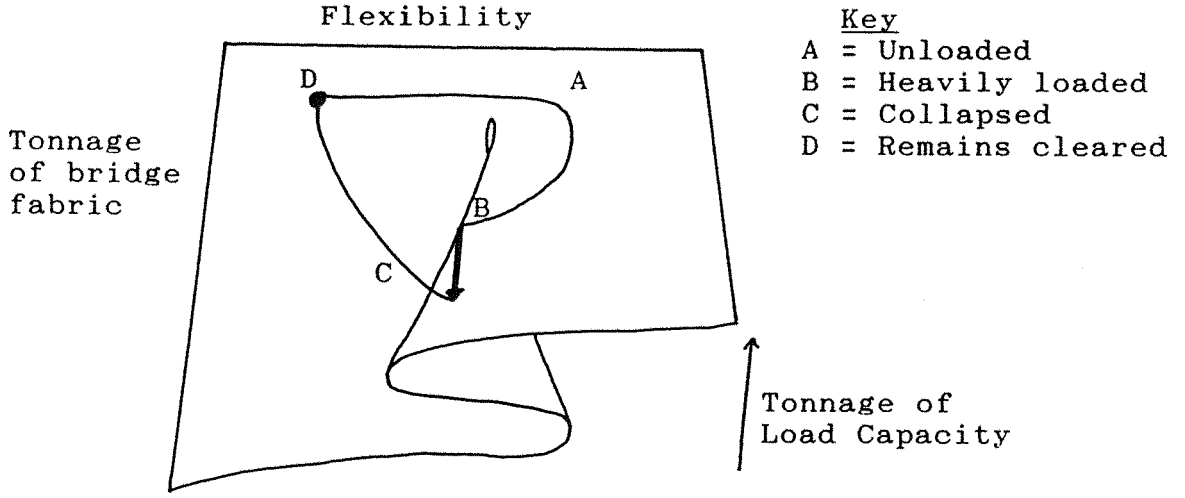


FIGURE 4: A BRIDGE- Collapse and Rebuilding

ii. The Social Work 'opening'

The divergence characteristic arises from a slightly different usage of the graph. This shows a small but far-reaching the change in a behaviour through the passage of time in the context of the various influences. If an evolving behaviour meets a critical point, known as the 'cusp', it might move in one direction or the other, and in doing so would tend to rule out easy transitions from one to the other in the future. That is, having entered a bimodal area the discontinuity separating the modes would force a jump across the inaccessible region, showing hysteresis in any return.

A useful example of this is the Social Work phenomenon known as 'the opening'. In conversation with a client, the worker

will continually be in search of an opportunity to make a point that s/he considers important in the work undertaken. Rarely do workers bluntly state their point in fait accompli manner: they will wish to introduce or elicit a suitable topic that will lead to 'the opening'. At times, when tasks undertaken by workers are unpopular with the client, the latter may seem to be avoiding the issue that must be addressed, and the worker must strive to use the material presented to 'seize the opening' against the flow of conversation.

An 'opening' is therefore modelled around a cusp, which represents the point of bifurcation: the parting of the ways. Here, if the conversation can be steered by suitable influence, will present the opportunity to change the behaviour (physical, attitudinal or conversational) substantially and reasonably permanently. This constitutes 'progress' in Social Work terms. Future work might then be to capitalise upon this, or to try to create new cusps. Figure 5 shows the divergence possible.

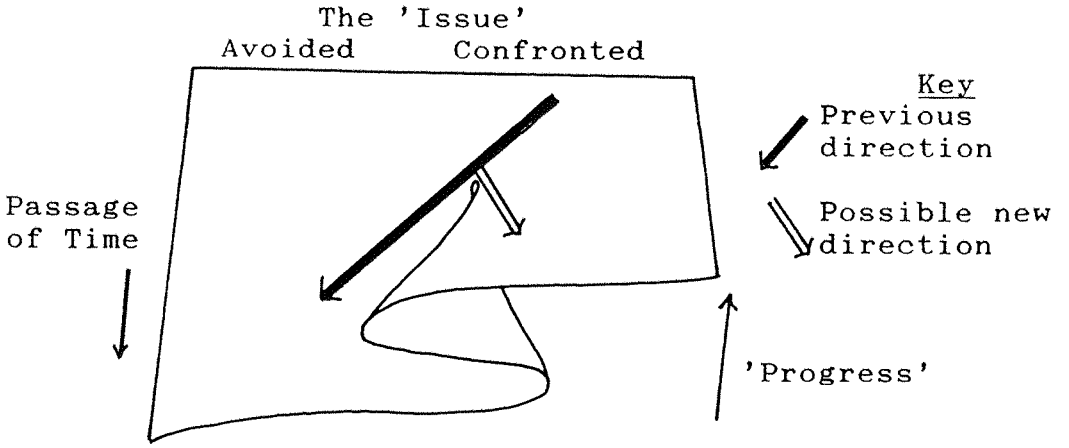


FIGURE 5: THE SOCIAL WORK 'OPENING'

6.4 The Potential of Catastrophe Theory Models

Other, more complex versions of these graphical substrates - the surface shape - can be used: Thom outlines seven 'elementary' catastrophes. From the bimodal fold type (the 'simple' cusp) illustrated above, they move up to trimodal (the 'butterfly') and thence to higher orders of multi-modality. The more sophisticated ones cease to be helpful here because their complexity encourages precision but prohibits easy visualisation and so any intuitive grasp of the implications. Since the conceptual models are not concerned with quantities and calculation, but more with properties or qualities, being able to understand the results is important in itself.

The point of these graphic models is to provide a basis for understanding the opportunities available in a situation rather than simply the observed behaviours. Since opportunities may be no more than ideas (as the passage in the Introduction describes), these models might be thought to be confusing fact and fiction without this forewarning. It is a positive strength that in a polarised situation the question 'What might a compromise be?' can be asked and any number of possibilities examined for their effects.

While the word 'catastrophe' has been used, it is important to note that the commonly assumed negative value is not intended. The graphs are neutral to the phenomena plotted out on them, and these might be 'good' (e.g. a cure) or

'bad' (e.g. a break-down). Stewart and Peregoy note the derivation from the Greek roots kata (down) and strophe (turning): "The parts of the graphs of interest in catastrophe theory are literally those that turn down." (1983). The word is used to mean a sudden change, regardless of the human implications; and the range of possibilities is very wide:

> "Almost any natural process exhibits some kind of local regularity ... which allows one to distinguish recurrent identifiable elements (). Otherwise, the process would be entirely chaotic and there would be nothing to talk about." (Thom, 1975)

A. Social Sciences Models

The opportunities to model natural processes brings us to the question of model building for the social sciences. Wilson (1981) has remarked that the application of the Catastrophe Theory modelling potential that has made most substantial progress has been in physics, especially optics, and engineering: "There is least progress in the social sciences" (p 225). This parallels Zeeman's comment on Catastrophe Theory that:

> "... in very complex systems such as occur in biology and the social sciences, it can sometimes provide a model where none was thought previously possible." (1977, p 65)

Wilson proposes that:

> "... since we are now alert to the possibilities of

jump, hysteresis, and divergence, as well as other kinds of bifurcation, then when examples of such behaviour turn up in observations, we may be encouraged to attempt to classify the transitions as a preliminary to more formal model building." (1981, p 64)

From this can be gathered the confidence to attempt to model Social Work phenomena more complex than the 'opening' using Catastrophe Theory techniques.

B. The Catastrophe Theory Modelling of Brief Family Therapy

The first steps in examining the aspirations of Brief Therapy from a Catastrophe Theory viewpoint were to identify the objective of rapid change brought about in families as a catastrophic jump in their psychosocial health and functioning:

- The aim of moving a family from a position of stable-but-unhealthy to one of stable-and-healthy as a rapid and one way transition shows as a discontinuity.
- The difference between 'breakdown' and curative processes suggested an example of hysteresis.
- The proposed alternatives of problem-bound or problem-free functioning, offered the clue of bimodality.
- And the possibility of rapid changes being achieved by a single re-patterning of behaviour means that there is (in this process at least) no intermediate stage of substance, indicating a region of inaccessibility.

Thus, four of the basic concepts were found to apply.

While other types of personal and relationship change may not fit these criteria, and require linear (or different non-linear) models, what became clear was that the process of change proposed by Brief Therapy approach did fit the characteristics of a Catastrophe Theory model. There was confidence that the Brief Therapy hopes for such rapidity of change (which contrasts so seriously with much Social Work experience) could be supported by a cogent argument explaining the abstract characteristics of that rapidity.

6.5 Conclusion

At this point, there was an identification that Catastrophe Theory could help Brief Family Therapy theory as a supportive framework bringing new concepts to bear at the meso-analytical level, i.e. at the joining of the macro-level theorising and the micro-level practice. This prompted the question as to whether a specific model could be developed using the two bodies of theory in partnership, in order to inform the Social Work method. The attempt at this will be described.

7. A CATASTROPHE THEORY MODEL OF BRIEF FAMILY THERAPY

7.1 Introduction

A. Research Statement: Conceptual Modelling

B. Devlopments

7.2 The Morale Conceptual Basis

A. Definitions of Morale

B. Previous Applications

C. Indications

7.3 HOPE: The Foundation of a Model

7.4 The Axes of the Model

A. Normal Factor

B. Splitting Factor

C. Bias Factor

D. Smoothing Factor

E. Butterfly Factor

F. Behaviour Factor

7.5 The Areas of the Behaviour Surface

A. Being

B. Despair

C. Pride

D. Eternal Hope

7.6 Patterns of Change

A. Homeostatic

B. Morphogenic

7.7 Implications of the Model

A. Problem Generation

B. Problem Resolution

7. A CATASTROPHE THEORY MODEL FOR BRIEF FAMILY THERAPY

7.1 Introduction.

This study has focused on the feasibility of developing a conceptual model based on the Catastrophe Theory set out above. An overview of the results gained from this prompt follow.

A. Research Statement: Conceptual Modelling

The objectives of this phase of the research project were set out in the form:

> "To Explore the Construction of a Catastrophe Theory Model of Family Functioning which will Organise Notions of the Abstract Nature of Personal Change, and Inform Arguments supporting Brief Family Therapy as a Useful Approach for Social Work."

i. To explore the construction...

   i.e. To commence an investigation into the feasibility of building a model;

ii. ... of a Catastrophe Theory model ...

   i.e. based on the rigorous principles laid out above;

iii. ... for family functioning ...

   i.e. including the range of behaviours from normal through to problematic;

iv. ... which will organise notions of the abstract

nature of personal change ...

i.e. place the current diversity into a coherent framework;

v. ... and inform arguements supporting Brief Family Therapy as a useful approach for Social Work.

i.e. offer scientific validation for expectations of rapid personal changes.

B. Developments

A model was constructed on Catastrophe Theory principles in order to portray some processes important to Brief Family Therapy. These processes were intended to relate to a number of influences found to feature in the theoretical literature. The model was refined so that the implications for theory and practice could be examined. A brief description can be found elsewhere (Simon, 1987).

Specifically, a 'simple fold' catastrophe model was employed as the basis of the model, which was treated as expanding to the 'butterfly' catastrophe when psycho-social pathologies set in. The model was therefore of a two phase construction: problem-free and problem-bound respectively. The behaviour surface was defined as generally representing the phenomenological behaviour of group morale, which was thought to be particularly relevant to families likely to receive social work intervention.

7.2 Morale: a Conceptual Basis

Morale, as an indicator of family functioning, was chosen as the conceptual foundation for the model. It was thought to have a fundamental link to the aims of therapy, which can be described:

> "All pyschotherapies show features such as providing hope and restoring morale..." (Waring, 1988, p 148)

Although this concept of morale may itself have a poor relationship with measurable indicators, it was anticipated that it would fit with many of the concepts of family functioning as described in the family therapy literature reviewed above, particularly those of the MRI and Milan groups. The difficulty in seeking reliable correlates between conceptual features and established behavioural indicators had the effect of reducing the later empirical study from a test of the model itself to a methodological pilot. This was perhaps regrettable considering the attractiveness of the mathematical medium. Nevertheless, as Poston and Stewert (1978) have said:

> "... the role of catastrophe theory [lies in] not providing the Complete Answer to anything, but [in] giving new information as to WHAT ARE THE IMPORTANT CASES for which more detail must be sought ..."
> (Quoted in Postle, 1980, p 196)

Thus, a model was developed around the general concept of family morale. This was the basis for a rigorous framework to describe the otherwise intangible changes that

may occur in the psycho-social phenomenon known as the family. The significant gains were expected to derive from the descriptions of the changes in morale, rather than the notion of morale itself. As Allport has said:

> "Morale, like health and sanity, has to do with a background condition in living. It is found in the fringe rather than the focus of consciousness, and in describing the fringes of consciousness our scientific language is poor and inept." (Allport, 1942, p 3)

This comment offered hope that the use of Catastrophe Theory to help in describing the "fringes of consciousness" would be a useful contribution. Therefore, the aim was not to attempt to address the changes in the focus of the family's consciousness, but to enhance the understanding of the complexities of morale as an indicator of, and influence upon, the family functioning.

A. Definitions of Morale

In seeking definitions of the term morale, several dictionaries were consulted with the following points emerging:

i. The most usual type of definition attributed to the term a mental, emotional or 'psychological' state involving a variety of linked adjectives:

courage, confidence, hope, pride,
self-control, discipline.

ii. The term usually referred to individuals, though groups were mentioned occasionally: e.g. "said of a body of persons..." (Oxford English Dictionary, Compact Ed.,

1971). In only one case was the relationship between the group-as-a-whole and the individual member mentioned.

iii. The purposefulness of the individual or group was rarely noted. However, the above quote continues: "... engaged in some enterprise..."

iv. Websters Dictionary (1976), gives three meanings, one of which relates to the origins of the term 'moral', the other two being relevant:

ai. "Confident, resolute, willing, often self-sacrificing and courageous attitude of an individual to the function or tasks demanded or expected of him by a group of which he is a part, that is based on such factors as pride in the achievements and aims of the group, faith in the leadership and ultimate success, a sense of fruitful personal participation in its work, and a devotion or loyalty to the other members of the group."

aii. "A sense of common purpose or a degree of dedication to a common task regarded as characteristic of or dominant in a particular group or organisation: Esprit de Corps."

b. "A State of individual psychological well-being and buoyancy based upon such as physical or mental health, a sense of purposefulness, and confidence in the future."

v. It was noted that the above quoted definition, in common with the others, held implicit an assumption of a <u>high</u>

state of morale. Low morale was not mentioned as such.

Definition a.i. was most suitable as a starting point for the family morale concept required for the present purposes.

B. Previous Applications

Previous uses of the term were expected to prove helpful. However, in the literature relating to psychological and sociological enquiries, morale is not often found mentioned. Various areas emerged from a search, which will be separated into those of conceptual and empirical relevance.

(1) Conceptual Applications

Watzlawick et al. (1974) commence their book with the story of a long lasting siege which had shown the effects of attrition equally upon those laying siege and the besieged. On reaching the critical point, the defenders threw down to the attacking force an ox carcass filled with barley. It was their last meat and cereal. The effect of this was that "upon receiving this scornful message from above, the discouraged [commander] abandoned the siege and moved on." (p xi). Had they stayed, they would have been victorious within days. In military matters, the troops' morale is a factor taken into consideration by the leaders. Roetter (1974) notes two main objectives for psychological warfare: to boost home morale or to demoralise the enemy. Probably, it is both, with the ratio of home to enemy morale being the crucial factor and either target may be chosen at any

given time.

In the area of groupwork with social work clients, some writers use the concept of morale in a generalised descriptive use: for instance, Klein (1961). Hartford (1971) relates the morale of a group to the developmental phases: low to begin with, rising rapidly as the group's hopes emerge, dropping away again as the testing and conflict phase arrives, re-emerging as the group undertakes work, and dipping as the group is confronted by it's own termination. This notion has a relevance to that of the family undergoing a developmental sequence, though over a longer term (see Carter and McGoldrick, 1980): the fluctuation of morale would seem to be quite a natural expectation. A closer parallel is that of the family in therapy, where a similar pattern might be anticipated, though with modifications for the fact of being a non-stranger group.

In sociological descriptions of particular families, the term can be found to be applied in a blunt sense, for example as Stephens (1945) described 'Problem Families' in Manchester and Liverpool:

> "The distinctive feature of the life of a family who have become a social problem is their passive acceptance of their condition. Indeed, with every case ... the collapse of morale and complete abandonment of any effort to recover is the key problem." (p 65)

Low morale is seen in these examples as both an indicator of, and a powerful influence (albeit for the worse) upon family functioning. This complex relationship, where morale is both 'cause' and 'effect' is most suitable to the present conceptual foundation, linking with the idea of 'circular causality' mentioned earlier (see 5.5.B). Lewin (1942), from his interest in the interaction of morale and the capacity to look in a forward direction, states this quite overtly:

> "A positive time perspective, () guided by worthwhile goals, is one of the basic elements of high morale. At the same time, the process is reciprocal; high morale creates long-range time perspective and sets up worthwhile goals." (p 64, emphasis added)

(2) Empirical Applications

In the field of industrial relations psychology, the morale concept has had a very close link to the notion of the willingness and ability to perform a task to a high quality and work-rate. That is, there is a proposed relationship between morale and output or productivity: e.g. Mayo (1933). Walker and Guest (1952) note however, that in order to develop measures, morale cannot be treated as a single undifferentiated concept. They cite types of morale in respect to the intrinsic job, company involvement, financial job status, and pride-in-group-performance (p 56). Rates of staff turnover and absenteeism are also commonly used as measures.

However, when it comes to linking morale back to the 'output' of the group, Kahn and Katz reviewed the research with despondency:

> "in the area of group relationships, as in others, we find the twin criteria of productivity and morale have many determinants in common ... [but] no consistent relationship between [them] has appeared in any of these research studies." (1960, p 567)

Perrow (1972) stated that "the history of research in this area is one of progressive disenchantment...":

> "As a result of nearly 30 years of intensive research, we have a large body of information on what does not clearly and simply affect productivity (or the intervening variable, morale) and a growing list of qualifiers and conditions that have to be taken into account." (p 106)

A useful comment was found in Belbin's (1981) descriptions of extensive investigations of teamwork in industry: morale and productivity do not show a straight-forward correlation. That is, although low morale showed itself as a result of failures, it was not simply the cause. Cases of teams with high morale eventually failing, and of teams 'going down smiling' were found. He describes the relationship between results and morale as "tenuous" (p 81). Barnard similarly offers the notion of morale for executives as being related to "the degree to which individual motives are gratified" (1954, p 17).

The gain from considering this area of study is in the notion of a family as a work-unit whose 'product' is what would be termed a general sense of security for the members. As Terkleson (1980) proposes, the purpose of a family is to provide a context that supports need attainment for all its individual members. Clearly, when Family Therapy is found to be necessary, this product is not sufficiently available.

In health-related psychology, especially in the field of rehabilitation work (e.g. Prosser et al., 1981; Schaefer et al., 1981), morale is taken to mean something between 'general well-being' and 'self-esteem', which are seen as too woolly and too precise, respectively. The term 'morale' is usually used in quotation marks (Prosser, 1985). Good morale is evidently important to the speed of recovery time after surgery (Sacks, 1984): an indication of a psycho-somatic link of some power.

In the study of gerontology and geriatrics, the terms 'quality of life' and 'subjective well-being' have currency. The latter has been defined as referring to "self-perceived, general, affective experience of individuals in terms of a positive-negative continuum" and has been conceptualised and operationalised inadequately according to George and Bearon (1980). George (1981) has reviewed the conceptual and methodological problems this area attracts. She concludes that foundations have now been laid but critical issues on both fronts must be addressed before substantive progress can

be made. Stock et al., (1983) believe that the dimensionality of the concept is the problem and that the construction of a model is required.

C. Indications

From these notes it will be seen that despite the empirical difficulties, 'morale' has been considered a useful area to study. The conceptual uses the term has been put to can be seen to relate to situations of change and the issues of achievement in these situations.

These investigations suggested that the concept of morale was appropriate for the area of interest and was known to be difficult to model on the basis of a simple formula. The expectation arising from Systems Theory and Communication Theory of the circular phenomenology of morale as both an indicator of and an influence on functioning was expected to show a complex relationship for modelling. These points were taken as confirming the relevance of the concept to Brief Family Therapy and promoting a challenge to construct a non-linear, Catastrophe Theory based model of morale.

7.3 HOPE: The Foundation of the Model

As a foundation for this model, a theme or 'dynamic' is required to describe how the model is at all relevant to human experience. The appeal of an intuitive fit is insufficient: there must be a reason why it fits, why it works as proposed, and why it is useful. Here, this reason is

'Hope'. Put simply, without Hope there could be no sensible concept of morale.

Hope is defined as the expectation that something desired will happen or be achieved. It may concern a specific issue or a general attitude to life. It indicates a motivation. Kelly (1955) has said that a person's processes are channelised by the ways in which he anticipates events, and this is the Fundamental Postulate for his theory. This anticipating is an expression of Man's quintessential Hope: it is the stuff from which he is made. Hope is the forward-looking, prediction-generating capacity that must be an essential component of intelligence. In this use, Hope is not intended to include the <u>object</u> of a specific desire, nor is any religious connection implied: it is in man's nature. As Kelly says:

> "We conceive a person's processes as operating through a network of pathways rather than as fluttering about in a vast emptiness. The network is flexible and is frequently modified, but it is structured and it both facilitates and restricts a persons range of action. () A person's processes, psychologically speaking, slip into the grooves which are cut out by the mechanisms he adopts for realising his objectives." (1955, p 62)

This all-embracing Hope continues tirelessly, taking us forward through life. Kelly expressed this notion in saying that a person may be seen as essentially a process. This

releases us from any need to "postulate some 'force' (motive, instinct, drive) in man impelling him to movement" (Bannister and Fransella, 1971, p 19) as though he were basically an inert entity.

> "For our purposes, the person is not an object which is temporarily in a moving state but is himself a form of motion." (Kelly, 1963, p 48).

Here we find an admirably concise description of the homeostatic characteristic. This notion will be carried over to the notion of a 'family as process'. This seems not only to be parallel, but rather more easily attributed to a family, where the individuals are quite clearly separate and carrying on their own lives within the family's life. Thus, it links up with Systems Theory assumptions about the relationships being most important, rather than giving primacy to the members of the system.

Notwithstanding this, a Catastrophe Theory model can be asked to propose some form of 'drive' that may be seen as energising the model and thereby motivating the movements. For the present purposes, Hope is eligible to be considered as this 'drive', and serves a bridging description between the phenomenological base of human experience and the mathematical base of an abstract model. In the Catastrophe Theory terminology, this 'drive' (Hope) is known as the 'fast dynamic'. In Social Work, there is a dearth of literature on Hope, which is curious in view of the objectives of the profession which has to be:

"...based on an over-arching belief (hope) in the possibility of individual and collective improvement" (Halliday, 1985, p 1)

That Hope is a universal trait is inherent in the fable of Pandora's box, expressed by Rickards in his preface to a book of remedies:

"Man's hope - to break beyond his cage, to extend himself, to improve himself, to cure himself, to save himself. From a hickup to an epidemick, from buggs to the bite of a mad dog, from frigidity to infidelity, from bad smells to freckles - whatever ailed you, [there] was hope" (1968, p 12)

And, to paraphrase an appropriate quotation (attributed to Gay, 1685-1732):

"While there is life, there is Hope."

7.4 The Axes on the Model

A six dimensional model was constructed with the aim of exploring the contribution that this type of Catastrophe Theory model could make to the theories of Family Therapy. The assignment of the axes to represent features felt to be important to family functioning will be described. In the language of Catastrophe Theory, each axis has a type name, as well as the name assigned from the subject dimension it is chosen to represent. As before, a two-dimensional portrayal of three dimensional 'diagrams' will be used to provide illustrations.

A. The 'normal' factor

An axis that represents an influence on the behaviour which, if increased on it's own, has a simply linear effect. That is, no discontinuities are introduced by this factor, which is consequently termed the 'normal' axis. In this construct this factor is named the Attempted Control of Behaviour (hereafter the first two words will be used). It portrays the level of influence brought to bear by family members to solve a difficulty or problem. It directly relates to the notion of attempted solutions as fundamental to the MRI school of Family Therapy, where any difficulty will be addressed by those concerned, usually successfully. However,:

> "... under certain circumstances problems arise purely as the result of wrong attempts at changing an existing difficulty ..." (Watzlawick et al., 1974, p 36)

This axis shows increasing values further away from the origin.

B. The 'splitting' factor

An axis that shows an influence upon the behaviour that introduces a discontinuity as it's value increases is known as a 'splitting' factor. In this construct, this factor was known as the Perceived Need to Control Behaviour (hereafter only the first two words will be used). This relates to what is usually thought of as the level of stress upon a family, but in this case it specifies those stresses that are recognised as difficulties by one or more individuals,

sufficient to trigger habitual or new attempted solution behaviour:

> "While fortuitous life difficulties, such as illness, accidents, or loss of a job sometimes appear to initiate the development of a problem, we see normal transitional steps in family living as the most common and important 'everyday difficulties' that may lead to problems. () Although most people manage to handle these transitions at least passably well, they all require major changes in personal relationships that may readily be mishandled" (Weakland et al., 1974, p 147-8).

As the value of this factor increases, the possibilities of constructive or problematic consequences diverge and the 'stakes' grow higher. This axis also shows an increasing value further away from the origin.

C. The 'bias' factor

A contribution from the influence that can sway the fold from side to side is called the 'bias' factor. This feature represents the degree of flexibility the family has to generate new behavioural patterns to respond to new difficulties, or to growing problems. It was called Creativity.

> "All systems will organise somewhere on a continuum ranging, at one end, from those that are flexible and able to change their 'rules' where pressures from internal (e.g. family developmental stages) or external (e.g. social or economic changes) sources demand structural changes, to those, at the other end of the

continuum, where any pressure for structural changes causes high levels of anxiety and [responses] to negate the change." (Cade and Seligman, 1982, p 170)

Decreasing Creativity pushes the fold to the right at the 'front' of the construct, thus shrinking the area at the higher level and expanding the lower level; increasing Creativity has the opposite effect.

D. The 'smoothing' factor

An influence on the behaviour surface that effectively alters the distance between the cusp and the 'back' of the construct is called the 'smoothing' factor. It sets the threshold value of the bifurcation point on the axis of the 'splitting' factor. In this construct this factor was known as Resources, reflecting the sense in which the family operates as a support system for family members (Caplan, 1976). Money, property, education, health, food, interesting employment, rewarding relationships with extended family and friends, 'contacts', etc. are all listed by Colon (1980) as important. Will and Wrate (1985) also include personal "latent resources" in their scheme. High Resources will increase the value of the threshold, pushing the cusp toward the 'front' of the construct. Reducing the number or effectiveness of Resources introduces the splitting point earlier in relation to an increase in the level of Perceived Need.

E. The 'butterfly' factor

A dimension that introduces a substantial change in the shape

of the behaviour surface is named after the new type of catastrophe that is represented. In the case of this model, it is called the 'butterfly' factor as it moves the shape from a simple cusp to a butterfly catastrophe. This axis was named Reification, and relates to the definition of a persistent problem by social construction. This is founded on the concept introduced by Watzlawick et al. (1974) that, by definition, a transient difficulty will not preoccupy a family for long, and the persistent problem is of a different order and must therefore be generated by a significant process. This process is the family's social construction of reality (Holzner, 1968), whereby:

> "... real is what a sufficiently large number of people have agreed to call real - except that this fact is usually forgotten; the agreed-upon definition is reified (that is, made into a thing in its own right) and is eventually experienced as that objective reality 'out there' ..." (Watzlawick et al., 1974, p 96)

A problem is defined by a process in which a behaviour is picked out of a stream of interactions, in some way depersonalised, and named as a 'problem'. From being a part of a sequence of actions, it is given noun status: 'The problem'. This is known variously as reframing, reconnoting, or repunctuating, but is not the therapeutic form (as discussed earlier, see 5.4.B above) where a noun is in effect renamed or replaced: in this case the noun is created.

As Wood put it:

> "In the minds of all concerned, the behaviour can literally take on a life of its own" (1988, p 51)

A problem is defined by a process whereby one behaviour is picked out of a sequence, depersonalised and labelled as 'a problem'.

At a zero value for this factor, the topography is that of a simple cusp; with increasing values, the butterfly sheet emerges and grows in size.

F. The 'behaviour' axis

This axis is simply the dimension of the model that records the results of the interactions of the influences combining to make up the model. By definition of the behaviour surface, the behaviour axis is continuous in some parts of the construct, and discontinuous in other parts.

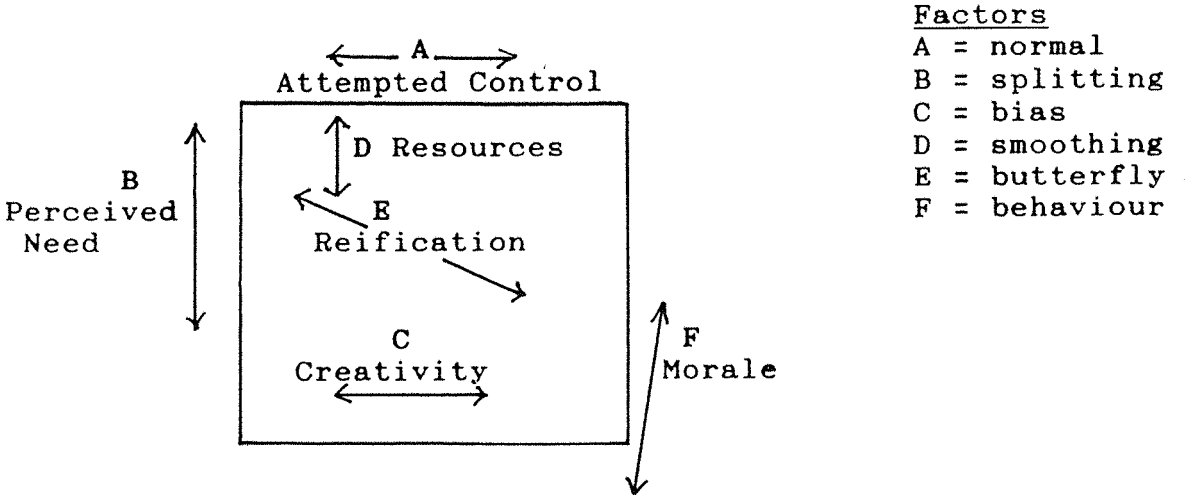


FIGURE 6: BLOCK DIAGRAM OF THE MODEL'S AXES

In Figure 6 it can be seen that axes A and B offer the major framework of the construct, with C, D and E showing the more intricate aspects within this frame, and F showing the resultant behaviour.

7.5 The Areas on the Behaviour Surface

The various places of interest on the behaviour surface were defined to enable the plotting of different transitions that a family could make as it 'moves' over the surface. These 'areas' were designed and named after the experiences a family might be expected to register as they function in the various situations dictated by the control factors described by the axes of the model.

The morale model of family functioning was designed as a two phase construction. The first phase was the 'simple cusp' catastrophe, the second phase was the 'butterfly' type of catastrophe. They differed only in respect of the existence of the butterfly sheet.

The first phase construct carried three areas of importance on the behaviour surface. One area was at the 'back' of the surface, shaped roughly as a band stretching across the back portion of the surface between the back line and the bifurcation point of the cusp. It was termed Being. Toward the 'front' and to the right was an area of approximately trapezoid shape called Pride, which was associated with the higher values of morale. Toward the 'front', to the left and

trapezoid area called Despair. These were both bounded by the outside edges of the construct at side and 'front', by the Being area toward the back, and were separated from each other by the discontinuity of the overlapping catastrophe fold, see Figure 7.

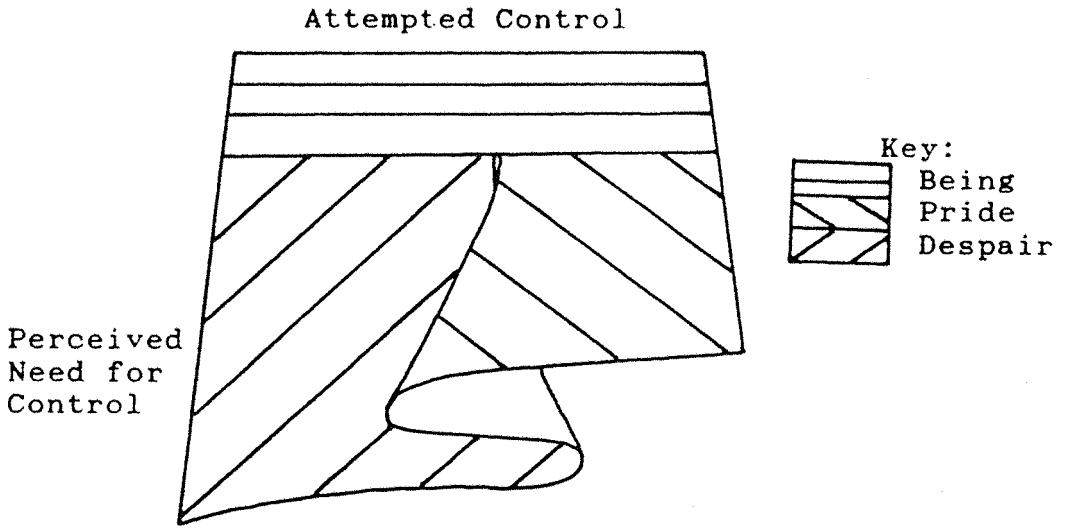


FIGURE 7: THE FIRST PHASE CONSTRUCT

The second phase of the model included a triangular area in the middle of the surface, bounded by the Being area and two discontinuity folds, one adjoining each of the Pride and Despair areas. Thus, two sets of catastrophic transition could be modelled, and inter-related definitively.

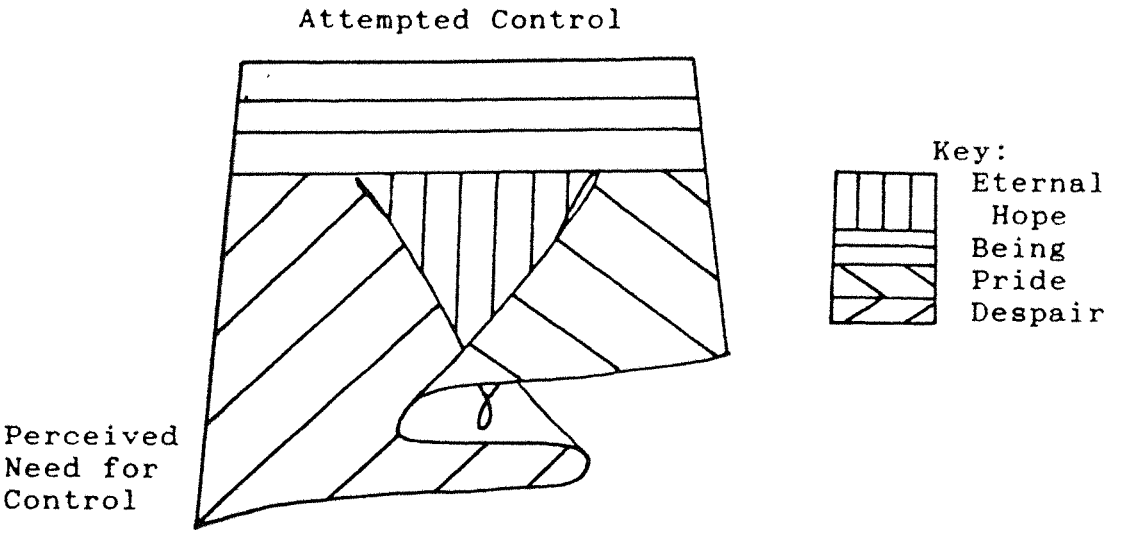


FIGURE 8: THE SECOND PHASE CONSTRUCT

These four areas of Being, Despair, Pride and Eternal Hope will be described. These are intended as descriptions of family experience, although the words are usually recognised as pertinent to individuals. Both direct and comparative approaches will be employed as this new field of family morale is not well charted. The terms will be given a leading capital to denote the areas of the construct.

A. Being

This area of the surface generally includes low levels of the control factors. It's width is dependent on the smoothing factor value, which alters the position of the cusp with respect to the 'back' of the construct. The Being area offers the possibility of representing an unstressed and relatively quiescent character in the family. It is included by way of a baseline upon which to build rather than as one of primary

interest. However, it does bring forward important implications in relation to some of the routes that may be plotted around the surface, which will be addressed later.

A low level of arousal is known to reduce the efficiency of performance at a given task, as shown by the 'inverted-U' relationship (Welford, 1973). However, when there is little or no perceptible task, this no longer holds true. The "Vedic science of Being" (Postle, 1980) as shown by Transcendental Meditation, and the mental state of 'restful alertness' with 'purposeless inaction' of the Zen "wu-wei" (Watts, 1962) offer a positive view of Being, albeit from an individualistic viewpoint.

Bakan (1966) proposed a dualism in the human experiences of Agency (i.e. action) and Being (i.e. communion). He did not polarise them as opposites, but rather placed them as complementary. However, there is a sense of one tending to predominate, even though combinations were thought to be productive. The Being area of this construct would be seen as predominantly the one mode of experience.

These more positive notions of Being show that since no action is pursued with any substantial determination, the usual concept of morale as a purely <u>reactive</u> phenomenon does not apply to this area of experience.

B. Despair

This area of the construct stretches from the left-hand border across to the catastrophe fold, and from the Being area at the 'back' to the arbitrary edge at the 'front'. The size and shape of the area is dependent on the 'bias' factor, which can swing the fold from side to side. This area ranges around the lower values of the morale axis.

Much of the literature of Social Work and allied professions describes individuals and families in various states of despair. It is often taken implicitly for granted as being in the nature of the job to work with such families. For instance, we can find Jordan saying:

> "Social Workers have to deal with people who are often themselves in the depths of despair, or even past despair, into numb resignation..." (1979, p 62)

Dictionary definitions of despair invariably refer to a loss of hope as the major feature, and describe the case of being driven to extremities from which no recovery is to be expected. Given that a concept of Hope is being used as a foundation to the model, despair cannot be taken as a complete absence of this Hope. It can, however, be taken to mean the loss of hope with regard to one or (more likely) several specific objectives. This does not imply a mechanistic approach to disappointment and frustrated hopes, but starting from this base allows a notion that a substantial loss of Hope may occur, but a portion of Hope will still

remain. It is the contrast with this that makes the other disappointment(s) so acute. This was clearly expressed by John Cleese in the recent film Clockwise:

> "It's not the despair I mind.
> The despair I can stand.
> It's the hope! [that I can't cope with]"

In the following, the distinction between the experience of despair for the individual and that of a whole family must be borne in mind. For the family group to be in a state of Despair implies that it will seem to be in such disarray that their identity as a social unit is doubtful. They will exhibit a disorganisation that will maintain this ineffectiveness as much as indicate their Despair. Their attempts to alter the situation will be uncoordinated to the point of perhaps appearing random. They will individually express feelings of helplessness, self-doubt and despair; as a group they may present as apathetic, dependent and even unmotivated to change things.

A family will have reached Despair following a serious disillusionment about their coping capacity. Substantially reduced circumstances, eroded material and financial resources, lack of rewarding feedback after attempts to better the situation, etc. would all be expected as possible factors.

In Despair, there may come a time when the group cannot be

regarded as a family for many practical purposes. For instance:

> "... the multi-problem poor family develops a pervasive sense of impotence, rage and despair. The only struggle is for survival ... the inevitable outcome is personal and familial disintegration." (Colon, 1980, p 344).

They may enter a stage of dissolution and break up into sub-groups: the nature of the original living unit therefore alters substantially. There may be a point where Social Work intervention at least supports, and may even precipitate the dissolving process.

C. Pride

This area of the surface is associated with the region of high morale on the vertical axis. It stretches from a notional boundary with the Being area through to the 'front' edge; from the right-hand edge to the catastrophe fold dividing this area from the other areas. Like the Despair area, it is dependent on the 'bias' factor.

Little seems to have been written about the morale of healthy and well-functioning families - or even individuals - in contrast to the problem-bound state. As Riskin (1982) puts it: "there are several major areas of deficiency in knowledge about 'healthy' families." (p 69). The notion of Pride used in this model is that of a feeling of well-being in relation to a job satisfactorily progressing, a task well finished. That is, it refers to the rightful feeling of pleasure, the

deserved sense of pride. In the film A Day in the Life of Ivan Denisovitch, the lead character is working on a labour camp as a bricklayer. After the whistle goes to signal mealtime, his companions rush off to eat, but Ivan pauses to admire his handiwork. This is a poignant expression of the importance of retaining pride in adversity: it is as though he says "Enforced labour it may be, but that wall is a product of my skill and so confirms my identity".

It must be stressed that the idea of 'hubris' is not intended to be associated with this notion of Pride. Palazzoli et al (1978) use it as a central concept in their model of schizophrenic transition in families, and since they are extremely important leaders in the field of Family Therapy it is important to differentiate these usages. Their description, which follows Bateson's (1973) introduction of the idea, is of a "pretension to succeed ... even at the price of death: that exasperated pride [which] can admit no defeat" and is found in symmetrical, highly disqualifying relationships. It is primarily a description of an individual experience, albeit in relation to another. It can be seen that this is quite different from the quiet satisfaction envisaged for the present model.

Given the paucity of previous material concerning the positive notion of Pride, three other sources will be drawn upon to aid the description. Two use of the term 'grace' in a way felt to be very close to aspects of the Pride

notion, and - interestingly - contrast it with the notion of Despair very much as intended in the model.

First: Kiekegaard (1944) wrote voluminously about despair, and occasionally mentions a notion of grace as a contrast. Whether he felt this to be an achievable state of experience may be doubtful, but there remains a constructional similarity with the present model. That is, Despair and Pride (grace) are poles of a unidimensional model. This shows a similarity with the 'morale' axis of the model.

Second: Sacks, in writing about his recovery from a broken leg and the subsequent emotional trauma, asked what it was that changed when his previously useless leg 'returned':

> "What was it, then, that suddenly came back? ... What came, what announced itself, so palpably, so gloriously, was a full-bodied vital feeling and action, originating from an aboriginal, commanding willing, 'I'? This new, hyper-physical principle was Grace ... [which] co-ordinated, subordinated, all phenomena to itself. It made the next move obvious, certain, natural. Grace was the prerequisite and essence of all <u>doing</u>."
>
> (1984, p 112; emphasis added)

Note the emphasis on 'doing': this speaks to the notion of the attempted solution requiring action, and to Bakan's (1966) second mode of Agency in respect of Being (see 7.5.A).

Third: Frankl (1973) contrasts his notion of despair with one of 'meaning': that is despair is an absence of useful meaning in life. This idea springs from his experiences in a Nazi concentration camp, where his identity was centrally guided by his vocation as a doctor, giving him meaning in an otherwise meaningless existence. Pride implies a degree of confirmation of self-worth and identity: as individual and family.

These authors are concerned with a phenomenon clearly related (in their minds) to the individual. All are in the realms of metaphysics: theological, psychological and existential, respectively. Even so, they write of experiences that lead them to identify what can be thought of as central motivating forces, or as primary substrates upon which the effects of other motivations are played out. It is this last metaphoric interpretation that most closely fits the visual presentation of the current model: the area of Pride on the behaviour surface.

Although it will be used mainly in relationship to the other areas of the model, it must be noted that the Pride area is very much a progressive one in its own right. Families who can be mapped as in this area are considered to be growing through the life cycle stages (McGoldrick and Carter, 1980). This sequence of changes in relationships and roles brings stresses as noted above (7.4.B) when the Perceived Need for Change was discussed.

Farmer describes it:

> "Throughout the cycle there is a gradual and continuous change of roles and hence statuses also, and each succeeding role-status change demands a series of adjustments from members of the group." (1970, p 133)

Indeed, it is this progression - through the challenges of the growth cycle - that generates the response of proudness. Terkleson would seem to be addressing this when he suggests that First Order changes (5.5.C.2.i) "involve increments of mastery and adaptation" which consequently bring "pride and satisfaction" (1980, p 39). This not considered so in the other areas of the model, where first order changes do not involve mastery.

This issue must be clearly understood: the Pride area is being defined as itself having a morphogenic character. This is possible because, as Thom (1983) identifies, there are two basic types of morphogenic change:

i. Pattern creation (or destruction)
   for example, a change from ovum and sperm to foetus - a complete new form.

ii. Pattern elaboration (or impoverishment)
   for example, a maturation from baby to adult physique - 'growth' in the usual sense.

The Catastrophe Theory model shows the first sort of change through transitions <u>between</u> the levels of the behaviour surface. The second type is shown <u>within</u> the Pride area. No growth of this sort occurs in other areas, hence the saying

about children thus caught: 'Growing taller but not growing up'.

D. Eternal Hope

This area only exists in the second phase of the model. It is the name given to the butterfly sheet that emerges as a triangular shape, its 'base' backing onto the Being area and the other two sides adjoining the Pride and Despair areas via catastrophe folds. Thus it is dependent for its overall size on the 'butterfly' factor, and is influenced by the 'bias' and 'smoothing' factors.

This area of the construct was intended to represent the state of morale found when a family has a persistent problem (as distinct from a transient difficulty). In situations where a family's functioning brings them to develop what they, or others, decide is a problem of any substance, then they are likely to feel some helplessness, and yet some hopefulness. The helplessness is a measure of their perhaps intuitive knowledge that their attempted solutions are not working well - even though this may not stop them using these behaviour patterns. The hopefulness comes from the well of Hope that people bring to bear on any predictable situation: they expect to be able to react to that situation productively.

This notion of helpless and hopeful feelings combining in the morale of these families shows an irony from which the name

sprang: to wait, hoping, forever, without relief, is a pitiful state. The feeling of being 'stuck' must be very powerful. It would erode any creative risk-taking that might introduce sufficient difference to alter the problem behaviour pattern. This would generate a self-fulfilling prophecy that demonstrates the more-of-the-same 'game without end' characteristic Watzlawick et al. (1974) describe.

In this way the morale of the family both indicates and consolidates their problem-bound state. The circular feedback mechanism can be seen clearest in this area, but forms an influence in the other areas too.

There appears to be little in the literature that describes this state of morale overtly. The major distinctions between Pride and Eternal Hope on the one side, and Eternal Hope and Despair on the other, have not been found elsewhere, even under different names. Palazzoli's concept of 'hubris' (1978), previously distinguished from the definition of the Pride area, shows the desperate tenacity with which the hopefulness can 'react against' the feeling of helplessness, generating (in these cases) the schizophrenic interaction. This experience would be placed in the Eternal Hope area, despite the association through the name with another area. In other writings, the experience is called 'despair', thus combining the areas of Despair and Eternal Hope, without the distinction thought to be helpful here. Kiekegaard's struggle (1944) with the concepts of despair

(life without spiritual meaning) and despair (life without despair) may be an example. Jordan's (1979) distinction between despair and 'numb resignation' (see 7.5.B) may be another. References to other authors must therefore be undertaken with care.

7.6 Patterns of Change

The Catastrophe Theory model is very powerful in its capacity to describe psychosocial changes. The five dimensions of control factors allow a multitude of routes to be plotted on the behaviour surface, demonstrating the changes in a family's morale. The total number is so large (in excess of 20) that after they have been identified, only a small number will be discussed in any detail. There are two major categories of pattern - the homeostatic and morphogenic; and in the latter, four distinct sub-categories.

A. Homeostatic patterns.

Homeostatic patterns of behaviour are those that remain within a given area on the behaviour surface. They may vary by very small amounts or by very large amounts, but cannot be maintained beyond that area. The behaviours included in an identified homeostatic pattern are seen as responsive adjustments to the ebb and flow of events, but the pattern itself will tend to exhibit stability. (This restates the content and form distinction: see 5.5.A and 5.5.C.3.i.a)

i. The Pride area: homeostatic variations will be

healthy changes in relatively high morale. A family attaining some landmark it perceives as important may celebrate noisily, or settle into quiet relaxation. Individual members may experience wide differences in their personal morale, but the group morale will show stability. The closer to the discontinuity fold they get, however, the nearer to a catastrophic jump they will be.

ii. The Eternal Hope area: homeostatic changes will all be variations on the problem(s) the family experiences. These sorts of change have been identified by Watzlawick et al., (1974) as being involved in 'problem-maintenance': that is, minimal shifts in behaviour that do not alter the pattern enough to extinguish the problem. They also call this pattern type the 'game-without-end', and, as Palazzoli et al. describe:

> "...it is necessary that the homeostasis of the group be preserved in order to insure the perpetuation of the game ... The [resulting] repertoire of moves is infinite ..." (1981, p 28-29)

Usually, these changes are 'variations on a theme', but larger-scale changes have been called 'symptom substitution' when one problem replaces another. In both cases the functional nature of 'having a problem' persists.

iii. The Despair area: although perhaps not immediately obvious, there may be various states of despair

discernible in a family's morale. These might range from shock, to chaos through an encysted resignation towards the dissolution of the family as a psychosocial entity. (This disintegration is not, however, thought to be within the confines of this homeostatic area. This perhaps indicates a new threshold to the left of the Despair area where a single parent family emerges, or children are permanently removed into Care. It is no longer a single 'group' in the sense of an identity as a family.)

iv. The Being area: a degree of variation in the 'quiescent' family could be expected. On its own, this was not expected to be of much importance to problem etiology or therapy.

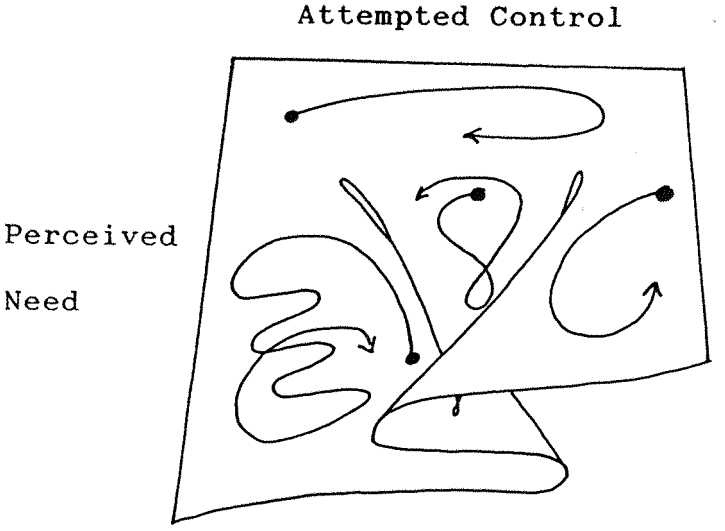


FIGURE 9: HOMEOSTATIC CHANGE, Example Patterns

The homeostasis concept is used in all of the behaviour surface areas. This separates this concept from the assumption that it is inherently unhealthy: a notion that sprang from the idea that therapists must 'fight' homeostatic 'resistance' to change. Thus, as the logic had it, homeostasis equals problematic behaviour pattern. Dell (1982) has challenged the too-close linkage that can be seen in statements like: "The schizophrenic game and homeostasis are, in fact, synonymous ..." (Palazzoli et al., 1981, p 28). This type of statement can only hold true in the Eternal Hope area of this model. Here, the concept of homeostasis relates to the maintenance of any behaviour pattern, be it healthy or unhealthy.

B. Morphogenic Patterns

There are a large number of examples of morphogenic change that can be modelled on the construct: here-in lies the most potentially useful descriptive power. By categorising the possibilities, our understanding of the options may be increased, giving more choice for therapeutic approaches. Since all these possibilities have, in effect, been generated inductively (rather than by observations), it may be that they are not all recognised easily from practice. However, they might be worth watching for as they may have important ramifications. Those that do fit with experience and/or theory can be usefully examined for their implications.

All the morphogenic changes described here concern movements

between the defined areas of the construct. This contrasts with the homeostatic changes that are within the areas, and the one case of morphogenic change within the Pride area (see 7.4.C.ii). The transitions of interest are between the three major areas of Pride, Eternal Hope and Despair. Four categories will be delineated, and examples noted briefly. The first two categories give three transitions in each direction (i.e. up or down the behaviour axis), making six in each. The later two address different mechanisms.

All these morphogenic changes are either problem-generating or problem-resolving. Hence, these routes show the possibilities of the macro-process of 'breakdown' or productive therapy.

B.1 Continuous Changes

Where progress (or regress) can be plotted as showing a relatively smooth and unbroken character, the route taken by the family is said to be continuous. Particularly, it does not cross a catastrophe fold directly. These routes are completely reversible: a return along precisely the same path is theoretically possible, though unlikely in practice.

i. Pride - Despair: a move from the high morale position towards the 'back' of the construct, bending left behind the cusp and returning toward the 'front'. This route would suggest a gradual erosion of morale, presumably by means of a too-late recognition of a stress or need for

control. Thus, the Perceived Need value reduces, then the Attempted Control, followed by an increase in Perceived Need, but insufficient Attempted Control. See Figure 10 (a).

The reverse route must involve a good deal of reassurance to help a family reduce its Perception of the Need, allowing a perhaps step-at-a-time approach to setting achievable tasks. In time, this route would bring the family out 'on top', the work being a rebuilding of the family. So great may be the difficulties in this type of work - because of the 'distance' to travel, and the presenting chaos that would make contracting the first major task of the therapy (which might fail) - it may be very rare.

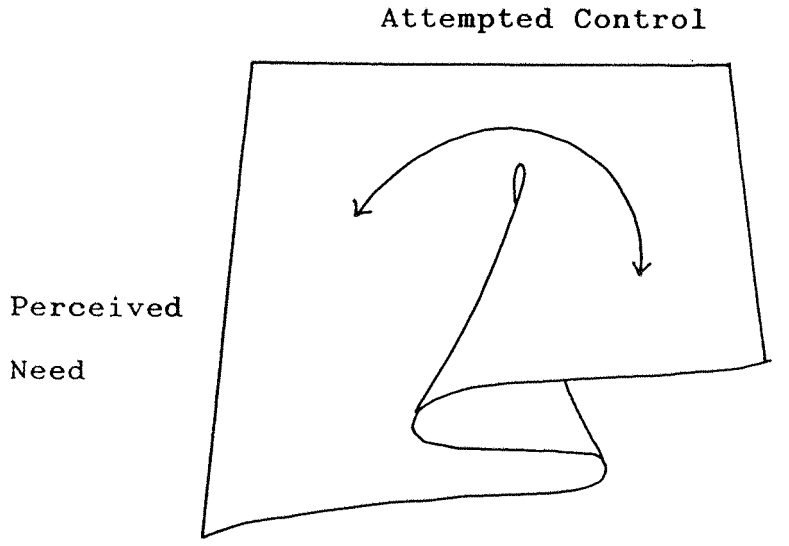


FIGURE 10 (a): CONTINUOUS ROUTES

ii. Pride - Eternal Hope: this route travels backwards along a similar path to i. above, but terminates earlier in the Eternal Hope area. The implication of this is that either this area pre-exists, or that it is generated by some surge of influence on the Reification axis. This will be described in detail later; briefly, a family suffering an erosion of morale may 'elect' to create a problem, as it were. (This would be the mechanism of the classical case of <u>scapegoating</u>, for instance; where a small difficulty might be unconsciously seized upon with disproportionate vigour as tensions are diverted away from the bigger threat. Other theories might also describe mechanisms showing this type of route.) See Figure 10 (b).

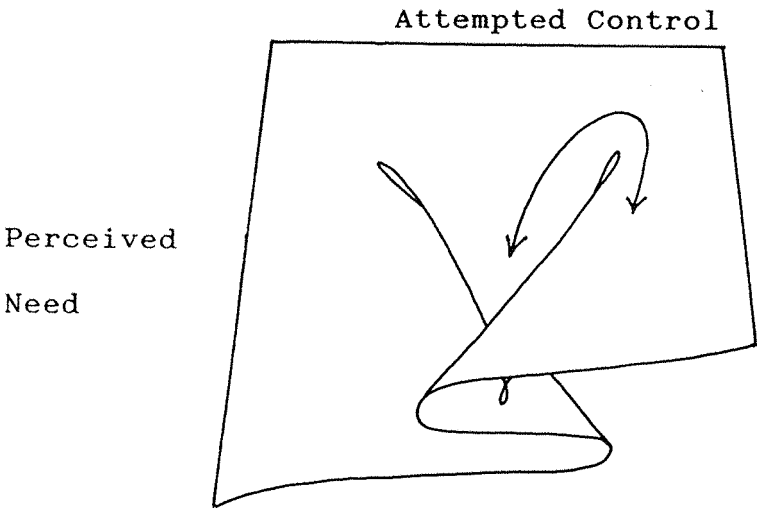


FIGURE 10 (b): CONTINUOUS ROUTES

The reverse path would seem to be the aim of many therapies. It would depend upon a setting of achievable tasks towards a healthy functioning. It is most clearly identifiable with the structural Family Therapy approach (Minuchin, 1974), with the work being a restructuring of the family.

iii. Eternal Hope - Despair: this path represents a reduction in circumstances by a lowered Perception of Need, followed by a decrease in Attempted Control and then a recognition of the Need. It is likely to be rare, perhaps only prompted by a family being seriously betrayed by a malicious or ignorant 'helper', or by the iatrogenic mutually thwarting effect of the helping network's agency conflicts. See Figure 10 (c).

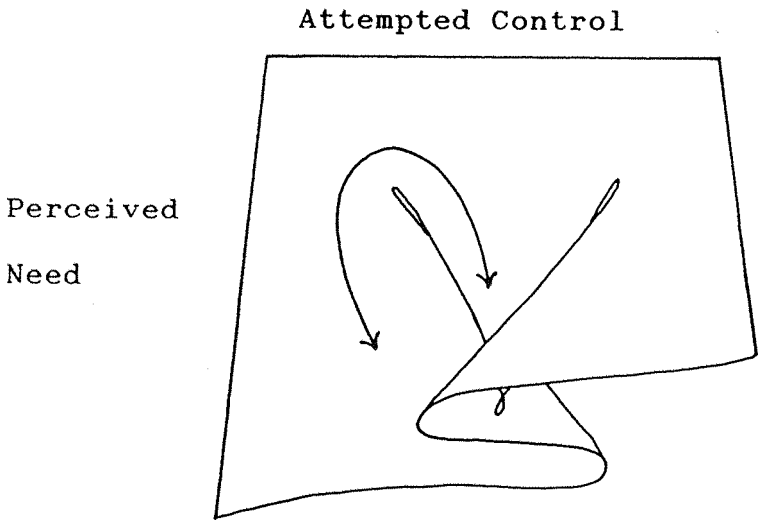


FIGURE 10 (c): CONTINUOUS ROUTES

The reverse path, from Despair to Eternal Hope, might be the preferred route of some therapies, on the basis of using a single problem as a 'staging post' in helping a family move out of chaotic Despair position towards Pride. It would therefore constitute only a part of the planned therapy route.

