Principles of Organisation of Psychic Energy within Psychoanalysis: a Systems Theory Perspective

by

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I declare that this thesis: 'Principles of Organisation of Psychic Energy in Psychoanalysis: a Systems Theory Perspective' is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Dedication

This thesis is dedicated first and foremost to my friend and long time mentor Doctor Pieter Grobbelaar, who not only provided the theoretical foundation of this work in his own Phd but whom also read every page of the draft I wrote for this thesis and gave his thoughts and ideas for its direction.

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I would also like to thank my mother for her belief in me, and my father for his support, and my wife for looking after our life while I worked.

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Abstract

The concept of Psychic Energy holds a very important position in the field of Psychoanalysis, particularly within the theories of Sigmund Freud. These ideas, including the notion of a constancy of excitation, or the 'pleasure principle', as well as energy transfer and 'cathexis', are important not only historically in terms of the subsequent development of Psychoanalytic theory, but also remain a core conceptual assumption of a number of concepts in contemporary use. However, the central ideas related to psychic energy have undergone little substantial revision or development since the end of Freud's career, despite a number of compelling critiques that call into question the central definitions and assumptions of these concepts, particularly the principles defining their governance. Grobbelaar (1989) has suggested that a number of problems within Psychoanalytic theory can be powerfully addressed through recourse to central propositions from the field of systems theory, and the case is made in the present thesis that some of the core problems with the energic theory may indeed be the result of a pre-systems epistemology. The present study proposes that psychic energy be defined as recursively constituted through three levels of the human system (inorganic, organic and informational), and that the core principles of regulation at the informational level is not constancy, or pleasure, but rather the necessity of maintaining organisation. In line with this proposition, the study reviews a number of theoretical propositions from systems theory and cybernetics (including the notions of energy defined as 'information' or 'free energy') and how they may be usefully deployed as principles of organisation of psychic energy within the psychoanalytic framework. Examples of how these principles may be used to explain Freud's core observations of ego functioning are presented as well.

Keywords: Psychoanalysis, Psychic energy, Cathexis, Libido, Freud, Systems Theory, Cybernetics, Autopoiesis, Free Energy, Neuropsychoanalysis

CHAPTER 1: Introduction

1.1 Background

Freud's concept of 'psychic energy' holds a critical place in the historical development of psychoanalytic theory (Holt, 1962; McIntosh, 1986). The notion of psychic energy within psychoanalysis that is addressed in this project may be broadly defined as referring to three central ideas. The first of these refers to 'the general level of excitation' of the nervous system, as well as a description of a core mechanism of regulation of that excitation and its influences on emotion and behaviour (Freud, 1950; Freud & Breuer, 1895/2004). The second idea refers to the process of 'cathexis' within the psyche. Here instinctual demands of the organism enter the psyche as a form of energy often termed an 'instinctual drive' (which is the third idea, though it is sometimes described as 'libido'), and that energy comes to be 'cathected' (invested or 'bound') within mental impressions in the psyche (Freud, 1911/1963). Freud believed these mechanisms to have a definitive influence on a variety of mental, emotional and behavioural phenomena, and they are (arguably) a cornerstone of his general theoretical model of the mind (Rapaport & Gill, 1959).

Further, Freud suggested that these dynamic processes of energic distribution in the psyche were governed by stable principles, the understanding of which would allow powerful predictions of psychic functioning, and human behaviour. Perhaps the most central of these principles is the 'principle of constancy' which refers to the general tendency to discharge psychic energy in order that it either remains at a constant, or tends towards removing it entirely, or keeps it at a low level (Freud, 1920/1955, presents all three possibilities). This principle is referred to in his later work as the 'Primary' function or process, as he views it as a core, fundamental process operating within the nervous system and psyche throughout life;

one that is invariant, though subject to modifications (Freud,1920/1955). This statement is critiqued by Rosenblatt and Thickstun (1970) who suggest that a range of observations indicate a capacity for internally-driven increase in the organism's level of activation or energy, beyond any stable level. However, from his earliest writings, Freud recognises problems with the discharge principle in that there are clearly a range of observations that indicate that there are exceptions to the principle, and concludes that the psyche must, and does, withhold direct discharge and retain levels of activation necessary for behaviour appropriate to the demands of reality, or as Freud refers to it, the 'the exigencies of life'. He referred to this as the 'Secondary' principle regulating psychic energy (Freud, 1950).

This secondary process or principle also remained a problem in Freud's theoretical structure of the energic processes in the psyche, effectively unsolved at the end of his publishing life. Initially he attempted to describe this secondary process on entirely mechanical terms, as a simple extension of the constancy (primary) principle in the nervous system. He suggested that it is governed by different structures of nerves: either in the form of groupings of different types of nerves which have differing energic characteristics (such as differing levels of resistance), or circuits of nerves (essentially like 'feedback loops') that oppose the flow to discharge (Freud, 1950, "The Project for a Scientific Psychology"). However, this account, besides lacking empirical support, resulted in irresolvable core internal contradiction (Holt, 1962).

Later, his theorising regarding the organisation of psychic energies relied more heavily on the concepts of pleasure or unpleasure within consciousness, which came to be referred to as the 'Pleasure Principle'. In the seventh chapter of 'The Interpretation of Dreams', Freud (1900/1991) described a 'pre-conscious' mechanism like a gate which limits access to consciousness and thereby to discharge. In his account, energically-laden disturbing ideas, the discharge of which begins to result in 'unpleasure', are held back from

consciousness (and thereby discharge) by the withdrawal of the energy of conscious attention (sometimes termed 'hypercathexis'). However, besides pointing out that the mechanisms of consciousness and the means by which they govern the preconscious gate are poorly defined, Holt (1962) also argues that the core internal contradiction present in 'The Project for a Scientific Psychology' (Freud, 1950) remains unaltered in this work as well.

