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PSYCHOLOGY THROUGH A KALEIDOSCOPE: AN ATTEMPT TO INTEGRATE SOME SHIFTING PERSPECTIVES.

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PSYCHOLOGY THROUGH A KALEIDOSCOPE

AN ATTEMPT TO INTEGRATE SOME SHIFTING PERSPECTIVES

All in the golden afternoon
Full leisurely we glide;
For both our oars, with little skill,
By little arms are plied,
While little hands make vain pretence
Our wanderings to guide.

Ah, cruel Three! In such an hour,
Beneath such dreamy weather,
To beg a tale of breath too weak
To stir the tiniest feather!
Yet what can one poor voice avail
Against three tongues together?

(Lewis Carrol, 1988, p.i)

CHAPTER 1. INTRODUCTION

THEORY REVISITED - BACK TO THE DRAWING BOARD

Ten years in private practice, and consideration of Lewin's maxim that 'there is nothing as practical as a good theory', made it necessary and, indeed, inevitable, to 'return to the drawing board' and to take a new look at psychological theories and the philosophy of psychological theory.

Psychology students, exposed to the full spectrum of psychological theories, invariably experience consternation, inquisitive searching and even bewilderment during the latter stages of their post-graduate years of study. Many students, nearly professionally qualified, still feel uncertain as to which model to adopt as their own and often remember perusing, studying and debating the various theoretical postulates, knowing that there are probably merits of truth in each of them. This realisation, however, merely adds to their confusion and consternation. Even though most theoretical viewpoints make sense when viewed from their particular framework, they are, to many critical students, unacceptable in their entirety for two main reasons. Firstly, this seems to be because each theory claims to be ' **The** Answer' and requires an element of 'faith' to be an acolyte. Secondly, theoretical viewpoints tend to be mutually exclusive and are vehemently defended by their adherents.

Some neonate professionals feel at times that psychology is disorganised because it seems as if the science of human behaviour is unable to reach consensus concerning many critical aspects of theory and practice. They also occasionally admit suspecting that the theoretical gurus should make it easier for uncertain neonate professionals - either by reaching consensus, or by explaining more comprehensively why they cannot agree. Macgregor 1990 has shown that in this uncertainty, the unsuspecting student psychologist and the unfortunate guru traverse the terrain at the cross-roads between psychology and philosophy, that there are no easy answers, and that the task for clarification always has been, and still remains, gargantuan.

Students are however, invariably relieved when a metatheoretical framework such as General Systems' Theory and Cybernetics, or another metatheoretical framework, is introduced into their curriculum. This provides them with a measure of cognitive fit in terms of a metatheory that makes allowances for the various complex and multidimensional contributions to psychological knowledge.

Macgregor 1990 has shown, furthermore, that it is not only the individual psychologist who experiences conflict and crises, but that the entire body of psychology, as a science on a metalevel, is possibly experiencing the same stresses and strains contemporaneously. Psychologists are participants in pre-paradigmatic chaos and, contemporary philosophical psychology illustrates that the conflicts experienced are based on the scientific conflicts of the time. On a microlevel, the individual psychologist experiences what psychology on a macrolevel is struggling with and as any adherent of the basic principles of General Systems' thinking would know, the interrelationship between systems, even on a metaphysical level, is part of the theoretical framework. Knowledge and terminology from different vantage points (to be discussed in a later section) clarifies that the contemporary professional invariably and inevitably becomes embroiled in a Zeitgeist within which the theory itself is undergoing a transformation characterised by the inevitable growing pains that portray potential maturation.

Another possibility (illustrated by Prigogine & Stengers' monumental work and also to be discussed in detail later) is that the 'fluctuations' experienced by the body of psychology as a science are indeed 'far from equilibrium' anomalies and that 'dissipative structures' are indeed the order, or disorder of the day with all the potential for change and growth entailed therein.

Retrospectively, it becomes obvious that the students, in their uncertainty, tentatively, yet intuitively, are aware of the underlying metaphysical quandaries and, with due respect to the participant-observer dilemma, are questioning either the absolute truth of Logical Positivism versus the absolute truth of Historicism, or the absolute truth of a combination of both. Or it is possible that they are feeling bombarded by the preparadigmatic crises and the disunity behind the united facade of the study of psychology. This crisis has not been solved, nor has the lack of unity been resolved. Rather, it seems to be escalating to the extent that there is national as well as international concern as to the status quo of psychology as a science, with a myriad of differing suggestions of how to address the problem.

The questions that should be asked are if this state of affairs is idiosyncratic only to psychology as a science, or whether it applies to the body of science as a whole? Are crises necessarily destructive? Questions such as these inter alia arise and will be addressed at different stages in this thesis. For now the following extracts will suffice:

> It is a striking sign of our time that the people who are supposed to be experts in their fields can no longer deal with the urgent problems that have arisen in their area of expertise. Economists are unable to understand inflation, oncologists are totally confused about the cause of cancer, psychiatrists are mystified by schizophrenia, police are helpless in the face of rising crime, and the list goes on and on.
>
> (Capra, 1989, p.6)

In a later section Capra goes on to quote Henry Luce, erstwhile Professor of Urban Values at New York University, who said that he was resigning his chair because he had nothing further to say and did not think that anyone had anything relevant to add because when the problem became too difficult one tended to lose interest.

David Peat expressed the same concern, but ended on a more positive note.

> ... over the centuries, science began to separate itself from philosophy to the point where, today, many scientists have little time for philosophical speculations. Likewise science fragmented itself into a host of different subjects and specialities and philosophy divided itself into a number of restricted academic concerns. Understanding today has given way to the accumulation of knowledge, and knowledge itself is divided into a myriad of specializations. In this way, as our knowledge of the universe and of ourselves becomes more and more detailed and differentiated, it begins to lose all sense of its wider context. It becomes knowledge without meaning and without understanding.
>
> (Peat, 1989, p.240)

Peat advocates a move to integrate the significant inter-relationships between the different areas of modern knowledge, maintaining that philosophy, psychology, science and art, inter alia, are all manifestations of our response to understanding the world in which we find ourselves, and cannot be studied in isolation, but must always be seen as part of a broader context.

The motivation behind this thesis is partly based in agreement with the aforementioned and partly on a paragraph in Staats which succinctly summarises a pragmatic scientific attitude to solving the problems that currently face psychology as a science.

> What is necessary is that psychology must consider systematically what its standards are to be. We need studies to consider systematically the various methodological questions involved in eliminating the vast artificial diversity present in psychology, and in preventing the production of more artificial diversity .... We have to change our science so that the publication of this type of work is made possible. A study showing the close relationship in the concepts and principles of two theories, formerly considered to be quite different, would be more important to publish than would some new theory that is being set forth as different from the rest, a simple addition to the deluge of diversity that already drowns us.
>
> (Staats, 1987, p.305)

Scientific emphasis has been placed on innovation at the expense of integration, and this study will be an attempt to make a contribution to the much needed movement towards order and integration in psychology as a science. It has been said that recognising resemblances between things that appear to be different is the essence of science (Kuhn, 1977). The natural sciences have many examples of finding similarities between phenomena thought to be disparate. Psychology has tried to order theory with the construction of what Staats (1987) calls 'grand theories'. Perhaps it is time to search for underlying similarities in terms of the current Zeitgeist and contemporary knowledge instead of adding to the proliferation of 'grand theories' that are not very pragmatic and thus tend to be unacceptable, simply because of their grandiosity.

In the same vein, Pietersen writes:

> The integrative or synthetic mode of thought seems to be the best suited to the development of imaginative and original theory. This is due to its characteristic (in moving from the observed to an understanding of what took place) of facilitating the detection of new patterns and relationships among phenomena and ongoing events.
>
> (Pietersen, 1989, p. 104)

Friedlander (1982) also remarks on the unbalanced nature of research, where most energy is channelled into the deductive approach, and Weick (1980) suggests that armchair theorizing should be encouraged in an attempt to stimulate inductive integrative theory building. Similarly, there are 'whispers in the wind' coming from all directions arguing and emphasizing the necessity of developing what Eysenck (1987) calls 'good theory' and an appropriate metatheory for psychology. These suggestions are coming from international as well as local theorists (Biesheuwel, 1987; Jordaan, 1989; Mauer, 1987; Mouton, 1985; Raubenheimer, 1981; Retief, 1986; Schoeman, 1991; Strumpher, 1981).

The initial goal of this thesis is thus to analize the nature of the so-called crises and chaos facing psychology and to ascertain if this state of affairs is ideosyncratic or generalisable to certain other sciences. The current definitions of the nature and goals of science will need to be specified as well and because it is difficult to place the topic in perspective without taking the historical development into account, this too will be examined from a philosophical viewpoint. This is deemed to be important because metaphysical concepts such as causality and temporality are key concepts running throughout this thesis.

The approach of this thesis can be likened to a kaleidoscopic vision with the same parts forming different wholes seen from shifting perspectives. It is also a bird's-eye view covering the subject from a metaphysical and physical as well as a psychological perspective. As mentioned, the problem to be addressed is the state of so called disunity and chaos in psychology and the goal is to attempt to make a contribution to the integration of some aspects of the metatheoretical and metaphysical concepts in the light of contemporary theory. It is not the intention to evaluate any of the contemporary viewpoints, nor is it intended to attempt to add any new theory, but only to expand on and integrate aspects of existing perspectives. The metaphysical fundamentals of causality, temporality and change will be referred to continuously and the concepts of order, disorder and even chaos will eventually be assimilated.

In synopsis therefore, the problem being investigated in this study is the state of so called crisis and even chaos that psychology is experiencing. The framework of the problem will need to be an outline of the current viewpoints and definitions of science to enable psychology's status as a science to be scrutinized. The method utilized to evaluate the problem is a survey of history, philosophy and metatheory within a wider framework of physics, metaphysics and psychology. If the problem is valid, the result will hopefully add some theoretical suggestions that could throw some light on viable integrative possibilities.

CHAPTER 2. A SALTY DIGRESSION

Before embarking on a bird's eye view of science as a whole and the so-called state of crisis and chaos in psychology; the historical development of philosophical psychology and the parallel trends observed in the development of physics, metaphysics and psychology, it would be propitious to make a slight detour that possibly sheds some light on the issue and ameliorates the expost facto conclusion of 'chaos and crises' in psychology. The premise of this detour regarding the limitations of science forms an important framework.

An observation made by the astronomer Carl Sagan (1979) referred to the natural sciences, but can easily be extrapolated to the social sciences. The goal of science is primarily to understand and then to predict and where possible to control, but our physical limitations are such, observed Sagan, that we are unable to understand a grain of salt in its entirety, much less the complexities of science and even less the different aspects of human 'being'. He goes on to state that there are perhaps 10^{11} neurons in the human brain and 10^{16} sodium and chlorine atoms in a grain of salt.

> ... if, as seems likely, every bit of information in the brain corresponds to one of these connections, the total number of things knowable by the brain is no more than 10^{14}, one hundred trillion. But this number is only one percent of the number of atoms in our speck of salt - we cannot fully understand a grain of salt - much less the intricacies of the universe.
>
> (Sagan, 1979, p.15)

Yet, despite these limitations, human beings are motivated to find regularities and to search for understanding. This understanding is acquired by querying and questioning, and the search for understanding and the need to make sense of the world is called Science. In the next section, before going on to discuss the so called conflict and chaos in psychology the concept of science will be examined in more detail as this provides the framework of the study of psychology.

CHAPTER 3. SCIENCE

Early in the 18th century, the philosopher Thomas Hobbes wrote the following words,

> For there is no such thing as perpetual tranquility of mind while we live here, because life itself is but motion, and can never be without desire, nor without fear no more than without sense.
>
> (Martin, 1977, p.197)

Etymologically, the word science stems from the Latin root 'scientio' - to know or understand and is indeed as Hobbes stated, an attempt to make sense of the world that we live in. The classic definition of the goals of science were that science aimed to understand, predict and control. This definition was relevant within the natural sciences and their offshoots (those that adhered to the principles of Logical Positivism), but the current definitions give an indication as to the possible directions in which theoretical psychology could be heading. It seems as if the only goal that has consensually stood the test of time is that of understanding. (Dawis, 1984; Faulconer & Williams, 1985; Staats, 1983; Strong, 1984).

In contemporary psychology, prediction and control are seen as part of the goals of Unified Positivism and any form of Reductionism, but philosophers such as Toulmin, see prediction and control primarily as the domain of technology. Howard (1984) feels that prediction is inappropriate for an agenic model where self-direction is salient, and Toffler (1984) regards science as an open system embedded in society and linked to it by numerous feedback loops. Dawes sees prediction as a 'vehicle of theory testing' (1984), while Manicas and Secord (1983) demarcate understanding into experimentally based, socially based and biographically / historically based understanding. Faulconer and

Williams (1985) reiterate Sagan's principle of limited understanding from a metaphysical view point:

> The human sciences, because they are engaged in temporal investigation, are not designed to arrive at an atemporal causal certainty.
>
> (Faulconer & Williams, 1985, p.1186)

From an hermeneutic framework, they see the goal of science as understanding, and not explanation or certainty.

Socio-rationalists, such as Gergen, see psychology as an 'historical science, rather than a natural science and the knowledge of psychology to be relativistic rather than to involve progressive advancements towards empirical truth or reality' (1983, p.31).

Social Constructionists (Hayes, 1989) query whether it is possible for psychology to be a science of human experience and behaviour at all, when the ontological 'object' of psychology's study is socially constructed.

In psychology then, it appears that there are three emphases. The one is a form of reductionism with the goals of understanding, prediction and control within a linear framework of causality. The second is contained within a socio-cultural/historical perspective with history forming a linear-causal chain. The final emphasis could be viewed as strongly anti-reductionistic with the goal of understanding from within a metaphysical, agenic, consensual or unified framework, where causality is multilateral and the outcome is seen in terms of possibilities and not probabilities. These major shifts appear to be as a result of the Zeitgeist in process, and the consensual professional agreement (explicit and implicit) as to the possible redundancy and demise of Logical Positivism as the only means available for an understanding of human behaviour. These emphases also obviously correlate with the three main trends found in psychology.

The shift has been away from the analytical paradigm of Logical Positivism towards a more holistic synthetic approach. In this mode, with psychology having the primary aim of understanding and with prediction less certain, the inductive and integrative process of knowledge development moves from parts to wholes, from data to theory, and from the concrete to the abstract. Many theorists maintain that active participation and aware observation, combined with inductive thinking, is the manner which possibly shows the most potential in understanding human behaviour. Pietersen writes that:

> The holistic outlook in science recognizes the essential indivisibility of human behaviour. When a person acts it is not characteristic or variable 'a', 'b', or 'c' which acts, but a total and dynamically integrated human being.
>
> (Pietersen, 1989, p.104)

In order to gain greater understanding, it is imperative to investigate the fundamental premises of Reductionism in more detail.

3.1 SCIENCE AND REDUCTIONISM

Reductionism was a rational theoretical progression flowing from the Cartesian method and the Newtonian dynamic machine model. Descartes' analytical method of logical deductive reasoning is thought to be his greatest contribution to science and from this method and the Newtonian paradigm it followed that if reality was primarily composed of matter, then to understand this matter, all that was necessary was to isolate the components and the basic building parts, and to identify the way in which they interacted.

Complex phenomena could thus be understood by reducing them to their basic mechanisms. This approach tried to understand one level of phenomena in terms of a lower, supposedly more fundamental, level (Brandt,1973; Peat,1987; Prigogine,1980).

In time, Reductionism eventually went on to postulate that even the most complex phenomena of society, such as consciousness and life, could be reduced to the behaviour of matter and thus, by implication, to the laws of physics (Prigogine 1980; Skinner,1975).

Reductionism on a neuropsychological level is exemplified by Carl Sagan's view that 'mind' is purely the consequence of the functioning of a combination of anatomy and physiology 'matter' (Sagan,1979).

Initially as mentioned, the principles of Reductionism were superimposed on the dynamic machine model. The present framework is quantum mechanics and the current viewpoints on Reductionism can be summarized in the following way: The human mind (including consciousness) can be explained by the workings of the brain, which, in turn, can be reduced to physiology and anatomy. Biological levels can be understood by atomic physics and, as current research seems to indicate, atomic physics is in the process of being clarified by quantum mechanics. To complete the circle, it seems clear (according to some quantum theorists) that the mind is an integral part of the formulation of the quantum dynamics (Bohm,1986). Reductionism in psychology, when seen in this context, therefore takes us around an epistemological circle that is decidedly reminiscent of the hermeneutic cycle.

3.2. THE OTHER SIDE OF THE COIN

On a more metaphysical level, there are scientists who postulate that contemporary findings in quantum mechanics indicate a strong possibility that matter and consciousness are different aspects of the one underlying order of nature, and that:

> Science ... is not fixed but fluid, and its methods, approaches, and techniques must be always ready to change and to respond in creative ways to new demands and situations.
>
> (Peat, 1987, p.180)

Viewing science in general, Prigogine and Stengers (1984) add another dimension to the current re-conceptualizations taking place in science, by stressing that the history of science shows that the accumulation of knowledge is far from a linear progression corresponding to a greater and closer approximation to some absolute intrinsic truth. It consists, instead, of numerous contradictions and unexpected 'turning points'. Prigogine and Stengers (1984) see the essential characteristics of modern science as a 'marriage' between theory and practice, and a vacillation between a need to understand on the one hand, and prediction and control on the other. They thus reiterate Lewin's maxim mentioned in the introductory paragraph of this thesis. They also do not perceive the experimental method in the conventional way, but rather as an 'art' which they define as being based on special talents or skills rather than on general rules. They stress that, because of this, there are no guarantees of success in research nor is there any form of protection against following 'blind alleys'.

This is a far cry indeed from the underlying premises of the methodology of Logical Positivism in its heyday. These premises were clearly stated by Emil Du Bois-Reymond in 1848 in the introduction to his book on animal electricity when he wrote:

> If our methods only were sufficient, an analytical mechanics [Newton physics] of general life processes would be possible and fundamentally would reach even to the problem of the freedom of the will.
>
> (Morowitz, 1981, p.36)

Mach (one of Einstein's mentors) saw the task of scientific enterprise to be that of arranging the facts of the topic being studied, in a simple and economical way. He viewed science as being useful only if it lead to an economy of thought and saw science as part of the Darwinian struggle for life, enabling man to organize experience. A great mathematician, he saw mathematical laws as nothing other than useful means to summarize scientific results succinctly (Prigogine & Stengers, 1984).

Prigogine and Stengers (1984, p.97) reiterate the limitations of the scientific endeavour mentioned previously by citing Du Bois-Reymond's words (stated in 1858) whereby it seems apparent that he had reviewed the standpoint cited in a previous paragraph.

'Ignoramus, ignoramibus'.

This indicates that recent scientists, in comparison to the confidence and certainty demonstrated by their predecessors during the dynamic 'machine' phase of development, are apparently perceiving their own and science's limitations from a more realistic perspective. Because of this, the stage was set for the new paradigm which Prigogine and Stengers see as the 'science of complexity' and which was, in due course, to be followed by 'the new physics'.

It must be added, however, that even though science as we know it, has experienced an inquisition in academic circles, it still has an aura of sanctity and special meaning to most of its adherents. Barbara Ehrenreich writes:

> Although we think of it as the most secular of human enterprises, there is a little known spiritual side to science, with its own stern ethical implications. Through research, we seek to know that ultimate Other ...
>
> (Ehrenreich, 1991, p.60)

It seems then, depending on the stance taken concerning the nature of science, that a different focus is placed. Again it is probable that all have merit with none being absolutely correct. Various degrees of elements of understanding, prediction and control will be identifiable in different sciences depending on their emphasis as a theóretical science or as an applied science. As Prigogine, Stengers and Lewin stressed, both theory and practice are of equal importance.

It is a fundamental premise of this thesis that there is a close inter-connection between the theoretical development of all of the branches of science. In the next section, now that the framework of science has been delineated, focus will be on the primary problem of this thesis, namely the questions revolving around psychology as a science of conflict and chaos.

CHAPTER 4. PSYCHOLOGY, - A SCIENCE OF CONFLICT AND CHAOS ?

4.1 INTRODUCTION

In the previous chapter, the contemporary criteria and goals of science were discussed. Within this framework it is necessary to examine whether psychology is indeed a science of conflict or not or whether it is merely a case of scientists taking different standpoints as to the validity of reductionism or otherwise. Conflict is a concept of which psychologists are only too aware, but it is perhaps an unnecessarily strong description for the reality of the current status quo.

Also, the reframing of negative connotations concerning the experiential world of a client, is an integral part of the armentarium of psychotherapeutic techniques. Perhaps, therefore, psychologists could be more effective examples of the dictum 'physician heal thyself' if they tried to apply the same strategy to their own science.

Before discussing the way in which the situation could be reframed and in an attempt to gain more clarity it is essential to discuss the different aspects of 'separatism, schisms and possible conflict' that abound. In the introduction to his book, Kendler (1981) writes that 'Psychology is an ambiguous science' and proceeds to write a comprehensive epistemological analysis of psychology as he perceives it. Undoubtedly, he demonstrates that there is considerable disunity within the unity of psychology; that separatism abounds, and that overt schisms seem to be the order of the day. To gain more clarity as to the seriousness of the status quo, the following section will begin with metaphysical differences seeing that these are of salient importance in this thesis. Thereafter other aspects of the differing viewpoints of crises and chaos will be discussed.

4.2. METAPHYSICAL DIFFERENCES

As mentioned previously, a decided reality does seem to be the limitations of man and thus of scientific knowledge. One of the most important realities that scientists of all disciplines have had to come to terms with in the last century, is that the 'truths' that we all deal with are limited and approximate descriptions of the temporal reality within which we find ourselves. Werner Heisenberg (1982), the renowned physicist who formulated the 'Uncertainty Principle' wrote that 'every word or concept, clear as it may seem to be, has only a limited range of applicability.' With these words, he implies that the goals of the Newtonian revolution are unlikely to be attained.

These implicit scientific limitations have resulted in uncertainties and heated debates as to the precise nature of truth and how, for example, causality and time can be understood. Many of the absolute truths that were dogmas accepted from within the Cartesian framework have, in contemporary times, been questioned, challenged and even relativized or negated (Vision, 1988).

The Cartesian framework, is based on fundamental dualities with a far-reaching history dating back to the debates of the earliest philosophers and these dualities have resulted in epistemological and methodological problems that have repeatedly come under the spotlight throughout the history of psychology.

Descartes (1596-1650) was the first philosopher who postulated the dualistic worlds of 'mind and matter' and suggested that the pineal body (within the brain) was responsible for the interaction between mind and matter in human beings. Descartes thus recognised the significance of the problem of the relationship between conscious experience and behaviour. Introspection was advocated to study the mind, and observation to study matter (behaviour).

> The consequences of Descartes' dualism were, inter alia, the schools of mechanistic biology on the one hand and the introspective school of psychology on the other.
>
> (Beison & Peters, 1972, p.53)

The debate still continues - the arguments have become more sophisticated, but the conclusions remain equally illusive. Linear causality, which was the fundamental deterministic principle from within the framework of Logical Positivism, has to a large extent been ousted and replaced with the complexity of multilateral mutual causality and the implicit unpredictability that characterises holistic system functioning.

The Cartesian tenet of the theoretical reversibility of time, has given way to the unpredictable, irreversible directionality that fits so adequately within the theory of the hermeneutic school of thought and into the 'science of complexity'' of the physicists. Absolute time and space do not exist in modern physics as Einstein's Theory of Relativity, Heisenberg's Uncertainty Principle and the team discovery of Quantum Theory have catapulted basic scientific thinking onto another dimension, which has in turn revolutionized modern science and, with it, psychology, as part of the system of science as a whole (Brandt, 1973; Capra, 1977; Peters, 1974; Prigogine,1984).