It is worth noting that these continuous types of change all appear to require alterations in the values of both major axes, perhaps even simultaneously. Further, all these routes pass through the Being area, which has been defined as a relatively quiescent area of experience, and this seems something of an unexpected notion perhaps. This will bear examination later.

B.2 Discontinuous Changes

If a jump over a fold is a part of the journey for a family, then the route is said to be discontinuous. All these routes are reversible only through the mechanism of hysteresis (see 6.2.A.ii). A return path will jump in a parallel trajectory with take-off and landing points distinct from the first ones.

Multiple jump routes are possible, particularly with the second phase construct because of the trimodality available in parts of the behaviour surface: for the moment, however only single jump routes will be considered. Further, only those jumps precipitated by changes in the values of the two

major axes (Perceived Need and Attempted Control) will be described in this category.

i. Pride - Despair: without altering the value on the Perceived Need axis of the First Phase construct, a decrease in the Attempted Control value will allow a family in the Pride area to drift toward the fold, and will eventually precipitate a sudden transition to Despair. The circumstances leading to this might range from misjudgement through to exhaustion. This plunge may have a quality of tragedy about it, possibly showing in suicide(s), involuntary separations, or complete dissolution of the family. It will therefore be termed 'Tragedy', see Figure 11 (a).

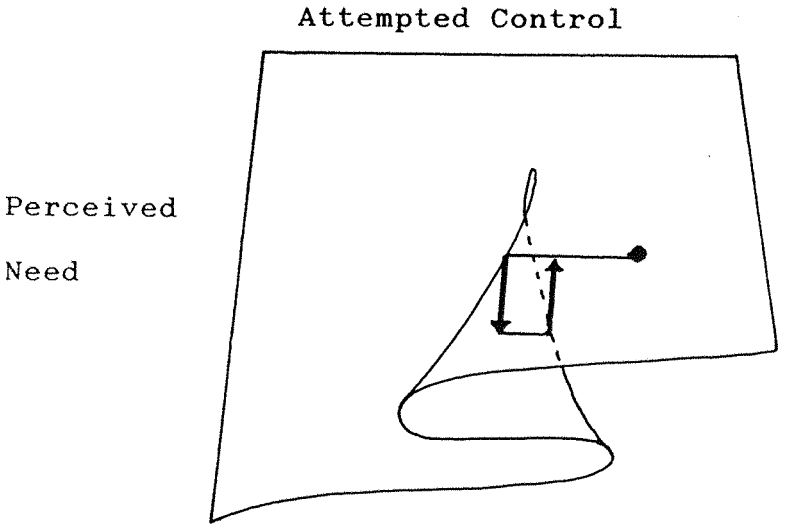


FIGURE 11 (a): DISCONTINUOUS ROUTES

The reverse path might seem an unlikely possibility, but a rapid onset (i.e. a discontinuous aetiology) might

offer hope for a similar return move. If the previous level of function was 'good enough', then a return in this way may be feasible, and could be sufficiently unexpected to called a 'remarkable recovery'.

ii. Pride - Eternal Hope: if the butterfly sheet is already in existence, a decrease in the Attempted Control level will result in a drift towards the jump to Eternal Hope. This would model the phenomenon of relapse: see Figure 11 (b). If the sheet is not already in existence, a more complex mechanism in generating it involves the Reification factor, which will be addressed at a later stage.

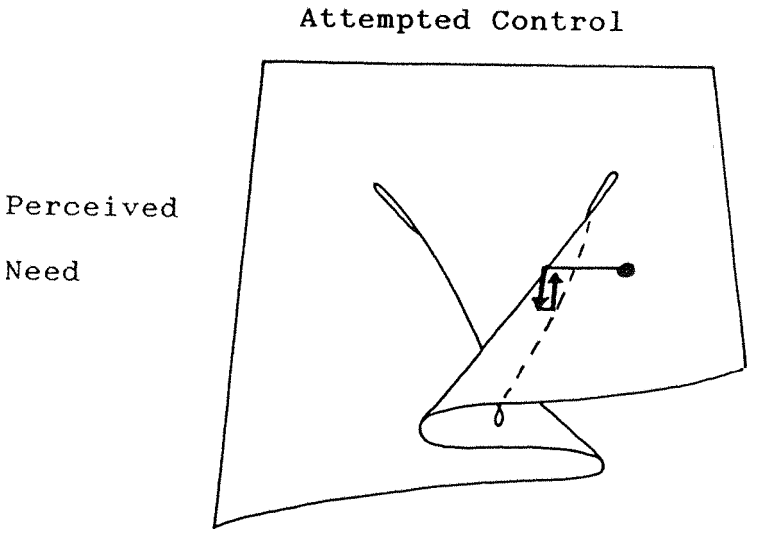


FIGURE 11 (b): DISCONTINUOUS ROUTES

The Brief Family Therapy school will be seen to use the single jump possibility of the reverse path as its ideal

therapeutic macro-process. A single reframing of the problem should, in ideal circumstances - according to the theory - institute a Second Order change, and hence a morphogenic move to the Pride area.

iii. Eternal Hope - Despair: further decreases in the Attempted Control value, at a maintained level of Perceived Need would push a family toward the fold and to a jump to Despair. See Figure 11 (c).

The return move might might serve similar purposes to that of the A. iii reverse move above: a 'staging post'.

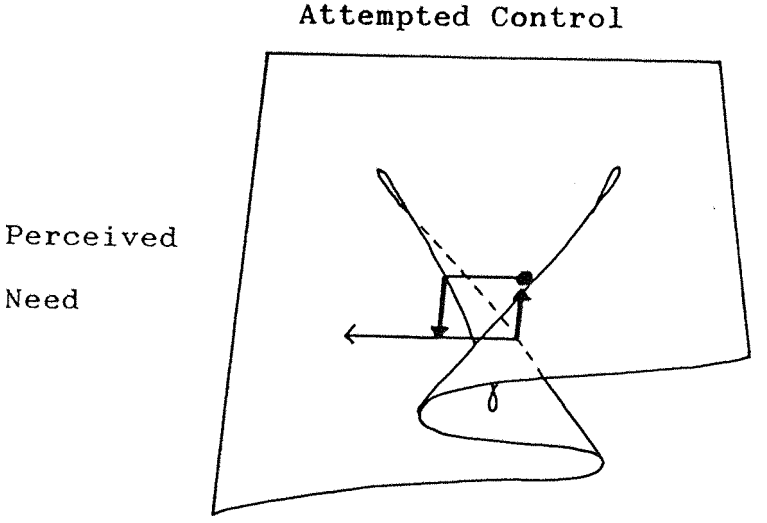


FIGURE 11 (c): DISCONTINUOUS ROUTES

These discontinuous change routes have been described in outline form only. Each family would be expected to show its own unique blend of environmental and behavioural factors.

The effects noted above have been simplified in terms of the changes in only one factor (the other being held still) for ease of description purposes. In plotting out real families, paths moving tangentially to the major axes in response to both influences would be expected to appear, but would (in this category) fall over the fold all the same.

B.3 The Secondary Factors

When a catastrophic jump occurs as the result of one of the influences other than the Attempted Control or Perceived Need factors, different mechanisms are considered to be at work. Metaphorically, it is as though the changes are not the result of the impact of these major factors 'pushing' the plotted point, so much as the consequences of changes in the topology of the behaviour surface itself. Thus, with the values on the two major axes remaining stationary, discontinuous changes may still be effected by these other factors. Each one will be shown alone: the possible combinations will be left until later.

i. 'Smoothing' factor: if changes occur to a family's Resources, this is represented by a movement of the cusp(s) towards or away from the 'back' of the construct. Thus, if a family had drifted toward a catastrophe fold (but had not 'jumped over') as a result of changes in the Need or Control influences, a decrease in Resources (a confidant moving away, a large bill, a baby sitter going to college, etc.), might pull the

SOUTHAMPTON LIBRARY UNIVERSITY

cusp forward to the point of a threshold being reached. The discontinuous jump to Eternal Hope or Despair would then be precipitated. See Figure 12.

Alternatively, a gain of resources might allow a jump 'up' to a higher area of morale. For instance, an inheritance, a play group or a job offer might have seemingly disproportionate effects.

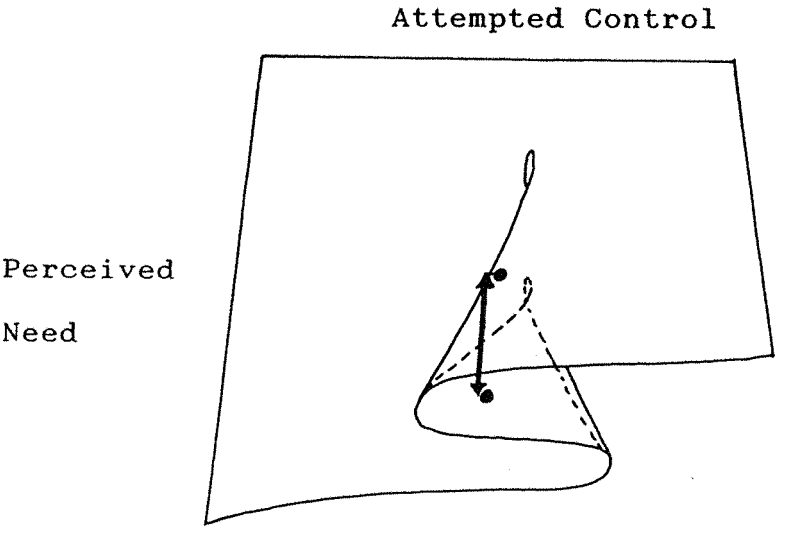


FIGURE 12: SMOOTHING FACTOR

ii. 'Bias' factor: changes in the flexibility or creativity of a family would show by the bias of the fold: to the right (Figure 13) for an increase; to the left for a decrease. A family near the fold in any of the areas might be effected to an unexpected degree by a relatively small change in their freedom of response to new or continuing difficulties. For instance, a debilitating

illness, or a rapid series of pregnancies might all increase one person's 'contacts' (with gains for the whole family, let's say, whether the contact is professional or otherwise), but the overall result is a shrinkage of mental manoeuvrability or imagination.

Thus, in difficulty, they would be prone to a sudden drop into Despair or Eternal Hope.

Exploiting the reverse route might appear very difficult, but it may be the underlying mechanism for some therapeutic processes.

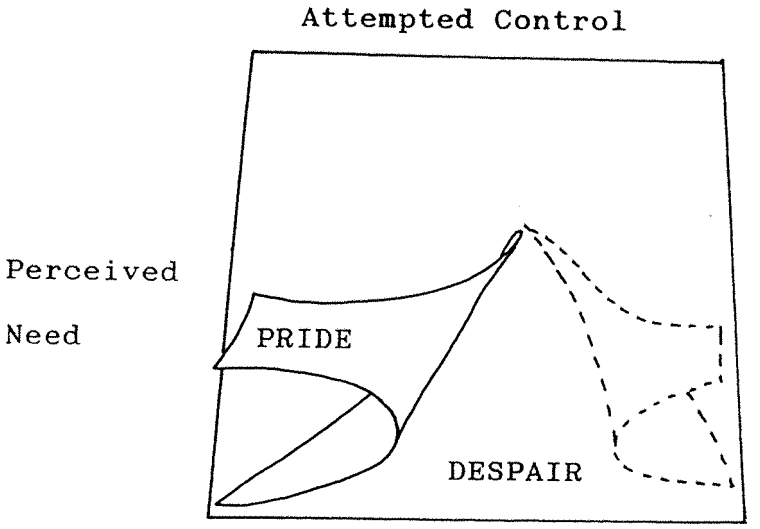


FIGURE 13: BIAS FACTOR

iii. 'Butterfly' factor: if the perceived 'reality' of the problem alters, this will show through the Reification axis. The outcome will be a growth or shrinkage in the size of the butterfly sheet, the Eternal Hope area.

Clearly, if the problem ceases to be 'real', the butterfly sheet will dematerialise (Figure 14, a), and the family will then experience (in effect) a jump to Pride. On the other hand, as a problem is felt to get more 'stuck' or entrenched, the Eternal Hope area will get bigger (Figure 14, b) giving more room for a host of homeostatic variations that will allow the 'symptom substitution' effect.

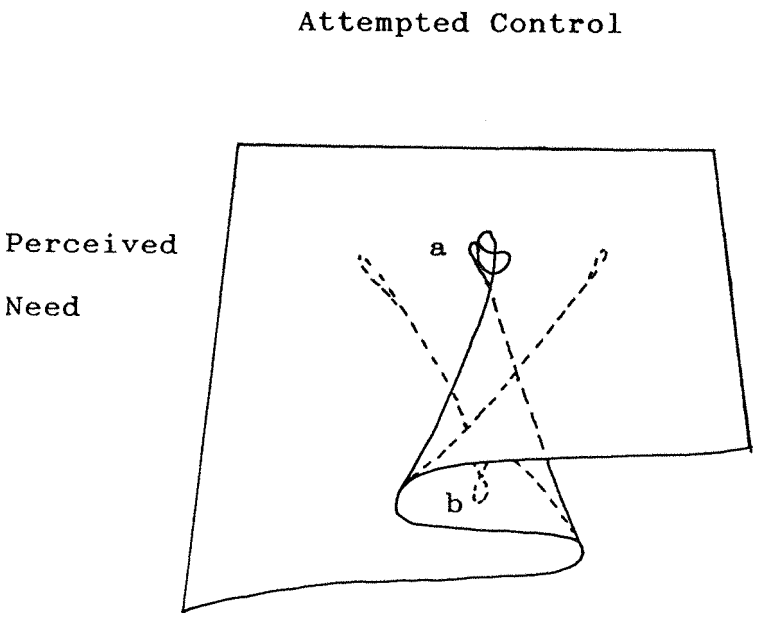


FIGURE 14: BUTTERFLY FACTOR

These secondary factors are intended to be considered in conjunction with each other and with the two major factors. It is the interaction of the complete set of control factors that makes for the power of this model. However, showing all the effects of all the factors together would be too complex a task for two dimensional illustrations. Even in the lower orders of permutations it would be less than useful,

doing little more than adding a confusion of shapes new to the eye.

Nevertheless, it is perhaps worth trying to portray some cases approximating 'worst possible' combinations. Consider, for instance, the situation where low Resources combine with low Creativity and nil Reification. This situation will show a family on the Pride surface at their most vulnerable: they will have an extremely small area of free manoeuvre, and will very easily fall into Despair.

For instance, consider a refugee family from a rigidly structured society having to cope with a complex user-initiated bureaucracy with no identified 'problem'.

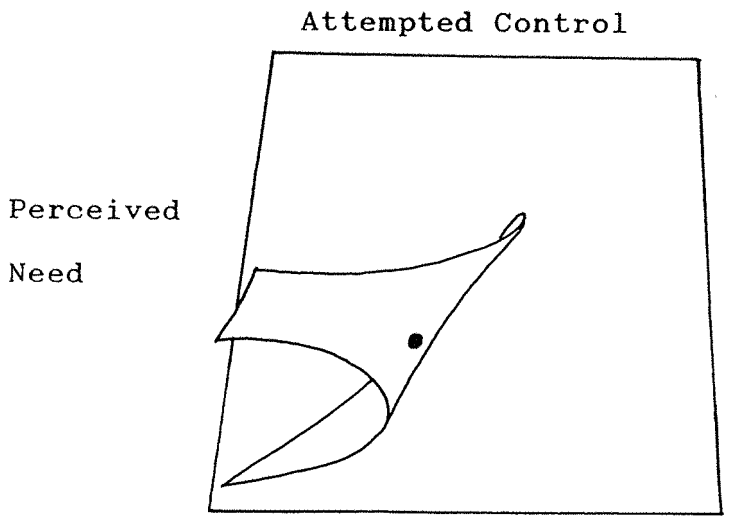


FIGURE 15: A PRECARIOUS FAMILY

They would be under-Resourced, with great demands upon their Creativity because their Attempted Control will not be suitable to the Perceived Need. They might feel an overwhelming sense of doom as there is little they can do to stave off a worsening situation. In this situation, unlabelled refugees may be highly at risk since their anticipated freedom will not appear.

On the other hand, a family showing low Resources, low Creativity and high Reification will indicate an entrenched problem with poor potential for productive self-help: they will require therapy.

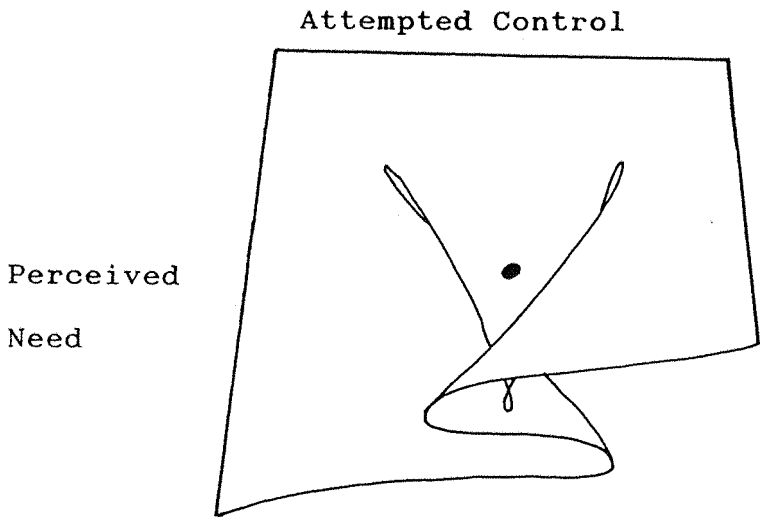


FIGURE 16: A 'STUCK' FAMILY

In contrast to the above two examples, the multi-problem 'under-organised' family (Jenkins, 1983) will be found in the Despair area. They can only function as a recognisable family

with the continuous support of a large network, extended family, community and/or professional. These families are typically under-Resourced and have low Creativity, but they do not have a 'problem' as such: they have a low Reification factor. The problem these families present is that they have too many difficulties, and it may begin to seem that one single problem would be preferable. Therapy may commence with a target of reducing the problem definition to one: a pattern of 'dependency'.

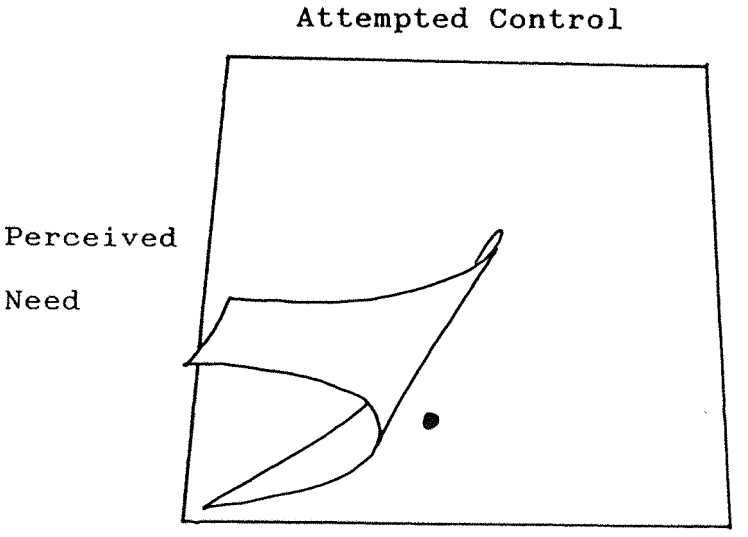


FIGURE 17: AN OVER-DEPENDENT FAMILY

B.4 Random perturbations

To the extent that the construct above portrays generalisations, an attempt to include the consequences of the element of 'chance' that comes into play on occasions must be made. The random influences of the 'rich tapestry' of day-to-day life are taken to alter the detail of the behav-

iour surface. It will cease to appear a smooth terrain, but will show ripples and local features of coarse texture. Transient phenomena, these will represent the results of what is sometimes known as Lady Luck: i.e. good or bad fortune 'on the day'. In the Catastrophe Theory language, this is called 'noise'.

It can have the effect of precipitating a transition slightly early or late, as the fold is minutely perturbed by these 'one-off' events. Figure 18 shows a cross-section of the First Phase construct with a family near the edge of the Pride area. A real 'misfortune' may then plunge them into Despair, because (in effect) the event is 'earth shattering' enough to have a large impact in a precarious situation.

Equally, of course, therapy may prepare a family for change without actually promoting the final movement. It may thus potentiate a highly productive outcome from an event that was only weeks before found unhelpful. The event is the same, but the effect is different: it is altered from trivial to substantial because of the proximity to the fold.

Negative varieties of these effects will be difficult to diagnose specifically as precipitating events and impossible to prevent. Positive versions cannot offer reliable therapeutic interventions, although one might aim to potentiate the family by placing them in a situation where they can make productive use of the opportunities that arise.

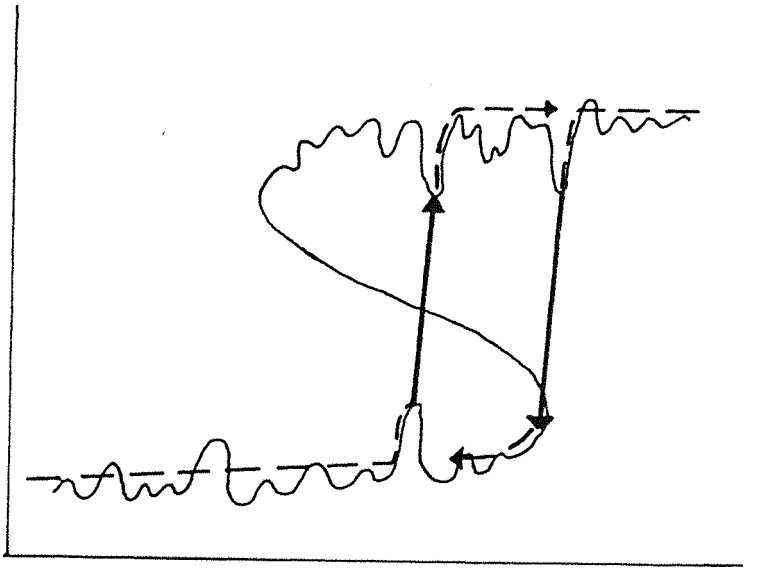


FIGURE 18: THE EFFECTS OF RANDOM NOISE

These effects cannot be usefully modelled in a detailed sense. However, this mechanism can help an appreciation that the 'last straw' may occasionally be truly a matter of luck, and equally, of the completely unexpected remissions that may occur.

7.7 Discussion of the Implications of the Model

All the pathways and routes listed above, be they homeostatic or morphogenic, continuous or discontinuous, are processes of change. This is emphasised when the perhaps surprisingly large number of routes can be identified as arising from the small number of eminently recognisable 'forces' used. The structural characteristics of the model permit a wide variety of proposals for therapy.

From this, the observation can be drawn that as a potential source of confusion between therapists or schools of therapy,

ing that they agree as to which process is being discussed. Skynner (1976) notes the tragi-comical ethical confusions arising between psychologists and psychiatrists when mis-communications occur over descriptions of the homeostatic and morphogenic types of change. Further difficulties can be imagined if a whole class of possible processes is not accepted as valid by one party. For instance, discussions of Brief Therapy may be doomed if the concept of discontinuous change is not common ground, as Rapoport (1970) implies when he says that the derision of what are called 'flights into health' shows "a distrust of the natural recuperative powers of people." (p 302)

Thus, one immediate gain from the simple identification of these processes is that the option to develop a taxonomic typology becomes available. The list laid out above constitutes a start to this: systematic development is required to complete it.

In view of the numbers, particularly when combinations are added in, a few of the processes will be explored in detail. They are amongst the most relevant to Brief Family Therapy which may help an understanding of the nature of the changes considered important for this approach to client's problems.

A. Problem-generation: the reification process

The Reification factor has been defined as responsible for

the changes of the Eternal Hope area. That is, the butterfly factor influences the size of the middle sheet from non-existant through to dominant. Thus it is intrinsically bound up in the process of a 'problem' being created. The alternative, when this does not occur in worsening conditions, is for the family to plunge into Despair in a big way, and quite possibly end up in dissolution. The process of problem generation with regard to this influence on the behaviour surface will now be explored.

This concept of Reification (see 7.4.E) is rooted in the idea of the social construction of reality. For, as Gregory (1974) asked:

> "... neither uncertainty nor ambiguity, neither distortion nor paradox, can be properties of objects: so how can we perceive uncertainties, ambiguities, distortions or paradoxes if perception is but a passive acceptance of reality?" (p xxvii)

Thus, the question of 'where do problems come from?' must be answered in terms of the idea that while a behaviour may be observed, the negative connotation that identifies it as a problem is an active mental creation. For a family group to agree it as a problem, a measure of negotiated agreement is required and the process by which this occurs is of importance.

There are two main mechanisms, demonstrating slow and rapid

aetiology:

i. A continuous pathway as described in 7.6.B.1.ii. This involves a drift 'backwards' in the Pride area towards the lower levels of both influences, to a point below the cusp. The Need influence then increases without the similar increase in Attempted Control, and the Eternal Hope area is created as the route passes below the cusp, as an alternative to Despair. Durrant describes this well:

> "Much of what happens as a problem develops is imperceptible and goes unnoticed. As family members habitually adjust to imperceptible changes, they never really notice change and their own participation in it's development. Member's restrained ways of viewing their problems as being internally caused lead to their being seen as static and the self-perpetuating trend being unnoticed. Bateson points out that 'it is very difficult to detect gradual change (since) organisms become habituated.' (1980, p 108)."
> (1987, p 148; emphasis added)

ii. A discontinuous path described 7.6.B.2.ii. Here, a family begins to move toward the left-hand edge of the Pride area, they may drop over (as it were), into the Despair area.

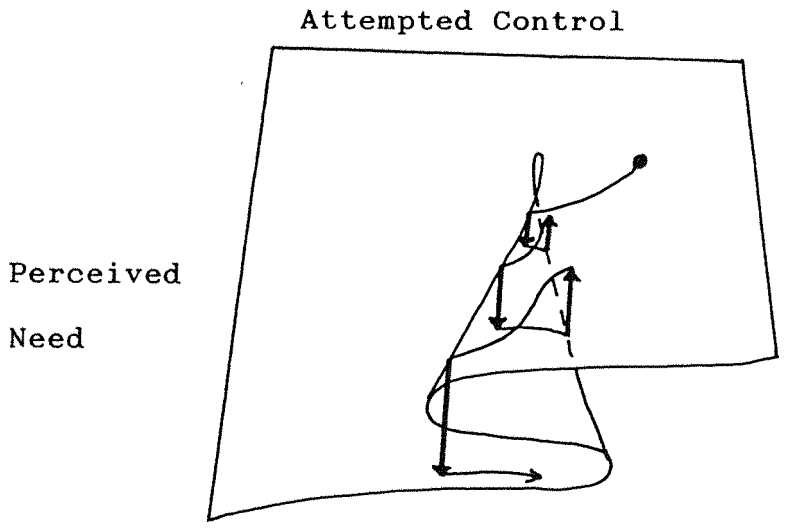


FIGURE 19: THE REIFICATION PROCESS

Once there, they may immediately exert sufficient pressure through the Attempted Control factor to solve the problem. This would result in a jump back 'up' to the Pride area. If this is not consolidated however, the drift back to the edge may recur, and a return to Despair follow. This can develop into a very rapid cycle (see Figure 19) which, because of the large impact on the morale (by definition of the changes) of the family, will be recognised and begin to feel 'real' to them.

The definition of 'ambivalence' fits with this cycle. This describes a sudden swinging of attitude from one pole of a conflict to the other pole (rather than the popular conception of being in a state of dilemma). In Pride, a positive view may be taken; in Despair, a negative view. The 'excluded

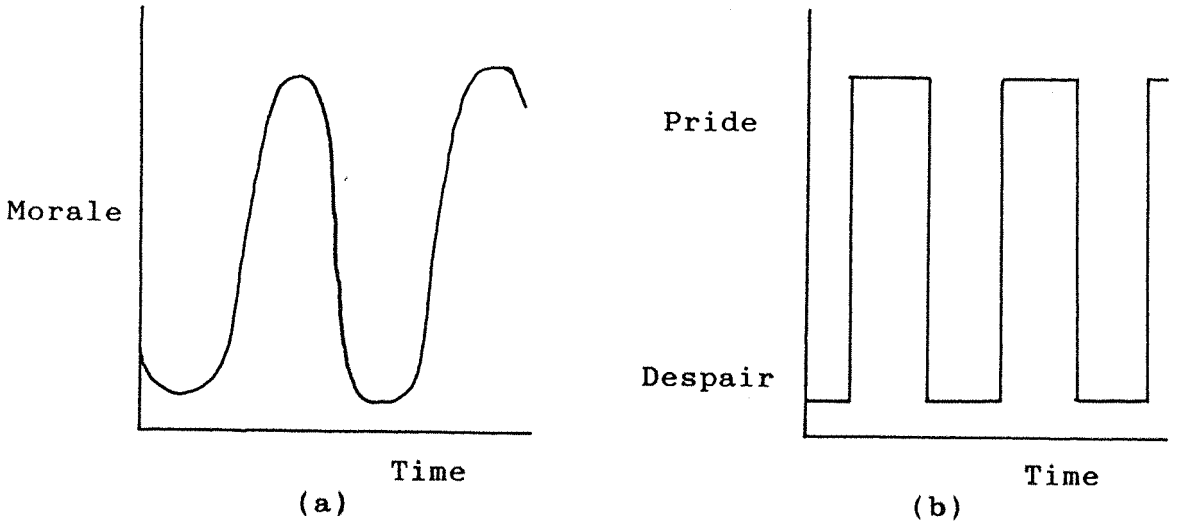


FIGURE 20: AMBIVALENCE

middle' (i.e. the inaccessible zone) allows the transition from one pole to the other in a way that leaves each distinct and uncontaminated with the other. Compromise is not an available option here, nor is a graceful 'sine wave' pendulum swing pattern of Figure 20 (a): it is a switching back and forth - Figure 20 (b).

This cycle is recognisable as a hysteresis effect. While it could theoretically continue, the duration likely to be found will be limited by the amount of 'elasticity' the family has: how much pain and chaos can they tolerate? Their Resources and Creativity may or may not last more than a couple of cycles. Whatever, as the family identifies the problem behaviour as the root or cause of the 'bad feeling' in these transitions (i.e. morale shifts), they will start to separate this behaviour (or pattern of behaviours) as an important new aspect of 'reality'. This distinguishing of figure from ground makes an entity of the problem, fixing it as a linear causality phenomenon, rather than a circular one.

Thus, the problem becomes dissociated from the family, as Papp (1983) describes. This is represented on the morale model as the change from the first phase to the second phase construct. This occurs through an unfolding of the Eternal Hope sheet, the eventual size depending on the value of the Reification factor. Once stable, this area offers a strong attraction to a family plotted on the model. Movements are converted from the large scale switching of Figure 20 (b) to the (ironically) more comfortable homeostatic variations of the Eternal Hope state. Whatever the emotional strain of the hopeful helplessness in the longer term, it is favourable to the plunging contrasts of Despair and Pride.

This formulation of the options available to a family - or, in parallel, an individual - shows a model that proposes in Catastrophe Theory terms that the single attractor (or minimum) is stronger than a continued hysteresis cycle between two other attractors. The concept of multi-stationarity suggests that when a number of discrete options exist (without compromise points), the most suitable will exert the strongest attraction.

In Family Therapy terms, this translates as indicating that a problem-bound stability (i.e. an unhealthy state of 'resistance to change') is likely to 'settle out' of uncontrollable morphogenic transitions. That is, an unbalanced dynamic cannot persist and a partial solution will be achieved. The uncertainty will produce a new structure, i.e.

'order out of chaos': the anti-thermodynamics theory arising from cybernetics (Dell and Goolishian, 1981; Prigonine, 1984). That is, structure is not always degraded, but can be created. This has an important implication, which is that 'resistance' (the supposed bane of the therapist's working life) is not a strategy chosen by the family, but an inherent feature of the state of 'having a problem'. It is a part of the survival effort - stability is better than chaos and dissolution, even if it brings a 'problem' with it.

The alternative is to have no 'resistance' at all and swing up and down like a yo-yo. This must surely show a feedback effect, described by Catastrophe Theory as the 'slow dynamic' acting to increase the Perceived Need. The 'distance' between the Pride and Despair areas would increase with consequent effects on the disruptive impact of the switching. Given that the downward transition is thought of as tragic, the possibility of (for instance) a suicide must grow as the cycle's circumference enlarges as it moves toward the 'front' of the construct. Or worse, a total family obliteration may result, particularly in under-Resourced, low Creativity families who seek to hide the 'problem'. An analysis of Hamlet's family (Simon, 1986) discusses this.

Put like this, it becomes clearer that for problem-bound families there is little choice: being trapped between the Devil and the deep blue sea is a reality for therapists to acknowledge. The interesting implication of this may be that

on occasion, a family seriously rocked by 'ambivalence' should be encouraged to an increase in the Reification factor and consequent development of the Eternal Hope area. The gain in developing a 'problem' would be that the likelihood of a serious form of dissolution will be avoided (for a time at least) and also the formalisation into a concretely tangible entity provides a starting point for a more problem focused phase of therapy. This may be the drive underlying de Shazer's response to families with a characteristically 'vague' reaction to tasks, when he returns equally vague interventions (1982).

B. Problem-Resolution: Discontinuous routes

Given the number of factors influencing the activity on the behaviour surface, a wide range of possible routes for discontinuous therapeutic change can be elucidated. In fact, the number of routes is larger than those of the continuous type by a ratio of five to one. While this may be an artefact of a model deliberately created to show the discontinuous change, the possibility is that the Protestant work-ethic approach to problems (as noted by Rabkin, 1972) rather blinkers one to the multitude of other ways to achieve a therapeutic objective.

An issue to identify at this stage is that of the precise social system we are addressing here. While problem generation can self-evidently occur to a family alone in its natural context, without necessarily being visited by some outside

force or agent, the process of therapy definitely implies the visit of a therapist/team. Thus, in therapy the social system that creates change may be productively considered to be the therapist (team) - family group. It is in this arena that the 'difference that makes a difference' is generated. The following descriptions of routes will not attempt to definitively account for the location of responsibility for choice of route. The process is considered to be a stochastic negotiation in a field of multi-stationarity. That is, the exact path taken will evolve as the therapist 'seizes' openings (see 6.3.ii) and the family 'allow' progress - a process that de Shazer helpfully identifies as "a co-operation" (1984).

The five general options available relate to the five control factors included in the model. They generate fifteen paths of the single jump type that move in an upward direction (i.e. Despair to Pride, Despair to Eternal Hope and Eternal Hope to Pride). Other routes in an upward movement include the multiple jump sequences, and these will also be explored. The effects of the control factors will be related to the various techniques used by Brief Family Therapists.

Two types of route may be discerned: those showing a simple relationship to a change in the control factor value, and those effected by a bifurcation. The former have a straightforward response to the therapeutic technique, the latter will show much more dependency upon the exact diagnosis of

position on the morale behaviour surface.

B.1. Single jump, simple outcome routes.

i. Direct de-reification: this would work through the butterfly factor, and would lead to a simple dissolving of the problem. The Eternal Hope area of the construct would diminish to nothing. Whether this would lead easily to a consolidated position on the Pride area, or to a return to an ambivalent 'switching' from Pride to Despair, would not necessarily be predictable.

In some cases the presented problem is so tightly bound to feelings of inevitability that it becomes important to use even a small chance to demonstrate that a different experience can be obtained (even the unpleasant and powerful feelings of ambivalence - which can then be harnessed for further work).

It is possible that the technique of positive connotation (Palazzoli et al., 1981) is the archetypal intervention to generate a de-Reification. Although there is a mechanism described in terms of paradox, the basic effect of this type of intervention is to challenge the definition of the identified behaviours as problematic. The technique of reframe represents a form of this, where some aspect of the behaviour's meaning is changed to a positive value. Bandler and Grinder describe a version of the process:

"The stigma of the symptom dissolves over time, because [the client] begins to pay attention to the symptom as being a message."
(1982, p 139)

Their technique converts a problem into a known message, and as such the behaviour becomes useful, instead of threatening, in indicating some aspect of the person's limitations. This notion is directly transferable to families.

Since the reframes and re-connotations used here are always positive, an outcome of ambivalent switching is unlikely.

ii. Achieved Control: this would operate through the major control factor, by bringing more control to bear on the behaviour to the point of a threshold where problems 'vanish'. The effect of the attempts to control the situation would suddenly change from counter-productive to productive.

Increasing this control, given the paradoxical nature of the Eternal Hope area, might mean that either logical or lateral interventions should be used. A variety of training interventions (e.g. Behaviour Modification, Assertiveness, Social Skills, Parentcraft, etc.) on the one hand, and the paradoxical forms of symptom prescription and "Go Slow" injunction (Watzlawick et

al, 1974) might prove useful.

iii. Creativity surge: a change in this control factor would alter the family's flexibility of response to the presenting problems. This may be the underlying mechanism of the 'double bind de-toxification' approach, where isomorphic paradoxes are offered to the family.

Palazzoli et al. (1978) describe working in this area at times, though not explicitly. De Shazer (1982) and Keeney (1983) develop the notion of 'difference' as vital to therapeutic change: de Shazer has proposed a binocular theory of change where the difference between the existing interpretation and the isomorphic yet new interpretation of the therapist offers an entirely new order of information. This seems quite parallel to Koestler's notion of bisociation (1964), in which the difference between the two foundation ideas generates the creative leap to the new idea.

The question may be asked here: where does this creativity come from? In practice, the therapist works creatively to trigger the family's own creativity: therefore, both are required. The therapist has only one hour of contact, and the family then must use their creative powers during the interval before the next session. De Shazer's "Do something different" (1984) intervention shows a simple version of this approach,

and Cade and Southgate's "How could you possibly change?" (1979) a challenging version.

B.2. Single jump, complex outcome routes.

Some routes are highly dependent upon the precise location of the family on the behaviour surface at the point when alterations are made to the relevant factors. The action centres around a notional line which bisects the developed Eternal Hope triangle from the frontal bifurcation point, running parallel to the Perceived Need axis to the back of the surface. (In cases where the bias factor value varies from zero, this line will distort in a linear and continuous - i.e. 'rubber band' - manner.) Two 'halves' of the triangle can thus be discerned, and the implications of this relate to the splitting factor (7.4.B).

i. Perceived Need for Control: changes in this factor will effect the urgency, importance or relevance of the problem to the family. For families on the 'Pride side' of the butterfly sheet, an increase in the Perceived Need will force a jump to the Pride area when the discontinuity is reached (Figure 21, a). Families on the 'Despair side' will show the opposite reaction: they will plunge into Despair (Figure 21, b). Therefore,

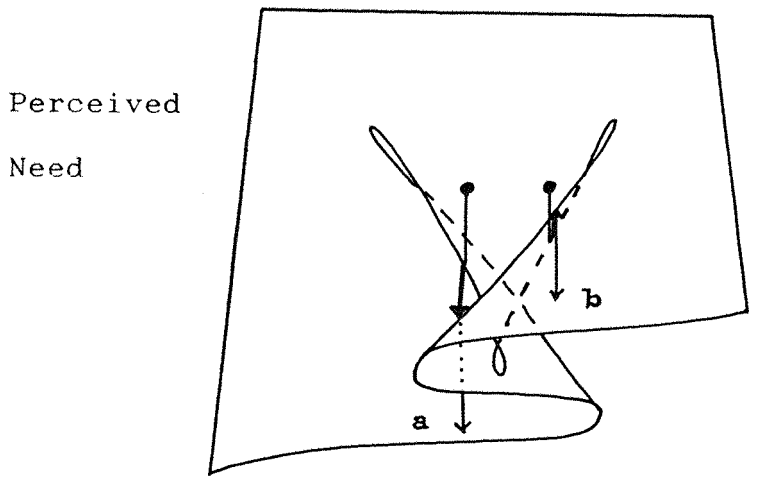


FIGURE 21: TWO PATHS WHEN NEED IS INCREASED

only one half of the families on the Eternal Hope sheet will react positively to interventions aimed at increasing the Perceived Need. This could be understood as indicating that families with a higher degree of Attempted Control will rise to the challenge; the others will be demoralised by a seemingly 'impossible' task, and will collapse.

Deliberate attempts to raise the Perceived Need will usually be related to lateral interventions. Minuchin (1974) discusses the uses of 'escalating the stresses' upon families and their members as a therapeutic technique. Haley (1976) is a master at almost bargaining with task options that the family respond to as 'challenges within reach'. Some forms of symptom prescription and prediction will raise the

anxiety level.

ii. Resources: responses to changes in the Resources factor work in the opposite direction to the Perceived Need factor. An increase in the latter moves the family forwards on the sheet, and nearer to the discontinuity threshold. An increase in the former moves the butterfly sheet forwards, moving the (effectively stationary) family further away from the discontinuity. Therefore, a decrease in Resources will force certain families on the 'Pride side' up to Pride, but will precipitate others near to the 'Despair side' threshold over that edge. In blunt terms, this shows some families responding well to adversity, whereas others are, unsurprisingly, forced to a 'last straw' position and subsequent disaster. These paths will look like those of Figure 21.

This complexity - the way that the 'Despair side' works within the common-sense logic familiar to Social Work, yet the 'Pride side' does not - shows the need for, and attendant difficulties, in accurate assessments before offering financial or material aid, or advocacy with Resource problems.

For the sake of clarity, the above section has been presented as if the notional bisection line were the single influence on the direction taken by a family subject to the factors noted here. However, there is another issue to mention here

for the sake of completeness: trimodality. There are places around the frontal bifurcation point where the behaviour surface is not simply bimodal (offering either/or alternatives) but offers three possible options. This area seems unduly complex for analysis at this level, and will be by-passed. It may be that the best reaction to it is to temporarily propose a 'trimodality rule' in which Hope drives the strongest attractor, and therefore transitions will tend to be towards Pride.

B.3. Multiple jump routes.

Two routes will be considered here, each containing just two jumps. Routes with higher numbers of morphogenic change are possible in real life, and could be modelled here, but they cease to be so directly concerned with the business of therapy and become plots of a family's 'life snake' evolution. (Most families' life snake will stay in the Pride area, since gentle morphogenic change is possible within this area: see 7.5.C.2.)

i. Despair - Eternal Hope - Pride: The first 'move' in this therapeutic plan is to encourage a single, tangible and easily identifiable problem to emerge from the chaos of the Despair behaviours (se 7.6.B.2.iii). This will reduce the ambivalence within the family, as noted earlier in the description of ambivalence (7.6.A.ii). However, as yet another, new problem emerges, this may be perceived by other agencies as a worsening and

increase their anxiety and possible ambivalences as to the viability of progress.

The second move would then be to tackle this problem with a view to seeking a morphogenic transition to Pride. Clearly the ideal in this situation would be two straight jumps arising from two highly successful interventions - but this must be a rare occurrence in the real world. (An intermediate sequence might include one continuous and one discontinuous transition.) This route is the basis of any Brief Therapy approach to the highly dis- or under-organised families (Jenkins, 1983) who often have multiple agency involvement over long periods of time. It contrasts with the logical approach which would take a continuous route from Despair to Pride: 7.5.B.1.i, with great resource and time implications.

ii. Eternal Hope - Despair - Pride: this route is a possibility for a Brief Therapy approach to persistent and well defined problems, and stands in contrast to all other 'curative' routes. It is perhaps the most unconventional approach, based as it is on an initial move that appears in an 'unhelping' direction: i.e. worsening the situation, by losing the few fixed points that 'stable' problem patterns provide. However, it is the second move that shows the helpful power of the route: the rebound from Despair to Pride. This works by

triggering sufficient desperation to allow the family a greater risk-taking power, described by Haley as:

> "... encouraging the family members to talk about how desperate their situation is. Rather than reassure them it is not so bad, the therapist can agree with them that it is quite bad. If the situation is made to appear desperate enough, they will listen to the therapist and do the task he offers. That is, the therapist uses their desperation as a motivation by emphasising it." (1976, p 55)

Similarly, Smets comments on crisis situations:

> "People are more willing to try 'anything', even unusual actions, because they are desperate for change" (1985).

A variety of other sources of support for this notion may be found: for instance in the phases of group therapy, there is the well known 'storming' phase (Tuckman, 1965) where members become disheartened, upset, and feel helpless and hopeless (Mullen and Rosenbaum, 1962). A 'giving up hope' stage is known in the 'bottoming out' process of alcoholics working on their addiction (Davie, 1980; Tiebout, 1949). One suggested therapy for victims of the 'learned helplessness' syndrome (Seligman, 1973) is to push them into boring, repetitive and unrewarding tasks until they react against it, and to then offer large

rewards as well as the cessation of the tasks, so as to reinforce initiative, self-motivation, and an internal locus of control, etc.

Whitaker is described as encouraging families to see themselves as chaotically organised individuals or disrupting subgroups. They will then encounter a despair at 'not being a family' and will return with greater motivation (Neill and Kniskern, 1982). Papp (1980) and Madanes (1981) mention the second move in the form of a 'recoil' from the absurdity of a symptom prescription that apparently worsens the problem. These are thought of as rebellion-generating interventions, and have some similarity with Kraupl-Taylor's prokaletic (challenging) psychoanalytic techniques. (These latter are essentially negative reframes and reconnotations, and may have much in common with some of Haley's Ordeal Therapy interventions, 1984.)

Interestingly, a parallel can be usefully drawn with the creative process itself. This is set in four stages by Gordon (1975): preparation, incubation, inspiration and verification. The incubation period is the time when the mental process is unconscious, which is very frustrating for the creator, who may become convinced that no answer will arise. This is pleasantly controverted when the "Eureka!" comes. Similarly, there are two routes by which the Zen <u>sartori</u> may be achieved: continuous

'purification', or an 'instantaneous turning about within the depths of consciousness' (Watts, 1957). The former is a teaching mode, the latter works through the koan double bind. (Bateson, 1956)

The point underlying all the above materials is that the therapeutic macro-process is based on a two step sequence, wherein Despair is a stage that is followed by positive results despite the previous pessimism.

7.8 Conclusion

A Catastrophe Theory basis for modelling the processes of Brief Family Therapy appears able to describe many of the paths taken. These can be related to the techniques of the approach. The unconventional nature of some of the routesd taken can be shown clearly, and the logic informing them as treatment of choice options described. A number of areas for discussion are prompted.

8. DISCUSSION

8.1 Introduction

8.2 Change Theory

8.3 The Illustrative Medium

8.4 Other Psychotherapy Models

- A. Anorexia Nervosa
- B. Psycho-analytic Affect Theory
- C. What Happens in Groups?

8.5 Explanatory Powers

- A. 'Miracle Changes'
- B. Family Intervention
- C. Counter-Intuitive Proposals

8.6 A New Paradigm

8.7 Exploring the Model's Contributions

- A. Theoretical
- B. Practical

8. DISCUSSION

8.1 Introduction

The forgoing - introductions to Brief Family Therapy and Catastrophe Theory - have allowed the description of a sophisticated model of personal and relationship change. It is now appropriate to consider its usefulness.

> "Any useful theory or model must propose much about its topic - in this case the 'human condition'. The majority of these theories spring from theories of personality, and these are usually described in structural terms. Changes, family or personal, are then described as movements within and between these structures. The processes of change tend to be described only obliquely and hence remain embedded in the structural theory." (Simon, 1987a, p 60)

But:

> "Theories of change are fundamental to therapy" (Simon, 1987a, p 72)

Several areas will be discussed here, including the unifying effect of the model on concepts of change.

8.2 Change Theory

The combination of concepts brought together above, and used as the basis for the 'morale model', form into a constellation that is here called Change Theory. This term was generated in response to a lack of substantial and system-

atic explanation of how people change, and how to help this, in Social Work (and other disciplines) as a whole. As Fischer (1978) put it:

> "...most of the helping professions have concentrated on theories - from Freud to Piaget to Erikson - that help practitioners understand their clients but not change them, emphasising diagnosis at the expense of intervention. Thus systematic ways for professionals to implement their theories - the techniques or procedures, what the practitioner is actually supposed to do - either have been given scant attention or ignored altogether." (p 17)

Change Theory is offered as a healthy start to remedy this, by organising the conceptual framework for the changes these "techniques and procedures" are expected to generate. The types of interventions have not been detailed, but the overview offered (see 5.4) shows the width of the range. The combination of a strategic approach to intervention choice and a reassurance that the discontinuous jump is a legitimate objective should provide a very powerful therapeutic approach for Social Work.

8.3 The Illustrative Medium

The use of the Catastrophe Theory medium helps the description of the rapidity of change Brief Family Therapy sets as its objective. It provides a structured framework that allows some precision into the visual aids for the argument.

This follows the notion that:

> "Scientific explanation is essentially the reduction of the arbitrariness of the description"
> (Thom, 1983, p 161).

In the complicated area explored above, where no objective test for exact measurement or the determination of truth exists, such an ethos is the basis for the attempt to make progress. As Waddington (1977) has said of situation where things are "interconnected into complexes":

> "Our old-fashioned common sense has not had to face such situations before, and is not well adapted to doing so. We need nowadays to be able to think not just about simple processes but about complex systems (and) it is often useful and enlightening to have visual illustrations of ideas." (pp xii & xiii).

He also makes the remark, so pertinent to the conceptual model presented:

> "Perhaps the visual model gives some intuitive understanding why systems which reach the limit of their initial stability are often split up into two stable pathways rather than resulting in complete turmoil".
> (p 112)

The Catastrophe Theory basis of the model is extremely familiar with this concept that of one or more well defined alternatives to a disrupted situation. This notion itself

has caused some difficulties in the past, as both materialism and science assume that the existence of any given phenomenon proceeds its essence. That is, any thing which does not (yet) exist cannot have any material meaning in the world. However, Catastrophe Theory clearly assumes the opposite when the two sheets of cusp fold indicate in a formal sense exactly where a phenomenon will emerge having passed a given threshold. Indeed, the bimodal area of the graph shows how 'close' (yet distinct) the two alternatives are.

This formalisation of the belief that an alternative can be found with only little apparent change, and rapidly at that, underpins the model's usefulness in proposing the Brief Family Therapy approach in contrast with the 'Growth through Pain' approaches. These latter therapies regard rapid change with suspicion, and emphasise the change as a continuous growth path with an uncertain or even unknown destination.

Another benefit is to shed some light on the client self-determination (or 'manipulation') issue. Often found linked to the unknown destination assumption is the idea that it is the client who finds the destination through some process of taking choices. Despite the tangled logic invoked by the notion of a client needing help to make a 'free choice', the idea is advanced that the client must make the choices in order to make the progress: it is part of the healing process. The alternative belief is that a new option is already available and that the client can be helped to

'discover' it without any need for choice-forcing at all. This can be a useful framework when clients appear to 'resist' choosing any risk-taking behaviour.

The differences between these belief sets shows how distinct the therapeutic approaches are. This lays a foundation for the idea to be advanced below (see 8.6) that the Brief Therapy approach is revolutionary. As such, it is bound to find a difficult passage in a new profession (Social Work) conscious of its dependence upon established traditions and received wisdoms.

8.4 Other Psychotherapy Models

Three other models will be discussed. The first to be advanced in this area was Zeeman's model of the treatment of Anorexia Nervosa in 1978. Secondly, a highly developed model of the psychoanalytical notions of affect has been produced in 1987. In the same year, the area of groupwork has been approached. Other models have been constructed, but will not be described other than a brief note here. For instance, Woodcock and Davis (1980) also describe models for reactive schizophrenia and learned helplessness. Postle (1980) also describes one for Primal Scream Therapy, and another for Transcendental Meditation. Sutton et al.. (1988) describe the parent-child interactions in child abuse.

A. Anorexia Nervosa

The compulsive eating disorder that has in recent years

become known as the 'slimmers disease' in the popular press, has attracted a number of therapeutic approaches. Dr Hevesi has used hypnotic trance induction to alter the sufferer's concern with food. The aetiology commences with a stringent dieting and progresses to a fasting-gorging cycle, which Zeeman (1978) has described as increasingly bimodal, with hysteresis in evidence. For the treatment programme, the trance state is modelled by the introduction of a butterfly sheet, which expands until it opens out upon the 'normal behaviour' area of the surface.

The model shows the various aspects of the aetiology and treatment adequately. No further development was undertaken, (for instance, modelling other treatment approaches).

B. Psychoanalytic Affect Theory

Sashin and Callahan as a team have generated a double cusp Catastrophe Theory model for the complexity of 'subjectively experienced feelings' in an attempt to systematise the area. Their model is twice the size of a butterfly model, having two behavioural factors and eight control factors. Even so, they feel that both the behaviour and control spaces are over-simplified and that the development has further to go.

The work of these researchers, written with each as first author of one of the two articles as yet unpublished (1987) shows how powerful Catastrophe Theory may be in potential. However, it must be said that the higher order models quickly

lose their intuitive helpfulness as illustrations, although the sophistication of explanatory power evidently increases.

C. What Happens in Groups?

Hinshelwood (1987) offers a cusp catastrophe model of the behaviour of individuals and groups in a psychoanalytically based therapeutic community. His work shows some parallels with the present study: he is concerned with personal despair and group morale, and he proposes that morale sinks through a vicious circle of demoralisation. He does not present these ideas in any detail, however, having perhaps written the book for a wider readership.

He defines two ingredients for morale: beliefs in the integrity and the effectiveness of the therapeutic group. His model shows dimensions of Disturbance and Flexibility (control factors) and Cohesiveness (behaviour factor). He shows the higher part of the surface as healthier than the lower, which demonstrates the 'demoralisation trap'. Whilst a useful offering, Hinshelwood's model leaves some questions as to the details of the possibilities. There is some difficulty in the dimensions too: for instance, he uses the terms Flexibility and Rigidity to name control and bias factors respectively, with little description of their difference (i.e. low Rigidity is NOT high Flexibility). Further, he does not exploit the model to its full, as he only defines one pathway which shows a discontinuous aetiology for demoralisation and a continuous route for improve-

ment. The power of such modelling is surely to enable the question: why not find a discontinuous route for 'cure'?

These models show that the social sciences are a fruitful area for Catastrophe Theory modelling, and that the dangers of over-complication and over-simplification must be considered. Even so, they all attempt to bring a framework to bear to clarify areas of complexity or confusion.

8.5 Explanatory Powers

The model as developed here goes some way towards an explanation of some of the more curious and less common-sensical aspects of Brief Family Therapy's proposals. A few of these can be explored, with some constraint on space.

A. 'Miracle Changes'

Brief Family Therapy that positively expects rapid changes, and uses words such as 'transformation' (Palazzoli et al., 1978) and 'saltology' (from the latin Saltus, jump: Rabkin, 1976). Given current expectations of long, hard and usually unrewarding work with intracable problem families, some justification for this position is necessary. The Catastrophe Theory model describes the discontinuity concept rigorously, defining its parameters in relation to continuous routes. This shows it not to be merely a fond wish drawn from some impatience (say) rooted in the therapist's own problems with delayed gratification. Rather, the possibility of more discontinuous routes being elucidated from the model than cont-

inuous routes rises the opposite question, in parallel with Rabkin's suggestion that it is a Protestant work-ethic problem for those who do not accept the possibility of rapid changes.

B. Family Intervention

One of the enduring principles of all Family Therapy has been that the whole family (system) must be considered, if not necessarily interviewed. Explanations have been put forward in terms of the homoeostatic 'resistance'. The Brief Family Therapy school suggests that, once started, transformatory changes can proceed rapidly since the resistance is reduced at a stroke at this point. However, more positive explanations also obtain: the very fact of a concerted movement may prove self-accelerating in its own right.

A concept to illuminate this is available in the form of catalysis. This term usually referrs to a form of chemical interaction in which a substance alters the speed of a reaction between other substances without itself being used up in the process (Bond, 1963). One view of a therapist could be said to be that of a professional catalyst for family change, by joining with the family at a time of need, and leaving it after a period of defined work. (There are arguments for allowing that the therapist also change, but - in the language of this model - the order of change would be expected to be different. Ethical demands would require that the family's second order change can only be accompanied by a

first order change in the therapist - he may gain experience, wisdom, research data, etc., but no substantial personality or behavioural change).

One particular form of catalysis offers a useful metaphor for family change. A catalyst that speeds up the rate of a reaction that produces more of that same catalyst is said to be auto-catalytic. That is, a reaction proceeds at a rate that accelerates as more product is generated. A common English description of this is: Nothing succeeds like success! The form of the underlying mechanism for this is termed synergy: a general type of interaction in which the components help each other react, and may be used up in their own reactions, but not in each other's. A plain way to describe this might be to suggest (in the case of a 'stuck' family) that both/all components (i.e. family members) are necessary and none are sufficient alone - as the Systems Theory contribution states.

The therapeutic mechanism proposed is therefore one in which all or most of the family members commence change at very similar times, and the changes in one person (and/or relationship) accelerate changes in another, and are then confirmed, supported and encouraged in turn. Occurring in many parts of the system simultaneously, a mutually encouraging movement will speed up and diffuse throughout the entire system. This will proceed at such a rapidity as to be essentially unrecognisable to anyone expecting to work with

the individual components of the system even if providing a co-ordination.

This intervention would be based on a notion of professional co-ordination, but will have the danger of acting as a buffer, slowing and distorting the conscious and unconscious negotiations. This comment upon a Social Work method usually assumed to be fundamental to all approaches will appear to many to be quite paradoxical. However, the auto-catalytic negotiations will best proceed at a mainly unconscious level, and as such are best left alone once initiated. It would not therefore be reasonable to expect the participants to be aware of the process, which will have a serious impact on attempts to research this process through methodological approaches using conscious awareness, as for instance in 10.3.A.

The synergy mechanism clearly only informs the second order mid-phase of the three phase flightpath of discontinuous change describe and illustrated earlier (Figure 2; see 5.5). It remains for the therapist to initiate this synergistic change and then to aid in the consolidation process when targets are reached.