In 'Beyond the Pleasure Principle', his last paper that deals substantially with the topic, Freud (1920/1955) shifted emphasis onto the distinction between 'freely mobile cathexis' on the one hand, and' bound' (or quiescent) cathexis on the other. He suggested that it was 'unbound', freely mobile cathexis that was associated with the conscious experience of unpleasure, which generates a tendency to bind the energy in a quiescent cathexis to reduce the unpleasure (thereby describing a different governing mechanism of the secondary process), and that pleasure is associated with the 'rate of discharge' of energy. While this concept of a tendency to bind cathexis is important to Freud's theory, Holt's (1962) critique of the bound-unbound distinction highlighted many inconsistencies and unanswered questions (including the problem that conscious attention must involve freely mobile energy) that remained at the end of the paper. Holt argued that after this preliminary formation above, Freud did nothing to develop this description further, instead describing pleasure and unpleasure in a contradictory manner later in the paper, where he suggested that freely mobile cathexis was linked with greater unpleasure *as well as greater pleasure* than bound cathexis. In the same paper, Freud (1920/1955) tried to explain the observation that unpleasurable experiences often seem to be generated and often repeated in the mind in a manner that seems to defy the pleasure principle. He argued that beyond the pleasure principle, there was a tendency in the psyche to repeat unpleasurable experience; to explain this Freud posited a 'repetition compulsion' that is the manifestation of a 'death instinct' in the organism. Besides a variety of critiques of the death instinct concept (Fenichel, 1935/1953; Hartmann,

1964), the implications that this notion may have had for governing energic mechanisms (or an influence it may have had on the 'reality' principle in the psyche) did not solve many of the problems already identified in Freud's work on excitatory processes in the psyche.

Besides the logical problems of internal consistency of the energic theory, many aspects of the theory have also been the subject of intense debate spanning from the 1940s until the present day (though the most intense period of the debate is in the years from the 1950s through to the early 1980s). This debate has included a wide range of critiques of the energic principles. These criticisms have included the definition of psychic energy and its status as an explanatory theory (Basch, 1976; Swanson, 1977), the lack of a neurophysiological correlate of the construct of psychic energy (Basch, 1976; Zepf, 2010), a lack of empirical support for the claims of the theory (Grunbaum, 1984; Zepf, 2010), its lack of usefulness in the analytic situation (Gill, 1983; Kubie, 1947; Wallerstein & Applegarth, 1976), difficulty in linking aspects of the theory to observations (Rapaport, 1960), and the 'structural' critique of the energic theory that claims that psychic phenomena are more determined by the meaning of stimuli than their quantitative element (Hartmann, 1950; Plaut, 1984). While powerful responses to some of these criticisms exist, many of these criticisms remain unresolved.

1.2 Problem Statement

It is proposed by the present thesis that Freud's work was unable to provide a coherent and satisfying theoretical account of the governance of the energic mechanisms in the psyche. As a result, the central problem statement regarding the state of the energic theory in psychoanalysis that was proposed by this thesis was stated as follows:

The principles of governance by which processes relating to psychic energy and excitation are regulated, are inadequately developed in the field of Psychoanalysis.

1.3 Justification for the study

The significance of the problem stated above, and the justification for the current study is given from three different viewpoints. Firstly, the centrality of the theory of energic regulation within the evolution of psychoanalytic ideas (as well as an omnipresent assumption within psychoanalytic thinking), is highlighted. Secondly, the necessity for any theory to remain consistent with proven empirical findings in the same or other fields is addressed, particularly with regard to rapidly developing knowledge within the field of cognitive neuroscience that appears to have bearing on the theory of energy regulation. Lastly, the importance of a better developed theory of energy regulation is addressed from the standpoint of clinical usefulness, particularly within the analytic situation, where it may lead to a more accurate understanding of the patient's behaviour, as well as more sophisticated interpretation.

1.3.1 The importance of the theory of energic regulation within Psychoanalysis

McIntosh (1986) is unequivocal in his statement of the importance of the concept of psychic energy within the field of psychoanalysis:

> *"The quantitative notion of psychic energy is the most fundamental of Freud's ideas, on which the entire edifice of his thought is built. For him, the activity of the mind consists of nothing but the formation, transformation, storage, and discharge of quantities of psychic energy. Virtually all of his main ideas derive from or depend on*

> *this concept, including primary and secondary process, displacement, condensation, reversal, repression, bound versus free processes, defense, instincts, identification—the list could go on much further. All of these consist of processes, states, or structures of quantities of psychic energy." (p. 405).*

Over a period spanning several decades over the middle of the last century, the core concepts of psychic energy within psychoanalysis were at the centre of a heated and prolonged debate within the psychoanalytic field. Swanson (1977) refers to a series of texts in which the concept is criticised, including papers by Apfelbaum (1965), Applegarth (1971), Basch (1973; 1975a; 1975b), Colby (1955), Gardner (1969), Gill (1976), Holt (1965; 1967), Klein (1976), Kubie (1947; 1975), Nagel (1959), Nuttin (1956), Peterfreund & Schwartz (1971), Peters (1960), Rosenblatt and Thickstun (1970) and Rubinstein (1965; 1967). A number of these authors call for major revision of the theory, or even the refutation of this core of energic concepts altogether (such as Klein's proposed 'theorectomy'). However, Swanson (1977) also refers to a range of papers which defend the importance and usefulness of the concepts:

> *"A panel discussion in 1970 … however, reflected a strong, almost unanimous, consensus that the economic point of view has great value for clinical psychoanalysis. Energy concepts were described as essential to explaining and crucial to understanding certain behavioural phenomena. Greenson, Loewenstein, Lustman, Rubinfine, and others explained how and why they found the economic point of view useful." (p. 603)*

The proliferation of debate by itself should reflect the importance of this conceptual core in the body of psychoanalytic theory. Given that constant evolution and development of theory is a fundamental necessity within natural and social sciences (Kuhn, 1962), it thus remains a standing justification for projects such as the current one, that a conceptual core that is of such central significance to its field has remained so undeveloped and beset with unresolved contradiction and critique.

