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FROM THE EDITORS

As we head into Winter, a number of exciting things are in the air for AAIMHI. At the end of July, there is a two day meeting in Sydney on Principles of Attachment Theory with four overseas speakers. This will be followed in Melbourne by a one day meeting with the same speakers. Details of both meetings are given later in the Newsletter. Then in October, the South Australian Branch are holding their Inaugural Meeting which follows the Faculty of Child Psychiatry Annual Meeting. Plans for the Third Pacific Rim Meeting which is being held in Sydney in April, 1995, are under way and a report on their progress is also included later in the Newsletter. This year promises to be a stimulating one for AAIMHI!

The Newsletter contains two major articles. The first is on Chaos Theory. As Isla Lonie explains there has been interest in the application of this theory in research in infant development, and at the Fifth World Congress of WAIPAD in Chicago, there was a three hour Symposium devoted to this subject. The second is from Desiree Saddik, and on the very relevant area of brief mother-infant psychotherapy, based on her trip last year to Europe. One reason that there is interest in infant psychiatry is the realisation that interventions during infancy can have major effect on the future development of the child, a point taken up by Isla in her contribution. Desiree highlights the importance of these brief interventions. We are hoping in future issues to print further contributions from her on this area.

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IS THE BABY'S GAZE A STRANGE ATTRACTOR?

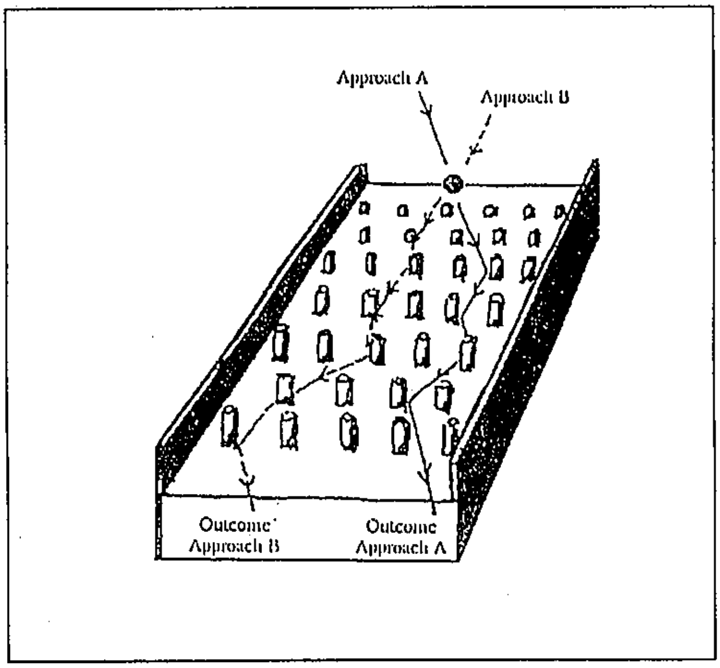
Chaos theory: A new paradigm in biological research

ISLA LONIE

Chaos theory has become a popular term for describing a new approach to understanding complex systems which change over time. It is an aspect of more general studies known as dynamical systems theory, dynamic systems theory, dynamic pattern theory or coordinative systems theory, but the name chaos theory has caught on and is widely used. In a series of publications now emerging from the biological sciences concepts derived from chaos theory are being employed to provide new insights into human behaviour and development. For instance, the August 1993 volume of the journal ***Child Development*** *has a section devoted to recent research on the development of motor skills in the infant which make considerable use of this new paradigm. A dynamical systems approach offers not only a theoretical framework within which to ask developmental questions, but also both experimental strategy and analytical tools to answer them. In the belief that this approach will soon become invaluable in research into psychological development, this article attempts to provide a brief review of the basic language and concepts used in this new approach.*

Important events are occurring in the scientific world which are in the process of revolutionising our thinking about how the world works. This was brought home to me last year when I decided to attempt to upgrade my sketchy knowledge of mathematics by doing a unit of mathematics intended as a preparation for the biological sciences at Sydney University. For the whole of one term our lecturer told us each week that it was incredibly important that biology students were aware of the theory of chaos. Until five years ago, he said, it was not understood that complex phenomena often dismissed as random 'noise' had their own patterning and structure. This could now be represented mathematically, often with the assistance of computer graphics. In effect, **these representations permit the visualisation of the effects of feedback**. As a result, more complex models for understanding biological systems in dynamic interplay are becoming possible.

We need here to make a distinction between the concepts of linear and non-linear processes. The concept of **linearity** refers to a system where variations in the values of one variable are matched by proportional changes in another (as for instance in a straight line graph). This is the sort of model which has often been used to predict outcome in biological phenomena. We attempt to identify a variable and to keep all other variables constant and then to see if changes in this variable produce predictable changes in outcome. We might, for instance, identify a group of depressed patients and see if a certain drug improves their well-being as measured on a scale devised to measure the symptoms of depression. To allow for the possibility of spontaneous improvement, we then have a matched control group who are given placebo tablets under the same conditions. We attempt to allow for observer bias by having our researchers and subjects 'blind' to knowledge as to who is receiving the active drug. Results are assessed in terms of statistically significant outcomes. For the most accurate predictions, large numbers of subjects are required, while replication of the findings by other groups of researchers give them a greater reliability. In this kind of research the assumption is made that other factors which have not been measured are irrelevant since the results are compared with a group of controls who do not receive the active treatment. This group is 'matched' with the treatment group for basic data such as age and sex, and sometimes socio-economic grouping. **In order to reduce the effect of individual variations between the subjects, results are pooled for a large number of subjects so that these differences are smoothed out and lost to the final analysis.**



REPRESENTATION OF DIFFERENT PATHS TAKEN BY A BALL ON A PEGBOARD TO SHOW SENSITIVE DEPENDENCE ON INITIAL CONDITIONS.