It does indeed seem as if science as a whole, and psychology as part of the whole, is experiencing a paradigm shift and this could theoretically be experienced as a crisis. In Thomas Kuhn's view (1962, 1977), the transformation of a paradigm only appears during a crisis. A paradigm that was previously accepted as an unspoken truism, or even a rule, begins to be questioned. Researchers, scientists and professionals begin to query postulates previously adhered to, and a formerly homogenous scientific group gradually diversifies. The questioning escalates as the emergence of a possible new paradigm fuels the flames of dissent. Rival paradigms are endemic until the corporate body of the theoretical milieu takes a stand and makes a commitment. The storm settles, new text books are published and a new generation of scientists settle within the framework. The previous paradigm is often viewed with condescension within an historical perspective which places the current paradigm as being obviously closer to the 'truth' (Kuhn, 1962).

This process mirrors the nature of the crises, conflicts and chaos facing contemporary psychology and to a large extent physics as well. The science of psychology however, is experiencing further growing pains - as there is still considerable debate on such a basic issue as to whether psychology can even consider itself a science or not.

4.3. PSYCHOLOGY AS A SCIENCE

Many psychologists agree that psychology is the study of human behaviour, but there is still a certain amount of controversy as to whether psychology can really define itself as a science in the truest sense of the word.

Kendler sees psychology as an ambiguous science because of the differences in the areas of study, in the methodology and in the varying goals. He writes:

> The unity of psychology has all but collapsed. Psychology is a multi-disciplinary field with different segments employing irreconcilable orientations.
>
> (Kendler, 1981, p. 371)

Scientists such as Pratt and Bergmann (1981) even feel that 'psychology is a division of scientific labour, not a subject matter'.

Staats (1987) views psychology as a science but, because it is poorly developed, classifies it as being pre-paradigmatic. Staats sees the opposing competitive theoretical frameworks as the root of the current crisis facing psychology, and feels that this separatism is responsible for the science's inability to formulate an encompassing paradigm.

> When approaches consider each other's work as irrelevant, each group of scientists with a common approach represent a school or preparadigm, not a paradigm.
>
> (Staats, 1987, p.99)

Staats had stated earlier (1983) that, because of the separatism and the lack of cohesion, 'many psychologists continue to discover the wheel'.

De Greene, also recognising this tendency, wrote:

> Psychology, as we have now seen, is a remarkably diverse science that often seems to be at odds with itself and with its neighbour. Internecine battle has long ranged within psychology: clinician against experimentalist, 'brass-instrument' man against 'field theorist', 'rat-man' against 'headshrinker', pure scientist against applied worker. Many psychologists believe that this conflict has been for the better and will lead to a truly stable eclectic science. Actually this is far from true, and at no time more evident that when we try to answer the question, just what are the psychological factors in systems?
>
> (De Greene, 1970, p.25)

Koch (1961) and Popper (1980) both feel that psychology is not a science at all, but is rather a part of philosophy. Koch is very critical about psychology's symbiosis with the natural sciences and elaborates on the issue as follows:

> Ever since its stipulation into existence as an independent science, psychology has been far more concerned with being a science than with courageous and self-determining confrontation with its historically constituted subject matter. Its history has been largely a matter of emulating the methods, forms and symbols of the established sciences, especially physics. In so doing, there has been an inevitable tendency to retreat from broad and intensely significant ranges of its subject matter, and to form rationales for so doing, which could only invite further retreat.
>
> (Koch, 1961, p. 629)

Koch, 20 years later (1981), still feels very strongly that there are certain facets of psychology that are impossible to understand and study. This is especially true, he argues, if psychology persists in using the methodology of the natural sciences. By doing so, he maintains that the end results will remain a conglomeration of irrelevant research findings.

Reiterating Koch's sentiments, the words of the poet William Blake perhaps best dramatize the contrast between the pursuits of art and the rigorous methodology of the natural sciences: 'Art is the Tree of Life. Science is the Tree of Death'. Is scientific endeavour doomed to conflict, chaos and even extinction?

In a more positive vein, perhaps Descartes, as one of the pioneer fathers of Reductionism, had an underlying vision of the interrelationships between scientific enterprises that are so much part of the current Zeitgeist's thinking and that differs radically from Koch's views mentioned earlier. He, as one of the instigators of the dynamic model of the 'world-machine' school of thought and paradigm wrote as follows:

> All philosophy is like a tree. The roots are metaphysics, the trunk is physics, and the branches are all the other sciences.
>
> (Capra, 1989, p.55)

Van Strien (1987) is of the opinion that most of the current theories can be evaluated merely as generalisations based upon practical experience, and is not very optimistic about the solution to the problem being found and sees psychology as a 'theoretically immature science'. Other prominent psychologists, such as Karl Pribram, recognise the difficulties that beset modern psychology, but nevertheless remain positive.

> The transition from behaviourism, especially stimulus-response behaviourism, to cognitive psychology was characterised by an increasing difficulty with operationalizing such concepts as drive, and an increasing ability to operationalize concepts such as effort and attention. I believe the next revolutionary turn in psychology will, in a similar way, be characterized by an increasing difficulty in operationalizing concepts we now hold dear, such as information processing, and by an increasing ability to operationalize such concepts as meaning and intuition. The 21st century is beckoning and I predict advances in psychology, both as a science and in practice, which will rival those in biology, the chemistry and the physics of the 20th. This is my faith.
>
> (Pribram, 1985, p.6)

The psychologist, unlike the philosopher, says Kendler (1981), must go beyond the mere analysis of the mind-body problem and other philosophical issues, because the psychologist, by nature of the subject matter he studies, must cope with the subject matter both empirically and theoretically.

As was discussed in the previous section, it appears that many contemporary definitions of science have relegated the absolute positivistic goals of prediction and control to history, and view the goal of science as understanding only (Dawis, 1984; Faulconer & Williams, 1985; Manicas & Secord, 1984; Staats, 1983; Strong, 1984).

Both unity and disunity exist in the basic task of defining psychology as the 'science of human behaviour' and separatism rears its head repeatedly - even as to the what the actual nature of behaviour is. If theorists have difficulty in agreeing on the nature of behaviour, it does not bode well for psychology as the science of behaviour.

The mainstream schools of psychology are also caught within the web of separatism in terms of the disparate areas of the study of behaviour. The framework of undergraduate and graduate training and study to a large extent determines the emphasis placed and the framework adopted by the acolyte. Behaviourists thus study 'behaviour', Psychoanalysts place emphasis on the unconscious that is said to be the cause of the behaviour, and Humanists concentrate on conscious behaviour in terms of the thoughts, feelings and motivation that they feel characterize and lead to it. Causelity and determinism are then defined from within these respective frameworks as being either environmental, psychic or emotional, and the time and place of study moulds the framework of the student (Faulconer & Williams, 1985; Staats, 1981).

Staats (1987) still agrees with this and maintains that the 'pre-paradigmatic chaos' results in fragmented knowledge and that the subsequent training perpetuates the fragmentation.

Staats maintains that, as a result of the fragmentation in the areas of study, schisms are perpetuated, and he states categorically that 'the important thing is that these schisms have served as obstacles to the development of unification in psychology' (1987).

Staats (1987) views these conceptual schisms not as theories in the broad sense of the term, but rather as 'informal frameworks that constitute part of one's world view'. Examples of these schisms, according to Staats, include: The nature versus nurture controversy that has divided philosophers for centuries and psychologists for decades; The atomistic analysis of behaviour versus the holistic viewpoint; The idiographic point of view that sees each individual as being unique in contrast to the nomothetic point of departure, much akin to the basic postulate of Logical Positivism, which maintains that there are certain laws that govern functioning and that can be applied generally if they can only be isolated and defined; and finally, a major schism manifests in experimentalism versus the naturalistic observation of behaviour, and, with this, the quantitative versus qualitative research methodology.

The latter schism adds to the separatism inasmuch as the 'publish or perish dictum' forces professionals to perform research that is, according to Koch (1961), possibly irrelevant and not what they would necessarily have chosen if the scientific methodological prerequisites were different. 'Methodocentrism' (Morris & Shammer, 1987) with the intrinsic alternatives of empiricism, axiomatism, rationalism and metaformism, complicates the entire matter even further.

Commenting on the dualistic, separatist nature of scientific inquiry, the anthropologist Gregory Bateson stated:

> I want to emphasize that whenever we pride ourselves upon finding a newer, stricter way of thought or exposition,

> whenever we start insisting too hard upon operationalism or symbolic logic or any other of these very essential systems ... we lose something of the ability to think new thoughts. And equally, of course, whenever we rebel against the sterile rigidity of formal thought and exposition and let our ideas run wild, we likewise loose. As I see it, the advances in scientific thought come from a combination of loose and strict thinking, and this combination is the most precious tool of science.
>
> (Bateson, 1979, p.75)

Eysenck (1987) suggests that the reality of 'good versus bad theory' could elucidate the problem, but his solution adds another aspect of dualism with adherents of differing viewpoints then debating the validity of his criteria of what can be classified good and what should be considered bad theory.

Pietersen (1989) also mentions the numerous bipolar distinctions that are characteristic of modern psychology. These include: Positivism versus anti-positivism; Naturalism versus Historicism; the dimensional versus the morphogenic; Positivism versus the cultural model; Empiricism versus Subjectivism; classic versus romantic understanding; analytic versus holistic knowledge; analysis versus synthesis; deductive versus inductive science; static-synchronic versus dynamic diachronic science; and science versus art.

Different therapists debate and argue with equal conviction as to the effectiveness of their chosen paradigm, and their therapeutic successes confirm their convictions, even though they intrinsically seem to be based on opposing and even conflicting fundamental premises. What are the underlying similarities? Can they be identified, and if so, can they be theoretically justified within the limitations of the current theoretical knowledge?

The preceding section elaborated on the issue of unity within a disunified science. It cannot be denied that schisms and separatism abound and Kendler's suggestion that psychology is indeed a 'science in conflict', although negatively portrayed with a relatively pessimistic prognosis, certainly has merit.

As mentioned, an attempt will be made to reframe the negative connotations to show that the so-called 'chaos' could be redefined as part of the status-quo of science as a whole or could be seen as part of a process, and as such would be ongoing from within a framework of crisis leading to growth and development.

Before doing so, however, an important question, relating to the implicit nature of conflict, needs to be explored: is conflict necessarily destructive, or is there an underlying potential for change possible during crises and conflict-filled situations? If change in social and psychological theory is seen as a normal facet of individual as well as social structures, and if change is defined as being dynamic and a constant, then crises can be redefined as aspects of transformation. This metaphysical concept will be explored in greater detail in a later section but at this stage, an interesting point that is relevant is that Chinese philosophy uses a term for crisis that could refer either to danger or to opportunity, depending on the interpretation.

4.4. CHAOS OR PROCESS ?

William G.Perry (1970) postulated that individual cognitive and ethical growth and, by implication, maturation, takes place in four stages. He saw this scheme of development as being composed of positions and transitions, the one potentially, but not necessarily, leading to the other in an hierarchical progression. These phases are as follows:

- **Dualism**, whereby meaning is divided into two realms: good versus bad, right versus wrong, we versus they. 'Right answers exist somewhere for every problem, and authorities know them ... Knowledge is quantitative'

- **Multiplicity**, whereby diverse viewpoints are acceptable if right answers are not known and 'everyone has a right to his own opinion; none can be called wrong'

- **Relativism**, whereby diverse viewpoints are analysed and compared. 'Some opinions may be found worthless, while there will remain matters about which reasonable people will reasonably disagree. Knowledge is quantitative, dependent on contexts'

- **Commitment** takes place when a choice is made in the awareness of relativism and the locus of choice is within the individual.

(Perry, 1970, p.79)

This is an outline of the optimal process. If the progression does not take place, the individual can react by temporizing, (stalling the process); opting out of the process by escaping and by 'exploitation of multiplicity and relativism for the avoidance of commitment'; or by a retreat which entails a regression to dualism 'coloured by hatred of otherness' (Perry, 1970).

Perry was referring to the growth of an individual, but could well have been referring to the growth of psychology as a science on a meta-level. All the stages he elucidates have been discussed with numerous examples of dualism, multiplicity, relativism and commitment being cited. Multiplicity is also clear if the research by Nisenholtz (1983) is taken note of where he ennumerates 375 prominent psychotherapies.

The progression outlined by Perry is remarkably similar to the stages of development of philosophical psychology to be discussed in the following section with the final stage of commitment still pending but very relevant in the light of the current Zeitgeist. If this could be recognised, it would not be necessary to continue with the 'temporizing', and often the 'escape and retreat', allowing attention to be focused on attempts at integration and the creation of order from the chaos. This is especially valid if it is accepted that order and disorder can be fluctuations in the process of development (Prigogine & Stengers, 1984) and that crisis according to Chinese philosophy could imply both opportunity and danger.

To summarize then it seems as if scientists, in their quest for greater understanding, ask ontological questions (from the Greek 'ontos' meaning being, and 'logos' meaning knowledge) relating to the nature of existing phenomena, in the form of 'What is knowable?' Furthermore, they ask epistemological questions (from the Greek 'episteme', meaning good and true knowledge) which are normative questions defining what is good and acceptable knowledge (Raubenheimer, 1981). These ontological and epistemological aspects form the foundation of the search for understanding which we call science, and psychology can hardly not be granted scientific status if the aforementioned criteria are taken into account. The fact that there does seem to be a great deal of disagreement characterizing psychology is also clear. Whether this conflict is viewed negatively and pessimistically or the converse will surely determine the long term prognosis of psychology as a science. And, as mentioned, the difficulty of the task is complicated by the fact that this search for understanding must always be tempered with the wisdom of scientists recognizing their limitations.

Leo Buscaglia sums up the relationship between dogmatism, absolute truth and man's limitations.

> ... true knowledge is not in the knowing **but in the seeking**. I'm always suspicious of any organisation or philosophy or creed that has the answer for every question. I think it is more likely that others are struggling with the same problems and asking the same questions, and some questions may have no answers.
>
> (Buscaglia, 1986, p.226)

Bearing Carl Sagan's statistical and Leo Buschaglia's philosophical conclusions in mind, the next task will be to go back in time and look at the historical development of philosophical psychology. What does seem to be clear if the current definitions of science, and the varying viewpoints of psychology as a science are taken into account however, is that science itself, and not only psychology as a science, is indeed at a cross-roads. It also seems to be clear that a great deal of the polemics centre around the physicist's and metaphysicist's, and hence the psychologist's concepts of time. As temporality and causality are different sides of the same coin the salient importance of clarifying the concepts is evident. It also seems as if theories ultimately survive or are relegated to the background depending on their metaphysical viability so it is essential to view 'time' from different perspectives. Time will therefore be examined at different stages throughout this work.

4.5. SCIENCE AT THE CROSSROADS

While in the first quarter of this century physicists and cosmologists were forced to revise the basic notions that govern the natural sciences, in the last quarter of this century biologists will force a revision of the basic notions that govern science itself.

(Von Foerster, 1981, p. 33)

Ten years later, this prediction seems to be reiterated in scientific circles. This is illustrated by the words of the physical chemists Coveney and Highfield:

Among the academic community, there is an ever-increasing pressure to specialise in order to publish, to seek out the trees from the wood, which has lead to an exponential growth of the scientific literature and the concomitant shift towards the sacrifice of understanding on the altar of calculation. There is a wider panorama lying undiscovered before us, a luxuriant growth of possibilities to explore.

(Coveney & Highfield, 1991, p.264)

The authors go on to say that the Brussels school, headed by Prigogine, is focusing attention on how to relate the various meanings of time seen as motion (as understood in dynamics and in thermodynamics and as interpreted in history, biology and culture) to each other. They quote Prigogine as saying that:

It is evident that this is not an easy matter. Yet, we are living in a single universe. To reach a coherent view of the world of which we are part, we must find some way to pass from one description to another.

(Coveney & Highfield, 1991, p.265)

To reduce the reversible foundation of time, as seen from within the dynamic framework, and the irreversible arrow of time of thermodynamics, to another duality (to plague the thinking of the scientists of the future) is one alternative.

> [The other] is based on a radical reassessment of the microscopic world engendered by the recent ubiquity of dynamical chaos in all but the most idealised situations. Although dynamics and the second law can never be reduced one to the other, both seem to be intrinsic elements of nature, in a manner reminiscent of quantum-mechanical wave-particle duality.
>
> (Coveney & Highfield, 1991, p.265)

This nature of this 'radical reassessment' and it's relevance for psychology will be discussed in detail in the sections dealing with quantum mechanics and the 'new physics'. As mentioned in an earlier section, another alternative is to view science as part of a process according to Perry's model.

In conclusion, firstly, according to the general scientific consensus and the criteria for science mentioned, psychology indeed has the right to consider itself a science albeit a science experiencing the stresses and strains of the current Zeitgeist. Secondly, the inter-relationship between the various sciences even in their experienced crises and chaos seems to be clear. Koch's (1971, 1978, 1981,) viewpoint mentioned earlier in this chapter is contentious and open to criticism. To elucidate this further, it is necessary at this stage to look at the historical development of philosophical psychology. This vantage point was chosen, because it appears that theories are eventually acceptable or not depending on their metaphysical foundations. Causality and temporality in particular seem to be the eventual cornerstones of theories and as indicated are cause for intense polemics.

CHAPTER 5. STAGES OF PHILOSOPHICAL PSYCHOLOGY

In 1643, Sir Thomas Browne wrote the following words;

> Nature is not at variance with art, nor art with nature; they being both the servants of God's providence...
> Nature hath made one world, and Art another.
> In briefe, all things are artificial, for Nature is the Art of God.

The following chapter is a broad cursory overview of the philosophical trends of thought that have influenced the development of the philosophy of psychology and is not intended to be comprehensive. The initial viewpoints were more or less chronological (Logical Positivism and Historicism), but the prevailing streams mentioned are contemporaneous. The focus remains on the metaphysical foundations as these are seen to be of salient importance.

Psychology as an independent science is just over one hundred years old and was influenced by Auguste Comte's writings and the consensual extrapolation from the natural science model. This model involved the systematic study of psychological events using experimental methodology and high standards of objectivity. This extrapolation from the natural science model is sometimes called psychologism (Sartre, 1967) and the idea behind the 'logic' of the experimental method resulted in the term Logical Positivism (Kendler, 1987).

5.1. LOGICAL POSITIVISM

The seeds of this metaphysical framework were obvious in the writings of many scientists and philosophers in the 1600's as the Zeitgeist began to emphasize the development of the natural sciences.

Francis Bacon wrote in 1620 ;

> Those, therefore, who propose not to conjecture and guess but to discuss and know: who are resolved not to invent grotesques and fables of worlds, but to look into and as it were to disect the nature of this real world, must consult only things themselves.
>
> (Martin, 1977, p.103)

Bergmann (1967) writes that Logical Positivism was a movement rather than a school of thought and that the term first appeared in the 1930s. This 'movement' was the result of the interaction that took place between the Cambridge School of Analysis and the Vienna Circle. The consensus amongst theorists according to Bergmann (1967) is that as long as one sticks to cautious generalities, all logical positivists could agree that they

> (a) hold human views on causality and induction; (b) insist on the tautological nature of logical and mathematical truths; (c) conceive of philosophy as logical analysis ....; (d) that such analysis leads to the rejection of metaphysics in the same sense that for example the points of dispute among the traditional forms of idealism, realism and phenomenalism could not be stated, or at least could not be stated in their original intent in a properly clarified language.
>
> (Bergmann, 1967, p. 2.)

It seems therefore that Logical Positivism was characterized by a number of interrelated tenets, amongst these being the unity of science; the verifiability theory of meaning; the idea of language being a form of calculus with interpretation being a form of logic and mathematics; and finally that legitimate philosophy could only consist of logical analysis. Metaphysics and theology were also summarily rejected (Ayer, 1934; Bergmann, 1967; Cottingham, 1984; Hanfling, 1981; Weitz, 1966; Vision, 1988).

Ayer (1934) spoke of 'mystical intuition'. He did not deny that the mystic is able to discover truths 'by his own special methods', but still maintained that the mystic's statements, like any others, should be subject to the test of actual experience. He also felt that his criterion of verifiability was to be regarded 'not as an empirical hypothesis, but as a definition'. Hanfling (1981) criticizes Ayer (1934) who, after affirming the connection of meaning with verification in experience writes that the

> .... the addition of 'in experience', is really superflous, as no other kind of verification has been defined
>
> (Hanfling, 1981, p. 130)

Hanfling goes on to say that the verification of a priori statements such as those found in logic and mathematics were overlooked by the earlier theorists. Furthermore, he feels that philosophy too is an a priori discipline and

> Hence, if there are methods of verification in philosophy, we should not expect them to be of the empirical sort; and the same is true of metaphysical statements.
>
> (Hanfling, 1981, p.131)

Logical Positivism therefore also saw human behaviour as a function of general verifiable laws operating much like the laws in the natural world. These laws were a 'given' and, as such, were independent of history, time or place, and the focus of study was the unravelling of permanent scientific 'truths' and thus of scientific laws. The modus operandi of the scientific search for understanding was seen to be a process of logical inductive reasoning, resulting in the subsequent unravelling of the **facts** of nature. This was then to be followed by the formulation and empirical verification of the isolated logical hypotheses and theories.

The goal of science, as mentioned earlier, was to be to understand (unravel and objectify) these laws, so that much of human behaviour could be predictable and, by implication, potentially under control. These laws were based on an empirical method, characterized by objective observation, empiricism, operationism and induction, and on an 'objective realism'. In this analytic tradition of Logical Positivism, knowledge was seen to be something, awaiting discovery, outside the person studying it (Bolton, 1979; Capra,1982; Dawis, 1984).

The premise was therefore that scientific laws should be established inductively and not deductively and that the scientist would then infer general truths from particular observations and experiments (Hanfling, 1981; Vision, 1988).

Karl Popper (1976) was associated with the members of the Vienna Circle and became highly critical of many of their doctrines as he felt that according to the approach advocated by the Vienna Circle, scientific observations and experiments would be limited to a finite number. His criticism was that it would be impossible to establish a general law to be universally applicable if this law was only based on a finite number of observations. His work, **Logic of scientific discovery**, originally printed in 1934 marked a decisive break with the verificationism of the logical positivists. He felt that the **methods** scientists used to arrive at their conclusions were not really that relevant and that this was the terrain of psychology and not of logic and philosophy. He maintained that scientists could arrive at their theories in a number of ways, even as Einstein had suggested, by a 'leap of creative insight'. What was of salient importance though was how the theories were subsequently tested. Here Popper argued, strictly logical deductive reasoning was applicable and followed by stating that his 'principle of falsifiability' was the essence of the logic of science inasmuch as it is a principle of demarcation which marks off genuine science from so called pseudo-science.

> The falsification or refutation of theories through the falsification or refutation of their deductive consequences is, clearly, a deductive inference.
>
> (Popper, 1976, p. 88)

Logical Positivism, nontheless held a major sway over psychological theory for a number of decades, and contributed to an explosion of research and a proliferation of scientific endeavour that influenced the understanding of innumerable aspects of human behaviour (Ford, 1984; Prigogine & Stengers, 1984).

The fundamental underlying metaphysical principle of linear causality, **even though metaphysics was denied and condemned,** however, proved to be fraught with methodological problems, especially in the human sciences. Firstly, the complexity of human behaviour could not be reduced to a linear model, and, secondly, the permutations of probabilities proved to be astronomical and thus difficult to unravel (Faulconer & Williams, 1985; Klin, 1972; Kramer & De Smit, 1977).

Faulconer and Williams (1985) regard the fact that Logical Positivism was based on linear causality and on laws that were atemporal as the crux of their criticism, and postulate that the untenability of these basic metaphysical foundations is the flaw that inevitably led to the redundancy and so-called eventual demise of the movement.