1.3.2 Compatibility with contemporary neuroscience

Of all the concepts within psychoanalysis, energic concepts have always had the closest connection with neurophysiology and neuroscience. In his earliest writings, Freud (1950) attempted a psychological description of psychic process that was essentially unified with a neuroscientific description based on neuroscientific knowledge existing at that time, and writers such as Bateson (1972) have indicated Freud's clear intention that the concept of energy should operate as a conceptual bridge between the physiological and the psychological. Within Freud's writing, psychic energy as a concept has varied between a dual definition of both physical and psychological at times, and purely psychological at others. However, authors such as McIntosh (1986) and Swanson (1977) have critiqued this possibility, insisting that 'energy' as a psychological concept essentially cannot be entirely separated from physiological concepts.

The implication of this position is that the psychoanalytic theory of energy is in some sense 'vulnerable' to empirical findings from neuroscience. While it is argued in the third chapter of this thesis that a theory of energic regulation in the psyche does not have to be expressed in neurophysiological terms, it would nonetheless be problematic if the core assumptions of a psychological theory of energy were *incompatible* with empirical data from

neuroscience. However, besides the problem of incompatibility, psychoanalysis as a field can benefit from the ongoing developments in the field of neuroscience, in that developments in neuroscience may spark shifts in psychoanalytic understanding (Kandel, 1999; Solms & Turnbull, 2003).

In this regard, it seems incongruent that while the field of neuroscience has received such rich development over the last century (particularly the last few decades) the conceptual framework of psychic energy has received so little revision. In particular, recent work by Friston and colleagues (see Friston, Kilner and Harrison, 2006) in systems neuroscience may have important implications for the present topic, where indices of brain functioning are measured in terms of their probability, utilising concepts from Shannon's information theory, Gibbs' free energy and others. Using the established practice within cybernetics that equates measurement error of signal with 'free energy' in the system, these researchers have proposed that the brain constantly seeks to reduce the free energy in the system. This finding has strong parallels with Freud's principle that the mind seeks to reduce free energy, through binding or discharge. The researchers themselves have highlighted the connection between their findings and Freud's formulation of primary and secondary process (Carhart-Harris & Friston, 2010). There is some overlap between these concepts and those proposed by Freud, but there is also sufficient difference that suggests that significant room for development exists in the psychoanalytic account that may align these fields more compatibly.

1.3.3 Improving clinical application of energic concepts

Within psychoanalysis, a primary index whereby theory is evaluated is in its clinical usefulness, particularly within the analytic situation. A useful theory should result in improved clinical understanding of the client as well as inform more effective intervention.

As indicated previously, while some authors have criticised the clinical utility of energic concepts on the basis that they are far removed from observations (or interventions) that can be made in the analytic situation (Rapaport, 1960), a number of authors have expressed how their own clinical understanding and intervention have been improved through use of energic concepts (Greenson, 1967; Loewenstein, 1957; Modell, 1963; Shevrin, 1984 and Sjodin, 2010).

In this respect, the link between energic concepts and neurophysiology described above, may have important implications for its clinical utility. Reich (1945) highlighted the importance of the reality of the body in psychoanalytic interpretation; he suggests that the closer an interpretation is to the physiological reality of the state of the body, the more effective it will be in facilitating change. In this he cites case material where his interpretations of his clients' 'character armour' result in powerful changes in affect and behaviour. Within the present discussion, it may be suggested that where the analyst's interpretation most accurately reflects real neurophysiological constraints regulating psychic energy, this may be of greater utility to the patient than interpretations that are distorted or irrelevant to that physiological reality.

1.4 Aim of the study

Given these reasons of the significance of the energic theory for the entire theoretical structure of Psychoanalysis, as well as the need for compatability with other fields of science and the need for physiologically accurate interpretation in the analytic situation, the current thesis proposed that a coherent theoretical structure is required to fill this gap, in order to provide a systematic basis for making predictions about aspects of mental functioning and

behaviour that are significantly influenced by the characteristics of energic processes in the mind. The aim of the study was thus expressed as follows:

The aim of the present study is to offer a coherent formulation of central principles of governance of mechanisms of psychic energy, within the field of psychoanalysis.

1.5 The role of systems theory in a coherent formulation of the organisation of energic mechanisms

Grobbelaar (1989) proposed that the systems theory perspective in psychology may provide an important addition to psychoanalytic theory. He suggested that Freud's theoretical structure was limited by a pre-systemic epistemology, and that a number of inadequacies in Freud's theories exist not because of a lack of rigour, but are an inevitable result of a pre-systems approach. He argued that systems theory approaches may be usefully incorporated within psychoanalytic theory in order to solve some of the theoretical problems. In his thesis, he suggested changes to a number of Freudian concepts in line with systemic principles, and indicated a trend where other writers had already begun taking a similar approach:

> *"… the application of systems theory has been used mostly as a heuristic device where it was directly applied to Freudian theory (Gedo & Goldberg, 1973), or systemic principles are implicitly used in a theoretical formulation of a small aspect of Freudian theory (Freud, A., 1965; Kohut, 1968). Nevertheless, the importance of a systemic approach to remedy some of the flaws in Freudian theory has been illustrated by these theorists. At the same time they also indicate the need for a more*

extensive application of systems principles to Freudian theory." (Grobbelaar, 1989, p. 5).

Grobbelaar proposed a steady interrogation of concepts within psychoanalysis from a systems perspective, and suggested that such a process could lead to an evolution of thought within psychoanalysis.

The use of systemic principles to address problems in psychoanalysis is not novel. Bateson (1972) specifically criticized Freud's energic theory in favour of his own theoretical work in 'Steps to an Ecology of Mind'. However, Bateson and other systems theorists have not necessarily attempted to integrate their theories with existing formulations of psychic energy within the psychoanalytic field. Further, writers such as Strachey (in his editor's introduction to Freud, 1950) have pointed to similarities between Freud's work and subsequent developments within systems theory, but this is not systematically developed within Freud's work. Other writers within psychoanalysis, such as Hartmann (1964), Rapaport (1960), and later Kohut (1977) criticised the inadequacy of energic mechanisms in Freud's work as a theory of psychic functioning, and have instead tried to develop the centrality of psychic structures in defining psychic functioning. However, these writers have not made systematic use of systems theory and epistemology in their work.