C. Counter-intuitive proposals

As mentioned above, some implications of the model may be surprising. Brief Family Therapy is well used to this, frequently referring to these issues as paradoxical, and

even so occasionally finding this a confounding description (as, for instance Dell (1981) attempts to demonstrate). Thus:

> "... complex network systems behave in very unexpected ways. Their behaviour has been described as '<u>counter-intuitive</u>', in the sense that if one makes some changes to the system with the intention of producing a certain effect, the actual response often turns out to be something quite unanticipated".
>
> (Waddington, 1977, p 91, emphasis added)

Social workers have grown accustomed to recognising the uniqueness of responses to given situations. The client's individual reactions have to be taken into account, and there are no reliable and proven procedures for much more than a very small proportion of the work. Family Therapy has gone further than other Social Work methods in acting into the illogicality of problem situations. Three areas will be discussed briefly.

i. The phrase or saying "It'll get worse before it gets better" has an essence quite at variance with much supportive Social Work practice. 'Support' usually means encouragement: "Chin up, it won't be long before its all over". To forewarn clients that a crisis awaits them, and indeed must be weathered before any improvement can be expected, is unusual. However, the notion is familiar to medicine: the course of an illness may include a crisis that resolves into recovery or serious

consequences. The model above shows an acknowledgement of these routes: the one-jump Eternal Hope to Pride by means of increasing Perceived Need and the two jump Eternal Hope-Despair-Pride both involve the predicted crisis.

Another phrase can be found in Strategic Therapy: "You are trying too hard, go slowly". This is associated with the continuous External Hope-Pride route that shows a path that leads backwards towards the Being area and then round the back of the cusp toward Pride. Only when the Need factor is reduced can the continuous path go round the back of the cusp: otherwise the discontinuous jump is found. (This casts an interesting light on those practitioners professing to use logical methods: it is illogical to try to persuade clients to stop 'needing' change so much in order to achieve that change; see 7.6.B.1.i. But in order to avoid the jump, this is what must be done).

ii. The whole area of paradoxical intervention (see 5.4.B) raises numerous questions, many of which can only be answered outside this framework - for instance, semantics, logic and communications theory. But the way in which certain interventions depend upon the exact position of the family on the External Hope sheet (see 7.7.B.2.ii) shows the unexpectedness of some possibilities, and considering the converse of this (i.e. to para-

phrase Waddington above: the unexpected action producing the desired response) leads toward the logic of the paradoxical intervention.

iii. The question of 'how much change is enough change?' raises issues concerning the modelling of change in vacuo. While the model is not in position to help with absolute judgements, it can make suggestions on the relative shape of the macro-process of therapy. Casement (1985) discusses this from a psychoanalytic viewpoint, considering the client's need to gain his own independence, bases his position on Winnicot:

> "Corrective provision is never enough. What is it that may be enough for some of our patients to get well? In the end the patient uses the analyst's failures, often quite small ones, perhaps manoeuvred by the patient ... and we have to put up with being in a limited context misunderstood ( ). So in the end we succeed by failing - failing the patient's way. This is a long way from the simple theory of cure by corrective experience". (Winnicot, 1965, p 258).

Thus, the consolidation of a healthy position requires more work than that taken to achieve that position initially. The hazard of relapse by 'sliding off' the Pride sheet from a position of fragile recovery can be shown on the model. For instance, the capacity of dried

out alcoholics to re-institute the alcohol intake that would prove lethal to others, within a matter of days, (Edwards et al, 1976) shows how substantial a relapse can be. This reminds us that the essence of the condition surviving without its existence: perhaps the reason underlying Alcoholics Annonymous dictum of 'Once an alcoholic, always an alcoholic'.

Further, the model shows that whereas the restoration of one dimension of function may appear to constitute 'enough' change on that dimension, a higher level than a simple restoration may be required in order to make the jump from one sheet to the next. The feature of hysteresis helps us consider the possibility that post-trauma treatments must aim to regain the previous stability by pressing further than the precise point of pre-trauma health. A straight-forward return as measured by limited means is not sufficient. For instance, in Figure 22 a family starting from point A fall off the Pride sheet onto a lower one. They could then be helped to move to point B which would show the same degree of Attempted Control and Perceived Need for Control. However, it is evident that they need to move beyond that point according to the Attempted Control dimension to achieve the jump to health at point C.

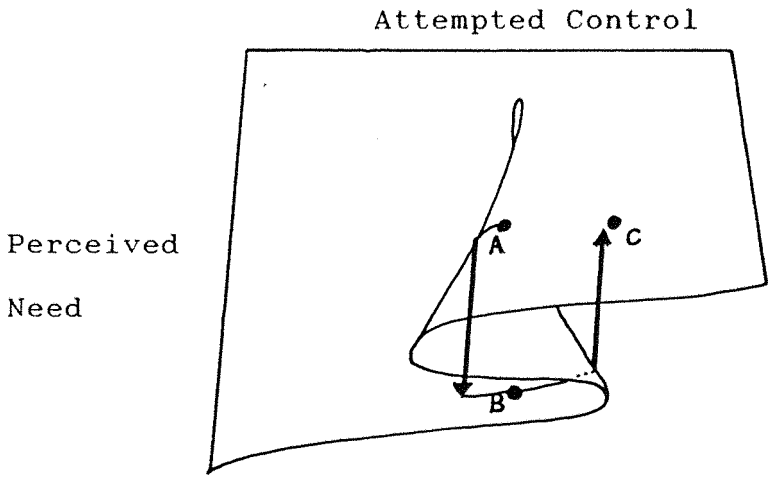


FIGURE 22: SIMPLE CORRECTION IS INSUFFICIENT

It can be seen that the conceptual model has some quite far reaching powers of explanation, going further than other Social Work methods into the uniqueness of the individual situations by finding some underlying forms in the shapes of change rather than in the client or professional characteristics.

8.6 A New Paradigm

Many of the theoretical components described above are new, and departures from the traditional approaches associated with Social Work. Indeed, they have been recently called revolutionary in their own fields. Some of them already have links with each other: for instance, cybernetics with systems theory, systems theory with family therapy, cybernetics with catastrophe theory. In each field there can be found an awareness of the wide ranging nature of these changes, and the implications for other fields. For instance, of Systems

Theory, Ackoff (1980) writes:

> "... we are leaving one cultural and technological age and entering another, and () we are in an early stage of of changes in our conception of the world and in our way of thinking about it. These changes () are as fundamental and as pervasive as were those associated with the renaissance and its product, the industrial revolution. This socio-technical revolution may well come to be known as the resurrection." (p 26)

Woodcock and Davis (1980) describe Catastrophe Theory as:

> "...a controversial new way of thinking about change - change in the course of events, change in an object's shape, change in a system's behaviour, change in ideas themselves ... it proposes that the mathematics underlying three hundred years of science, though powerful and successful, have encouraged a one-sided view of change..." (p 9)

Hoffman, (1981) charts the history of Family Therapy:

> "... new ways of thinking have led to an epistemological revolution, one that touches all the sciences and that challenges many traditional concepts, from the belief in linear causality to theories of individual motivation. Family therapy, although not a behavioural science per se, is in the odd position of being one of the few areas of behavioural research and practice to be influenced by this epistemological shift." (p 3)

These all show evidence of a phenomenon called the 'paradigm change' by Kuhn (1970). He described the process of the elaboration of scientific theories as 'normal science'. On occasion anomolies in the results of experiments (or practice) are found which cannot be explained by the theory. From being curiosities, they grow to be challenges to that theory. The anomalies become important to the scientific community who, in adjusting their theories far enough in attempts to accommodate to them, may eventually experience a 'crisis of confidence' in that theory. This may generate the scientific revolution as a new theory is developed from an existing germinal idea, or from scratch.

It is interesting to note the parallels this historical approach identifies in the process through time with the model presented here. Using the terminology employed above, a systemic change is recognisable, and a Second Order change. The property of bimodality shows while the innovators and conservatives debate the old and new interpretations. The change is essentially discontinuous, with an inaccessible area between the two modes, as Kuhn says:

> "Just because it is a transition between incommensurables, the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience. Like the Gestalt switch, it must occur all at once (though not necessarily in an instant) or not at all." (1970, p 150)

From this can be seen the appealing circle that the 'paradigm change' concept describes what the Change Theory is doing to Social Work, and the Change Theory can describe the process of the 'paradigm change'.

(This is not to criticise Popper's contribution to the philosophy of science, but as Bloor (1976) points out, his theory was essentially an atomistic and static one, and would seem appropriate for the ethics of 'normal science'. Kuhn's contribution is more a historical perspective than an ethical one, and is recognisably more systemic and context-aware. These have been polarised unsuccessfully in debates, and Bloor notes a stalemate because the differences in these contributions are almost at the level of paradigmatic themselves. That is, they are not really comparable, and are useful in different situations.)

It is important to place ourselves with respect to this transition. We are currently in an area of bimodality, which has an impact upon the methodological approaches considered acceptable for an empirical study, as noted in the Introduction (3.3.B)

8.4 Exploring the model's contributions

A. Theoretical

The model was seen as providing a strong frmaework for Change Theory. It was hoped that this can support policy debates concerning service delivery design where Brief Family Therapy

might be helpful.

It was also felt to broaden the distinctions between the fields of research legitimately concerned with reductionistic approaches to continuous change processes and those systemic approaches to discontinuous changes. Further, the distinction between outcome and process research described earlier (3.2), can be refined with the difference between systemic-process research and linear-process research.

B. Practical

Bringing together in combination these new paradigm fields into a Change Theory, with the 'moral support' of Kuhn's theory, a very powerful force for explorations is assembled.

Such explorations could concern two types of observations:
- The results of conceptual applications in practice;
- Family behaviour in the context of the model.

The first would rest on the practitioners need for tools that can help them nurture their own skill and optimism for productive change in the face of perceived apathy and resistance. Research design would seek to ascertain how helpful the above model was to direct practice. Suitable therapists would have to be recruited, trained and monitored: this was recognised as an impossible task for the researcher living in a circumscribed and rural area.

The second approach would be in the nature of an empirical study of data collected about significant indicators from families in relevant situations. However, it was identified early on that there existed no established methodology for such an exercise. This forced the study to take the form of a methodological pilot, which was expected to provide very limited chances of demonstrating the more crucial aspects of the model. However, this study was undertaken, and will be described in Part Three.

P A R T T H R E E

TOWARDS AN EMPIRICAL STUDY

CONTENTS

9. Towards a Method

10. Methodological Issues

11. A Pilot Study: The Method

12. The Results of Exploratory Data Analysis

13. Discussion

9. TOWARDS A METHOD

9.1 Introduction

9.2 Starting an Investigation

9.3 A Pilot Study

9.4 Conclusion

9. TOWARDS A METHOD

9.1 Introduction

The work so far described has been an exercise in speculative model building. It has used the combination of Brief Family Therapy theory and Catastrophe Theory to explore the possible patterns of family member inter-action during periods of both 'ordinary family life' and substantial change. The resulting model may not gain an immediate empathy with practising Social Workers, with its maths-based theory and complex drawings. In part way of answer to some of the difficulties that may be felt it is worth remembering that:

> "...a model is always an approximation, usually a simplification, and hopefully an aide to insight" (Borko, 1967; as quoted in Lippitt, 1973, p 1)

In creating the model, it was hoped that some advance in our appreciation of the complexities of the family as a system might result.

9.2 Starting an Empirical Study

It was an important feature of the objectives of the work that some investigation into the realities of family life in stability and change be undertaken. Various factors argued actively for this, and some previously inhibiting factors were removed.

i. There has been a poorly verbalised criticism of therapeutic work that accepts, and even encourages, swift changes in people. Such changes have been said to be 'flights into health' (see Rapoport, 1970), 'fragile spontaneous remission', 'symptom substitution'. These terms can be used to deny the significance of rapid changes observed. Illich (1976) would argue that this denial is itself iatrogenic: i.e. they will result in a lengthening of a troubled person's difficulties against the ethics of the helping professions. Family Therapy has, as a movement, been associated with a seeking after rapidity and efficiency in prompting change (for instance, Palazzoli et al., 1978; Watzlawick et al., 1974; Weakland let al., 1974; de Shazer et al., 1982), although some schools do not state this overtly.

Weakland et al., (1974) quote results for 97 cases, which averaged at 7 sessions of contact per family. Palazzoli et al. (1978) seem to be the first to announce a monthly basis for their sessions, suggesting that they had come to expect changes within 10 sessions. At one hour per session, this totals less than 10 hours of contact time in a less than 10 month period. There seems to have been little work reported on the subject of timescales in the fifteen years since 'Brief Family Therapy' announced its presence. It was in 1970 that Rapoport stated there

was a need for "definitions of the concept of 'brief' and these can only be achieved by conciously experimenting with time factors".

ii. The fluid complexity of the family system makes it a confounding unit to study. It is a social system small enough to permit identification of (and with) the constituent people. Yet it is large enough to include an infinite variety of patterns of transactions at high frequency. Attempting to identify, categorise and trace all the alterations in these patterns as proposed by the conceptual model would be a mammoth task.

However, it has been said that:

> "discontinuity, nonlinearity, and locally erratic behaviour are not of themselves reasons for trying to model behaviour, as most real-world systems are at best stochastic and certainly not linear or mathematically very well-behaved." (Gregson, 1983, p 330)

That is, any investigation into this area will be difficult. Wilson (1981) encourages a modest approach:

> "In general, we are involved mainly with deductive model building. But since we are now alert to the possibilities of jump, hysteresis, and divergence, as well as other kinds of bifurcation, then when examples of such behaviour turn up in

observations, we may be encouraged to classify the transitions as a preliminary to more formal model building." (1981, p 64)

iii. The difficulty of a study based on any finite approach, using measurements of behaviour, presents the issues as to the handling of such data. This was anticipated to bring substantial issues up since the Catastrophe Theory model was based in mathematics, even if it was only the illustrative medium that was used for conceptual explorations. The rigour and detail that was necessary required much of the data handling capacity for any empirical study.

However, as Gregson said:

"the increase in the depth and diversity of quantitative analysis and the ready facility with which new methods are packaged into and disseminated by computers make many problems tractable that but a short time ago were incomprehensible or insoluble." (1983, p ix)

iv. Mannhiem has addressed Society's self-evaluative crisis, and the dangers of high technology developments not keeping pace with the moral and ethical deliberations as to safeguards against abuse and the consequent 'disintegrating' effects. Hall (1966) quotes him as saying:

"What is the good of developing child guidance, psychiatric social work, psychotherapy, if the one that is left to guide is left without standards?" (p 11)

In other words, it may be less than useful to make even further theoretical and ethical discourse into new, unconventional and perhaps speedier techniques for the relief of problems, than to attempt to back up this position with 'facts and figures' of a type that would be of use in guiding the work with real families.

Out of these various factors influencing the initial explorations of the possibility of an empirical study grew two major objectives:

- To attempt to provide some corroborative evidence for the conceptual model, by means of some form of investigation into its proposals;
- To attempt to generate some body of factual data that might be of use to practising Social Workers and their management, focusing on either the timescale aspects or the diagnostic implications.

These objectives sit side by side in the sense that the model offers a spur to both levels of investigation. Progress in the development of any constructs with applications to the work place is a "continuous process of continuously corrected feedback" (Lippitt, 1973, p30). Indeed as de Jouvenal states:

"... research capable of shedding light on the dynamics

of change will be of primary importance, and we shall see very few talents devoted to pure erudition (that which cannot conceivably affect our decisions)."
(1967, as quoted by Titmus in his discussions of the convergence of the Social Sciences on the "common task of forecasting", 1968, p 18).

9.3 A Pilot Study

Early considerations covering the possible directions that an empirical study might take addressed the question of the scale of the work that could be undertaken. Time and resource limits were significant factors. The need to delineate a clear focus became evident.

Against this stood the danger of failing to capitalise upon the opportunities provided by the model: i.e. questions might be asked of it might be so limited that they effectively appear to trivialise it. A model purporting to provide such an explanatory power brings with it the problem of how easily it can be put to the test.

The relevance of the issues studied to practical application was also a factor. The problem of 'What constitutes significant change and how to start it' is not new. It presents in every therapeutic session. It is also a recurrent theme in service delivery design. In a recent Conference (JUC/BASW, 1985) a view that the need to study the Social Work process arose. Professor Parker said:

"We now need research which will allow us to meaningfully to enter the time between the Before-and-After tests ... the process of change itself." (Pritchard, 1985)

The complexity of the model, and the time and resource issues were acknowledged as constraining the study. It was decided that a pilot study was the limit of movement in the circumstances. It was hoped that this would provide a basis of contribution that could be developed later. Confirmatory or critical testing of either the conceptual model or the therapeutic method could not be undertaken.

9.4 Conclusion

As stated above, this study commenced with an awareness that little or no work had been published in this area. Little help could be expected in some of the newer parts of the work.

What was known was that Palazzoli *et al* (1978) found substantial changes within the four week period. Other authors suggested even shorter periods. However, nothing was found in the literature to distinguish between the various phases that could be described of such changes. For instance, the personal changes could be separated from the relationship changes. The change-negotiating phase could be demarcated from a consolidation phase. The question of 'how long does change take?' is a deceptively simple one, which depends on definitions of the problem and the progress,

the clinical requirements and the family requirements, etc. Did the four weeks represent one or two weeks of rapid changes, followed by a strengthening period which allowed the family to recognise and acknowledge the changes, thus permitting the next stages to be addressed (an overriding clinical factor)? Or was it a logistically convenient gap between sessions that happily generated an average in which most families changed (if at all). Or was it connected to the 'Just Noticeable Difference' phenomenon where the therapist's perceptions of a confirmable degree of change had occurred in a subtle and fluid observation field: the family social system?

These are not new problems, but they do not appear to have been systematically tackled by a research project. Rather, they seem to appear in the guides and theories for therapy. As noted elsewhere (Simon, 1987a):

> "The processes of change tend to be described only obliquely and hence remain embedded in the structural theory. Thus, as important basic assumptions, their influence on the practice and description of therapy is felt rather than understood."(p 60)

The hope of this study was, then, to explore as far as was possible along this path with some systematic basis. If necessary, it might only point out the hurdles that hampered the progress and limited the results in terms of practical applications.

10. METHODOLOGICAL ISSUES

10.1 Introduction

10.2 Research Design

A. Two Approaches

B. Research Statement

10.3 Research Techniques

A. The Retrospective Interview Option

B. The Participant-Observation Option

C. The Questionnaire Option

10.4 Guiding Principles

A. The Subject Families

B. Design Simplicity

C. Ethical Considerations

D. Ergonomics for *in vivo* Research

10.5 Definitions and Hypotheses

A. The Morale Concept

B. Specific Hypotheses

10.6 Design for an Instrument

A. The Difficulty of a Longitudinal Study

B. Steps in the Design Evolution

C. The Rating Scale

D. The Overall Diary Presentation

E. The Relationship between Instrument and Model

10.7 Additional Data Sources

A. The Follow-Up Questionnaire

B. The Family Profile Format

10.8 Data Processing Techniques

A. Exploratory Data Analysis

B. Time Series Analysis

C. Infinite Explorations?

10.9 Conclusion

10. METHODOLOGICAL ISSUES

10.1 Introduction

To proceed in an orderly manner, a path had to be taken through a number of decision points in step. These decisions successively narrowed and defined the area the work would cover and the method to be used.

10.2 Design Issues

It was evident that to attempt a study of the entire conceptual model was well outside the scope of the limited means and time available. An immediate selection had therefore to be made: What area of the model would be amenable to a feasible examination that would generate positive results and allow some conclusions to be drawn?

A. Two Design Options

Posing this question encouraged an appreciation of the two essential themes of the conceptual model: the structural and the dynamic.

i. The Structural

The topographic surfaces defined by the Catastrophe Theory base and developed with the Family Therapy theory and the concept of 'family morale'. Pursuing this theme was envisaged to entail a search for measures that could be combined so as to define the five-dimensional space of the butterfly construct. This

might eventually refine into a diagnostic tool capable of supporting predicative testing. Implementing this approach would require a large number of previously tested measures, a large pool of volunteers, and a means with which to explore the permutations of measures towards an increasing correlation with real outcomes. Problems could be foretold in terms of taking account of professional input, rating the 'creativity' and 'resources', and methods for permutating the measures stochastically.

ii. The Dynamical

The family processes as represented by the various structures of the model, shown in the diagrams above. This approach would concentrate on an attempt to identify some of the processes specified by the model, with particular interest in the detailed examination of those cases where a catastrophic change was found clinically. This would require some instrument capable of measuring some characteristic(s) of the family members expected to show association with both the 'morale' and the problem. Problems anticipated included the definition and tracking of the 'morale', and various issues arising from repeated sampling such as data handling, subjects loosing patience or gaining too much familiarity with the measure, and logistics.

The latter approach was chosen. The longitudinal approach appeared more containable and achievable than the alternative. Although coloured by the knowledge that no previous work had been done in this area, the possibility of developing a useful instrument seemed high. Further, the exploration of the dynamics at the level of the macro-process of therapy was nearer to the spirit in which the conceptual model was developed.

B. Research Statement

The early decision to limit the study to a pilot combined with the absence of method or instrument to lead to the further decision to pursue a methodological study rather than seriously attempt a test of the model. The work became loosely defined as:

'an attempt to create a means with which to peer closely at the processes of change'

This was refined into the following statement:

"The Study will Attempt to Analyse Patterns of Change in Families During the Course of Therapy, with Purpose-designed Data Processing Techniques."

This constitutes several key phrases:

i. The Study will Attempt...

i.e. it is a pilot scheme;

ii. ...to Analyse Patterns of Change...

i.e. those expected by the model;

iii. ...in Families...

i.e. a particular social unit that fits both the conceptual model and the researcher's work as a professional;

iv. ...During the Course of Therapy...

i.e. over a long period of time in which relationship changes might be expected to occur;

v. ...Purpose-designed Data Processing Techniques.

i.e. the collection and analysis of this type of data has not been previously attempted: methods will have to be created.

10.3 Research Technique

The choice of the particular technique to be employed followed the decisions on the main area of investigation. There were the four major approaches to be considered: interviews, participant-observation, questionnaires, and written information sources.

Considering the aim of longitudinal monitoring of the family process, the choice lay between participant-observation and questionnaire techniques. Written sources were thought to be available for additional information. Interviews were explored as a medium for eliciting retrospective data and a particular example will be briefly described.

(This case was also presented in condensed form, using the conceptual model, in Simon, 1987.)

A. The Retrospective Interview Option

The option of a major interview at the end of therapy, in conjunction with therapist's notes and referrer's comments was a possible approach. While this seemed a natural progression from the therapy itself, it could only gather qualitative data which would under-use the conceptual model's potential. Difficulties might also be expected over the recall of information and the distortions of perception likely to occur during the attitudinal changes that should be hoped for from the therapy. Further, some aspects of the process of change were anticipated to be unconscious: i.e. synergistic (see 8.5.B.). However, after one case of dramatically rapid improvement early in the life of the study, an interview was conducted. It will be presented here to illustrate both the rapidity of change achievable and the difficulty in the retrospective interview.

A foster family was referred to a Brief Family Therapy project at the Family Centre following doubts as to the long term viability of the placement in the Social Worker's mind. The boy placed was 11 years old, and had been with the family for about 7 years. However, the foster parents had only been approved as 'short-term' and this had rather played upon the Foster mother's mind.

Prior to the referral, the boy had shown unruly, obstreperous and destructive behaviour at home and had been under-functioning and somewhat withdrawn at school. He had not been getting on at all well with the natural children of the Foster parents (all of whom were older than him). A recent incident of importance was the re-commencement of interest from the natural mother, with an increased frequency of distressed phone calls to the Social Worker from the Foster mother.

The family agreed to a contract of 10 sessions (the usual for the project). We worked toward observable change in the boy ('Thomas', a pseudonym). The team comprised the researcher as therapist, two Social Workers behind the one way screen, one of whom was the referrer. The third session was preceded by the arrival of yet another letter from the natural mother, and seemed stronger in seeking some contact with 'Thomas' than before. This was anticipated to cause the Foster mother some distress. Accordingly we agreed to bring into the session both the referring Social Worker (in person) and the natural mother (by means of the letter). Defining the Social Worker as a useful mediator, we set about restructuring the hierarchy in which they all related. The therapeutic techniques will not be detailed, but the overall message was emphasising the Foster parent's competence at their (limited) job, and commensurate with this a long interval was set before the next session.

Before the fourth session, the Social Worker had already witnessed evidence of change, as had her Senior, at a formal Review in the home. This information was offered to the family at the start of the session. The Foster parents agreed completely, a significant departure from the doubting hesitance they had previously shown. They then commented that it had all started in the car driving home from the previous session with us...

A week or so later, quite independently, the Educational Welfare Officer volunteered that 'Thomas' had been better recently: in fact, it had been so noticeable that the Staff Room had discussed it in surprise. Tracking back, the date turned out to be the day after the session known by then to have been pivotal.

We decided to follow this up after six months, and they agreed to come. A mention of a general research interest was made and the session overtly audiotaped with their permission after the usual confidentiality assurances. It is from this tape that the following was transcribed verbatim.

The adults were asked how it had been when we had first met:

FM. "We got to nearly breaking point actually, where things were so chaotic at times that we just didn't know which way to turn, or how to go on."

Th. "I've heard that things have gone well, from [the referrer], and that there's been some ups and downs,

but, from what I've heard they are things that could be expected to go wrong..."

FM. "Well after such a phenomenal change, for it to go like that for ever, there's bound to be a few hiccups ...(pause)..."

Th. "Have you two talked about the change with 'Thomas'?"

FF. "Only since the change - well, um - we felt that anytime he slipped back he [only] needs reminding that he's - (to his wife) - what did we used to call him?"

FM. "Grumpy 'Thomas'."

FF. "Grumpy 'Thomas', (to 'Thomas', with a smile) wasn't it? As I say, after such a phenomenal change, if he slipped back we used to say we thought we'd finished with Grumpy 'Thomas' - didn't we?"

Th. "You still remember those days?"

FM. "Oh yes!"

Th. "When you were at breaking point and not knowing which way to turn and, well, perhaps at the end of your tethers a bit at times..."

FM. "At times!"

Th. "And suddenly that seems to have changed - quite suddenly?"

FM. "It changed overnight - um - 'cos it was unbelievable the way it changed: Grumpy 'Thomas' disappeared one night on the way home in the car - from here - and just comes to visit now occasionally in short bursts instead of being there all the time."

When asked about themselves having changed, they maintained that 'Thomas' had changed first, and then they had relaxed and felt very much relieved.

A number of issues can be brought out of this material:

i. Conflicts between objectives

'Thomas' had been reluctant to come to the session, and remained quite but attentive throughout. Later, he did a drawing for us. It was felt not to be advisable to press him as we felt that he was concerned that the session, held in the same room as before, represented a retrograde step. We did not want to risk confirming his impression by asking difficult questions as though important issues for his Foster placement hung on his words.

The Foster parents had gained some perspective on the situation that existed at the point of referral, but they did not volunteer any information about the nature of the "chaos". It would have been inappropriate to their self-perception to delve deeply into this. Indeed, our initial therapeutic hypothesis included an idea that the adults had a fairly desperate denial of the magnitude of the problems. We had no wish to re-awaken this part of their coping mechanism by now.

The therapist's first statement in the transcribed part of the interview can be seen to be biased in favour of the positive, and to lead to a frame of normality in

describing the 'ups and downs'. This was a direct result of the clinical objective: specific research objectives not having been openly stated, a more 'neutral' and academic position could not be taken. (Of course, this could be approached differently in other interviews.)

ii. Bias factors

The rapidity of the changes, especially so quickly after a therapy session, could have been an embarrassment to the adults. That is, after only three hours of contact, we had solved the problem they had struggled with for months. Quite often, this can lead to perceptions that ascribe the pivotal factor to phenomena outside therapy. This would be difficult to challenge for fear of threatening the therapeutic consolidation.

In this case, the Foster parents were remarkably open and honest about the direction, speed and magnitude of that change.

iii. Interview structure problems

A partly, or fully structured interview might have to be designed in order to elicit the sort of information required. It is perhaps hoping for rather too much to expect family members to understand the various concepts in the model, quite apart from discriminating accurately between them. A 'plain English' protocol of descriptions of Pride, Eternal Hope and Despair, and slow and rapid

change would therfore be required: a set of key-phrase questions would need to be refined. This would only give minimal information, however.

The interview presented above is as good as one has the right to expect. The Foster mother did say later that she had reached a pitch where "I thought it was me that's wrong". This might be construed as showing that she had reached the bottom of Despair and hence been ripe for commitment to any ray of hope she saw. In conjunction with the notes of the session (where the metaphor of a shepherd failing to close the gate and mend the fences was used) this interpretation might fit. However, as research evidence goes, the proposal that this was an example of the Eternal Hope-Despair-Pride double-jump route (see 7.6.B.3.ii) seems tenable only with generosity.

This approach appears similar to the situation that faces the researcher attempting to trace back the process of decision-making in social administration. This, as Donnison et al., (1965) describe it, is tortuous:

> (An) "account of administrative processes makes them appear deceptively systematic and continuous. In practice, the performance of a particular task or carrying through of a particular development, seldom fills the working day of those responsible for it. It may consist of one item towards the end of a crowded committee agenda, a telephone call made the following

month, a memorandum prepared over the weekend dealing mainly with other matters, then a hurried departmental meeting followed by a chance discussion between two people on their way to lunch. Such are the scattered incidents - if the researcher is fortunate enough to be able to trace them - which should be threaded together to produce what the participants may later regard as an unrecognisably coherent story." (p 35, italics added)

Further, since the personal stakes are higher in the therapeutic process than those of the administrative process, the researcher might be lucky to elicit enough to get this far!

The processes of change in a family may not be carried out at anything like this level of consciousness either. They are more likely to be based on some internal adjustments of attitude followed by behavioural negotiations at a perhaps equally unrecognised level. A 'back tracking' exercise may thus never be validated by the participants. The possibility of using this approach with Social Workers at a secondary level by asking about their experiences with rapid changes was recognised (see 8.3.i).

In summary, the appeal of the retrospective interview, even structured, was too superficial for the present study. It carries little promise, and too many difficulties, and consequently could not be used on a wide scale.

B. The Participant-Observation Option

This technique raised a number of issues:

- Logistically, as an employed Social Work manager, the prospect of repeated visits with a note book to the homes of more than 2 or 3 families for an indefinite period of time, was not encouraging.

- The possible conflict and bias effects that might arise when the researcher was also the therapist were a concern for a single interview (see above), quite apart from a regular series of visits. This would be very difficult to account for, though could perhaps be structured under the discipline of Action Research (Clark, 1972).

- The question of what to observe and record was a major difficulty. Should it be problem behaviour, or some other indicator known or thought to be linked to the concept of 'family morale'? This area would require a lot of developmental work with regard to the operational terms and criteria.

- An identified concern was that of the qualitative nature of the data obtainable by this technique. Hopes of rigorous hypothesis testing would involve some form of coding the behaviour (e.g. Vetere, 1984) which might become unacceptably time consuming.

- An advantage that called for consideration was that of the participant-observer approach being fairly recognisable to the researcher's colleagues and employers - on who's goodwill the study would depend.

The difficulties appeared to outweigh the advantages in this approach, and it was not taken up.

C. The Questionnaire Option

This approach generated the considerations:

- Logistically, a questionnaire seemed more manageable than a series of home visits. A self-report type of form could return home with the family instead. Production resources permitting, this aspect was attractive.
- Bias effects were expected to present less of a problem as the researcher would not be present at the time the form was completed. Also any references to the researcher would be of interest in their own right.
- The question of what sort of questionnaire format could appropriately be used would shape the major thrust of the developmental work. The design would support the preference for relatively 'hard' data: i.e. quantitative.
- A possible disadvantage, in contrast to the other options, was that the numerical and 'standardised' appearance might gain less support from colleagues.

Given these points, the decision was taken to follow the third direction. An exploration of the design of a repeatedly self-administered questionnaire format would be undertaken to try to trace the 'ups and downs of family life'.

10.4 Guiding Principles

A number of issues arose during the course of the design and

early implementation stages of the study, that were recognised as being of central importance to the overall consistency of direction. They were consequently developed as general guiding principles.

A. The Subject Families

In terms of the hopes of arriving at results that would be of use in practice, the choice of type of family to recruit was relevant.

i. Client families requesting help with their relationship problems were originally conceived to be central to the sample group as the process of change would offer the most useful data for the practitioner as well as to the research. In relation to the conceptual model, the central interest in the morphogenic changes could be most usefully studied if the family was receiving some therapeutic intervention. However, there could be no guarantee that a curative change would occur during the period studied: the therapeutic outcome could not be that well controlled!

ii. Families who could be described as 'normal' appeared less attractive in the first instance, but were considered to present an interesting comparison group in that homeostatic types of change might be studied. Also, it has been suggested that too little research has been carried out on these families:

> "Objective, longitudinal data about effective or 'healthy' whole-family interaction and its relationship to the children's development, as well as methods for collecting these data, are extremely limited. Existing knowledge from the clinical research tradition in the field has been primarily based on a pathology model. This reflects the traditional clinical approach: identifying those factors that produce disease and developing therapeutic procedures. To the extent that there is a body of knowledge about 'non-labelled' families, it has been obtained almost entirely through cross-sectional studies." (Riskin, 1982, p 67)

The opportunity to study 'non-labelled' families was felt to be worthwhile, both for the sake of that particular area, and for comparative purposes within the present study. In the event, three sample groups were used. However, it must be emphasised that the investigation was not set up as a strictly differential, matched-control study, but rather as an explorative methodological pilot.

iii. The possibility of observing foster families before and after the placement of a disturbed child was also suggested. The contribution these situations could offer concerned the measurement of a pre-placement baseline and the follow through of tracing the perturbations as the placement was made. Should the placement go well, these movements would be

homeostatic; should more serious disruption occur, the changes could be morphogenic - possibly leading to dissolution. However, this was felt to be ethically unsuitable for a methodological pilot, and was not pursued.

B. Design Simplicity

An attempt to explore the usefulness of a conceptual model that offers explanation of a wide range of behaviour, might run into difficulties by trying to investigate the practical implications of too many facets of the model. The Catastrophe Theory basis is in part responsible for this difficulty because of the number of dimensions deliberately brought together: the aim being to model complex interactions. Despite this, the most simple design structure for the study, and the most conservative hypothesis to test remained desirable. That this could only lead to a partial testing of the model was recognised.

C. Ethical Considerations

A number of ethical issues were identified, and were given particular attention since the study could not be approached as a large-scale survey with any anonymity built into it.

i. Confidentiality: written records would be accumulated, and the possibility of computer records becoming subject to the Data Protection Act lead to a careful approach to data storage. The decision was made to insist that respondents choose codenames for them-

selves allowed both a measure of security and a demonstration of the importance it was given. On the computer, only these codenames were stored, with no other identification of the respondents.

ii. Conflicts of interest: the potential difficulties that might arise between the research and therapeutic objectives were considered.

- These conflicts were not expected in the 'non-labelled' families in a direct way. However, it was anticipated that such families might use the opportunity to seek advice on difficulties. This would be responded to by making overt any suspicion that this was occurring, and suggesting a self-referral to the appropriate office. Further, it was noted that:

> "a particularly important area that has been seriously ignored in much family research literature is the matter of the effects, good or bad, on 'healthy' families that result from the very processes of researchers studying them. This aspect of studying 'non-labelled' families, with its ethical implications, must in itself be carefully evaluated." (Riskin, 1982, p 69; see also Rosenthal, 1963)

- For families who were in any therapeutic work, therapy was to take precedence where the situation

became untenable for both activities. (This never arose.)

- The two activities were to be separated in the minds of all concerned as quickly and as fully as possible. During the therapy sessions, a minimum of 'researchy' talk was encouraged; during the research interviews, therapy-oriented discussion was to be deflected as politely as possible. If one activity was mentioned by the worker in the 'other' context, it was for reasons related to the current task. The one exception was the first recruiting discussion, which took place in the first therapy session for those 'treatment regime' families.

- In contrast to the therapeutic approach, the research had a more individually based nature. The private nature of the research was to be emphasised to encourage the family members to honour the 'no peeking' agreement as described later.

- Any acceptance or refusal to participate would not influence any subsequent offer of therapy or other resources.

The ethics of the research venture were felt important enough to be considered early, especially as much of the work would be with families from the researcher's work place, and

conflicts would not be avoidable.

D. Ergonomics for in vivo Research

As the study was expected to take place in the families' homes - their natural environment (see 3.5) - a large number of non-standard influences were expected. No attempt was made to reach a laboratory level of purity for the tasks the families were asked to undertake. The methodological pilot would take an interest in these issues, and the 'ups and downs of family life' must be by nature unpredictable.

The instrument was to be made as 'user-friendly' as possible. Since the research method was moving towards a minimisation of researcher-family contact (excluding the therapy sessions where relevant), no opportunity for error correction, motivating or immediate and detailed follow-up on incidents of interest was available. This 'arms length' feature made for an experimental feel to the project, and before going to press by putting the instrument fully on trial, as much prepartory work as possible was achieved.

10.5 Definitions and Hypotheses

Various operational terms were defined with respect to 'family morale'.

A. The Morale Concept.

This term presented the most difficulty. In the field of organisational psychology, the concept of morale is always

defined in relation to the work done by the subject(s). Thus, it is measured by means of productivity, work quality, and behavioural indicators such as absenteeism, sickness, etc., contextural factors such as line management communication, the physical working conditions, etc. Much of this appears intuitively transferable: for instance, the links between personal symptoms, executive subsystem functioning, and the external stresses can be quite clearly picked out of Minuchin's Structural Family Therapy theory (1974). Analysis of semi-autonomous group functioning (Manz and Sims, 1982) seems to represent much of the possible contribution of organisational psychology in 'micro'.

The family, though sometimes thought of as a work group in terms of child rearing tasks, has never been subjected to detailed analysis in this fashion and the prospect of initiating this was thought beyond the bounds of this study.

The possibility of utilising the 'self-esteem' concept and the measures that have been developed was considered. This was useful because at a conceptual level, the self-esteem notion suits the concept of 'morale'. It offers the possibility that the 'family morale' might be directly found from an average of the personal esteem values. Although seeming to flirt with a dangerous reification of the concept of morale into a reduction, this potential danger could perhaps be avoided. The idea that a mathematical mean might be as close as could be hoped to come to a practically

achievable indicator remained attractive.

There were some problematic issues, however. For instance, the logistics of a daily or even weekly administration of the known self-esteem measures would assume significantly difficult proportions. Also, using a high frequency sampling method would put this sort of measure at risk of a low 'test-retest reliability' as subjects became over-familiar with it. Using a large and complex schedule, or even with a pared-down version, the possibilities of routinised responses, loss of interest leading to a high drop out rate, or opportunistic 'public relations' responses would constitute sources of bias.

With these points in mind, the creation of a working definition of 'morale' came to involve an appreciation of the importance of the mathematical aspects of the concept of 'trend'. Although the mathematical mean appeared a useful way forward, there was also a sense in which integration calculus was also appropriate: it was as though the area under the curve was filled by the family member's lives. Thus, flattening effects might be caused by the time delays in the transmission of news or feelings between members. On the other hand two quite separate incidents in member's private lives might multiply family feeling into a peak (positive or negative) out of proportion with the events themselves.

Another aspect considered was that of the competitive

relationship: for instance, where a 'one-up-manship' battle can be identified. In these circumstances, a mathematical description known as the Ratio Goal Hypothesis might be relevant. Following Richardson (1960), Ostrom (1978) presents the 'regression analogue' of this:

$$Y_t = a + bX_t + e_t$$

where:

Y_t is the observed behaviour,

X_t is the other relevant behaviour,

b is the ratio goal,

a is the 'grievance constant',

e_t is the random disturbance factor.

The 'grievance constant' addresses a number of possible situations. If it is positive, it represents "deeply rooted prejudices, standing grievances, old unsatisfied ambitions [or] persistent dreams of world conquest"; and if negative, it represents "a permanent feeling of contentment". It can be seen that this ratio goal model with a positive grievance factor could form the basis of a model of the relationship of two family members in contention or covert conflict. Indeed, it reminds us of the description of hubris from Palazzoli et al.:

> "... that exasperated pride which has taken up its abode in each of the couple, and can admit no defeat. Failure, or even its possibility, becomes unbearable, and must be prevented at any cost. Withdrawing from the conflict

does not present itself as a solution, for this would be the same as admitting defeat." (1978, p 24).

This base for modelling competitive relationships seems suitable for certain situations, but holds a problem in that a ratio can remain constant and yet the absolute values 'shoot off the end of the scale': how should the scale be set up? Mathematical analysis at this level of detail was felt too involved for the developmental stage of this methodological pilot.

The notion of a 'trend' was returned to, with Chatfield's description being as follows:

> "This may be loosely defined as 'long term change in the mean'. A difficulty with this definition is in deciding what is meant by 'long term'. For example, climatic variables sometimes exhibit cyclic variations over a very long time period such as 50 years. If one had just had 20 years of data, this long term oscillation would appear to be a trend, but if several hundred years' data were available the long term oscillation would be visible. Nevertheless, in the short-term it may still be more meaningful to think of such a long term oscillation as a trend. Thus in speaking of a 'trend' we must take into account the number of observations available and make a subjective assessment of what is 'long term'" (1975, p 13).

In the present study, micro-, meso- and macro-level oscillations were expected: that is, at the content, homeostatic and morphogenic-evolutionary levels. The 'content' level refers to the individual actions, and events a person experiences and reports. The other two levels have been described in Part 2.

These conceptual descriptions of the relevant periods were not sufficiently definite in mathematical terms. In addressing this area, Hartmann et al. (1980) cite several authorities recommending that between 50 and 100 data points be collected in any observation run. These recommendations were set in the context of the interrupted time series investigations where the early half of the series is compared to the later half. The implication of this was that for each half to be internally consistent, 25 to 50 points were needed. This fitted quite neatly with the statement, arising from practice, that one month was a good period to allow for morphogenic changes (Palazzoli et al., 1978). Translating this into a logistically suitable figure, 28 daily samples would provide a feasible minimum involvement to ask of any participant family.

Given this time period within which to base the definitions, these were set up as follows:

i. Stable Morale: a relatively stationary trend, discernible over the 4 week period.

Where:

- 'stationary' means an essentially flat trend, having a slope of zero or thereabouts.
- a certain amount of perturbation is acceptable, as the theory predicts homeostatic perturbations in data gathered by any instrument capable of measuring the more substantial morphogenic changes anticipated in therapy.
- the fact of family therapy theory and crisis intervention literature both stating that 4 to 5 weeks as the duration for a crisis-induced morphogenic change, means that the absence of large-scale alterations in trend must imply stability.

ii. Changing Morale: a distinct transition phase, having two possible forms:

a. The postulated 'discontinuous' type of change would be expected to show a 4 or 5 week period at maximum, possibly much less. A high rate of perturbation and a substantial slope should be associated with this type of change.

b. The postulated 'continuous' type of change would be expected to show a period longer than one month, to have less perturbation and a gentler (but still appreciable) slope than the 'discontinuous' type.

Since no experience was available, no figures could be put on the slopes expected, nor on the ranges of perturbation anticipated.

B. Specific Hypotheses.

Since the project was a methodological pilot, it was the instrument and associated data analysis techniques that were under test rather than the conceptual model at this stage. Consequently, the aim of the study was to attempt to demonstrate the use of the empirical developments, and therefore the Popperian null-hypothesis became:

Hypothesis 1.

> That the instrument and data analytical techniques would not be able to generate any data of the sort that could eventually be useful in testing the model.

To help the testing of this hypothesis, several subsidiary hypotheses were defined. As guides for the exploration, rather than predictive proposals to be disproved, they were not translated into their null equivalents. All references to 'morale' here relate to the operational definitions above.

Hypothesis 2.

> Examples of a baseline pattern of stable morale would be identifiable from individual data series.

Hypothesis 3.

Examples of both continuous and discontinuous changes in morale would be identifiable.

Hypothesis 4.

Examples of both 2. and 3. above would be identifiable in the family mean data series.

Hypothesis 5.

Examples of two patterns of internal differences between the family member's data series would be identifiable in cases where 4. above is found:

i. Sequential changes - i.e. the changes in the members following a discernible order, each commencing after the previous one finishes (see Figure 23, a).

ii. Parallel changes - i.e. changes in the members clustering in a very close association, with two or more individuals commencing the changes in direction in a parallel fashion:

a. Co-incidental - although both traces appear to commence changing direction at the same time, this seems to be individual reactions to the same or temporally close events (see Figure 23, b).

ii. Synergistic - two or more traces changing direction together, initially in response

to the same event, but latterly in response to each other's changes. That is, each member appears to encourage and support the others progress, perhaps unwittingly. The momentum thus gained is a feature of the interaction in a 'belt and braces' form. The interleaving manner of changes might appear as a parallel set of staircase traces (see Figure 23, c).

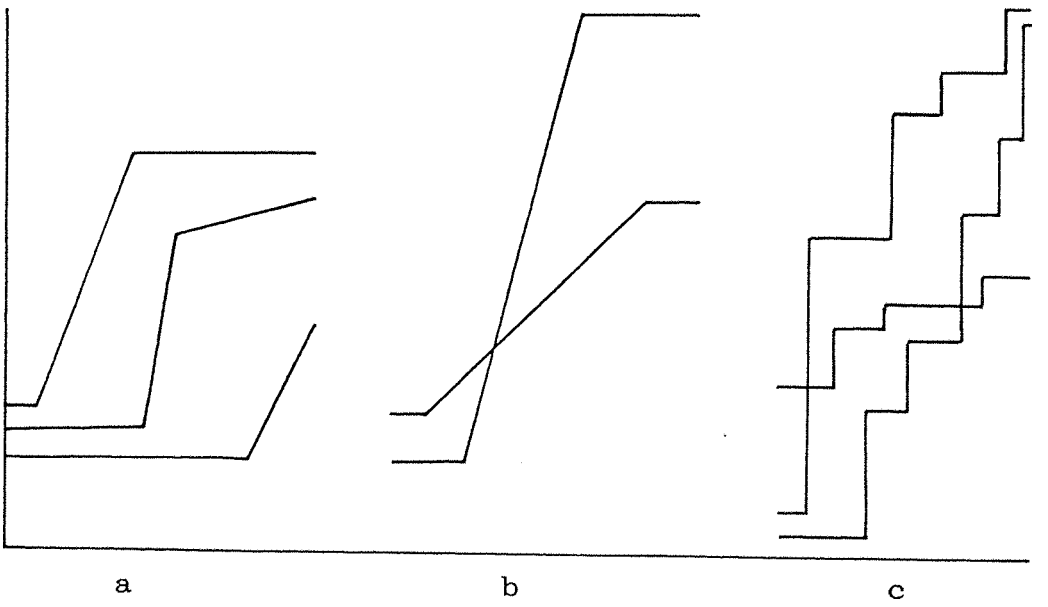


FIGURE 23: FAMILY PATTERNS OF CHANGE

Hypothesis 6.

Examples of two patterns of the discontinuous type of change in either individuals of family means would be identifiable:

i. Single step changes - i.e. one discontinuity (see Figure 24, a).

ii. Double step changes - i.e. two discontinuities close together within the 4 week period. Specifically, the patterns expected were:

a. Eternal Hope to Despair to Pride, which translates into requiring the first slope to be negative, and the second to be positive (see Figure 24, b).

b. Despair to Eternal Hope to Pride, translating as two separate positive slopes (see Figure 24, c).

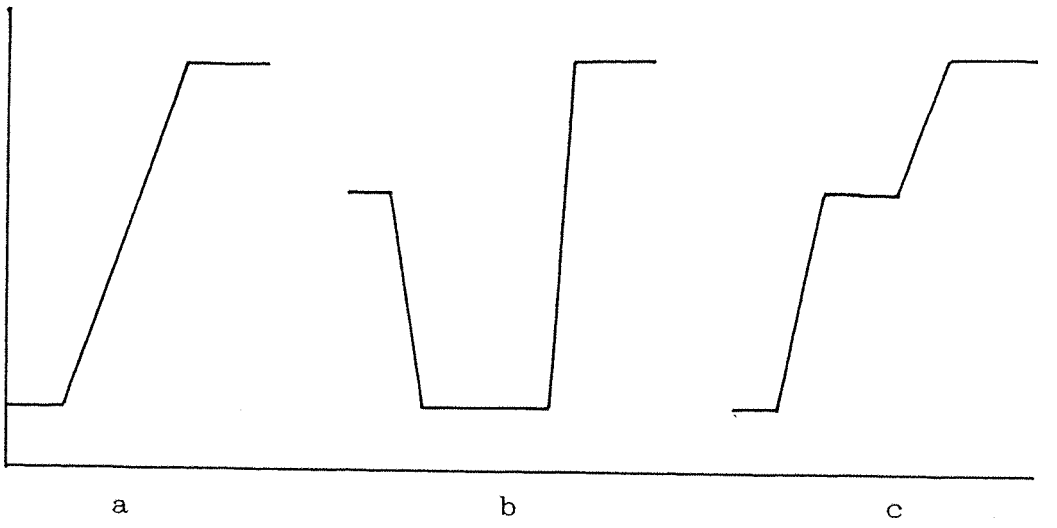


FIGURE 24: THREE TYPES OF DISCONTINUITY

10.6 Design for an Instrument

The development of an instrument capable of gathering data that would be able to test these hypotheses was undertaken. It will be described in the progression from a brief summary of the difficulties through the design steps towards the final product.

A. Difficulties in a Longitudinal Study

Once the decision had been taken to use a longitudinal monitoring device, the next developmental phase was that of design. The guiding principles here were that the format should be simple, cheap, non-threatening, confidential, and practical. The major dimension of exploration was the number of questions that could be asked at any one sampling point in the time span of participation, and the focus of these questions.

Longitudinal studies have been carried out over different time periods ranging from weeks to years, and offering resolutions of between hours and months. The ratios of duration to resolution appeared to cluster such that no reports of long-duration, high-frequency studies were found. It was considered possible that this implied that asking subjects to undertake that amount of work is not feasible. Unfortunately, it was this sort of ratio that was thought desirable to try to catch a family in morphogenic change at an unpredictable point in a span of anything up to 6 months, and yet give an almost hour-by-hour resolution of the process.

Attention was given to the possibility of using known measures, or perhaps a series of chosen key questions. As noted previously, self-esteem measures were particularly interesting. The locus of control and anxiety / aggression / depression scores were examined, as was the possibility of a

problem classificatory coding schedule. Larger, broad spectrum schedules such as the Beavers-Timberlawn (Lewis et al., 1976), Circumplex Model (Olson et al., 1979), Multisystem Multimethod (Cromwell and Peterson, 1983) and McMaster (Will and Wrate, 1985) approaches were unhelpful on various counts. In the main, their size was too daunting, and paring-down did not seem feasible.

Riskin comments on the problem:

> "Following the early clinical-impressionistic studies, quantitative approaches came into vogue. These studies have usually been short-term (a few minutes to a few hours of observation) and have stressed methodology and measurement. Objective instruments have been developed, but most are so complex that their applicability is limited..." (1982, p 68).

The alternative of a small scale instrument of general nature used repeatedly was thought likely to be more relevant to the task of tracking the changes, rather than striving for a format standardised in relation to 'healthy', or statistical, norms. Thus, a set of a few, simply phrased questions asking about indicators thought to relate to change was appropriate. This led to the defining of the most useful focus of these questions.

For example, the following were considered, from:

"How are you feeling today?"

through to:

"Please describe the most important event that happened today to your

a. Mother.....

b. Father.....

c. Brother.....

etc.

etc.

on the 10 point scale described below".

Riskin comments further:

> "Conceptually, advances have been made. A plethora of high-level abstractions and conceptual schemes () have been developed. But the field is noticeably weak in concepts and hypotheses that can be operationalised and subjected to empirical tests." (1982, p 69).

B. Steps in the Design Evolution

Initially, the type of instrument envisaged for this study was a derivation of Kelly's Repertory Grid (Kelly, 1955; Fransella and Bannister, 1977). Being based on the individual's own world-view and Kelly's insistence on Man as a process of life, the Grid was highly congruent with the model's foundations and made an appropriate first step in

the development. Approaches to family grids have been developed (Proctor, 1984, Karastergiou-Katsika and Watson, 1985; Gale and Barker, 1987). This method which was thought to offer a link between individual movements and family health and morale.

However, the usual form of administration was far too cumbersome, requiring some training and 60 to 90 minutes. The possibility of a smaller 'mini-grid' completed on a weekly or even daily basis was still considered too complex. The use of Grids as a 'Before and After' test of change was retained as an option, while the development of the main instrument continued.

The next stage was to consider using a Grid as a Before-only test, and then use some of the constructs, or elements, as daily response scales:

i. One to three appropriate constructs, agreed as significant with the subject, on which to rank order elements such as Mother, Father, Social Worker, Teacher, etc.

ii. The similar use of (say) four specified constructs:

'Who can I depend upon?'

'Who depends on me?'

'Who can I share good news with?'

'Who can I share bad news with?'

This idea was derived from Kelly's Dependency Grid (Fransella and Bannister, 1977) and appears to relate to Attempted Control behaviours, as used by the

model.

iii. The use of specific questions relating to a construct in the Grid (which would have to be 'given' during the administration of the Grid, in order to ensure its presence) asking to whom the subject turned for help with experiences categorised as, for example, practical, feelings, decisions, information, problems, etc.

iv. The use of a bipolar scale to rate the subject's 'general feeling' about the people used as elements in the Grid (again 'given') or at least all family members. Two ratings per element could be requested so that a range of feeling through the day could be recorded.

v. The use of various of the above in conjunction with some form of 'current events' recording format:

   a. a checklist of recurrent problems previously agreed with the subject as relevant to the major complaint,

   b. a simple question enquiring about what the most important event of the day had been.

vi. The use of v.b. above with a bipolar rating scale, and a similar format for the subject's overall general mood of that day.

vii. The use of v.b. above, modified to ask about the most important events:

   a. inside the home,

   b. outside the home.

The final stage of the developmental process was to take format vii. above and consider it logistically as a practical proposal for a daily self-administered recording scheme. As a daily record, the idea of calling it a 'diary' made sense, allowing it to be presented to subjects in a non-threatening way. This led naturally to the idea of a weekly pamphlet, which was then matched with a 'summary' question about the week as a whole for the entire family. The duration of the participation was envisaged as being up to six months. By this means, an approximation of the track of a continuous process of family interaction was hoped to be gained: a higher resolution and/or longer period was not feasible. Details of the final format are presented later, and a copy of the weekly diary appended (see 16.4).

In contrast to the time-budget usage of diaries as data collection tools, the designed instrument was open-ended in terms of the experiences it asked subjects to report on. This is the 'projective' type of self-report method (Cromwell et al., 1976). Subjective responses were asked for: the most important event to them might not be important to another person. It was not simply activities, but significant experiences, being recorded. Young and Willmot (1984) quote de Grazia:

> "By using a strictly quantitative, assembly belt conception of time - time moving as a belt of equal units - one ignores the significance of most activity. A moment of awe in religion or ecstasy in love or orgasm

in intercourse, a decisive blow to an enemy, relief in a sneeze, or death in a fall, is treated as equal to a moment of riding the bus, shovelling coal, or eating beans." (1962, p 347-8)

Also different is the use of a diary format as a 'health log', as Lewis et al (1976) and Robinson (1971) report. Attempting to convert this approach into a 'psycho-social health log' did not seem feasible as defining the terms and criteria would present a major problem.

It can be seen from these other uses of the diary approach that the seeking of such subjective information rather separates the designed format from previous work of this type. Since the study was to be conducted in vivo, (that is, with self-reporting families in their own homes) factual verification was not likely to be possible. Therefore, the trial had to concentrate more on the efficiency of the diary as a means for generating the relevant data.

C. The Rating Scale Design.

The design of the rating scale required attention. Since no standardised results were being sought, the opportunities were wide. The possibility of producing a graphic presentation of the results brought a comparison with the techniques of Force Field Analysis. Here, the results are expressed in terms of the degree of force exerted upon the measured variable (Lippitt, 1973, p 29). This was in some ways an approach intuitively suitable for the presentation of

data to show the homeostatic variations of a morale trend. In terms of the type of data, it demands the rating scale be at least ordinal, if not interval, in form. The Force Field graph illustrates two forces, one at the top of the 'y' axis, the other at the bottom: this seemed to suggest a similar separation of positive and negative experience.

A bipolar scale was defined around zero as the mid-point. A relatively high resolution to the 'y' axis was required in order to offer a high sensitivity to change as was also in keeping with the concern over the resolution of the time axis. Ten points were set on each side of the mid-point, giving a scale of 21 points, ranging from -10 through 0 to +10. For easy identification, -10 was nominated the pole for negative experience and labelled "VERY BAD", +10 for positive experience, labelled "VERY GOOD". These labels were hoped to be general enough for respondents to invest their own personal interpretations of meaning in them. The mid-point was left unlabelled, in case "0" was taken to mean 'no feelings'. The scale points were left unnumbered so as to reduce any 'dehumanising' effects and also to reduce the temptation to compare between the seven days of the weekly pamphlet.

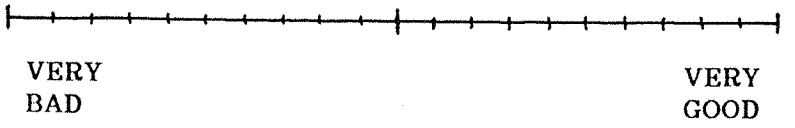


FIGURE 25: THE RATING SCALE

This scale design is essentially of the Likert model which (in theory) should have a continuous and linear relationship between the scale points and the underlying (latent) dimension being measured. It was necessary to be clear that the non-linear Thurstone and Guttman models of scale construction (see McInver and Carmines, 1981, p 11) were less useful. The reason for this was that unless the scale was considered to be linear any discontinuities found in the study could be thought merely artefacts of the scale.

The number of points chosen reflected the belief that the subjects would be able to make the fine distinctions in their subjective weighing of the important events of the day. Exceptions anticipated included youngsters and those adults showing problems such as depression, mania or seriously erratic behaviour. Given the general types of families to be sampled, encountering these was considered unlikely.