These sentiments were shared by certain philosophers,

> For a time the logical positivism program for the elimination of metaphysics seemed unstoppable; it's eventual collapse was not due to any rationalist counterattack but to internal tensions and difficulties to do with the verification principle itself.
>
> (Cottingham, 1984, p. 108)

Many philosophers today agree that any system of thought essentially contains certain fundamental assumptions that are impossible to verify by means of experience. This is because every system implicitly has it's own metaphysics. Despite their professed elimination of metaphysics, the logical positivists did infact rely on one central metaphysical doctrine, and that was the principle of verifiability itself (Bergmann, 1967; Cottingham, 1984; Hanfling, 1981; Weitz, 1966).

Physics also established that atoms, molecules, electrons and photons are highly complex theoretical constructs whose properties are often specified in terms of abstract mathematical models very far removed from the world of direct empirical observations that are difficult if not impossible to verify. The results are that

> The positivist seems to be faced with a fatal dilemma; either he will have to make his criterion so stringent that it will exclude the generalizations and theoretical statements of science, or else he will have to weaken his criterion sufficiently to open the door to the speculations of the metaphysician.
>
> (Cottingham, 1984, p. 112)

Staats (1983) too, 50 years after Popper, also criticises the absolutistic claims made by the adherents of Logical Positivism and feels that the guiding framework did not, and could not, deal with the scope and complexity of the subject matter of science as a whole. Furthermore, the statement that theory is either axiomatic or non-scientific made no allowances for the progressive development of psychological theory via other avenues such as Humanism and Psycho-analysis. The movement's insistence and over-emphasis on methodology resulted in numerous conclusions being made that had questionable meaning and significance. The critics of Logical Positivism use this 'irrelevant' outcome to repudiate the basic tenets and successes of the framework. Staats (1983) maintains that the insistence on objectivity influenced the research negatively, as no allowance whatsoever was made for introspection or subjectivity.

From a system's perspective, Ford (1984) believes that any reductionistic principles are inappropriate for an agenic model functioning in a network of mutually causal processes. Other theorists such as Polkinghorne, Howard and Patton (1984) also reject this model, since they feel that the significance of a person's behaviour lies in the functions it serves for that person. They propose a developmental model in which emergent patterns of behaviour may occur that are unpredictable (in terms of the person's history).

Ex post facto criticism is relatively easy and these criticisms were made with the 'objectivity' of hindsight. Before this, however, the Zeitgeist and the theoreticians began to recognize the inadequacies of Logical Positivism and the spotlight moved its beam to Historicism. This philosophical trend was chosen as it encompasses the fundamental metaphysical foundations of the mainstream schools of thought namely, Behaviourism, Psychoanalysis and Humanism / Existentialism. Before discussing Historicism as part of the philosophy of psychology though, it is necessary to give a cursory overview of the so called recent revolution in the philosophy of science as this trend created the ambience of the Zeitgeist and led to the development of Historicism.

This 'recent development in the philosophy of science' in general was

> ....not so much a further development of the dialogue as an abrupt breaking off; in it's extreme form it rejects both the rationalist and the empiricist mode of knowledge as fundamentally misguided.
>
> (Cottingham, 1984, p. 144)

The two central philosophers instigating this approach were Thomas Kuhn (1962) and Paul Feyerabend (1962). Both agreed with Popper in rejecting logical positivism's modus operandi of gradually accumulating scientific knowledge through observation and experiment, but rejected Popper's falsification theory. The arguments of Kuhn and Feyerabend are not only confined to how scientists operate, but they also cast doubt as to whether the results of a theory can be tested against the facts; Kuhn with his theory of ' paradigm shift' says that theories are not improved on with additional data, but rather that there is a 'gestalt switch' as the 'world is suddenly seen through new spectacles' (Kuhn,1962). He felt that the entrenched models or as he called them 'paradigms' were protected by the scientific community and 'once it has achieved the status of a paradigm, a scientific theory is declared invalid only if an alternative is avalable to take its place'. Kuhn maintained strongly therefore that a dominant scientific theory would not be allowed to be shaken if anomalous results were recognised by it's adherents.

In addition to the aforementioned, both Kuhn and Feyerabend independently arrived at the conclusion that theories are 'incommensurable'. The 'incommensurability thesis' maintains that because observations depend on theory and theory in turn determines the way in which scientists perceive the world, there can be no rational and objective way of deciding between two or more theories. This viewpoint challenges the roots of the objectivity of any scientific or philosophic (and per implication any psychological) world view.

> The result of this (though many philosophers, including Kuhn himself in his later writings, have been reluctant to go the whole way with Feyerabend) is an extreme form of epistemological relativism (some would say 'anarchism') in which not only theories themselves, but also the very methodological standards in terms of which they are evaluated, lose any plausible claim to objective correctness.
>
> (Cottingham, 1984, p.146)

Philosophers such as Richard Rorty (1980) feel that philosophy will have to abandon the idea of any philosophical inquiry being able to uncover an 'objective truth'. Neither the empiricist notion of verification via the senses, nor Popper's notion of empirical falsifiability will be able to lay claim to ultimate objectivity. Rorty proposes that philosophy should develop into hermeneutics and instead of attempting to discover 'the foundations of all knowledge' should accept that all understanding operates from within a given conceptual framework. These 'relativists' thus theorize that any theory is part of the predominant ideology of a given culture at a given time. This is the theoretical milieu that resulted in the school of thought known as Historicism.

5.2. HISTORICISM

Karl Popper (1980) has entitled this view as 'sociologism' and maintains that it is the crux of the sociology of knowledge. In this perspective, a concept can only be fully understood once it's historical and social circumstances are unravelled and analysed. Historicists also maintain that theories and opinions including supposedly self-evident assumptions are merely products of a particular set of social and historical circumstances.

> In place of the individual conditions of learning, historicists prefer socio-historical circumstances. Historicism rejects all trans-historical or ahistorical explanations. Since realism seems to imply an ahistorical justification of it's subject matter, historicism about truth and values would imply anti-realism. In fact the latter would be a species of relativism whose unit of local objectivity would be a socially or historically defined epoch.
>
> (Vision, G. 1988, p. 164)

Historicism thus objectifies 'history'(ontogenetic) and sees history as a causal network underlying all behaviour, individual as well as social. The adherents of this school of thought were categorically adamant that laws from the natural world could never be extrapolated in their entirety to the understanding of the human world.

As the name implies, a central concept to this school is history and, with it, time - which is seen as the succession or accrual of events in a linear sequence or chronology. This concept, on an implicit metaphysical level, is the basic assumption underlying the methodology and the epistemology of all schools of Historicism.

Psychoanalysis and its related schools are seen to be based on Historicism and causality, because of the underlying concept of psychic determinism. Behaviourism started from within the positivistic framework and subsequently developed into a variation and combination of Historicism (in the form of socialization) and Logical Positivism (with the laws of reinforcement, both S-R and S-O-R) (Faulconer & Williams,1985).

Humanism, on the other hand, even though it does not place such an emphasis on historical development, objectifies and reifies emotions and creates emotional laws that are causal and historical. Humanism does, however, make allowances for directionality in the form of free will, but because of the basic underlying metaphysical assumptions of causality and atemporality, there is a risk in this framework that human freedom could be reduced either to arbitrariness or to causality in the behaviouristic sense (Wann 1964). In Humanism, history and culture are not seen as the determinants, but personal history is (Bolton, 1979; Koch, 1961).

Faulconer and Williams (1985), however, feel that human freedom can only be differentiated from arbitrariness from within a framework of temporality, which is currently to be found in the hermeneutic approach.

5.3. HERMENEUTICS

This philosophical school plays and important role in contemporary thinking and as such will be discussed in greater detail seeing that the concepts are complex and it's effect on psychology is still felt to be unpredictable.

Hermeneutics had its origins in theology, as an attempt to interpret and understand biblical texts. Early in the twentieth century, the German theologian Schleiermacher initiated the integration of hermeneutic thought into an hermeneutical philosophy. At that stage, and still in contemporary thinking, 'hermeneutics is the science or art of interpretation' (Kruger, 1991, p.107).

The philosopher Dilthey continued Schleiermacher's work. Despite his efforts, psychological understanding eluded him and, becoming disenchanted with trying to systemize it, he also finally viewed interpretation from an historical perspective. Kruger, however, emphasizes:

> ... psychology is deeply indebted to Dilthey, in that he stressed the need for understanding rather than explaining in Psychology and in his emphasis on the dialogical nature of understanding, Dilthey uncompromisingly opposed the ideas that the human being can be understood as an object.
>
> (Kruger, 1991, p.109)

Contemporary hermeneutic philosophies have been further developed by the work of Martin Heidegger and Gadamer and are based on a human science of understanding, as opposed to the scientific method of the natural sciences. Kruger also emphasises that 'although all interpretation is understanding, not all understanding is interpretation' (Kruger, 1991,). He stresses that hermeneutic interpretation must go beyond the obvious and add to understanding in an almost revelationary manner. Another keystone of contemporary hermeneutics is that temporality is 'the essence of being' and that 'we are temporal beings in a temporal world' (Faulconer & Williams, 1985). Again the rejection of the scientific method is based on the premise that:

> Science, as practised, demands atemporality, but human events are temporal.
>
> (Faulconer & Williams, 1985, p.1184)

Temporality is an important concept emphasized in both psychology and physics, and as such will be discussed in the sections where it is felt to be relevant and where concepts differ. As mentioned in previous sections the metaphysical cornerstones of causality and temporality seem to be the ultimate points of acceptance or rejection of any theoretical school of thought and as a result, any attempt at integration will be forced to take them into account.

HERMENEUTICS AND TIME

The basic tenets of Logical Positivism, as mentioned, are rejected by the adherents of the Hermeneutic school of thought due to their criticised flawed arguments of linear causality and atemporality. Historicism too is rejected because of the emphasis placed by the adherents of this school on the importance of linear causality in some form or another.

Time, from a Hermeneutic point of view, cannot be contained, because something that is in perpetual motion cannot be summarily stopped or frozen. Because time is movement that cannot be contained, it cannot be linear or spatial but must be:

> ... directional and relational; the past exists in the now as the 'from whence' and the givenness of the present, the future exists in the now as the 'to whence', its possibilities.
>
> (Faulconer & Williams, 1985, p.1184)

Time is also not a contentless vacuum that is merely filled or passed, and it has a significance of it's own as it continues relentlessly with or without us. For us, the importance of time from within the hermeneutic framework is because it defines 'what we do', since we are within time. As such, it is directional with possibilities that are not subject to the 'laws' of behaviour (causal) or governed by the 'laws' of our individual or group history.

Hermeneutic science postulates that is only by understanding the 'essence of being' that we can approximate the 'truth of being' and 'render being intelligible'. Its goals are to seek this intelligibility (understanding) and not to attempt to clarify and explain it. By doing so, the objective is to 'approximate the truth' which is always perceived as a relative and a temporal truth. Truth, in turn, is seen as 'how' things are, with a relative validity and not as the correspondence to 'what' they are which is seen as an absolute validity. Because this 'how' is relative, truth, as understood, can change with time, as can understanding and criticism. These basic metaphysical postulates form the crux of the Hermeneutic viewpoint, as theorized by Heidegger and Gadamer (Faulconer & Williams, 1985).

The framework of hermeneutics is a circlė consisting of relative presuppositions (based on language), which are then followed by personal interpretation and understanding of a relative truth. This, in turn, leads to further presuppositions in endless hermeneutic circles, optimally leading to a greater and greater understanding. Interpretation is obviously not a linear process whereby conclusions are progressively built one on another, but instead:

> One enters the circle of understanding at some point and then considers the parts, then again the whole, and goes round to see if the interpretation is sufficiently refined.
>
> (Kruger, 1991, p.113)

The goal of understanding is not necessarily progress, but maturation and further understanding, as progress implies 'betterment ', improvement and a movement forward. The Hermeneutic viewpoint queries if we can, in all honesty, categorically state that current theories are 'better' than preceding theories. Is not the most that we can hope for, that they make more sense at a particular stage in time? Certainty (based on atemporal causality and objectification) eludes us, and all we can aspire to is a 'temporal articulation of truth'.

Hermeneutic psychology is metaphysical and metatheoretical, with concomitant vague, pragmatic implications. The theoretical viewpoints, below, not intended to be comprehensive, are other current trends in the Zeitgeist and seem to be the consensual destination towards which psychology, as the science of human behaviour, may be heading. These are Socio-rationalism, Relative Realism or Uninomic Positivism, Eclecticism, and the use of metatheories such as General Systems' Theory.

5.4. SOCIO-RATIONALISM

Adherents to this philosophical inclination perceive psychology as an historical science and as a human construction based on inter-subjective consensual agreement (Gergen, 1985). Like truth, reality is not static or a given and thus cannot be known, but must be 'actively construed'. (Strong, 1984) states that 'scientific knowledge is an organic evolving construance of reality'. Its goals and values are determined by its pragmatic applicability, and its methodology must fit its goals and values. The implications of this inter-subjective accrual is, to critics of the metaphysics of socio-rationalism, merely a variation on the theme of historicism. Faulconer and Williams (1985) suggest that socio-rationalists must 'rethink temporality' to avoid falling into the trap of linear causality.

Staats (1983) maintains that it is naive to presume that scientific issues in psychology are capable of being resolved by a process of inter-subjective consensual agreement. He suggests a move towards Relative Realism and Uninomic Positivism in order to solve the problem.

5.5. UNINOMIC POSITIVISM

This is a very pragmatic approach that postulates that the world can be known in part through observation. Observation can never be true or complete in the absolute sense, but can be true for the 'now'. The accumulation of knowledge using science's methods and improved and improving observations, can result in an inexorably closer and closer approximation of the truth (Staats, 1985).

This perspective is reiterated by philosophers such as Cottingham (1984) who writes that

> It may be possible to establish an intercultural core of objective truths based on the universal constraints of logic, coupled with the simple non-theoretical beliefs which are based on our ordinary perceptual experience.
>
> (Cottingham, 1984, p.151)

He goes on to say that even if the rationalist can establish a 'bridge-head' of logic including perceptual beliefs that can be an 'advance on' or 'nearer the truth than it's predecessors' it is in the right direction for there really is an objective world 'out there' and 'there is no reason to abandon the notion of objective reality, or to give up the struggle to make our view of it progressively clearer, more comprehensive and more accurate'.

Staats (1985) also comments on the tendency of theories of psychology to be accepted or rejected in their entirety. Because of this, much of the useful knowledge acquired is overlooked, positive contributions wane only to gain ascendency at a later stage in some or another 'rediscovered' form. He advocates a method of Relative Realism and Unified Positivism to avoid this unfortunate tendency and also to ensure that the productive elements from schools of thought, which may even appear to be mutually exclusive, may be aligned into a unitary theory. This 'bridging', he believes, could bring about a shift from pre-paradigmatic chaos to the much needed paradigmatic unification and clarification.

From a unified positivistic perspective, science is much the same as it is in the natural sciences, inasmuch as it seeks knowledge through observation and can progressively improve its observations and methods. It differs in that its theory is not necessarily axiomatic. (Methods such as action research could fit in to this framework).

Staats sees the science of psychology as a 'self-correcting enterprise' and it is precisely this which gives it its long-term progressive nature. He warns, on the other hand, against perpetuating the schisms of pre-paradigmatic science. Staats views the 'paradigmatic revolution' as a 'gigantic theoretical task' but feels that 'the preconditions do exist for establishing a compact scientific discipline' (Staats, 1983). This task involves significantly more than taking an eclectic position as it entails unifying theory, and not just utilizing it for practical purposes.

There are, however, others who see theory as metaphysics and view metaphysics as the realm of the philosopher. This approach is also very pragmatic and could be called classical eclectism.

5.6. ECLECTISM

Eclectism focuses on the 'doing' of science, rather than on its meaning and content. Borgen (1984) writes that there is a trend in professional psychology towards epistemological eclectism and methodological diversity.

He also clearly states the eclectic approach to theory:

> For many eclectics theory is metaphor, rather than final truth; its justification is its ability to help clients.
>
> (Borgen, 1984, p.459)

Eclectism, even though it is the practical modus operandi with the greatest following, is disdained in theoretical circles. Eclectism, as a system of psychotherapy, has been eliminated since Corsini's second edition (1985) and it seems as if there is a consensual resistance towards its theoretical viability and validity. According to some viewpoints however, this so-called 'Cinderella' of psychological theory is effectively incorporated into General Systems' Theory as a metatheory and is seen as part of the strategy phase of the cybernetic cycle. This approach would acquire more theoretical credibility if its modus operandi could obtain a sounder theoretical basis in terms of the contemporary schools of thought and a starting point could possibly be found in terms of defining metaphysical common denominators that could unify the so-called 'doing' theoretically. This is the aim and the direction envisaged in this thesis but the intention is not to validate the use of random techniques, but rather to see if there are not ways and means to possibly move from school of thought to school of thought via a metatheoretical framework that is metaphysically sound.

5.7. METATHEORETICAL PERSPECTIVES

As mentioned in the previous section, there is also a trend towards integration by the utilization of metatheories. These encompassing theories attempt to create a framework that could incorporate all the different approaches in a meaningful synthetic model. Schoeman (1991) mentions the following examples of other metatheoretical approaches: Eclectism, Transtheoretical Orientation, Holism, the Multifaceted Approach, Dialectic Constructivism, General Systems' Theory, Ecological Theory and finally the other various approaches aimed at epistemological clarification.

5.8. GENERAL SYSTEMS' THEORY

This metatheory is the framework adopted in this thesis and as such will be discussed in greater detail in a later section. For now the concise summary elucidates the basic metaphysical postulates that characterise this trend.

General Systems' Theory, as a metatheory, perceives human beings as active causal agents, or self-control systems. Causality is thus multilateral. Humans are viewed as being teleonomically directed towards efforts to influence their environment, without there necessarily being a predetermined final goal, although the process is goal seeking (Bateson, 1979; Beison & Peters, 1979; Bertalanffy, 1968; De Greene, 1970; Jantsh, 1980).

The focus of 'scientific understanding' from within this framework, and the research questions posed, are related to how the system as an individual, or as a group, attempts to function and to influence others; how the system as an individual or group is influenced by others; and how any changes in context exert an influence on the former and/or the latter functioning. If the emphasis is on the former, the focus will be on the strategies used and how the strategies relate to the goals, but if the emphasis is on the relationship formation, the focus will be appropriately adjusted. The nature of the phenomenon being studied will determine the strategy chosen. Holism and dynamic inter-relationships are thus basic tenets.

Before discussing the 'to where' (in Heidegger's terminology) psychology as a science, taking all of the above into account, seems to be heading, it is essential to give an overview of the historical development of physics, metaphysics and psychology. This is because one of the basic premises underlying the inter-relationships between systems dictates that conflict and chaos (the basic problem addressed in this thesis) if it does indeed exist, should be manifest in all three systems. The other decrees that the historical developments noted should overlap continuously.

CHAPTER 6. PHYSICS, METAPHYSICS AND PSYCHOLOGY

6.1. INTRODUCTION

As previously stated in the section concerning philosophical psychology and as supported by Descartes' view on the subject, the development and growth of the theories of physics and of psychology to a certain extent overlap, and are influenced by the metaphysical Zeitgeist and body of knowledge of the time. The following section is an analysis of the approximate chronology and inter-relationship of the thinking in these two disciplines, and will refer to relevant metaphysical ideas and developments. The inter-relationship between history and science (natural and behavioral) will be illustrated, and links will be made with the metaphysics of the time.

It is necessary to review this inter-relationship, since this thesis states that we must specify more clearly where our theory has been derived from, in order to suggest the direction in which we are headed (the 'to where' in Heidegger's terminology).

Psychology, in certain theoretical circles following Koch's (1981) recommendations, is currently making strong efforts to break away from what is seen as a symbiotic relationship with physics. It will be shown, however, that, with a few exceptions, the relationship is still symbiotic. Both disciplines are still dancing to the tune of the Zeitgeist's metaphysics and metatheories.

Theoretical physics was largely responsible for the development of Logical Positivism and, with it, rigorous determinism and linear causality. Behaviourism followed suit and was in harmony with Logical Positivism. The counter-reaction of Historicism, in the form of Humanism, was an emphatic statement against the so-called mechanization and dehumanization of human beings. It will be illustrated that even Psychoanalysis itself was based on the Newtonian paradigm.

It is perhaps a valid suggestion (that could be theoretically justified from within the General Systems' model) that science, as a body of knowledge, has developed a life of its own with inter-relationships between its sub-disciplines, the natural and the human sciences. In this form, science will continue its course into the following century. Despite the so-called 'crises, conflict and chaos' experienced by many of its adherents, science will indeed enable its inquisitive, innovative and creative followers to understand the world more comprehensively. The desired **absolute** prediction and control however, will be put into perspective as an understandable, although false and illusionary, hope and ambition. The Prigoginian paradigm, in turn, positively re-frames the 'crises, conflict and chaos' currently being experienced as 'dissipative structures' with their implicit potential for higher level functioning.

6.2. THE BEGINNING

Throughout the Middle Ages, science was based on man's view of nature, as seen from within the socio-cultural milieu of small communities with a relatively basic network of communications, and was defined by the religious beliefs and dogmas of the time. The Church's tenets of faith, and Aristotle's philosophy of thought, were comprehensively combined within a conceptual framework by Thomas Aquinas - a scientist and cleric of substantial standing in both the religious and scientific worlds. Medieval science was thus based on both reason and faith; the primary goal was to understand nature as an organic phenomenon, from within the framework of God's spiritual universe.

In the sixteenth and seventeenth centuries, there was a dramatic shift in paradigms, which culminated in the Newtonian dynamic machine framework of science. The modus operandi changed from reason and faith to 'Reductionism', with God still being perceived as the primary driving force.

This shift was initiated by new discoveries in astronomy and physics, brought about by the work of Galileo and Copernicus, and was eventually catapulted on to a different level by the genius of Isaac Newton. Simultaneously, the reasoning of philosophers such as Descartes, laid the foundation for the development of the 'new' scientific method, further expounded by Sir Francis Bacon. This paradigm shift resulted in the birth of axiomatism and the analytical method, with the Newtonian 'world-machine' as the scientific interpretation of nature (Johnson, 1983).

Descartes' was firmly convinced of the nature of certainty implicit in the scientific method. He saw it as his personal destiny to differentiate 'truth' from ignorance and error in science as a whole, and wrote that all science was certain, evident knowledge. He also stated that we reject all knowledge which is merely probable and judge that only those things should be believed which are perfectly known and about which there can be no doubts.

This belief in the unquestionable certainty of the scientific quest for knowledge was the keystone of the Cartesian philosophy. Unfortunately for the adherents of science as a whole, the belief was based, for a relatively long time, on a fundamentally erroneous premise. In the light of contemporary thinking, this quest for 'absolute truth' and its control, defies the simple logic of 'common sense'. As previously discussed, 'absolute truth' is currently viewed as an elusive improbability, and even an impossibility. With few exceptions, all aspects of scientific knowledge are limited and approximate. The scientific method still has obvious merits and a wide range of applicability, but only if the claims to absolute truth are seen in perspective.

The Cartesian method was analytical and reductionistic. Descartes advocated a strict division between the study of mind and the study of matter, which still causes confusion in contemporary thinking. He regarded the mind as 'res cognitans' and matter as 'res extensa', maintaining that the latter was machine-like and functioned according to mechanical laws of nature, which were immutable and waiting to be defined by the mind. Dynamism and structure were core concepts and the goal of science was seen as the eventual control of matter and thus of nature. This thinking was also extended to living things - plants, animals and the human body were subject to the same reductionistic law of analysis, as it was perceived that the rational soul of man was connected to his body by the pineal gland, while man always functioned as a duality (Van Wijk, 1990).

It must be emphasized that the positive contributions of Descartes' framework are recognized by scientists world-wide. The theory of Dynamic Reductionism, however, has caused and continues to provoke much debate and numerous problems for the theoretical as well as the applied scientist.