1.6 Research Question

In line with Grobbelaar's (1989) prescription, the present thesis examined some of the core theoretical propositions of the systems approach with a view towards how they may be applied to reformulate psychoanalytic principles governing energic distribution in the psyche. The research question adopted by the current study was as follows:

How may assumptions and concepts of systems theory and cybernetics be used to reformulate the psychoanalytic principles of governance of energic processes of the psyche?

1.7 Method

The method used in the present study was conceptual analysis. Conceptual analysis may have different goals. One such goal may be to attempt to integrate across disciplines, indicating how concepts and relations between concepts from one discipline may be used to improve or focus more precise understanding of concepts and their relations in another discipline (Dreher, 2000; Leuzinger-Bohleber & Fischmann, 2006). The current project took such a form of a conceptual research study, which addressed a conceptual-theoretical problem within one theoretical paradigm by applying concepts from another. As such, this was a qualitative, non-experimental, exploratory research design.

Within the field of psychoanalysis, conceptual analysis is characterised by a focus on the use of concepts within the broad psychoanalytic endeavour (Dreher, 2003):

> *"Conceptual research defines itself by its subject matter: namely, psychoanalytic concepts, those tools of language by which we attempt to grasp empirical phenomena—especially clinical phenomena—theoretically. As a working definition I would put it this way: conceptual research is concerned with the systematic investigation of the meanings and uses of psychoanalytic concepts, including their changes, in relation to both clinical and extraclinical contexts." (p. 109-110).*

In the present project, the concepts were examined in terms of the observations with which they are connected, the relations they imply with other concepts, their logical integrity, their developmental influences and their usefulness in application.

Dreher (2000) suggests that conceptual research differs from forms of empirical research in that the qualitative data analysed by the study are the texts in which the theories are presented. The data in this research study are primary theoretical texts relating to systems theory (primary theorists describing base theoretical assumptions and propositions), as well as secondary texts either critiquing the theoretical concepts from those primary texts, or applying them to phenomena that are potentially comparable to the phenomena described as psychic energy. This literature was found through a full search of UNISA's library resources including books, journal articles, e-resources and all others. Further, journal articles not directly available through UNISA's library resources were sourced on Google scholar search, and books were purchased on Amazon.com.

1.8 Findings: a systems theory reformulation of psychic energy within psychoanalysis

Systems thinker Ludwig von Bertalanffy (1969/2009) proposed a general critique of pre-systems theories of biological and social sciences, that they encounter difficulties as a result of adopting an approach similar to that of the natural sciences:

> *"It was the aim of classical physics eventually to resolve natural phenomena into a play of elementary units governed by 'blind' laws of nature. This was expressed in the ideal of the Laplacean spirit which, from the position and momentum of particles, can predict the state of the universe at any point in time. … In contrast to this mechanistic view, however, problems of wholeness, dynamic interaction and organisation have appeared in the various branches of modern physics. … It is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organisation and order unifying them, … Again, similar trends appeared in Psychology. While classical association psychology*

> *attempted to resolve mental phenomena into elementary units – psychological atoms as it were – such as elementary sensations and the like, gestalt psychology showed the existence and primacy of psychological wholes which are not a summation of elementary units and governed by dynamic laws." (von Bertalanffy, 1969/2009, p. 31).*

In this passage, von Bertalanffy articulated a critique of traditional explanations in science that they failed to perceive such a holistic perception of systems. According to Bateson (1972) and Keeney (1983), pre-systemic paradigms of explanation often failed because they sought linear cause-and-effect relationships rather than perceiving that systems behaved in particular ways primarily because of their organisation rather than individual causative events. Bateson (1972) described a scenario where he showed that how a dog responds when you kick it has more to with reasons related to itself than to the kick, and that energy of the dog's response comes from within its own metabolism, rather than from the kick.

In this way, the present study concluded that Freud's attempt at explanation of the regulation of psychic energy failed because he attempted to demonstrate how the energy found in the intensity of behaviour derived from the intensity of stimuli acting on the person's nervous system. However, following Bateson (1972) it is suggested that the energy (or intensity) of peoples' affective and behavioural responses is more determined by the organisation of their minds, rather than the objective intensity of the stimulus.

The core proposition of the present project states that the governance of energic mechanisms in the psyche (including affect and behaviour) does not serve a principle of constancy or discharge as Freud suggested, but rather serves the principle of maintaining systemic organisation. This principle follows Maturana and Varela's (1980) concepts of autopoiesis and structural coupling. In this formulation, the mind is bound to the autopoietic

organisation of the living system that is the human being, which gives rise to a tendency of maintaining the organisation of the activity of the mind, which is nonetheless subject to changes in structure due to shifts in the mind's environment with which it is structurally coupled.

The present thesis demonstrates how systems theory concepts such as autopoiesis, feedback, boundary conditions or even entropy may add further understanding regarding the governing of energic mechanisms in the psyche. Further, the study explores the usefulness of the field of cybernetics in generating an integrative model of energic governance in the psyche, in which energy is treated as information which the system may respond to in predictable manners.

It is hoped that the present study can offer an important addition to the field of psychoanalysis, representing a potential reformulation of base concepts with potentially far reaching implications for existing theory, as well as providing a basis for developing incipient theory regarding psychic energic processes, within the psychoanalytic field in future. It may provide the basis for slightly altered clinical understanding and intervention, and further provide another template for the ongoing interrogation of psychoanalytic concepts from within a more contemporary theoretical framework. It may provide an example of how specific systemic concepts and principles can become more common within the discourse of practicing psychoanalysts in their work.