(fig. 1)

By contrast, **non-linearity** refers to a system where there is an effect of feedback, so that output at any point is affected by the preceding state and so may be variable across a range of conditions. This situation may be modelled by the example of a pegboard where two balls may start off at the same point, but by taking a slightly different course at say, the first peg, may end up far apart at the end of their course (fig. 1). Every non-linear process leads to branch points (also called bifurcations) as in the pegboard, where one course or another may be taken. Depending, say, on whether the ball passes to the right or the left of the first peg, so the subsequent course of the ball is decided and is predictable, at least until it hits the next peg when we are back with the chance factors of right or left. We cannot however predict the outcome for the ball when it is at the beginning of its course, because each right/left 'decision' is amplified by the 'feedback' of its subsequent course. In this unfolding of a process, information is thus generated and retained, as we know is the case in human development. **In this sort of modelling individual differences are of the essence and the information obtained relates to the unique course of a particular developmental history.**

KEY CONCEPTS IN DYNAMICAL SYSTEMS THEORY:

DYNAMICAL SYSTEM:

This is defined as a set of variables that exists within a definable 'space' and which displays stability over time in variable relationships. For instance, the example of locomotion is 'bounded' within the individual and the available environment, and remains stable in many differing situations. Again, the mother-infant relationship might be thought of as a set of variables which includes subsystems such as the infant's temperament, the mother's personality functioning, the presence or absence of post-natal depression, economic circumstances, the presence or absence of a partner, the quality of relationships with significant others, stable housing, and so forth.

DEGREES OF FREEDOM:

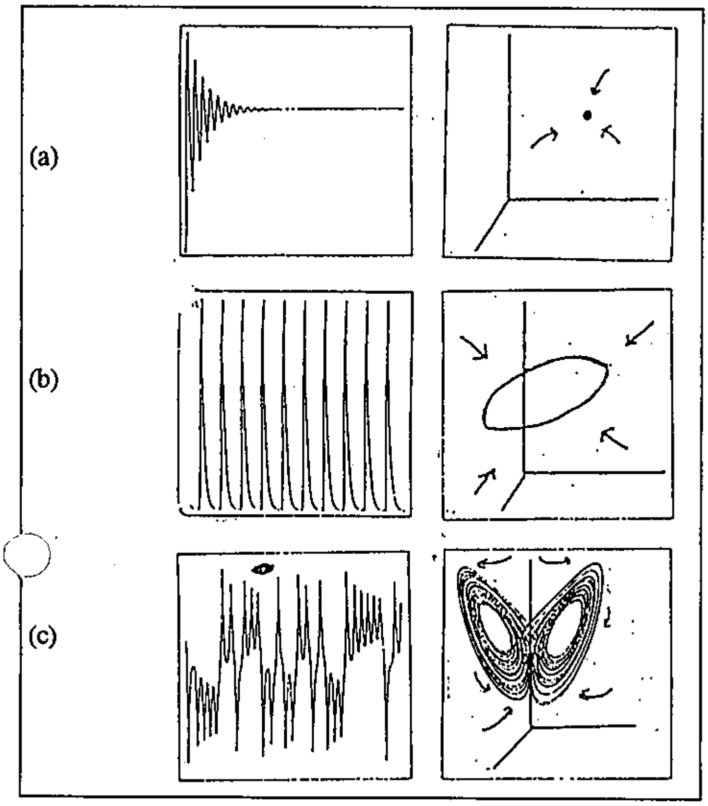
This term refers to the ways in which a system might change. In considering the development of locomotion in the infant we need to consider the interaction of many subsystems such as the central nervous system, the muscles (including muscle tone and proprioceptive pathways), the joints, the effect of gravity and the relative size of the infant's head, whether the infant has freedom of movement or is nursed tightly swaddled, the child's relationship with caregivers, and so on. Each of these subsystems has the potential for great variability. This concept of degrees of freedom may also be expressed in terms of **dimensions** (e.g. three-dimensional state space; n-dimensional phase space; high or low dimensional systems, where 'high' refers to many degrees of freedom). It will be readily seen that this concept of multi-dimensionality is also applicable to infant emotional development.

PHASE SPACE:

This term may be thought of as a representation of all the possible paths along which a system may evolve. We might think of a plot of the variable set over the range of all the system variables, with one variable on each axis of the plot. If there were twenty variables, we would need a concept of twenty-dimensional phase space - clearly a very mathematical abstraction!

PHASE SPACE PORTRAIT

If 20-dimensional phase space could be represented, (perhaps by using many different colours), it would give us a 'portrait' of the degrees of freedom of our system. A more accessible example is three-dimensional phase space which can be represented on a flat page by a three-dimensional drawing (fig. 2). Such representations are frequently found in the research literature which is using applications of chaos theory.



TIME SERIES AND PHASE SPACE DRAWINGS OF THREE TYPES OF ATTRACTORS

On the left are drawings of the usual graphic representations of motion with time plotted on the horizontal and amplitude (degree of movement) plotted on the vertical axis. On the right are the corresponding representations in **phase** space or **phase space** portraits. Both provide a pictorial view of a system's long term behaviour. a) Point Attractor (b) Limit Cycle Attractor (c) Strange Attractor. Arrows indicate that dynamic trajectories tend to coverge on these behaviour patterns of the collective variable.