6.3. THE NEWTONIAN PARADIGM

At this point in the history of science, the time was right for the development of the Newtonian world view. Isaac Newton realised Descartes' dreams of a scientific revolution. The essence of his philosophy on the experimental method was formulated in his manuscript 'Principia Mathematica' (1687) as follows:

> Whatever is not deduced from the phenomena is to be called a hypothesis; and hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical, have no place in experimental philosophy. In this philosophy, particular propositions are inferred from the phenomena, and afterwards rendered general by induction.
>
> (Encyclopaedia Brittanica, 1952, p.1152)

It was in this work that Newton stated his laws of motion. Like the Greek Atomists before him, he treated matter as passive and inert. Inertia played a central role in his theory of the world as it stated that matter would remain at rest for ever unless it was acted upon by an external force. Newton's view of matter as inert substance shaped and formed by external forces became an integral part of Western Culture during the Industrial Revolution.

Coveney and Highfield state that the nature of time was obscure in Newtonian physics, since time was introduced in mathematical terms to formulate the concept of motion (change of position in time).

> There is a paradox in Newtonian time. Human experience reveals that time marches ever onward. The passage of time is what enables us to observe motion, but the reason for time's arrow remains unexplained. Newton's equations of

motion produce results that are counter-intuitive: their time symmetry makes them oblivious to the direction of time.

(Coveney & Highfield, 1991, p.68)

Both time and space, it would seem, were seen by Newton as being absolute. Time had no connection with the physical world and flowed uniformly from the past, through the present and towards the future. Time was irrelevant in the machine paradigm and could, in principle, go backwards and forwards, and could thus be seen as 'reversible'. (This concept of 'reversible' time made the entire reasoning behind Reductionism theoretically feasible.)

Material particles were all composed of the same basic homogenous atoms, with variations resulting from differing densities of the matter. Motion was caused by gravity which was seen as a basic attraction between matter. At the time of the publication of the Principia, clocks were the most sophisticated machines and Newton's image of the workings of nature as an elaborate clockwork seemed particularly appropriate. God, in the act of creation, set the world in motion (much like a clock) and its continued movement was governed by divine dynamic laws. The 'world- machine' was thus seen as being rigorously deterministic and predictably causal. Everything, from within this framework, could be predicted accurately if the state, at any stage, was definable. Chance played no role at all as every event was determined by initial conditions.

Possibly the greatest triumph in Newtonian science was the discovery and elucidation of gravity as the force which determines the movement of planets in the sky, as well as the motion of bodies falling towards earth. These laws lead to questions regarding the path of trajectories, and the rules governing these movements were defined as lawfulness, determinism and reversibility (Prigogine & Stengers, 1984).

Newtonian science was formulated during the age of craftsmanship, when machine-building was an important economic enterprise and was thus an active science that, to a limited yet important degree, enabled craftsmen to predict and control their natural world. Newtonian theory enabled scientists to explain many aspects of nature with far greater clarity than had previously been possible. Astronomy, physics and mathematics entered a scientific renaissance and the success experienced by scientists confirmed the validity of the new-found paradigm. This dynamic machine paradigm is still, to a large extent, the blueprint for science as a whole, and for physics in particular. It has proved so powerful that, to a certain extent, it still seems inviolable.

Prigogine and Stengers (1984) nevertheless maintain that the 'old' laws of Newtonianism may not necessarily be universal, but certainly still apply to important, yet restricted aspects of science. During the Age of the Machine, traditional science focused on stability, order, equilibrium and predictability. It is therefore still applicable to closed systems and linear relationships, where measurement is based on small inputs yielding commensurately measurable small results. It is also relevant to the movement of trajectories where positions and velocities are completely predictable. Coveney and Highfield write that:

> Trajectories of planets, missiles, rockets, satellites and space probes such as Voyager are all worked out in advance on the basis of the 300-year-old theory.
>
> (Coveney & Highfield, 1991, p.69)

In summary, the basic concepts forming the foundation of the Newtonian paradigm were as follows:

1. All separate material objects (matter) in the world move in absolute space and time, and interact mechanically with each other.

2. There are fundamental forces which are intrinsically different from matter.

3. Fundamental laws can be used to describe the movement and interactions of these material objects, and these dynamics can be quantified.

4. Rigorous determinism eliminates any possibility of chance. The world can be understood, predicted and controlled if the Cartesian division between mind and matter forms the basis for the description.

It was the discovery of thermodynamics and electromagnetics that first called the Newtonian paradigm into question, sowing the seeds for the growth of the new paradigm of the 'science of complexity'. Before discussing the development of the Science of Complexity, it is necessary to examine, in more detail, the influence the Newtonian paradigm had on the development of psychology as a science.

The underlying metaphysical roots of the Newtonian world view were atemporality, rigorous determinism, dynamics, linear causality and reversibility. These principles, in turn, filtered through to the Zeitgeist, allowing the development of Logical Positivism, concomitantly affecting the philosophical development of psychology as a science.

6.4. PSYCHOLOGY AND THE CARTESIAN AND NEWTONIAN PARADIGMS

Following the trends set by biology and medicine, the science of psychology has undoubtedly been shaped by the Cartesian paradigm. Psychologists within the Zeitgeist of the time, and following Descartes, also adopted the strict division between the res cognitans and the res externa, which inevitably made it extremely difficult for them to understand how mind and body interact with each other. The resultant confusion about the role and nature of the mind, as distinct from that of the brain, is a unmistakable consequence of the Cartesian division (Bohm, 1984; Brandt,1973; Capra, 1977; Peat, 1987).

Descartes advocated that the mind should be studied by introspection and the body by methods used in the natural sciences. The mainstream subdivisions of psychology did indeed follow Descartes' suggestions and the results remain operational. Those interested in the study of 'mind' followed the introspection path, while the Behaviourists focused exclusively on behaviour ('matter'); even Psychoanalysis was firmly entrenched in the physics, metaphysics and philosophy of the Newtonian world view.

Theorists such as Locke and Hobbes refuted Descartes' mechanical 'animal' model. Locke postulated his famous 'tabula rasa' model, whereby sensory perceptions were imprinted on a blank mind. The seeds of mechanism were thus sown in a climate of Newtonian dynamics and mechanics.

Reductionism gained momentum when it became evident that the complexity of psychological functioning could and should be reduced to fundamental rules. In accordance with this, David Hume was one of the first self-theorists who followed Newton's methods of inductive reasoning.

During the 1870's, psychology was given scientific status by the work of Wilhelm Wundt, the founder of the first psychology laboratory. In this dynamic and exciting time, it was thought that all mental functioning could be reduced to specific elements. The goal of psychology, according to Wundt, was to ascertain, scientifically, how these elements could be combined to form perceptions, ideas and other cognitive processes. For Wundt, psychology was the study of the mind and conscious experience, which could be observed directly or indirectly. The former 'immediate' experience was the object of study in psychology and the latter 'mediate' experience was based on the observational premises of physics (Kendler, 1987).

Many still adhered to the Cartesian division with firm conviction, although some theorists, such as Wertheimer, strongly contested the division of mind and matter, and advocated a Gestalt approach. Others, such as William James, the father of Functionalism, followed suit. Newton's influence, however, can still be seen in the dynamic nature of James' 'stream of consciousness' concept, although James placed more emphasis on phenomenology, as opposed to 'trained introspection', and emphasized the importance of the structural elements of behaviour.

Structuralism still held sway and Tichener transferred Wundt's experimental approach to the USA. During the same period, Pavlov carried out his now famous work on conditioned reflexes. Watson assimilated the Pavlov's findings into a comprehensive theory of Behaviourism, but was very critical of the method of introspection used by the Functionalists. He stated categorically that psychology had as much need for consciousness as physics and chemistry. His model was strongly based on the Newtonian paradigm; humans were complex machines reacting to external stimuli. Causality was linear, and behaviour was predictable and explicable, by analysing either the stimulus or the response. Determinates were in the external world and psychology was a study of learning.

Behaviourism gained momentum at the beginning of this century with the contribution of Hull's work, and continued with the contributions of Skinner and his momentous work on reinforcement. Skinner maintained that consciousness, as an entity, did not exist. He also regarded values as consequences of either positive or negative reinforcement and advocated the scientific control of human behaviour.

> What we need is a technology of behaviour comparable in power and precision to physical and biological technology.
>
> (Skinner, 1975, p.3)

This is undoubtedly a construct strongly linked to the Newtonian paradigm and to this day forms the cornerstone of the mechanistic model of the behaviouristic school of thought. Linear causality is governed by atemporal laws that are predictable and controllable.

Psychoanalysis was based on psychiatry (the medical model, which in turn was founded on the natural sciences) and not on the psychology of the time. The Newtonian Zeitgeist, however, still influenced the climate, and according to Kendler (1987), the philosophy of Nietzsche 'anticipated' many of Freud's later ideas. Nietzsche's seminal ideas can be summarized as follows:

1. Psychic energy operates in a manner analogous to physical energy.
2. Humans are driven by unconscious motives.
3. Disturbing memories are forced out of consciousness.
4. Dreams are psychologically significant.
5. Sexual and aggressive instincts can be redirected to socially accepted ends.

6. Understanding and resolving conflicts between conventional morality and animalistic urges is therapeutic.

(Kendler, 1987, p.231)

The inter-relationship between physics, metaphysics, philosophy and psychology is thus demonstrated once more.

Freud always felt strongly that Psychoanalysis ought to be established as a scientific discipline, and tried to use the concepts of Newtonian physics. The four basic perspectives that he used to analyse the psyche were clearly extrapolated from the Newtonian basic principles mentioned above. These perspectives include a topographical analysis, a dynamic analysis, an economic point of view and an etiological analysis (Corsini, 1989).

Numerous authors have commented on Freud's use of an hydraulic model as the link between psychiatry and the physics of the time. (Brandt, 1982; Capra, 1989; Lilienfeld, 1978; Peterfreund, 1971).

Freud used psychological 'space' to locate the id, ego and superego. Other spatial metaphors such as depth psychology were fundamental, and the unconscious and the subconscious were seen to house subconscious and unconscious 'matter'. 'Dynamic' Psychoanalysis entailed discovering how conflicting 'matter' interacted by means of life 'forces' that were intrinsically separate from the 'matter'. These life-forces were the libido, and thanatos. Furthermore, catharsis was seen as the release of mutually inhibiting dynamic forces. These examples might be interpreted as clear illustrations of classical mechanics.

Psychoanalysis, like Behaviourism, is deterministic. Every psychological event has a definite cause (psychic determinism) and results in a definite outcome or effect. The psychological state of the individual is determined by the idiosyncratic 'initial conditions' of early childhood. The etiological analysis traces these causes and effects backwards in a reverse linear trajectory, and therapy must remain objective in the true sense of the word by maintaining the Cartesian division of mind and matter at all costs.

Freud, in contrast to the 'absolute truth' stance taken by many theorists at the time, recognised the limited nature of scientific models and realised that Psychoanalysis would have to be modified as science developed.

> Just as in quantum mechanics, knowledge in Psychoanalysis is never absolute or unequivocal. The description of the analysand, like that of the particle in physics, is never complete. A psychoanalysis is always incomplete (Freud 1937b) like all science (Heisenberg,1971b).
>
> (Brandt, 1982, p.72)

An historical and metaphysical analysis of the development of psychology, which was embroiled in the Newtonian World-machine paradigm, clearly shows how psychology simultaneously adopted the scientific model of the time, and how Logical Positivism and Historicism came about. The development is reminiscent of Descartes' tree of science analogy, and it is clear that his principles of 'res cognitans and res externa' exerted a strong influence on the formation of the main stream branches of psychology perceived currently.

The following section will examine the beginnings of the paradigm shift and the development of the Science of Complexity initiated by the discovery of thermodynamics and electromagnetics.

6.5. THE SCIENCE OF COMPLEXITY

Prigogine and Stengers (1984) state that the birth of the Science of Complexity took place unobtrusively as far back as 1811 when Fourier described mathematically how heat conduction takes place in solids.

It was thought, initially, that heat conduction caused by the movement of molecules could be explained from within the Newtonian paradigm. Evaporation of a liquid and temperature and pressure of gases could be understood from within a purely mechanistic model. Pressure, volume, chemical composition and temperature were, and still remain, the parameters used to describe macroscopic systems.

The fact, however, that heat actually transformed and altered the intrinsic properties of matter, did not fall so neatly into the Newtonian paradigm. The development of thermodynamics thus became the :

> ... science of the correlation among the variations in these properties. In comparison with dynamic objects, thermodynamic objects therefore lead to a new point of view. The aim of the theory is not to predict changes in the system in terms of the interactions among particles; it aims instead to predict how the system will react to modifications we may impose on it from the outside.
>
> (Prigogine & Stengers, 1984, p.106)

The first law of thermodynamics states that the total amount of energy in a process remains constant and is always conserved; it may change, but is never lost. This principle of the conservation of energy lead to a new phase in the theory of physics, and had far-reaching scientific and socio-cultural implications.

At the end of the nineteenth century, Maxwell, followed by Michael Faraday, studied electro-magnetic forces and added to the Newtonian concept of a dynamic 'machine' force, with a much more complex electro-magnetic 'field force'. They proved that the latter was a reality which could be investigated without any reference to 'matter' or material objects. This was the beginning of the theory of electro-dynamics which eventually culminated in the understanding that light was an alternating electromagnetic field travelling through space in the form of waves.

It was in this scientific climate that the second law of thermodynamics was formulated by Carnot in 1824. This law dealt with the dissipation of energy and stated that, following the first law (the principle of conservation), the total energy in a process remains constant, but the âmount of useful energy diminishes as it is 'dissipated' into heat, friction and so on. In mechanical processes a certain amount of energy is always dissipated and cannot be recovered, and, because of this, processes are not reversible as the dynamic model had postulated. This irreversibility was followed by the concept of the 'arrow of time', whereby processes move in a direction from order to disorder. The world could therefore not be a clockwork machine. It was beginning to be recognized that science was infinitely more complex than it had appeared to be during the Newtonian Age. The 'arrow of time' and, with it, the realization that irreversibility seemed a more appropriate theory, caste doubt on the concept of linear causality, resulting in theoretical uncertainty and dissension. Reductionism could simply not be applied to irreversible processes (Prigogine & Stengers, 1984).

In 1865 Clausius set out to calculate a mathematical distinction between the concepts of the conservation of energy (as set out by the first law of thermodynamics) and the theory of irreversibility (the second law); in so doing, he introduced the concept of entropy. Entropy (energy transformation or turning) was initially defined as the function explaining the distinction between the conservation of useful energy and that of 'dissipated' energy, that is irreversibly wasted in a process. Entropy is therefore a quantity that measures the degree of transformation of a physical system and, according to the second law of thermodynamics, can also be seen as a measure of disorder. According to Clausius' version of the second law, the entropy change in a reversible process is zero, while entropy always increases during irreversible processes.

> Any naturally occurring processes in an isolated system must be accompanied by an increase in the system's entropy, according to the Second Law. Entropy therefore furnishes an arrow of time for all isolated systems. The temporal evolution of an isolated system stops when the entropy attains its maximum value, when the system is at its most random state. The system has then exhausted all its capacity for change - it has reached thermodynamic equilibrium.
>
> (Coveney & Highfield, 1991, p.153)

It is important to remember, however, that for open systems, the state of maximum entropy must take the immediate environment's state of entropy into account as well, and for living organisms, thermodynamic equilibrium is only attained with death. The next task is to examine how thermodynamics can elucidate irreversible processes which are not in equilibrium and how this relates to the work of Prigogine (to be discussed in detail in a later section and only mentioned in the context of entropy at this point).

Non-equilibrium thermodynamics comprises two versions: the linear version describes the behaviour of systems close to equilibrium, while the non-linear version deals with systems that are 'far-from-equilibrium'.

Furthermore, a dynamic object could be controlled by its initial conditions, but a thermodynamic object can only be controlled by its boundary conditions (gradual changes in temperature, volume and pressure) and as Prigogine and Stengers succinctly state:

> Thus the 'negative' property of dissipation shows that, unlike dynamic objects, thermodynamic objects can only be partially controlled. Occasionally they 'break loose' into spontaneous change.
>
> (Prigogine & Stengers, 1984, p.120)

As discussed, entropy and the 'arrow of time' could not be explained by the laws of Newtonian mechanics. When Boltzmann's concept of probability showed that statistical laws could be utilized to explain the likelihood of processes, a semblance of clarity was obtained and Reductionists heaved a sigh of relief.

Some theorists felt that probability theory enabled the first law of thermodynamics to be understood from within the dynamic system, and a distinction was made between the problems of transition from the microscopic to the macroscopic level. A compromise could be made if it could be accepted that the second law is violated regularly in microscopic systems, but in macroscopic systems this law is almost a certainty. Still other theorists, such as Coveney and Highfield, maintain that, based on Prigogine's contentions, this distinction cannot be made.

> Once we relinquish the deterministic description based on trajectories, we have made a radical theoretical and philosophical reassessment based on the kind of knowledge available to us even for the simplest of situations. In place of a rigid deterministic framework and inflexible predictive power, we are 'reduced' to a statistical level, wherein determinism can find no place, and the future

> behaviour is unpredictable in anything other than a probabilistic sense.
>
> (Coveney & Highfield, 1991, p.279)

At the end of the Newtonian worldview era, the laws of nature were accepted as being far more complex than Newton and Descartes had ever imagined, but their underlying concepts were still accepted. At the beginning of this century, however, the development of the theory of relativity and quantum theory ended the era of Newtonian mechanics and the Cartesian world view, setting the stage for the development of the 'new physics' that saw the world as being far more complex than had ever been imagined. Theories were turned upside down, and paradoxes culminated in even more paradoxes. Before discussing the development of the 'new science', it is necessary to inspect what was happening to the science of psychology during the stage described as the Science of Complexity.

6.6. PSYCHOLOGY AND THE SCIENCE OF COMPLEXITY

As explained above, the main innovations in scientific thinking during the Science of Complexity era were brought about as a result of the discovery of the first and second laws of thermodynamics, the discovery of electro-magnetism, and the clarification of the principle of entropy and probability theory. The correlation between the variations in properties was noted and the environment was recognized to be of salient importance. In the dynamic framework, objects could be predicted and controlled by their initial conditions, but in the thermo-dynamic framework, they could only be controlled by their boundary conditions. Electro-magnetism showed that the field-force could be studied without reference to matter and the second-law of thermodynamics introduced the principle of irreversibility.

The metaphysical cornerstones of the edifice of the Newtonian world view were under siege.

In psychology, holism came to be recognized as a viable adjunct or alternative to the Cartesian mind-body dichotomy and Gestalt psychology became popular among German theorists, including Wertheimer, Kohler and Koffka. The key concepts of this school of thought were holism, transactions, phenomenology and 'nativism' (the term they used to describe genetic pre-programming). In summary the premises were outlined as follows:

> The fundamental formula of Gestalt theory might be expressed in this way: there are wholes, the behaviour of which is not determined by that of their individual elements, but where the part processes are themselves determined by the intrinsic nature of the whole. It is the hope of Gestalt theory to determine the nature of such wholes.
>
> (Wertheimer in Kendler, 1987, p.201)

Predictably, this brand of holism was rejected by Reductionists, but was adopted by many theorists and practitioners who were later to be seen as the forerunners of the Humanistic school of thought.

In the psychoanalytical camp, two of Freud's former followers broke away to form schools of thought that were more in accordance with the trends of the Science of Complexity.

According to Jung, libidinal energy was a result of the opposing forces of introversion and extraversion within the individual. Healthy functioning depended on a balance between these two psychological forces. He also felt that the unconscious entailed much more than a personal unconscious and included a collective unconscious that represented a deeper level of the human psyche, which was common to all man-kind. Jung also expanded on Freud's ideas concerning causality, by maintaining that psychological events and patterns could also be connected acausally. He introduced the term 'synchronicity' to describe the simultaneous occurrence of acausal connections between psychological events and happenings in the external world of reality (Corsini, 1985). Jung was indeed part of the Science of Complexity, but, as will be discussed in the final chapter of this thesis, he also anticipated the development of the 'new science' wherein patterns of mind and matter could be seen as reflections of one another, and events (following the findings of quantum physics) could be seen as waves or particles.

These examples could be considered to be indicative of the beginnings of the theoretical importance of boundary conditions, the role of the environment, 'field forces' and unpredictable causality in human behaviour. These beginnings were further elaborated on by Adler.

Alfred Adler was the theorist who most closely anticipated current systems' thinking, but because he was part of the Zeitgeist of his time, he could only formulate an appropriate temporal model. His work was the earliest to emphasize wholeness, purposefulness, openness and movement towards goal-directed states. For Adler, the fundamental driving force was self-assertion which was aimed at self-improvement that was harmonious with society. Mosak and Dreikus state that:

> We observe glimpses of Adler in the Freudian ego-psychologists, in the neo-Freudians, in the existential systems, in the humanistic psychologies, in client-centred theory, in rational-emotive therapy, in integrity therapy and in reality therapy.
>
> (Mosak & Dreikus in Corsini, 1973, p.75)

Adler's fundamental principles of holism, phenomenology and teleology were in accordance with the Zeitgeist of the Science of Complexity and, as suggested by Mosak and Dreikus, filtered through to various sub-divisions of the three main-stream schools of thought of the time. Psycho-analysis, Behaviourism and Humanism were all affected, initiating the beginnings of the conflict and chaos that currently face psychology.

This was, among other reasons, due to the fact that the basic metaphysical concepts underlying all three schools were gradually becoming increasingly contradictory and inappropriate. Causality, temporality and change were in a state of 'dissipation' and flux.

6.7. THE NEW PHYSICS

It is significant that physics, the science that gave rise to materialism should also be the instigator if the demise of materialism. During this century the new physics has tumbled the central tenets of materialistic doctrine in a sequence of staggering developments. It was early in this century that Albert Einstein published articles on two innovative theories - the 'theory of relativity' and a new understanding of electromagnetic radiation. These theories were destined to revolutionise scientific thinking as they demolished Newton's assumptions about space and time. The area in which the clockwork universe functioned was suddenly seen to be characterized by shifting and warping. The foundations of the theory of special relativity in this shifting and warping universe and which criticized the theory of the 'clockwork universe' because it could only refer to observers moving at **constant** velocities, were based on the criticism of the following principles:

1. .... : the laws of physics must be the same everywhere in the universe, no matter what the velocity of the observer.
2. The speed of light is constant and independent of the motion of the light source.

(Coveney & Highfield, 1991, p.76)

With his theory, Einstein went beyond Newton's purely mechanical theories, relativising physics and, with it, science as a whole.

> There is no privileged frame of reference in the universe to which other observations can be related in absolute terms.
>
> (Coveney & Highfield, 1991, p.77)

According to Einstein's Theory of Relativity, space and time are relative concepts - the concepts of absolute space and time of the Newtonian world view were no longer theoretically viable. In his theory, Einstein showed that space and time are always relative to the particular role of the observer, and even when the observer examines phenomena close to the velocity of the speed of light, space-time becomes a fourth co-ordinate which needs to be specified relative to the observer (Peat, 1987).

This relativistic framework also lead to the important realization that mass is essentially a form of energy and can consequently be transformed into other forms of energy. The idea that mass is a form of energy lead to a re-evaluation of the property of 'matter'. Mass, from the perspective of the New Physics paradigm, is viewed not necessarily as a material substance, but as 'bundles of energy'. All objects have these 'bundles of energy' contained in their mass and the relationship between this energy and mass is explicit in Einstein's famous equation $E= MC^2$ (with 'C' being the speed of light) (Hawking, 1990).

The change in the scientific view of matter also lead to a relativistic view of the forces acting between particles of matter. Significantly, force and matter could now be seen to have a common origin in the dynamic patterns of particles. Activity and energy are thus the essence of being and there are consequently no static structures in nature. There is a stability of dynamic balance and, by implication, change and irreversibility are nature's constants. This is important on a metaphysical level.