During the process of development, the researcher was approached by colleagues interested in using the diaries to help them track the progress of women in a group they were running. This became one of the sample groups for the study. An early version of the diary format was used (as appended, 16.4), the development having only reached stage B.vi above. This meant that direct comparisons could not be undertaken. However, a contrast could be obtained, with a view to exploring their relative efficiency.

D. Overall Diary Presentation

The general physical presentation of the diary was felt to hold important implications for the success of the venture. It was borne in mind that the subjects could not be thought of as ordinary and robust adults drawn from a random cross-section of the public participating in a 'one-off sampling' survey. Children, teenagers and adults having problems affecting their confidence or patience were likely to be the sample. The ergonomic issues such as simplicity, neutrality, confidentiality, and even fun therefore had to be weighed against the research requirements of precision, relevance and logistics. The following design considerations emerged:

i. The title page

It was felt advisable to have as simple as possible a front to the diary. The intention was to present a clearly informative and uncomplex first impression.

- It was made clear that the diaries were a part of a University-based research project. The alternatives of either declaring it as a purely personal or Agency-based project were seen to oppose the preference for neutrality.
- The title stated that the research concerned families, prompting the contrast with individual focused. This, it was hoped, would reduce the likelihood of contamination effects arising from within the family unit. For instance, parents might monitor their children's responses to check they have understood the instructions (like school

homework) for helpful or defensive reasons. Any alterations resulting from this would reduce the validity of the research on either the methodological or the construct-testing front.

- Two 'administrative' questions were placed on the front, as a reminder to subjects to complete them for each pamphlet. They formed clear statements about the confidentiality and consistency issues. The former was brought out by the use of the word 'Codename' rather than simply 'Name'; and the latter was implicit in the request for the date the week began.

All these points enabled the researcher to introduce the issues to the family in the first interview by showing a copy of the diary. Nothing else was written on the front page, so as to minimise distractions.

ii. The Instructions

Two whole pages were devoted to a description of the way the diary worked. One page contained direct instructions, and the other presented three examples of completed scale responses, complete with imaginary events to show their relationship. Implicit in this was a degree of suggestion about the linearity of the scale. The instructions included the issues of privacy, timing the recording and an invitation to describe the events being rated. A 'Thank you' was also included.

iii. The Daily Record

The next seven pages constituted the daily recording section on a page-a-day basis. The two scales were drawn horizontally across the width of the page, the spacing thus allowing a medium sized felt-tip pen to circle an intersection or mark a cross discriminatingly. The scales were preceded by the questions, and followed by a gentle invitation to describe the events rated. A question at the bottom of the page asked for the date and time the rating was done.

The precise wording of the two questions was designed carefully. They were intended to ask the respondent to think back over the day so as to review the experiences. Next the respondent was asked to identify the two events they felt retospectively to be the most important. Both questions were identical to this point. The first then enquired about events "in your home" and the second about events "outside your home". Rather than attempt a definition of the nuclear family, with the attendant dangers of excluding or including members the family would disagree with, the word 'home' was selected. This would allow families to negotiate their own definitions of who was relevant.

iv. The Weekly Question

The last page was the inner side of the cover, on which a final question was placed. This was presented in the same

format as the daily questions, but enquired about the whole week, for the whole family. Again, the two most important events were again referred to, with 'inside' or 'outside' not being defined.

v. The Back Page

The back cover was left blank for any comments about the diary itself. Although a structured set of questions about the diary were to be asked at the end of each family's contribution, it was hoped that 'off the cuff', spontaneous comments would prove helpful.

The above format was created from three pages of A4 paper folded in half to give an A5 sized page. They were typed up on their side so that once folded and stapled, they formed a book-style pamphlet. Once the master copy was completed, the photocopying was straightforward.

E. The Relationship between Instrument and Model

While the objective of the method uder development was to support the conceptual model with findings from real families, the relationship between the instrument and the behaviour axis of the model must be clearly stated as being low.

The temptation to attempt to define the three major levels of the conceptual model in terms of the measurement scale was resisted. For instance, the suggestion might be made

that the Pride area should be defined as the upper third of the scale, Eternal Hope the middle section, and so on. However, this was subject to two serious constraints. First, this would only hold toward the 'front' of the construct, since the 'back' was defined as continuous. Second, there could be no reassurance of a direct equivalence between the 'morale' axis and the measurement scale. The study of the discontinuities between the levels in finite terms was not included in this limited excursion into empirical study.

However, the aim was to attempt to demonstrate a discontinuous change: i.e. a jump from Eternal Hope or Despair to Pride. The exact direction could not be evaluated since the Attempted Control and Perceived Need axes could not be sampled by the method. If an example of the 'step' type of shape was found, then the implication would be that there was evidence to support some match between the scale and the model. Further strengthening of this support would be gained if the range of variation of the two horizontal parts were separated by an appreciable gap. That is, if the levels of 'noise' on the baseline and the subsequent stable trend were limited such that they did not overlap, then a discontinuity could be proposed (see Figure 26). On the other hand, an overlap, if found, would not rule out a discontinuity. Whether or not evidence was found was not crucial to the model, since the complex behaviour surface exhibits both continuous and discontinuous areas, both covered by the

scale. However, a finding of a discontinuous jump was felt to be sufficient to validate both the model and the method.

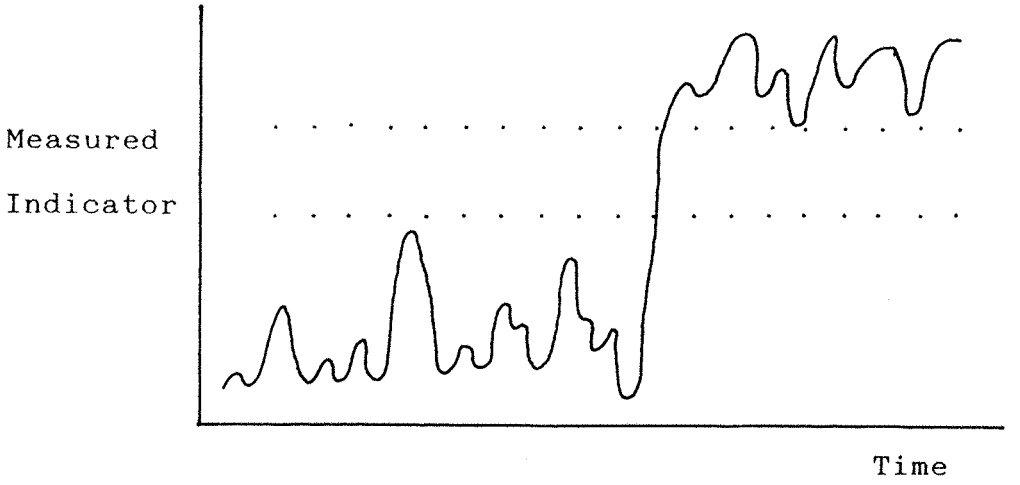


FIGURE 26: Possible Evidence for Discontinuity

10. 7 Additional Data Sources

The diary format was constructed as the main data collection instrument for the numerical base of the study, - two other sources were used. The first was a culling of data from the Agency research forms that predated this study. The other was essentially a follow-up questionnaire about the diaries as a task completion exercise.

A. The Follow-up Questionnaire

In as much as this work as the piloting of a method for analysing family patterns was known to broaching new areas of investigation, the relatively simply procedure of following up families co-operating with the study was felt to be an important opportunity. Gathering retrospective ideas and feelings about the exercise as a whole was consistent with the exploratory nature of the study as explained to the

families, and the divergence of the therapist/researcher roles at this point was felt to be generally manageable. The aim of this set of questions was to elicit material that would be useful in forming a critique of the method, and consequently the material sought was the respondents' subjective experiences after having undergone the self-evaluative procedures requested by the diaries.

A semi-structured interview framework was used with a questionnaire providing the base, additional comments being noted longhand - some verbatim. The questionnaire, titled "Diary Completion Questions", was designed with five 'A to E' rating questions, one multiple choice question, and room for volunteered comments. Confidentiality was preserved by the use of the previously chosen codenames. The entire format was presented on both sides of an A4 page with instructions in the introductory paragraph. The first five rating questions were concerned with the individuals feelings about how easy the various component tasks of the diary were to them. The sixth question offered five specified possible reasons why the respondent may have put less than the requested four crosses per day on the scales, and asked what the reasons might have been if none of the alternatives presented were relevant.

B. The Family Profile Format

The third data set collected were the general facts of the family's situation so far as the research was concerned.

These facts included four research items (codename, family ID code, status and no. of weeks' diaries completed). In all cases, the occupation of the head of the household was taken for social class identification, using the HMSO Classification of Occupations (1980), and the Class was recorded for comparison between the groups (see Figure 28).

Where appropriate some information culled from the Agency's own research forms (Name, Age, Occupation, No. of children under the age of 16, Family Structure code and Presenting Problem code). Also collected were some subjective items from these same forms which were concerned with the level of risk the child(ren) was perceived to be at - particularly with regard to the likelihood of Avoidable Care or Custody or other unprofitable family separation, and the subjective rating of the change of risk level, and the similar rating of the achievement of planned objectives. The subjective ratings were given, in the first and last instances, by the referrer, the middle one being the workers directly concerned with the therapy. Dates of therapy sessions were also recorded.

An example Profile form is appended (see 16.4).

C. General Observations

In that the researcher was a practising social worker and the research involved the families in some form of task with observable behaviour, notes were kept on the 'clinical'

observations where possible. The categories of tasks that were observable were as follows:

i. How the decision as to who participated was undertaken.

ii. How the family grappled with the learning involved in the diary completion procedures.

iii. How they went about choosing the codenames.

iv. How they responded to the issue of privacy within the family.

v. How the general task of completing the diaries was achieved.

vi. How the Follow-up questionnaire/interview was responded to.

These categories were used to make written notes after the interviews and/or tasks were done. No standard scheme or coding was used: these were comments arising from professional observations which might aid at a later date the recall of particular features about each family, and might help in creating a pen picture for descriptive purposes.

10.8 Data Processing Techniques

The diary format was designed to collect data, hopefully in large quantities, for the purpose of examining the 'ups and downs' of family life. The aim was to utilise this data in such a way as to optimise this examination. Specific techniques were required in order to enable sense to be made of the mass of data, verbal and numerical.

A. Commentary data

The approach to the analysis of the text written in the diaries was potentially problematic. Having invited an open-ended response from the subjects, there might have arrived an enormous quantity of material that would be descriptions of the four important events each day. It would not form a narrative, but a collection of discrete items. Because of this, and the fact of the scalar data being the primary basis for analysis, the choice of approach to this data was deferred until after the numerical analysis. A selective examination would then be undertaken, of certain individual's data to seek supportive evidence for any awareness of the change found in the graphs.

A few areas of interest were identified:

i. Commonality - the degree to which the same events were described by the different family members, and the degree of similarity in rating them. This was expected to be more relevant to the 'Inside the Home' scale than the 'Outside' scale. However, it was recognised that the subjective nature of the exercise meant that a higher commonality would be expected from a quiet, introverted and centripetal family than an extrovert and centrifugal one, so this area could not be thought of as an internal consistency test for the diary. An excessive degree of commonality might suggest that adults were colluding, or 'guiding' their children (even unwittingly).

ii. Association with the scalar ratings - would patterns

about the events mentioned be identifiable? Perhaps the text would reflect a subject's awareness of changes that would show in the graphs? Would repetitive patterns be found that might support the circular therapeutic hypothesis?

iii. Any mention of the researcher in either research or therapist roles would be interesting.

iv. Any comments about the research itself would similarly be interesting.

B. Numerical data

The rating values from the -10 to +10 diary scales were the major data to be recruited from the sample. The instrument and its instruction set was designed to promote the return of quantitative data first and foremost. Upon the processing of this data depended much of the outcome of the study. Two data analysis approaches were found to be valuable in this situations: the general area of Exploratory Data Analysis and the more specific field of Time Series Analysis.

i. Exploratory Data Analysis

The definitions of the hypotheses (see 10.5.B) could not be made sufficiently accurate with respect to previous research findings to allow a rigorous testing. The aim was to explore the proposals of the conceptual model tentatively, teasing out the patterns and trends as best could be done. A school of analysis has systematised this approach: Exploratory Data Analysis, which acknowledges that the:

"...principles and procedure of what we call

> confirmatory data analysis are widely used...We can no longer get along without (it), but we need not start with it."
>
> (Tukey, 1977, p vi)

This position suits the present study by allowing a starting point for a methodological pilot study where the results may fall short of confirmatory of the model's hypotheses.

Much of the additional data collected was intended to provide background information for the families sampled. No data processing was expected beyond simple totals and means. The Follow-Up Questionnaire was designed to produce quantitative data for comparative purposes as part of the methodological analysis. However, the A to E rating scale provided produced ordinal data, and was hence subject to the same restraints as the scalar data as mentioned above. Again, only a low level of inference from this data was anticipated and the results were expected to be sufficiently useful for the present purposes.

ii. Time Series Analysis

In taking the longitudinal data collection method, the series of data points must be treated in ways that do not disrupt their order in either the processing or the interpretation. As Gregson says:

> "The major stumbling block of time series analysis is the problem of seriel dependency. Seriel dependency means that adjacent observations are more similar than observations that are not adjacent. It violates the

assumption of independence." (1983, p 138)

The data set must be treated as a coherent sequence in which time is an essential feature. Indeed, this is very much the objective of the study, which Gregson (1983) contrasts with:

> "...the most common methods of representing quantitative results in psychology (as) frozen outside time; thus they deliberately average out much of the sequential structure that holds any sparse clues as to the nature of the processes within the organism." (p ix) "...the paths that the system takes, in time, to get to or back to a steady state." (p 8)

One of the benefits of time series analysis is that much of its output is in graphic form, and:

> "...the greatest value of a picture is that it forces us to notice what we <u>never</u> expected to see."
> (Tukey 1977, p vi, original emphasis)

Lippitt states that:

> "In the perception of shape lies the beginning of concept formation. () The perception of shape is the grasping of structural features found in or imposed on the stimulus material." (1973, p 27)

Relatively late in the study, an example of a simple use of the time series approach was published in the Family Therapy literature. Kenji Kameguchi (1986) shows the performance of a school-refusing child graphically, plotting percentage attendance against time (monthly). A sharp decrease from 100%

to 0% shows the onset of the problem, and after four sessions the attendance begins to rise to 100%. In the first two months of this rise, approximately 90% of the attendance is regained, and over the next three months the remainder returned. In terms of Catastrophe Theory, this perhaps demonstrates a discontinuous resumption of 'normal' behaviour, followed by a consolidation phase where other (home based) problems of obedience, doing chores, and doing homework were tackled.

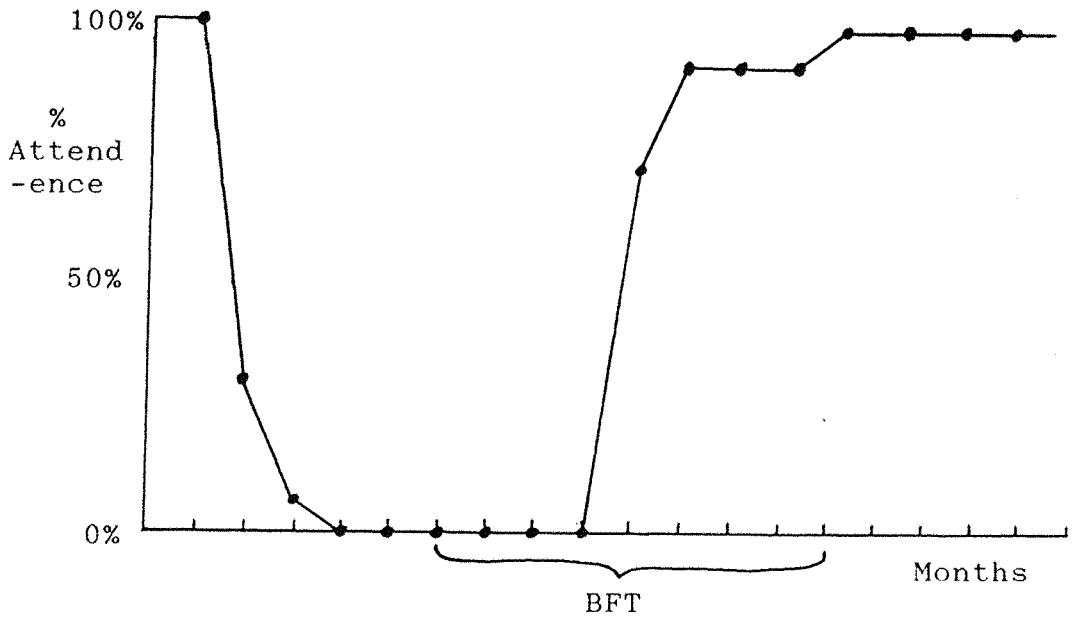


FIGURE 27: SCHOOL ATTENDANCE PROGRESS

A means to process the data so as to show these sorts of shapes of the trends was developed. Techniques of curve-smoothing were included because of their ability to transform the data to show these trends. Tukey (1977) advocated the use of a technique known as the 'Moving Median' and a number of other authors recommend the 'Moving (or Running) Average'.

Additionally, techniques of 'Hanning' and 'Splitting' were available. Given the starting point of the study, the first two options were retained, the other two being noted for possible future use.

Another means with which to examine the data was thought useful for inclusion was that of the 'simple average' over periods of a week and month. By collapsing the data into these periods, trends associated with the Family Therapy and other relevant literature might emerge. The disadvantage was that much detail would be lost within each week, since seven data points would be represented by one.

The derivation of linear regression values was thought to be useful in addressing the issues of the slope of a trace as the hypotheses dictate. This type of manipulation had to be treated with caution: the scalar data was ordinal in type and therefore not suited to rigorous statistical testing with the parametric tests (Siegal, 1956). However, the independent variable was of the interval type (days), which lessened the violation of the parameters. Further, each subject's own personal construction of the linearity (or otherwise) of the scale was retained coherently: any deviation from the interval nature described in the instructions and inferred in the examples in the front of the diaries would be retained within the data time series. It was not to be compared mathematically with any other subject's series and so the assumption of linearity required by the interval parametric

tests was not called upon. With the qualification that definitive comparative work could not be undertaken, the use of slope values was thought useful to demonstrate the quality of the trends. Revenstorf et al. use linear regression calculations on similar data with appraent confidence, but even so, comparisons by eye were the only approach felt valid here.

Various inter-relationships between the data series collected were thought to be worth investigating:

i. The intra-individual patterns - the variations between the four ratings per day; for instance, a poor experience at 'Home' might be consistently balanced by good experiences 'Outside'. Similarly, departures of the responses from the trend might prove interesting.

ii. Intra-familial patterns - for instance, counter-balancing between individuals might show evidence of homeostasis mechanisms.

iii. Inter-family comparisons were thought beyond the realms of possibility, with the exception noted of aligning all examples of a step discontinuity together and finding a mean. This might show a stronger outcome of the pattern.

In order to utilise all the various techniques in all the various applications, a flexible approach had to be designed. To allow this, and to handle the quantity of data that was expected to be collected, it was necessary to develop a computer programme.

C. Infinite Explorations?

The processing of the data was to be done on an explorative basis. A large amount of data was anticipated for each subject, therefore the potential areas of pattern-seeking noted above - the variety of permutations - were thought to be large. The implication that had to acknowledged was that a limit would have to be called at some point meant that the possibility of this being prompted by logistical issues (e.g. time) rather than a clear 'success or failure' indicator.

10.9 Conclusion

The objective of the methodological development was to enable the implementation of a practical study. The eventual scheme that evolved was reasonably suited to the researcher's working environment and was permitted to proceed by the Social Services Department management.

The subjects were recruited and inducted relatively rapidly and the visual inspection stages undertaken as the diaries returned. The development of the computer programme took much longer and this seriously affected the data analysis, both through delay and failing to reach the required effectiveness in the full repertoire of routines. Further, the fact that "Diaries are among the most arduous techniques to code and process" (Oppenheim, 1966,p 219) was little consolation.

The method was was sufficiently developed to be implemented in an orderly manner and results obtained for discussion.

11. A PILOT STUDY: THE METHOD

11.1 Introduction

11.2 The Sample Groups

A. The Brief Family Therapy Families

B. The Day Care Group

C. The Contrast Families

D. Comparisons

E. Recruitment

11.3 Data Collection Management

A. Introductory Interviews

B. Logistics of the Diaries

C. Terminating Participation

D. Data Interpretation

11.4 The Computer Programme

A. Programme Functions

B. Sample Choice Control

11.5 Conclusion

11. A PILOT STUDY: THE METHOD

11.1 Introduction

Having developed an instrument and data processing method after the above deliberations, it was put into operation with three sample groups of respondents. These respondents were recruited, inducted into the procedure and finally debriefed. The diaries were produced, delivered and collected. The data was then assimilated, computerised and inspected.

11.2 The Sample Groups

Three sample groups were used in this study. Two were designed for, the third arose fortuitously. One group was of healthy, non-labelled families; the other two attended two different treatment facilities at the researcher's place of work. The objective was to gain six families in each group. Each group was required to be separate from each other: that is, subjects were not allowed to belong to more than one group for the period of the participation.

A. The Brief Family Therapy Families

This group of families were recruited from the Brief Family Therapy Project at the Family Centre, Isle of Wight. Criteria were that the family had been referred to this project (henceforth called 'BFT'), that they had children of any age, and that they were willing and able to participate. The introduction of these families to the study was hoped to occur as quickly as possible after the commencement of the

therapy. For an ideal trace, starting the diaries before the first therapy session would have been preferable: this was not feasible, however. No standard duration of participation was expected because the BFT project routinely contracted for 10 sessions, but with a uniquely variable interval. However, the treatment regime prompted the hope that these families would show examples of the 'discontinuous' change.

B. The Day Care Group

These mothers and toddlers attended a group Project for young families at the Family Centre, Isle of Wight, known as the Family Day Care group ('FDC' for short). They were characterised as having a high percentage of single mothers. As the study was being developed, the workers in this Project approached the researcher to negotiate the use of the diaries with their client group. Their aim was to enhance their treatment through the information gathered, and to help the mothers' self-awareness. The early version of the diary was used on the understanding that the data would be available to the researcher for analysis. No standard duration was expected. Because of the educative and peer-group pressure nature of this treatment, 'continuous' type changes were anticipated. As the culture of participation grew, incoming clients tended to agree to participate as a matter of course, and this, combined with the worker's emphasis, made for a high consistency of completion.

C. The Contrast group

It was felt that a number of families who were not complaining about problems serious enough to warrant professional attention would help examine the usefulness of the diaries. That is, if these families found the instructions difficult to comprehend or difficult to complete with discrimination, then families disadvantaged through their problems might not be able to use this recording format well enough to maintain the credibility of the results. It was decided to limit the requested participation of these families to four weeks. Examples of 'continuous' and 'discontinuous' changes were not expected in the ordinary course of events. Thus only 'normal' homeostasis perturbations were expected. If at all possible, the timing of this month was to be adjusted to include significant (but ordinary) life events, such as a member leaving home, a change of school, a birth, a holiday, a return from hospital, etc.

D. Comparisons

	BFT	FDC	Contrast
Number of families	5	6	5
Number of members	16	6	18
Mean social class *	2.8	2.1	2.8
Family Structure:			
intact, nuclear	3	4	3
reconstituted	1	0	2
single parent	1	3	0

FIGURE 28: TABLE OF COMPARISON: THE THREE SAMPLE REGIMES

(* Taken from HMSO Classification of Occupations, 1980) (with unemployed and single mothers rated zero.)

E. Recruitment.

Each group was recruited by the different means according to the nature of the group.

i. The BFT group were recruited through the therapy sessions: the objective was simply stated as making the request to all eligible families, consecutively, until the desired number of six was reached. In the event, only five were found before the line was drawn on this stage of the study because of a down-swing in the referral rate, combined with a high rate of ineligible families and two refusals.

2. The FDC group were recruited through the task set by the group leaders: they all discussed the research project, and all agreed to participate. This was relatively straight-forward as the members were only deciding on their own behalf since they were the only respondents in their families.

iii. The CONTRAST group were recruited slowly and sporadically through word of mouth and advertising. By definition, these families were not connected with the researcher's Agency, and had to be found by other means. Some were friends of the researcher's wife, one was recommended by another CONTRAST family, one was interested by an advert placed in a local church magazine. Other adverts, placed in local corner shops, a supermarket, and the researcher's workplace Staffroom provid-

ed a disappointing response. Three families were ineligible because:

- one had contact with a Social Worker (but this was only found out by chance),
- one had no children,
- one had extremely young children.

An example advert is given below:

VOLUNTEER FAMILIES WANTED
to keep a daily diary for 4 weeks
SOUTHAMPTON UNIVERSITY
FAMILY PROJECT
Telephone.....XXXXXX

Overall, it took roughly eighteen months to recruit, induct and follow through all participants.

11.3 Data Collection Management

As the three groups of families were recruited and managed separately, various differences were apparent. Some were due to the differences in the research aims set for each group, some to the nature of the context of the group. For instance, the CONTRAST group were found through non-Agency contacts, which meant that the researcher role was clear and unambiguous. The FDC group were a primary group in their own right (i.e. they met face to face) which allowed their diaries to be collected and monitored by the group leaders.

Because of these differences, efforts were made to note departures from consistent guidelines. This was not to attempt any matched-group control methodology, but to monitor the effectiveness of the diary format.

Three phases - introduction, participation and termination will be described, using the management of the CONTRAST group as a basis.

A. The Introductory Interviews

1. CONTRAST families: the research was introduced as University based study in search of volunteer families. The project was aimed at investigating the 'ups and downs of family life' on a day-by-day basis. If the initial curiosity was continued, a home visit to meet all the family was arranged, and a sample diary given to inspect. The various issues of confidentiality, consistency, privacy, the pilot nature of the study, the interest in comments and criticisms and (again) that contribution was voluntary were discussed. If they were still willing, the issues of who was eligible to take part, the choice of codenames, and the logistics were negotiated. Then a detailed run through of the recording procedure was undertaken and a few personal facts were collected.

The purpose of the first meeting was to inform and negotiate involvement. Some of the above issues shaped the 'contract' with the families, and will be expanded upon:

i. Privacy - it was stated that as the study was as interested in individuals as families-as-a-whole, preserving the privacy of the diaries was important to their freedom in responding as fully as possible. They were asked to hide their diaries, to agree their private nature, and to resist the temptation to peek. No refusals were encountered. Some families thought the matter a laugh, others were insistent on member's established rights to privacy.

ii. Confidentiality - the wider issue of where the diaries would go after completion was discussed. The intention to use of a computer was used to introduce the idea that security through the use of codenames might be advisable. This often produced hilarity, although occasionally some resisted what they appeared to find an imposed 'identity change'. The families were reassured that the circle of knowledge would be very limited and any publication would use only codenames and the usual camouflage conventions.

iii. Client stigma - the scope of the study was mentioned and it was acknowledged that some of the families were receiving a professional input. This issue was not dwelt upon as any thoughts that the CONTRAST families might also have problems worth professional consideration were to be avoided. It was anticipated that if a family did begin to bring skeletons out for covert professional inspection, the research contact would be closed down. A polite withdrawal and advice as to where to go for help

would be made. This problem was never encountered. Occasionally, the description of CONTRAST families as "ordinary" was used as an icebreaker or reassurance that this family was not considered a client; but care was exercised as some families might have felt this term a slight on their identity.

iv. Active participation - this was encouraged with dual purpose: to reassure that no 'correct' answers were known, and from the viewpoint that a pilot study needs all the feedback it can gather.

v. Consistency - the study's high dependence on continuity of response was made clear. The diary instructions were used to focus on this. The difference between the scalar ratings and the text responses was made, and the acceptability of responding with the former only was put to them. The timing of the activity was raised: at bedtime they could 'think back' over the entire day. This was complicated in two families where a spouse was a night shift worker: bedtime could be at 9am, but this was held to as the end of that member's 'day'.

vi. Voluntariness - this was always emphasised. This did not concern the families, as curiosity seemed the main motivation for participation. A number of families did decline the invitation to join the study, and no further mention was made in any further dealings with them.

vii. Eligibility - a negotiation as to who would be suitable to participate was necessary. The initial interview was quite often started with the parents alone, and they

were asked to consider who would be physically and mentally equipped to undertake the task. For instance, live-in grandparents and young children were raised as possible exclusions. On one occasion, eligibility was discussed about one teenager who was about to leave to become independent at college and would therefore be physically absent: the interest of such a major life event suggested inclusion, and this was agreed.

The few items of information required for the Family Profile were collected: names, ages and occupations.

The process was essentially similar for the BFT families. However, the FDC mothers were inducted by the group leaders, who were asked to discuss similar issues where appropriate.

B. The Logistics of the Diaries

For the CONTRAST and BFT families the diaries were delivered and collected weekly if at all possible so as to keep a turn-over continuing. This was to prevent a build up of diaries that could then be compared from week to week since this was thought to be likely to lead to a contamination effect. This was achieved in all but a few instances, when hold-ups resulted in gaps in the data series. Some subjects, notably in the FDC group made up their own diary from plain paper, drawing out the scales and then scoring them. On occasions, agreed gaps were negotiated: for instance during a hospital-isation. On the other side, holidays and a removal to new

accommodation allowed extra diaries to be given in a bundle.

The FDC group had a weekly meeting which automatically generated a weekly delivery/collection cycle.

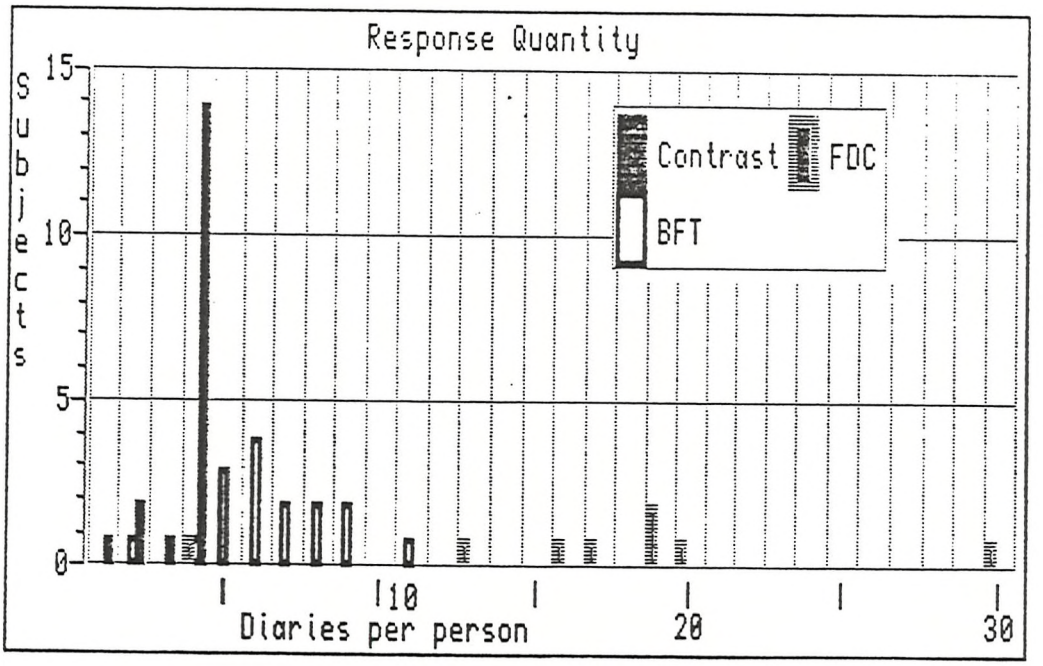


FIGURE 29: THE DIARY RETURN QUANTITIES

In total 353 dairies were delivered, completed and collected.

C. Terminating Participation

After the certain periods of time the diaries were stopped. This was after the contracted four week period for the CONTRAST families, upon leaving the Family Day Care group for the FDC mothers, and as negotiated with the BFT families.

The families were thanked for their contribution and asked to complete the Follow-up Questionnaire. Comments of any sort about all aspects of the research were encouraged and noted.

Confidentiality was again stated, and the family member's agreement in principle to being 'written up' in disguised form obtained.

D. Data Interpretation

The family scalar data was entered into the computer in order to store it in an accessible manner for the computerised Exploratory Data Analysis. The 353 diaries created 10590 individual data points approximately. Since the coherence of the traces - the seriel dependency - was crucial, the data had to be lifted from the diaries in a standardised form. Therefore certain interpretation conventions had to be observed.

i. Where one cross 'X' was put on a scale, this was always entered as the first (i.e. lowest score).

ii. Where three or more crosses were put on the scales, the outer two were entered as scores.

iii. Where the crosses were occasionally not plainly placed on the scale points marked, they were attributed to the nearest point as judged by eye.

iv. Where the crosses were consistently placed between the points marked, they were 'rounded out' toward the poles, thus making 5.5 into 6 and -7.5 into -8.

v. Where arrows and comments indicated that scores had been wrongly entered and the respondent had realised this and wished to show the amended state, these instructions were observed.

The FDC group member's data was entered similarly, except where the diary structure varied from the family diary:

i. The instructions ask for these respondents to order their crosses to show initial and final responses to the most important experience of the day. Therefore, the data were entered in that order: initial first, then final.

ii. All data were taken from the same period in chronological time (March to August), regardless when the respondent commenced the group. The effect of this was to make all data synchronous, but losing any view of the methodological issues of initial uncertainty of response or 'dropping off' with time.

11.4 The Computer Programme

The programme was initially developed on a Commodore PET computer with a double disc drive and daisy wheel printer. Midway through the development process, the work was transferred to a Sinclair QL computer with double cartridge drives and a dot matrix printer. The reasons for this included the fact that the QL was bought for home use and was therefore accessible more readily, the language for was upgraded from BASIC to SUPERBASIC, the resolution on both the VDU and printer was much improved, and the operation speed was increased. These reasons made the QL the more powerful in most respects. The areas in which it did suffer where the storage medium (microdrive cartridges) showed difficulties in reliability and in limited file capacity. Secondly, the RAM

memory size also proved limiting, as the programme size and data array size were too large relative to the memory capacity.

A. The Programme Functions

The programme was developed with Exploratory Data Analysis in mind. The objective was to use the computer to store and analyse the data, and then provide visible results. This required a high degree of flexibility in the number and type of commands that had to be offered by the programme. The various functions will be described in broad here, with more details and the programme listings available in the appendix (16.2 and 16.3).

i. 'Management': the options of entering data, exploratory data analysis with or without statistical work, and graphic output printing were offered. These were the major empirical tasks undertaken and were mutually exclusive. Only rarely were two or more options required at a sitting. Choices ii. to x. are the EDA ones, and xi. and concern data input.

ii. 'Data Source': Some types of operation were defined here according to the type of data to be used - particularly whether it used the raw data as collected or used it in a form that had to be substantially operated upon first. In this category were the comparisons of data series: between a family mean and a member, between two members to examine the time relationship or 'lag', and between the raw data and the derived trend to show the

discrepancy through time. The other category allowed a choice of one or all the crosses, the former allowing statistical work while the latter prohibited it.

iii. 'Scale Format': Choices over which scale (Question 1 or 2), their mean or difference, or the weekly scale (Question 3) were offered.

iv. 'Scale Response': This set of options related to the lower of higher cross on the scale chosen, the mean or difference, or both.

v. 'Manipulation': This decision point allowed various mathematical treatments of the data series, while keeping the series' integrity. Options included no treatment, curve shrinking effects (e.g. weekly or monthly means), or curve smoothing effects (running averages or running medians). These were the most powerful data exploration tools for examining trends and changes of trends in the (sometimes) highly scattered values of the raw data.

vi. 'Period': This choice subset related to the curve shrinking option, otherwise being automatically set at daily or weekly for the data source chosen.

vii. 'Factor': Likewise, this subset related only to the curve smoothing operations, allowing larger or smaller resolution 'tools' to do the smoothing, singly or in a preset combination.

iix. 'Analysis': This option set offers two types of statistical analysis, or both, or none. The two types were essentially in the two directions of the axes, i.e.

longitudinal in time (trend) and across the 'morale' scale (cross-section).

ix. 'Range': Where Analysis was chosen, the choice of the whole curve or a section of it was given. For the latter, the section could be defined on a pre-set basis before the operational run, or interactively during explorations.

x. 'Sample': The type of data sample was chosen from individual subjects, family means, 'regime' (sic) means, and interactively defined subset means.

xi. 'Enter': For data entry, the major options were those of establishing a new file, updating an existing file, and generating family or 'regime' mean files.

xii. Entry mode was ascertained, offering either typing in straight from individual diaries or bulk entry from several diaries belonging to the one subject.

The above instruction set offered a range of Exploratory Data Analytic operations of approximately forty. Some unevenness of the texture of the instruction set was necessary to allow sub-sets to be constructed for particular reasons. For instance, for curve smoothing, a variety of smoothing factors were allowed, which were not applicable to any other manipulative operation. The full width of operations were not explored as the programme was constructed to offer opportunities rather than prescriptions. The range of possibilities was so large when combined with the number of variations of data (41 subjects, 4 traces each, sectionable in their own right, all comparable between

traces, family members, and family and regime means), that it was impossible to explore the full potential of the programme.

For the EDA operations, a number of 'Run Management' options were given. Bulk analyses could be set up by means of a repetition technique. The first and last members could be chosen, but no exclusions were allowed for: this was simple task queuing in an automated circle. Given that curve smoothing data manipulation operations were themselves highly reiterative, the total time for a large number of data files being treated thus indicated overnight runs. Automatic hardcopy production was allowed. All interactive and keyboard scanning activities were disabled for this type of work. Finally, the choice of whether to show the results in their 'real' form of data points or to link these into a line trace was offered. This defaulted to the latter, and was invariably used because it provided the most visible trace.

B. Sample Choice Control

The choice of subjects was given at the end of the operational parameter choice section of the Exploratory Data Analysis part of the programme, and in the Data Entry section. It was provided in a separate window in the screen, in a simple paged list form.

Three different types of list were available:

i. Individuals were grouped into their families, and were

identified only by their Codenames and Family ID codes.

ii. For choices of Family and Subset Means, only the Family ID codes or the Codenumbers of the Subset members were listed.

iii. For the 'Regime' choices a single page offered the three options.

Since the files were all separately stored on a single cartridge, this operated as a Random Access Memory and no difference was found in the recall of any file, barring effects arising from the file size. Access time varied between 30 and 60 seconds, which was by-passed when the same data was required for a second enquiry, as the previous file number was checked before the cartridge file was found.

Examples of the screen appearances can be found in the Manual in the appendix, though by the multiple choice approach the variations were too large to attempt to show many examples of the EDA parameter choices screen.

11.5 Conclusion

The method proved operable, though not without its problems.

The 'production line' of diaries was demanding of time and administrative support would have been helpful here. Resources to aid the postal delivery and return of the diaries would have made the process smoother and less labour intensive, though losing the personal contact that may have

helped keep up subjects' motivation. Computer hardware problems could have been avoided by an earlier appreciation of the requirements. However, the availability of adequate computing power may have been difficult to find without the full resources of a Local Authority or nearby University.

In summary, the method was sufficiently workable to enable a body of data to be collected and examined, and the results of these explorative analyses will be described next.

12. RESULTS OF EXPLORATORY DATA ANALYSIS.

12.1 Introduction

12.2 Methodological Analysis

A. Direct Observation

B. Visual Inspection

C. Response Quantity

D. Response Quality

E. Time Relationship Issues

F. Follow-up Questionnaire

G. Implications

12.3 Data Analysis

A. Homeostatic Patterns

B. Morphogenic Patterns

12.4 Conclusion

12. RESULTS OF EXPLORATORY DATA ANALYSIS.

12.1 Introduction

The completed diaries were examined in the light of two different questions: the methodological analysis and the data analysis. The data relevant to the 'ups and downs' of family life were abstracted and the numerical data processed by means of the computer programme. The observations relevant to the diary as a method were collated to form a criticism of the method.

The diaries were examined in the following sequence:

- The scale data was entered into the computer,
- Visual inspection of the completion of the diary,
- Computerised analysis of the numerical data,
- Visual exploration of the diary text.

For the methodological analysis, the other sources of information were also used: the observations of the family's responses to the initial tasks of the research, and the Follow-up Questionnaire, and an analysis of the data dropout rates.

12.2 Methodological Analysis

A. Direct observation of the first responses to tasks

As a practising worker in the field, the family's responses were evident, and were noted. Their reaction to the descriptions of what was involved, who should do it, how,

when, and where, etc., were all observed, and were also subject to a degree of guidance from the researcher. This was true for both the BFT group and the CONTRAST group; but not for the FDC group, since the introduction to the task was done by the group leaders. Because the aim of the introductory meeting(s) was to ensure a well-informed participation, the guidance was necessary.

The BFT group drew more concern than the CONTRAST group as the variation of the responses was found. Although true of both groups to some degree, the BFT group showed more differences between the family members. This could be seen as confirming the problematic relationships in these families with rigid role divisions showing in high contrast, for example. In the H/4 family, the identified client ('Skins') showed a marked bewilderment at the instructions, etc.; this reflected both his low intellectual capacity and his 'clown' role within the family. In the D/4 family, the marital schism was clear: the mother taking a detailed, practical and controlling approach, and the father taking a lackadaisical and good-humoured approach.

In one family (G/5), a blurring of boundaries was found when the mother declared that she wanted to try the diaries to see if they would help the identified client with his dyslexia problem. Indeed, one volunteer family had to be politely refused on the dual grounds that they had a Social Worker and could not be eligible for the CONTRAST group, and the mother

was hoping that the diaries would make the identified client realise just how naughty he was by virtue of having to record his behaviour. These were the only two cases where this type of confusion of issues was found.

B. Visual inspection of the diaries

As the diaries were received from the families, they were examined with respect to the broad question of the quality of the completion of the diary. Although a simple task in that a few moments reflection and subjective valuation were all that was required, the task was reasonably complex in the number of instructions given. The two scales, each needing two crosses; the weekly scales on the last page; the voluntary notes; the privacy issue; etc., all required a good grasp of the instructions. A number of examples of difficulty were found at the time of reception and later inspection of the whole series.

i. One subject ('Felicity') occasionally used the scales for recording the wrong experience, and then put arrows to indicate the scales should be swapped over. She was quite aware of this, and commented in the Follow-up Questionnaire on the urgency of "putting it down" as soon as she had thought of the experience to record.

ii. One subject ('Joan Collins') used the gaps between the points on the scales, rather than the marked points, effectively creating half-values. (This was dealt with for the computer entry by rounding out in each direction away from the midpoint, see 11.3.D).

iii. One subject ('Ickerus') once put three crosses on one scale, then crossed all three out and left the enigmatic message "I have none".

iv. One subject ('Golden Eagle') appeared to use the two halves of the -10 to +10 scale separately: that is as -10 to 0 and 0 to +10. The curves encroached onto the other halves only once in 77 days. It was as though he had taken the "One good thing, one bad thing" instruction quite literally, assuming that GOOD could never be on the lower side of the midpoint and vice versa.

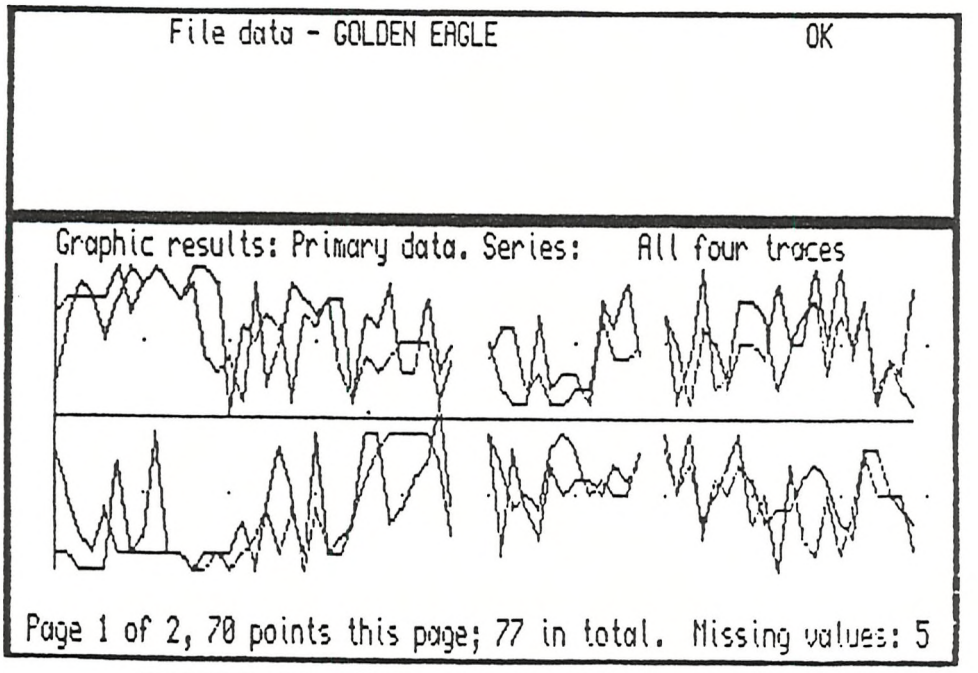


FIGURE 30: 'GOLDEN EAGLE', RAW DATA

v. One subject ('Mona') appeared to use the two halves of the scale separately in a different way: as though it were two independent ten-point scales reading from left (low) to right (high), so that the latter extremes were seen as occurring at the midpoint and +10, instead of at

-10 and +10. This did not occur consistently, but she was aware of it and commented in the Follow-up Questionnaire.

The rarity of most of these sources of inaccuracy served to show how well the majority of the respondents managed in completing the diary. Only the latter two noted above proved irrecoverable, giving 39 out of 41 subject with mathematically usable data. All in all, it was felt to be an achievable task within the limits set for eligible volunteers.

C. Response Quantity

The overall return rate of the diaries has been detailed above (see Figure 29, 11.3.B). The character of this return with respect to the completeness of the responses - was examined from two points of view: family textures and the individual textures.

The diaries and resulting graphs were examined to observe the continuity of the response over time. The quality of each subject's consistency in completing the diary day-after-day was expected to show a number of reactions ranging from anxiety through boredom to enjoyment. As well as the written and verbal comments, an analysis was made of the number of data dropouts in the subject's data series for the light these missing values might shed on the diary method.

The immediate impressions gained from the data in graph form

were that several subjects had large (i.e. more than 1-2 day gaps). The whole D/4 family showed a 7 day block of missing values, representing a failure in the logistics: a set of diaries were not delivered. The G/5 family suffered a bereavement of in the grandparental generation with the result that the identified client refused to complete his diary for that week. 'R2D2' went on a holiday for the last of her agreed four weeks, accidentally left the diary there, and proved unable to retrieve it. (Whereas 'Daisy' left the family home for college in her last week and did complete her diary, having half-expected to be too busy.) These large dropout blocks appeared to reflect the understandable hazards to a project of this sort.

More interesting were the dropout patterns seemingly more attributable to the method. In particular, 'J.M.' consistently placed only one cross on each scale, giving no written indication as to whether each was a 'Best' or Worst' experience in the day. The inference drawn from this was that he had mis-heard or mis-understood the instructions and had not read the guidelines within the diary. The fact that his wife had completed with four ratings per day lent encouragement that the instructions had not been given wrongly. However, the children also showed curious dropout patterns: 'Skillbo' completed the first week only, and 'Corona' left a long (14 day) gap in the middle of her series. A question seemed to be drawn over this whole family (E/4), even though they were from the CONTRAST group. A clear criticism of the method was

not found here, though a small question was placed beside the explanatory dialogue in the introductory interview.

i. Family coherence

Having agreed to participate, none of the subjects then failed to complete a single diary: that is, all subjects returned a number of diaries. Many subjects returned 100% of the diaries provided. The exact totals are shown in Table 43 (see 16.1)

Many families participated as a coherent group, returning the same number of diaries for each member: of the 9 families where there was more than one member, 5 were coherent in this way. In one of the other, non-coherent, families the reason for the difference was a diary lost while on holiday, which was considered a 'natural hazard' for this methodological approach. However, the other three (two BFT and one CONTRAST families) showed an unevenness of response that clearly represented the family's disarray. Through observations, it was felt that this was related to discipline problems within the family in some way. This was not surprising in the BFT families, as these two families presented teenage rebellion issues; however, the problem was deeper than this as in both cases there were differences between the two parents also. The CONTRAST family was the E/4 family, who had a very unusual response as already discussed.

ii. The dropout rate

The dropout rate was calculated as a percentage of the total series for each subject with respect to the number of missing values. A 'dropout' was defined as the number of units of single scalar data that were missing: i.e. the number of crosses missed off the diaries - up to 4 per day. Known and understandable reasons were accounted for, leaving a rough indication of personal reaction to the task. The former included holidays, illness, logistical hold-ups in the delivery of diaries, and one family suffered a bereavement in the grandparental generation. Other understandable gaps were caused by subjects deciding that as they had not been outside the house, they were not required to complete the 'Outside the home' scale.

The BFT and CONTRAST groups of families showed a close similarity in the average number of dropouts, but had very different Standard Deviations. Unexpectedly, the CONTRAST group had the higher, though this was quickly traced to one family. This family (E/4), already referred to above, showed four types of data dropout:

- the father placed only one cross on each scale per day,
- the father and the son only completed two weeks' diaries,
- the daughter showed a large gap of 14 days from halfway to very near the end of the four weeks,

as though she had stopped but later changed her mind,

- the occasional single day dropout.

'Skillbo' was aware of his dropouts and commented: "I forgot to fill this in the past three days". The overall result of these various sources of omission was to raise the Standard Deviation value for this family well above the values of any other family in either group by a factor of five. This reflects the inter-member differences in continuity of response. Omitting this family from the calculations brings the CONTRAST group mean from 12.3 to 5.2, in comparison with the BFT value of 13.2; with Standard Deviations from 116 to 44, in comparison with 53.

These facts bring a speculation about the level of disturbance that could be in this family's functioning. This thought was somewhat supported by direct observations in the interviews where a significant degree of suppressed anger was sensed, though its object was unclear. In her text, 'Corona' remarks on accidents and/or illness at a rate of every day for 7 out of 10! Overall, it was felt that this family were quite untypical of a CONTRAST family in the sense of either matched pairing or of measured normality. Since this was not a required criterion (hence the term 'CONTRAST'), the poor response served to highlight that while other areas of functioning were self-evidently problematic,

the BFT families were able to participate in the research project sufficiently well to make their contribution meaningful.

Other analyses of the data across the two groups showed that Women scored a lower dropout average and Standard Deviation than Men, a position reversed when the father of the above family was extracted from the data. Children produced the highest mean and Standard Deviation values. As the Children included the Identified Client in all but one BFT family (where the child was too young to complete the diary), an analysis of the IC versus non-IC children (from the BFT families) was done. This found that the former had a higher mean dropout rate and a lower Standard Deviation, which was taken as reflecting the disturbance shown by those children leading to their becoming so labelled.

While the lack of coherence in the data return was disappointing with regard to gathering a neat set of complete and clearly covarying data series, the qualitative variations offered a methodological insight. The diary method did bring in a substantial amount of useful data, but could not be relied upon to provide complete consistency in a mathematically precise manner. In a sense, then, the instrument must be regarded as recording the family process only intermittently. All the same, as a pilot of a naturalistic field study method, a pleasingly high quality of return was demonstrated.

D. Response Quality

An overview was taken of the general quality of the responses, from two different perspectives: self-expression evidence and the written responses in the diaries.

i. Self-expression indicators

The diaries were examined for the degree of self-expression evident in the responses. None of the diaries were seriously defaced; only childrens doodles were found. The freedom with which respondents used the range of scale points was important. A very contained and narrow range might indicate a hesitation to commit feelings to paper; a very wide ranging response might represent an over-dramatisation. Alterations in the pattern, e.g. from 'constrained' to 'free', might be related to a turning point in a relationship change. This could show in the trend mean, the pattern spread or the organisation of the patterns (regular or erratic, etc.) changing. Examination for this was possible through the cross-sectional analysis of the data spread, as displayed by a histogram of the total usage of each scale point in the subject's data.

In the analysis, very different spread patterns emerged as Figure 31 shows: unimodal, bimodal, flat and peaked varieties. The possibility of treating these as 'finger-prints' and examining them at intervals down the time axis was expected to provide the opportunity to spot

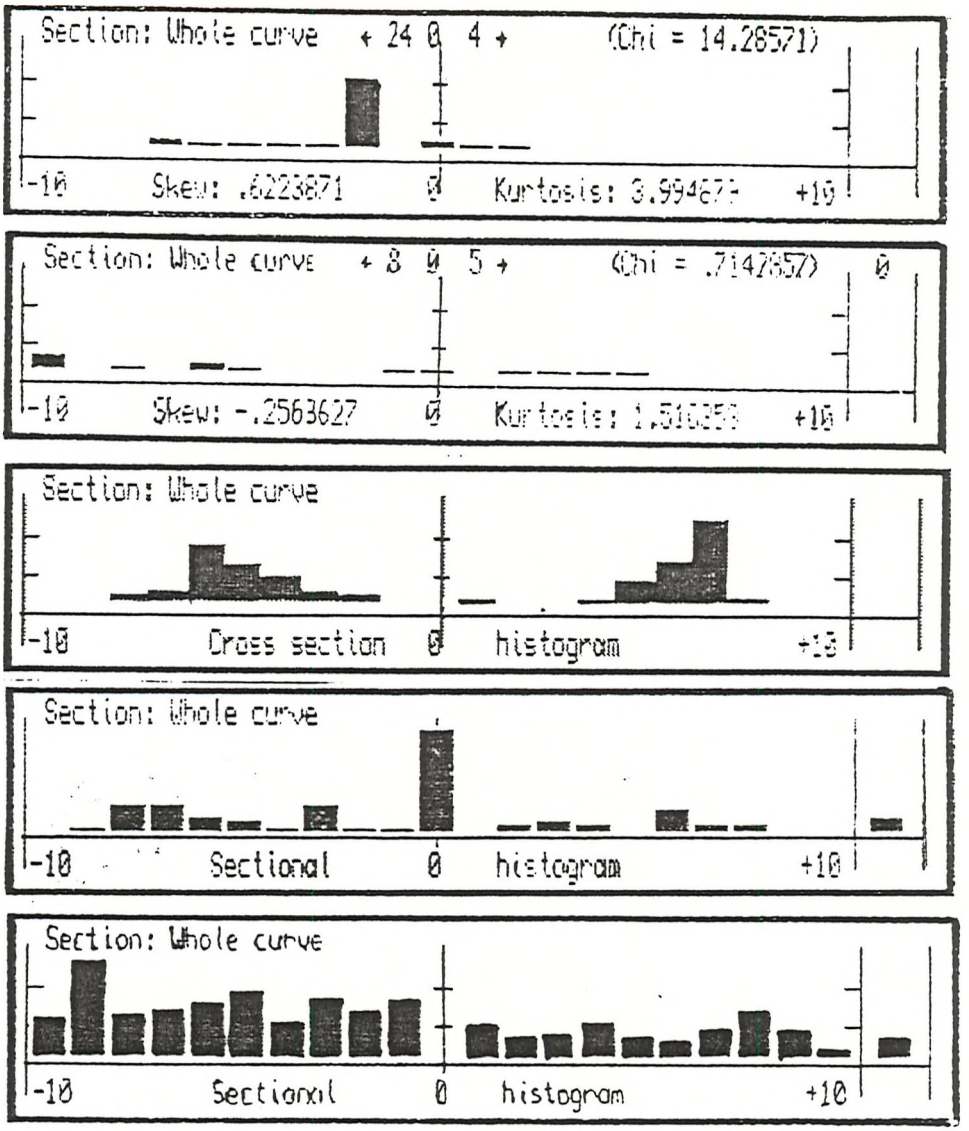


FIGURE 31: CROSS-SECTIONAL ANALYSES, Examples
(Harold Hedgerow, Joan Collins, Sharpeyed Eagle,
Mona, Golden Eagle respectively)

patterns spread changes, and the capacity to inspect the trace at different intervals was included in the analysis programme, at preset or interactively defined sections.

ii. Text responses in the diaries

The possibility that some subjects would completely omit text responses was clearly allowed for in the initial instructions: the priority for the research was the ratings. An examination of the diaries for the text found that approximately 20% made no written comment or offered only an absolutely minimal amount. For instance, 'I.S.', 'J.M.', 'Postman Pat' and 'Sharpeyed Eagle' all put nothing. 'Harold Hedgerow' and 'Silver Spade' put an absolute minimum. 'Ted' wrote nothing except "At home all day" to justify a lack of 'Outside the home' ratings. It was interesting to find is that two families figure: one BFT and one CONTRAST - as showing 3 of 5 and 2 of 4 zero or minimal written responses, leaving the remaining two (of the seven) as individuals within their families.

The tentative conclusion drawn from these observations is that some subjects felt unwilling to respond fully, perhaps as a result of feeling unsafe. No intuitive feel of a serious lack of privacy in these families was detected at the time, although 'Skillbo' admitted to looking in his sister's diary (and found "it was very funny"), she had not known until the Follow-up interview. Therefore the infrequent contribution of text was ascribed to the personalities in the main. The clustering in family groups was perhaps due to either factors in the introductory interview or family members compar-

ing notes shortly afterwards.

Had the cause been later in the time scale, a delay or falling off would have been seen rather than a lack of response commencing from the first day onward. A delay was shown in two cases. 'R2D2' apparently changed her mind after the first couple of days and showed this by Tipexing out these few comments: this was never explained. One subject wrote only for the first week ('Skins'). This is likely to have been a combination of laziness and testing the researcher-therapist boundary to see whether any criticism could be drawn: none was.

Like the response quantity, the quality showed a texture attributable to the method. However, some part of this texture was also due to the individual respondent, and indicated some aspect of their recording of experience. Changes in the quality of this record were of interest in the longitudinal study. For instance, alterations in the rate, topics or emotional tenor of written text could be used as indicators of change through time very much as the cross-sectional information might be.