(fig. 2)

COLLECTIVE VARIABLE:

In dynamical systems theory, it is the aim to compress multiple variables into one or a few key variables which capture the essence of the system under study. Two or three such variables may be conveniently represented on a flat page. Such variables are known as **collective variables.**

CONTROL PARAMETER:

This is a collective variable whose change over time seems crucial to change in the system. Continuity is maintained because most of the components of the system have not materially changed. Discontinuity is manifest because the components of the system now relate to each other in a different way, so that their collective behaviour has undergone a shift. The discoveries in locomotor development will be explored in greater detail later in this paper. However the account of Lynne Murray's work in post-natal depression given in an earlier newsletter (No. 3, Dec. 1992; p. 5) serves also to illustrate this point. In terms of outcome, her finding that the form of the mother's speech to her infant (mother-focused or infant-focused) influenced later development might be thought of as such a control parameter.

ATTRACTOR

A set of points in the phase space to which the system, if stable, tends over time. We could think here perhaps of a jelly setting in a mould. Here the temperature of the jelly is the control parameter. When it is high the jelly is in a state of transition and could take on the shape of any mould in which it was placed. As it cools, in time a stable equilibrium is reached so that it can be shaken out of the mould and still hold its shape. Similarly, locomotion in the human begins as alternate extension and flexion of the legs in kicking. As walking develops, it is at first uncertain and subject to sudden lapses (perturbation). In the adult, it tends to be more or less automatic and other activities can be carried out at the same time. Increasing skill can be conceptualised as an increasingly stable attractor. Three major types of attractor are described (fig. 2):

POINT ATTRACTOR: the defining characteristic of a system in stable equilibrium, represented in a phase space portrait as a point. Here the system tends to a single state in a phase space plot of its behaviour. An example could be of a lump of dough poised at the top of a basin, and which will fall to the bottom in due course.

CYCLIC (LIMIT CYCLE) ATTRACTOR: the defining characteristic of stable oscillating (wave) systems. A pendulum is a typical example here, and is represented in a phase space portrait as a circle. Locomotion with its alternate cycling of limb movements may also be characterised as under the influence of a cyclic attractor.

STRANGE ATTRACTOR: This is the representation of the structure of chaos. The system is **bounded** (it remains within a delimited area of phase space), and **non-periodic** (it never retraces its path exactly). It never intersects itself, because if it did it would then repeat itself in a periodic loop tracing exactly the same path at each circuit. Strange attractors come in all sorts of strange shapes - for instance the Lorenz or 'butterfly' attractor shown in Fig 2 which has two distinct regimes like the wings of a butterfly. A video record of the path of such an attractor shows it winding back and forth like tracing the outline of a skein of wool. An analogy often used here is that of the making of flaky pastry by repeated folding and stretching. The structure is infinitely deep, for the longer the system extends in time, the more complexity appears. A strange attractor can usefully be thought of as setting a limit to random activity. The concept of chaos is important in that it frees dynamics from the restrictions of order and predictability, permitting a system to investigate in random fashion all of its dynamic potential. It is now being argued that it is this quality which allows biological systems to adapt to a variety of environmental conditions and to be self-regulating. For instance, recent studies on brain function suggest that the underlying patterns of neuronal activity are chaotic and that it is this quality which enables extremely rapid and flexible responses to incoming stimuli by means of flipping into a new attractor pattern.[1]

There is currently some excitement in attempting to fit various forms of human behaviour into this paradigm. For instance, obsessive-compulsive behaviour could be thought of as cyclic patterns which do not move back to chaos. Attention-deficit and learning disorders could be related to the inability to drop out of chaos and lock into a particular mode. Some strange attractors such as the 'butterfly' attractor have discrete regimes which have been likened to different rooms in the same house. A small perturbation at the right point in the trajectory of such a regime can flip it from one 'room' to another.

DYNAMICAL SYSTEMS (CHAOS) THEORY

* **A dynamical system is by definition one that changes over time**
* **Dynamical systems theory specifically offers a set of principles for studying the emergence and evolution of new forms**
* **Upcoming states depend on current states rather than upon prior (e.g. stored, programmed) states.**
* **Composition alone does not account for pattern**
* **Pattern and order can emerge from the process of the interactions of the components of a complex system without the need for explicit instructions.**
* **Specific propositions are made concerning stability and loss of stability**
* **As a dynamical system loses stability, it has the possibility of evolving into another stable system.**
* **Such a system is said to be in a state of transition**

Such an attractor might well provide a model for multiple personality or for the phenomenon of splitting in borderline personality disorder where significant others can shift from being idealised to denigrated almost at the flick of an eyelid. The shift from remembering to dissociation often seen in sexual abuse victims could be another example.

Finally, perhaps this limerick may be helpful in recalling the essence of strange attraction.

If a system's attractor is strange
You will see its trajectory range
Through every spot
You can possibly plot
In the state space of temporal range

(Ted Melnechuck)

DISCONTINUOUS PHASE SHIFTS

Complex systems exhibit multiple behavioural patterns and switch between these patterns in a discontinuous manner by **discrete phase transitions**. This is modelled by a shift from one **attractor state to another** without stable intermediate states. These phase shifts result from the amplification of fluctuations as the control parameter changes over a critical value. An example here is the six different states of early infancy as described by Wolff.[2,3] Infants pass from one state to another quite abruptly without a stable intermediate state, and when in one state do not show the features of other states. You can demonstrate a phase shift for yourself by flexing say, the left index finger and extending the right at the same time, and then reversing this process, so that the right is flexed and the left extended. Try speeding up this process of **out of phase** movements, and observe what happens. With increasing speed you will find that for a short period the movement becomes chaotic and unpredictable, and then settles down to an **in phase** movement of alternate flexion and extension of both your digits. Here the control variable is the energy delivered to the system to increase the speed.