Einstein posited the idea of a four-dimensional existence in space and time, with his theory of relativity demonstrating that time perception depends on the observer's point of view. The theory also proved that Newton's absolute time was not theoretically viable, but Einstein did not elaborate on the phenomenon of the irreversible nature of the thermodynamic 'arrow of time' implied by his theory.

Then came quantum theory, which in turn totally transformed the image of matter. The old assumption that the microscopic world was simply a scaled-down version of the everyday world had to be abandoned. Newton's deterministic machine was replaced by an almost mystical and paradoxical conjunction of waves and particles.

Quantum physics was formulated at the beginning of this century by an team of physicists. This new aspect of physics was a significant paradigm shift in theory as it necessitated scientists adopting radically different perspectives in terms of the basic concepts of space, time, matter and causality.

Einstein's Theory of Relativity altered the scientific view of matter and atoms, and Quantum Theory revolutionized the ideas of subatomic particles. The conclusion made by $E=MC^2$ (that matter was in fact a form of energy) was also applicable to the world of microphysics. Electrons, protons and neutrons were not the tiny solid particles understood within the framework of classical physics, but had a dual nature, sometimes appearing as particles and at other times as waves. To further complicate matters, it became clear that these sub-atomic particles were capable of undergoing continual transformations from the one state to the other. Quantum mechanics gave science the theoretical framework from which to describe the continuous transformations of particles and waves into each other (Prigogine & Stengers, 1984).

Atomic objects, then, do not actually appear to have any intrinsic properties that are not related to the environment. Whether a particle-like or a wave-like attribute is found to be manifest, is dependent on the experiment and the researcher's perspective (Peat,1987).

In Quantum Theory, therefore, there are no objects, only inter-connections. On a sub-atomic level, the 'world-machine' could in no way be seen as a 'clockwork' model but became, instead, a network of inter-connections with a wave-like or a particle-like probability, but never a certainty, of existence. The observer becomes linked to the quantum system and disturbs the state of this system. While the macro level can be analyzed in terms of the quantum level, the quantum level is conditioned by the macro level. It is as if two mirrors reflect each other continuously.

Quantum Theory obviously had a revolutionary effect on the Newtonian approach, not only by changing the way physicists viewed their subject, but also by changing the worldview that was associated with it. Bohr stressed that quantum theory revealed the underlying indivisibility of nature, and Heisenberg's Uncertainty Principle (to be discussed in a following paragraph) showed the effect of the observer on the observed. The words of the physicist John Wheeler appropriately summarize the momentous change:

> We had this old idea, that there was a universe out there, and here is man, the observer, safely protected from the universe by a six-inch slab of plate glass. Now we learn from the quantum world that even to observe so minuscule an object as an electron we have to shatter that plate glass; we have to reach in there ... So the old word 'observer' simply has to be crossed off the books, and we must put in the new word 'participator'. In this way we've come to realize that the universe is a participatory universe.
>
> (Peat, 1987, p.4)

This conclusion was profound and, in the scientific world, caused great consternation for the Reductionists on the one hand and excitement for the anti-reductionism school on the other. What was physics as an exact science to do with the uncertainty implied by quantum mechanics?

Walter Heisenberg, in his significant work, 'The Uncertainty Principle', went on to elucidate these limitations in mathematical formulae. Essentially, the principle shows that when the scientist focuses on aspects such as particle, wave, position or velocity, there are pairs of inter-related aspects that cannot be defined at a precisely simultaneous moment. The more one is emphasized, the more the other becomes uncertain, and the relation between the two is understood by the 'uncertainty principle'.

> Heisenberg's principle says that in the sub-atomic realm it is impossible to know simultaneously the position and the momentum of that electron with any precision. If one wishes to measure the exact position at some instant, then

its momentum (or its equivalent velocity) cannot be known with any certainty whatsoever, and vice-versa.

(Coveney & Highfield, 1991, p.125)

The authors go on to state that Heisenberg's principle also has implications for the measurement of time, inasmuch as there are limitations to the accuracy with which energy can be measured within an interval of time.

Again, as so often happens in science, an answer posed another question: how could the relationships between these pairs of interrelated aspects be defined?

Part of the answer was found in Wolfgang Pauli's subsequent Exclusion Principle whereby it was shown that while certain of the particles (mesons and photons) move in symmetry, others, (electrons, protons, neutrons and neutrinos) move asymmetrically. Pauli thus discovered an abstract pattern lying beneath the surface of atomic matter (Peat, 1987).

Niels Bohr added to this by the introduction of the 'Principle of Complementarity' whereby descriptions of the particle both as a wave and as a particle were seen to be different explanations of the same reality. Measurements can be made of either coordinates, or of momenta, but not of both simultaneously. Both descriptions need to be given but both are subject to the limitations postulated by the uncertainty principle. Various perspectives about the same system may be complimentary inasmuch as they deal with the same reality, but it is impossible to reduce them to a umbrella description. In addition to this, all questions and descriptions imply a choice - of an event to be investigated or of a measuring device to be used. Because of this choice factor, the 'answer' can only give access to a limited reality.

> This implies a departure from the classical notion of objectivity, since in the classical view the only 'objective' description is the complete description of the system as it is, independent of the choice of how it is observed.
>
> (Prigogine & Stengers, 1984, p.225)

This Principle of Complementarity is an integral part of the way in which contemporary scientists view many aspects of nature.

(It is perhaps important to mention, at this stage, that Heisenberg also felt that what was truly fundamental in nature was not the particles themselves, but the symmetries that they followed). David Bohm further elaborated on this trend with his theories on 'active information' and the 'implicate order'. He postulates the existence of a quantum potential that carries information about the movement of particles, and hence results, in an implicate or enfolded order. The explicate order arises as it unfolds and enfolds within the implicate order of the whole (Bohm, 1980). It seems possible, according to this view (but not according to Prigogine and the Brussels school), that the subject matter of Newtonian science (explicate order and linear causalities) could be at the upper end of a hierarchy sustained by the implicate order of the quantum world.

As is well known, Einstein was involved with the seminal ideas of quantum mechanics, but firmly rejected the unpredictability and irreversible aspects of the burgeoning theory. His famous dictum 'God does not play dice with the universe' summarizes his rejection succinctly and his renowned EPR (Einstein, Podolsky and Rosen) thought experiment contended that there were deterministic variables underlying the non-local connections manifest by quantum particles. Much research has followed in an attempt to throw some light on this dilemma and, according to Coveney and Highfield:

> Unfortunately for Einstein and his followers, quantum mechanics won the day. That there do indeed seem to be faster-than-light connections between distant regions of space-time was confirmed in 1982 by Alain Aspect and his colleagues at the Institut d'Optique Theorique et Appliquee in Paris. Two quantum particles, in widely separated regions of the universe, somehow constitute a single physical entity. It would therefore appear that the potty and peculiar universe suggested by quantum uncertainty is upheld: God does play dice with the universe. And we must conclude that Einstein's vision of a deterministic reality fully described by science is an elusive chimera induced by our 'common sense' view of the world.
>
> (Coveney & Highfield, 1991, p.136)

Quantum theory has added a considerable amount of knowledge to science's understanding of matter and, as mentioned, has forced it to adopt a dual theory of time. One aspect is in accordance with classical dynamics retaining a similar concept of reversible time. Time, as understood within classical mechanics, remains a parameter, with the past and the future being equivalent. As theorized by Schrodinger's equation, time is reversible and deterministic as the reversible change of wave function corresponds to a reversible motion along a trajectory. Coveney and Highfield maintain that time has a 'second class' status in quantum mechanics because it is not regarded as 'observable' and, for this reason, the time-energy uncertainty principle is unclear. The other aspect, influenced by Heisenberg's Uncertainty Principle and Boltzmann's Probability Theory (in which only probabilities can be predicted), implies acausality and irreversibility.

> ... quantum mechanics has no choice but to postulate the coexistence of two mutually irreducible processes, the reversible and continuous evolution described by

Schrodinger's equation and the irreversible and the discontinuous reduction of the wave function at the time of measurement.

(Prigogine & Stengers, 1984, p.228)

The significance of Quantum Theory for Prigogine and Stengers lies in its introduction of probabilities to the sub-atomic world, and the fact that the wave function takes place in a deterministic manner in the measurement process, after the 'choice' has been made. Before that, probability is all that is possible to predict with certainty.

The authors go on to conclude that the coexistence of reversibility and irreversibility indicates that the classical view of a self-contained 'world-machine' is impossible at the microscopic level, and that one of the goals of science should be to facilitate a connection between the reversible 'arrow of time' world of classical dynamics and the complex macroscopic world of irreversible processes of the Science of Complexity. (This is part of the Prigoginian paradigm to be discussed in a later section.)

To summarise, and to add to the significant contributions that have stemmed from science during the Science of Complexity and during the initial stages of the New Physics, there remains the awareness for physicists that physics as a science, and as a 'stream of knowledge', seems to be heading to a non-mechanical reality, whereby the indivisibility of nature moves in an abstract symmetrical patterns of implicate order that unfolds and enfolds. It appears, furthermore, that the inter-relationship between mind and matter is far more significant than Descartes ever imagined.

This summary leads to two relevant questions. Firstly, is this physics, metaphysics or psychology that we are referring to?

Secondly, are Reductionism and anti-reductionism not becoming strange bedfellows in the conclusions drawn from the Science of Complexity, as implied by the words of Prigogine and Stengers?

The Science of Complexity has lead to the formulation of the metatheoretical approach postulated by the adherents of General Systems' Theory, whereby the world is seen in terms of integration, relationships and organization. This will be discussed in the following section.

CHAPTER 7. PSYCHOLOGY AND THE NEW PHYSICS

7.1. GENERAL SYSTEMS' THEORY

> When I consider the short duration of my life
> swallowed up in the eternity before and after,
> the little space which I fill
> engulfed in the infinite immensity of spaces of which
> I am ignorant and which know me not, I am frightened,
> and am astonished at being here rather than there.
>
> (Pascal Pensees, 1670 in Martin, 1977).

It is perhaps appropriate to begin this section with Sir Geoffrey Vickers' words on the critical implications of General Systems' thinking:

> The world is a complex of inter-related systems. Some are related hierarchically like the levels of organisation in as organism. Some are related laterally and functionally like the organs of the body or the departments of a business. Some are related by that strange mixture of competition and cooperation which an ecologist sees when he looks under a paving stone or into the Amazon jungle. Nearly all systems which include human beings are unstable and their instability is nearly always the unwilled results of man's actions, monstrously multiplied in power by technology, but not correspondingly informed by increased understanding.
> So the order of which we are a part of is of infinite complexity from the biosphere to the cell and far beyond. The extent to which we can redesign any part of it without disastrous impact on other parts is very limited and we do not know and probably cannot fully know its limitations. Moreover the limitation which we know best is the one most in conflict with our recent faith in linear progress. For

> the linear development of any element in any system is bound in time to be self-limiting or self-reversing or lethal to the stability of the system as a whole. Man the master of nature is a false myth. Man the steward has an unbearable responsibility.
>
> (Vickers, 1978, p.9)

7.2. BACKGROUND AND HISTORICAL DEVELOPMENT OF GENERAL SYSTEMS' THEORY

Dichotomies seem to characterize theories in flux. Norbert Muller, (1976) writes, from an applied mathematical perspective, that there are four dichotomies characteristic of system models. These are:

- Static versus dynamic systems;
- Stationary versus non-stationary systems;
- Deterministic versus stochastic systems, and
- Linear versus nonlinear systems.

He states that a system is dynamic if its variables are dependent on the course of time, and is stationary if its structure does not change over a course of time. In stochastic systems the events are influenced by random causes and random effects.

Muller states that:

> Usually, realistic system-models in the social sciences will be dynamic, non-stationary, stochastic and non-linear and, in addition possess a high complexity. Doubtless such systems cannot be handled analytically.
>
> (Muller, 1976, p.14)

This deduction from applied mathematics was anticipated by Ludwig von Bertalanffy who is acknowledged to be the 'father' of General Systems' Theory. Linear models, according to Von Bertalanffy (1969), formed part of the mechanistic approach of classical science, and were thus the foundation stone of Logical Positivism. As mentioned in previous sections, this approach concentrated on bivariate linear causal train processes, which are problems with causes and resultant effects. Kramer and De Smit (1977) elaborate on this and state that linear systems are characterised by 'homogeneity and additivity'. Homogeneity implies that a change in input by an amount of factor k, results in a change in output by an amount of factor k. A system is additive if the output for two inputs is equal to the sum of the outputs of the individual inputs.

Kramer and De Smit (1977) go on to state that a system is not linear if it does not satisfy both conditions of homogeneity and additivity. Furthermore, for systems with a memory, this may cause difficulties because the state of the system then always plays a role. It therefore appears that problems of 'organised complexity', which characterize most of the problems studied by the social scientist, are not easily solved when viewed from within a linear framework.

The reason for this, if one follows Von Bertalanffy's (1956) and Kramer and De Smit's (1977) deductive reasoning, is firstly that human behaviour is obviously far too complex and organized for the allowances of the linear framework. Secondly, if one takes Kramer and De Smit's (1977) criteria for linear systems as being reasonable and valid, it becomes clear that human behaviour cannot and does not meet the criteria of homogeneity and additivity, and cannot therefore be categorized as being explicable from within the linear framework. Furthermore, human behaviour would be characterized by having a memory and the state variable would thus play an important role. Behaviour can consequently not be the result of an identifiable cause, and neither could one cause result in a specific effect. This implies a complexity far beyond the reach of the linear framework for the solution of problems. In order to account for this complexity, Ludwig von Bertalanffy (1956) proposed the development of General Systems' Theory.

Von Bertalanffy's vision went far beyond providing solutions to isolated problems of organized complexity. He wrote that:

1. There is a general tendency toward integration in the various sciences, natural and social.
2. Such integration seems to be centred in a general theory of systems.
3. Such theory may be an important means for aiming at exact theory in the non-physical fields of science.
4. Developing unifying principles running vertically through the universe of the individual sciences, this theory brings us nearer to the goal of the unity of science.
5. This can lead to a much needed integration of scientific education.

(Von Bertalanffy, 1956, p.5)

Twenty years later, Kramer and De Smit (1977) summarized the functions of systems' thinking as providing a multi-disciplinary means of communicating with an inherently heuristic approach in the methodology. It therefore appears that Von Bertalanffy's original objectives were realistic and have, to a large extent, been attained.

To clarify, it can be said that the Systems' approach advocated by Von Bertalanffy (1956) and succinctly summarized by Kramer and De Smit (1977), is a non-linear methodology based on the following premises:

1. In order to cope with the fact of organised complexity, phenomena in general can be viewed as systems of interacting elements.
2. Reality is regarded in terms of wholes, and the essence of General Systems' Theory is that the whole is more than the sum of its parts.
3. The systems' environment is regarded as essential, systems in interaction with the environment as open systems, and systems not in interaction with the environment, as closed systems.

Kenneth Boulding in 1956 was one of the first to expand on the first premise mentioned above and to provide a theoretical hierarchy of systems.

He refers to General Systems' Theory as the 'skeleton of science' and sees the quest of General Systems' Theory as being to provide a systematic theoretical construct from which to discuss the general relationships of the empirical world. He outlines two possible approaches for structuring General Systems' Theory. The first is the observation of the empirical world from which several general phenomena, found in various disciplines, can be isolated. These general phenomena could then be used to construct general theoretical models relevant to them. The second approach is the method used by Boulding, outlined below.

He classifies the empirical fields of systems in a complex hierarchy and suggests a level of abstraction appropriate to each. This method leads to a 'system of systems'. Boulding classified nine such levels:

1. The most basic level is the static structure, which could be termed the level of frameworks. As an example of this, he cites the geography and structure of the universe.
2. The second level is the simple dynamic system incorporated in essential, predetermined motions. He views this as the level of clockworks and mechanics.
3. The next level would be a cybernetic system characterized by automatic feedback control mechanisms. This could be thought of as the level of the thermostat.
4. The fourth level is called the 'open system'. It is a self-maintaining structure and is the level where life begins to differentiate from non-life. This is the level of the cell, which is capable of the transmission of information.
5. Level five can be termed the genetic-social level. It is typified by the plant and pre-occupies the empirical world of the botanist. Certain cells have different functions from other cells, but there is still the quality of 'equifinal growth' on 'blueprinted growth'.
6. The sixth level is the animal system level which is characterized by increased mobility, teleological behaviour, and self-awareness.
7. The next level is the human level. The essential difference between this level and the sixth level is man's possession of self-consciousness and his capacity to think abstractly.
8. The eighth level is that of social organisations. The important unit on this level is not the individual,

but the organizational role that the individual assumes.

9. The ninth and final level is that of transcendental systems. This level makes allowances for ultimates, and the 'inescapable unknowables' which also exhibit relationships and systematic structures. (This is illustrated in this thesis by the use of paradigms and metatheories and it is also suggested that science as a body of knowledge could fit into this category.)

At present, varying degrees of knowledge exist at each of these levels. In each succeeding level, there is a lesser degree of completeness. An advantage of this classification, according to Boulding, is that it gives an idea of the gaps existing in scientific knowledge. General Systems' Theory can assist research of these 'gaps'.

Furthermore, each level interacts with increasing complexity with its environment. Each level can be compared with a corresponding level of complexity in another scientific discipline.

> Thus the economist who realizes the strong formal similarity between utility theory in economics and field theory in physics is probably in a better position to learn from the physicist.
>
> (Boulding, 1968, p.6)

The researcher, as an initial step, generally uses models of a lower level to study phenomena classified in a higher level. According to Kramer and De Smit (1977), adequate models are found at the first, second, third and, at most, the fourth level. They maintain that adequate descriptive models for practically all of the different sciences are found at the first level. As an example, they cite the use of an organisation chart in administrative sciences, explaining that this is using a first-level model in order to obtain insight into an eighth-level system.

Boulding's (1956) classification gives perspective to the risk involved in using a first-level model to obtain insights into an eighth-level system. Kramer and De Smit (1977) emphasize the fact that in using this method, a number of relevant aspects are omitted from the observation and thus from the conclusion. They stress the fact that the researcher should always bear this in mind and be aware of the risks involved in over-simplification in the analysis of phenomena. It was precisely this, which was the fundamental flaw in the framework of Logical Positivism. Linear causality, as a basic premise, was, and remains, an over-simplification which lead the entire body of science, including the social-sciences, on a long journey down a cul-de-sac.

Edgar A. Levenson (1978), elucidates the differing viewpoints of Structuralists and Systems' theorists. Structuralism postulates a basic infra-structure of organization of human thought and is, as such, concerned with the human sciences. General Systems' Theory, on the other hand, maintains that a hierarchy of structure exists in the real world and universe, which includes, but is not modeled on, human initiative and enterprise. General Systems' Theory maintains that the world, and indeed the universe, orders itself in this way. Structuralism maintains that this is how human beings and science order the world. 'Order', in terms of the former paradigm, always has and will exist, 'waiting' to be understood by scientists; in the latter paradigm, control and prediction are again coupled with understanding.

In summary, it appears that General Systems' Theory has provided an alternative map which is far more appropriate in understanding the complexities of the human sciences as well as the natural sciences. It is an open theory, making allowances for the development of new ideas and for relegating to history, theories and constructs that are no longer appropriate for the Zeitgeist of a particular theoretical time and milieu. General Systems' Theory does not claim to be an 'absolute'theory, but recognises the salient importance of incorporating seminal ideas that increase the validity of the basic theory. New roads and paths can be traversed, and different 'bird's eye views' can highlight the understanding of the terrain.

Systems' theory looks at the world and the universe in terms of the degree to which all phenomena are interrelated and interdependent. Within this framework, an integrated whole whose properties cannot be reduced to those of its parts is called a system. Living systems are organized in such a way that they form multi-level structures (Rademeyer 1978; Schoeman 1983). Each level consists of subsystems which are wholes in regard to their parts, and parts with respect to the larger wholes.

Molecules thus combine to form organelles, which in turn combine to form cells. The cells form organs, which also form systems in inter-relationship with other organs. This is clearly illustrated by the physiology of the body whereby the digestive system, nervous system, immune system and excretory system, inter alia, combine to ensure the optimal functioning of the human or animal body. Individuals in turn form families, groups, societies, peoples and nations. All of these entities can be regarded as wholes in the sense that they are integrated structures, but they are also parts of larger wholes at higher levels of complexity. **Parts and wholes in an absolute sense, therefore, do not exist at all.**

The term 'holistic' has a different meaning in the systems approach than in the linear model. In the latter framework, holistic, from the Greek 'holos' (meaning whole), referred to an understanding of reality in terms of integrated wholes whose properties cannot be reduced to those of smaller units. Koestler (1978), from a systems' approach, proposed the use of the term 'holon' to describe systems which can be both parts and wholes. He stressed the fact that each holon has two opposite yet complimentary tendencies: an integrative tendency as part of the larger whole, and an assertive tendency to ensure the preservation of its individual autonomy. In any healthy open system, there is a dynamic interplay between these two tendencies which maintains the flexibility and openness of the system as an 'holon'. Maruyama (1975) introduced the term 'autopoeisis' to define the system's tendency to maintain its identity or 'distinctive wholeness', and Dell elaborated on this concept as follows:

> If the organisation of a living system is circular then the organisation is a **closed** organisation ... The significance of organisational closure is that it directly implies autonomy ... Each living system has its own autonomous individuality because the nature of its structure fully specifies how the system will behave under any and all interactions. Interactions do **not** specify how the system will behave, the **system** specifies how it will behave.
>
> (Dell, 1985, p.6)

Karl Pribram also advocates the trend towards holism and states:

> I would like to see the label **holistic** become more respectable. For not only is the whole greater than and different from the sum of its parts, ... but the whole can under certain conditions also become enfolded in all its 'parts'. Thus each 'part' represents the whole, as in a hologram. Convolutional and matrix mathematics, the distribution of dissipative structures we are coming to know, allow holistic descriptions to be rigorously scientific and precise as any that have been used in physics, chemistry and biology.
>
> (Pribram, 1985, p.6)

Bearing Von Bertalanffy's (1956) seminal premises underlying the theory in mind, and taking cognizance of both Boulding's (1958) 'system of systems'and Koestlers (1978) clarification of 'holons', the next step is to give an overview of time.

7.3. GENERAL SYSTEMS' THEORY AND TIME

> 'The Garden of Forking Paths' is a picture, incomplete yet not false, as Ts'ui Pen conceived it to be. Differing from Newton and Schopenhauer ...[he] did not think of time as absolute and uniform. He believed in an infinite series of times, in a dizzily growing, ever spreading network of diverging, converging and parallel times. This web of time - the strands of which approach one another, bifurcate, intersect, or ignore each other through the centuries - embraces every possibility.
>
> (Borges, 1981, p.42)

It appears thus that Ts'u Pen in the 16th century was anticipating the concept of space-time that was part and parcel of Einstein's theory of relativity and also the dual particle - wave aspect of quantum mechanics.

> The theory of relativity does, however, force us to change fundamentally our ideas of space and time. We must accept that time is not completely separate from and independent of space, but is combined with it to form an object called space-time.
>
> (Hawking, 1988, p.23)

Miller's (1969) classic definition of systems specifies not only the importance of space, but also of time in understanding systems and their functioning.

> Systems are bounded regions in space and time, involving energy interchange among their parts which are functionally related.
>
> (Miller, 1969, p.44)

Early systems' theorists differed from current theoretical trends in their perspective of time. They rejected linear determinism and its implicit 'reversible' time, but did not elaborate on the concept of time. This resulted in the conceptualization of time tending to follow the trends set by Newtonian absolutism or Einstein's relative time. Only within the framework of the current 'chaos' in psychology has it become obvious that time as a metaphysical concept needs to be clarified further.