1.9 Outline of Remaining Chapters

Chapter 2: The Development of the Concept of Psychic Energy within Psychoanalysis

This chapter presents an account of the evolution of the concept of psychic energy in the field of psychoanalysis. This account offers a definition of terms and core theoretical statements to orient the reader who is not fully familiar with the field. In addition, this chapter provides material for evaluating the contributions of concepts to the field of psychoanalysis and exposes some of the critique. The chronological structure of the chapter contextualizes, and provides insight into, how various terms of the theory were developed as responses to problems that Freud (and other authors) perceived and grappled with. While other forms of critique are also highlighted in this chapter, the particular focus is on critiques of the internal consistency of the theory.

Chapter 3: Critiques of Freud's Energic Concepts

This chapter presents a discussion and evaluation of the critical literature that has been published about the energic concepts, within the field of psychoanalysis. This chapter addresses core areas in which the energic theory has clearly failed while also discussing areas in which it continues to offer a valuable contribution to the field. The chapter begins by exploring the definition of psychic energy and its nature, and the clarity of its central propositions. Questions about evidence or support for the theory are discussed, including whether it has any explanatory value, and what observations it may be linked to or predict. The practical usefulness of the energic ideas is explored, and the accuracy of its main assumptions and propositions is discussed. The chapter ends with a summary of the core areas that require re-conceptualisation.

Chapter 4: Systems Theory as a reformulation of Psychic Energy

The chapter presents an introduction to the field of systems theory, including its core propositions, epistemological interventions and the innovations related to cybernetics and information science. This introduction outlines the core innovations in systems theory that form part of the basis of the reconceptualisation of Freud's energic theory that is proposed in the following chapter. Each such innovation of systems theory revisits the energic concepts in Freuds work to discern either similarities or advantages that the systems concepts have over the traditional psychoanalytic concepts. This includes examining work done by some psychoanalytic authors to integrate the concepts.

Chapter 5: A Systemic Reformulation of the Energic concepts in Freud's Theory

This chapter presents a formulation of a metapsychological principle for psychoanalysis that is a restatement of the role originally played by the energic theory in Freud's psychoanalytic theory, from a systems theory perspective. This chapter presents the primary goal of the present work which is a systemic formulation of the energic hypothesis, and clarifies a systemic model in which energy is regulated. The limitations and benefits of the model are described. The chapter then returns to the intial observations which Freud's theory was meant to explain, and attempts to apply the newer formulation to these.

Chapter 6: Conclusion

This final chapter reviews the core elements of the thesis, highlighting the central points made in each chapter and summarizing the fundamental propositions of the present dissertation, including the replacement of a tendency towards discharge by a tendency

towards maintaining organisation. A number of recommendations are made for future research work that may be given rise to by the project, including the usefulness of the formulation in the clinical setting as well as work on reality testing and psychosis, complexity and levels of recursion, and extremes of human experience viewed as systems far from equilibrium. A final note is made contextualising the present thesis within a broader project of reviewing the core tenets of psychoanalysis from a systems theory perspective.

CHAPTER 2: The Development of the Concept of Psychic Energy within Psychoanalysis

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The primary focus of this chapter is on texts written by Freud. However, subsequent contributions by other writers within the field of Psychoanalysis (notably Reich and Hartmann) are briefly reviewed as well. The Freudian texts reviewed here include ‘Studies in Hysteria’ (Freud & Breuer, 1895/2004), which Freud co-authored with his mentor Breuer (although some key sections are Breuer’s alone); ‘The Project for a Scientific Psychology’ (Freud, 1950); the seventh chapter from Freud’s (1900/1991) ‘The Interpretation of Dreams’; and finally ‘Beyond the Pleasure Principle’ (1920/1955). While a number of other texts within Freud’s work make references, additions, or revisions to some of the concepts, it is these four texts that deal with the topic of psychic energy most substantially. This review highlights the descriptions of the organisation of energic mechanisms that are proposed in

these texts. Critiques of the mechanisms of governance are highlighted as well, and are more fully discussed in Chapter 3. The contributions of other psychoanalytic writers to the subject of energy are also reviewed, followed by an evaluation of the importance of energic concepts within Psychoanalysis and the central problem statement of this thesis, which is the lack of development of these core ideas. First, the thesis examines Freud and Breuer's (1895/2004) book 'Studies in Hysteria'.

2.1 Studies in Hysteria

2.1.1 Contribution

In 'Studies in Hysteria' (Freud & Breuer, 1895/2004), co-authored by Freud and his mentor Breuer, Breuer proposed that the nervous system holds a quantity of excitation. He suggested that the nervous system demonstrates a central ordering principle that acts to discharge 'surplus' excitation. Freud added (though ascribing it to Fechner) that the nervous system exhibits a *"tendency to maintain intracerebral excitation at a constant" (p. 200),* which is similar in principle to the tendency towards homeostatic equilibrium. This is a critical theoretical statement because it implies that the primary determining, organising principle of a wide range of neural, somatic, ideational, and behavioural phenomena, is that these phenomena first serve the purpose of returning the level of nervous excitation to its baseline constant (the specific level of this baseline constant is proposed to be different for different individuals). Logically, this principle also refers to phenomena where the activities of the organism also strive to *raise* the level of excitation when it falls *below* this constant. This however, is not the primary focus of Freud and Breuer's (1895/2004) work, though it is mentioned (p.199). Rather, they were seeking to develop a theoretical account of abnormal behaviour, specifically 'hysterical' phenomena, which they believed was associated with

surplus levels of excitation rather than a lack of excitation. Therefore, the bulk of their writing focuses on mechanisms that reduce surplus excitation.

Breuer suggested that affects represent a common cause of strong excitement in the nervous system, which often requires much activity to discharge. He suggested that human affects each possess instinctually prepared paths for the discharge of their associated surplus excitation. For example, excitation that is generated through the affect of anger may be diffused through enervations in the skin of the face, dilating blood vessels turning the face red, or increasing muscular tension in the upper body and hands. Such excitation may also be diffused through motor action.