BIFURCATIONS

These are phase shifts where the collective variable jumps into two or more stable modes. For instance, fruit trees which bear a large crop one season and a small one the next are exhibiting this phenomenon. Complex systems may undergo multiple bifurcations, resulting in increasing behavioural complexity. An example of this could be the increasing complexity of behaviour in the course of infant development.

SCALING

This term refers to changes in magnitude of a variable whose essential pattern remains stable. A good example is a fern leaf, where the overall pattern of the leaf is replicated in the form of each of the leaflets of which it is composed. The patterning is perhaps not exactly the same, although readily recognisable as similar. This has led to use of the term '**self-similar**'. At a phase transition scaling (changes in magnitude) on only one or a few control parameters shifts the entire system into a new pattern - i.e. the system is more sensitive to perturbations. This principle helps explain the different timing and often intermittent character of behavioural development. We often observe 'pieces' of functional behaviour long before the performance of the mature behaviour. In locomotor development, for instance, very young infants can perform 'stepping' movements as in walking if they are supported, while actual walking of course takes much longer to be established.

RATE LIMITING COMPONENT

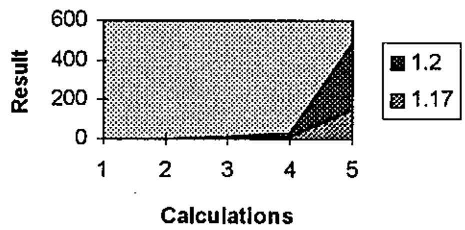
The slowest developing component of a system

According to dynamical systems theory, developing systems increase in complexity by a cascade of successive bifurcations or phase shifts. As the system reorganises through the scalar change in a component, the newly emergent forms themselves act as control parameters. Changes in any one domain therefore may become amplified and have system-wide reverberations. What may appear to be a small change or acquisition may trigger a succession of major developmental landmarks. This principle provides an explanation for the phenomena of development and allows for the concept of self-regulation.

FEATURES OF CHAOTIC SYSTEMS

1. They form **deterministic dynamical systems**, as compared with probabilistic systems. This is to say that preceding events influence subsequent outcome, as may be seen from the example of a pegboard where the initial right/left decision may be thought of as governed by the laws of probability, say, a 50% chance either way. However the subsequent course is then **predictable** or **deterministic**, at least until the next peg.

2. They display **sensitive dependence on initial conditions**, because the effect of feed-back rapidly augments original differences. The example of the pegboard shows this phenomenon. We may also readily check this effect on a hand calculator. If we take the number, say, 1.17 and square it we get 1.3689. We may then square this result to obtain 1.8739. Repeating this process another three times gives the number 152. On the other hand if we commence instead with 1.2, we get 341. Here the effect of rounding off our original number from two to one decimal place results in a difference of 190 after a mere five repetitions or **iterations.** We are using the effect of feedback here because each result



(fig. 3)

is taken as the starting point for the next manipulation. I have used the example of squaring because the difference shows up extremely quickly, but any mathematical activity which makes use of feedback shows a similar divergence as the number of iterations increases. This remarkable insight shows us that wherever feedback is a factor, **it is impossible to measure our initial conditions so accurately that outcome may be predicted with confidence.** This principle has serious consequences for the validity of research which attempts to predict outcome in complex systems from careful measurement of initial conditions. It may account for the poor predictive value of many earlier developmental research programmes. **Initial conditions in complex systems can never be measured with such accuracy that outcome may be predicted, although it may be understood in retrospect.**

3. Their motion is bounded within a representational field known as **phase space** (that is, the entire range of possibilities of a system) and is under the influence of a **strange attractor**.

HOW DO WE KNOW IF A SYSTEM IS IN A STATE OF TRANSITION?

1. CRITICAL FLUCTUATIONS -
Increased variability in the system's dynamics.

2. CRITICAL SLOWING -
A perturbation to a transitional system will result in a slower return from the deviation

3. CRITICAL THRESHOLD -
Moving a system into a transition can be achieved when a CONTROL PARAMETER(S) crosses a critical threshold.

4. SCALING -
Evidence that a specific control parameter is indeed one that is critical to behavioural change may be found in its effect on the system when it is changed across a range of values

5. SPATIALLY COUPLED DYNAMICAL SYSTEMS -
The time evolution of patterns (spatial, temporal or spatio-temporal) is most adequately addressed by contemporary methods when the process in question is representable as a single dynamical system with a single control. For the pattern-formation processes encountered most commonly in biology and psychology, a continuum of spatially coupled dynamical systems is imaginable together with a continuum of controls.

RESEARCH TECHNIQUES

1. IDENTIFICATION OF COLLECTIVE VARIABLE (not a trivial problem)

* They cannot be identified a priori
* Identifying a source of behavioural change remains an empirical exercise
* Studies in humans where individual differences often render group means meaningless may indicate that a case study design should be preferred
* Essential that developmental descriptions also contain a task analysis
* The collective variable is tracked over time to reveal whether it displays a stable system
* If so, it is argued that an attractor has been found which represents the dynamical system

2. IDENTIFICATION OF PHASE TRANSITIONS

* May be best discovered in the course of individual developmental profiles.
* A collective variable acting as a control parameter should show scalar changes in the time period of the phase transition
* Variables that themselves change rapidly during or prior to a phase shift may be control parameters (but even small changes in crucial scalars can amplify fluctuations)
* Mapping of several likely control parameters may be a more fruitful strategy

3. EXPERIMENTAL MANIPULATIONS

* Once candidates for control parameters are identified, we can perform experimental manipulations or exploit the natural variability among individuals to confirm whether changes in the single parameter drive the system reorganisation.