Hermeneutic theorists have added significant understanding to the conceptualization of time and thus, possibly, to the content of the contextual framework of General Systems' thinking as a whole.

Time, from this perspective, is seen not as something only as linear or spatial, but as '... directional and relational; the past exists in the now as the 'from whence' and the givenness of the present, the future exists in the now as the 'to whence', its possibilities' (Faulconer & Williams, 1985).

This viewpoint is strongly reminiscent of the so-called current 'fundamental' theory of quantum mechanics. Determinism and linear causality imply reversibility, and it is mainly the principle of 'possibilities' and the tenet of unpredictability of the hermeneutic framework, that differentiates hermeneutic theory from the classical viewpoints.

> ... in such deterministic theories, time is relegated to a subordinate role: whichever way time is taken to unfold, the entire future, as well as the past, is contained within the present - all three are in a sense aspects of one and the same thing.
>
> (Coveney & Highfield, 1991, p.261)

The hermeneutic theorists further explain that time is not a vacuum, since it is not something contentless that living systems merely fill or pass through. The significance of time, for them, is encompassed in what living systems actually do, and therefore, for the open systems that characterize all living systems, there exists irreversible directionality with numerous possibilities that are difficult if not impossible to predict.

This framework is obviously more complex that the linear learning framework and clarifies different aspects of learning more succinctly. It can also be seen that the theoretical formulation of General Systems' Theory is continually elaborating its structure and, in so doing, remains an open system itself.

Contemporary physics, as mentioned, views time as part of the concept of space-time and sees the increase of disorder or entropy as an example of the arrow of time as this is something that distinguishes the past from the future and in so doing gives time a direction.

Stephen Hawking states that there are at least three different arrows of time.

> First, there is the thermodynamic arrow of time, the direction of time in which disorder or entropy increases. Then, there is the psychological arrow of time. This is the direction in which we feel time passes, the direction in which we remember the past but not the future. Finally, there is the cosmological arrow of time...
>
> (Hawking, 1988, p.145)

Our subjective sense of the direction of time is determined within our brain by the thermodynamic arrow of time. We remember things in the order in which entropy increases. The act of measuring is again a concept of choice just as the wave-particle measurement of quantum physics is.

> This makes the second law of thermodynamics almost trivial. Disorder increases with time because we measure time in the direction in which disorder increases. You can't have a safer bet than that!
>
> (Hawking, 1988, p.147)

During the 1970's, the field of cybernetics in the social sciences underwent a change. Bateson (1979), Maruyama (1975), and Von Foerster (1978), all proposed a second-order cybernetics as opposed to the first-order cybernetics of the engineers and robot builders. According to second-order cybernetics, living systems cannot be seen as objects that could be programmed from outside (as the linear model maintained), but rather as self-determining independent entities. The concept of self-determination is in stark contrast to the determinism of linear causality. The Newtonian paradigm, and with it linear causality, was followed by the science of complexity, characterized by multilateral, mutual causality. This, in turn, has made way for the 'New Physics' and the concomitant causality characterized by unpredictability. The work of Ilya Prigogine is the current culmination of the latter trend.

The following section deals with the work of Ilya Prigogine as the foremost exponent of exciting new ideas that have bearing on the direction in which the body of science, and with it psychology, could be heading.

CHAPTER 8. THE PRIGOGINIAN PARADIGM

Ilya Prigogine was born in Russia in 1917. He was awarded the Nobel Prize in 1977 for physical chemistry for his monumental work on the 'dissipative structures' that develop out of non-linear processes in non-equilibrium systems. In his work, he focused on those aspects needing urgent attention in the light of the status-quo of scientific theory which had come to terms with quantum theory and the theory of relativity, but which was faced with theoretical dilemmas in terms of the phenomena of disorder, instability, diversity and non-linear relationships (Prigogine, 1980).

As previously mentioned, Prigogine and Stengers (1984) recognized the salient importance of Newtonian mechanics for the operations of closed systems, and accepted the dual temporal/atemporal nature of quantum mechanics. The focus of their attention has, however, been the unanswered questions relating to the functioning of the 'open systems' that characterize much of the world in which we live.

They recognized the merits of qualified reductionism for closed systems. They argued forcibly, however, against the existence of a true 'fundamental' level in nature, because each level would need its own unique description and, as postulated by quantum theory, would be conditioned by the levels around it and the observers studying it. The implication, clearly, is that absolute reductionism could never work whenever one level is chosen as a basis; it will be found to depend, for the definition of its concepts, on the levels surrounding it and the context of its meaning.

Before detailing an analysis of the salient concepts of this paradigm, a short synopsis will be given to place the theory in an holistic perspective.

It seems probable that Prigogine's framework developed out of general systems' thinking and could be interpreted as a theory which deals with and clarifies certain aspects of formerly vague general systems'concepts. By so doing it adds salient theoretical information to General Systems' Theory as a metatheory. Prigogine's framework comprises systems containing subsystems that are continually fluctuating. This coincides with system's thinking, but the crux of the new development is that disorder can be 'the order of the day' and is not necessarily negative or destructive. A central concept is that order and concomitant organization can and do 'spontaneously' arise from this disorder and even from the chaos that could possibly ensue from this disorder; this 'order' occurs through a process of 'self-organization' which is also a fundamental concept of general systems' thinking in orderly functioning. The theory also throws new light on topics such as equilibrium and entropy.

Prigogine and Stengers maintain that, in the light of their experimental research, it seems as if entropy may actually produce order and organization as well us undermine it. Entropy thus has a 'mutualistic' function not previously recognized, and has positive as well as negative properties and potential.

Because fluctuating systems are subject to the laws of feedback, they often find themselves in a state of disorder. It can happen that, at a 'singular moment' or 'bifurcation point', the system may disintegrate into total chaos or 'leap' on to a new, more differentiated, higher order, which these theorists have named 'dissipative structures'. One key concept of this phenomenon is that these dissipative structures require more energy to sustain themselves because they are more complex. Another is that it seems these structures, which arise out of so-called irreversible disorder, can eventually operate on an higher level of organization than they previously did.

Darwin's theory of evolution and the Prigoginian paradigm meet on a different level. Clarity and optimism are added to the rather pessimistic view of entropy and the second law of thermodynamics within the framework of the 'Science of Complexity'. Entropy does not necessarily drain the energy systematically out of a system, resulting in homogeneity before extinction. Rather, the conclusions of Darwin and Prigogine, made at different times and from different starting points, meet to predict a world that, in many ways, becomes more organized on a higher level of complexity with the passing of time. **This is the world as we know it.**

Finally, this paradigm implies that it is theoretically possible to form a synthesis between chance and determinism, and this premise is of salient importance to the conclusions of this thesis.

> Thus, according to the theory of change implied in the idea of dissipative structures, when fluctuations force an existing system into a far-from-equilibrium condition and threaten its structure, it approaches a critical moment or bifurcation point. At this point, it is inherently impossible to determine in advance the next state of the system. Chance nudges what remains of the system down a new path of development. And once that path is chosen (from among many), determinism takes over again until the next bifurcation point is reached.
>
> (Prigogine & Stengers, 1984, p. xxiii)

8.1. THERMODYNAMICS AND ENTROPY

In a previous chapter, the laws of thermodynamics were discussed in detail, together with the theoretical development of the topic from classical dynamics through to the science of complexity and ultimately to the 'new science' of quantum mechanics and relativity. These phases synoptically correlate with the study of matter and forces at equilibrium, in the 'close-to equilibrium' region, and, finally, in the 'non-equilibrium' region. On a metaphysical level, causality begins with rigid determinism, moves on to multilateral mutual causality and finally, unpredictable causality forms the essence of the basic train of thought.

Lars Onsanger's (in Prigogine & Stengers, 1984) theory of 'reciprocal relationships' (which analyzed the inter-relationships between forces in processes) resulted in a shift of interest from the concept of equilibrium to that of non-equilibrium. The theorem of minimum entropy, in linear regions with boundary constraints, supported Onsanger's theory but showed that systems do not necessarily move towards non-equilibrium, but often to a state of inertia.

> Linear thermodynamics thus describes the stable, predictable behaviour of systems tending towards the minimum level of activity compatible with the fluxes that feed them.
>
> (Prigogine & Stengers, 1984, p.139)

What is the nature of the connection between organized simple life forms, which can be described according to their initial states and their boundary conditions, and more complex forms, in which disorder and even chaos can ensue? Is it at all possible to describe open systems according to their initial states?

Prigogine and Stengers answer the latter question in the affirmative, and describe the connection between the process. The thermodynamic forces acting on a system can be such that the system can be nudged, or pushed, into a state of fluctuation or turbulence. This has been demonstrated by the experimental methods of thermodynamic theorists such as Benard (in Prigogine & Stengers, 1984), who proved the 'Benard Theory of Instability', and showed that heat transfer, which was initially considered to be a waste in classical thermodynamics, can in fact can be proved to be a source of order.

> The interaction of a system with its outside world, its embedding in non-equilibrium conditions, may become in this way the starting point for the formation of new dynamic states of matter-dissipative structures.
>
> (Prigogine & Stengers, 1984, p.143)

The Benard experiment, cited as a classic example of the Second Law of Thermodynamics, shows that when flows of matter and energy sustain a system 'far from equilibrium', it is possible for new forms and orders of structure to develop. This experiment is illustrated in physical chemistry by the following: when a pan of water is slowly heated on a stove, heat at first moves upwards into the cooler water by conduction. Since no part of the liquid is 'far from equilibrium', the surface is smooth and undisturbed. As the water at the bottom becomes hotter, and therefore less dense, it tries to rise, while at the same time cooler water falls from the top. Under these competing flows the water is 'far from equilibrium' and contains a mixture of flows, whirls and eddies. As the rate of heating continues to rise, however, a critical point is reached at which the whole system moves from disorder to order. This occurs when heat can no longer be dispersed quickly enough through random movement alone, and the little eddies are suddenly magnified into large-scale flows, causing random movement to change to a series of large scale convection currents.

For Prigogine and Stengers this onset of order is a 'spectacular phenomenon', since millions of molecules suddenly move coherently instead of in a chaotic and random way. They go on to state that, if the gradient of temperature is increased even further, the convection patterns will become more complex; oscillations will again occur and the ordered aspect of convection will be destroyed.

All such dissipative structures are maintained at the expense of a constant consumption of energy, releasing large amounts of entropy into their external environment. Prigogine and Stengers claim that the living universe manifests itself in many different ways, but the emergence of meaningful patterns are ubiquitous in nature.

They also state that living systems appear very complex from the thermodynamic point of view, because certain reactions are 'close to equilibrium', while others are definitely 'far from equilibrium' and still others are 'far, far from equilibrium'. To illustrate this, they liken the flow of energy in living systems to that of the flow of a river. The movement is generally smooth and regular, but at times it descends over rapids and waterfalls. This movement liberates part of the energy contained and can, by implication, bring it to a 'bifurcation point'.

8.2. BIFURCATIONS AND SYMMETRY BREAKING

Bifurcation points are regions of extreme instability 'far from equilibrium', from which dissipative structures emerge.

> At equilibrium or near-equilibrium, there is only one steady state that will depend on the values of some control parameters ... as the system is pushed farther and farther away from equilibrium at some point we reach the threshold of the stability of the 'thermodynamic branch'. Then we reach what is generally called a 'bifurcation' point.
>
> (Prigogine & Stengers, 1984, p.160)

These points in space and time contain the nuclei of future structures. At a bifurcation point, which is nature's supreme point of change and chance, a system may move in one of several possible directions, each of which will give rise to a new structure. Recent research has shown that matter acquires new properties in 'far from equilibrium' conditions and can 'perceive' external fields, such as the gravitational field, as non-equilibrium 'magnifies the effect of gravitation'. This implies the possibility of intrinsic pattern selection even at a 'lower' hierarchy (the scientist asking the questions merely stands from the vantage point of a participant-observer and elucidates the various forces and patterns that are at work).

The 'Feigenbaum Sequence' quoted by Prigogine and Stengers deals with time and the development of deterministic and stochastic processes.

> The 'historical' path along which the system evolves as the control parameter grows is characterized by a succession of stable regions, where deterministic laws dominate, and of instable ones, near the bifurcation points, where the system can 'choose' between or among more than one possible

> future. Both the deterministic character of the kinetic equations whereby the set of possible states and their respective stability can be calculated, and the random fluctuations 'choosing' between or among the states around bifurcation points are inextricably connected. The mixture of necessity and chance constitutes the history of the system.
>
> (Prigogine & Stengers, 1984, p.169)

In previous sections attention was focused on science as a whole, and psychology as a science. In an attempt to shed light on the status quo, the development of physics as a science was discussed, and the parallel or sequential development of psychology described. General Systems' Theory as a current metatheory was examined in detail and, finally, the theoretical possibilities of the Prigoginian paradigm, as an adjunct to General Systems' Theory, were discussed.

The theory of the Prigoginian model has the potential to add to and clarify certain process aspects of the General Systems' Theory, providing further clarification for the theoretical and metaphysical dilemmas that beset contemporary psychology. The seminal ideas that make this possible will be discussed in more detail in the following chapter.

It is also significant to note that this combination of General Systems' Theory as a metatheory with the Prigoginian paradigm added to it seems to have filtered through to science as a whole with the development of the current 'Science of Chaos'.

> The movement towards a 'post-mechanistic paradigm, a paradigm suitable for 21st-century science, is taking place across a broad front: in cosmology, in the chemistry of self-organizing systems, in the new physics of chaos, in quantum mechanics and particle physics, in the information

> sciences and (more reluctantly) at the interface of biology with physics. In all these areas scientists have found it fruitful, or even essential, to regard the portion of the Universe they are studying in entirely new terms, terms that bear little relation to the old ideas of materialism and the cosmic machine. This monumental paradigm shift is bringing with it a new perspective on human beings and their role in the great drama of nature.
>
> (Davies & Gribbin, 1991, p.2)

In the context of irreversible processes, dynamical chaos (which is anything other than pure mayhem) coexists with self-organization. The latter furnishes an arrow of time but also has within it the cycles and patterns which are part and parcel of the functioning of the world around us. The new Science of Chaos has taken metaphysics from a deterministic description of the world based on predictable behavior to one that is based on probabilities. Within this framework it is possible to describe an entropy that increases with time and the great divide between time symmetrical laws and the Second Law of Thermodynamics can be bridged.

The Science of Chaos elucidates how the arrow of time fits both within Newton's theory and quantum theory and in so doing theoretically justifies creative evolution. As stated, the science of chaotic systems can also be incorporated within General Systems' Theory as a metatheory as it clarifies hitherto unclear concepts as to the functioning of disorderly systems. To gain greater clarity the basics of the current trend will be discussed briefly.

8.3. THE SCIENCE OF CHAOS AND FINDING ORDER IN CHAOS

The trends initiated by Prigogine and his co-researchers at the Brussels School also seem to have filtered through to the different fields of natural science such as climatology, physiology and biology inter alia and these trends have even been remarked upon by popular magazines such as Newsweek. A current article states that for the past 10 years a new school of thought has been emerging amongst contemporary scientists and the main characteristic of this current trend is that chaos is seen as a basic world order with the following characteristics:

Chaotic systems can begin in an orderly fashion and can subsequently dissolve into complete disorganization; in a chaotic system almost identical starting points can evolve into completely different end-points that nontheless show extreme sensitivity to the initial conditions; the evolution of chaotic systems follows mathematical rules known as the equations of chaos and the course of chaotic systems cannot be predicted but the 'constraints on it's behavior can be '

> That's because it's behavior tends toward a certain position, or state, called a strange attractor. The strange attractor defines the universe of possibilities for a system...But while the attractor lays out all the possibilities, exactly which one the system will choose is unknowable.
>
> (Newsweek, May 25th 1992, p.47)

It seems then that the trends in the different sciences are converging into one current metaphysical viewpoint whereby order and disorder are both seen as part and parcel of the reality of the world as we currently know it. Chaos is not seen to be necessarily destructive but is a possible milieu that exists in nature in coordination with order and structure. Furthermore, chaos can be the matrix out of which higher order functioning developes.

CHAPTER 9. THE IMPLICATIONS FOR PSYCHOLOGY WITH REFERENCE TO THEORY AND PRACTICE

Previous theoretical sections have dealt with the interrelationship and theoretical integration of physics, metaphysics and psychology. Schoeman (1991), in an article discussing separatism and trends towards integration also came to the conclusion that the time is ripe for attempts to be made to integrate the various schools of thought found in psychology on a metatheoretical level. In accordance with the Zeitgeist of the time, the task of this thesis has been to generate some ideas that could throw a little light on these attempts and to integrate aspects of science as the 'body corporate' as a whole and the different streams of psychological theory as parts of this whole.

It is clear therefore, if all foregoing literature study is taken into account, that **any attempts at integrating some of the disparate trends in contemporary psychology will have to consider the metaphysical aspects of causality and temporality as well as change.** It is also essential that **order** as well as **disorder** be contained in the integration and that cognizance is taken of **chaos.** This section will thus move between these metaphysical criteria, the three main streams of thought in psychology on a metalevel and psychotherapy on a microlevel. The relevant contributions of the salient finds of contemporary physics will be referred to continuously. It has been obvious throughout this study that it is the metaphysical foundations that ultimately form the cornerstones of the edifices of the three main streams of psychology, and in the final analysis form the basis of the internecine strife that characterizes theoretical as well as practical psychology.

As stressed previously, a distinct reality does seem to be the limitations of man and thus of scientific knowledge as a whole. One of the most important albeit unfortunate realities that scientists of all disciplines have had to come to terms with in the last century, is that the 'truths' that we all deal with are limited and approximate descriptions of the temporal reality within which we find ourselves. It thus seems probable that the hopes and aspirations of the Newtonian revolution are unlikely to be attained (Bergmann, 1967; Cottingham, 1984; Hanfling, 1981; Vision, 1988; Weitz, 1966).

As has become apparent, these implicit scientific limitations have resulted in uncertainties and heated debates as to the precise nature of truth and how, for example, causality and time can be understood. Historically, many of the absolute truths that were dogmas within the Cartesian framework have, in contemporary times, been questioned, challenged and even relativized or negated (Vision, 1988). A 'paradigm shift' in Kuhn's (1962) terminology has indeed taken place.

As discussed in an earlier section and repeated here for emphasis, the Cartesian framework was based on fundamental dualities with a far-reaching history dating back to the debates of the earliest philosophers. These dualities have resulted in epistemological and methodological problems that have repeatedly come under the spotlight throughout the history of psychology and philosophy and also set the stage for the theoretical nightmare of the dichotomy between subjectivity and objectivity and all the polemics that have subsequently ensued around that particular conundrum.

> The consequences of Descartes' dualism were, inter alia, the schools of mechanistic biology on the one hand and the introspective school of psychology on the other.
>
> (Beison & Peters, 1972, p.53)

The debate still continues - the arguments have become more sophisticated, but the conclusions remain equally illusive and

always seem to eventually focus on the metaphysical concepts of causality and temporality and the implications these concepts have for the study of any form of change, gradual or sudden.

Linear causality, as has been repeatedly mentioned was the fundamental deterministic principle underlying the framework of Logical Positivism, and has to a large extent been ousted and replaced by the complexity of multilateral mutual causality and with the implicit unpredictability that characterises holistic system functioning.

The relationship between causality and temporality is clear as the Cartesian tenet of linear causality resulted in the logical premise at that stage that time was theoretically reversible. This, in contemporary science including physics, psychology and philosophy has given way to the tenet of unpredictable, irreversible directionality that fits so adequately within the theory of the hermeneutic school of thought, existentialism and into the 'science of complexity' of the physicists. In this new physics, absolute time and space do not exist as Einstein's Theory of Relativity, Heisenberg's Uncertainty Principle and the team discovery of Quantum Theory have catapulted basic scientific thinking onto another dimension. This has in turn revolutionized modern science and, with it, psychology, as part of the system of science as a whole (Brandt, 1973; Capra, 1977; Beison & Peters, 1974; Prigogine,1984).

It does therefore indeed seem as if science as a whole, and psychology as part of the whole, is experiencing a paradigm shift and this could theoretically be experienced as a crisis. **What is important for this thesis is that the so called crises are seemingly ultimately based on the metaphysical tenets of causality and temporality with the implications these tenets have for the process of change.**

In the introductory paragraph of this chapter, the goal of this work was detailed before emphasizing the significance of the metaphysical concepts. Before moving on to discuss the integrative possibilities envisaged however, the basic question and problem of this thesis needs to be addressed. This is the question as to whether psychology as a science is truly in a veritable state of crisis and chaos because of the multiple disparate points of view that characterize it. The perspectives of the new science of chaos make it possible to rephrase these crises facing contemporary psychology in a more positive light as it seems that psychology is indisputably part of the world-body of science even as it manifests it's own so called chaos and crises. There is a therefore a strong possibility that psychology will develop a 'higher order' of functioning than its previous functioning if the theory of dissipative structures is valid. This premise predicts a positive future for psychology as a science in contrast to the pessimistic future predicted by the 'prophets of doom'. Furthermore, psychology's parallel development with physics even in this trend, is illustrated by Prigogine and Stengers' observations about the development of physics:

> This feeling of confidence in the 'reason' of nature has been shattered, partly as the result of the tumultous growth of science in our time. Our vision of nature is undergoing a radical change toward the multiple, the temporal and the complex...We were seeking general, all embracing schemes that could be expressed in terms of eternal laws, but we have found time, events, evolving particles. We were also searching for symmetry, and here also we were surprised, since we discovered symmetry-breaking processes on all levels, from elementary particles to biology and ecology.
>
> (Prigogine & Stengers, 1984, p.292)

It seems conspicuous from the foregoing that both physics and psychology were contending with the same scientific conundrums and paradigm shifts simultaneously.

The second issue entailed in the goal of this thesis is currently relevant and this is the integrative possibilities that a metatheory offers.

9.1. THE NEED FOR A METATHEORY

In the introductory chapter to this thesis, mention was made of Lewin's dictum that there 'is nothing as practical as a good theory'. There are many 'good theories' in the science of psychology, so many in fact that the status quo is sometimes reminiscent of a tower of Babel situation. Throughout this work, any form of absolutism has been criticised vehemently and the important contributions of the many 'good theories' have constantly been mentioned. In the light of current knowledge a serious attempt has been made to theoretically validate the use of the practical strategies and techniques that the different schools of thought have to offer. It was also mentioned in the section on eclectism that any integrative model would have to offer more than an intuitive, preferential choice of strategy selected from any school of thought as the solution, and this has been one of the primary goals of this work. It was however not the intention to add any new theory, but rather to integrate and substantiate the existing practicalities theoretically so that eclectism could be seen in a more feasible theoretical light. Greenburg and Pinshof (1986) state that eclectism seems to be the practical modus operandi chosen by the majority of therapists and Goldfried (1980) writes that there are more than 130 therapeutical approaches. This means that there is an implicit overlap if there are theoretically only three main streams of thought and also implies that there are very few theoretically and practically pure behaviorists, psychoanalysts or existentialists in the field. As mentioned earlier, in spite of this however, Corsini eliminated eclectism from his (1985) edition and Smith (1982) writes that ' there seems to be dissatisfaction with the term eclectism per se'.

Goldfried (1980), in contrast to Schoeman (1991) maintains that integration seems unlikely on a theoretically philosophical level but is possible on a level of technique. In so doing, he also intimates the importance of eclectic thinking. He goes on to say that the most significant integration would be on a level of strategies and principles of change. It is however a fundamental premise of this thesis that unless the integration is firmly based on a philosophical, metaphysical basis it will not survive the test of time as it is has been shown that it is on this level that theories ultimately stand or fall. At this stage of theoretical knowledge, it does seem to be possible, despite Goldfried's doubts to integrate the main streams of thought on a metaphysical level. This was touched upon in the previous chapter and will be elaborated on in a later section.