> *"Affects that are 'active' ... even out the increased excitation by motor removal. Shouting and jumping for joy, the increased muscular tone of anger, angry words and acts of retaliation allow excitation to flow away through movement. ... The fact that these reactions diminish and calm excitement is part of everyday experience. ... we express this linguistically through phrases such as 'to cry one's eyes out' and 'to let off steam', and what is being given out is precisely the increased cerebral excitation." (Freud & Breuer, 1895/2004, p. 204)*

This tendency to discharge surplus excitation may take the somatic or motor forms described above. However, such discharge may also take place through neural activity that is associated with 'psychical' or 'ideational' activity (or 'work'). Breuer suggests that the associative activity of thinking slowly drains away excessive excitation in the psyche. However, this phenomenon is described as limited in two senses. First, when affects are strong, they disrupt the normal flow of association, inhibiting the capacity to discharge this excitation through purely psychic means. This statement is invaluable to Freud and Breuer's

(1893/1963) account of psychological ‘trauma’, as it simultaneously explains the symptom of repetitive, intrusive recollection of a traumatic event and the failure of psychical work alone to easily achieve sufficient discharge. Second, Breuer suggested that the somatic and more active ‘motor’ methods of discharging excitation, rather than supplementing associational means of discharge, also disrupt normal associative activity.

Another distinction was made by Breuer, between a form of excitation generated through strong affect (which he called ‘non-uniform’ excitation) and a more generalised ‘uniform’ kind of excitation of the nervous system that he termed ‘intracerebral tonic excitation’. The latter term refers to a general level of activation of the nervous system. When this level of uniform excitation is high, the neurons become far more susceptible to excitation, firing more easily and more intensely in response to stimulation (Freud & Breuer, 1895/2004). This level of tonic excitation varies on a continuum from almost none in the case of deep sleep, through a certain degree of tension that is required to be awake and ready to work (a so-called ‘optimum’ level), up to heightened states of tense expectancy, such as states of anxiety, restless boredom, or agitation, which are all experienced as ‘unpleasant’.

It is also important to note that Breuer described this level of intracerebral tonic excitation as partly determined by the physiological needs and drives of an organism, such as the need for oxygen, water, and food, all of which can (sometimes dramatically) increase this tonic excitation of the nervous system. In the following quotation, which describes the physiological origin of uniform excitation, the forerunner of Freud’s later concepts of the libido (the sexual instinctual drive) and cathexis can be discerned:

> *“Sexuality appears at puberty in the first of these forms as a vague, indefinite, aimless increase in excitation. In later development (in the normal course of things), this endogenous increase in excitation caused by the functioning of the sex glands*

becomes firmly connected with the perception or idea of the opposite sex and, of course, with the idea of a particular individual, when the wonderful phenomenon of falling in love occurs. This takes over the entire quantity of excitation that has been freed up by the sexual drive, so becoming an 'affective idea'. In other words, when the idea is actualised in consciousness it releases an increase in excitation that really originates from another source, the sex glands." (Freud & Breuer, 1895/2004, p. 202-203)

The propositions presented thus far were generated in order to construct a theory of abnormal behaviour, and initially, to explain the phenomenon of hysteria. To this end, Breuer proposed that when instinctually prepared paths for the discharge of excitation were denied to a person for whatever reason (such as social constraints), the nervous system would seek other paths for discharge that were not prepared by instinct through evolution (Freud & Breuer, 1895/2004). Not all such 'non-instinctual' paths for discharge were considered pathological by Breuer. Many phenomena in everyday life were explicable as attempts to discharge surplus excitation that is generated by strong affect. Breuer gave examples of the phenomenon of tightly gripping the dentist's chair instead of pushing the dentists hand away, and of Bismarck, who, rather than openly expressing frustration with his king in front of an audience, would often smash a valuable vase to the ground in private. These actions are often voluntary motor substitutions, and they are often adaptive (Freud & Breuer, 1895/2004).

However, while generating the theory of hysterical conversion, Breuer did describe a pathological means of discharging excitation, which occurs when the demand for discharge has exceeded a person's capacity to discharge it through either associative means or voluntary motor removal (Freud & Breuer, 1895/2004). In the specific application to hysteria,

Breuer suggested that the nervous system can be likened to an electrical system where, if the tension in the system becomes too high, breaks can occur at weak points in the insulation (pp. 205) just as a short circuit can occur between electrical subsystems.

> *"The assertion that the conditions in the nervous system are to a degree similar is quite plausible. It forms a thoroughly coherent unity, but at various points, great, but not insurmountable, resistances are inserted that prevent the general and even spreading of excitation. Thus for the normal person who is awake the excitation of the ideational organs does not pass on to the organs of perception; we do not hallucinate. In the interests of the safety and efficiency of the organism, strong resistances separate the nervous apparatuses of those vital complexes of organs, such as the circulation and digestion, from the organs of ideation; their independence is preserved, they are not directly influenced by ideas. But only resistances of varying individual strength can prevent the passage of intracerebral excitation into the circulatory and digestive apparatuses: there is every degree of emotional excitability separating what is nowadays a rare ideal – the person who is quite free from 'nerves', the action of whose heart remains constant in every situation and is influenced only by the work it has to do, and who maintains a good appetite and digestion whatever danger he is in – from the nervous person for whom the slightest occurrence is cause for palpitations and diarrhoea." (Freud & Breuer, 1895/2004, p. 205-206)*

This is an important theoretical statement in terms of the governance of energic mechanisms in the psyche, as Breuer and Freud are stating the principle of a tendency to maintain excitation at a constant and they are indicating that the normal mechanisms of discharging surplus excitation have an upper 'threshold' of operation; this limit must be reached before 'abnormal' mechanisms of discharge take place. Note that this threshold rests

upon a distinction that mechanisms of discharge of surplus excitation in the nervous system may be termed ‘normal’ or ‘abnormal’.