4. INTEGRATION OF DIFFERENT LEVELS OF DESCRIPTION

* e.g. dynamics at neural level coupled to dynamics at the behavioural level.

FEATURES OF A DYNAMICAL SYSTEMS APPROACH TO BIOLOGICAL RESEARCH

1. The focus is on the process, not just outcome measures

2. No component or subsystem has developmental priority

3. Task and context, not instructions, assemble behaviour

4. Control parameters are not stationary since the state space evolves through time

I shall now briefly review a paper in the journal *Child Development* and another earlier paper by Esther The[illegible] whose use of this new paradigm is exemplary.

The earlier paper[4] is concerned with the infant's development of locomotion. Thelen used a longitudinal multiple case study observing nine infants twice monthly from one month of age until they walked independently or refused the experiment (usually between 7 and 9 months). She noted that infants were capable of regularly alternating (stepping) movements of their legs from early on, but that this was not a very stable state as they were often poorly coordinated. However, when they were supported over[illegible] treadmill, there was a dramatic increase in both the rate of stepping and in the strictly alternating movements of their limbs. The experiment showed that the treadmill steps were not simple reflexes, for not only did they adapt to increasing speed of the treadmill in a manner identical to independent walkers, but they were also able to compensate for extreme perturbation. Even when one leg was driven by the treadmill at twice the speed of the other, regularly alternating stepping movements continued. The basic mechanism whereby the legs respond to a backward stretch (provided by the treadmill) by alternating swings was thus postulated to be in place at a very early age, but that the system was not very stable. Thinking of this capacity to alternate leg swings as an attractor pattern becoming more stable with increasing age was a useful concept. It was noted that the first three to four months showed the greatest variability and instability. This is also a time of especially rapid changes in terms of weight gain and in measures of chubbiness and leg volume, which could perhaps be control parameters for treadmill stepping. In effect, the legs at this point may become relatively heavy for the infant to lift in stepping movements. This observation of increased variability provides a means to dissect a complex system to point to other factors which are changing (scaling) and which could be the control parameters which 'drive' the system at this point. Developmental change, Thelen notes, 'is the reorganisation of components [of the system] to meet adaptive tasks. It assigns the sources of new forms to the self-organising properties of systems that use energy in a particular configuration. Pattern and complexity can emerge from the cooperativity of more simple elements.' [...] 'Because prescriptions for action do not exist outside of the context that elicits action, components are free to assemble and reassemble within the constraints of the organism and the task. The physical and social context of the developing animal is more than just a supportive frame; it is an essential component of the assembled system. [...] The process of developmental change is [...] normally accompanied by a period of instability, where the system is exploring, so to speak, another level of stability.'

In the second paper I wish to quote, Esther Thelen et al[5] (pp. 1058-1098) make a number of useful observations on the development of directed reaching as the emergence of a qualitatively new skill in infants aged between 12 and 22 weeks. 'A central question for understanding perceptual-motor development' she says, 'is how infants acquire a discrete new pattern of behaviour such as reaching, from precursors that themselves do not contain the pattern.' Citing evidence (in the same journal) that infants can reach for objects emitting sounds in the dark, she rejects earlier theories of visual-motor mapping, concluding instead that 'goal-directed reaching emerges from an ongoing background of other movements of the arms [...] The first problem for an infant who desires an object within reach may be [...] to adapt his or her current ongoing spontaneous and intentional movements to the specific, new task of reaching and grasping.' She compared results from four infants learning to reach for a toy, and discovered dramatic differences in approach. A particularly active infant, Gabriel, at first made swipes towards the toy, gradually learning to damp down his movements. On the other hand, Justin, although moderately active, responded more to social stimuli than to objects and tended to prefer a position with his hands flexed on his chest. His movements were smaller and less frequent than Gabriel's and when he began to reach for objects, he made contact at lower speed and had to scale up his muscle movements. Thelen emphasises that learning to reach is thus a process of **individual problem solving,** unique to the individual, 'where the problem to be solved depends on the individual's own developmental history and current sensorimotor status.' We may note that this research introduces an important new concept, namely the careful accumulation of knowledge about the unique factors in the development of an individual in contrast to the more usual statistical number-crunching. In Thelen's paper a huge amount of data has been accumulated concerning the development of just four infants with recognition of different strategies in modulation of movements of arms and hands. She notes: 'this account of early reaching would have been impossible with cross-sectional, group data or traditional analyses. Neither the infants' ages nor their actual performances (they were equally effective in contacting the toy) could predict the dynamic parameters of reaching. Infants did not uniformly improve on these variables. Indeed, the infants were so variable that averaging them together on any measure would have only obscured their individual solutions.'