It is also suggested that Lewin's maxim be slightly changed to 'there is nothing as practical as a good metatheory' as a metatheory that can offer suggestions and possible solutions to the integration of the schools of thought in a theoretically sound manner can surely be the beginning of clarifying the dilemma that besets psychology.

It is essential that the divergent and differing viewpoints that characterize psychology and that are cause for concern among numerous adherents of the science, be contained in an order or system that makes allowances for contemporary metaphysical viewpoints. As has been pointed out continuously throughout this thesis the interrelationship between psychology and physics has firm historical foundations. So, to keep in line with this trend it would also surely be advisable for contemporary psychology to take cognizance of some of the important current findings of physics. Not to do so would possibly be perilous for psychology as a science as there could be a danger of it being 'left out on a limb ' as it were and being relegated to the backwaters of the development of the greater body of science as a whole.

Again, Levenson (1978) clearly showed via General Systems' Theory that the interrelationships between the sciences and the Zeitgeist has a momentum and intrinsic characteristics that perpetuate sui generis. The conclusion reached is that the most scientists can hope for is to recognize and understand some of these characteristics at a particular point in space-time and that a fundamental reality of science still remains that no measurement, no experiment or observation is possible without a relevent theoretical framework. This further accentuates psychology's need for a suitable metatheory.

Contemporary psychology could be able to unite some of the many disparate points of view that seemingly cause the so called 'conflict and chaos' into a encompassing model via a metaphysical and a physical science route within the framework of General Systems' Theory as a metatheory if the Prigoginian paradigm is utilized as an adjunct to General Systems' Theory.

This is because the Prigoginian paradigm recognizes the dual nature of causality and the significance of disorder as well as order in system functioning. It also clarifies the sequential nature of system functioning as the system possibly moves from a state of equilibrium into disequilibrium and sometimes even into disorder and chaos.

Quantum theory on another level could be another means of integrating disparate frameworks into a basic quantum psychology. The latter could theoretically explain the essence of any therapeutic encounter from any school of thought as a fundamental process. Quantum theory could also possibly provide a model of consciousness if the thoughts of David Bohm could be elaborated on:

> We may well now ask whether the close analogy between quantum processes and our inner experiences and thought processes is mere coincidence...the remarkable point by point analogy between thought processes and quantum processes would suggest that a hypothesis relating these two may well turn out to be fruitful. If such an hypothesis could ever be verified, it would explain in a natural way a great many features of our thinking
>
> (Bohm, 1986, p.29)

Quantum theory and psychology will be elaborated on further in a later section; the immediate task is to examine General Systems' Theory as a metatheory and to survey the studies that have attempted to utilize General Systems' Theory as a integrative model.

9.2. PSYCHOLOGY AND GENERAL SYSTEMS' THEORY

To keep the metaphysical criteria of temporality and relativism in mind it seems appropriate to reiterate Karl Popper's words;

> I admit that at any moment we are prisoners caught in the framework of our theories; our expectations; our past experiences; our language. But we are prisoners in a Pickwickian sense: if we try we can break out of our framework at any time. Admittedly, we shall find ourselves again in a framework, but it will be a better and roomier one; we can at any moment break out of it again.
>
> (Popper, 1970, p.56)

As mentioned in a previous section, theory is a formal statement of vision in the realm of science and belongs to the realm of scientific endeavour that is the effort to learn more about and understand more about the complexities of nature. A good theory is a bridge of thought connecting facts and should imply a relationship between them. In psychological theory, therapy is a culmination of the aforementioned and rich theory can and has resulted in a spin off of many different ideologies in different areas of interest and speciality. To turn a full circle and to reiterate Kurt Lewin's words quoted in the introduction of this thesis, indeed, 'there is nothing as practical as a good theory'. However, the value of these 'spin-offs' is temporal and limited and subject to drastic change as new knowledge leads to new discoveries that render the old knowledge redundant and obsolete. This has in reality been the fate of numerous content specific theoretical viewpoints.

General Systems' Theory however, is not a theory with a specific content. Rather, it is a 'theory about theories' or a metatheory. In Boulding's words, it is an attempt 'to establish the general relationships of the empirical world' (1968). Unlike mathematics, which can exist without any specific content, and scientific theories which are content-specific, General Systems' Theory makes a concerted effort to bridge the gap between the two entities of knowledge and to establish a metatheory which could define the relevant communalities of all science. It's purpose would be to relate different aspects of scientific knowledge to each other and make it possible to inquire as to how different systems operate similarly at the same level of complexity. This is partially the content of this thesis with the emphasis on the interrelationship between physics, metaphysics and psychology. This interrelationship could also be extrapolated to the different streams of thought in psychology if they could be seen as systems operating at the same level of complexity within the science of psychology but with each focussing on different essentials of psychological functioning. To use Descartes' tree analogy again, the trunk could be the essentials of quantum psychology and the branches the different schools of thought. All are integral but none are absolute.

Lazlo (1972) also uses the hierarchical framework to order and view the entire universe. At the base of the hierarchy he places the space-time (and per implication causality) metaphysical aspects and above this in an ascending order, he places the elements of energy [electrons, nucleons, photons, quanta and atoms]; above this in ascending order come the stratified sytems of molecules, crystals, colloids, cells and protoorganisms; these are followed by organisms, sociosystems and ecosystems eventually culminating in the global system. Thereafter the macrohierarchy consists of stars and planets, stellar clusters, galaxies and galaxy clusters and all aspects of the astronomical universe.

In Lazlo's hierarchy, the interrelationships of the study of the various sciences is implicit and for the purpose of this thesis in particular, the interrelationship between the study of physics, metaphysics and psychology is obvious. Descartes' tree analogy still holds good even though his hierarchy was more simplistic than Lazlo's. The base (Descartes' roots) still remains metaphysical.

Lazlo felt that it was not the task of General Systems' Theory to explain phenomena within each of these levels as this was the task of the individual specific sciences within which different systems approaches were being developed independently. The task of General Systems' Theory would be to coordinate these independent models into a general theory of systems.

Another important fundamental premise is that General Systems' Theory postulates an hierarchy of structure in the real world and even in the universe that includes but is not purely a construct designed by man. The order is sui generis as it is 'how the world orders itself'.

Continuing on a similar metaphysical vein, Rapoport writes that General Systems' Theory has

> made a significant contribution to a revitalization of philosophy in a world dominated by science...Traditional natural philosophy has been supplanted by natural science whose methods proved to be immensely more powerful than those of speculative philosophy... General Systems' Theory has revived the role of speculative analogy, more sophisticated, one would hope. It has revived organismic thinking as a compliment to analytic thinking, has suggested concepts appropriate to a holistic approach to both a conception of reality and to a theory of cognition.
>
> (Rapoport, 1976, p.23)

Science then is the human enterprise directed at progressively understandiOng more and more of this intrinsic order. It is a never ending quest, can never be absolute and as has been stressed in an earlier section is always hampered by man's limitations. Because of the latter, dualities and multiplicities are an unfortunate characteristic of this quest. It appears to be then, that is is only the radical paradigm shifts (Kuhn,1970) that shake the foundations of the existing body of a scientific enterprise that enable 'quantum leaps' or 'dissipative structures' to develope into higher levels of complexity in functioning (that in turn entail concommitant levels of causality that are characterized by unpredictability). **Order, chaos and progress form aspects of the same whole and irreversibility is a source of order at all levels as it is the mechanism that brings order out of chaos (Prigogine & Stengers, 1984).**

Some attempts have been made to utilize General Systems' Theory as as integrative model. The literature review indicates that the first psychologist to advocate an integrative systems approach to the study of personality theory was Gordon Allport (1956). His work was based on Von Bertalanffy's premises and his aim was to illustrate the meta-theoretical potential of General Systems' Theory. Allport felt that his four criteria defining open systems were sufficient to encompass all the different psychological theory advocated by adherents at that stage.

1. Material and energy exchange covered stimulus response theory;
2. Steady-state maintenance encompassed what personality theory had detailed in terms of stress reduction and ego defenses;
3. The third criterion was the tendency of systems 'to go beyond steady states and to strive for an enhancement and elaboration of internal order even at the cost of considerable disequilibrium '. The examples he cites are inter alia Jung's concept of individuation, Maslow's theory of human growth, and Erikson's search for identity.
4. The fourth and final criterion referred to the capacity of a system within an environment to form a higher-order system of system's and environment and to exhibit different

characteristics in different environments. Lewin's field theory and the theories of social psychology fit into this transactional framework whereby the relations between larger units rather than the relations between individual units form the system.

Allports third and fourth criteria were seminal ideas ahead of his time as the Zeitgeist was just not ready for 'far from equilibrium structures' and the wave-particle paradox of quantum theory.

The concepts of General Systems' Theory can also be utilised to understand process and change in human behavior. Again, the analysis is not done from a content specific framework but rather from a metatheoretical perspective. The aspects of optimal psychological functioning as illustrated by Amerikaner (1981, p.45) can be summarised as follows:

1. Openness to exchange with the environment;
2. The development of adequate boundaries;
3. Increasing complexity over time (discussed in terms of differentiation, integration, and hierarchization);
4. Increased self-regulation and autonomy;
5. The development of adequate feedback mechanisms;
6. Movement toward a relatively stable 'steady state' or 'dynamic equilibrium'.

This summary also preceeded Prigogine's monumental work, so it would be necessary to the add the important aspects that he clarified. Amerikaner's synopsis deals with 'being' and Prigogine adds to this by taking cognizance of 'becoming', and becoming always entails change and irreversibility.

9.3. THE PRIGOGINIAN PARADIGM ADDED

Prigogine and Stengers (1984) recognized the salient importance of Newtonian mechanics for the operations of closed systems, and accepted the dual temporal/atemporal nature of quantum mechanics. The focus of their attention has, however, been on the unanswered questions relating to the functioning of the 'open systems' that characterize much of the world that we live in.

They recognized the merits of qualified reductionism for closed systems. They argued forcibly, however, against the existence of a true 'fundamental' level in nature, because each level would need its own unique description and, as postulated by quantum theory, would be conditioned by the levels around it and the observers studying it. The implication is that absolute reductionism could never work whenever one level is chosen as a basis, as this level will always be found to depend on the levels surrounding it for the definition of its concepts, and the context of its meaning.

Quantum theory and the Prigoginian paradigm have made it clear that pure objectivity is an illusion and that the subjective conceptualization of objectivity is in actual fact a result of choice. The subjective/objective schism should thus be laid to rest.

Causality, and with it the metaphysical integration of the schools of psychology nonetheless still remains a theoretical dilemma.

THE POLEMICS OF CAUSALITY AND THE PRIGOGINIAN PARADIGM

The literature study has brought to light that there are still uncertainties relating to the clarification of the concept of causality. The three trends discussed previously will be summarized briefly in the following section and the possibilities for a metaphysical integration will be elaborated on thereafter.

Because of the metaphysical concepts of irreversibility, unpredictability and the uncertainty implicit in all but closed system's initial conditions, pure linear causality according to some theorists (Faulconer & Williams 1985; Ford 1984; Polkinghorne, Howard & Patton 1984), could only remain the deterministic principle of technology. Newton's equations are only able to predict effects accurately **if the initial conditions are known precisely.** Coveney and Highfield have the following to say about pure linear determinism:

> Even in principle, this task simply could not be performed by any brain or calculating process of less than infinite capacity. Saying that the search for precision would be infinite means exactly that-it could go on for ever and still not be over. Determinism can only exist if one enters the realm of religion. For verily, only a being as omniscient as God Himself could hope to handle such a literally limitless amount of information.
>
> (Coveney & Highfield, 1991, p.272)

The Prigoginian paradigm does not agree with the foregoing but maintains that determinism can and does exist even if it is not seen as absolutely linear and that it is indeed theoretically possible to form a synthesis between chance and determinism.

> Indeed, the **laws of equilibrium are universal.** Matter near equilibrium behaves in a 'repetitive ' way. On the other hand, far from equilibrium there appears a variety of mechanisms corresponding to the occurence of various types of dissipative structures (my emphasis).
>
> (Prigogine & Stengers, 1984, p.13)

Prigogine and Stenger's synthesis of 'matter' being subject to universal deterministic laws when near equilibrium and chance when far from equilibrium is clarified further as follows. This extract is repeated for the sake of emphasis as it is of salient importance to the conclusions of this thesis.

> Thus, according to the theory of change implied in the idea of dissipative structures, when fluctuations force an existing system into a far-from-equilibrium condition and threaten its structure, it approaches a critical moment or bifurcation point. At this point, it is inherently impossible to determine in advance the next state of the system. Chance nudges what remains of the system down a new path of development. And once that path is chosen (from among many), determinism takes over again until the next bifurcation point is reached.
>
> (Prigogine & Stengers, 1984, p. xxiii)

This framework thus makes allowances for the metaphysical integration of the three major streams of thought in contemporary psychology **because it implies that chance and determinism are aspects of a path of development and are not mutually exclusive.** A metaphysical synthesis between Behaviorism, Existentialism and Psychoanalysis could be based on Prigogine's synthesis of chance and determinism if determinism is indeed the fundamental metaphysical crux of Behaviorism and Psychoanalysis and chance (choice) the crux of Existentialism as has been postulated. Psychological functioning then fundamentally becomes a synthesis of chance and learning, of freewill and determinism with neither being paramount, but with both being part and parcel of human behavior as part of a process of development. **What could be a more comprehensive metaphysical integration than the application of Prigogine and Stenger's conclusions relevant to physics extrapolated to psychological theory?**

In the introduction to this thesis, mention was made of the fact that all the schools of thought 'seemed to make sense when viewed from their point of view' and that this was very confusing for the student. Prigogine's framework removes the absolute trends that caused the confusion as with his synthesis of chance and determinism causality becomes a process or can even be seen as functioning along a continuum that makes allowances for all three points of view. Non-equilibrium thermodynamics has come to the rescue of theoretical psychology's absolutism and mutual exclusivity.

This is because non-equilibrium thermodynamics divides naturally into two parts: a 'linear version' describes the behavior of systems close to equilibrium, while the 'non-linear version deals with systems that are far away from equilibrium. Prigogine, as mentioned in an earlier section coined the term 'dissipative structures' to describe systems that are far from equilibrium since they result from the exchange of matter and energy between system and environment, together with the production of entropy (dissipation) by the system. The complex and mutually dependent processes leading to the formation of these structures he collectively terms as self-organization. Thus the spontaneous creation of order is not contrary to the Second Law. The description of the behavior of 'linear systems' as contained in their 'sum over histories ' will be discussed in the following section. This is an important additional concept emanating from theoretical physics and could provide an alternative concept for the metaphysical foundation of the linear causality that is fundamental to the school of Behaviorism and Psychoanalysis.

Stephen Hawking, who currently holds Newton's chair as the Lucasian Professor of Mathematics at Cambridge University adds another dimension to causality as he cites the following and clarifies the complex nature of causality that for all intents and purposes appears to be linear but is in actual fact a 'sum over histories'. An immediate theoretical dilemma appertaining to psychological theory comes to mind. Is it not possible that this causality that appears to be linear, but in actual fact is a 'sum over histories ' phenomenon not the causality that has deceived and eluded psychological theory and caused so much altercation? Is the conceptual confusion relating to the linear causality of behavior not merely the result of theoretical incompleteness within a complex metatheoretical framework? The concept of a causality that is in fact a 'sum over history' is far more appropriate in explaining human behavior than the narrow concept of linear causality as the essence is that it could be used to validate a causality that does in reality seem to be linear. The main criticism usually levelled against Behaviorism is invariably based on the fundamental oversimplification entailed in the metaphysical foundation of linear causality applied to the complexity of human functioning. This would fall away if the causality was rather seen to be a 'sum over history' causality.

Stephen Hawking writes as follows:

> A nice way of visualizing the wave/particle duality is the so called sum over histories introduced by the American scientist Richard Feynman. In this approach the particle is not supposed to have a single history or path in space time, as it would in classical non-quantum theory. Instead it is supposed to go from A to B by every possible path... In general, if one compares a set of neighbouring paths, the phases or cycles will differ greatly. This means that the waves associated with these paths will almost cancel each other out. However, for some sets of neighbouring paths the phase will not vary much between paths. The waves for these paths will not cancel out. Such paths correspond to Bohm's allowed orbits.
>
> (Hawking, 1988, p.60)

If the concept of a causality of 'sum over histories' is added to the existing framework of psychological theory it could clarify the so called linear causality fundamental to the behavioristic school. This is because it is a far more viable theoretical postulate to account for the complexity of human behavior than the narrow concept of linear causality with it's implied reversability. The end result would be the same, but the metaphysical foundation would be sounder. As discussed, it seems as if the root of the problem is based on the conceptual confusion that has ensued as a result of the fact that quantum theory has as yet not been taken into account.

It is proposed therefore that causality as a metaphysical concept would be far more appropriate in psychological theory if both multilateral mutual causality as well as the 'sum over histories' were taken into account. Bohm's allowed orbits would delineate the parameters further as part of the 'constraints' mentioned in Hawkings' words cited above.

With these concepts and Prigogine and Stengers' theory as background it is now possible to summarize the metaphysical integration envisaged. As is clear by this stage, a system may reach a steady state 'near equilibrium' and remain relatively constant and integrated but there is always a constant exchange of energy between the system and the environment and as Von Bertalanffy (1968) stressed, 'dynamic equilibrium' is marked by increasing self-regulation and autonomy. This self-regulatory function is made possible by the use of feedback mechanisms and the 'Feigenbaum Sequence' quoted by Prigogine and Stengers and mentioned in an earlier section and repeated here for emphasis. This sequence also deals with temporality and the development of deterministic and stochastic processes over a period of time.

> The 'historical' path along which the system evolves as the control parameter grows is characterized by a succession of stable regions, where deterministic laws dominate, and of

> instable ones, near the bifurcation points, where the system can 'choose' between or among more than one possible future. Both the deterministic character of the kinetic equations whereby the set of possible states and their respective stability can be calculated, and the random fluctuations 'choosing' between or among the states around bifurcation points are inextricably connected. Tbe mixture of necessity and chance constitutes the history of the system.
>
> (Prigogine & Stengers, 1984, p.169)

If this salient concept is added to General Systems' Theory it offers a viable theoretical framework to explain and contain the deterministic principles of Behaviorism and Psychoanalysis as well as make allowances for the stochastic principles of Existentialism and Hermeneutics. As was discussed in the section on philosophical psychology and analysed in the chapter on physics, metaphysics and psychology it is a logical conclusion to draw that the underlying deterministic principles of a particular Zeitgeist formed the metaphysical foundations of the three main streams of thought in psychology.

The current Zeitgeist could then be used to integrate all three schools of thought within the metatheory of General Systems' Theory and on a metaphysical level could be integrated by the dual causality model postulated by Feigenbaum and accepted by Prigogine. Feynman's 'sum over histories' concept of causality could in turn broaden the scope of linear causality not mentioned by Prigogine. If causality can be seen to exist along a continuum, and the metaphysical foundations of the schools of thought in psychology can be aligned along this continuum, then mutual exclusivity can be eliminated on a metaphysical basis. The schools of thought could then be seen to be perspectives of a whole and not each as mutually exclusive entities in their own right. This can only be theoretically feasible if the schools of thought are seen as commensurate theories, and not as incommensurate as postulated by Koch and Feyerabend (1962). The content and detail of these commensurate theories will of necessity sometimes overlap and other times will emphasize different aspects of behavioral functioning. The 'sum over histories' learning of Behaviorism could stand side by side on a continuum with psychodynamics and with the choice and free-will of Existentialism as part and parcel of different aspects of psychological functioning. It is a psychological truism that effective learning can only really take place in a system that is characterized by relative equilibrium.

It is also possible to envisage psychodynamics as a part of an individual quantum memory. If choice is so fundamental to the functioning and understanding of so many basic scientific issues, (Prigogine & Stengers 1984), it seems reasonable to extrapolate it to human functioning. If these conjectures are acceptable, then it is possible to envisage that the principles of causality characterising Behaviorism in this integrative model could apply to systems that are 'near equilibrium'. In turn the causality of Psychoanalysis and Existentialism would be more suitable for systems 'far from equilibrium' and 'far, far from equilibrium' respectively. In this framework the different paradigms would then not be mutually exclusive, but would rather be seen as existing and functioning on a metaphysical continuum that makes allowances for temporality and the dual nature of causality.

Strict linear causality would still only be applicable to closed systems whose initial conditions are known and this obviously does not include human behavior. But stratified linear causality ('sum over histories') that is not as rigid nor as absolute as the linear causality of Logical Positivism could be seen to exist alongside that of multilateral mutual causality. Stratified linear causality is a concept coined to qualify that causality could well be 'historically layered' instead of linear and to illustrate this concept learning can be used. Any form of learning always takes place upon an indeterminate platform or strata of previous learning rather than from a point of knowledge. This is because, according to Hawking (1988), there cannot be a 'single history or path in space-time' even though it may appear to be so when waves and particles overlap and intersect continuously.

The feedback resulting in learning need not necessarily be specific but can also be vague and diffuse and open to choice. This brings us to the potential for disorder that is manifest in all living systems.

Because fluctuating systems are subject to the laws of feedback, they often find themselves in a state of disorder. It can happen that, at a 'singular moment' or 'bifurcation point', the system may disintegrate into total chaos or 'leap' on to a new, more differentiated, higher order, which theorists have named 'dissipative structures'. One key concept of this phenomenon is that these dissipative structures require more energy to sustain themselves because they are more complex. Another is that it seems these structures, which arise out of so-called irreversible disorder, can eventually operate on an higher level of organization than they previously did. **This is the world in general as we know it and for the psychotherapist, the world of therapy in particular.**

9.4. FURTHER IMPLICATIONS FOR DIAGNOSIS AND THERAPY

The analysis of the state of the system (the diagnosis) is of salient importance as it gives an indication of the frame of reference in terms of the school of thought that is to be chosen for a particular patient at a particular time. As discussed in the previous section, according to the Feigenbaum sequence, causality can move from linear (sum over histories) to multilateral to unpredictable based on the state of equilibrium of the system. Feynman's concept of the 'sum over histories' is seen to be more appropriate to the state of equilibrium of open systems than linear causality.

It is also hypothesized that these 'states of systems' on a continuum from equilibrium to far from equilibrium to 'far, far' from equilibrium correspond to the theoretical and therapeutic emphases placed by the major schools of thought in psychology. Neither is absolute, but all are part if the same whole seen from different perspectives on a continuum of equilibrium.

Behaviorism, as mentioned in the section on the philosophy of psychology is based on linear causality and historicism. This, according to the Feigenbaum sequence occurs in the state of the system characterized by equilibrium. **Behaviorism with it's emphasis on learning is thus the most appropriate model for individuals that are in a relative state of equilibrium.** Because of the implicit connotations of reversible time however, the Behaviorist maxim that 'anything that is learned can be unlearned' should be changed to 'anything that is learned can be relearned'. Relearning is far more appropriate as unlearning is basically impossible because the 'new state' can never be the same as the original previous state. Time is simply not reversible.

As is well known, Behaviorism is a very relevant model for psycho-education and guidance. It is also an ideal model for general parent effectiveness programs and is very applicable to 'normal' individuals with 'normal problems' where history is indeed irrelevant simply because it has fortunately not effected the individuals state of equilibrium adversely. Ideally, an objective of therapy could thus be to utilize the other models to stabilize equilibrium before applying behavior modification techniques. The corollary would be that it would be ineffective and possibly even counterproductive to use this frame of reference for systems that are far, or far, far from equilibrium. To illustrate, learning programs will be most effective in premarital counselling and in any form of marital guidance where the parties are presumably in a state of equilibrium. If one or both of the parties are far from equilibrium as a result of conflict or for other psychodynamic reasons, individual counselling or therapy will initially be essential to enable equilibrium to be re-attained before proceeding with learning programs.