E. Time Relationship Issues

The passage of time as represented in the diaries and displayed by the computer programme was not completely transparent to this study. That is, there were issues about the representation of time itself in certain areas of the data

that required consideration.

i. Phase relations and delay

In two families, one adult was a night shift worker. This meant that these married partners' definitions of what was a 'day' was at variance to the other families. While the 'Outside the home' scale was understandably different, as it recorded incidents at work (at night), the partner's 'Inside' scales was not equivalent either, since one would sleep a proportion of the day. This led to a difficulty in regarding the partner's series as co-varying, as they were to a substantial degree out of phase. Nonetheless, since they were defined as a family, the stresses and benefits of such a life were expected to show. This issue was borne in mind when the data series were examined as graphic representations of the daily 'ups and downs' when there might be an apparent delay in one adult responding to an event common to both partners.

ii. The FDC group 'time window'

The seven group members' data series were entered into the computer as a coherent time window, regardless of the date at which they entered the group. Their starting dates were all different, but they were recorded in the data files as through a family rather than a set of individuals. The reason for this was to allow a view of the group process over time as well as individuals.

However, the possibility of finding a mathematical group mean on a relative time base (instead of absolute) was precluded: an examination of whether all members demonstrated a slow accomodation to the method in some way, or a dropping of motivation, was not possible.

These time relationship issues required consideration in the interpretation of the results. They were inherent qualities of the method as used with these subjects, rather than any part of the subject's responses.

F. The Follow-up Questionnaire

Two forms of data were collected after the subjects had completed their series: numerical ratings and volunteered comments.

i. The Rating data

The questionnaire data were converted from the A - E form to an 1 - 5 rating form. They were processed from the directions of the five questions asked; and also from the three 'regimes'. Figure 32 shows these results. It was found that the Grand Mean of the ratings of all the questions about the diary completion task, across all the families, showed at 3.31, in comparison with the mid-point of 3. This covered a range of 2.54 to 4.44, a Standard Deviation of 3.72. This was taken as reassurance of the general level of understanding achieved in the participating respondents.

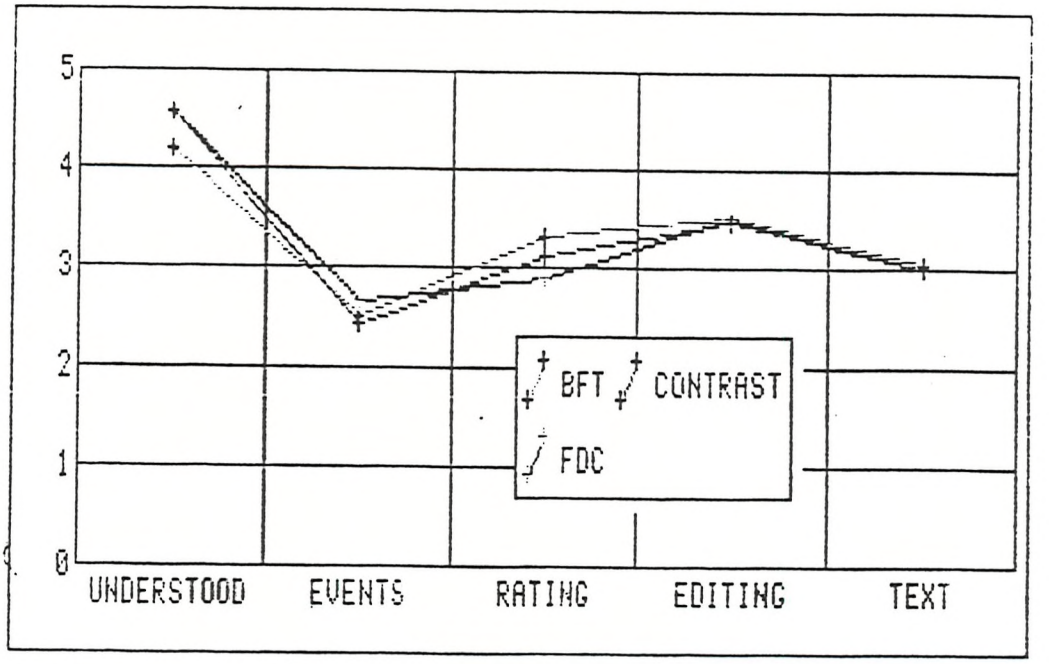


FIGURE 32: RATINGS OF THE DIARY COMPLETION TASKS

ii. The Follow-up Comments

During the interview for the Questionnaire, general comments about the exercise were elicited. In broad, these fell into two types: those making a comment on the procedure in some way, and those referring to the interest generated by the subject's awareness of the diary's reflection of themselves. These were thought of as methodological and personal comments respectively.

a. Methodological comments

Several subjects wanted to mention the way the questions defined the important dimensions of the experiences to be rated. For instance, one comment (from 'S.L.N.') concerned the issue of perceptions of 'important' experiences - "meaningful" as opposed to "trivial", or "transient". Another noted that the 'Inside' versus

'Outside' the home descriptions in the questions were artificial, and more specifically, one subject queried whether dreams not about the family were inside or outside. A variety of interpretations of this issue were found through the visual inspection of the diaries, ranging from one subject who entered "Not Applicable" to the 'Outside' question when she did not go out of the house that day, to another who moved house to stay with relatives during a bereavement and called this house 'home' in the same way she had called her own house.

None of the subjects referred to news on the radio, TV or papers as 'Outside' as it had been anticipated they might: indeed 'Macho' described being irritated by the TV news, and rated it on the 'Inside' scale. However, no especially significant news appeared to have occurred during the period, so the feeling of invasion by bad news may not have been prompted.

Other responses about the diary method itself included observations that more space was needed, that a blank page would be better than the rating scales, and several different versions of the scale itself. Other comments related to the activity of completing the diary, particularly saying that it needed to be filled in quickly (all in one go, rather than being thought about in depth).

b. Personal comments

One subject stated that she found it "helpful" to think back over the day, and even if not at the time, it could be at a later date. It may have been significant that this was a single mother ('Joan Collins'). A mildly depressed man ('Gollum') said that he was interested in the difference in his 'Inside' and 'Outside' scores. Two showed an interest in their scores: one finding that the scores would move toward the midpoint if he was not sure of what to put ('Gollum'), the other noticing that his scores tended to "hover" around the same values ('Harold Hedgerow'). This latter subject took the discussion onto a philosophical plane by wondering if feelings were 'really there' and could be rated in so arbitrary a manner, thus touching on the issue raised by 'S.L.N.' above.

Four subjects reported that the experience was not all good: the diaries "mediocre'd life" and were "hard to remember and boring to do" ('Daisy'). One said "I got fed up with it a few times" ('C3PO'), another said "It just bugged me!" ('James'). The last one ('Ted') owned to regretting participation, but without specifying a reason. Pleased reactions were also evident, for personal reasons, or as a general support for "sociological research" ('Harold Hedgerow').

The general contribution level was good, with both methodo-

logical and personal responses to the task tending to support the diary method as sufficiently usable.

G. Implications

On the whole, the exercise of recruiting volunteers to complete the diaries was successful, both in terms of their experience and as far as the gathering of the required type of data. The general idea of a diary - a private, subjective daily task of fairly repetitive nature appeared acceptable. The specific dimensions of WORST-BEST and INSIDE-OUTSIDE seemed assimilable by the majority of the volunteers. The rating method appeared to be easy enough to understand and implement.

In general, the family members found the stamina to continue the diaries for the required period, and also gained the privacy and the permission necessary to record opinions and observations about other family members from them. The variations found in the data series were clearly attributable to the volunteer's subjective life experience rather than artefacts of the scale or random perturbations.

12.3 Data Analysis

The objective of the diary method was to collect data that would allow a glimpse inside the 'ups and downs' of family life in the home. Given that the methodological analysis found that the diary system appeared to fulfil its function reasonably, the question of what could be found from the data

of the computer programme, the volunteer's data series' were studied. Two broad types of pattern were sought:

- Homeostatic variations
- Morphogenic movements

with due regard for the hypotheses developed earlier (see 10.5.B).

A. Homeostatic patterns

Several different manifestations of homeostatic patterns were found, both within a subject's data, and between subjects.

i. Individual's Patterns

a. 'Harold Hedgerow' showed a very close tracking of the two curves on each scale (see Figure 33).

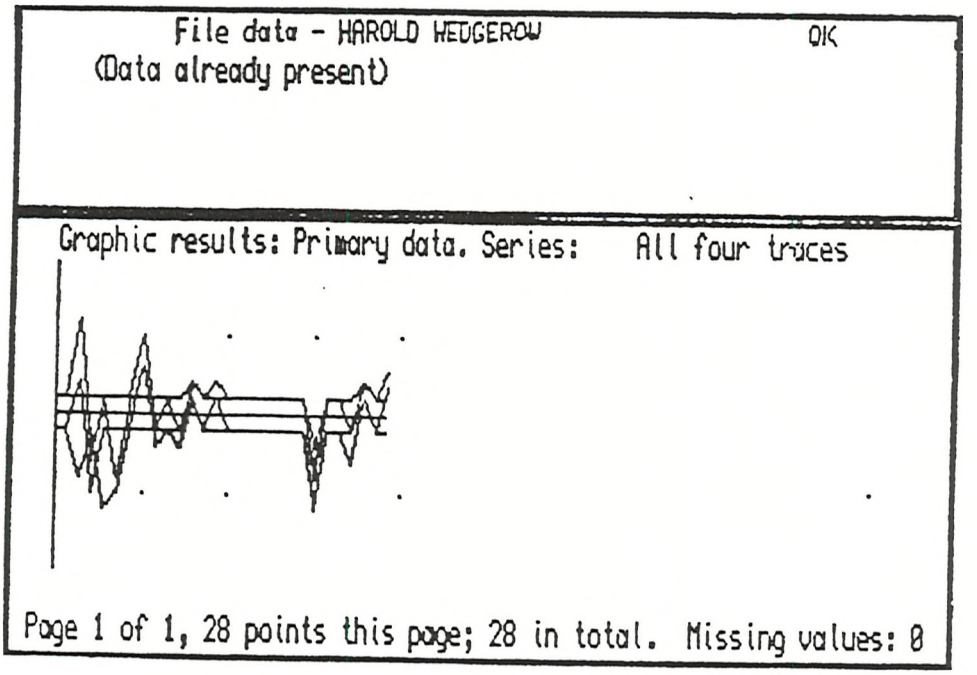


FIGURE 33: 'HAROLD HEDGEROW', RAW DATA

That is, his two 'Inside the home' series ran parallel

to each other through the (minimal) perturbations; and the 'Outside' pair of series had a similar relationship. This could be interpreted as evidence of a rigidity, a lack of spontaneity; but it is difficult to know whether this should be ascribed to his internal experience or to his choices in approaching the recording task.

b. 'Joan Collins' offered curves that also showed some periods of the 'best' and 'worst' moving in parallel, though at other times they separate. A sawtooth oscillation of roughly a week's cycle was identifiable (Figure 34), which was a good fit with her report of feeling out of control of her life, dominated by the needs of her child and apparently very 'needy' boyfriend. However, this regularity was only observed over two weeks, making it difficult to interpret.

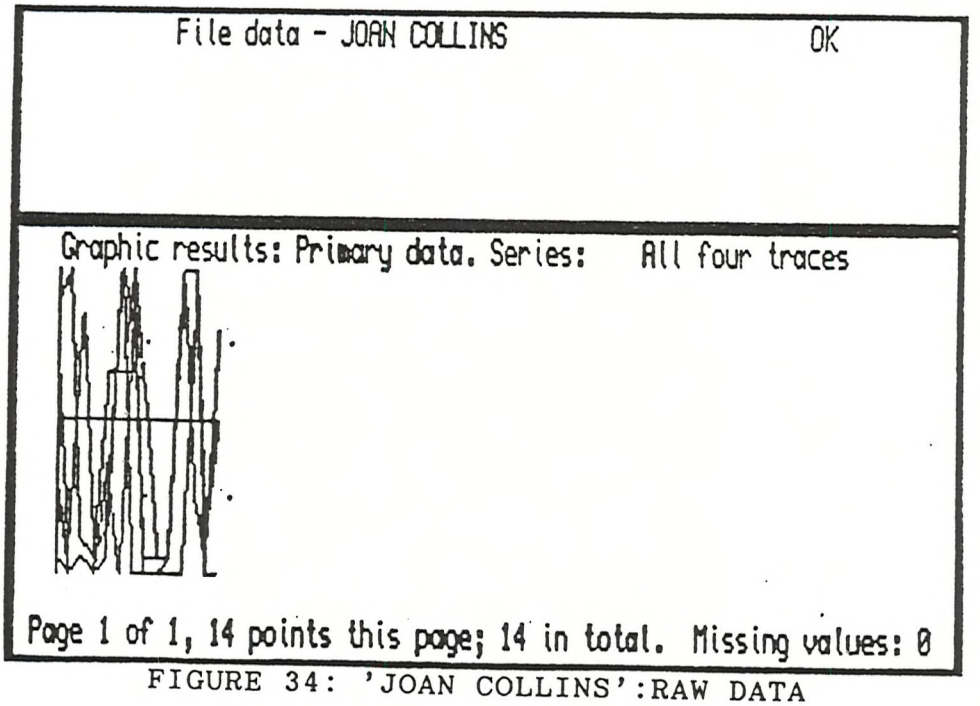


FIGURE 34: 'JOAN COLLINS':RAW DATA

This data was taken to represent a visible demonstration of the family therapy notion that homeostatic patterns can show large perturbations as well as small ones (as in Figure 33 above). The theoretical identification of homeostatic change as first order change - a stable pattern of change as opposed to a changing pattern of change - is shown.

c. 'I.S.' presented curves that were remarkable for a pattern showing a contained range of variation through the weeks, having a mean just above the midpoint, with a double spike in the middle of the series (Figure 35). This feature spike was remarkable for two reasons: the size of the two deviations, and the fact that they moved simultaneously in opposite directions.

On examination of the diaries, it appeared that she only entered four pieces of text: two to describe uneventfulness early in the series, and two on the same day to describe the peak ('Outside') as due to winning 10 in a raffle, and the trough ('Inside') as hearing that an old friend had died. While these events are presumed to be unconnected, it is interesting that their combined effect was to balance each other, and that they were recorded so as to show this. This last notion derives from the observation that these scores (+10 and -10) were only used on this occasion.

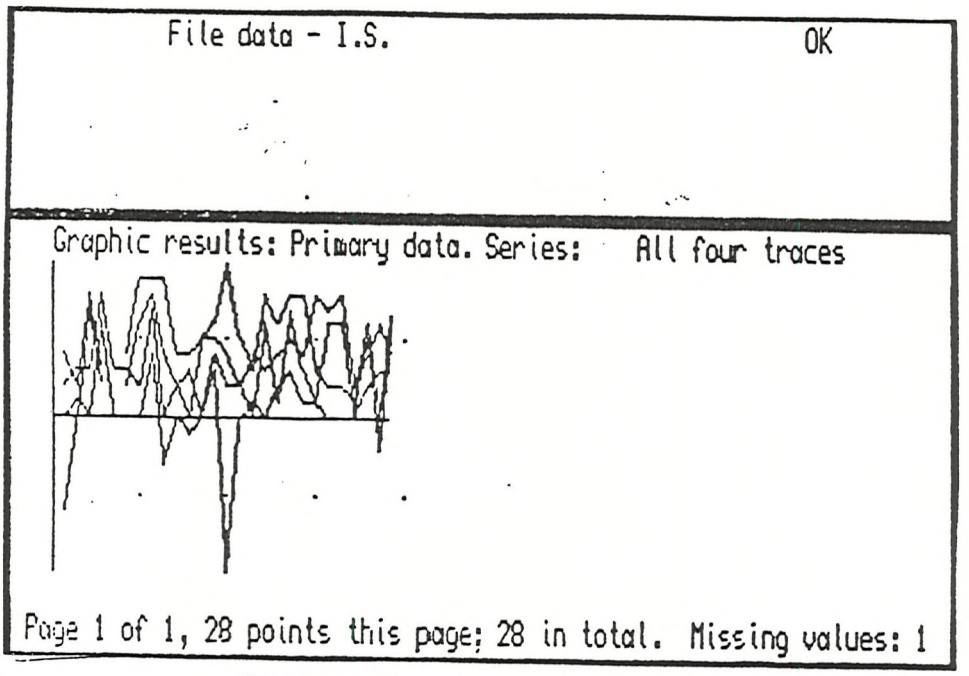


FIGURE 34: 'I.S.', RAW DATA

d. All the above examples come from the CONTRAST group of subjects. Two longer term examples of sawtooth patterns were found in a 'BFT' family: 'Postman Pat' (whose curve lasted for 77 days) and 'Sharpeyed Eagle' (84 days), father and son, respectively. The former's data series can be seen to show a very narrow range pattern, centring around the mid point: the mean and standard deviation were 1.7 and 16.5 (Figure 36).

His series can be divided into two different patterns. The first half shows a coherent sawtooth, with all four individual series moving in concert. The second is a balanced sawtooth, with evidence of at least one point peaking for each trough of 1, 2 or 3 points.

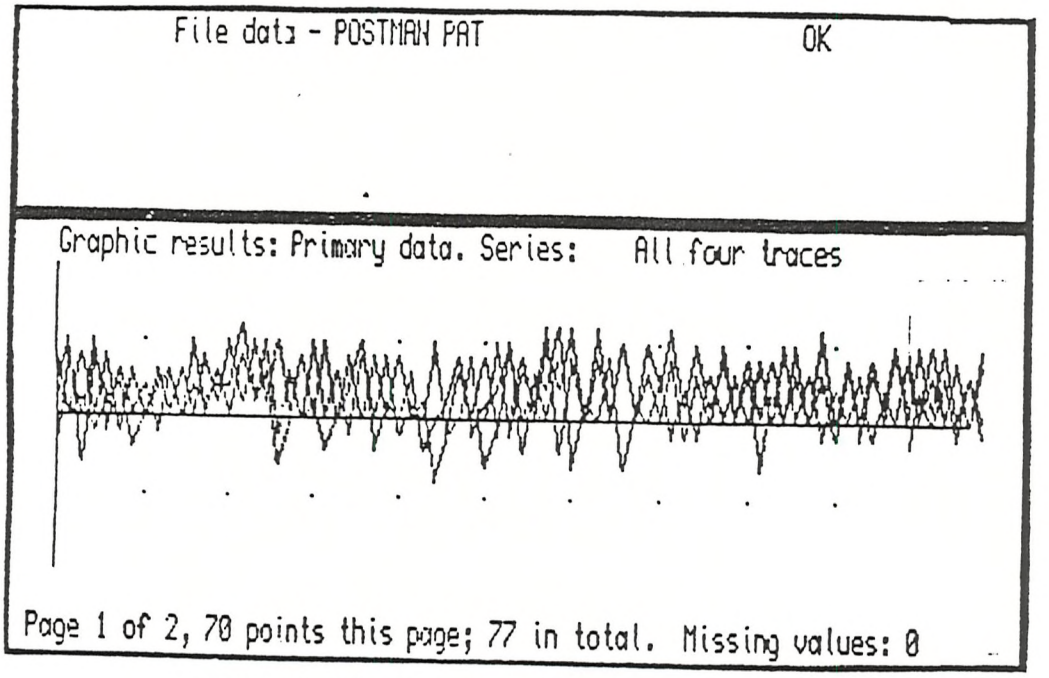


FIGURE 36: 'POSTMAN PAT', RAW DATA.

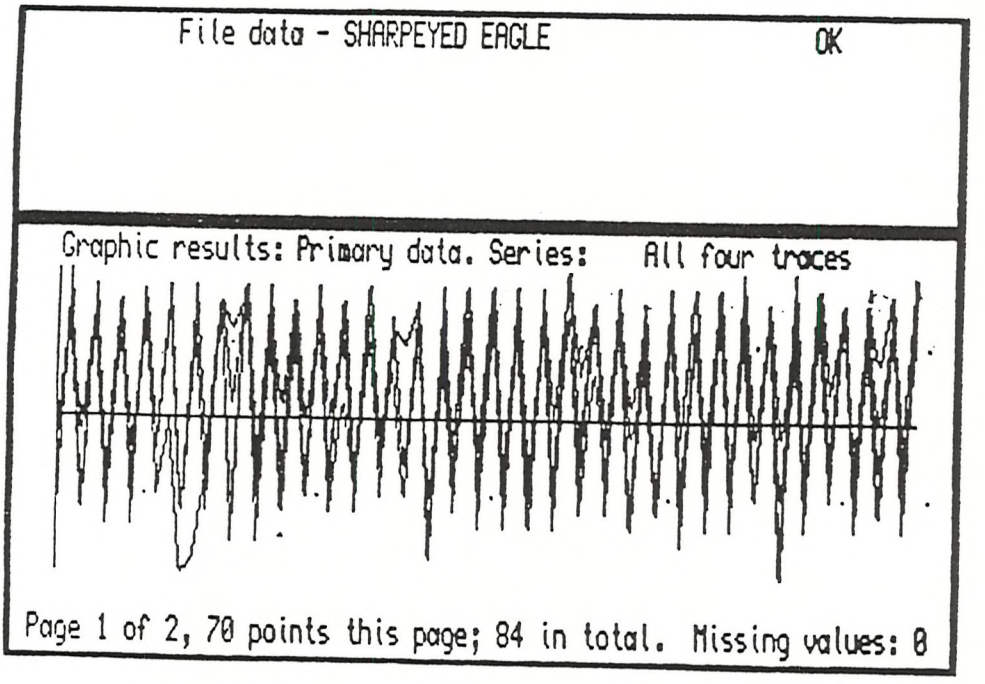


FIGURE 37: SHARPEYED EAGLE, RAW DATA

The graphs from 'Sharpeyed Eagle's' data (Figure 37) showed a single coherent sawtooth of much greater amplitude and consistency (see the Cross-sectional analysis, Figure 31). Only half a dozen points were out of phase: an incredible ratio of over 1:50 when compared to those in phase. This raised an inescapable question of 'rigidity', whether it was an accurate reflection of the boy's experience, or an 'artefact' of his need to record in this way. Yet in his personal presentation, he gave no reason to expect 'rigidity' and he was not the Identified Client.

ii. Family Patterns

a. The A/2 family showed a complementarity visible to 'eyeball examination'. Where 'Harold Hedgerow' had a tight parallel formation (see Figure 33), his wife produced a much more mobile picture. (Figure 38). She used the entire range of the scale as a comparison showed. 'Diane' showed differences between her 'Best' and 'Worst' traces that ranged up to 10 in contrast to her husband, who produced a very low and steady trace - Figure 39 shows the differences between his two 'Inside' series.

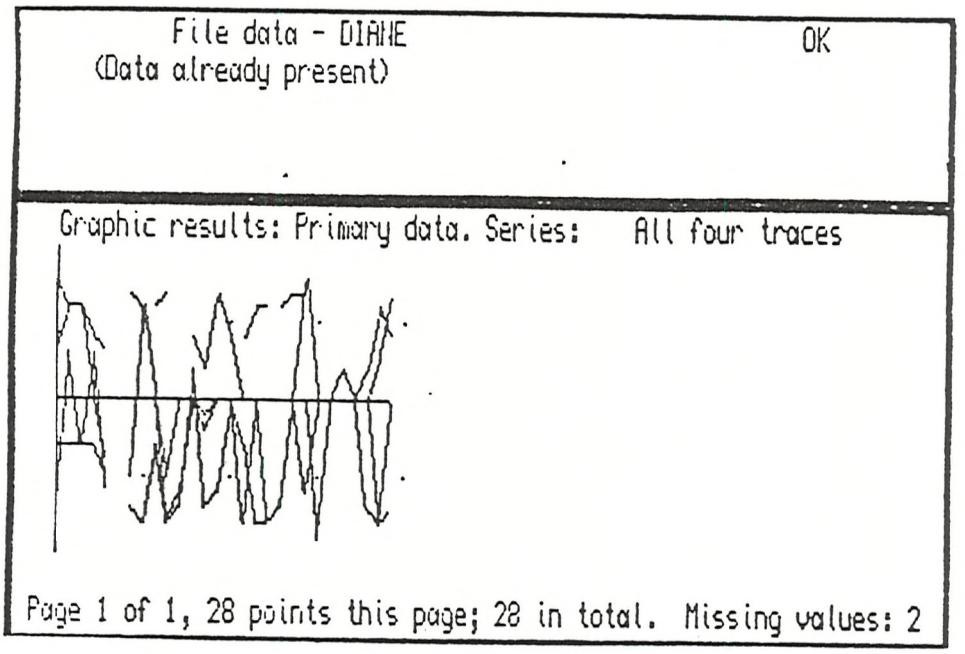


FIGURE 38: 'DIANE', RAW DATA

Further, 'Diane' showed a dropout rate of 28%, whereas her husband's was 0%. The complementarity found here was not of the numerical ratio type, with (say) husband's peaks balanced by wife's troughs, but in the relationship by virtue of what the data suggests to be personality differences. Direct observation supported this: 'Harold' was a quiet, introverted home-loving man; 'Diane' was an energetic, extroverted and gregarious woman. Although they react similarly to events common to them (troughing together when their children both suffered accidental injuries and peaking for 'Harold's' birthday) their degree of response was different. Further, their curves reflect their different lives, the lack of common interests accentuated by 'Harold's' night shift work.

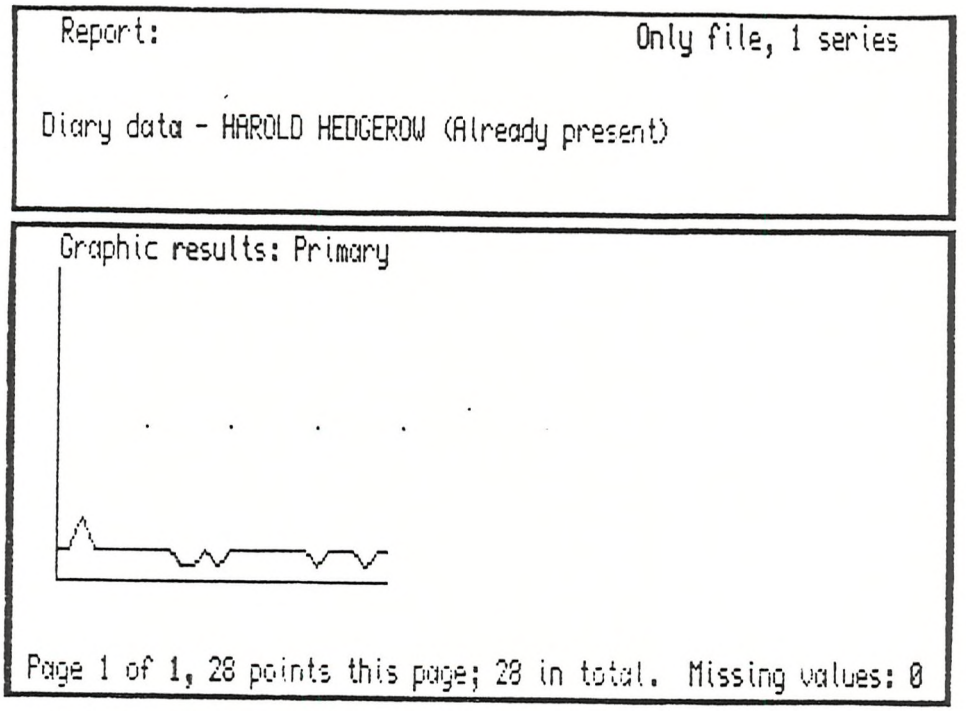


FIGURE 39: HAROLD HEDGEROW, 'INSIDE' DATA, DIFFERENCE

b. 'Postman Pat' and 'Mousie' showed an essentially similar relationship. 'Pat' showed the limited sawtooth pattern (see Figure 36) and 'Mousie' showed much more mobile pattern (Figure 40), with a high dropout percentage (15%), and a high Standard Deviation.

This family (G/5) suffered a bereavement in the last week of the traces shown (in the appendix). The lack of reaction in 'Postman Pat' and 'Sharpeyed Eagle' (commented upon, in general, in d. above) appears surprising in the first instance. However, they also react very insignificantly to the mother's ('Mousie') illness with a temperature and several days in bed (where she leaves a gap) and the following period where the identified client ('Silver Spade') was reported to be very truculent (and his own trace has a large gap!).

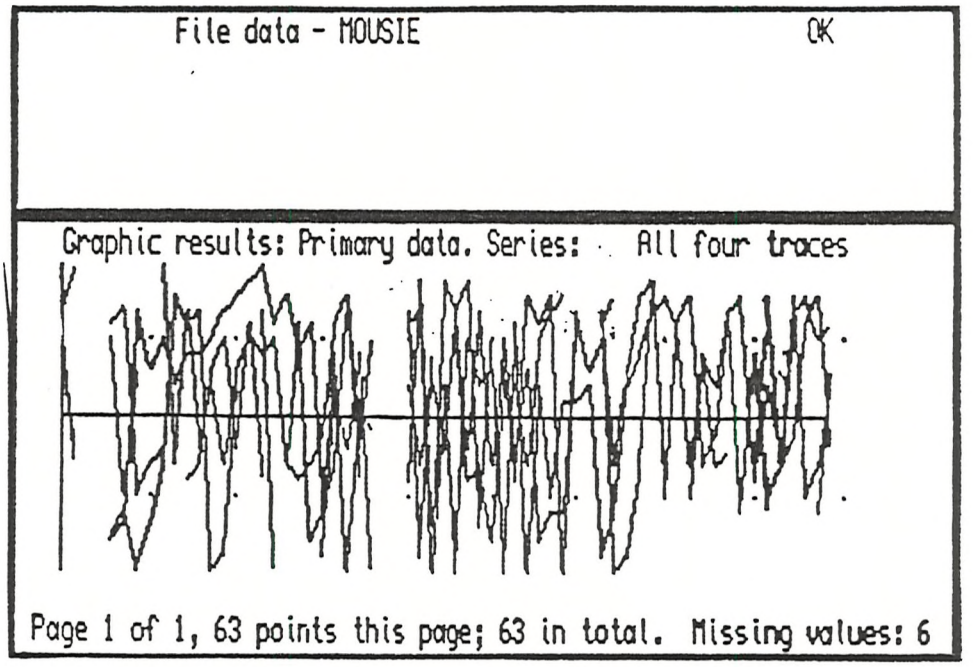


FIGURE 40: 'MOUSIE', RAW DATA

This could easily be interpreted as a complementarity between two sub-groups: mother and identified client fighting for control with step-father and oldest boy appearing to be passive onlookers. An alternative explanation might involve the latter two attempting to stabilise a highly charged and dramatised conflict by deliberately 'not over-reacting'. This was an interesting reframe, which fitted with the observation that 'Mousie' spent a lot of time and energy lobbying on behalf of 'Silver Spade' (because of his dyslexia) and attempting to pull increasing numbers of advocates into the battle with the Local Education Authority.

c. 'Skins', an identified client, was observed in family sessions to have a highly complementary relationship with the rest of his family - mother, father and older

brother. Everything they held important, he appeared to them to disregard. Every time they thought there was progress, he 'spoiled' it with another delinquent act. Examination of the traces showed some evidence of this difference by taking an average of all of the series from 'Skins' and comparing it with the complete average of all of the series from the other three family members (Figure 41). Instances of opposing swings between these two sub-groups of the family were found, and a delay of at least a day in any parallel movements into peaks or troughs. Further, inspection by eye shows that with one exception 'Skins' remains in the middle range of the scale, whereas the other three show much more labile traces. This fits with the boy's preoccupation of appearing 'laid back' and unconcerned - much to his parents annoyance.

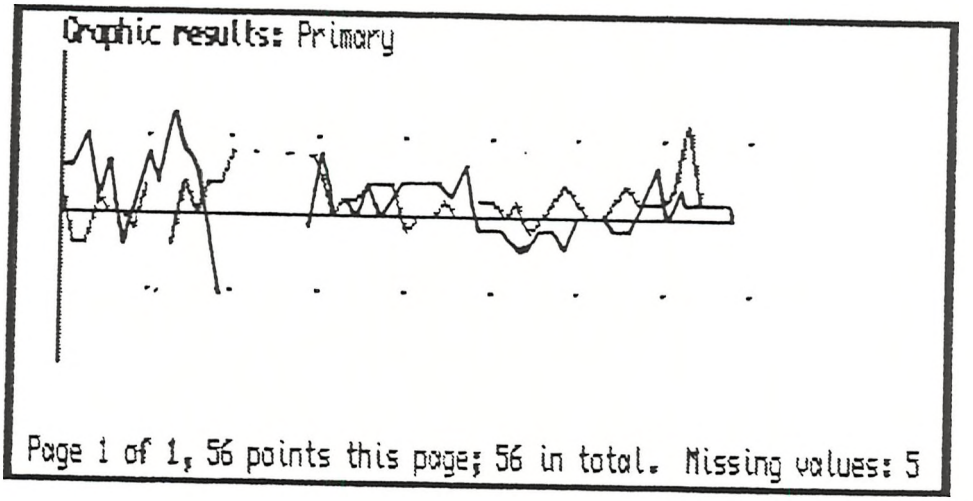


FIGURE 41: THE H/4 FAMILY, Subgroup vs IC Comparison ('Skins' = smooth line, Subgroup = fuzzy line)

This family is analysed in a little more detail in Simon (1987b).

d. A number of examples of clear responses to what can be reasonably considered as external factors were found. These perturbations to the previous pattern show in different forms: for instance, 'Vivian' shows a marked double oscillation of substantial range with all four data series following very much in parallel (see trace in appendix). It may be that these concerned the finish with a girl friend, death of a guinea pig and erection of a rope swing. As he only wrote text once a week in summarising form, these connections have been inferred.

e. Other patterns revolving around known events of some importance to the family were found. For instance, 'R2D2'showed a marked upswing when her older sister went away on a residential holiday: perhaps released from living in her sister's shadow? Her father ('Alex') also went on holiday, and at the end of his trace can be seen his reaction to a firework display seen over water. The mother ('Pat') in this family had an operation shortly before the diaries started and her variable trace reflects her uncertain recuperation. Her husband had been very concerned (and depressed one day) on her behalf, but in the middle of his trace he has graphically indicated the joy of their returning sexual activity (see appendix).

iii. Group Patterns

Unfortunately, the FDC group could not be analysed as a group because of pressure of time.

It can be seen that a wide variety of shapes can be seen in the data series traces, from which can be elucidated helpful notions about the family relationships when placed beside existing observations.

B. Morphogenic Patterns

No morphogenic patterns were found. None of the BFT families tracked with the diaries were successful in their therapy as far as the goals set regarding the referred problems; although some comments were forthcoming to the effect that the sessions had helped in other areas of the family difficulties. For instance, several parents were positive about the progress in their marriages, but this may have been improvement within a sub-system to some cost for the system-as-a-whole.

As no morphogenic changes were observed in the families, none were expected in the traces. As a cross-checking exercise, the traces were inspected for step-shapes and trends of high slope as the morphogenic changes were hypothesised to generate. No clear evidence of these patterns was found, though 'Joan Collins' did appear to show quite a high slope value of 4.3. However, this was only over two weeks, and could not be easily interpreted (see Figure 42).

The lack of opportunity to test the instrument with a family known to have undergone a morphogenic change was disappointing.

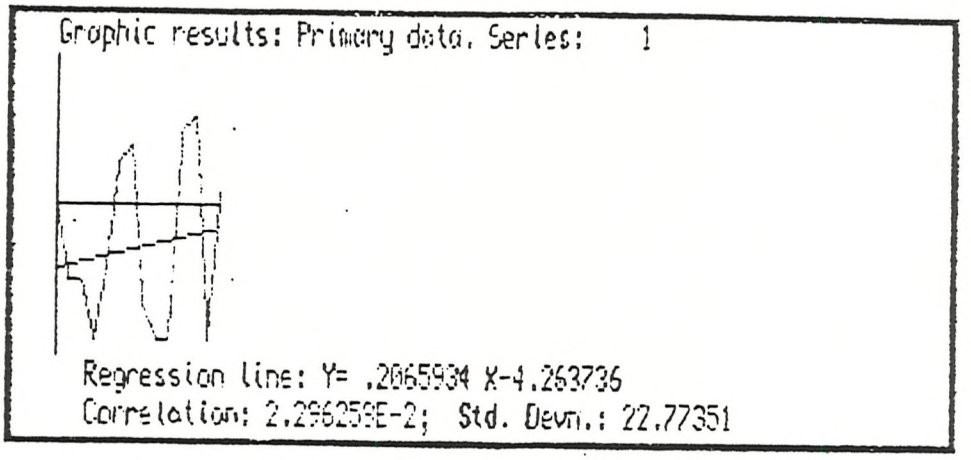


FIGURE 42: 'JOAN COLLINS', ALL DATA AVERAGED, SLOPE ANALYSIS

12.4 Discussion

The results can be seen to provide some points of interest. Rather than explore them through the width of their implications, a return to the hypotheses constructed earlier (see 10.4.B) will help in condensing this discussion.

1. The major hypothesis proposed that, as a Null Hypothesis, the method would prove unproductive. In response to this, it has become clear that the method (i.e. the instrument and data processing/exploration techniques) has a substantial utility. Although not tested to the full extent of its

designed capacities, the evidence supports the likelihood that a step-shaped morphogenic change would be discernible in the trace elicited. Certainly, it operates satisfactorily in providing traces that fit with the concepts of homeostatic behaviour patterning.

2. The method can demonstrate stable trends in morale in individual and family data as the subjects moved through life's vicissitudes.

3. The remaining hypotheses all concern morphogenic changes, which have not been subject to test because none of the subjects has provided this opportunity. That is, examples of continuous and discontinuous changes in both individual and family data, in either parallel or sequence form, by single or double step in the discontinuous type have not been found.

4. The relative efficiency of the various approaches attempted in this pilot have not been adequately tested. In particular, it is unfortunate that time has not permitted a close examination of:

- comparisons between the two different diary formats;
- comparisons of the daily and weekly traces.

In future developments of the method, these areas should be addressed, in order to refine the instrument. A consequence would be the streamlining of the data processing part of the method: with less data per diary and less need to explore the relationships between the traces, the computer programme

could be reduced in size and complexity.

5. The full potential of the computer programme was not used. The full variety of curve smoothing options was not explored; nor was the 'deviation from trend' option which might have offered the possibility of a closer examination of the day to day 'ups and downs', the homeostatic fluctuations by removing underlying trends. Statistical analyses of time series data usually separate out the four components of secular trend, 'seasonal variation', cyclical fluctuations and irregular movements: offering a perhaps more penetrating analysis of the variance in the data. Linear regression slopes could be used as the trend, seasonal variations approximated with the curve smoothing routines and the residual curve offer the last two factors combined.

Also, a thorough exploration of the lead/lag relationships between family members might show unexpected features. Revensdorf et al. (1978) explore lead/lag aspects of marital relationships. Nightshift workers' relationships with their spouses and children might be expected to show a delay. In other families, the finding that one parent delayed communication of all important events concerning the children by a day, this would be a visible demonstration of a recognisable distancing and controlling tactic.

The regression slope values could also be examined. There are a number of aspects to this: for instance, comparisons of the

slopes of the four different daily traces for each subject, in sections down the time axis, between family members and with regime averages could all be undertaken. These comparisons would have to be heavily qualified by the fact of the ordinal scale on the y axis as mentioned above (see 10.8.B.ii), but would be permissible under the spirit of Exploratory Data Analysis.

6. Overall, the method has produced sufficient data to allow the beginnings of a detailed attempt to 'peer closely' at the processes of change within families. A number of points deserve a more careful discussion, and space is given to this next.

P A R T F O U R:

CONCLUSIONS

CONTENTS

14. Conclusions

15. Reference List

16. Appendices

14. CONCLUSIONS

14.1 Introduction

14.2 The Empirical Study

A. Progress in the Study

B. Future Directions

14.3 The Conceptual Model

A. The Conceptual Model Considered

B. Future Directions

14.4 Ramifications

14.5 Final Conclusions

14.1 Introduction

This work has taken the form of a development of a conceptual model followed by a methodological pilot concentrating on one aspect of the model. Definitive and far-reaching conclusions were therefore not expected: indeed, within the constraints of such a study, very limited conclusions were likely.

An exploration of the factors that shape personal and interpersonal changes has been pursued. Often these changes have been known to be difficult: conscious effort has not proved sufficiently effective in prompting them. Therefore, it has been largely the unconscious processes that have been modelled and then traced. This tracing must necessarily be recognised as an approximation rather than a definitive description of these processes. Quantitative indicators have been sought to sample what is best thought of as a qualitative phenomenon. This was held in mind by the loose research definition of attempting to 'peer closely' at the processes of change (see 10.2.B).

This type of approach is characteristic of the exploration process, in both modelling and data analysis:

> "Far better an approximate answer to the right question which is often vague, than an exact answer to the wrong question, which can always be made precise."
> (Tukey, 1963, p 13)

It is hoped that the present study has asked the 'right' question about the processes of change, and has generated some useful results. The empirical study will be concluded before a return to the conceptual model, which was the starting point for this exercise.

14.2 The Empirical Study

The progress made by study will be summarised, and directions for the future noted.

A. Progress in the Study

The family study was regarded as productive. Longitudinal data for family members were obtained, manipulated and displayed, during both 'normal' life and two types of therapy. These traces showed many aspects of the homeostatic processes described by the theory and allowed by the model. This was taken as indicating success: the instrument and processing techniques were capable of tracking the mainly unconscious processes through time.

The opportunity to track a discontinuous second order (morphogenic) change was not present and therefore it is not known whether the method would demonstrate it adequately, nor exactly what shape it would be. This was unfortunate since the finding of a step shape in a trace would at a stroke have demonstrated the utility of the method and the accuracy of the concept. However, the assumption that because no 'jump' was demonstrated, the instrument is incapable of detecting

it was avoided as this would be a Type II conclusion validity error. Further, no discontinuous jump was found where only homeostatic processes were expected: this was seen as supportive of the conceptual model since such a finding would challenge either the model's assumptions or the method's accuracy, or both.

B. Future Directions

The study could be taken further in several ways:

1. Continued recruitment and analysis of families in therapy could be undertaken. The present method would be used, and refinements to the data processing (especially the computer programme) explored. Particularly useful would be a determined trawl for morphogenic changes, to test for demonstrations of single and multiple jump discontinuous 'flightpaths'.

A wider view of how a discontinuous step-shape change might present than that described above should probably be taken: the new 'baseline' may consolidate to show a high value as Figures 23 and 24 suggest, but then be 'accomodated' - that is, fall off to a lower value again. This would not necessarily mean relapse, but rather that the link between the sampled behaviour and the 'family morale' is not direct and proportional. This linkage being poor does not devalue the general method as it contrasts actual behaviour with imposed conceptual model. All the same, it might be that other instruments can be found to elicit a stable step-shape. The

objectives of the study would have to be explicit on this point: what (precisely) is being sought?

The method could also be reviewed for its efficiency: the diaries could be cut down to the minimum if a 'key question' could be defined. Perhaps the invitation to write down comments could be ommitted, or ignored in the analysis; the two questions about 'Inside' and 'Outside' could be refined into one question and hence time series, thus reducing the data processing complexities. Further consideration could be given to the resolution aspect of the instrument: are daily responses appropriate, or would finer or coarser sampling be effective? It is difficult to answer any of these questions without the benefit of experience arising from being able to demonstrate morphogenic traces as well as homeostatic ones.

2. The alternative methodological choice of construct validation (Cronback and Meehl, 1955) could be pursued. This would require finding operational definitions for the axes and areas of the model and comparing with other well-known constructs and measures, as discussed in 10.2.A.i.

3. A deeper analysis of family member covariance might lead to an elucidation of the detailed mechanisms of homeostasis and morphogenesis. For instance, for the former, a lead/lag analysis (see Revensdorf et al., 1979) to see if one member tends to make a down-swing and (say) two days later two other members make a counteracting up-swing, with a fourth member

remaining steady. A repeating cycle (a periodicity) such as this would be perfectly in line with systemic hypotheses for families, both problem-free and problem-bound. The Ratio Goal Equation (see 10.5.A) might be approximated, which could bring a fresh mathematical analysis to the area. This might be difficult with the ordinal data however. Similarly, the lead/lag comparisons might have to rest on the sign of differences rather than the quantity.

Further similar analysis might help discern the sequences of movements in morphogenic change. Symmetrical, sequential, and synergistic patterns could be expected. This might require additional methodological work in order to properly define this micro-level pattern in the crucial few days of the 'flightpath' (see 5.5.C.5): periodicity analysis will only help in excluding aspects of traces trivial to the pursuit of the morphogenic 'jump'. Linear stationary time series exploratory data analytic techniques will be insufficient, since the passage of time is not neutral: time is not a true independent variable in this context. The social construction of reality shows that 'what happens when' is important; for instance in the timing of jokes, the 'no news is good news' dictum, and the 'being sent to Coventry' protocol all depend on silence: hence the silence becomes a crucial statement in the transaction. This was mentioned earlier with de Grazia's study of the unequivocal nature of 'events' (see 10.6.B). However:

"...the theory and practical analysis of non-linear and

non-stationary time series is still, comparatively, in its early stages of development."
(Blauberg et al., 1977, p 413)

14.3 The Conceptual Model

An overview of the conceptual developments will be taken, with directions for consideration noted.

A. The Conceptual Model Considered

The conceptual model is useful because of its abilities to help explain current Brief Family Therapy thinking, and to take the theory forwards. The model was born of two distinct and different theories, which have combined easily to provide a powerful description of a wide range of types of personal and relationship change. Using a formal diagrammatic approach to creating visual aids, it has taken some complex ideas and offered a stable framework within which to place them. Whilst requiring some apparently obscure language to describe this framework, the end results show a rigorous typology of changes that can begin to be linked to types of intervention, and in turn mechanisms for these types of change can be elucidated.

The processes of developing and understanding the model require a demanding level of concentration. It may be argued that such a model does not simplify the area usefully, and so contributes little to the practice of Social Work. In response, we must consider that the model attempts to

This alters the shape of the Being area suitably: it would only cover low levels of both control factors. However, it would also change the exact relationship between the cusp and these factors, eradicating the uncertainty of outcome implication for movements on the Eternal Hope area created by the Resource or Perceived Need factors (see 7.7.B.2). This would therefore be removing the 'splitting' factor effect (see 7.4.B).

The net gain of this alteration is uncertain, and would need more consideration than could be given in the time available.

14.4 Ramifications

It must be remembered that the initial prompt for the Catastrophe Theory model arises from the apparent illogicality of Brief Family Therapy interventions and unusual expectations for discontinuous change. Without some medium for description, the differences between these features and more conventional Social Work methods becomes little more than a sharp divide of beliefs. Whilst not always a problem, this divide can obstruct the dialogue required to promote the Brief Therapy methods (see for instance 7.7) within an accountability-conscious profession (see 3.2)

In the current climate, the environment for Social Work would seem to need every method and technique available to it to improve its efficiency in working with the variety of clients it is required to be concerned for. An alarming scenario can

be visualised if the cost-effectiveness of the service droops, and this will be briefly sketched as an important macro-context for the position of Family Therapy within Social Work. It has been explored in more detail elsewhere (Simon and Axford, 1988).

The possibility of an increasing flow of 'Statutory' work, over which there can be little or no gatekeeping control must cause concern for the quality of work that can be offered, unless the staffing establishment and other resources increase in step. If the time available per client drops in inverse proportion to the number of clients, then the inevitable movement will be to reduce the quality of work, hence slowing the likelihood of improvement in the family's situation that originally precipitated the Social Work involvement. This will create a log-jam. The degeneration of quality would be bound to reach some threshold, whereupon the entire system would come under review - probably hostile review, at that. And, at that point, Society might accept that it cannot afford this, and perhaps other, helping profession(s).

Unless we believe that civilisation can float upon its own laurels, the concern is unavoidable. However, even if effective methods and techniques are discovered, there is still a difficulty in implementing them - as Smale said of developments to improve Social Work practice, they have:

> "... received much support but also encountered a great deal of resistance, mainly based on financial consider-

ations (because of) scarce resources."
(1983, p 251)

Further, in a short paper concerned with the gap between research and practice in child care (the most logical area of Social Work for Family Therapy), Hazell suggests that:

> "... one of the main barriers to implementing the systemic and process messages of research is our own individual and largely individualistic ideologies." (1987, p 57)

Similarly, there are difficulties in promoting research into family therapy approaches as mentioned earlier (see 3.3.B). Especially, the theory and method do not sit well with established research methodologies, which as Auerswald (1987) points out, will make some proposals ineligible for financial support. Smale says quite bluntly:

> "The research evidence suggests that we are only just beginning to look and listen to social work methodology the right way." (1983, p 260)

This project has attempted to examine a model and methodology on a developmental basis. As such, the project has had to take some explorations as far as possible within an allotted time space, with other restraints on resources. All such work must reach a break-even point where further work might be possible, but the likelihood of decisive improvements drops substantially. This project has not managed to propose a model that remains clear throughout the entire domain of

its description; nor to create an empirical methodology that produced clear evidence of the step-shaped change that would validate both method and model.

However, the hope is that the conceptual model provides a sufficiently useful platform for the theory to give a clear framework to guide choices of macro-process for intervention, and organises some of the concepts about the abstract nature of personal and interpersonal change. It is also hoped that the empirical study suggests directions for the development of process research studies into the ways people change.

14.5 Final Conclusions

This work has been drawn down into a small number of points by way of general conclusions to offer a final perspective:

1. A model has been developed on the basis of Catastrophe Theory, using Family Morale as a construct, to demonstrate 'Change Theory' in the language of Brief Family Therapy.

2. The model organises the notions of homeostasis and morphogenesis, first and second orders of change, and continuous and discontinuous change, utilising other ideas on the abstract properties of change.

3. Rapid change in the face of previous stability is shown to be a scientifically legitimate concept, thus support-

ing arguements for the use of Brief Family Therapy as a cost-effective approach for Social Work.

4. An instrument and data processing techniques were designed and put into operation as a methodological pilot with forty one volunteers.

5. Analysis of the data successfully demonstrated the tracing of homeostatic variations in behaviours. The opportunity to trace a discontinuous morphogenic change was not presented to this study, leaving an area of inconclusiveness.

These concluding points may be helpfully viewed in relation to the overall context of the developments this project has undertaken. By way of summarising comment, then, we should remember that:

> "Therapy ought to be difficult to explain. If it is not, there is a distinct danger that the activity being described is no more than common-sense advice. ()
>
> It is possible that since therapy is primarily based on conversation, the use of language to describe it may hinder rather than help on occasion. Theoretical and research literature is also linguistic. The danger is that the intended distinctions may get muddled up with semantic similarities, and unexpected inferences may cloud the original clarity of meaning. These dangers are

well worth trying to avoid. The use of visual aids is a method of supplementing linguistic metaphor: it can be much more enlightening and can offer intuitive understandings of complex issues (Waddington (1977). Indeed, de Bono (1967) suggests that an identifiable technique to escape old patterns and generate new ones is to think visually." (Simon, 1987a, p 59)

This project has worked by means of both conceptual modelling and empirical investigation to develop the use of visual illustrations to demonstrate the **Shapes of Change.**

15. REFERENCE LIST

Ackoff, R. L. (1980) The Systems Revolution, in Lockett, M. and Speer, R. (eds) Organisations as Systems, Open University, Milton Keynes.

Adams, R. and Hill, G. (1983) The labours of Hercules: some good reasons why social workers should not try to be different and practice family therapy, Journal of Family Therapy 5:71-80.

Aldridge, D. (1985) Personal Communication.

Allport, G. (1942) The Nature of Democratic Morale, in Watson, G., Civilian Morale, Houghton Mifflin & Co, Boston.

Anthony E. J. and Koupernik, C. (eds) The Child and His Family, Wiley-Interscience, New York.

Arnheim, R. (1969) Visual Thinking, University of California Press, Berkeley.

Auerswald, E. H. (1969) Introduction, to 'A Systems Dilemma, Hoffman, L., and Long, L., Family Process 8:211-234.

Auerswald, E. H. (1987) Epistemological confusion in family therapy and research, Family Process 26:317-330.

Bakan, D. (1966) The Duality of Human Existance, Beacon Press, Boston.

Bandler, R. and Grinder, J. (1982) Reframing: Neuro-linguistic programming and the transformation of meaning, Real People Press, Moab, Utah.

Bannister, D. and Fransella, F. (1971) Inquiring Man, Penguin Edition, London.

Barnard, C. J. (1954) The Functions of the Executive, Harvard

University Press, Cambridge, Mass.

Bateson, G. (1973) Steps to an Ecology of Mind, Paladin, St Albans.

Bateson, G. (1978) The birth of a matrix in Double Bind and epistemology, in Berger, M. M. (ed) Beyond the Double Bind, Brunner/Mazel, New York.

Bateson, G. (1980) Mind and Nature: A Necessary Unity, Fontana.

Bateson, G., Jackson, D.D., Haley, J., and Weakland, J. (1956) Towards a Theory of Schizophrenia, Behavioural Science 1:251-264.

Bavelas, J. B. (1984) On "Naturalistic" family research, Family Process 23:337-341.

Belbin, R.M. (1981) Management Teams, Heinneman, London.

Blauberg, I.V., Sandovsky, V.N. and Yudin, E.G. (1977) Systems Theory; Philosophical and Methodological Problems, Moscow, Progress Publishers.

Bloor, D. (1976) Knowledge and Social Imagary, Routledge, Kegan and Paul, London.

Borko, H. (1967) Automated Language Processing, J. Wiley & Sons, New York.

Bond, G. C. (1963) Heterogenous Catalysis: Principles and Applications, Oxford University Press, Oxford.

Bowlby, J. (1987) John Bowlby at 80 - Part 1: Impromptu Bowlby, Association of Family Therapy Newsletter 7:3-9.

Buckley, W. (1980) Systems, in Lockett, M., and Speer, R. (eds) Organisations as Systems, Open University, Milton Keynes.

Cade, B. W. (1979) The Use of Paradox in Therapy, in Walrond-Skynner, S. (ed) Family and Marital Therapy: A clinical approach, Routledge & Kegan Paul, London.

Cade, B. W. (1980) Strategic Therapy, Journal of Family Therapy 2:89-99.

Cade, B. W. (1981) The Pyramid: an unsuitable shape for treatment agencies, Association of Family Therapy Newsletter Summer, p 4-7.

Cade, B. W. and Seligman, P. M. (1982) Teaching a Strategic Approach, in Whiffin, R. and Byng-Hall, J. (eds) Family Therapy Supervision, Recent Developments in Practice, Academic Press, London.

Cade, B. W. and Southgate, P. (1979) Honesty is the Best Policy, Journal of Family Therapy 1:23-31.

Cadwallader, M. (1959) The cybernetic analysis of change in complex social organisations, American Journal of Sociology 65:154-157.

Callahan, J. and Sashin, J. J. (1987b) Predictive models in psychoanalysis (Manuscript submitted for publication)

Callam, R. and Rachel, P. (1987) Why are we always 'too busy'? Problems of practitioner research in family therapy, Journal of Family Therapy 9:329-354.

Cannon, W. B. (1932) The Wisdom of the Body, Kegan Paul, French Trubner, London.

Capra, F. (1983) The Turning Point, Fontana, London.

Caplin, G. (1976) The family as support system, in Caplan, G. and Killilea, M. Support Systems and Mutual Help: Multi-dsciplinary Explorations, Grune and Stratton, New York.

Carter, E. A. and McGoldrick, M. (1980) The Family Life Cycle: A Framework for Family Therapy, Gardner Press, New York.

Casement, P. (1985) On Learning From the Patient, Tavistock Publications, London.

Chasin, R. and Grunebaum, H. (1980) A brief synopsis of current concepts and practices in family therapy, in Pearce, J. K. and Freidman, L. J. (eds) Family Therapy: Combining Psychodynamic and Family Systems Approaches, Grune and Stratton, New York.

Chatfield, C. (1975) The Analysis of Time Series: Theory and Practice, Chapman and Hall, London.

Clark, P. A. (1972) Action Research and Organisational Change, Harper and Row, London.

Colon, F. (1980) The Family Life Cycle of the Multi-problem Poor Family, in Carter, E. A. and McGoldrick, M. (eds) The Family Life Cycle, A Framework for Family Therapy, Gardner Press, New York.

Coulshed, V. and Abdullah-Zadeh, J. (1983) Case Examples of Family Therapy in Social Services Department, Social Work Today 14:11-15.

Cromwell, R. E., Olson, D. and Fournier, D. G. (1976) Tools and Techniques for Diagnosis and Evaluation in Marital and Family Therapy, Family Process 15:1-49.

Cromwell, R. E. and Peterson, G. W. (1983) Multisystem-Multimethod family assessment clinical contexts, Family Process, 22:147-163.

Cronback L.J. and Meehl, P.E. (1955) Construct validity and

psychological tests, Psychological Bulletin 52:281-302.

Dale, P. (1984) Three act tragedies, Community Care 20/10/1984:12-14.

Dale, P., Waters, J., Davies, M., Roberts, W. & Morrison (1986) The Towers of Silence: creative and destructive issues for therapeutic teams dealing with sexual abuse, Journal of Family Therapy 8:1-25.

Davie, E. (1980) Escaping from the bottle, Social Work Today 11:14-16.

De Bono, E. (1967) The Uses of Lateral Thinking, Penguin, Harmondsworth.

De Grazia, S. (1962) Of Time, Work and Leisure, Twentieth Century Fund, New York.

De Jouvenal, (1967) The Art of Conjecture, Weidenfeld and Nicolson, London.

De Shazer, S. (1982a) Patterns of Brief Family Therapy: A ecosystemic approach, Guildford, New York.

De Shazer, S. (1982b) Some conceptual distinctions are more useful than others, Family Process 21:71-84.

De Shazer, S. (1985) Keys to the Solution in Brief Therapy, Norton, New York.

Dell, P. (1981) Some irreverent thoughts about paradox, Family Process 20:37-57.

Dell, P. (1982) Beyond Homeostasis: Towards a Concept of Coherence, Family Process 21:21-41.

Dell, P. and Goolishian, H. A. (1981) "Ordnung durch Fluktuation: Eine evolutionare epistemology fur menschliche systeme" Familiendynamik 6:104-122.

Dimmock, B. and Dungworth, D. (1985) Beyond the Family; using

network meetings with statutory child care cases, Journal of Family Therapy 7:45-68.

Donnison, D. V., CHapman, V., Meacher, M., Sears, A., Urwin, K. (1965) Social Policy and Administration, George Allen and Unwin, London.

Dunlap, K. (1928) A Revision of the Fundamental Laws of Habit Formation, Science 67:360-362.

Dunlap, K. (1942) The Technique of Negative Practice, American Journal of Psychology 55:267-273.

Durrant, M. (1987) Bowling out fears - test victory for double description, Journal of Family Therapy 9:145-159.