> **In developing systems the ultimate challenge is accounting for the successive order.**
>
> **Composition alone does not account for pattern**
>
> **Upcoming states depend on current states rather than upon prior (e.g. stored, programmed) states.**
>
> **Chaos = a process of deterministic or controlled randomness**
>
> **Chaos frees dynamics from the restrictions of order and predictability, permitting a system to investigate in random fashion all of its dynamic potential**

We may see that already Thelen has stated the principle of sensitivity to initial conditions. She also introduces a number of important new concepts derived from chaos theory to enunciate her argument, commencing by enlarging on the concept of **degrees of freedom** available to the infant in terms of the assembly of neurones, muscles, joints and metabolic processes which must be organised into an intentional hand movement. Secondly all these actions must be **scaled** up or down in intensity to achieve the desired result. 'Pattern and order', she says in her earlier paper, 'can emerge from the process of the interactions of the components of a complex system [p.79] [...] When the participating elements or subsystems interact, the original degrees of freedom are compressed to produce spatial and temporal order [p. 82]' She notes that 'we are coming increasingly to see that complex systems have a capacity for **self-regulated** behaviour which is dynamically stable in any given context so that we can say that the system prefers a certain range of behavioural outputs (characterised in dynamic terminology as an abstract attractor state). Such a state may move to another state by means of a **phase shift,** where scaling on only one or a few **control parameters** transfers the entire system into a new phase. Because of the holistic nature of such cooperative systems, this change in a crucial variable beyond a critical point reverberates to a system-wide reorganisation [p.88]. Organisms tend to show a delimited number of behavioural patterns which within certain boundary conditions will act like dynamic attractors. A dynamical system consists of a bounded set of variables that displays stability over time in variable relationships. A dynamic attractor refers to the underlying pattern to which such a system tends in time. These attractor states will then be the preferred configurations from a number of initial conditions, and they will be relatively resistant to perturbation.'

Turvey & Fitzpatrick,[6] in a commentary on the various papers presented in this volume of *Child Development* note the following:

1. The inappropriateness of computational treatments of development, and the need for more biologically and physically relevant treatments.

2. The application of methods and techniques of non-linear dynamics to developmental processes: a pattern formation or dynamics approach to child development as an alternative to the conventional approaches emphasising maturation, specific learning experiences, cognitive stages, and strategies of encoding and retrieval.

3. Information-processing explanations (neural network and feedback loops) involving concepts of control mechanisms and feedback loops.

4. The search for solutions to the problem of how to convert many degrees of freedom into a controllable system by forming synergies (collective variables).

It might be useful for us to consider in what ways these ideas might be applied to our own area of interest. It could be thought both from the research findings of Murray's group, and our own clinical experience, that the mother's identification of her baby as a person is much influenced by her personal experiences with her own mother (we could say with her internal representations of her mother). This could be thought of as a control parameter which shifts the dynamic interaction between the nursing couple into a specific attractor state. We might then have a mathematical re-statement of Winnicott's concept of transitional space.

From the treatment trial where early results showed that only dynamic psychotherapy had a positive influence on infant cognitive outcome, we may think that it seems likely that it is again the mother's internal representations of her own mother and of her infant which is the control parameter for the focus of her speech. In terms of the dynamical systems theory outlined above, we could think of the mother's attractor state as being focused primarily on her own mother, and by failing to interact with that of her infant's nascent attractor state, draws him into her own dynamics, rather than foster an interaction which creates a new balance of forces which may evoke his full potential.

If we apply these principles to the development of object constancy within the dyadic relationship of the nursing couple, we might think of the newborn infant as existing within many degrees of freedom - an essentially chaotic state - which becomes progressively organised as an orientation towards the mother in increasingly sophisticated ways. The earliest interactions are perhaps organised particularly around a sense of smell and the mother's 'body feel' - her heart beat; the timbre and cadences of her speech; her bodily movements, all of which have been present for the infant in the womb. A very young infant will also make eye contact, looking at the mother with a wide-eyed gaze which she will interpret as an indicator of personal presence - 'somebody in there, looking at me'. Perhaps it is particularly this gaze which induces the mother to think of her infant as a person, and to begin to find ways to communicate. In this new language, we should of course conceptualise the infant's gaze as a little stranger attractor.

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We are pleased to be able include a report from Desiree Saddick about her visit to France, Switzerland and England last year. This, the first instalment looks at some of the issues surrounding brief Mother-infant psychotherapy as practised in the centres she visited. We expect to include in future Newsletters, further contributions from Desiree on what was clearly a very exciting and rewarding trip.

MOTHER-INFANT PSYCHOTHERAPY: PRELIMINARY THOUGHTS

DESIREE SADDIK
PROGRAMME MANAGER, EARLY PARENTSHIP OUTREACH PROGRAMME, CANTERBURY FAMILY CENTRE, MELBOURNE

The Cresswick Foundation Fellowship in Family Relations and Child Development supported an overseas tour for me to examine amongst other work, brief interventions for mothers and babies. Work considered included that of Professor Serge Lebovici at Paris-North University; Dr Antoine Guedeney at the Institute de Puericulture, Paris: Professor Bertrand Cramer and his team at University of Geneva; Ms Juliet Hopkins, Mrs Dilys Dawes and Mrs Isca Salzberger-Wittenberg from the Tavistock Clinic London, and Dr Lynne Murray, at the Winnicott Research Unit, Cambridge University. Most of the information was gathered through conversations and observations on the work of these professionals.

That brief work is possible with mother and infants has been accepted by many (e.g. Cramer and Stern, 1988, Hopkins, 1992). Professor Lebovici was amongst the first to provide a brief intervention in families with infants with sleeping disorders in 1959 at the Alfred Biret Centre, Paris. By treating the family systems and considering transgenerational and psychological factors he was able to alleviate the sleeping problem. He observed that brief interventions of 2-3 sessions were effective in treating insomnia if the parents were relatively well functioning.

Research has supported that change occurs for functional problems in the infant and for depression in the mother. Psychodynamic approaches have been compared to non-psychodynamic work e.g. interactional guidance, and supportive work. Results suggest that no one approach is superior as yet but that process factors that approaches hold in common must be examined.