The above quote is also significant with respect to another theoretical proposition that was put forward, which refers to functionally defined boundaries in the nervous system that ‘prevent the general and even spreading of excitation’ between ideation and perception. According to this description, these boundaries provide resistance but they are not impermeable, implying that excitation of sufficient quantity can pass the barriers. Furthermore, the statement indicates that sufficient excitation can pass beyond the boundaries of the nervous system into the ‘complexes of organs’ of the body, including muscles, which are implicated in the process of motor discharge.

Freud and Breuer (1895/2004) clearly describe the ‘affective’ (and hence psychogenic) origin of the heightened excitation associated with the pathological discharge of ‘hysterical conversion’ in a number of cases. In one such case, Breuer and Freud (1893/1963) refer to a clerk who, after being assaulted by his superior, demonstrated a symptom of falling to the ground in a frenzy of wordless rage. Breuer and Freud claimed that they were able to provoke the symptom while the man was under hypnosis, and he later revealed that he was reliving the assault during this time. The man returned after he experienced another falling symptom, this time revealing under hypnosis that it occurred while he was reliving the experience and this had triggered the symptom. This observation together with a large amount of published case material led Breuer and Freud (1893/1963) to suggest that *“hysterical patients suffer principally from reminiscences” (p40).* They suggested that the memory traces of a psychic trauma remain as a provoking agent in the nervous system, regularly exciting the person and requiring discharge. As Breuer (in his section from Freud & Breuer 1895/2004) suggested in his analogy of an electrical circuit, once the tension has caused a break or breach, such as a hysterical symptom, that breach becomes a ‘weak point’ in the circuit. This weak point acts

as an outlet for the system when the tension within reaches a sufficiently high level (regardless of the contemporary cause of the tension).

Thus, the theoretical account of hysterical conversion (owing at least as much to Breuer as to Freud) represents the first complete description of the adaptive, functional nature of the symptom of hysteria in psychoanalysis. This would later be described in Freud's work as the 'defensive' function of this symptom. As such, the concept of excitation and the tendency to maintain excitation at a constant in the nervous system form the core foundation of psychoanalytic thought. This foundation has had a profound influence on the subsequent historical development of psychoanalysis.

2.1.2 Critique

While Breuer is attributed with many of the claims made above, Freud continued to develop the implications of this energic idea long after his working relationship with his mentor Breuer ended (Bernfeld, 1944). He did not initially express disagreement with Breuer about any of the concepts above, but he expressly repudiated Breuer's concepts of so-called hypnoid states. Breuer viewed these states as special modes of mental operation, in which associations were particularly loose and allowed for abnormal associations between affective energies and physical functions that underlay hysterical conversion (Bernfeld, 1944).

In addition to Grunbaum's (1984) critique of the lack of empirical support for many of the theoretical propositions described above, these fundamental principles of psychic activation have been strongly challenged on a purely conceptual level by a number of writers who have indicated that some of these assumptions and propositions may be inaccurate or inadequate to explain a range of psychic and behavioural phenomena (Gill, 1977; Holt, 1962).

A criticism that is strongly relevant to the present thesis regarding the theoretical propositions offered in ‘Studies in Hysteria’ is the proposed tendency to maintain excitation at a constant, the notion of homeostatic equilibrium. Rosenblatt and Thickstun (1970) suggest that the principle of homeostatic equilibrium may be inappropriate for describing the regulation of energy in the psyche in Freud’s theory. This phenomenon is described as inappropriate because homeostatic equilibria are used to define ‘closed’ systems that have no transactions with or mutual influence on an outside environment. The biological systems of living organisms are not viewed as closed systems, as they have transactions with a broader environment, such as breathing, eating, and drinking. Thus, biological systems are more characteristic of ‘open’ systems, which do not demonstrate static equilibrium. This critique is developed further in the third chapter.

Lastly, the principle of a tendency to discharge or maintain a homeostatic equilibrium has been challenged by writers with regards to behaviour. These authors suggest that there are a number of observations of the excitation and nervous activation of organisms (including humans) that appear to violate this principle. For example, Rosenblatt and Thickstun (1970) have argued that human behaviour shows a clear capacity for internal increases in excitation, beyond optimum stable levels. Further, Freud (1920/1955) himself seemed to discover this problem and later suggested that the mind demonstrates a tendency to repeat unpleasurable experiences (associated with an increase in energic tension) in a manner that seems to violate the tendency to discharge. This last critique is only partly addressed in the text reviewed next.

2.2 The Project for a Scientific Psychology

2.2.1 Contribution

'The Project for a Scientific Psychology' refers to a series of letters written to Freud's friend Fliess, between the years of 1886 and 1899. In these letters, Freud proposed a neurological basis for the ideas that he had been working on with Breuer. At the time he wrote them (roughly the same time as the publication of 'Studies in Hysteria'), he was excited about his ideas, writing to Fliess (Freud, 1950):

> *"The barriers suddenly lifted, the veils dropped, and it was possible to see from the details of neurosis all the way to the very conditioning of consciousness. … the whole thing held together, and still does. I can naturally hardly contain myself with delight" (p . 129).*

However, Freud later became convinced that the theory was inaccurate and attempted to suppress the letters. They were later found amongst Fliess' papers and were published in English under the name 'The Project for a Scientific Psychology' in 1950.

Freud's (1950) purpose in writing the 'Project' (as it is often referred to) was stated as follows:

> *"The intention is to furnish a psychology that shall be a natural science: that is, to represent psychical processes as quantitatively determinate states of specifiable material particles, thus making those processes perspicuous and free from contradiction. Two principal ideas are involved: [1] What distinguishes activity from rest is to be regarded as Q [referring to the term 'quantity' described below], subject to the general laws of motion. (2) The neurones are to be taken as the material particles." (Freud, 1950, p. 295)*

Whereas the energic concepts described above from ‘Studies in Hysteria’ focused on an energic description of ‘pathological’ phenomena, the ‘Project’ sought to describe the fundamental ordering processes of ‘normal’ psychic functioning and attempted to describe their material basis in the physiology of the neurones. Thus, the ‘Project’ was linked to a then emerging science of the structure and function of brain neurones.