Edwards, G. and Gross, M. M. (1976) Alcohol Dependence: Provisional Description of a Clinical Syndrome, British Medical Journal 1:1058-1061.

Elkaim, M. (1981) Non-equilibrium, Chance and Change in Family Therapy, Journal of Marital and Family Therapy 7:291-297.

Ewing, C. P. (1978) Crisis Intervention as Psychotherapy, Oxford University Press, New York.

Farmer, M. (1970) The Family, Longmans, London.

Fischer, J. (1978) Effective Casework Practice: An Eclectic Approach, McGraw Hill, New York.

Fisher, S. G. (1984) Time limited brief therapy with families: a one year follow-up study, Family Process 23:101-106.

Fisher, L., Anderson, A. and Jones, J. E. (1981) Types of Paradoxical Intervention and Indications/Contra-indications for Use in Clinical Practice, Family Process

20:25-35.

Foley, R. (1985) George Kelly and Gregory Bateson: Thesis-antithesis or synthesis (a comparison of personal construct and systems theory), Paper presented at the 6th International Congress of Personal Construct Psychology, Cambridge, England.

Frankl, V. (1973) Psychiatry and Existentialism, Pelican, Harmondsworth.

Freud, S. (1914) The Psychopathology of Everyday Life, Pelican, London.

Freud, S. (1971) Complete Introductory Lectures on Psycho-analysis (translated and edited: Strachey, J.) George, Allen and Unwin, London.

Frude, N. (1980) Methodological problems in the evaluation of family therapy, Journal of Family Therapy 2:29-44.

Gale, A. (1979) Problems in outcome research in family therapy, in Walrond-Skynner, S. Family Therapy and Marital Psychotherapy, A Critical Approach, Routledge & Kegan Paul, London.

Gale, A. and Barker, M. (1987) The repertory grid approach to analysing family members' perception of self and others: a pilot study, Journal of Family Therapy 9:355-366.

George, L. K. (1981) Subjective Well-Being: Conceptual and Methodological Issues, in Eisdorfer, C. (ed) Annual Review of Gerontology and Geriatrics 2:345-383.

George, L. K. and Bearon, L. B. (1980) The Meaning and Measurement of Quality of Life in Older Persons, Human Sciences, New York.

Glick, I. D. and Kessler, D. R. (1980) Marital and Family Therapy, Grune and Stratton, New York.

Gordon, R. (1975) The Creative Process: Self-expression and Self-transcendence, in Jennings, S. (ed) Creative Therapy, Pitman, London.

Gregory, R. L. (1974) Conceptions and Mechanisms of Perception, Duckworth, London.

Gregson, R. A. M. (1983) Time Series in Psychology, Lawrence Erlbaum Ass., London.

Haley, J. (1973) Uncommon Therapy: The Psychiatric Techniques of Milton Erikson, MD, WW Norton, New York.

Haley, J. (1976) Problem Solving Therapy, Jossey-Bass, San Fransisco.

Haley, J. (1984) Ordeal Therapy: On unusual ways to change behaviour, Jossey-Bass, San Fransisco.

Hall, M. P. (1966) The Social Services of Modern England, Routledge and Kegan Paul, London.

Halliday, A. (1985) The role of hope in post basic social work education, an invitation to dialogue, Paper read at Australian Association for Social Work Education, Bicentennial Workshop Series.

Hansen, C. (1981) Living in with families, Family Process 20:53-75.

Hartford, M. E. (1971) Groups in Social Work: Applications of Small Group Theory and Research to Social Work Practice, Columbia University Press, New York.

Hazzell, T. (1987) Research, Ideology and Practice - a discontinuity, Children and Society 1:51-57.

Heisenberg, W. (1930) The Principles of Quantum Theory, University of Chicago Press, Chicago.

Henkel, R. E. (1976) Tests of Significance, Sage University Paper Series on Quantitative Applications in the Social Sciences, London.

Hinshelwood, R. D. (1987) What Happens in Groups?: Psychoanalysis, the Individual and the Community, Free Association Books, London.

Hoffmann, L. (1981) Foundations of Family Therapy: A Conceptual Framework for Systems Change, Basic Books, New York.

Holzner, B. (1968) Reality Construction in Society, Schenkman, Cambridge, Mass.

Illich, I. (1974) Medical Nemesis, Pantheon, New York.

Isnard, C. A. and Zeeman, E. C. (1977) Some models for catastrophe theory in the social sciences, in Zeeman, E. C. (ed) Catastrophe Theory, Selected Papers 1972-77, Addison Wesley, Reading, Mass.

Jackson, D. D. and Weakland, J. H. (1961) Conjoint Family Therapy: Some Considerations on Theory, Technique and Results, Psychiatry, Supplement to 24:30-45.

Jackson, D. D. (1957) The Question of Family Homeostasis, Psychiatric Quarterly Supplement 31:79-90.

Jacobson, N. S. and Margolin, G. (1979) Marital Therapy: Strategies Based on Social Learning and Behaviour Exchange Principles, Brunner/Mazel, New York.

Jenkins, H. (1983) A Life-cycle framework in the treatment of under-organised families, Journal of Family Therapy

5:12-14.

Jordan, B. (1979) Invitation to Social Work, Martin Robertson, Oxford.

Jordan, W. (1981) Family Therapy - an Outsider's View, Journal of Family Therapy 3:269-280.

Kahn, R. L. and Katz, D. (1960) Leadership Practices in Relation to Productivity and Morale, in Cartwright, D. and Zander, A. (eds) Group Dynamics: Research and Theory, Second Edition, Tavistock, London.

Karastergiou-Katsika, A. and Watson, J. P. (1985) A comparative study of repertory grid and clinical methods for assessing family structure, Journal of Family Therapy 7:231-250.

Kameguchi, K. (1986) A systemic family psychotherapy of a case of school refusal, In Brief 6(3):7-9.

Kauder, A. (1980) Research on the family, Bulletin of British Psychological Society 33:419.

Keeney, B. (1983) Aesthetics of Change, Guildford, New York.

Kelly, G. A. (1955) The Psychology of Personal Constructs, WW Norton, New York.

Kelly, G. A. (1963) A Theory of Personality: The Psychology of Personal Constructs, Norton, New York.

Kierkegaard, S. (1944) The Sickness Unto Death, University Press, Oxford.

Klein, J. (1961) Working in Groups, Hutchison University Library, London.

Koestler, A. (1964) The Act of Creation, Hutchison,

London.

Kovel, J. (1978) A Complete Guide to Therapy, From Psychoanalysis to Behaviour Modification, Penguin, Harmondsworth.

Kraupl-Taylor, F. (1969) Prokaletic Measures Derived from Psychoanalytic Technique, British Journal of Psychiatry 115:407-419.

Kuhn, T. S. (1970) The Structure of Scientific Revolutions, Chicago University Press, Chicago.

Leckerman, S. (1957) The effects of changes in roles on the attitudes of role occupants, in Brown, H. and Stevens, R. (eds) Social Behaviour and Experience, Hodder and Stoughton, London.

Lewin, K. (1942) Time Perspective and Morale, in Civilian Morale, Watson, G. (ed) Civilian Morale, Houghton Mifflin & Co, Boston.

Lewis, J. M., Beavers, W. R., Gossett, J. T. and Phillips, V. A. (1976) No Single Thread: Psychological Health in Family Systems, Brunner/Mazel, New York.

Lippitt, G. L. (1973) Visualising Change: Model Building and the Change Process, N.T.L.Learning Resources Group, New York.

McIver, J. P. and Carmines E. G. (1981) Unidimensional Scaling, Sage Quantitative Applications in Social Sciences, Beverly Hills.

Madanes, C. (1981) Strategic Family Therapy, Jossey-Bass, San Fransisco.

Malan, D. H. (1976) The Frontier of Brief Psychotherapy,

Plenum, New York.

Manz, C. C. and Sims, H. P. (1982) The potential for "groupthink" in autonomous work groups, Human Relations 35:773-784.

Maruyama, M. (1963) The Second Cybernetics: Deviation-Amplifying Mutual Causal Processes, American Scientist 51:164-179.

Mayo, E. (1933) The Human Problems of an Industrial Civilisation, MacMillan, London.

Merton, R. (1948) The Self-fulfilling prophecy, Antioch Review 8: 193-210.

Merton, R. (1957) Social Theory and Social Structure, Second Edition. Free Press, Illinois.

Minuchin, S. (1974) Families and Family Therapy, Tavistock, London.

Mullen, H. and Rosenbaum, M. (1962) Group Psychotherapy, Free Press, Glencoe.

Nadel, S. F. (1951) The Theory of Social Structure, Cohen and West, London.

Neill, J. R. and Kniskern, D. P. (1982) From Psyche to System: the evolving work of Carl Whitaker, Guildford, New York.

Nuttall, K. (1985) The Place of Family Therapy in Social Work, Social Work Monographs, University of East Anglia, Norwich.

O'Hagan, K. (1984) Family crisis intervention in social services, Journal of Family Therapy 6:149-182.

O'Hagan, K. (1986) Crisis Intervention in Social Services,

Macmillan, London.

Olsen, D. H. (1972) Empirically unbinding the Double Bind: a review of research and conceptual formulations, Family Process 11:69-94,

Olsen, D. H., Sprenkle, D. H. and Russell, C. S. (1979) Circumplex model of marital and family systems: I. Cohesion and adaptability dimensions, family types, and clinical applications, Family Process 18:3-28.

Ostrom, C. W. (1978) Time Series Analysis: Regression Techniques, Sage Publications, London.

Oxford English Dictionary, Compact Edition (1971) Clarendon Press, Oxford.

Palazzoli, M. S., Boscolo, L., Checchin, G. and Prata, G. (1978) Paradox and Counterparadox: A New Model in the Therapy of the Family in Schizophrenic Transaction, Jason Aronson, London.

Palazzoli, M. S., Boscolo, L., Checchin, G. and Prata, G. (1980) Hypothesising - Circularity - Neutrality: Three Guidelines for the Conductor of the Session., Family Process 19: 3-12.

Papp, P. (1980) Greek Chorus and Other Techniques of Paradoxical Therapy, Family Process 19:45-57.

Papp, P. (1983) The Process of Change, Guildford, New York.

Parad, L. G. and Parad, H. J. (1968) A Study of Crisis-Oriented Planned Short-term Treatment, Part II, Social Casework XLIX:418-426.

Penn, P. (1982) Circular Questioning, Family Process 21:267-

279.

Perrow, C. (1972) Complex Organisations: A Critical Essay, Scott, Foresman and Co, Glenview, Illinois.

Pincus, A. and Minahan, A. (1973) Social Work Practices: Model and Method, Peacock Publishers, Itasca, Illinois.

Pinsof, W. M.(1981) Family Therapy Process Research, in Gurman, A. S. and Kniskern, D. P. (eds) Handbook of Family Therapy, Brunner/Mazel, New York.

Postle, D. (1980) Catastrophe Theory, Penguin, Harmondsworth.

Poston, T. and Stewert, I. (1978) Nonlinear modelling of multistable perception, Behavioural Science 23:318-334.

Prigogine, I. (1984) Order Out of Chaos, Heinneman, London.

Pringle, M. K. (1975) The Needs of Children, Hutchinson Educational Ltd, London.

Pritchard, C. (1985) Personal Communication.

Proctor, H. (1984) A construct theory approach to family therapy and systems intervention, in Button, E. (ed) Personal Construct Theory and Mental Health, Croom Helm, Beckenham, Kent.

Proctor, H. (1985) Personal Communication.

Prosser, G. (1985) Personal Communication.

Prosser, G., Carson, P. Phillips, R., Gelson, A., Buch, N. Tucker, H., Neophytou, M., Lloyd, M., and Simpson, T., (1981) Morale in Coronary Patients Following an Exercise Programme, Journal of Psychosomatic Research 25:587-593.

Rabkin, R. (1972) On Books, Family Process 2:12.

Rabkin, R. (1976) Critique of the clinical use of the Double

Bind hypothesis, in Sluzki, C. and Ransom, D. (eds) Double Bind: Foundation of the Communicational Approach to the Family, Grune and Stratton, New York.

Rabkin, R. (1977) Strategic Psychotherapy, Basic Books, New York.

Rapoport, L. (1970) Crisis Intervention as a Mode of Brief Treatment, in Roberts, R. W. and Nee, R. H., Theories of Social Casework, University of Chicago Press, Chicago.

Reid, W. J. and Shyne, A. W. (1969) Brief and Extended Casework, Columbia University Press, New York.

Revenstorf, D., Hahlweg, K., and Schindler, L. (1979) Lead and lag in aspects of marital interaction, Journal Behaviour Analysis and Modification 2:174-184.

Revenstorf, D., Kunert, H., Hahlweg, K., and Schindler, L. (1979) The use of cross-correlational and other time-series parameters in clinical analysis, in Anderson, O. D. (ed) Time Series Analysis: Theory and Practice 1, North-Holland Publishing Co.

Richardson, L. F. (1960) Arms and Insecurity, Pittsburgh, Boxwood.

Rikards, M. (1968) Brews and Potions, Hugh Evelyn, London.

Riskin, J. (1982) Research on 'Non-Labelled' Families: A Longitudinal Study, in Walsh, F. (ed) Normal Family Processes, Guildford, New York.

Robinson, D. (1971) The Process of Becoming Ill, Routledge & Kegan Paul, London.

Robinson, J. P. and Shaver, P. R. (1973) Measures of Social Psychological Attitudes, Survey Research Center

Institute for Social Research, Ann Arbour, Mich.

Roetter, C. (1974) Psychological Warfare, B. T. Batsford, London.

Rosenbaum, R.L. (1982) Paradox as epistemological jump, Family Process 21:85-90.

Rosenthal, R. and Rubin, D. B. (1978) Interpersonal expectancy effects: the first 345 studies, Behavioural and Brain Sciences 3:377-415.

Rutter, M. and Madge, N. (1976) Cycles of Disadvantage, Heinneman, London.

Sacks, O. (1984) A Leg to Stand On, Duckworths, London.

Sashin J. J. and Callahan, J. (1987a) Towards a comprehensive scientific model of affect theory (Manuscript submitted for publication).

Schaefer, C., Coyne, J. C. and Lazerus, R. S. (1981) The health related functions of social support, Journal of Behavioural Medicine 4:381-406.

Schwartzman, J. (1984) Family theory and the scientific method, Family Process 23:223-236.

Seligman, M. (1973) Fall into Helplessness, Psychology Today 7(1):43-48.

Sheldon, B. (1986) Social work effectiveness experiments: review and implications, British Journal Social Work 16:223-242.

Siegal, S. (1956) Non-parametric Statistics for the Behavioural Sciences, McGraw-Hill Kogakusha, Tokyo.

Simon, D. I. (1985) Following the trend, Computer Applications in Social Work 2:11-13.

Simon, D. I. (1986) Hamlet's Survival and Family Violence, (Unpublished Manuscript).

Simon, D. I. (1987a) On change, catastrophe and therapy, Journal of Family Therapy 9:59-73.

Simon, D. I. (1987b) How do families experience their process of change? Paper read at Annual Conference of Family Therapy, York; to be published in Journal of Family Therapy.

Simon, D. I. (1988a) Facing Failure, Journal of Strategic and Systemic Therapies 7(1),7-14.

Simon, D. I. (1988b) Urging Caution: A Powerful Message for Change, (Unpublished manuscript).

Simon, D. I. and Axford, T. (1983) Something Extra, Social Work Today 15:12-14.

Simon, D. I. and Axford, T. (1988) Family therapy and the national welfare, (Manuscript in Preparation)

Simon, D. I. and Vine, M. (1987) A case of therapy by proxy?, Journal of Family Therapy 9:101-111.

Simon, H. (1952) Comments on the Theory of Organisation, American Political Science Review 46:1130-1139.

Skynner, A. R. C. (1976) One Flesh, Seperate Persons: Principles of Family and Marital Therapy, Constable, London.

Sluzki C. E. (1983) Process, Structure and World Views: Toward an Integrated View of Systemic Models, Family Process 22:469-476.

Sluzki C. and Ransom, D. (1976) Double Bind: Foundation of the Communcational Approach to the Family, Grune and

Stratton, New York.

Smale, G. G. (1977) Prophecy, Behaviour and Change, Routledge and Kegan Paul, London.

Smale, G. G. (1983) Can we afford not to develop social work practice?, British Journal of Social Work 13:251-264.

Smale, G. G. (1984) Self-fulfilling Prophecies, Self-defeating, Strategies and Change, British Journal of Social Work 14:419-433.

Smets, A. C. (1985) What to do when the crisis is over?, Journal of Strategic and Systemic Therapies 4:20-26.

Smith, D.E. (1925) The History of Mathematics, vol II, Dover Publications, New York.

Smith, L. P. (1934) All Trivia, Penguin, Harmondsworth.

Speer, D. C. (1970) Family Systems: Morphostasis and Morphogenesis, Or, Is Homeostasis Enough?, Family Process 9:259-278.

Spence, J. C. (1946) The purpose of the family, Convocation Lecture of the National Children's Home, Epsworth.

Stephens, T. (ed) (1945) Problem Families, Gollanz and Pacifist Service Units, London.

Stewert, I and Peregoy, P. (1983) Catastrophe Theory Modelling in Psychology, Psychology Bulletin 94:336-362.

Stierlin, H (1974) Separating Parents and Adolescents, Quadrangle, New York.

Stock, W. A., Okum, M. A., Haring, M. J., Witter, R. A. (1983) Age differences in subjective well-being: a meta-analysis, in Light, R. J. (ed) Evaluation Studies Review Annual 8:279-302.

Sutton, A., Gergory, P. and Simon, D. I. (1988) Child abuse: models of catastrophe, (Manuscript submitted for publication)

Terkleson, K. G. (1980) Toward a Theory of Family Life Cycle, in Carter, E. A. and McGoldrick, M. The Family, Life Cycle: A Framework for Family Therapy, Gardner Press, New York.

Thom, R. (1975) Structural Stability and Morphogenesis, (English trans: Fowler, D. H.), Benjamin, New York.

Thom, R. (1983) Mathematical Models of Morphogenesis (trans:, Brookes, W. M. and Rand, D.) Ellis Horwood, Chichester.

Thompson, S. and Kahn, J. H. (1970) The Group Process as a Helping Technique, Permagon Press, Oxford.

Tiebout, H. M. (1949) The act of surrender in the treatment process with special reference to alcoholism, Quarterly Journal of Studies on Alcoholism 10:48-58.

Titmus, R. M. (1968) Commitment to Welfare, George Allen and Unwin, London.

Totman, R. (1979) The Social Causes of Illness, Souvenir Press, London.

Triseliotis, J. (1987) 'Family Therapy' or Working with Families, Practice 1:5-11.

Tuckman, B.W. (1965) Developmental sequences in small groups, Pychological Bulletin LXIII,384-399.

Tukey, J. W. (1977) Exploratory Data Analysis, Addison Wesley, Reading, Mass.

Von Bertalanffy, L. (1953) Biophysik des Fliessgleichgewichts, Braunsschweig, Veweg.

Von Bertalanffy, L. (1968) General Systems Theory, George Braziller, New York.

Vetere, A. (1984) Participant-Observation in Families with School-Refusing Children, Ph. D. Thesis, Southampton University.

Waddington, C. H. (1977) Tools for Thought, Paladin, St Albans.

Walker, C. R. and Guest, R. H. (1952) The Man on the Assembly Line, Harvard University Press, Cambridge, Mass.

Walrond-Skynner, S. (1978) Indications and Contra-indications for the use of family therapy, Journal of Child Psychology and Psychiatry 19:57-62.

Watts, A. (1962) The Way of Zen, Penguin, Harmondsworth.

Watzlawick, P., Beavin, J. H. and Jackson, D. D. (1967) Pragmatics of Human Communication: A Study of Interactional Patterns, Pathologies and Paradoxes, Norton, New York.

Watzlawick, P., Weakland, J. H. and Fisch, R. (1974) Change: Principles of Problem Formation and Problem Resolution, WW Norton, New York.

Watzlawick, P. (1984) Self-fulfilling Prophecies, in Watzlawick, P. (ed) The Invented Reality, Norton, New York.

Weakland, J. H. (1976) The 'Double Bind' hypothesis of schizoprhenia and three party interaction, in Sluzki C. and Ransom, D. (1976) Double Bind: Foundation of the Communcational Approach to the Family, Grune and Stratton, New York.

Weakland, J. H., Fisch, M. D., Watzlawick and Bodin, A. M. (1974) Brief Therapy: Focussed Problem Resolution, Family Process 13:141-168.

Webster's Third International Dictionary (1976) G. and C. Meriam, Springfield, Mass.

Weeks G. and L'Abate, L. (1979) A Compilation of Paradoxical Methods, American Journal of Family Therapy 17:61-76.

Weeks, G. (1978) A Bibliography of Paradoxical Methods in the Psychotherapy of Family Systems, Family Process 17:95-98.

Weiner, N. (1961) Cybernetics, Wiley, New York.

Welford, A. T. (1973) Stress and Performance, Ergonomics 16:567-587.

Wender, P. H. (1969) Vicious and Virtuous Circles: The Role of Deviation Amplifying Feedback in the Origin and Perpetuation of Behaviour, Psychiatry 31:304-324.

Whan, M. (1983) Tricks of the Trade: questionable theory and practice in family therapy, British Journal of Social Work 13:321-337.

Whitehead, A. N. and Russell, B. (1910) Principia Mathematica, Cambridge University Press, Cambridge.

Will, D. and Wrate, R. M. (1985) Integrated Family Therapy: A problem-centred psychodynamic approach, Tavistock, London.

Wilson, A. G. (1981) Catastrophe Theory and Bifurcation: application to urban and regional systems, Croom Helm, London.

Winnett, R. A. and Neale, M. S. (1981) Flexible Work

Schedules and Family Time Allocation: Assessment of a system observing individual behaviour using self-report logs, Journal of Applied Behaviour Analysis 14:39-46.

Winnicott, D. W. (1954) The Child, the Family and the Outside World, Penguin, Harmodsworth.

Winnicott, D. W. (1965) The Maturational Process and the Facilitative Environment, International Universities Press, New York.

Wolberg, S. (1965) Short-term Psychotherapy, Grune and Stratton, New York.

Wood, A. (1988) King Tiger and the roaring tummies: a novel way of helping young children and their families change, Journal of Family Therapy 10:49-64.

Woodcock, A. and Davis, M. (1977) Catastrophe Theory, Penguin, Harmondsworth.

Wright, C. (1981) The quickness of the hand deceives the eye, Community Care, 10/10/1981, 20-21.

Yin, R. K. (1984) Case Study Research: Design and Methods, Sage, London.

Young, M. and Willmot, P. (1984) The Symmetrical Family, Penguin, Harmondsworth.

Zeeman, E. C. (1977) Catastrophe Theory, Selected Papers 1972-1977, Addison-Wesley, Reading.

Zeeman, E.C. (1978) A catastrophe model of Anorexia Nervosa, in Booth, D.A. (ed) Hunger Models, Academic Press, London.

16. APPENDICES

16.1 The Subjects Data

16.2 The Computer Programme Introductory Manual

A. The Programme Modules

B. Other Routines

C. The Major Variables

D. The Programme Structure

E. The Future of the Programme

F. The Screen Displays

16.3 The Computer Programme Listing

16.4 The Instruments Used

16.1 THE SUBJECT'S DATA

The data collected from the subjects was a mixture of numerical and verbal. Disociated from the former, the latter will not appear in any sensible form here unless the bulk of diaries were appended. The former would not make any sense as a list of numbers. Therefore, the numerical data is presented here graphically, in the form of the 'All four traces' printout. Where appropriate, the graphs have been butt-jointed to show traces longer than the 70 day lengths printed out, in order to enhance the visual impact of the trace. The graphs have been photostatically reduced in order to fit them onto a page satisfactorily.

The diaries have been retained.

The subjects have been gathered into a summary table for ease of inspection.

FIGURE 44: TABLE OF SUBJECTS

Subject Codenames	Family ID code	Diary Weeks
REGIME: BRIEF FAMILY THERAPY		
Gollum	C/2	7
Felicity		7
Chips	D/4	16
Carnations		18
Bruno		9
Dusthaze		4
Joan Collins	F/1	2

Postman Pat	G/5	11
Mousie		9
Sharpeyed Eagle		12
Golden Eagle		11
Silver Spade		11
Cheetah	H/4	8
Trojan		8
Magnum		8
Skins		8

REGIME: CONTRAST FAMILIES

Harold Hedgerow	A/2	4
Diane		4
Macho	B/3	4
Mona		4
Daisy		4
J.M.	E/4	2
I.S.		4
Skillbo		2
Corona		4
Alex	I/4	4
Pat		4
C3P0		3
R2D2		4
Ted	J/5	4
Slave		4
Vivian		4
Ickerus		4
James		4

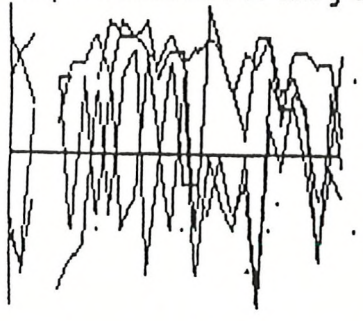
REGIME: FAMILY DAY CARE GROUP

Mrs B.	-/7	8
S.L.N.		20
V.H.		21
J.A.		20
A.D.		21
LINDA		20
M.E.C.		23

The A/2 family, CONTRAST group

File data - MACHO OK

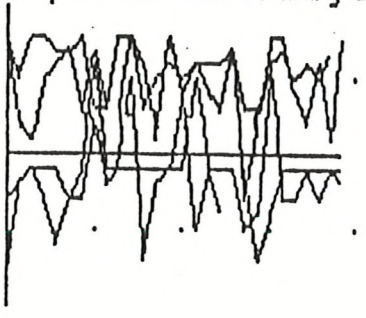
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 2

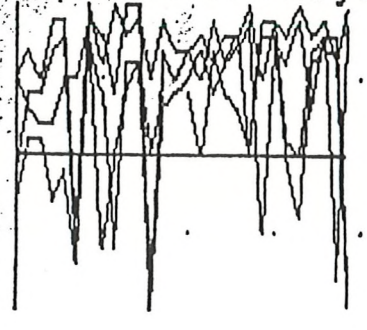
File data - MONA OK

Graphic results: Primary data. Series: All four traces



File data - DAISY OK

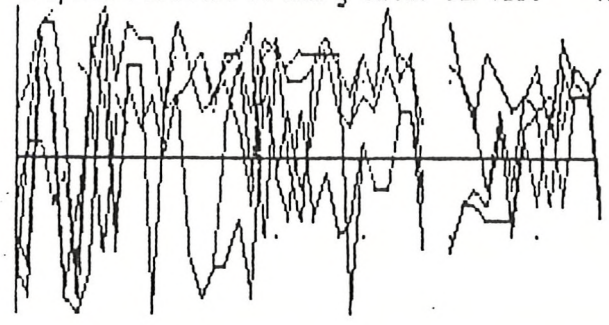
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - FELICITY

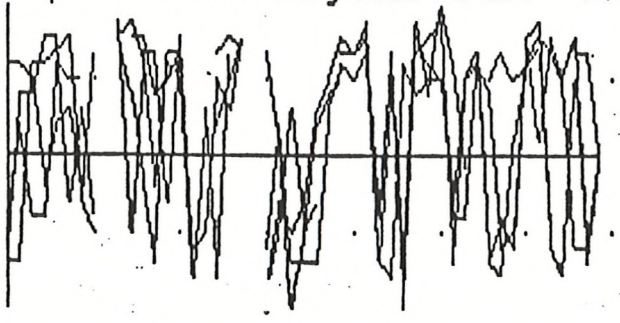
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 48 points this page; 48 in total. Missing values: 0

File data - GOLLUM OK

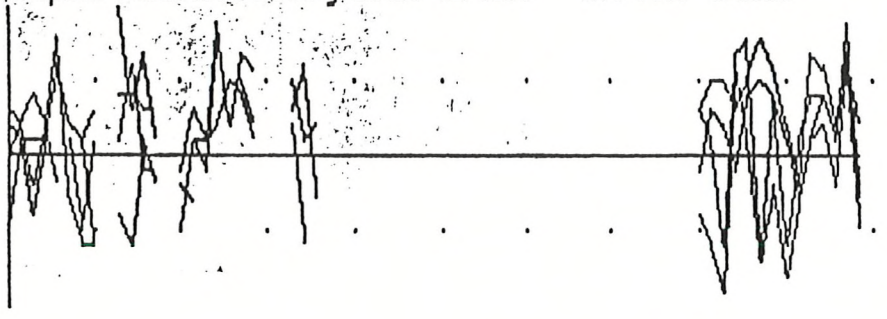
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 49 points this page; 49 in total. Missing values: 4

File data - CHIPS OK

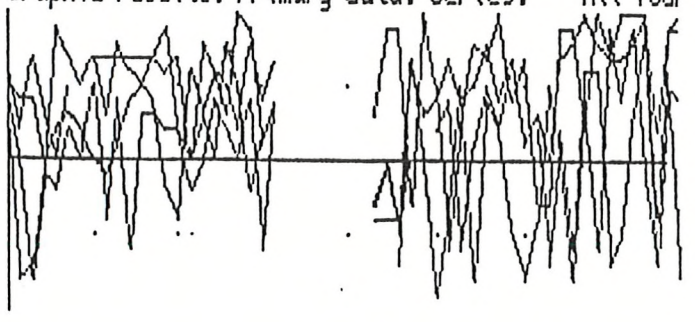
Graphic results: Primary data. Series: All four traces



Page 1 of 2, 70 points this page; 112 in total. Missing values: 38

File data - CARNATIONS OK

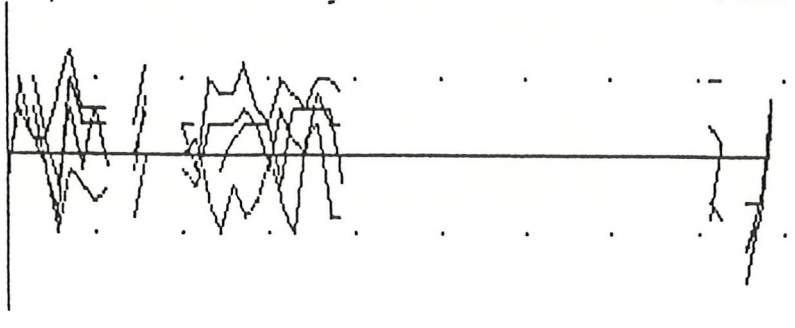
Graphic results: Primary data. Series: All four traces



Page 2 of 2, 55 points this page; 126 in total. Missing values: 51

File data - BRUNO OK

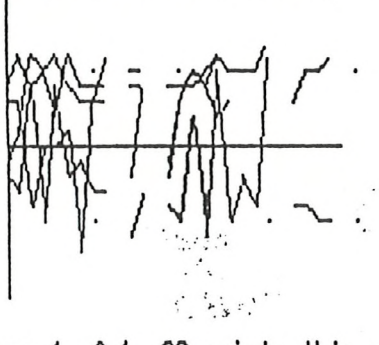
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 63 points this page; 63 in total. Missing values: 37

File data - DUSTHAZE OK

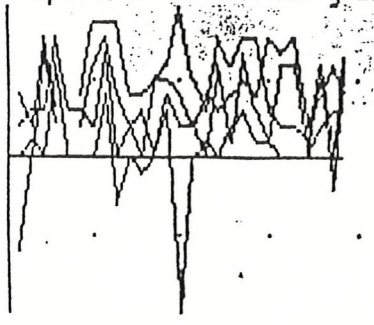
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 7

File data - I.S. OK

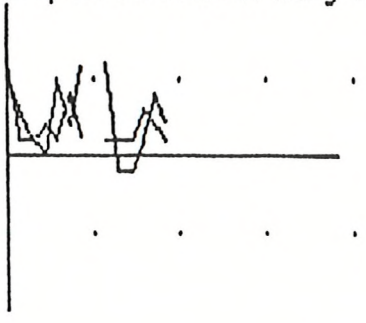
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 1

File data - J.M. OK

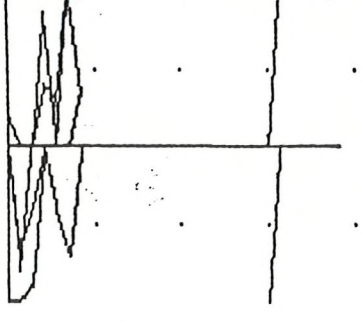
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 16

File data - CORONA OK

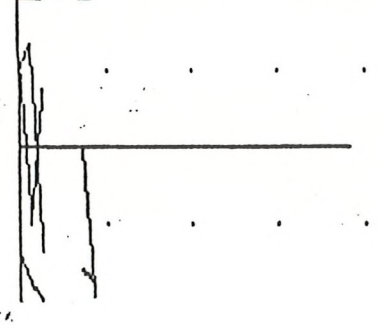
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 20

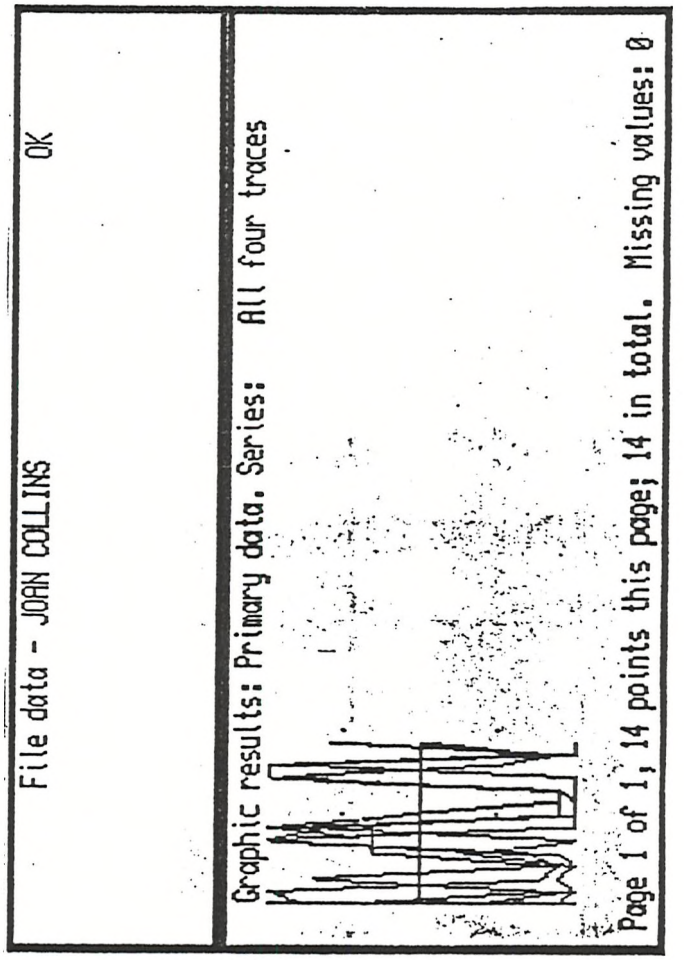
File data - SKILLBO OK

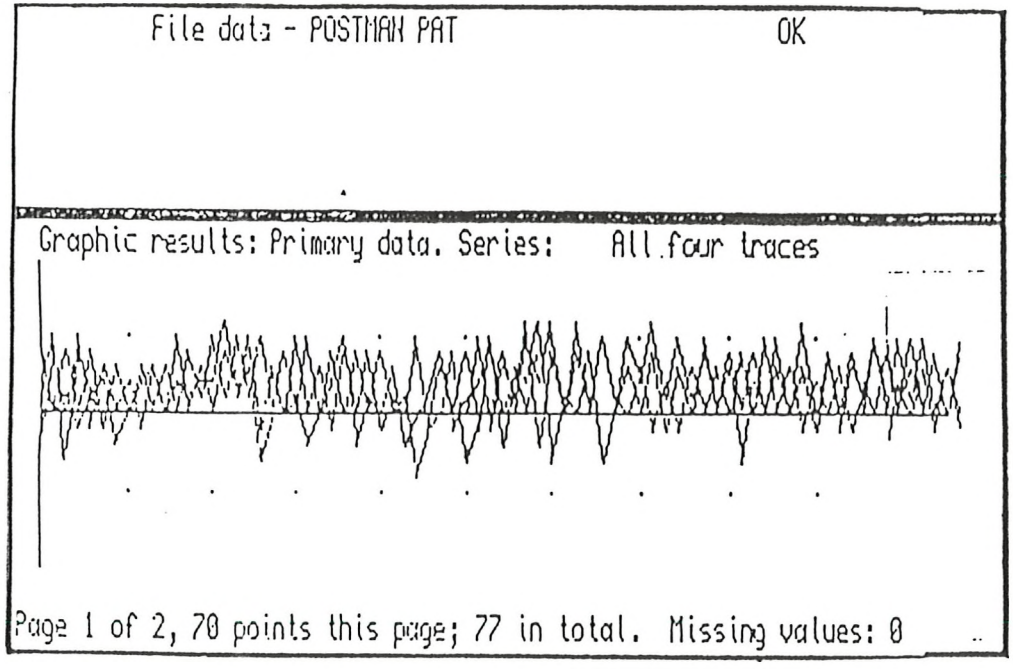
Graphic results: Primary data. Series: All four traces

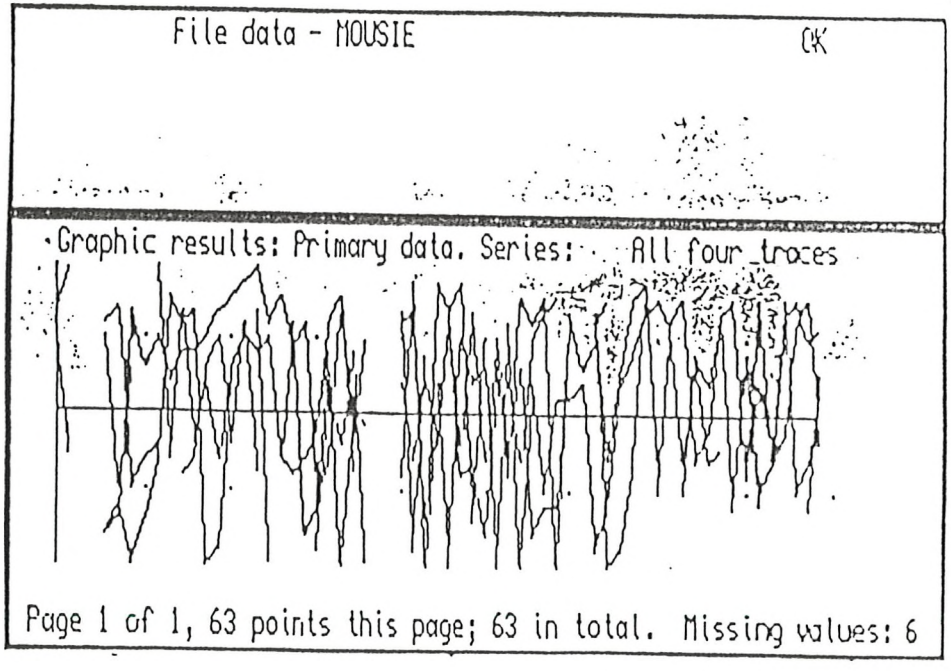


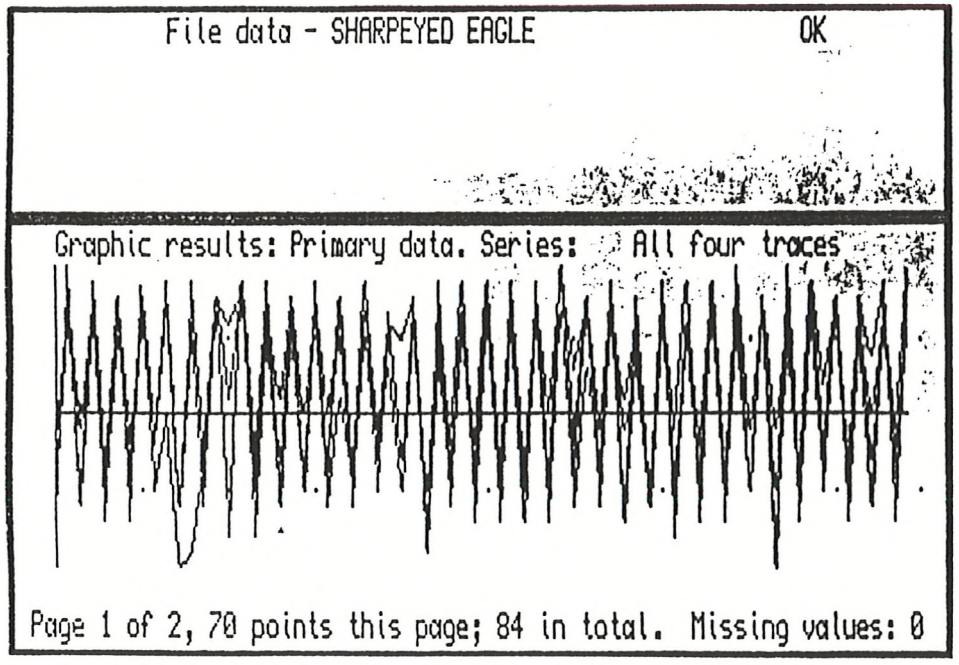
Page 1 of 1, 28 points this page; 28 in total. Missing values: 24

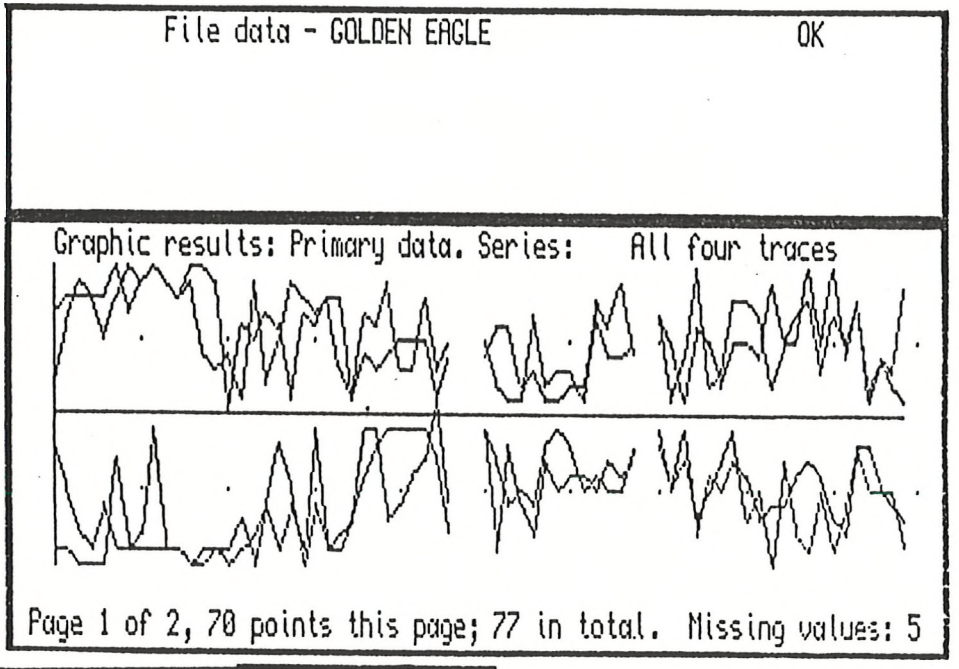
The F/1 family, BFT gmp

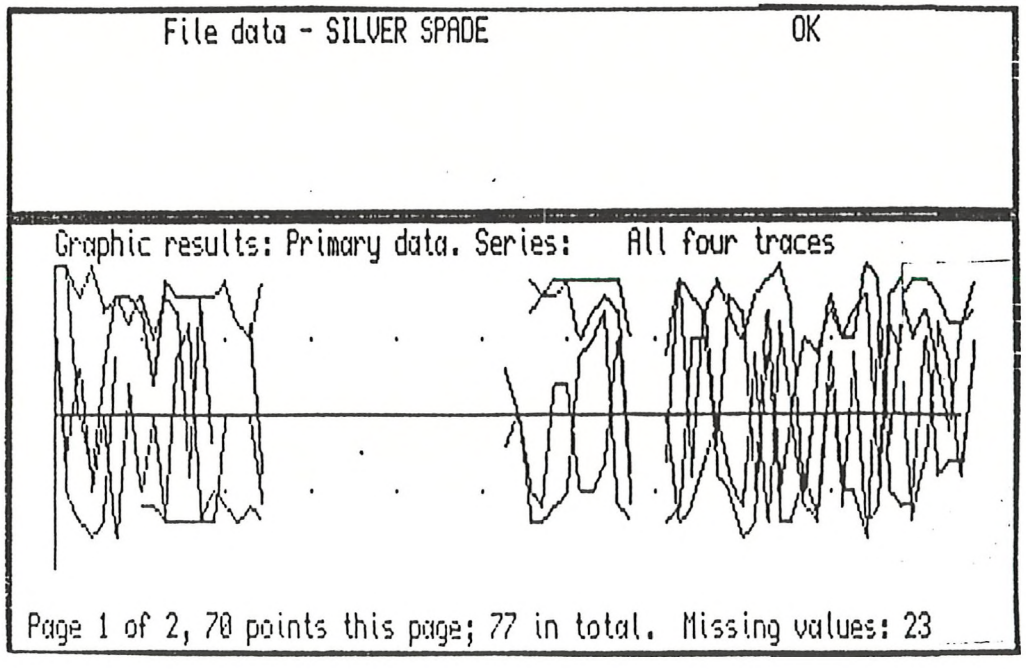



File data - POSTMAN PAT
OK
Graphic results: Primary data. Series: All four traces
Page 1 of 2, 70 points this page; 77 in total. Missing values: 0


File data - MOUSIE
OK
Graphic results: Primary data. Series: All four traces
Page 1 of 1, 63 points this page; 63 in total. Missing values: 6

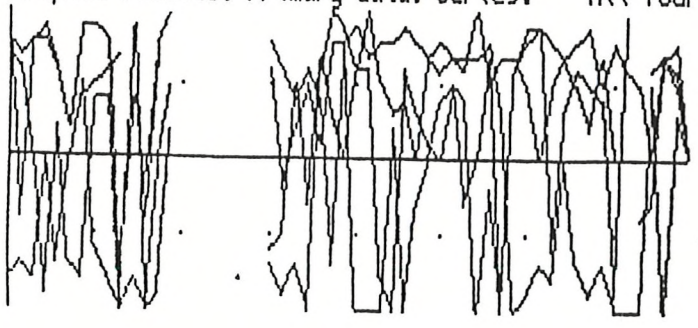

File data - SHARPEYED EAGLE
OK
Graphic results: Primary data. Series: All four traces
Page 1 of 2, 70 points this page; 84 in total. Missing values: 0


File data - GOLDEN EAGLE
OK
Graphic results: Primary data. Series: All four traces
Page 1 of 2, 70 points this page; 77 in total. Missing values: 5


File data - SILVER SPADE
OK
Graphic results: Primary data. Series: All four traces
Page 1 of 2, 70 points this page; 77 in total. Missing values: 23

File data - CHEETAH OK

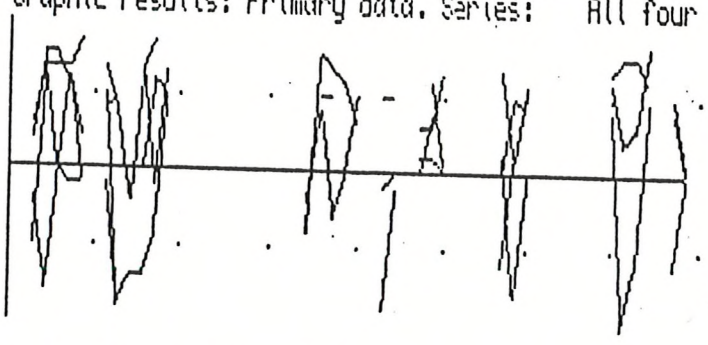
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 56 points this page; 56 in total. Missing values: 8

File data - TROJAN OK

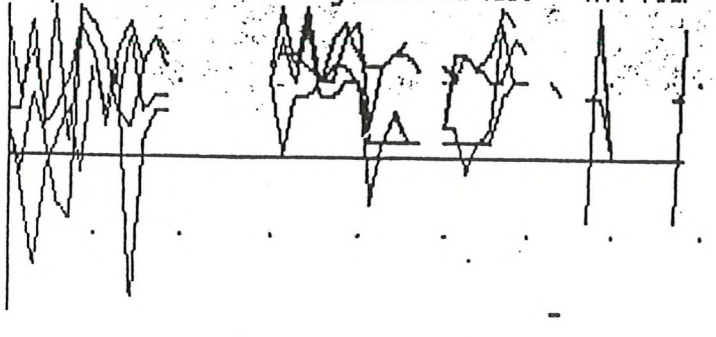
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 56 points this page; 56 in total. Missing values: 33

File data - MAGNUM OK

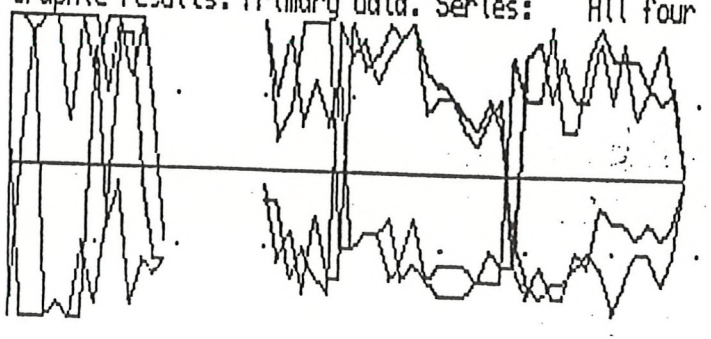
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 56 points this page; 56 in total. Missing values: 17

File data - SKINS OK

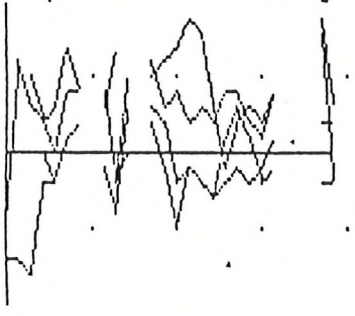
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 56 points this page; 56 in total. Missing values: 8

File data - ALEX OK

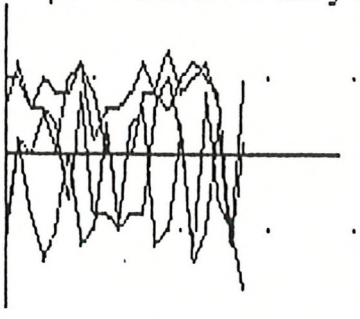
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - PAT OK

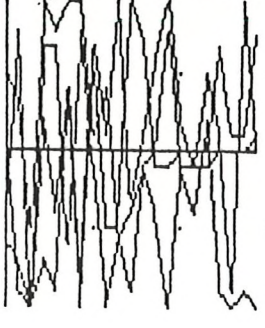
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - C3P0 OK

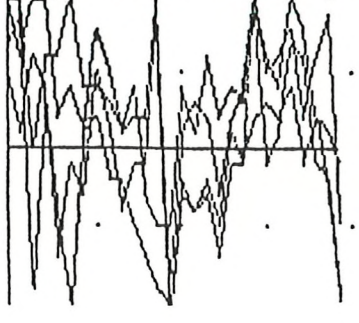
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 21 points this page; 21 in total. Missing values: 0

File data - R2D2 OK

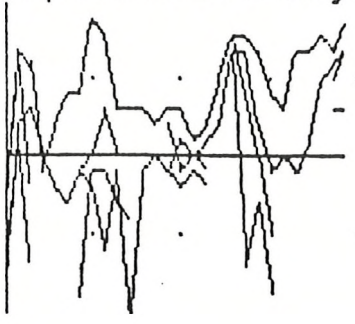
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - TED OK

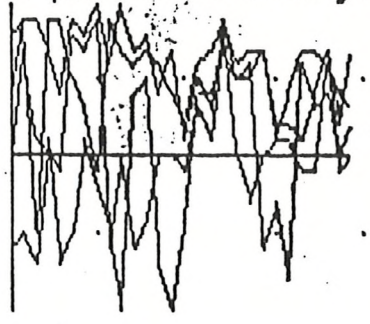
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - SLAVE OK

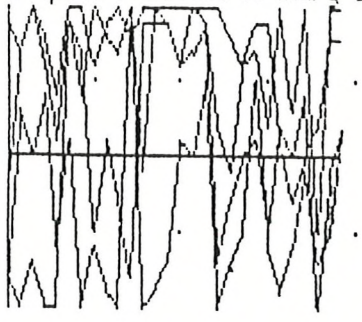
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - ICKERUS OK

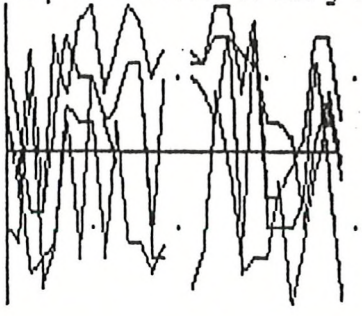
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - JAMES OK

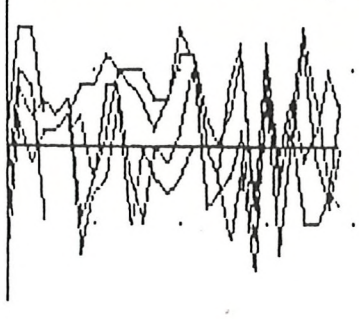
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 2

File data - VIVIAN OK

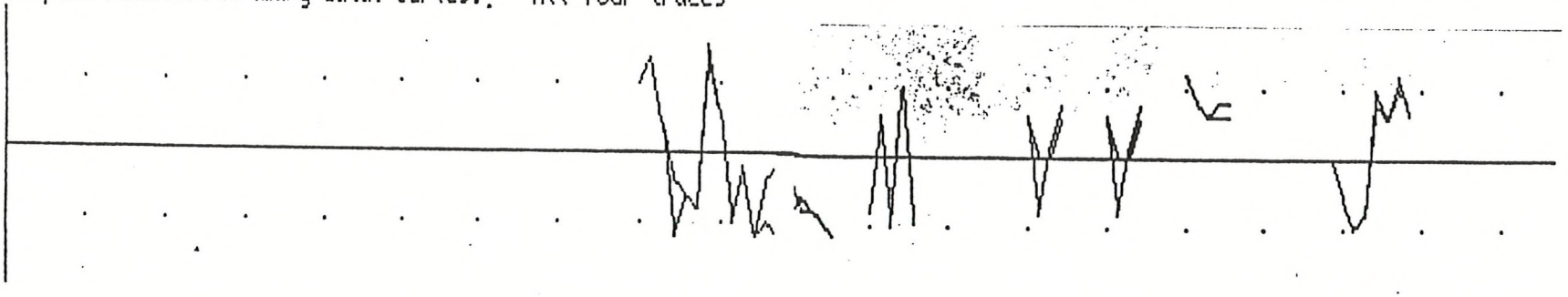
Graphic results: Primary data. Series: All four traces



Page 1 of 1, 28 points this page; 28 in total. Missing values: 0

File data - MRS. B. OK

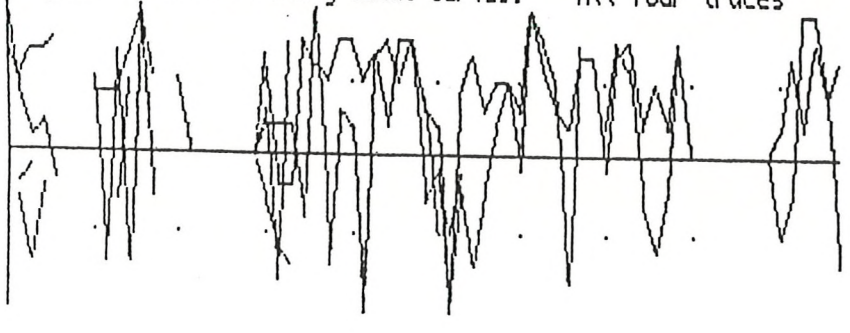
Graphic results: Primary data. Series: All four traces



Page 1 of 2, 70 points this page; 126 in total. Missing values: 57

File data - V.H.

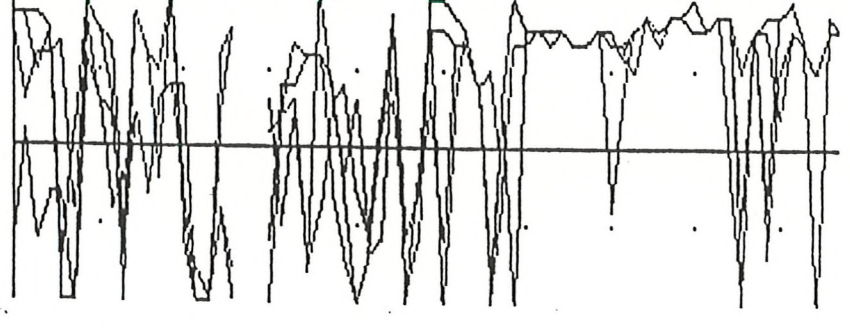
Graphic results: Primary data. Series: All four traces



Page 2 of 3, 68 points this page; 147 in total. Missing values: 0

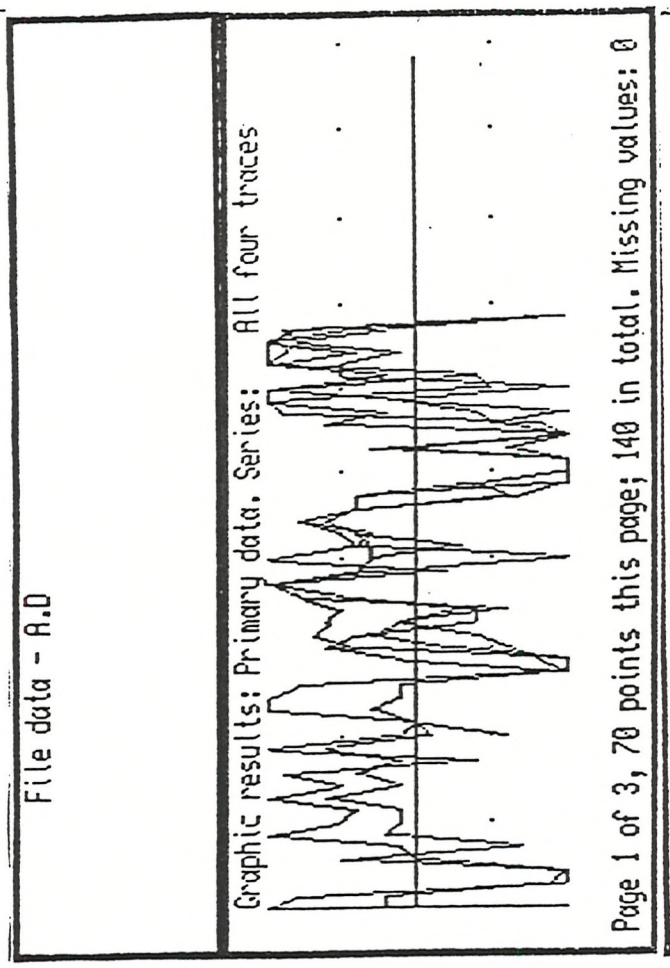
File data - S.L.M.