Mother-infant psychotherapy is based on the assumption that the symptoms in the infant can best be treated by treating the mother-infant relationship rather than treating the mother and infant individually (Hopkins, 1992). Selma Fraiberg in her seminal work on mother-infant psychotherapy (1980) stated that mother-infant psychotherapy[1] is the treatment of choice when the baby comes to represent figures in the parent's past, or when the baby comes to represent an aspect of the parent which is negated or hated. Selma Fraiberg coined the term 'ghosts in the nursery' to refer to these negative forces (Fraiberg, 1980). Hopkins (1992) states that the symptomatic infant was found to be the victim of negative transference. The primary focus of the work is understanding the parent's transference or representation of their baby, rather than understanding their transference to the therapist.

Palacio Espasa and Manzano (1987) extend the idea of 'ghosts in the nursery' and state that the infant represents the lost object for the parent and in doing so provides an outlet for conflicts that have been suspended since childhood. The conflicts may result from poorly integrated aggression towards their parents, or their parents' death and related guilt, further exacerbating the grief. Interactive patterns may assist parents in denying painful grief. In positive relations, love dominates over aggression and there is a recognition of the infant's own needs. With poorly integrated aggression, an infant's needs may be confused with a predominantly aggressive projected image.

Mother-infant psychotherapy as described by Cramer, Lebovici, Fraiberg and others consists of three basic processes:

1. Given the mother's description of her infant's symptoms and their meaning to her, the therapist perceives a focus that reveals the main conflicts and anxieties in the mother, and is evident in the observed interaction.
2. These are related to the mother's past and current history (i.e. the 'ghosts in the nursery') and to her own unconscious and conscious conflicts.
3. When the mother is able to remove her mental representations of the infant from the interfering representations of her past, mother and infant are free to grow and develop along new paths (Cramer and Stern, 1988).

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[1] The term 'mother-infant psychotherapy' will be used to cover other related terms such as 'parent-infant psychotherapy', infant-parent psychotherapy', developmental guidance', etc. (Fraiberg, 1980).

The links between the mother's representations of the infant and the mother's past are discussed. The context is such that the therapist respects the mother's right to choose who is present in the therapy room (e.g. father, maternal grandmother). The infant is always present. Free association is encouraged. The therapist avoids making transference interpretations and attempts to develop and enhance a positive transference in the sessions.

The therapist's countertransference may be used indirectly. The therapist may ask the mother about the feelings the baby evokes for her (i.e. how does the baby make you feel?), in an attempt to use the child as projective object in the sessions and to address transference issues. The therapy ceases at the important moment when there is a decrease in the presenting symptoms of the infant. If the therapy continues there is the risk of deepening the transference and difficulties with future attempts at termination may arise.

Brief therapeutic intervention is contraindicated when there are no signs of early grief. Parents may project the sad, unwanted, degraded parts of themselves onto their children so that they react to them only with rejection and hostility. In turn, the children will respond with gaze aversion or autistic behaviour, so making the possibility of treatment more difficult (Palacio Espasa and Manzano, 1987).

The efficacy of brief interventions is dependant on the severity of psychological problems presented by the family. It is most effective with cases that primarily involve functional disturbances of sleep, feeding, toileting, or behavioural symptoms like temper tantrums, anger and aggression, perceived by the parent or observed. Considerable improvement in the mother-child interaction and symptom relief can occur in to five sessions. Chronic symptoms in the infant such as failure to thrive, or illness in the infant, would not be suitable for brief therapeutic interventions.

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The nature of the relationship between parent and therapist is a key factor. A positive transference, or pre-transference, is required for effective brief intervention. The transference can be interpreted initially to change an ambivalent pre-transference into a positive one, however long term work is indicated if the transference remains ambivalent (Palacio Espasa, 1984). Hopkins believes that the success of brief intervention is based on a 'transference cure' where the critical internalised parent is temporarily replaced by a good object (Hopkins, 1992). The intensity of the transference must also be considered. It can be regulated by changing the frequency of the sessions. For example, if it is too intense, sessions should be kept further apart. An intense erotic transference can be evoked in the case where the therapist is of the opposite sex, or an idealised and persecutory transference may develop with a therapist of the same sex (Palacio Espasa, 1984). Such intense transferences suggest the need for long-term work.

The Geneva research group do not include mothers with post-partum depression or psychosis, mothers with personality disorders and previous psychiatric histories, or families at risk of losing the infant to care in their research sample. Whether brief work is suitable for these families in conjunction with other supports remains as a question. Mothers with post-partum depression are not included because there is concern that the mother will not be able to invest in the therapeutic process. By contrast, Lynne Murray included depressed mothers in her group without reporting any difficulty in including such mothers.

Salzburger-Wittenberg (1993) believes that the success of brief intervention is not only based on the mother's past and personality, but on the therapist's capacity in the presence of the parents, to form and to hold a focus in her mind as a basis for the brief therapy.

Hopkins will consider the counter-transference and believes that mothers who can communicate their own distress are more likely to benefit from the session. She also takes her cues from the infant, and speaks of experiences where at the moment she has lost all hope, the infant shows signs of trusting. (Hopkins, 1992). She also states that the mother's understanding of the link between the past and present can provide a framework for understanding past bewildering emotions. It can ease an exaggerated sense of guilt and self-blame and give permission to the mother to feel previously forbidden emotions (Hopkins, 1992).

There is a wide range of families with infants at risk of emotional difficulty, neglect and abuse, and there is a need for a complex service model to address the multiple needs of these families. Brief intervention is just one possible intervention for families with infants experiencing difficulties. Most central is the necessity to understand the limitations of brief interventions, and indicators for other longer term interventions.