Psychodynamic principles in the form of Psychoanalysis, Transactional Analysis, Gestalt therapy, Ego psychology or any related trend in this framework would be more appropriate for individuals 'out of equilibrium'. This school of thought came into being during the 'Science of Complexity' and as was mentioned in an earlier section was strongly influenced by the metaphysics and the physics of the time. In the state of 'out of equilibrium' causality becomes more complex and is thus multilateral. The philosophical trend during this stage of development was Historicism and as such, history too became more significant. This relevance of this causal factor was reinforced by Einstein's theoretical contributions mentioned earlier and to be discussed in more detail in a later section. History is indeed significant because an understanding of personal psychodynamics is necessary for the patient before they can come to terms with and work through the conflicts causing their psychic pain and their resultant state of disequilibrium. The dictum that ' it is necessary to understand before it is possible to predict and control' is very applicable to the patient or client that is experiencing conflict and psychic pain and is thus 'far from equilibrium'.

Psychodynamic principles would also be pertinent in child psychology where personal insight is not the objective but rather, cognizance has to be taken of the child's psychodynamic functioning in order to enable the therapist to personalize parent effectiveness strategies and or to plan the course of therapy. For instance, if a child or adolescent is functioning 'far from equilibrium' as a result of unfulfilled nurturant or affiliation needs, and is 'acting out', it would be questionable to use the behavior modification technique of 'time out' as a strategy as this could theoretically fuel the symptom. Rather, therapy and the parent effectiveness procedure should begin with addressing the child's needs before applying relevant behavior modification techniques.

As stressed, the relationship is the crux of any therapeutic encounter but is particularly important and applicable to individuals who are in a state of equilibrium that is 'far, far from equilibrium'. The basic principles of existentialism are relevant for all therapeutic encounters but are essential for individuals who need to heal before they can develop. As any therapist will confirm, causality as well as the outcome of therapy is unpredictable because of the individual complexity of the dynamics. Exceptional progress may take place according to the theory of 'dissipative structures' but it is also possible for the patient to 'choose' to opt out and remain psychotic or severely neurotic.

The practical implications of the integrative model indicate that the situational analysis or diagnosis is of salient importance in psychotherapy. As such it also provides ample subject matter for research to define and clarify such issues as to what the criteria for states of equilibrium are, and what would be optimally correlated therapeutic techniques.

Before moving on to discuss the essential contributions of other theories to the crux of integrative model, it is necessary to outline the aforementioned schematically and by so doing, to gain greater clarity.

9.5. A SCHEMATIC OUTLINE

Schematically the integrated model can be outlined in the following manner:

METAPHYSICS: TEMPORALITY AND CAUSALITY

↓

TEMPORALITY

Irreversible for all but closed systems

↓

CAUSALITY

Linear or sum over histories → multilateral → unpredictable

↓

METATHEORY

GENERAL SYSTEMS' THEORY AND THE NEW PHYSICS

↓

SCHOOLS OF THOUGHT AS ASPECTS OF THE WHOLE

BEHAVIORISM	PSYCHOANALYSIS	EXISTENTIALISM
Causality, sum over histories.	Causality, multi-lateral/mutual.	Causality, unpredictable.

↓

SITUATIONAL ANALYSIS or DIAGNOSIS or CURRENT SCENARIO

STATE OF THE SYSTEM

EQUILIBRIUM → →	FAR FROM EQUILIBRIUM → →	FAR FAR FROM EQUILIBRIUM

↓

CHOICE OF FRAME OF REFERENCE BASED ON THE <u>STATE OF THE SYSTEM.</u>

CHOICE OF STRATEGY FROM THE RELEVANT SCHOOL OF THOUGHT

With this framework and all the afore-mentioned in mind, it is now necessary to discuss a related aspect of causality, namely history and this leads to a discussion of Einsteins' contributions to an understanding of the relevance of history in psychology.

The process nature of causality, in line with the principle of irreversibility means that causality can only be clarified by means of hindsight as, as has been illustrated by Coveney and Highfeld in a previous paragraph, there is no way that anyone can with certainty have the foresight to predict irreversible effects and or possibilities.

In psychotherapy however, the process nature of causality and with it personal history remains however one of the cornerstones of interpretation whether by means of the therapist stating the obvious or by revealing hitherto unthought of correlations. **As such it is also one of the crucial factors in the process of psychotherapy as the present ('the now') is the culmination of all the previous multilateral and stratified (sum over histories) linear causes and subsequent effects.** The individual relativism of the process of psychotherapy also becomes indisputable and because of this the contributions of Einstein's theory of relativity become relevant.

9.6. PSYCHOLOGY AND EINSTEIN'S THEORY OF RELATIVITY

According to Einstein's theory of relativity, we can only reach a universally valid understanding of events by considering the four-dimensional universe as consisting of space-time and by no longer regarding events separately in terms of either space or time. Thus, time cannot be identical across different systems and the concept of absolute simultaneity becomes meaningless. Entropy takes place continuously and changes occur from energy as transformations occur. Because of this, life-spans and histories are characteristic of all living systems and it cannot therefore be irrelevant at which point in space-time they are observed.

With this theory, Einstein went beyond Newton's purely mechanical theories, relativising physics and, with it, science as a whole.

> There is no privileged frame of reference in the universe to which other observations can be related in absolute terms.
>
> (Coveney & Highfield, 1991, p.77)

In his theory, Einstein showed that space and time are always relative to the particular role of the observer, and even when the observer examines phenomena close to the velocity of the speed of light, space-time becomes a fourth co-ordinate which needs to be specified relative to the observer.

This relativistic framework also lead to the important realization that mass is essentially a form of energy and can consequently be transformed into other forms of energy. The idea that mass is a form of energy lead to a re-evaluation of the property of 'matter'. Mass, from the perspective of the New Physics paradigm, is viewed not necessarily as a material substance, but as 'bundles of energy'. All objects have these 'bundles of energy' contained in their mass and the relationship between this energy.

The change in the scientific view of matter also lead to a relativistic view of the forces acting between particles of matter. Significantly, force and matter could now be seen to have a common origin in the dynamic patterns of particles. Activity and energy are thus the essence of being and there are consequently no static structures in nature. Rather, there is a stability of dynamic balance, and by implication, change as well as irreversibility are nature's constants.

These findings are metaphysical factors that are of salient importance to the science of psychology inasmuch as if change is a constant then stress too must be seen as a constant as it is difficult to envisage constant change without some degree of stress. If this is so, then a basic focus in psychology should be on conceptualizing stress as a force of 'activity and energy'. This is in line with Caple's (1987) conceptualization of the 'change process in developmental theory' and 'second order change'.

Einstein also posited the idea of a four-dimensional existence in space and time and with his theory of relativity demonstrated that time perception depends on the observer's point of view. This is important on a metaphysical level and it is of salient importance to emphazise that according to this theory as well, so called 'scientific objectivity' is also an illusion as it is relative to the perspective of the vista and the observer.

Psychology obviously cannot afford to disregard Einstein's premises concerning objectivity and history if the aforementioned is taken into consideration as to do so would imply that human behavior operates in a 'timeless' dimension and this has obviously been negated by both physics and metaphysics. This would then imply that ontogenetic as well as relevant sociocultural history would of necessity have to be taken into account if understanding is a primary goal of intensive psychotherapy. In more or less stable systems where learning is the objective as in Behaviorism, and much as the theory postulates, the history would not need to be a primary focus.

The relativity of time is well known to psychologists and is taken into account in concepts such as 'emotional age', 'maturity' and 'chronological age'. Developmental psychology is thus theoretically based on a matrix of temporality and relativity and as such shows the reality of interdisciplinary connections. It is also essential to take heed of the metaphysical reality of irreversible time as history in psychotherapy.

Change as has been stressed is a related aspect of causality and as such needs to be clarified further.

9.7. CHANGE FOR BETTER, AND CHANGE FOR WORSE.

Change is a fundamental aspect of system 'process' and as such the General Systems' viewpoint as applied to human behaviour needs to be clarified. Function will be emphasised as structure refers to the more ordered relationships between the components of the whole.

An open system per se is seen to become more complex over time. The system always retains its individual identity and its integrity but developes from a more general and homogenous state to a more specialized and heterogenous condition by means of the process of progressive differentiation.

Change as stressed previously, is nature's constant since the open system is continually exchanging energy in one form or another with it's environment. The integrity of the system is maintained by the system boundary which should be permeable enough to ensure interaction but never too permeable as this would cause the disintegration of the system.

Change within one component of the system has the potential to effect the system as a whole. This potential however depends on the structural relationship between the components of the system or subsystems.

But what happens if the system's self-regulatory function ceases to function effectively and is unable to move on to an higher level of organization? This question brings us into the realm of emotional distress and the world of psychotherapy. This is the world of change for the worse.

Emotional illness in General Systems' terms has been given a broader context than in the traditional terminology. In Bowen's (1966) framework, emotion refers to the automatic processes governing life on all levels, from the cellular to the societal. Bowen writes that it includes the force that biology defines as instinct, reproduction, the automatic activity controlled by the autonomic nervous system, subjective emotional and feeling states, and the forces that govern relationship systems. 'In broad terms, the emotional system governs the 'dance of life' in all living things'.

Thus, emotions refer to anything that is the end result of the affective experiencing of the individual.

To expand on Bowen's definition of emotional systems mentioned above, Papero writes that the human brain with it's myriad of connections to the human body appears to be the centre of a highly evolved guidance system, possibly the 'most complex ever to evolve'.

> Feeling states can pass between and among organisms with great speed. The means of transmission are often subtle and may not involve language. Visual cues are important as well as voice tone and **other more subtle sensory processes.** (my emphasis).
>
> (Papero, 1990, p.41)

On the subject of more subtle sensory processes it is necessary to go back in time to some of the questions posed by one of psychology's doyens and veritable seers. In an article published in 1973, Carl Rogers wrote about the challenges facing psychology and remarked on the possibility of psychology having to make allowances for different realities than those generally accepted. He mentioned the research done by Russian psychologists on telepathy, clairvoyance and precognition, asks ' What do we make of this'? and goes on to say :

> Perhaps in the coming generation of younger psychologists, hopefully ... there may be a few who will dare to investigate the possibility that there is a lawful reality which is not open to our five senses; a reality in which **space is not a barrier and time has disappeared;** a reality which can be perceived when we are passively receptive, rather than actively bent on knowing. It is one of the most exciting challenges posed to psychology. (my emphasis).
>
> (Rogers, 1973 p.385)

This could be the world of quantum psychology elucidated by the world of quantum physics.

9.8. PSYCHOLOGY AND QUANTUM PHYSICS

Walter Heisenberg's formulation of the uncertainty principle in 1926 had profound implications for the way in which science viewed the world. This principle, as has been mentioned, put an end to Laplace's dream of a theory of science that would be completely deterministic. This uncertaintity principle lead Heisenberg and his colleagues to reformulate mechanics into quantum mechanics which was based on the uncertainty principle. In this theory, particles no longer had separate well-defined positions and velocities that could be observed, but had a quantum state which was a combination of position and velocity. Quantum mechanics does not predict a result for an observation but rather a number of possible outcomes and the likelihood of each. It introduced the elements of unpredictability or randomness into science. This new aspect of physics resulted in a significant paradigm shift in theory as it necessitated scientists adopting radically different perspectives in terms of the basic concepts of space, time, matter and causality.

Just as Einstein's Theory of Relativity altered the scientific view of matter and atoms, Quantum Theory revolutionized the ideas of subatomic particles. The conclusion made by $E=MC^2$ (that matter was in fact a form of energy) was also applicable to the world of microphysics. Electrons, protons and neutrons were not the tiny solid particles understood within the framework of classical physics, but had a dual nature, sometimes appearing as particles and at other times as waves. To further complicate matters, it became clear that these sub-atomic particles were capable of undergoing continual transformations from one state to the other. Quantum mechanics gave science the theoretical framework from which to describe the continuous transformations of particles and waves into each other. The significant thing about the dual wave-particle nature of the quantum world is that it is not restricted to subatomic and atomic phenomena. Davies and Gribbin (1991) state that 'In principle, even macroscopic objects such as people and planets have their individual quantum waves'. The reason why we do not notice these waves is because the length of the quantum waves diminish in proportion to their momentum, so, the greater the mass of an object, the shorter the waves will be.

> If macroscopic objects also have associated waves, then in principle the independent reality of everything seems to go into the quantum melting pot.
>
> (Davies & Gribbin, 1991, p. 210)

Atomic objects and per implication macroscopic objects as well, do not actually appear to have any intrinsic properties that are not related to the environment. Whether a particle-like or a wave-like attribute is found to be manifest, is dependent on the experiment and the researcher's perspective.

In Quantum Theory, therefore, there are no objects, only inter-connections. On a sub-atomic level, the 'world-machine' could in no way be seen as a 'clockwork' model but became, instead, a network of inter-connections with a wave- or particle-like probability in a matrix that is characterized by 'shifting and warping'. An observer becomes linked to the quantum system and disturbs the state of this system. While the macro level can be analyzed in terms of the quantum level, the quantum level is conditioned by the macro level. As was mentioned earlier on in this work, it is as if two mirrors reflect each other continuously.

It is possible that inter-alia, quantum physics can make a significant contribution to psychology's understanding of relationships. As discussed, 'being' in a quantum world is seen as an indeterminate wave/particle dualism and change as a transitional state of 'being'.

> Things and events once conceived of as separate, parted in both space and time, are seen by the quantum theorist as so integrally linked that their bond mocks the reality of both space and time. They behave, instead, as multiple aspects of some larger whole, their 'individual' existances deriving both their definition and their meaning from the whole.
>
> (Zohar, 1991, p.18)

The significance of holism is reemphasized from another perspective and the idea of a non-local reality that clarifies instant change over a distance could also have a link with Carl Roger's 'lawful reality which is not open to our five senses; a reality in which present, past, and future are intermingled, in which space is not a barrier and time has disappeared;...' (1973).

One can only speculate along the same vein and wonder if Carl Rogers would not also see a quantum psychology as the fundamental principle underpinning his important concept of empathy, and it is reasonable to postulate that the enigmatic concepts in psychology such as bonding, empathy, transference and countertransference, and projective identification would be theoretically more viable if they could be based on a quantum psychology affiliated to quantum physics. In everyday speech we talk about 'being on the same wave-length' as someone else and about the other's 'vibes' being good or bad. This could indeed be a quantum reality that we are unbeknowing referring to.

On a more scientific vein and in psycho-analytical terminology, projective identification is a process whereby unconscious content is projected from the client to the therapist and the therapist experiences incongruent and strange feelings which are attributed to the client's feelings appropo the therapist. Eventually the therapist

> comes to understand that it is an interactional phenomenon or, to speak phenomenologically, it is part of the being-together of the therapist and client in the shared common world of the therapeutic encounter.
>
> (Kruger, 1991, p.114)

This 'being-together' and indeed the being together of all therapeutic encounters could be based on the same fundamental reality of quantum psychology mentioned earlier.

The profound conclusions drawn by quantum physics as to the state of 'being' in the world as an indeterminate dual nature of wave and particle, and Einstein's conclusions as to the importance of time (history) give psychology a physical and metaphysical foundation that cuts across the boundaries of the different perspectives to a greater and to a lesser extent. **This is because quantum psychology deals with the crux of therapy in any school of thought as it deals with the relationship.**

Psychologists are only too aware that the essence of any therapeutic encounter remains 'the relationship'. This is affirmed and reaffirmed by the theory of quantum psychology borrowed from quantum physics. Just as individual thought (the particle) can change into thinking (the wave) imperceptibly, the therapeutic encounter could also be seen as a quantum relationship, equally sensitively balanced and crucial. If the therapist cannot remain on the same 'wave-length' as the client by means of empathy, transference, counter transference, projective identification and any other relationship essential, the prognosis will be uncertain to say the least. Fundamental aspects of the theories of Psychoanalysis and Humanism have been validated by physics and what is important, they have been substantiated as being mutually inclusive on a physical and a metaphysical level.

Quantum psychology also has profound implications for the process of 'diagnosis', the 'situational analysis' and or the evaluation of the 'current scenario'. To paraphase the words of Prigogine, (1984). ' Whatever we call reality (in this case of the diagnosis), it is revealed to us only through an active construction in which we participate'. (The parenthesis is added for clarity). In psychology, there can be no subject being evaluated by an 'objective expert' unless the subject is indeed obviously in a state that is 'far, far from equilibrium'. Diagnosis as well as therapy becomes a quamtum partnership if these findings are to be taken seriously.

The concept of a quantum psychology based on quantum physics also has exciting research possibilities.

Quantum psychology could enable us to see ourselves as part of the process of nature as we are enmeshed in the mind / matter duality as well as the wave/particle duality. As was discussed in an earlier section, emphasizing one aspect of either of these dualities renders the other uncertain and unpredictable and reality depends on how we look at it and how we define it.

> Whatever we call reality, it is revealed to us only through an active construction in which we participate.
>
> (Prigogine, 1984, p.293)

This 'contextualism' is an extension of the 'supra-system' of General Systems' Theory and the 'active construction' too shows a link with the conundrums experienced by research physicists.

> Interpretation, which plays a central role in psychoanalysis, has been recognized by modern physicists as being an important factor in their science too. This can be seen in such statements as: 'Often, as in his studies of atomic phenomena, [the physicist] finds that he is not able to observe directly either the structure or the function of what he is studying and that he must subsist entirely on indirect hints derived from **measurements whose very interpretation often poses the most severe problems.**
>
> (Brandt, 1982, p.80)

So, to summarize the relationship between quantum physics and psychology, it is necessary to repeat the gist of the epistemological circle mentioned in an earlier section. The human mind is characterized by consciousness and introspection and can be partially explained by central nervous system functioning. This in turn can be explained by anatomy and physiology which can be understood by atomic physics. The latter is currently clarified most adequately by quantum mechanics but, as has been discussed in detail can only be formulated with the mind as an integral part of the system. The epistemological circle begins with the mind and closes with the mind.

The circle makes no allowances for absolutes (but then neither does Einstein's Theory of relativity). It does however encompass the mind/matter duality into a system, illustrates the close connection between psychology and physics and provides a framework for integration at a different level. The kaleidoscope has shifted but the fundamental elements of integration are still there to be seen.

9.9. CONCLUSION

As has been illustrated, the historical trends in science and thus in psychology were based on two diametrically opposed metaphysical viewpoints. Many scientists still advocate the reductionistic viewpoint but it has been shown throughout this thesis that there is a move to consider 'the world' in totality and in so doing to adopt a more holistic perspective. This perspective could end the focus on simple models in favour of a model that makes allowances for the complexity of reality. The essence of the Prigoginian paradigm is that the view of science has undergone a radical change towards the 'multiple, the temporal, and the complex.' This viewpoint is also an integral part of General Systems' Theory as a metatheory.

This perspective also makes ample allowances for the limitations of the scientist and of the scientific endeavour and also indicates that any form of absolutism is erroneous and short-sighted as it is difficult to envisage theoretical absolutism enduring in a multiple, temporal and complex world.

In a model combining General Systems' Theory as a metatheory with the Prigoginian paradigm added, and also taking cognizance of the salient findings of contemporary physics, the underlying metaphysical concepts of temporality and causality make it clear that the past lies irretrievably behind us and that we are part of a world characterized by unpredictable possibilities and quantum dynamics. This model also makes adequate theoretical allowance for a new clarification of the concept of linear causality if it is seen as as a form of 'sum over histories' learning.

The concept of determinism too has been expanded on as the new contemporary trends have recognized the dual nature of chance and determinism, not with one being subordinate to the other, but as different sides of the same coin in a world that is continuously organizing and reorganizing itself. In addition to causality and change, order, disorder and even chaos have been accounted for in the theories of modern physics.

If psychology recognizes this status quo as it appears that physics has, it would be possible to make an intellectual rapprochement between the study of the mind and of matter and psychology the science aimed at understanding ourselves and the world we live in would be able to take a quantum leap into an exciting future.

Perhaps it would be appropriate to give the final word to Ilya Prigogine as he epitomises the scientist of the Zeitgeist and the future, a future that was indeed initiated by him.

> Perhaps the coming together of our insights about the world around us and the world inside us is a satisfying feature of the recent evolution in science...
>
> (Prigogine & Stengers, 1984, p.299)

A significant synthesis on a metaphyeical level between the major paradigms in psychology is implied with the composite of the relationships between chance and determinism and subjectivity and objectivity. With mind and matter being different sides of the same coin, we can now talk of freewill and determinism instead of or and versus. There is room for preferences and choice in emphasis and methodology and the future is indeed filled with exciting and unpredictable possibilities. This has been made a viable option by considering the contemporary findings of the 'natural sciences' and combining them with the trends in the 'human sciences'. The unity of science is thus indisputable and hopefully the unity of psychology can be envisaged in a related model.

10. SUMMARY

The relatively young science of psychology almost appears to be undergoing an adolescent identity crisis. The literature abounds with questions as to 'who are we', 'where do we belong' and 'where are we going to'? These questions, just as is characteristic of adolescence, are not explicit, but implicitly permeate the being of the questioner. Kendler, (1981) and Staats (1989) inter alia state categorically that there is considerable disunity within psychology, that separatism abounds, and that overt schisms and non-debatable absolutism seems to be the order of the day.

One of the goals of this thesis has been to examine the detail of the so called crises and even chaos facing psychology. To do so, it was necessary to survey the current definitions of science as well as psychology as a science.

Because it is a basic assumption that it is difficult to predict the direction that psychology is heading without an understanding of it's historical development, a journey was made through time as seen from a metatheoretical viewpoint and the stages of the development of philosophical psychology were briefly surveyed. This literature study accentuated the close interrelationship between the historical development of science as a whole, and for psychology in particular, the close simultaneous developmental history shared by physics, metaphysics, and psychology. So the next step was to examine this interrelated developmental history in more detail.

This section ends with an overview of salient fundamental conclusions of the 'Science of Complexity ' and the 'New Physics' where it becomes clear that certain aspects of physics seem to be heading in a direction of a non-mechanical reality whereby the indivisibility of nature is stressed and whereby observer and observed become dual aspects and part of a larger whole.

Psychology and physics meet in a quantum world whereby both are essential to arrive at an adequate understanding of phenomena being researched. In quantum theory, the nature of the particle-like or wave-like attribute manifest has been shown to be entirely dependent on the experimental choice and on the researchers perspective. Mind and matter are thus shown to be inextricably linked.

Certain schools of physics and psychology see General Systems' Theory as a metatheory and as a contemporary explanatory model integrating aspects of science. Consequently, this metatheory was examined in detail. Current developments in the study of disorder, instability, and non-linear relationships as theorized by Prigogine and Stengers (1984) were added to the metatheoretical model to explain hitherto unclear concepts. The 'Science of Chaos' which deals with chaotic systems is also touched upon as a development emanating out of the Prigoginian paradigm.

In line with trends that emphasize the necessity of research that makes a concerted effort to contribute towards the essential need for integrative models, this too has also been explored. (Goldfried, 1982; Peat, 1989; Pietersen, 1989; Schoeman, 1991; Staats,1987; Weick, 1980).

Thus, the final model is an integration of many of the essential characteristics that the current Zeitgeist in physics, metaphysics, and psychology has to offer. A serious attempt is made to integrate the metaphysics of the time continuously as it appears to be that theories survive or cease to be relevant because of seeming flaws implicit in their metaphysical foundations.

Throughout the thesis, the limitations of understanding are stressed, and the illogic of absolutism criticised. To mature into adulthood, psychology as a science must remain an ' open system' that is prepared to change and recognise it's limitations. There must be ways and means to integrate the salient contributions of the various schools of thought that are relevant in current times. This much needed theoretical integration that remains open and waiting for the Zeitgeist to develop is indeed an ideal to be strived for albeit a difficult goal to attain.

This work is an attempt to contribute something to this end.

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