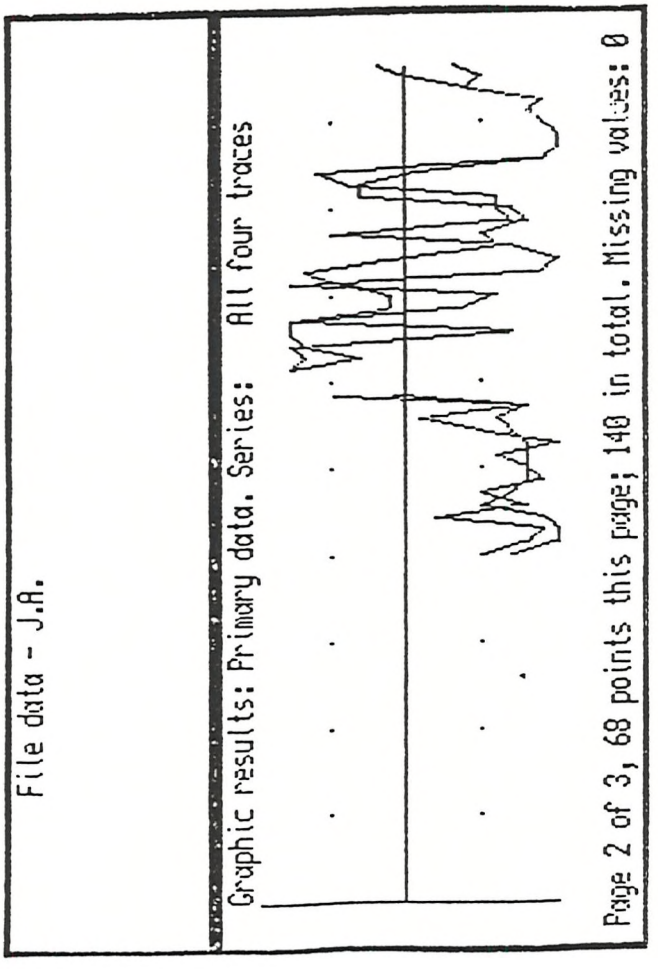
Graphic results: Primary data. Series: All four traces

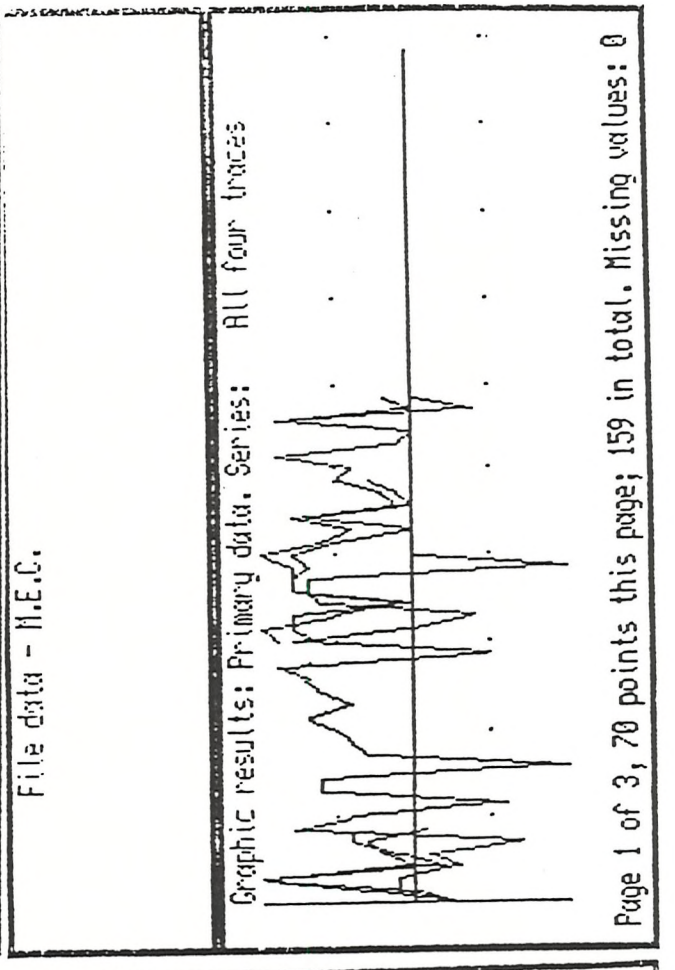


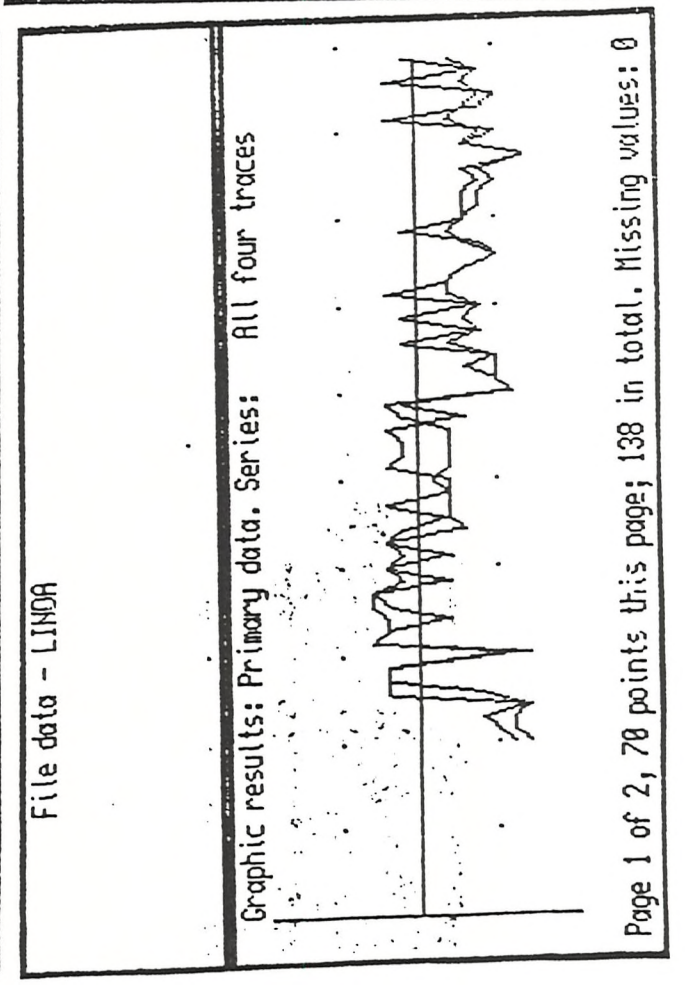
Page 2 of 3, 68 points this page; 140 in total. Missing values: 0

The FDC group, four members









16.2 COMPUTER PROGRAMME INTRODUCTORY MANUAL:

A Time Series Data Handling and Analysis Programme

This computer programme was written for the specific purpose of the storing and exploring time series data arising from the empirical study described above. It retains the status of a research programme where accuracy met a combination of flexibility and speed. It was required to be accessible to modification: both as requirements altered and for debugging (as this was the author's first major programming project). However, in use it was needed to offer a reasonable speed of operation. Thus, it is somewhat skeletal, having few REMarks, but is not compressed (to a minimal form) nor compiled into machine code.

Memory space requirements for the unexpanded QL (at 96K RAM) forced the splitting down of the programme into modules. These were:

- A Boot, which included a main menu;
- A Data Entry module;
- An Exploratory Data Analysis module;
- A Statistical Analysis module for optional use;
- A Results Hardcopy routine.

Two types of permanent data file were established:

- Time Series Files for each subject;
- A Co-ordination File for all subjects.

None of the permanently stored material (programme

modules or data files) contained confidential personal information.

A brief overview of the programme modules will be given, and certain routines that were taken from other sources will be credited.

A. The Programme Modules

i. The Boot Module

Taking advantage of the auto-loading feature of the QL, a short routine was written to identify the programme, set up the initial parameters and offer the main menu. The main menu presented choices that would then determine if further modules were needed, in which case they were merged and immediately run (MRUN).

ii. The Data Entry Module

This module was physically attached to the Boot: space limitations did not affect the operation of this pair in any way, and combining them saved an unnecessary MRUN operation. The Data Entry routines offered two methods of entry: reading directly from a week-long diary, or compiling into list form the data from several diaries (from the one subject: sometimes the case with BFT families with long inter-session durations; and the case with all FDC subjects, who were entered as coherent time window). Data editing facilities were offered, since the data interpretation and entry procedures were laborious and eye-straining. Storage and

retrieval routines were included to allow the data to be transferred to and from the magnetic medium of the micro-drives.

iii. The Exploratory Data Analysis Module

This module was the main purpose of the programme. It allowed the choice of data (individual, family, regime, or subset), the choice of treatment for that data, some control over the display, and some options for the method of the programme run. The total number of choices in the first two categories numbered approximately 40 (allowing for the uneven texture of the instruction set, as necessitated by the different treatments). In terms of permutations, the number was too large and complex to derive.

The areas of selection offered were outlined earlier (see 11.4).

Large sections of this module's operations were automated to save operator time, and the amount of automation could be increased for batch usage. Some parts were highly interactive, requiring choices to be made by the researcher: for instance choosing sections of the curve for more detailed study.

iv. The Statistics Module

This was only merged onto the end of the EDA module if required, thereby saving in preparation time. This module

offered two major types of analysis: longitudinal and cross-sectional. Linear regression was available to provide trend information from the slope of the curve (or parts of it). Response spectrum histograms could be drawn for all or parts of the curve, to show distributions for skew and bimodality, etc. Standard Deviations were available on both.

Note must again be made here that the cross-sectional statistics were tenuous in that parametric tests were applied to non-parametric data. The rating scale was essentially an ordinal data scale, whereas the tests assume interval type of data. Therefore, as has been said above, only indications for exploratory purposes can be drawn from these tests. While the 'independent variable' of time could be said to be interval type data, care must still be exercised in utilising the scale data; and also in comparisons, since some subject's 'days' were up to 180 degrees out of phase with others.

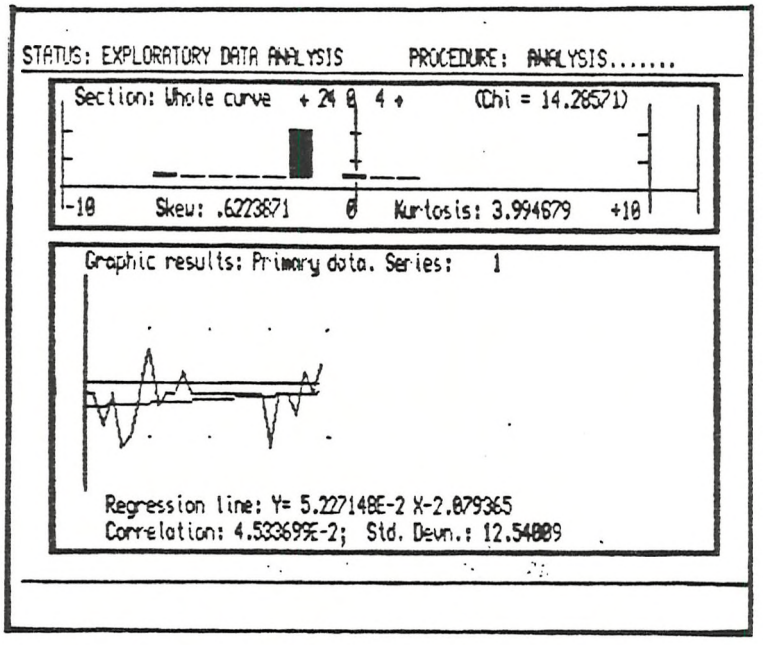


FIGURE 45: DATA-ANALYSIS: An Example (Harold Hedgerow)

Figure 45 shows an example of the printout of a full data analysis: the time series trace, the linear regression, the cross-sectional breakdown, with the additional calculations available.

v. The Results Hardcopy Module

This module was extremely short, but could not be placed with any other module as it appeared very susceptible to interference. It was based on a screen dump routine as supplied with one of the QL programme quartet: the graphics facility. It fails if memory space is not large enough and (apparently) if certain predetermined memory addresses are not free. Written in machine code, no access was available to the author and therefore, not having clear information on this latter point, the only tactic was to create an environment with a maximum of free memory for it. Thus, the dump is loaded, the pre-saved screen data file loaded, RECOLoured to white for greatest clarity, and the dump routine CALLed into operation.

B. Other Routines

Routines other than those written by the researcher were used and must be credited. Brief descriptions only will be offered.

i. KERMIT. This was written by C. Gianone (Columbia University) and J. R. Doupnik (Utah State University). It functions as a data checking and translation protocol for hostile transfer environments. It was used to help the

transfer of the typed thesis draft from the word processor on the researcher's Sinclair QL (which was showing data storage accuracy problems) to the Agency's Ericsson PC compatible, using WordStar word processor. Although very late in the study, this undoubtedly saved data and time, for which the researcher is very grateful.

ii. STORE. This was a short efficient storage routine published in Sinclair QL World, September 1986. It was used with the computer programmes under development as it saved time with backing up copies. It also planted the programme's name into line 1, making for clarity of developmental stage any particular programme file.

C. The Major Variables

A few arrays were used, mostly of fairly small size:

- MENU$: for menu options,
- HEAD$: for titles and headings, and sundry other text,
- CODE$: for the subject co-ordination file,
- a%(5,168), b%(2,24):

    the main daily and weekly data series respectively;

    (the largest dimmensioned arrays)

and sundry other integer arrays for data handling for:

- cross-sectional histograms,
- curve section choice data,
- Exploratory Data Analysis treatment control.

Integer variables were used wherever possible since precision

mathematics was not required. Mnemonic variable names were used frequently: all the data treatment controls were named after shortened versions of their English equivalents: 'prd' for period, 'rng' for range, 'ftr' for factor.

D. The Programme Structure

A structured programming approach was used as far as was possible. Procedures were used frequently, with orders of nesting becoming very deep. Branching between procedures provided a powerful means to save space: for instance, much of the two curve smoothing methods was identical, merely the digital combing procedure needed to be different. The main control of the EDA module was gathered into a procedure called 'Operations', which is a list of procedure calls embedded in a repetition structure complicated by a number of conditional circumstances.

E. The Future of the Programme

The programme is as yet incomplete. Time did not permit all the options and combinations to be debugged and tried out. Some modifications might be explored productively. Compression of the programme into its shortest length possible would save on load and save time, on memory space usage, and just possibly on operating speeds to a marginal degree.

The screen dump routine referred to in the hard copy module above was the GPRINT_PRT routine from the QL EASEL programme.

It can be modified by the One to One Screen Dump programme from COMPWARE which creates a new version called GPRINT_NEW. This was designed to offer a cleaner picture in situations where the symmetry between the two dimensions was important. However, the trade-off is against a shrinkage of the screen width and the time series graphs called for as much width as possible. Since no gain was found for the present purposes, CALLing GPRINT_PRT was considered to be sufficient.

Similarly, a screen data file utility was found and experimented with. Translation difficulties left insurmountable bugs and time constraints demanded this development be put aside. It was intended to shrink the storage requirements of the file on the microdrive. Called a Compander, it works by converting a literal pixel-by-pixel data stream to a contrast-based data file. Thus changes in pixels are noted, leaving large numbers of identical pixels defined by the first one and the number of repetitions.

Another development that would help the operating speed was attempted, but memory space problems became prohibitive. The idea was to load all Time Series data into a 'virtual memory' array during the initialisation procedure. This would then save load time. The means to be used were a large string array and a coding system provided by the COERCION facility in the QL Superbasic instruction set. The numerical data was to be translated into alphanumeric characters through their ASCII values, allowing a double compression. That is, double-

and triple-character values (e.g. -10) convert into a single character (in this case 'A'), and an array containing 168 Time Series values shrinks from being DIMensioned as such to a string array DIMensioned at the equivalent of one 170 character word. This latter equivalence was to be managed by splitting the 170 into four words because of an upper limit on buffer size. Only the size of the main mathematical sections of the programme prevented the deployment of this procedure: the memory ceiling was found and gave symptoms of operating inconsistencies. A listing of the development programme is appended. A commercial operation speed utility (Lightning by Digital Precision Ltd, London) became available for the QL at the end of the study: too late to be useful here, but potentially worth investment.

Alternative applications for this type of programme could be explored: Social Work deals with patterns of change in almost every area of its work. For instance, treatment group processes, referral and admission rates, and the impact of legislative change have been considered (Simon, 1986).

F. Screen Displays

Some of the main screen displays other than the data output displays are provided to give some idea of the programme's presentation. Colour displays were used, which cannot be reproduced here; in the main, white lettering indicated a title, green a response or guidance, and red showed a prompt area requiring an input.

RESEARCH PROGRAMME

SOUTHAMPTON UNIVERSITY

SOCIAL WORK STUDIES DEPARTMENT

'M. PHIL. MASTER'

Diary Data Management Programme

D I SIMON

SCREEN A: BOOT, INTRODUCTION

SETTING UP INITIAL VALUES

VARIABLES : SETTING UP- OK

MENU ARRAY: READING IN- OK

HEAD ARRAY: READING IN- OK

CODE ARRAY: READING IN- OK

DATA ARRAY: SETTING UP- OK

WAIT

SCREEN A: BOOT, INITIALISING REPORTS

MASTER MENU

MANAGEMENT:

1 ENTER DATA

2 EXPLORATORY DATA ANALYSIS

3 DISPLAY ONLY

4 HARDCOPY RESULTS

5 SAVE & EXIT

CHOOSE

SCREEN C: BOOT, MASTER MENU

DATA ENTRY:

MENU:

1 Establish new file

2 Update existing data file

3 Generate family-mean file

4 Generate regime-mean file

5 Finished

SCREEN D: BOOT, DATA ENTRY

DATA ENTRY: Establish new file

Enter Codes Data

Codename: Diane

Family ID:

Status:

Family ID:

Comprising- A letter signifying the family, '/' then the number of members, eg Z/9

SCREEN E: BOOT, DATA ENTRY

DATA ENTRY: Update existing data file

daily data weekly data

4	7	1	1
-3	3	-3	5
-9	-2	-4	0
-6	0	?	

SHOWING WEEK 5

File data: HAROLD HEDGEROW

4 WEEKS NOW ENTERED

1. Diary form
2. Precoded Batch form?

EDITING AVAILABLE
F1: HELP
F2: Insert Blank week
F3: Edit current week
F4: Show another week
F5: Data entry

SCREEN F: BOOT, DATA ENTRY & EDITING

STATUS: EXPLORATORY DATA ANALYSIS PROCEDURE: Run management

CONTROLS

DATA SOURCE:	ALL 4 SERIES
SCALE FORMAT:	Q 1
SCALE RESPONSE:	AVERAGE
MANIPULATION:	MOVING AVERAGE
PERIOD:	DAILY
FACTOR:	3
ANALYSIS:	CROSS SECTION
RANGE:	SECTIONS (CHOICE)
SAMPLE:	FAMILY MEAN
DATA:	A/2

OPTIONS

AUTOPILOT OPTIONS:
(y for yes)

Repeats?
Single run only

Automatic Hardcopy No

Autopilot On

Plot line or points?

SCREEN G: DATA AND PARAMETER SELECTION

16.3 THE COMPUTER PROGRAMME LISTING

The programme is reproduced here in the developmental form it had reached at the time of writing. It is incompletely debugged and drafted: it does not yet match the design specification. It is presented in the various sections in which it was used, as memory space required a modular approach.

The Boot and Explore sections both use the Store routines in the first 25 lines, and the same microdrive handling procedures in lines 9000 onwards. These lines have therefore been omitted from the Explore section to save space. The sections listed include the Boot and Data Entry Modules, the Exploratory Data Analysis Module, the Statistics Module and the development programme for the Virtual Memory routine.

LISTING: SCREEN DUMP PRINTER

```
100 CLS:AT 0,8:PRINT"SCREEN DUMP PRINTER"
105 PAPER 0:INK 4:CLS£1,2
110 PRINT\"Setting up  ";
120 dump=RESPR(4000):LBYTES adv1_GPRINT_PRT, dump
130 PRINT "OK"\\
140 DIR adv1_
143 AT 13,15:PRINT "filename="
145 AT 14,17:PRINT "'adv1_Screen_?'"
150 INK 2:AT 16,18:INPUT"file no: ";f
160 f$="adv1_Screen_"&f:CLS
165 CLS£0:PRINT£0, "Seeking ";f$
170 LBYTES f$,131072
180 RECOL   0,7,7,7,7,7,7,7
190 RECOL£0,0,7,7,7,7,7,7,7
200 CALL dump
210 AT£0,4,50:INPUT£0, "Delete file? ";y$
220 IF y$="y" THEN DELETE f$
230 CLS:GO TO  140
```

LISTING: BOOT & DATA ENTRY

```
Mpaper 17:cls:csize 3,1
print\\'      Time series data'
print\'    Management programme'
print\\'         D I SIMON'
cls£0: print£0,\\'Loading...'
1 REMark file saved: 1988 Jul 24 00:22:40
2 DEFine PROCedure store
3 LOCal drive, name$,file$:CLS£0:INK£0,5
4 PRINT£0,"Store current programme...",DATE$:IF DATE<8E8:set_date
5 AT£0,1,0:PRINT£0,"Enter file name:  ";:INK£0,7:INPUT£0,name$,:INK£0,5
6 FOR drive=1,2
7   file$="mdv"&drive$"_"&name$
8   AT£0,2,(drive*15)-15:PRINT£0,"Drive ";drive;FILL$(".",30)
9   DELETE file$:OPEN_NEW£3,file$
11  PRINT£3, "paper 17:cls:csize 3,1"
12  PRINT£3, "print\\'      Time series data'"
13  PRINT£3, "print\'    Management programme'"
14  PRINT£3, "print\\'         D I SIMON'"
15  PRINT£3, "cls£0: print£0,\\'Loading...'"
16  PRINT£3, "1 REMark file saved: "&DATE$
17  LIST£3,2 TO
18  PRINT£3; "cls£0:run"
19  CLOSE£3:AT£0,2,(drive*15)-6:PRINT£0," OK"
20 NEXT drive
21 AT£0,2,55:PRINT£0, "Storage complete"
22 END DEFine
23 DEFine PROCedure set_date
24 INPUT£0,"Set date- yyyymmddhhmmss: ";d$:IF LEN(d$)<>14:GO TO 24
25 SDATE d$(1 TO 4),d$(5 TO 6),d$(7 TO 8),d$(9 TO 10),d$(11 TO 12),d$(13 TO 14):AT£0,0,32:PRINT£0,DATE$:AT£0,1,0:CLS£
26 END DEFine
50 GO TO 60
51 CLS:FOR a=0 TO nn%:FOR aa=0 TO 3:PRINT code$(a,aa);FILL$(" ",25-LEN(code$(a,aa))-(aa*5));:NEXT aa:PRINT:NEXT a:WAI
52 ab=0:FOR a=0 TO 5
53 UNDER 1:PRINT "Series: ";a:UNDER 0
54 :FOR aa=1 TO dn%
55 :PRINT a%(a,aa),:ab=ab+1
56 IF ab=7 THEN PRINT:ab=0
57 NEXT aa:PRINT\\:ab=0:NEXT a:WAIT
58 FOR a=0 TO 9:FOR aa=0 TO 5:PRINT MENU$(a,aa)!!!:NEXT aa:PRINT:NEXT a
59 STOP
```

LISTING: BOOT & DATA ENTRY

```
130 REMark programme entry management
140 MODE 8:PAPER 64:INK 7:CLS
150 AT 3,9:PRINT "RESEARCH PROGRAMME"
160 AT 7,7:PRINT "SOUTHAMPTON UNIVERSITY"
170 AT 8,3:PRINT "SOCIAL WORK STUDIES DEPARTMENT"
180 AT 10,11:PRINT "'MPHIL MASTER'"
190 AT 13,3:PRINT "Diary Data Management Programme"
200 AT 15,13:PRINT "D I SIMON"
210 WAIT:PREPARING:WAIT
215 :
220 DEFine PROCedure WAIT
230 PAPER£0,7:INK£0,2
235 IF #d=0 THEN AT£0,2,26:ELSE AT£0,2,13
237 PRINT£0," SPACEBAR ";
240 PRINT£0, INKEY$(£0,500)
250 CSIZE 0,0:PAPER £0,0:CLS£0
270 END DEFine WAIT
290 :
300 REPeat master_menu
310 MODE 8:PAPER 0:INK 4:CLS:AT 2,0:UNDER 1:PRINT"MASTER MENU";FILL$(" ",26)
320 UNDER 0:INK 6:AT 6,5: PRINT MENU$(0,0)
330 FOR a=1 TO 5: AT 7+a,5:PRINT a!! MENU$(0,a)
335 AT 15,5:PRINT "Choose"
340 LET Q$=INKEY$(-1):Q%="0"&Q$
350 IF Q%<1 OR Q%>5 THEN GO TO 340
360 MODE 4:#d=0
370 :IF Q%=1 THEN DATA_ENTRY
380 :IF Q%=2 THEN MRUN adv1_mphil_explore
390 :IF Q%=3 THEN MRUN adv1_mphil_explore
400 :IF Q%=4 THEN LRUN adv1_mphil_screen_printer
410 :IF Q%=5 THEN FINISH
420 END REPeat master_menu
430 END DEFine
440 :
450 DEFine PROCedure FINISH
460 CLS: AT 10,5:PRINT "Finish...ok"
470 STOP
480 END DEFine
490 :
```

```
1210 DEFine PROCedure SET_CODES
1220 LET c%=1:tn%=0:REMark code & max series length
1230 LET cc%=0:REMark temp code no store
1240 LET att%=0:fz%=0:REMark display variables
1250 OPEN£3, con_150x180a325x35_3:BORDER£3,2,2
1255 INK £3,6:CLS£3
1260 SELect ON smp
1270 : ON smp=1
1280 :   individual_code
1290 : ON smp=2
1300 :   family_code
1310 : ON smp=3
1320 :   regime_code
1330 END SELect
1340 BORDER£3,2,0:CLS£3:CLOSE£3
1345 a= "*" INSTR cd$:IF a>0 THEN cd$=cd$(1 TO a-2)
1347 al=12:IF src=5 AND lg%=1 THEN al=13
1348 am=0:IF sd%<>0 THEN GO TO 1360
1350 AT al,am:PRINT "DATA:":AT al,am+17:PRINT cd$
1360 END DEFine
1365 :
1370 DEFine PROCedure individual_code
1375 aa=0:AT£3,0,3:PRINT£3,"Codenames:"
1380 FOR a=c% TO n%
1400 : AT£3,1+a-aa,1:PRINT£3,a!!code$(a,0)
1410 : IF code$(a,1)<>code$(a+1,1) THEN LET fz%=1:REMark new family group
1420 : LET att%=att%+1
1430 : IF att%>6 AND fz%=1 THEN
1434 :  choose:CLS£3:aa=a+1
1435 :  AT£3,0,3:PRINT£3,"Codenames:"
1436 :  IF c%<>0 THEN EXIT a
1437 : END IF
1440 : IF fz%=1:aa=aa-1:LET fz%=0
1450 END FOR a
1460 IF c%<1 THEN choose
1470 LET cd$=code$(c%,0):REMark for display
1480 END DEFine
1485 :
1490 DEFine PROCedure family_code
1495 aa=0:att%=3:AT£3,0,3:PRINT£3,"Codenames:"
1500 FOR a=1 TO n%
1510 : IF code$(a,1)=code$(a-1,1) THEN NEXT a
1520 : z$=a:AT£3,att%,2:PRINT£3,a;FILL$(" ",4-LEN(z$));
1530 : PRINT£3, code$(a,1);:z$=code$(a,1)
1535 : PRINT£3, FILL$(" ",8-LEN(z$));code$(a,2)
1540 : LET att%=att%+1
1543 : IF att%=8 THEN
1545 : choose:IF c%>0 THEN CLS£3:EXIT a
1546 : att%=3:CLS£3:PRINT£3,"   Codenames:"
1550 : END IF
1555 END FOR a
1560 family_ranging
1570 LET cd$=code$(c%,1)
1575 a= "*" INSTR cd$:IF a>0 THEN cd$=cd$(1 TO a-2)
1580 END DEFine
1590 :
```

```
1600 DEFine PROCedure family_ranging
1610 FOR a=c% TO n%
1620 : IF code$(a,1)<>code$(c%,1) THEN EXIT a
1630 : LET rpn%=a
1640 END FOR a
1650 END DEFine
1660 :
1670 DEFine PROCedure regime_code
1680 FOR a=4 TO 6
1690 : AT£3,(a-2)*2,2:PRINT£3,!!a-3!!hx$(a)
1700 END FOR a
1705 choose
1710 REMark PRINT£3:cd%=INKEY$(-1)
1720 LET cd$=hx$(c%+3)
1730 FOR a=n% TO nn%:IF code$(a,2)=cd$&" *" THEN c%=a
1740 END DEFine
1745 :
1750 DEFine PROCedure choose
1755 c%=0:c$="0"
1760 AT£3,15,2:PRINT£3,"[ 99 = not present ]"
1770 AT£3,16,7:INPUT£3,"File no.? ";c$
1773 LET att%=0:aa=aa+8
1780 IF c$=" " OR c$="":END DEFine
1785 c%=c$:IF c%>99 THEN GO TO 1770
1790 END DEFine
1795 :
```

```
4100 DEFine PROCedure new_week
4102 BORDER£4,2,2,4
4103 CLS£5:BORDER£5,2,2
4105 PRINT£5," New Week:":zz$=""
4110 PRINT£5,"  ENTER ↑ = or week number"
4120 AT£5,3,0:PRINT£5,"    Week: ";:CLS£5,4:PRINT£5,wk%
4125 REPeat in
4130  wz=0:z$="":z$=INKEY$(-1):nw%=CODE(z$)
4140  IF nw%=192:zz$=wk%-1:z$="":REMark previous week
4150  IF nw%=200:zz$=wk%+1:z$="":REMark next week
4160  IF nw%=10:EXIT in
4170  zz$=zz$&z$:wk%=zz$
4173  AT£5,3,9:PRINT£5,wk%
4175  IF wk%>wn% OR wk%<1
4176   AT£5,5,3:INK£5,2:PRINT£5," Beyond end of Series!"
4177   wz=1:zz$="":INK£5,5
4178  ELSE
4179   AT£5,5,0:CLS£5,4
4180  END IF
4185 END REPeat in
4187 BORDER£5,2,2,4
4190 IF wz=0:show_week:edit_keys
4195 finis=1
4200 END DEFine
4210 :
4300 DEFine PROCedure show_week
4310 CLS£4:ak%=(wk%*7)-6
4320 FOR b=ak% TO ak%+6
4330  FOR bb=1 TO 4
4335   aj%=b-ak%+1
4340   AT£4,aj%,(bb*5)-3:PRINT£4,a%(bb,b)
4350  END FOR bb
4360 END FOR b
4370 FOR b=1 TO 2:AT£4,1,(b*5-3)+20:PRINT£4,b%(b,wk%)
4380 AT£4,12,7:PRINT£4,"SHOWING: WEEK ";wk%
4390 END DEFine
4400 :
```

```
4500 DEFine PROCedure editor_help
4510 CLS£5:PRINT£5,"HELP:"
4520 PRINT£5,"Screen editing of data is"
4530 PRINT£5,"possible by calling data"
4540 PRINT£5,"choosing the item and altering"
4550 PRINT£5,"it on the screen"
4555 WAIT:edit_keys
4560 END DEFine
4570 :
5000 DEFine PROCedure poll
5001 REPeat polling
5002  a$=INKEY$(-1):pl%=CODE(a$)
5003  IF pl%=10:a%(aa,a+dn%)=aa$:aa$="":EXIT polling
5004  IF (pl%<48 OR pl%>57) AND pl%<>45:data_editor:EXIT polling
5005  aa$=aa$&a$:AT£4,a,(aa*5)-3:PRINT£4,aa$
5006 END REPeat polling
5007 END DEFine poll
5009 :
7000 DEFine PROCedure edit_keys
7010 OPEN £5,scr_200x70a260x145:BORDER£5,2,2,4:CLS£5
7013 PRINT£5," EDITING AVAILABLE"
7015 PRINT£5,"  F1: HELP"
7020 PRINT£5,"  F2: Insert Blank Week"
7030 PRINT£5,"  F3: Edit current week"
7035 PRINT£5,"  F4: Show another week"
7040 IF de%=0:PRINT£5,"  F5: Data entry"
7045 IF de%=1:PRINT£5,"  F5: Return to data entry"
7050 END DEFine
7060 :
```

```
8000 DEFine PROCedure generate_mean_files
8020 CLS:PRINT MENU$(10,ff)
8030 smp=ff-1
8040 SELect ON ff
8060  =3:family_mean_files
8080  =4:regime_mean_files
8100 END SELect
8120 END DEFine
8140 :
8200 DEFine PROCedure family_mean_files
8205 smp1=smp:smp=1:fm0=0:fm2=0:REMark sample & addition mode counter
8210 rpn%=code$(c%,1)(3):PRINT "Number of family members: ";rpn% \
8220 FOR a=c% TO c%+rpn%-1
8230   cd$=c%:zx=1:c%=a:retrieve_diary_data:zx=0
8240   fm1=1
8245   IF fm2<dn% THEN fm2=dn%
8250 END FOR a
8255 fm1=0:dn%=fm2
8260 cd$=code$(c%,1)&" *"
8265 FOR a=c%-rpn%+1 TO c%:code$(a,1)=cd$
8270 ru%=rpn%:mean_sub
8275 sd%=0:smp=smp1:rpn%=0:REMark reset
8280 END DEFine
8290 :
8300 DEFine PROCedure regime_mean_files
8303 AT 0,40:PRINT hx$(c%+3)
8305 smp1=smp:smp=1:fm0=0:fm2=0:REMark sample & addition mode counter
8310 FOR a=1 TO nn%
8315  IF code$(a,2)=hx$(c%+3):c%=a:retrieve_diary_data:fm0=fm0+1
8320  IF fm0>1 THEN fm1=1
8325   IF fm2<dn% THEN fm2=dn%
8330 END FOR a
8335 dn%=fm2:REMark largest member dn%
8340 cd$=hx$(c%+3):fm$="Regime mean"
8345 ru%=fm0
8350 mean_sub
8355 nn%=nn%+1:code$(0,3)=nn%
8360 code$(nn%,0)=fm$
8365 code$(nn%,1)="-/"&ru%
8370 code$(nn%,2)=cd$
8375 code$(nn%,3)=dn%
8380 smp=smp1:rpn%=0:fm1=0:REMark reset
8385 END DEFine
8390 :
8400 DEFine PROCedure mean_sub
8410 FOR aa=1 TO 4
8420  FOR ab=1 TO dn%:a%(aa,ab)=a%(aa,ab)/ru%
8430 END FOR aa
8440 END DEFine
8450 :
```

```
8500 DEFine PROCedure DATA_ENTRY
8505 REPeat entry
8510 CLS:PAPER 0:INK 4:PRINT "DATA ENTRY:":LINE 0,95 TO 200,95
8515 INK 6:OPEN £4,scr_260x150a50x45:BORDER£4,2,2:dn%=0:wn%=0
8517 AT£4,1,5:PRINT£4,"MENU:"
8520 FOR a=1 TO 4:AT£4,a+2+1,5:PRINT£4,a!!MENU$(10,a):NEXT a
8522 AT£4,11,5:PRINT£4,"5  Finished"
8525 ff=INKEY$(-1):AT 0,13:PRINT MENU$(10,ff)
8526 CLS£4:BORDER£4,2,0
8530 SELect ON ff
8535  =1:n%=n%+1:c%=n%:enter_codes_data
8540  =2 TO 4:s#p=ff-1:sd%=1:SET_CODES
8545   IF ff=2 AND code$(c%,3)<>0:AT 5,40:retrieve_diary_data
8550   IF ff=3 OR ff=4:CLS:generate_#ean_files
8555  =5:EXIT entry
8560 END SELect
8565 IF ff=2 THEN enter_diary_data
8570 store_diary_data
8575 store_codes_data
8580 WAIT
8585 END REPeat entry
8590 END DEFine
8595 :
8600 DEFine PROCedure data_type
8601 OVER£5,-1:BLOCK£5,20,10,6,49,2:OVER£5,0
8602 OPEN £3,scr_200x30a260x110:BORDER£3,2,2
8603 AT£3,0,2:PRINT£3,"1. Diary for#"
8604 AT£3,1,2:PRINT£3,"2. Precoded Batch for#? "
8605 ff=INKEY$(-1):IF ff>2 THEN GO TO 8605
8606 BORDER£3,2,0:CLS£3:CLOSE£3:BORDER£4,2,2
8607 IF ff = 1 THEN Diary_form_ip:ELSE Batch_form_ip
8608 END DEFine
8609 :
8610 DEFine PROCedure enter_diary_data
8612 AT 5,40:PRINT "File data: ";code$(c%,0);",  ";code$(c%,1)
8613 AT 3,2:PRINT "daily data:",!!!"weekly data:"
8614 wn%=dn%/7:wk%=wn%+1
8615 AT 7,40:PRINT wn%;"  weeks now entered"
8616 OPEN £4,con_200x150a50x65_3:BORDER£4,2,2,4
8617 AT£4,12,7:PRINT£4,"SHOWING: WEEK ";wk%
8618 de%=0:edit_keys
8619 data_type
8620 END DEFine
8621 :
```

```
8630 DEFine PROCedure Diary_form_ip
8635 AT 0,50:PRINT "Diary form":finis=0:aa$="":a$="":a=0:aa=(
8640 a=0:aa=0:AT£4,12,7:PRINT£4,"SHOWING: WEEK ";wk%
8645 FOR a=1 TO 7
8650 :  FOR aa=1 TO 4
8653 :   AT£4,a,(aa*5)-3:PRINT£4,"?"
8660 :   poll
8668 :   IF finis=1:GO TO 8740
8670 :  END FOR aa
8680 END FOR a
8690 FOR aa=1 TO 2
8700 :   AT£4,1,20+(aa*5)-3:INPUT£4, b%(aa,a+wd%)
8710 END FOR aa
8720 INK£4,7:AT£4, 8,18:PRINT£4, "All correct? ";
8730 ye$:IF y%=0 THEN editing
8740 dn%=dn%+7:code$(c%,3)=dn%:finis=0
8745 wk%=wk%+1:wn%=wn%+1:AT 7,40:PRINT wn%
8750 AT£4, 10,18:PRINT£4, "Another week? ";:INK£4,5
8760 ye$:CLS£4:IF y%=1 THEN GO TO 8640
8770 CLOSE£4:AT 9,40:REMark storage notes
8780 END DEFine
8790 :
8800 DEFine PROCedure Batch_form_ip
8805 AT 0,50:PRINT "Batch form"
8820 FOR a=1 TO 4
8830  da%=0:wn%=0:CLS£4
8835  REPeat Batch
8840  FOR aa=1 TO 7
8845   da%=da%+1
8850   poll
8860  END FOR aa
8865  wn%=wn%+1:IF bt%=0 THEN dn%=wn%*7:code$(c%,3)=dn%
8870  REMark wn%=no week blocks, dn%=total days
8875  IF a=1:INK£4,7:AT£4,8,18:PRINT£4, "Next column? ";:ye$
8885  CLS£4:INK£4,5:IF y%=1 THEN y%=0:wd%=wn%:EXIT Batch
8886  IF a<>1 AND wd%=wn% THEN EXIT Batch
8890  END REPeat Batch
8893  LET bt%=1
8895 END FOR a
8897 :
8900 FOR a=1 TO 2:AT 8,20+(a*4):PRINT a
8905 aa=0:FOR a=1 TO 2
8910 REPeat Batch1
8915 LET aa=aa+1
8920 AT 9+aa,20+(4*a):INPUT b%(a,wd%)
8925 IF aa=wn% THEN aa=0:EXIT Batch1
8930 LET wd%=wd%+1
8935 END REPeat Batch1
8940 CLOSE £4
8950 END FOR a
8952 AT 17,0:REMark for data stored message
8953 END DEFine
8954 :
```