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PROPOSAL FOR STUDY GROUPS

It has been suggested that AAIMHI could facilitate the formation of Study Groups in the various States. There are already a number of study groups of which we are aware. In Sydney, Bryanne Barnett hosts a group which meets at Liverpool, three to four times a year, the Parent-infant Clinical and Research Group. In Melbourne there is a regular weekly group, centred on the Children's Hospital. However, there are a number of people who are interested in infant psychiatry who do not have links with these meetings and might be interested in regular meetings, perhaps monthly, to discuss papers, research topics etc.

With the Pacific Rim Meeting next year looming on the horizon, such meetings would perhaps foster the organisation of Workshops or Symposia which could be part of the Rim Meeting Programme. They may stimulate people to present their work, or suggest new research projects which could be undertaken collaboratively.

The Newsletter Editors would like to hear from anyone who might be interested in such meetings so that the formation of such groups can be facilitated. (phone (02) 817 5223; fax (02) 879 7305)

WORLD ASSOCIATION FOR INFANT MENTAL HEALTH

There is still considerable confusion about the relation of the World Association for Infant Mental Health, (WAIMH) and the Australian Association for Infant Mental Health. (AAIMHI)

Membership of either organisation does not mean automatic membership of the other. In fact, I have just realised through a casual conversation at a meeting, that there are members of the international group (WAIMH) who have not had information about local meetings. Members of WAIMH receive the WAIMH Newsletter which is published, like ours, quarterly, and also receive a discount on the Infant Mental Health Journal.

The local organisation is AAIMHI, which is an affiliate of WAIMH, but membership of the local organisation does not include a discount on the Journal. It does, through this Newsletter, disseminate information about local activities.

The Pacific Rim Meeting which is to be held in Sydney next year, is a meeting held under the auspices of WAIMH, rather than AAIMHI, although, as there is no formal organisation of WAIMH other than the international executive, the arrangements for that meeting will be by AIMHI members.

I hope this clarifies, rather than obfuscates!

David LONIE, Regional Vice President, WAIMH.

FORTHCOMING MEETINGS

AAIMHI & WAIMH

Principles of Attachment Theory: Relevance to Intervention with Infants and Caregivers. Westmead Auditorium, Westmead, NSW, July 29 and 30, 1994. If you have not registered for this yet, remember the early bird date is June 16.

The Mother's experience of Depression and the Infant's Approach to the World. Royal Children's Hospital Melbourne, August 1. Judith Lumley, Mary Sue Moore, Lynne Murray and Peter Cooper are the speakers. Enquiries Dr Campbell Paul, Royal Children's Hospital, Melbourne.

Inaugural Meeting, South Australian Branch of AAIMHI, October 10, 1994. This meeting is immediately following the Faculty of Child Psychiatry Annual Meeting.

Australian Association for the Welfare of Child Health. National; Conference, 1994. Facing the Challenge.

Date: October 6-7, 1994
Where: University of Western Sydney, Nepean.
Enquiries: AWCH National Office, Phone (02) 633 1988, Fax (02) 633 1180

Faculty of Child Psychiatry, Royal Australian and New Zealand College of Psychiatrists. 7th Annual Meeting. 'Families under Pressure: The Changing Face of the Family in the 1990's.

Date: October 6-9, 1994.
Venue: Glenelg, South Australia.
Enquiries: Dr Graham Martin, Phone (08) 204 4556

Karitane International Conference: Family realities in the stressful nineties.

Date: November 2-4, 1994
Venue: Sydney.
Enquiries: Karitane International Conference, P.O.Box 79, Turramurra NSW 2074. Phone (02) 449 5279, Fax (02) 988 3856

AAIMHI Committee
Elected October 27, 1993

PRESIDENT	Beulah Warren M.A. (Hons).,M.A.Ps..S
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Deadline for next AAIMHI Newsletter
August 15, 1994

Please send letters to the Editors, newsletters, announcements, short articles etc to

The Editors,
AAIMHI,
PO Box B7,
BORONIA PARK NSW 2111

FIRST ANNOUNCEMENT

THIRD WAIMH PACIFIC RIM MEETING

The Journey of the Infant through the Family and Culture: Can we Help?. Third Pacific Rim Meeting, WAIMH, April 21-23, 1995.

Planning for this meeting has started with the booking of the venue, the appointment of a Conference Organiser, and invitations to members of the WAIMH Executive.

The Programme will be organised by a Melbourne committee headed by Campbell Paul, and the Venue arrangements by a Sydney Committee headed by David Lonie. The Venue we have chosen is the Home Building, University of Sydney. We hope to arrange accomodation to suit, as they say in the brochures, all tastes and budgets.

The title of the meeting should allow for a wide range of interesting areas. We hope to make the child's construction of narrative a major topic, and also the question of cultural influences on development.

The WAIMH Executive members we have invited and who have accepted the invitation are Serge Lebovici, the Past President of WAIMH, and Antoine Guedeney, from France, and Hi Fitzgerald and Charley Zeanah from the States. We have also invited Hisako Watanabe from Japan, and those who were at the first Pacific Rim Meeting in Hawaii will remember her marvellous presentation of mother-infant psychotherapy. A number of other visitors from overseas have also expressed interest in coming. We hope also that there will be a two day meeting, on Post Partum Mood Disorder, preceding the WAIMH meeting, under the auspices of the Marcé Society, with Professor Cox, University of Keele, as Guest Speaker.

The committees organising the meeting are going to need lots of help, so please contact either Campbell Paul or David Lonie if you want to be involved in the actual planning.