LISTING: BOOT & DATA ENTRY

```
8955 DEFine PROCedure enter_codes_data
8960 PRINT:UNDER 1:PRINT "Enter Codes Data":UNDER 0
8965 INPUT "Codename: ";code$(c%,0)
8966 OPEN£3, scr_275x200a225x45
8967 PRINT £3,"Family ID:"\\"Comprising- A letter signifying"\"the family, '/' then the number"\"of member
3," Z/9"
8970 INPUT "Family ID: ";code$(c%,1)
8975 nf%=nf%+1:CLS £3
8980 FOR a=1 TO n%:IF code$(c%,1)=code$(a,1) THEN nf%=nf%-1:EXIT a
8985 INK £3, 5:PRINT £3,"STATUS:"\\:FOR a=4 TO 6:PRINT £3,(a-3)!!hx$(a)
8986 INPUT "Status:   ";cx%:code$(c%,2)=hx$(cx%+3)
8987 IF cx%=1 THEN BFT=BFT+1
8988 IF cx%=2 THEN FDC=FDC+1
8989 IF cx%=3 THEN control=control+1
8990 code$(0,0)=n%:code$(0,1)=nf%:code$(0,2)=BFT&","&FDC&","&control
8991 n%=n%+1:c%=c%+1
8993 CLOSE £3
8995 END DEFine
```

```
9000 DEFine PROCedure retrieve_codes_data
9005 LOCal a,aa
9010 IF zx=0 THEN PRINT "Codes data - retrieving";
9020 OPEN_IN £5, mdv1_mphil_codes
9030 FOR a=0 TO 3:INPUT £5, code$(0,a)
9040 n%=code$(0,0):REMark no individuals
9050 nf%=code$(0,1):REMark no families
9055 nn%=code$(0,3):REMark no data files
9060 FOR a=0 TO nn%
9070   FOR aa= 0 TO 3
9080     INPUT £5, code$(a,aa)
9090   END FOR aa
9100 END FOR a
9105 regime_nos
9110 CLOSE £5:PRINT " OK"
9120 END DEFine
9125 :
9130 DEFine PROCedure retrieve_diary_data
9135 LOCal a,aa
9140 PRINT "Diary data - ";code$(c%,smp-1);
9145 IF cd$=cx$ AND prevman=1:AT 1,20:PRINT"Already present":END DEFine
9150  IF smp=1 THEN cd$=c%
9155 OPEN_IN £5, "mdv2_mphil_data_"&cd$
9160 dn%=code$(c%,3)
9170  FOR a=1 TO dn%
9180   FOR aa= 1 TO 4
9185     IF fm1=1 THEN
9186       INPUT £5, z%
9187       a%(aa,a)=a%(aa,a)+z%
9188        IF a%(aa,a)>99 THEN a%(aa,a)=a%(aa,a)-99
9189      ELSE
9190       INPUT £5, a%(aa,a)
9195     END IF
9200   END FOR aa
9210  END FOR a
9215 : IF smp>0 THEN GO TO 9280:REMark skip week data
9220 LET wd%=dn%/7:REMark no weeks
9230 FOR a=1 TO wd%
9240   FOR aa=1 TO 2
9250     INPUT £5, b%(aa,a)
9260   END FOR aa
9270 END FOR a
9280 CLOSE £5:PRINT " OK"
9285 cx$=cd$:REMark store id code
9290 END DEFine
9300 :
```

```
9305 DEFine PROCedure store_codes_data
9310 LOCal a,aa
9315 z=0:zz=11:IF sd%=1 THEN z=40:zz=10
9320 AT zz;z:PRINT "Codes data - storing:";
9325 DELETE mdv1_mphil_codes
9330 OPEN_NEW £5, mdv1_mphil_codes
9335 LET code$(0,0)=n%:REMark individuals
9340 LET code$(0,1)=nf%:REMark families
9345 LET code$(0,2)=BFT$","$FDC$","&control
9350 LET code$(0,3)=nn%:REMark files
9355 FOR a=0 TO 3:PRINT £5, code$(0,a)
9360 FOR a=0 TO nn%
9365   FOR aa=0 TO 3
9370     PRINT£5, code$(a,aa)
9375   END FOR aa
9380 END FOR a
9385 CLOSE £5:PRINT " OK"
9390 END DEFine
9395 :
9400 DEFine PROCedure store_diary_data
9405 LOCal a,aa
9410 z=0:zz=11:IF sd%=1 THEN z=40:zz=9
9415 AT zz,z:PRINT "Diary data - storing: ";
9420  IF s=p=1 THEN cd$=c%
9425 DELETE "mdv2_mphil_data_"&cd$
9430 OPEN_NEW £5, "mdv2_mphil_data_"&cd$
9435  FOR a=1 TO dn%
9440    FOR aa=1 TO 4
9445      PRINT£5, a%(aa,a)
9450    END FOR aa
9455  END FOR a
9460 :IF s=p>1 THEN GO TO 9490:REMark skip week
9465 FOR a=1 TO wd%
9470   FOR aa=1 TO 2
9475     PRINT£5, b%(aa,a)
9480   END FOR aa
9485 END FOR a
9490 CLOSE £5:PRINT "OK"
9495 END DEFine
9500 :
9600 DEFine PROCedure regime_nos
9610 LET cd$=code$(0,2):f= "," INSTR cd$
9620 LET BFT=cd$(f-1)
9640 LET ff=" INSTR cd$(f+1 TO)
9650 LET FDC=cd$(f+1 TO ff+f-1)
9660 LET control=cd$(ff+f+1 TO)
9670 END DEFine
9675 :
clsf0:run
```

```
60 REMark      MPhil MASTER programme
101 :MODE 8:mde=1
102 REMark ************ DIRECTORY  OF  ROUTINES  ************
103 REMark 100  : intro & setting up
104 REMark 300  : master menu
105 REMark 500  : master manager
106 REMark 600  : choices
107 REMark 2100 : preparing
108 REMark 2600 : tester
109 REMark 3000 : printout
110 REMark 3500 : curve smoothing
111 REMark 4510 : period averages
112 REMark 4900 : raw data collation
113 REMark 5000 : data selection
114 REMark 7000 : operations
125 REMark 9000 : adv handling
126 REMark ************ DIRECTORY  OF  ROUTINES  ************
129 :
130 REMark programme entry management
140 MODE 8:PAPER 64:INK 7:CLS
141 AT 2,7:PRINT "SOUTHAMPTON UNIVERSITY"
142 AT 3,3:PRINT "SOCIAL WORK STUDIES DEPARTMENT"
150 AT 3,9:PRINT "RESEARCH PROGRAMME"
155 AT 7,13:PRINT "D I SIMON"
160 AT 7,7:PRINT "SOUTHAMPTON UNIVERSITY"
170 AT 8,3:PRINT "SOCIAL WORK STUDIES DEPARTMENT"
180 AT 10,11:PRINT "'MPHIL MASTER'"
190 AT 13,3:PRINT "Diary Data Management Programme"
195 AT 12,18:PRINT "&"
200 AT 15,13:PRINT "D I SIMON"
205 AT 16,10:PRINT "Computer Programme"
210 WAIT:PREPARING:WAIT
215 :
```

```
220 DEFine PROCedure WAIT
230 PAPER£0,7:INK£0,2
235 IF md=0 THEN AT£0,2,28:ELSE AT£0,2,13
237 PRINT£0," SPACEBAR ";
240 PRINT£0, INKEY$(£0,500)
250 CSIZE 0,0:PAPER £0,0:CLS£0
260 REMark PAPER 0: INK 6
270 END DEFine WAIT
290 :
300 REPeat master_menu
303 OPEN£4, scr_448x200a30x15:CLS£4
305 MODE 8:PAPER 0:INK 4:CLS:LINE 0,90 TO 190,90
310 INK 4:AT 1,0:PRINT'MASTER MENU';FILL$(" ",26)
320 INK 6:AT 3,5: PRINT MENU$(0,0)
330 FOR a=1 TO 5: AT 5+a,5:PRINT a!! MENU$(0,a)
335 AT 14,5:PRINT "Choose"
336 INK 4::LINE 0,0 TO 190,0
340 LET 0$=INKEY$(-1):0%="0"&0$
350 IF 0%<1 OR 0%>5 THEN GO TO 340
355 agn%=0:st-t%=0
360 CLOSE£4:MODE 4:md=0
370 :IF 0%=1 THEN MRUN MDV1_MPHIL_MASTER
375 :IF 0%=1 THEN DATA_ENTRY
380 :REMark RESERVED LINE FOR MRUN FUNCTION
385 :IF 0%=2 AND sts%=0 THEN MRUN mdv1_mphil_statistics:sts%=1
387 :IF 0%=2 THEN master_manager
390 :IF 0%=3 THEN master_manager
400 :IF 0%=4 THEN LRUN mdv1_mphil_screen_printer
410 :IF 0%=5 THEN FINISH
415 IF agn%=1 THEN GO TO 360
420 END REPeat master_menu
425 END DEFine
430 DEFine PROCedure FINISH
435 CLS: AT 10,5:PRINT "Finish...ok"
440 STOP
445 END DEFine
450 :
```

```
460 DEFine PROCedure header
465 INK 6:AT 0,0:CLS£1,4:PRINT "STATUS: ";STATU$
470 AT 0,40:PRINT "PROCEDURE: ";PROK$:INK 4
480 END DEFine
490 :
500 DEFine PROCedure master_manager
505 REPeat manager
510 CHOICES
520 SET_CODES
530 lag_choices
540 AUTO_OPTIONS
550 OPERATIONS
560 IF agn%=4 THEN EXIT manager
570 END REPeat manager
580 END DEFine
590 :
600 DEFine PROCedure CHOICES
603 OPEN£1, scr_448x200a32x16:CLS£1
605 MODE 4:INK 4:LINE 0,95 TO 167,95:LINE 0,1 TO 167,1
607 IF agn%=1 THEN CLS£0:PRINT£0, "0 = finished alterations"
608 choice%=0:IF agn%=2 THEN choice%=1
610 na%=0:REMark set not applicable flag
612 FOR a=1 TO 10:LET g(a)=0:NEXT a:rd%=0:lg%=0:expt=0
614 FOR a=0 TO 6:sct%(a)=0:NEXT a:sl%=dn%:sct%(6)=dn%
620 STATU$=MENU$(0,0%):PROK$="Job selection":header
625 AT 2,5:CSIZE 2,0:PRINT hx$(0):AT 2,25:PRINT hx$(2)
630 UNDER 0:CSIZE 0,0
633 : OPEN £4,scr_230x150a50x50
635 : OPEN £3,scr_175x150a290x50
640 : BORDER£3,2,6:PAPER £3,0:INK£3,7:CLS £3
643 : BORDER£4,2,6:PAPER £4,0:INK£4,7:CLS £4
645 controls
646 CLOSE£3
647 END DEFine
648 :
649 DEFine PROCedure controls
650 FOR aa= 1 TO 9
660  AT£4,aa,2:PRINT£4, MENU$(aa,0)
670 : IF (aa=2 OR aa=3) AND g(1)=2 THEN na%=1:expt=1
675 : IF aa=5 AND g(4)<>2 THEN LET g(5)=1:expt=1
680 : IF aa=5 AND g(2)= 5 THEN LET g(5)=2:expt=1
685 : IF aa=6 AND g(4) <3 THEN LET g(6)=1:expt=1
687 : IF (aa=7 OR aa=8) AND 0%=3 THEN na%=1:expt=1
690 : IF aa=8 AND g(7)= 5 THEN LET g(8)=1:expt=1
695 : IF aa=9 AND agn%=1 THEN LET g(9)=smp:expt=1
700 :   IF expt=1 THEN expt=0:GO TO 745
705 : : :IF choice%=0 THEN choose_codes
710 : : :IF g$<>"0" THEN g(aa)=g$
715 IF aa=9 AND g(9)>1 THEN sub1
720 IF aa=4 AND g(4)=3 THEN sub2
725 IF aa=3 AND g(3)=5 THEN sub3
730 IF aa=5 AND g(4)=2 AND g(5)=1 THEN CSIZE £3,3,1:PRINT £3,\hx$(3):CSIZE 0,0:PAUSE 100:aa=4:GO TO 660
745 AT£4,aa,19:IF na%=0 THEN PRINT£4, MENU$(aa,g(aa)):ELSE :PRINT£4,hx$(3):na%=0
750 END FOR aa
755 allocate_vars:choice%=0
760 END DEFine
770 :
```

```
800 DEFine PROCedure choose_codes
805 :  UNDER£3,1:AT£3,1,2: PRINT £3, aa!MENU$(aa,0):UNDER£3, 0
810 :    FOR b=1 TO 5:AT£3,b*2+1,4: PRINT£3,b!MENU$(aa,b);\
815 :    AT£3, 13,2:PRINT£3,"--------choose---------"
820 :     g$=INKEY$(-1):IF g$)"5" THEN GO TO 820
825 :    IF g$=0 THEN choice%=1
830 : CLS£3
840 END DEFine
850 :
870 DEFine PROCedure sub1
880 CLS£3:PRINT£3,\\"Member printouts? (y)":ye$:pt%=y%
890 END DEFine
895 :
900 DEFine PROCedure sub2
910 CLS£3:PRINT£3,\\"Interpolate? (y)":ye$:ipl%=y%
920 PRINT£3,\\"Residual plot? (y)":ye$:rd%=y%
930 LET rs%=0:IF rd%=1 THEN PRINT£3,\\"Smoothed? (y)":ye$:rs%=y%
940 END DEFine
945 :
950 DEFine PROCedure sub3
955 CLS£3:PRINT£3,\\"Fill in between curves? (y)":ye$
960 inf%=y%:CLS£3
965 END DEFine
970 :
1000 DEFine PROCedure lag_choices
1005 OPEN £3,con_175x150a290x50:BORDER £3,2,6
1010 INK£3, 6:lg%=1
1015 IF src<>5 THEN END DEFine
1020 CLS£3:PRINT £3, \" LAG ANALYSIS:"\\
1025 PRINT£3, " NB Both data series"\" treated identically"
1030 PRINT £3, \\"  1. Auto"\\"  2. Manual"
1035 AT£3,10,12:INPUT£3, alg%
1040 IF plt%=1 THEN alg%=1
1045 AT£3,2,0:CLS£3,2
1050 AT£3,3,3:PRINT£3,"COMPARISON DATA:"
1055 FOR a=1 TO 5:AT £3,2+a*2,5:PRINT£3, a!!MENU$(9,a):PRINT£3
1065 lagsmp1=smp
1070 aa=9:choose_codes:lagsmp2=g(10):smp=lagsmp2
1075 lagc1=c%:SET_CODES:lagc2=c%:REMark CLOSE£3
1080 c%=lagc1:smp=lagsmp1
1085 lag%=1:vlag%=0:REMark default vals
1090 END DEFine
1095 :
1100 DEFine PROCedure allocate_vars
1110 LET src = g(1):REMark data source
1120 LET fmt = g(2):REMark Q1 or Q2
1130 LET res = g(3):REMark high or low response
1140 LET man = g(4):REMark manipulation
1150 LET prd = g(5):REMark period of averaging
1160 LET ftr = g(6):REMark smoothing factor for moving averages
1170 LET anl = g(7):REMark analysis type
1180 LET rng = g(8):REMark range of curve for analysis
1190 LET smp = g(9):REMark sampled data
1200 END DEFine
1205 :
```

```
1210 DEFine PROCedure SET_CODES
1215 IF strt%=1 OR agn%=1 THEN END DEFine
1220 PROM$="Data selection":header
1225 tm%=0:REMark max series length
1230 c%=1:IF smp1=4 THEN c%=n%+1
1240 att%=0:fz%=0:REMark display variables
1250 OPEN#3, con_175x150a290x50_3
1255 INK #3,6:CLS#3
1260 BORDER#3,2,6:INK #3,6:CLS#3
1265 SELect ON smp
1270 : =1:individual_code
1280 : =2:family_code
1290 : =3:regime_code
1300 : =4:subset_code
1310 END SELect
1315 CLOSE#3
1320 END DEFine
1325 :
1330 DEFine PROCedure show_code
1335 a=10:IF src=5 AND lg%=1 THEN a=11
1340 AT#4,a,2:PRINT#4, "DATA:":AT#4,a,19:PRINT#4, cd$
1345 END DEFine
1347 al=12:IF src=5 AND lg%=1 THEN al=13
1348 am=0:IF sd%<>0 THEN am=40
1350 AT al,am:PRINT "DATA:":AT al,am+17:PRINT cd$
1360 :
1365 :
```

```
1370 DEFine PROCedure individual_code
1375 att%=1:f=0:b=c%:c=n%
1380 FOR a=b TO c
1385 : AT£3,0,1:PRINT£3, "Codenames:"
1390 :   AT£3,att%+f,4:PRINT£3, a
1400 :   AT£3,att%+f,8:PRINT£3,code$(a,0)
1410 : IF code$(a,1)<>code$(a+1,1) THEN fz%=1:REMark new family
1420 : att%=att%+1
1430 : IF code$(a+1,1)(3)+att%+f>10 AND fz%=1 THEN
1435 :  choose:CLS£3:aa=a+1
1436 :  IF c%<>0 THEN EXIT a
1437 : END IF
1440 : IF fz%=1 THEN f=f+1:LET fz%=0
1450 END FOR a
1460 IF c%=99 THEN cd$=nn%+1:ELSE :cd$=code$(c%,0)
1470 show_code
1480 END DEFine
1485 :
1490 DEFine PROCedure family_code
1495 att%=0:PRINT£3,"    Codenames:"\\
1500 b=1:c=n%:IF smp=4 THEN b=n%+1:c=nn%
1505 zz=1:IF smp=4 THEN zz=0
1510 FOR a=b TO c
1515 : IF code$(a,1)=code$(a-1,1) THEN NEXT a
1520 : IF code$(a,0)="Regime mean" THEN GO TO 1540
1525 : z$=a:PRINT£3,"  ";a;FILL$(" ",4-LEN(z$));
1530 : PRINT£3, code$(a,zz);
1535 : z$=code$(a,zz):PRINT£3, FILL$(" ",10-LEN(z$));code$(a,zz+1)
1540 : LET att%=att%+1
1543 : IF att%=8 OR a=c THEN
1545 :   choose:CLS£3:PRINT£3,"    Codenames:"\\
1546 REMark : att%=3:CLS£3:PRINT£3,"   Codenames:"
1550 : END IF
1555 END FOR a
1560 family_ranging
1570 IF c%<= nn% THEN cd$=code$(c%,1):ELSE :cd$="Not present"
1575 show_code
1580 END DEFine
1590 :
```

```
1600 DEFine PROCedure family_ranging
1605 IF smp=4 THEN rpn%=c%:END DEFine
1610 FOR a=c% TO n%
1620 : IF code$(a,1)<>code$(c%,1) THEN EXIT a
1630 : LET rpn%=a
1640 END FOR a
1650 END DEFine
1660 :
1670 DEFine PROCedure regime_code
1680 FOR a=4 TO 6
1690 : PRINT#3:PRINT#3,a-3;hx$(a)
1700 END FOR a
1705 choose
1710 PRINT#3:cd%=INKEY$(-1)
1720 LET cd$=hx$(cd%+3)
1730 FOR a=n% TO nn%:IF code$(a,2)=cd$&" *" THEN c%=a
1740 END DEFine
1745 :
1800 DEFine PROCedure choose
1810 c%=0:c$="0"
1820 REMark IF smp1=4 THEN c$="1":GO TO 1850
1830 AT#3,12,5:PRINT#3,"99 = not present"
1840 AT#3,13,5:INPUT#3,"File no.? ";c$
1850 LET att%=0:f=0
1860 IF c$=" " THEN END DEFine
1870 c%=c$:IF c$>99 THEN GO TO 1840
1880 END DEFine
1890 :
1900 DEFine PROCedure subset_code
1910 family_code
1920 generate_mean_files
1930 END DEFine
1940 :
```

```
2000 DEFine PROCedure AUTO_OPTIONS
2010 IF agn%=2 THEN END DEFine
2020 PROK$="Run management":header:cc%=0
2030 OPEN £3,con_175x150a290x50
2040 BORDER£3,2,6:INK £3,4:CLS £3
2050 AT£3, 0,2:PRINT £3,"AUTOPILOT OPTIONS:"\"    (y for yes)"\\
2060 IF rng = 2 THEN preset_sections
2070 AT£3, 3,5:PRINT£3,"Repeats?":IF cc%=0 THEN ye$
2080 IF y%=1 THEN
2090 : cc%=0:rpn%=0:REMark data and no of repeats
2100 : LET cc%=c%:rpt%=1:REMark temp store & flag
2110 : AT£3, 3,12:PRINT£3,"  ";cc%!"to:"
2120 : AT£3,4,5:INPUT£3,"   ? for list  ";c$
2130 : IF c$="?" THEN SET_CODES: GO TO 2030:ELSE c%=c$
2140 : LET rpn%=c%:c%=cc%:REMark re-allocate
2150 : LET ry%=+1:IF rpn%<c% THEN ry%=-1
2160 : AT£3, 3,21:PRINT£3, rpn%:AT£3,4,0:CLS£3,4
2170 : AT£4,12,2:PRINT£4, "DATA:":AT£4,12,19:PRINT£4, code$(rpn%,0)
2180 ELSE
2190 : AT£3,4,10:PRINT£3, "Single run only":rpt%=0
2200 END IF
2210 AT£3, 6,5:PRINT£3,"Automatic Hardcopy?":ye$
2220 IF rng=3 OR y%=0 THEN
2230 : AT£3,6,23:PRINT£3, " No":hc%=0
2240 ELSE
2250 : AT£3,6,23:PRINT£3, " On":hc%=1
2260 END IF
2270 AT£3, 8,5:PRINT£3,"Autopilot?"
2280 IF rng=3 THEN
2290 : y%=0:REMark for any interactive work
2300 : AT£3,8,14:PRINT£3," On"
2310 ELSE
2320 : ye$:plt%=y%:AT£3,8,14:PRINT£3," Off"
2330 END IF
2340 AT£3, 10,5:PRINT£3,"Plot: Point (y)":AT£3,11,11:PRINT£3,"or Line?":ye$:AT£3,10,9
2350 IF y%=1 THEN PRINT£3," Point":lp%=0:ELSE :PRINT£3," Line ":lp%=1
2360 AT£3,10,15:CLS£3,4:AT£3,11,0:CLS£3,4
2370 fm%=0:IF src>2 THEN LET fm%=1: REMark family means flag, for storage operations
2380 CLOSE£3
2390 END DEFine
2400 :
2485 DEFine PROCedure ye$
2490 LET y$=" ":LET y$=INKEY$(-1)
2500 y%=0:IF y$="y" THEN LET y%=1
2510 END DEFine
2590 :
```

```
2900 DEFine PROCedure hard_copy
2910 IF hc%=0:AT£0,0,0:PRINT£0,"Hardcopy? (y) or special code ";
2915 INPUT£0,y$:IF y$ <> " " THEN
2920 : sp$="":IF y$<>"y":sp$=y$:REMark special code
2930 : control$="":FOR a=1 TO 10:control$=control$&g(a)
2940 : file$="mdv1_Screen_"&c%&sp$
2960 : CLS£0:PRINT£0,code$(c%),file$,control$
2970 : : SBYTES file$, 131072, 32768
2980 : END IF
2985 CLS£0
2990 END DEFine hard_copy
2995 :
3000 DEFine PROCedure printout
3005 PROK$="Printout Routine...":header
3010 SCALE 50,-5,-9: REMark set vert scale & origin
3015 OPEN£3, scr_415x125a48x86:BORDER £3,2,6
3020 dp1%=1:dp2%=1:dp3%=0:REMark initial value
3025 IF dn%>70 THEN LET dp2%=INT(dn%/70)+1:REMark no. pages
3030 LET l%=1:l1%=70:REMark set page start & end values
3035 IF dp2%=1 THEN l1%=dn%:REMark end value
3040 sl%=l1%:REMark section length
3045 display:hard_copy
3050 CLOSE£3
3055 END DEFine
3060 :
3100 DEFine PROCedure display
3105 mvtot%=0
3110 flag%=1:IF page%=1 THEN dp2%=1:REMark force single page
3115 IF dp3%>0 THEN dp1%=dp3%+1
3120 FOR dp=dp1% TO dp2%
3125 : framework
3130 : z=3:IF it%>0 OR lg%=3 THEN z=4
3135 : plotting (z)
3140 : data_details
3145 : paging
3150 END FOR dp
3155 END DEFine
3160 :
3175 DEFine PROCedure data_details
3180 : ch%=3:cl%=11:REMark IF anl<>5 THEN ch%=4:cl%=4
3186 : AT£ch%,cl%,1:PRINT£ch%,"Page"!dp!"of"!dp2%;",";!!
3187 : PRINT£ch%,sl%!"points this page;"!dn%!"in total."
3188 : AT£ch%,cl%,49:PRINT£ch%,"Missing values: ";mvtot%
3190 END DEFine
3195 :
```

```
3240 DEFine PROCedure framework
3245 INK 6:IF it%<2 THEN CLS£3
3250 LINE 2,0 TO 2,21
3255 IF rr%=1 THEN
3260   LINE 2,0 TO sl%+1,0
3262   FOR a=2 TO sl%+3 STEP 7:POINT a,10
3265 ELSE
3285   LINE 2,10 TO sl%+1,10
3287   FOR a=2 TO sl%+2 STEP 7:POINT a,15:POINT a,5
3290 END IF
3292 INK£3,6:AT£3,0,3:PRINT£3, "Graphic results:":INK£3,4
3295  IF dat%=1:AT£3,0,20:PRINT£3,"Primary";:ELSE :PRINT£3,"Secondary";
3300 END DEFine
3305 :
3310 DEFine PROCedure plotting (z)
3320 INK z:mv%=0:s=1
3330 IF series%=4 THEN inf%=0
3340 FOR a=1% TO 11%-1
3350 : rt%=10:IF rr%=1 THEN rt%=0:REMark adjustment value from graph base
3355 : LET az%=a%(0,a)+rt%:bz%=a%(0,a+1)+rt%:REMark set plot values
3360 : IF dp>1 THEN
3365 :  aa%=a-((dp*70)-70)+2
3370 : ELSE
3375 :  aa%=a+2
3380 : END IF
3385 : IF az%<21 AND bz%<21 THEN
3390 :  mv%=0
3395 :  plot_curve
3400 : ELSE
3405 :  mv%=mv%+1:REMark flag  missing value
3410 :  mvtot%=mvtot%+1:REMark total missing values in this section
3415 : END IF
3420 END FOR a
3425 END DEFine
3435 :
```

```
3200 DEFine PROCedure paging
3202 IF page%=1 OR dp2%=1 THEN WAIT:END DEFine
3204 IF plt%=1 THEN END DEFine
3208 IF anl<>5 THEN PRINT£0,"SPACE Analyse this page"
3210 pg$=INKEY$(-1):CLS£0
3214  IF pg$="1":l%=ll%+1:ll%=ll%+69:sl%=ll%-l%:REMark 'scroll' right
3215    :IF ll%>dn% THEN ll%=dn%:sl%=dn%-l%
3216  IF pg$="2":l%=l%-70:ll%=ll%-69:sl%=ll%:REMark 'scroll' left
3218  IF pg$=" ": analyse
3225 END DEFine
3230 :
3440 DEFine PROCedure plot_curve
3442 IF mv%=1 THEN mv%=0:END DEFine
3444 IF mv%>3 THEN
3446 : IF lp%=1 THEN lp%=0:mv%=1:aa%=aa%-2:az%=a%(0,aa%)+rt%
3448 END IF
3450 :IF lp%=0 THEN
3452 : INK 6:POINT aa%,az%
3454 :ELSE
3456 : LINE aa%-1,az% TO aa%,bz%
3457 :   IF series% >1 THEN FOR ss=series1 TO series2:multi_series
3458 :END IF
3460 IF mv%=1 AND lp%=0 THEN lp%=1:aa%=aa%+2:mv%=0
3462 END DEFine
3463 :
3464 DEFine PROCedure multi_series
3465 AT£3,0,43+(ss*2):PRINT£3,ss
3467 ay%=a%(ss,a)+rt%:by%=a%(ss,a+1)+rt%
3468  IF ay%>20 OR by%>20 THEN END DEFine
3469 INK 5:LINE aa%-1,ay% TO aa%,by%:INK 2
3470 IF inf%=1 THEN INK 4:LINE aa%,bz% TO aa%,by%:INK 2
3472 END DEFine
3474 :
3476 DEFine PROCedure print_controls
3478 CLS£ 4:AT£4, 2,5:INK£4, 4:
3480 FOR a=1 TO 4:PRINT£4,MENU$(a,g(a));",";!!:NEXT a:PRINT£4,"(x";lit%;")"
3482 AT£4, 3,5:PRINT£4, MENU$(5,g(5));", FACTOR: ";MENU$(6,g(6));","
3484 AT£4, 3,24:FOR a=7 TO 9:PRINT£4, MENU$(a,g(a));",";!!:NEXT a
3485 dn%=dn%+7:code$(c%,3)=dn%:wn%=dn%/7:wk%=wn%:AT 7,40:PRINT wn%
3486 END DEFine
3488 :
```

```
3490 DEFine PROCedure virtual_store
3492 FOR a=1 TO dn%:a%(b1,a)=a%(b2,a):END FOR a
3494 END DEFine
3495 OVER£5,-1:BLOCK£5,20,10,6,19,2:OVER£5,0
3496 :
3500 DEFine PROCedure curve_smoothing
3505 it%=1:REMark iteration counter
3510 IF rd%=1 THEN b1=3:b2=0:virtual_store
3520 IF series%=1 THEN page%=1:printout:page%=0
3530 PROK$=MENU$(4,man):header
3540 IF ftr=4 THEN ftr=5:REMark 53R'H
3550 LET ai=1:REMark reception array index
3560 LET tma%=0:tf%=0:ng%=0:ma%=0:REMark travelling mean vals
3565 AT£4,4,1:CLS£4,4:PRINT£4, MENU$(4,man);', iterations:"
3570 iteration_manager
3580 END DEFine
3590 :
3600 DEFine PROCedure iteration_manager
3610 REPeat iterations
3620 : AT£4,4,30:PRINT£4, it%;" Factor: ";ftr
3625 : LET ef%=INT(ftr/2):REMark set lag value
3630 : LET ff%=ef%:REMark reset index
3640 : LET flag%=0:REMark check for smoothing effect
3650 : smoothing_parameters
3660 : transfer_results
3670 : IF g(6)=4
3675 :   IF ftr=2 THEN EXIT iterations:REMark 53R'H
3677 :   IF it%>1 THEN ftr=3
3678 : END IF
3680 : IF flag%=0 THEN
3683 :   IF g(6)=4 AND ftr<>2 THEN ftr=2:REMark 53R'H
3687 :   IF ftr=3 OR ftr=5 THEN EXIT iterations
3688 : END IF
3690 : LET it%=it%+1
3700 END REPeat iterations
3710 : IF Q%=4 THEN lp%=1:display
3720 END DEFine
3750 :
```

```
3760 DEFine PROCedure smoothing_parameters
3770 LET df%=dn%-(ftr-3):REMark midsection length
3780 LET cf%=ftr-1:REMark start/finish section length
3790 LET af%=1:bf%=cf%:man_selection
3800 LET af%=1:bf%=ftr:mid_smooth
3810 LET af%=cf%+cf%:bf%=dn%:man_selection
3820 END DEFine
3825 :
3830 DEFine PROCedure mid_smooth
3840 FOR az=2 TO df%: man_selection
3850 END DEFine
3860 :
3870 DEFine PROCedure man_selection
3880 IF fmt=5 THEN GO TO 4110:REMark weekly data
3890 REMark start/end means
3900 FOR a=af% TO bf%
3910 : IF a%(0,a)>21 THEN NEXT a
3920 : LET tf%=tf%+a%(0,a):ng%=ng%+1
3930 END FOR a
3940 IF ng%>0 THEN LET ma%=tf%/ng%:REMark crude moving average
3950 LET ma%=INT(ma%):REMark rounded moving average
3960 IF man=4 THEN running_medians
3970 IF man=3 THEN moving_averages
3980 LET tf%=0:ng%=0:REMark resetting
3990 LET af%=af%+1:bf%=bf%+1:ff%=ff%+1:REMark incrementing
3992 OPEN#3, scr_415x125a48x86
3993 plotting (z)
3995 END DEFine
3997 :
4000 DEFine PROCedure moving_averages
4010 IF ng%=0 THEN
4020 : IF ipl%=1 THEN LET ma%=tma%+100:ELSE ma%=99:REMark interpolations?
4030 END IF
4040 REMark ma% into results array
4050 IF a%(ai,ff%)<>ma% THEN
4060 : IF ff%=ef% THEN
4070 :  FOR a=1 TO ef%:LET a%(ai,a)=ma%:REMark fill lag
4080 : ELSE
4090 :  LET a%(ai,ff%)=ma%:REMark load moving average
4100 : END IF
4110 LET flag%=1
4120 END IF
4130 IF ng%>0:LET tma%=((tma%+100)+ma%)/2)-100:REMark travelling mean
4140 END DEFine
4150 :
4180 DEFine PROCedure transfer_results
4190 FOR a=1 TO dn%
4195 finis=1
4200  LET a%(0,a)=a%(ai,a)
4210 END FOR a
4220 END DEFine
4230 :
```

```
4240 DEFine PROCedure running_medians
4260 tmp0=0:tmp1=20:diff%=0
4270 FOR a=af% TO bf%
4275 IF a%(0,a)>20 THEN END FOR a
4276 :AT£0,1,0:PRINT£0,diff%'!!tmp1,a'!!ff%!!!tmp(,flag%
4280 : LET diff%=ABS(ma%-a%(0,a))
4290 : IF diff% < tmp1 THEN tmp0=a:tmp1=diff%
4310 : IF ff%<>tmp0 THEN a%(ai,ff%)=a%(0,tmp0):flag%=1
4335   aj%=b-ai%+1
4340   AT£4,aj%,(bb*5)-3:PRINT£4,a%(bb,b)
4350  END FOR bb
4360 END FOR b
4370 FOR b=1 TO 2:AT£4,1,(b*5-3)+20:PRINT£4,b%(b,wl%)
4380 AT£4,12,7:PRINT£4,"SHOWING: WEEK ";wk%
4390 END DEFine
4400 :
4500 :
4510 DEFine PROCedure period_averages
4515 printout
4520 PRINT "PERIOD AVERAGES"!!
4530 FOR a= 1 TO 20:LET hz(a)=0
4540 averaging_calcs
4550 REMark IF prd-1=1 THEN LET dn%=ww%
4555 WAIT:edit_keys
4560 REMark IF prd-1=2 THEN LET dn%=mn%
4570 PRINT "OK":it%=2
4580 END DEFine
4590 :
4600 DEFine PROCedure averaging_calcs
4610   wn%=1:mn%=1:dd%=0:ww%=0:ma%=0:wa%=0
4620   IF switch=10 THEN weekly_calcs
4630 REMark daily calcs
4640 FOR a=1 TO dn%
4650 : IF a%(0,a)< 21 THEN
4660 : LET wa%=wa%+a%(0,a)
4665 : wn%=wn%+1
4670 : END IF
4680 : LET dd%=dd%+1
4690 : IF dd%=7 THEN weeks_mean
4700 END FOR a
4710 END DEFine
4720 :
```

```
4730 DEFine PROCedure weeks_mean
4740 IF wm%<>0 THEN
4750 : wm%=wm%/wn%:REMark mean
4755 : FOR aa=a-7 TO a:a%(0,aa)=wm%
4760 : LET mm%=mm%+wm%
4770 : LET ww%=ww%+1
4780 : IF ww%=4 THEN months_mean
4790 ELSE
4795 : a%(0,wn%)=99
4800 END IF
4810 dd%=0:wm%=0:wn%=0
4820 END DEFine
4830 :
4840 DEFine PROCedure months_mean
4845 IF prd=2 THEN END DEFine
4850 LET mm%=mm%/4
4855 FOR aa=(mn%*28) TO (mn%+1)*28:a%(0,aa)=mm%:END FOR aa
4860 LET mn%=mn%+1
4870 LET mm%=0:wn%=0
4880 END DEFine
4890 :
```

```
4900 DEFine PROCedure raw_data_collation
4910 AT 0,50:UNDER 1:PRINT "Raw Data";FILL$(" ",6):UNDER 0
4920 END DEFine
4930 :
5000 DEFine PROCedure data_selection
5010 PROK$="Data selection...":header
5020 REMark -------------fmt------------------
5021 REMark ¦       q1   q2   avg'd  diff   q3 ¦
5022 REMark ¦  low          ¦       ¦    ¦    ¦
5023 REMark ¦          1    ¦   5   ¦  8 ¦    ¦
5024 REMark ¦  high         ¦       ¦    ¦    ¦
5025 REMark res-------------+-------+----¦ 11 ¦
5026 REMark ¦  avg'd   2    ¦   6   ¦  9 ¦    ¦
5027 REMark ¦---------------+-------+----¦    ¦
5028 REMark ¦  diff    3    ¦   7   ¦  10¦    ¦
5029 REMark -------------------------------¦    ¦
5030 REMark ¦  both    4    ¦   -   ¦  - ¦    ¦
5031 REMark ---------------------------------
5040 REMark ::::::table of 'switch' variable::::::
5080 dat%=1:REMark flag for primary data
5090 rr%=0:REMark flag for graph base type: 0=norm, 1=difference graph
5100 IF fmt < 3 THEN
5110 : IF res < 3 THEN LET switch=1
5120 : IF res = 3 THEN LET switch=2
5130 : IF res = 4 THEN LET switch=3
5140 : IF res = 5 THEN LET switch=4
5150 END IF
5160 IF fmt = 3 THEN
5170 : IF res < 3 THEN LET switch=5
5180 : IF res = 3 THEN LET switch=6
5190 : IF res = 4 THEN LET switch=7
5200 END IF
5210 IF fmt = 4 THEN
5220 : IF res < 3 THEN LET switch=8
5230 : IF res = 3 THEN LET switch=9
5240 : IF res = 4 THEN LET switch=10
5250 END IF
5260 IF fmt = 5 THEN LET switch=11
5270 :
5300 IF switch > 10 THEN
5310 : week_q
5320 ELSE
5330 : day_q
5340 END IF
5360 END DEFine
5370 :
5380 DEFine PROCedure day_q
5390 LET a1=0:a2=0:a3=0:a4=0
5400 IF fmt=1 THEN LET a1=res
5410 IF fmt=2 THEN LET a1=res+2
5420 IF fmt>2 THEN a1=res
5430 IF res>2 AND fmt=1 THEN a1=1
5440 IF res>2 AND fmt=2 THEN a1=3
5450 :
5460 LET ai=a1:REMark for array index
5470 IF switch=2 OR switch=3 THEN LET a2=a1+1
5480 IF switch=5 OR switch=8 THEN LET a2=a1+2
5490 :
5500 :
```

```
5380 DEFine PROCedure day_q
5390 LET a1=0:a2=0:a3=0:a4=0
5400 IF fmt=1 THEN LET a1=res
5410 IF fmt=2 THEN LET a1=res+2
5420 IF fmt>2 THEN a1=res
5430 IF res>2 AND fmt=1 THEN a1=1
5440 IF res>2 AND fmt=2 THEN a1=3
5450 :
5460 LET ai=a1:REMark for array index
5470 IF switch=2 OR switch=3 THEN LET a2=a1+1
5480 IF switch=5 OR switch=8 THEN LET a2=a1+2
5490 :
5510 SELect ON switch
5520 :ON switch = 1
5530 FOR aa=1 TO dn%:LET a%(0,aa)=a%(a1,aa)
5540 :ON switch = 2
5550 average_sub
5560 :ON switch = 3
5570 difference_sub
5575 :ON switch = 4
5577 FOR aa=1 TO dn%:LET a%(0,aa)=a%(a1,aa)
5580 :ON switch = 5
5590 average_sub
5600 :ON switch = 6
5610 FOR aa=1 TO dn%
5620 : aj%=0:ak%=4:REMark total & divisor
5630 : FOR ab=1 TO 4
5640 :  IF a%(ab,aa)>21 THEN
5650 :    ak%=ak%-1
5660 :  ELSE
5670 :    LET aj%=aj%+a%(ab,aa)
5675 : END IF
5680 : END FOR ab
5690 IF ak%=0 THEN
5700 : a%(0,aa)=99
5710 ELSE
5720 : a%(0,aa)=aj%/ak%
5725 END IF
5730 END FOR aa
5740 :ON switch = 7
5750 a3=0:a1=1:a2=2:difference_sub
5760 a3=1:a1=0:a2=1:difference_sub
5770 a3=0:a1=0:a2=1:average_sub
5780 :ON switch = 8
5790 difference_sub
5800 :ON switch = 9
5810 a3=0:a1=1:a2=2:average_sub
5820 a3=1:a1=3:a2=4:average_sub
5830 a3=0:a1=0:a2=1:difference_sub
5840 :ON switch = 10
5850 a3=0:a1=1:a2=2:difference_sub
5860 a3=1:a1=3:a2=4:difference_sub
5870 a3=0:a1=0:a2=1:difference_sub
5880 END SELect
5890 :END DEFine
5895 :
```

```
6060 DEFine PROCedure week_q
6070 dn%=wd%
6080 SELect ON res
6090 :ON res = 1 TO 2
6100 a1=res
6110 FOR aa = 1 TO wd%:LET a%(0,aa)=b%(a1,aa)
6120 :ON res = 3
6130 FOR aa = 1 TO wd%
6140 IF b%(1,aa)>21 THEN a%(0,aa)=b%(2,aa):a4=1
6150 IF b%(2,aa)>21 THEN a%(0,aa)=b%(1,aa):a4=4
6160 IF a4=0 THEN a%(0,aa)=(b%(1,aa)+b%(2,aa))/2
6170 a4=0
6180 END FOR aa
6190 :ON res = 4
6200 FOR aa = 1 TO dn%
6210 LET a%(0,aa)=ABS(b%(1,aa)-b%(2,aa))
6220 END FOR aa
6230 END SELect
6240 :
6250 END DEFine
6260 :
6300 DEFine PROCedure residual_graph
6305 IF rd%=0 THEN END DEFine
6310 b1=2:b2=0:virtual_store
6320 a3=0:a2=3:a1=2:difference_sub
6330 data_manipulation
6340 dat%=2:REMark secondary data flag
6350 printout
6360 END DEFine
6370 :
```

```
6400 DEFine PROCedure curve_sections
6405 FOR a=1 TO 5:sct% a'=0: END FOR a
6410 sct%(0)=1:sct%(1)=gn%:sl%=gn%:sect=1:sct%(7)=1
6415 IF rng=1 THEN sct%(1)=gn%:sl%=dn%:REMark whole curve
6420 IF rng=2 THEN preset_sections
6425 IF rng=3 THEN set_sections
6430 END DEFine
6435 :
6440 DEFine PROCedure preset_sections
6445 IF plt%=1 AND ru% = 1 THEN PRINT "One at a time only":END DEFine
6450 CLS#3:PRINT#3,"Preceding:"\\"up to 5 sections"\\"'f' for finished"\\
6455  FOR a=1 TO 5
6460 :   AT#3,7,0:INPUT#3: s$
6465 :   IF s$="f" THEN EXIT a
6470 :   LET sct%(a)=s$:sct%(7)=sct%(7)+1
6475 END FOR a
6480 END DEFine
6485 :
6490 DEFine PROCedure set_sections
6495 REMark IF rng=3 THEN rng=rng+1:END DEFine :REMark call back later
6497 INK#0,4:AT#0,1,0:CLS#0
6500 PRINT#0, "Section length: space = move; 's' = set;'f' = finish"
6505 a=3:aa=1:REMark start point (offset=1) & section no
6510 sct%(0)=1:sct%(6)=1%:REMark outer values
6515 INK 6
6520 REPeat arrow
6530  IF a%(0,a-1)<20 THEN INK 2:LINE a,0 TO a,a%(0,a-1)+rt%
6550   AT#0,0,57:INK#0, 6:PRINT#0, "Data point: ";a-1:INK 3
6555  a$=INKEY$(-1)
6560   IF a$="s" THEN section
6565   IF a$="f" OR aa=5 THEN EXIT arrow
6570   IF a$=" " THEN a=a+1:IF a>=1% THEN EXIT arrow
6575 END REPeat arrow
6580 sct%(7)=aa:sct%(aa)=1%:sct%(6)=1%
6585 INK 2
6590 FOR a=sct%(aa-1)+2 TO sct%(6)
6595  IF a%(0,a-1)<20 THEN LINE a,0 TO a,a%(0,a-1)+rt%
6600 END FOR a
6601 CURSOR (sct%(aa-1)*5.5)+35,75:INK 6:PRINT aa
6602 state_sections
6603 aa=1
6604 FOR a=3 TO 1%
6605  IF a%(0,a-1)<20 THEN INK 8:LINE a,0 TO a,a%(0,a-1)+rt%
6606  IF a=sct%(aa)+1 THEN INK 7:LINE a,0 TO a,21:aa=aa+1
6607  x=5:IF rr%=1 THEN x=10
6608  IF a+2/7=INT(a+2/7) THEN INK 7:POINT a+1,x
6609 END FOR a
6610 CLS#0:INK 7:LINE 2,rt% TO 1%+1,rt%
6611 plotting (z)
6612 END DEFine
6613 :
```

```
6614 DEFine PROCedure section
6620 LET sct%(aa)=a-1
6625 INK 6:LINE a,0 TO a,21:INK 3
6626 sl%=sct%(aa)-sct%(aa-1)
6627 IF sl%<3 THEN CURSOR (sct%(aa-1)*5.5)+35,75:INK 6:PRINT aa:INK 3
6628 state_sections
6630 a=a+1:aa=aa+1
6635 END DEFine
6640 :
6650 DEFine PROCedure state_sections
6660 IF 1%>50 THEN END DEFine
6665 AT 8,53:INK 4:PRINT "Section lengths:"
6670 AT 8+aa,57:PRINT aa;": ";sct%(aa-1);" - ";sct%(aa)
6680 END DEFine
6690 :
6700 DEFine PROCedure examine_curve
6710 IF pl1%=1 OR arl=5 OR rng=3 THEN END DEFine
6720 CLS£0:INK£0,7:AT£0,0,0:PRINT£0,hx$(7)!hx$(2);"?":ye$
6725 IF y%=0 THEN CLS£0:END DEFine
6727 AT£0,0,18:CLS£0,4:INK 4:AT 0,9:PRINT"INTERACTIVE"
6728 CLS£4:AT£4,0,5:PRINT£4,hx$(7)
6730 : IF src=5 THEN LAG_EXAMINATION:GO TO 6720
6733 : AT£0,1,0:PRINT£0,"Between sections (y) or single section?":ye$
6735 : IF sct%(6)=0 THEN rng=3:set_sections
6737 : IF y%=1 THEN compare_sections:END DEFine
6740 : AT£0,1,0:CLS£0,4:INK£0, 4:INPUT£0,"Section number: ";sct
6745 FOR aa= 4 TO 7
6770 :AT£0,1,0:CLS£0,2:PRINT£0,MENU$(aa,0):CLS£0,4
6775 :FOR a=1 TO 4:PRINT£0,a!MENU$(aa,a)!!!:END FOR a
6780  IF aa=4 THEN INPUT man
6781  IF aa=5 THEN INPUT ftr
6782  IF aa=6 THEN INPUT anl
6785 END FOR aa
6800 data_analysis
6810 END DEFine
6820 :
6830 DEFine PROCedure LAG_EXAMINATION
6840 IF alg%=1 THEN END DEFine
6850 INPUT£0,"Enter increment/decrement of lag: ";lag%
6860 INPUT£0,"Enter vertical seperation: ";vlag%
6865 z=0:plotting (z)
6867 re_set_lag
6868 z=6:plotting (z)
6870 END DEFine
6880 :
6900 DEFine PROCedure compare_sections
6905 IF sct%(7)=1 THEN rng=3:curve_sections
6910 INPUT£0,"Section numbers "!!sx(1)!!sx(2)
6912 FOR cs=1 TO 2
6915 sct=sx(cs):rng=3:anl=3:linear_regression
6920 chi_compare:AT£4,cs,5:PRINT£4,less%;" 0 ";more%
6930 compare_skew
6940 END FOR cs
6950 END DEFine
6960 :
```

```
7000 DEFine PROCedure OPERATIONS
7002 OPEN#1, scr_448x200a32x16:CLS#1
7003 OPEN#2, scr_448x200a32x16:CLS#2
7005 INK#2, 4:LINE#2, 0,95 TO 167,95:LINE#2, 0,1 TO 167,1
7010 PROM$=hx$(1):header
7015 comp%=0:REMark for comparison of members
7020 LET rx% = c%: rv% = 1:REMark for repeats
7030 ru$ = code$(c%,1):ru%=ru$(3):REMark no members in this family
7040 SELect ON smp
7050   =1: IF rpt%=0 THEN rpn%=c%:REMark individual
7060   =2: IF rpt%=1 THEN rpn%=c%+ru%-1:ELSE :rpn%=c%:REMark families
7065   =3
7070    : rpn%=c%:REMark regimes
7075    : IF cd%=1 THEN ru%=BFT
7080    : IF cd%=2 THEN ru%=FDC
7085    : IF cd%=3 THEN ru%=control
7095   =4: IF rpt%=0 THEN rpn%=c%:REMark one off
7100 : END SELect
7110 CLS#0:OPEN#4,scr_415x55a48x25:BORDER#4,2,6
7130 :
7140 FOR rz=rx% TO rpn%
7150 : INK 4:CLS#4:INK#4,6:AT#4,0,3:PRINT#4,"Report:":INK#4,4
7160 : rv%=rpn%-rz+1
7190 : IF smp=2:rv%=1
7200 :   AT#4,0,45
7210 :   IF rv%=1 THEN
7220 :    IF smp=1:PRINT#4,"Only file, ";:ELSE :PRINT#4,"Last file, ";
7230 :   ELSE
7235 :    PRINT#4, rv%;" more files, ";
7250 :   END IF
7260 :
7280 : c%=rz:cd$=c%:REMark reset file no for repeats
7285 : IF smp>1 THEN cd1$=code$(c%,smp-1):cd$=cd1$(1 TO LEN(cd1$)-2)
7290 : ru%=ru%+1:REMark for regimes
7295 : data_sample
7300 : AT 4,5:retrieve_diary_data
7305 : data_selection
7310 : data_series
7315 : data_source
7320 : data_manipulation
7325 : REMark subset_mean_calcs
7330 : printout
7335 : REMark print_controls
7340 : REMark operations_analysis
7342 :
7345 END FOR rz
7350 CLOSE#4:PAPER#0,0:INK#0,3:CLS#0
7355 PRINT#0,"1. Same data, new treatment"\"2. New data, same treatment"
7360 PRINT#0,"3. Start afresh"\"4. Main Menu":agn%=INKEY$(-1)
7370 END DEFine
7380 :
```

```
7400 DEFine PROCedure operations_analysis
7405 IF anl=5 AND src=3 THEN END DEFine
7410 lag_adjustments
7420 curve_sections
7425 data_analysis
7427 regre$(rz,aq)=a$
7430 REMark residual_graph
7440 REMark examine_curve
7450 END DEFine
7460 :
7500 DEFine PROCedure data_source
7505 IF src < 3 THEN END DEFine :REMark dummy for raw data
7510 IF src = 3 THEN deviation_from_trend
7515 IF src = 4 THEN weekly_data_comparisons
7520 IF src = 5 THEN lag_adjustments
7525 END DEFine
7530 :
7535 DEFine PROCedure lag_adjustments
7540 IF src<>5 THEN END DEFine
7545 IF lg%=1 THEN adjust1:END DEFine
7550 IF lg%=2 THEN adjust2:END DEFine
7555 :
7556 DEFine PROCedure adjust1
7557 FOR a =1 TO 7: a%(5,a)=99
7558 FOR a=1 TO dn%+7:a%(5,a+7)=a%(0,a)
7559 FOR a=1 TO dn%+7:a%(0,a)=a%(5,a)
7560 dn%=dn%+7:lg%=2
7561 END DEFine
7562 :
7564 DEFine PROCedure adjust2
7565 b1=5:b2=0:virtual store
7566 c%=lagc2:cd$=c%:INK 6
7567 retrieve_diary_data
7568 data_selection
7569 data_manipulation
7570 b1=1:b2=0:virtual_store
7571 FOR a=1 TO 7:a%(0,a)=99
7573 re_set_lag
7575 lg%=3:z=4:plotting (z):INK 5
7576 anl=3:REMark flag to allow close exam
7578 END DEFine
7579 :
7580 DEFine PROCedure re_set_lag
7582 FOR a=1 TO dn%
7583  a%(0,a+7+lag%)=a%(1,a)+vlag%
7584 END FOR a
7585 END DEFine
7590 :
```

```
7800 DEFine PROCedure data_manipulation
7805 LET prevman=man   ..
7810 IF man = 1 THEN END DEFine :REMark dummy for raw dat
7820 IF man = 2 THEN period_averages
7830 IF man = 3 OR man = 4 THEN curve_smoothing
7840 END DEFine
7845 :
7850 DEFine PROCedure data_sample
7855 IF smp=1 THEN END DEFine
7860 IF code%(c%,3)=0 THEN AT 4,7:PRINT "No diary data stored"
7865 IF smp=2 AND '*' INSTR code$=0 THEN generate_week_files
7891 END DEFine
7895 :
7600 DEFine PROCedure deviation_from_trend
7605 : printout
7608 : rng_tmp=rng:rng=1:curve_sections:REMark whole curve
7610 : anl_tmp=anl:anl=1:data_analysis
7620 : rd%=1:residual_graph
7630 : rng=rng_tmp:anl=anl_tmp
7635 : dat%=2:REMark flag secodary data
7640 END DEFine
7645 :
7650 DEFine PROCedure weekly_data_comparisons
7660 LET switch = 8:res = 3: data_selection
7670 REMark then what?
7680 REMark transfer into harmless array eg 5
7690 REMark subtract q3 data from period averages results
7700 printout
7710 END DEFine
7720 :
```

```
7900 DEFine PROCedure generate_mean_files
7901 IF c%<>99 AND c%<=nn% THEN END DEFine
7902 STATU$="INTERACTIVE":PROK$="Generating mean":header:smf%=smp
7904 IF smp=2 THEN ru%=code$(c%,1)(3)
7905 IF smp=3 THEN ru%=code$(0,2):REMark split how?????
7906 IF smp=4 THEN
7907 CLS£3:INPUT£3,"How many files? ";rpn%:ru%=rpn%
7908  FOR a=1 TO rpn%
7909   REMark smp1=4
7910    SET_CODES
7911   ca%(a)=c%:smp=4
7912  END FOR a
7913 END IF
7914 fm1=0:smp1=smp:smp=1:ca$="":ry%=1
7915 CLS£3:PRINT£3,"   Member files:"
7916 REPeat rz
7917 :   IF smp1=4:c%=ca%(ry%):PRINT£3, c%
7918 :   IF ry%=1:ca$=c%:ELSE :ca$=ca$&","&c%
7919 :   cd$=c%:zx=1:retrieve_diary_data:zx=0
7923 :   IF smp1<>4:code$(c%,smp1-1)=code$(c%,smp1-1)&" *"
7924 :   fm1=1:REMark flag addition mode for data file input
7925 :   IF ry%=rpn% THEN EXIT rz
7926 :   ry%=ry%+1
7927 :END REPeat rz
7930 mean_sub
7932 smp=smp1:REMark reset smp
7934 cd$=code$(c%,smp1-1)
7935 IF smp=4 THEN cd$=ca$
7936 store_diary_data
7938 nn%=nn%+1:code$(0,3)=nn%
7940 code$(nn%,0)=ca$
7942 code$(nn%,1)="-/"&rpn%:STOP
7944 code$(nn%,2)="SUBSET"
7946 code$(nn%,3)=dn%
7950 store_codes_data
7952 c%=ry%:rpn%=0:fm1=0:REMark reset file no & flag
7953 STATU$=MENU$(0,0%)
7954 END DEFine
7970 :
7975 DEFine PROCedure mean_sub
7976 PRINT£3,"  Calculating mean"
7977 FOR aa=1 TO 4
7980   FOR a=1 TO dn%:a%(aa,a)=a%(aa,a)/ru%
7985 END FOR a
7990 END DEFine
7995 :
```

```
8000 DEFine PROCedure data_series
8010 series%=1
8020 : IF src=2 OR res=5 THEN series%=4
8030 : IF res=5 THEN series%=2
8040 AT#4,0,56:PRINT#4,_series%;" series"
8050 IF series%=1 THEN END DEFine
8060 series1=1:IF fmt=2 THEN series1=3
8070 series2=series1+1:IF series%=4 THEN series2=4
8080 FOR series=series2 TO series1 STEP -1
8090 AT#4,1,30:PRINT#4,"Manipulation: series ":AT#4,1,53+(series*2):PRINT#4,series
8100  b1=0:b2=series:virtual_store
8110  data_manipulation
8120  b1=series:b2=0:virtual_store
8130 END FOR series
8140 :
8150 END DEFine
8160 :
8300 DEFine PROCedure regime_mean_files
8303 AT 0,40:PRINT hx$(c%+3)
8305 smp1=smp:smp=1:fm0=0:fm2=0:REMark sample & addition mode counter
8310 FOR a=1 TO nn%
8315  IF code$(a,2)=hx$(cd%+3) THEN c%=a:retrieve_diary_data:fm0=fm0+1
8320  IF fm0>1 THEN fm1=1
8325   IF fm2<dn% THEN fm2=dn%
8330 END FOR a
8335 dn%=fm2:REMark largest member dn%
8340 cd$=hx$(cd%+3):fm$="Regime mean"
8345 ru%=fm0
8350 mean_sub
8355 nn%=nn%+1:code$(0,3)=nn%
8360 code$(nn%,0)=fm$
8365 code$(nn%,1)="-/"&ru%
8370 code$(nn%,2)=cd$
8375 code$(nn%,3)=dn%
8380 smp=smp1:rpn%=0:fm1=0:REMark reset
8385 END DEFine
8390 :
8400 DEFine PROCedure mean_sub
8410 FOR aa=1 TO 4
8420  FOR ab=1 TO dn%:a%(aa,ab)=a%(aa,ab)/ru%
8430 END FOR aa
8440 END DEFine
8450 :
```

LISTING: STATISTICAL ANALYSIS

```
10000 DEFine PROCedure data_anelysis
10005 IF anl=5 THEN END DEFine
10010 AT 0,5C:CLS 4:INK 4:PRINT "ANALYSIS"
10015 IF rng<>1 THEN \
10020 : FOR sct=1 TO sct%(7):analyse:hard_copy:END FOR sct:END DEFine
10025 ELSE
10030 : analyse:hard_copy
10035 REMark IF rng=3 THEN plt%=0
10035 END IF
10040 END DEFine
10045 :
10050 DEFine PROCedure analyse
10055 :IF anl=1 THEN linear_regression
10060 :IF anl=2 THEN cross_section
10065 :IF anl=3 THEN REMark dummy for invisible calcs
10065 :IF anl=4 THEN linear_regression:cross_section
10067 :IF anl=5 THEN END DEFine
10070 END DEFine
10075 :
10100 DEFine PROCedure linear_regression
10110 IF s=p>1 AND rv%<>1 THEN END DEFine :REMark deflect till ready
10130 s1=0:s2=0:s3=0:s4=0:s5=0
10140 FOR a=sct%(sct-1) TO sct%(sct)
10150 IF a%(0,a)=-1 THEN NEXT a
10155 as=a:IF sct>1 THEN as=a-sct%(sct-1)
10160 s1=s1+as
10170 s2=s2+a%(0,a)
10180 s3=s3+as*as
10190 s4=s4+a%(0,a)*a%(0,a)
10200 s5=s5+a%(0,a)*as
10210 NEXT a
10220 :
10225 sl%=sct%(sct)-sct%(sct-1)+1:REMark section length
10230 m$=(sl%*s5-s1*s2)/(sl%*s3-s1*s1)
10240 c$=(s2-m$*s1)/sl%
10250 r$=(m$*(s5-s1*s2/sl%))/(s4-s2*s2/sl%)
10255 :
10260 meanx=s1/sl%:REMark mean of x
10270 meany=s2/sl%:REMark mean of y
10280 qx=SQRT(s3-((s1*s1)/sl%)/sl%):REMark SD of x
10290 qy=SQRT(s4-((s2*s2)/sl%)/sl%):REMark SD of y
10300 IF anl<>3 THEN linreg_results
10301 END DEFine
10302 :
```

```
10303 DEFine PROCedure linreg_results
10305 INK 4:AT£4,1,5:CLS£4,4
10310 PRINT£4, "Regression line: Y="!m$!"X"
10330 AT£4, 1,42:IF c$>0 THEN PRINT£4, "+";c$:ELSE PRINT£4, c$
10340 AT£4,2,5:CLS£4,4:PRINT£4,"Correlation: ";r$;";  Std. Devn.: ";qy
10350 REMark m and c are in 'y=mx+c'
10360 REMark r=coefficient of correlation
10370 draw_reg_line:WAIT
10380 END DEFine
10390 :
10400 DEFine PROCedure draw_reg_line
10410 REMark draw regression line
10420 INK 6
10430 sla%=sct%(sct)-sct%(sct-1):IF sla%>70 THEN sla%=70
10435 slb%=sct%(sct)+1:IF sla%>70 THEN slb%=70
10440  LINE sct%(sct-1)+1,c$+rt% TO sct%(sct)+1,m$*sla%+c$+rt%
10475 INK 3
10480 END DEFine
10490 :
```

```
10500 DEFine PROCedure cross_section
10510 :
10520 spread_barchart
10530 spread_by_sign
10540 chi_section
10550 skew
10580 END DEFine
10590 :
10600 DEFine PROCedure spread_by_sign
10603 IF mean<>1 THEN END DEFine
10605 more%=0:less%=0:mean=0
10610 FOR a=sct%(sct-1) TO sct%(sct)
10620   IF a%(0,a)>0 THEN more%=more%+1
10630   IF a%(0,a)<0 THEN less%=less%+1
10640 END FOR a
10643 IF an1<>3 THEN cs=0
10645 AT£4,cs,25:PRINT£4,"< ";less%:
10650 AT£4,cs,30:PRINT£4,"0":AT£4,0,33:PRINT£4,more%;" ="
10653 END DEFine
10654 :
10655 DEFine PROCedure chi_section
10660 mean=s1%/2
10670 c1=(more%-mean)*(more%-mean)
10680 c2=(less%-mean)*(less%-mean)
10690 chi=c1/mean+c2/mean
10700 AT£4, 0,43:PRINT£4, "(Chi = ";chi;")"
10710 REMark chi=6:5%; chi=9:1%; chi=15:0.1% - df=2
10720 END DEFine
10730 :
10750 DEFine PROCedure chi_compare
10755 LOCal a,b,C,d,e,f,g,h,k
10760 REMark works to sections sx1% & sx2%
10770 sct=sx1%:spread_by_sign
10780 a=more%:b=less%
10790 sct=sx2%:spread_by_sign
10800 C=more%:d=less%
10810 e=a+more%:f=b+less%:g=a+b:h=more%+less%:k=e+f
10820 chi=((b*C-a*d)^2)*k/e*f*g*h
10830 AT £4,2,5:PRINT£4, "Above/below zero line: Chi = ";chi
10840 END DEFine
10850 :
10900 DEFine PROCedure skew_compare
10910 IF an1<>1 OR an1<>4 THEN linear_regression
10920 sct=sx1%:skew:g3=g1:g4=g2
10930 sct=sx2%:skew
10940 END DEFine
10950 :
```

```
11000 DEFine PROCedure spread_barchart
11005 cross_frame
11010 cross_count
11015 cross_histogram
11020 END DEFine
11023 :
11025 DEFine PROCedure cross_frame
11030 OPEN £4, scr_415x55a48x29:BORDER £4,2,6:CLS£4
11040 INK£4,5:LINE£4, 6,10 TO 6,90,275,10 TO 275,90
11050 LINE£4,540,10 TO 540,90,585,10 TO 585,90
11060 LINE£4, 5,25 TO 585,25
11070 LINE£4,6,45 TO 16,45,6,65 TO 16,65
11073 LINE£4,270,45 TO 280,45,270,65 TO 280,65
11075 LINE£4,530,45 TO 540,45,530,65 TO 540,65
11077 LINE£4,584,45 TO 586,45,584,65 TO 584,65
11080 AT£4,4,1:PRINT£4,"-10":AT£4,4,30:PRINT£4,"0":AT£4,4,57:PRINT£4,'+10"
11083 sct$=sct:IF rng=1 THEN sct$="Whole curve"
11084 AT£4,0,2:PRINT£4, "Section: ";sct$
11085 AT£4,4,14:PRINT£4,"Cross section":AT£4,4,35:PRINT£4,"histogram"
11088 END DEFine
11089 :
11090 DEFine PROCedure cross_histogram
11095 bottom=50:size=17:left=10
11100 FOR a=-10 TO +11
11110  aa=a+11
11120  IF aa=22 THEN left=18
11130  height=hz(aa)+2:PRINT£0,hz(aa)!!
11140  BLOCK size, height,left+aa*size,bottom-height,0
11150  BLOCK size-2,height-2,left+aa*size+1,bottom-height+1,3
11160 END FOR a
11180 END DEFine
11190 :
11220 DEFine PROCedure cross_count
11230 FOR a=1 TO 22:hz(a)=0:END FOR a
11240 FOR a= sct%(sct-1) TO sct%(sct)
11250  IF a%(0,a)>21 THEN
11260    hz(22)=hz(22)+1
11270  ELSE
11280    hz(a%(0,a)+rt%)=hz(a%(0,a)+rt%)+1
11290  END IF
11300 END FOR a
11320 END DEFine
11330 :
```

```
11000 DEFine PROCedure spread_barchart
11005 cross_frame
11010 cross_count
11015 cross_histogram
11020 END DEFine
11023 :
11025 DEFine PROCedure cross_frame
11030 OPEN £4, scr_415x55a48-29:BORDER £4,2,6:CLS£4
11040 INK£4,5:LINE£4, 6,10 TO 6,90,275,10 TO 275,90
11050 LINE£4,540,10 TO 540,90,585,10 TO 585,90
11060 LINE£4, 5,25 TO 585,25
11070 LINE£4,6,45 TO 16,45,6,65 TO 16,65
11072 LINE£4,270,45 TO 281,45,270,65 TO 281,65
11075 LINE£4,530,45 TO 540,45,530,65 TO 540,65
11077 LINE£4,584,45 TO 586,45,584,65 TO 584,65
11080 AT£4,4,1:PRINT£4,"-10":AT£4,4,30:PRINT£4,"0":AT£4,4,57:PRINT£4,"+10"
11083 sct$=sct:IF rng=1 THEN sct$="Whole curve"
11084 AT£4,0,2:PRINT£4, "Section: ";sct$
11085 AT£4,4,14:PRINT£4,"Cross section":AT£4,4,35:PRINT£4,"histogram"
11088 END DEFine
11089 :
11090 DEFine PROCedure cross_histogram
11095 bottom=50:size=17:left=10
11100 FOR a=-10 TO +11
11110  aa=a+11
11120  IF aa=22 THEN left=18
11130  height=hz(aa)+2:PRINT£0,hz(aa)!!
11140  BLOCK size, height,left+aa*size,bottom-height,0
11150  BLOCK size-2,height-2,left+aa*size+1,bottom-height+1,3
11160 END FOR a
11180 END DEFine
11190 :
11220 DEFine PROCedure cross_count
11230 FOR a=1 TO 22:hz(a)=0:END FOR a
11240 FOR a= sct%(sct-1) TO sct%(sct)
11250  IF a%(0,a)>21 THEN
11260    hz(22)=hz(22)+1
11270  ELSE
11280    hz(a%(0,a)+rt%)=hz(a%(0,a)+rt%)+1
11290  END IF
11300 END FOR a
11320 END DEFine
11330 :
```

```
11500 DEFine PROCedure skew
11510 d0=0:d1=0:d2=0:d3=0:d4=0:g1=0:g2=0
11515 FOR a=sct%(sct-1) TO sct%(sct)
11520 d0=meany-a%(0,a)
11530 d1=d1+d0
11540 d2=d2+(d0*d0)
11550 d3=d3+(d0*d0*d0)
11560 d4=d4+(d0*d0*d0*d0)
11570 END FOR a
11580 g1=(d3/d2)*SQRT(sl%/d2)
11590 g2=(sl%*d4)/(d2*d2)
11595 AT#4,4,10:PRINT#4, "Skew: ";g1
11596 AT#4,4,35:PRINT#4, "Kurtosis: ";g2
11600 END DEFine
11610 :
11620 DEFine PROCedure skew_calcs
11630 FOR a=sct%(sct-1) TO sct%(sct)
11640  IF hz(a)>mod% THEN mod%=hz(a)
11650 END FOR a
11660 skew=(3*(meany-mod%))/qy
11670 END DEFine
```

16. 4 THE INSTRUMENTS USED

Three main instruments were used in the empirical study. The diaries constituted the main data-collection vehicle, with the Family Profile and Follow-Up Questionnaire noting supplementary information. The diaries were used in two different formats: an early version was used for the FDC group as the opportunity arose fortuitously and the decision was taken to grasp it; and the latter one was used for both the BFT and CONTRAST families.

All instruments are shown here in the form of reduced photocopies of the pages. They have not been 'mocked up' into realistic examples: the diary pages give an idea of what was provided seven times in a single weekly pamphlet. Details of how the main diary was set out have been given previously (see 10.6.C).

The Main Diary

SOUTHAMPTON UNIVERSITY

DEPARTMENT OF SOCIAL WORK STUDIES

FAMILY STUDY PROJECT

CODENAME

Date started:

DAILY DIARY

This diary is a simple way to record how you felt each day about the things that happened to you that you felt were important to you. It is the things that were important to <u>you</u> that we would like you to record, and as this will be a private diary please do not show it to other members of your family.

The diary is for each day of the week, and each page is for a day. Please fill the diary in at bed time so that you can go back over the things that happened to you that day, and pick out the TWO most important things for each of the TWO questions on that day's page.

Each page has two lines drawn across it, labelled at one end VERY BAD and at the other end VERY GOOD.

One line is for the things that happened <u>inside</u> your home,

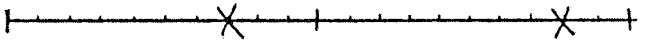
the other line is for the things that happened <u>outside</u> your home that affected you.

For each line you are asked to draw 2 crosses (X) to show whereabouts on the line between VERY BAD and VERY GOOD you feel <u>now</u> (at bed time) the two most important things are. One cross is for the most good thing, the other cross is for the most bad thing.

There is also a final question for the end of the week.

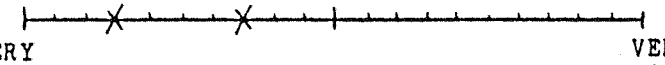
EXAMPLES

You were upset that there was no milk for breakfast (the bad thing) and also pleased that you received a present (the good thing).



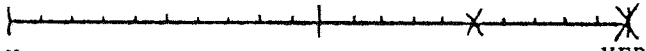
VERY BAD — VERY GOOD

You were upset that the local shop was shut just when you wanted to buy something (a bad thing) and you were also fed up because someone shouted at you (another bad thing).



VERY BAD — VERY GOOD

You were pleased that someone you are fond of paid you a compliment (a good thing) and you were overjoyed that something you expected to be very difficult turned out to be easy in the end (another good thing).



VERY BAD — VERY GOOD

It would help if you could say what the important things were.

THANK YOU FOR TAKING PART IN THIS RESEARCH.

Thinking about today, how do you feel now about the two most important things that happened in your home?

VERY BAD

VERY GOOD

If you want to, say what these things were.

Thinking about today, how do you feel now about the two most important things that happened outside your home?

VERY BAD

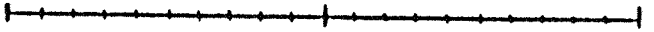
VERY GOOD

If you want to, say what these things were.

Day:

Date and time completed:

Thinking about today, how do you feel now about the two most important things that happened in your home?



VERY BAD

VERY GOOD

If you want to, say what these things were.

Thinking about today, how do you feel now about the two most important things that happened outside your home?

VERY BAD

VERY GOOD

If you want to, say what these things were.

Day:

Date and time completed:

Looking back over the whole week, how do you feel it has been for all the family?

VERY BAD

VERY GOOD

Would you like to say what the two most important things were?

SOUTHAMPTON UNIVERSITY: RESEARCH INTO FAMILIES

DAILY DIARY

Name:
Date started:

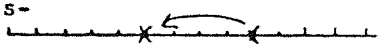
This diary is a simple way to record how you felt about important things each day.

There are only three questions each day: please answer them at bedtime so that you can remember the whole day.

Please do not show your diary to anyone else.

Examples-
Question 1: please decide what was the most important thing to happen in your day and write down a few details, even what was actually said if you want to.

Question 2: please put two X's one the line, the first one to show how you felt about the important thing, and the second one to show how you ended up feeling about it.
If your feelings did not change, put two X's at the same place; if they did change, put an arrow showing which was first and which was second, like this-



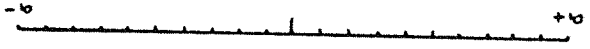
Question 3: just like Question 2, but about how you felt generally about things today.
+10 means feelings you like to have.
-10 means feelings you do not like to have.

Thank you.

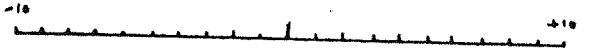
1. What was the most important thing that happened to you today?

Who did you first turn to with this news?
(for help or to share good news)

2. How did you feel about it?



3. How are you feeling generally about today?



Day:

The Family Profile

FAMILY STUDY PROJECT

FAMILY PROFILES FORMAT

Name	Age	CODENAME	Occupation

FAMILY ID CODE:

STATUS: BFT, DC OR CONTRAST _____

Number of weeks completed: _____

Number of children under 16:) _____
Family Structure Code:) see below _____
Presenmting Problem Code:) _____

Family Centre research codes-

A. Family Structure:
1. Single Adult
2. Couple without children at home
3. Intact nuclear family
4. Reconstituted family
5. Single parent - mother
6. Single parent - father

B. Presenting Problem
1. CHild abuse
2. Delinquency
3. Problems at school
4. Other child behaviour
5. Adoption counselling
6. Other (specify)

Comments:

The Follow-Up Questionnaire

DIARY COMPLETION QUESTIONS

It would help the research to know about your impressions of the diaries now that you have finished them. There are six questions about general things to do with how you got on with the diaries.

Most of the questions ask about how Hard or Easy things were filling in the diaries, and use a line from A to E for the answers - like this:

A——B——C——D——E

Hard Easy

Please choose the letter that shows your answer, and write it in the box beside the question. Thank you.

1. How easy was it to understand the instructions? ☐

2. How easy was it to decide on the most important things to happen each day? ☐

3. How easy was it to decide where to put the X's? ☐

4. How easy was it to resist the temptation to make some things seem better or worse than they felt at the time? ☐

5. How easy was it to write down what the important things were each day? ☐

The Follow-Up Questionnaire

6. Sometimes you may have put only 3, 2, I, or even no X's for a day. This might have been for the same reason each time, or for different reasons. Please tick the box beside all the reasons you remember affecting you:

You didn't care much about anything at the time? ☐

You were too happy or elated at the time? ☐

You were too fed up or angry at the time? ☐

You were too busy having a hectic day? ☐

You got fed up with the diary? ☐

or something else, such as .....? ☐

ANY COMMENTS OR SUGGESTIONS WOULD BE USEFUL!

CODENAME.....