In brief, Freud’s ‘Project’ (1950) was concerned with the principles that govern the excitation of neurones, the level of which he termed ‘Q’ (or at times ‘Qn’) or quantity. He suggested that the psyche forms part of a ‘reflex arc’ with stimulus energies entering the mind through the organs of perception, and ultimately connecting to the apparatus of motor discharge. He then argued that the central, functional purpose of the psychic system is to extinguish Q or return it to a baseline level of activation. He described three main categories of the neuronal system in the psyche, ϕ (phi), ψ (psi), and ω (omega). Energic ‘Q’ enters the perceptual system ϕ (phi) through the sense organs, which cap their terminal nerve endings and reduce Q to a quotient of the original stimulus; this quotient is then represented as a quantity of neuronal excitation ‘Qn’. This Qn passes relatively unimpeded into the ψ (psi) system, which is mnemonic or associative in nature. The ψ (psi) -system effectively discharges some of the Qn through the higher resistance of its ‘contact barriers’ (meaning ‘synapses’), which are changed through the passage of Qn. This process constituted his conception of the memory system.

Importantly, the ψ (psi) -system also receives Qn from the endogenous source of the body, through neuronal projections into another part of the ψ-system. A final, specialised grouping of neurones within the ψ-system is called ω and represents the system of conscious experience. These neurones are impermeable as they admit almost no Qn (thus they drain very little), but they permit qualitative aspects of an excitation to be perceived as conscious experience. The end of the reflex arc is the motor apparatus of an organism. Motor activity

discharges the majority of Q in the nervous system, such that motor discharge plus discharge of Qn in the operation of the psyche must equal the Q entering the system through perceptions from the sense organs and from endogenous sources (Qn is presented here as the physiological correlate of the instinctual drive) (Freud, 1950).

As with some of the reviewed critiques of 'Studies in Hysteria' discussed above, Freud (1950) recognised the seeming limitations of the tendency towards inertia when explaining psychic functioning. However, he argued that the primary function of the nervous system, the principle of the tendency towards 'inertia' (here described as keeping Qn off the neurones) is inviolable. This applies to the delay of discharge that is clearly evident in daily human behaviour, where people restrain reflexive motor discharge in order to perform reasoned activity to achieve their aims. He states that such activity apparently withholds discharge, but ultimately seeks a reduction in (or flight from) the stimulus Q, even though some Q remaining in the nervous system must be tolerated in order to achieve the final goal:

> *"For among the paths of discharge those are preferred and retained which involve a cessation of the stimulus: flight from the stimulus. Here in general there is a proportion between the Q, of excitation and the effort necessary for the flight from the stimulus, so that the principle of inertia is not upset by this. The principle of inertia is, however, broken through from the first owing to another circumstance. With an [increasing] complexity of the interior [of the organism], the nervous system receives stimuli from the somatic element itself-endogenous stimuli-which have equally to be discharged. These have their origin in the cells of the body and give rise to the major needs: hunger, respiration, sexuality. From these the organism cannot withdraw as it does from external stimuli; it cannot employ their Q for flight from the stimulus. They only cease subject to particular conditions, which must be realized in the external world … an effort is required which is independent of endogenous Qή and in general*

greater, since the individual is being subjected to conditions which may be described as the exigencies of life. In consequence, the nervous system is obliged to abandon its original trend to inertia (that is, to bringing the level [of Qή] to zero). It must put up with [maintaining] a store of Qή sufficient to meet the demand for a specific action. Nevertheless, the manner in which it does this shows that the same trend persists, modified into an endeavour at least to keep the Qή as low as possible and to guard against any increase of it- that is, to keep it constant. All the functions of the nervous system can be comprised either under the aspect of the primary function or of the secondary one imposed by the exigencies of life." (p. 296-297).

This passage is critical to the purpose of the present thesis, in that it posits a clear qualification or exception to the principle of inertia that operates in the nervous system; in order to extinguish the persistent Qn emerging from endogenous sources, Qn must be retained in the ψ (psi) -system rather than proceeding to reflexive motor discharge. Furthermore, Freud (1950) proposed that this modification is driven by the necessity to meet needs within specific circumstances of an external reality. This environmentally-influenced necessity for the modification of the discharge tendency is discussed more fully in Freud's (1911/1963) paper 'Two Principles of Mental Functioning'.

This secondary function of the nervous system also poses a significant problem to the theoretical structure that Freud proposes in the 'Project'. It requires that he account for how the nervous system retains energy within itself, rather than allow the quickest form of discharge. The larger part of 'the Project (Freud, 1950) seeks to explain in some detail how this is accomplished within the constraints imposed by the constancy principle. A core concept that Freud posited in this regard is 'cathexis', which defines a mechanism whereby energy is retained (or 'bound') in the nervous system.

A simple definition of cathexis may be drawn from Freud's later work. In his (1911/1963) paper 'Two Principles of Mental Functioning', the term cathexis refers to the process whereby energy that is present in the psyche (originating from an instinctual drive) becomes attached to, or invested in, particular mental impressions that are perceived by an organism as capable of satisfying instinctual needs (and neutralising the excitation that they produce), including impressions such as sensations, memories, or thoughts (Freud, 1911/1963). For example, if a person is severely dehydrated, then when they drink a glass of water, the intense pleasure and feelings of relief become invested in (or cathect) the image of the glass and the feeling of water in the mouth and throat and so forth. Thereafter, memories of the glass or encounters with a similar glass are accompanied by an increase in positive affect or anticipatory pleasure (representing an energic activation in the psyche). Furthermore, if a person becomes dehydrated again, the experience of the glass can be recalled as a fantasy (or hallucinated). This facilitates adaptive behaviour by motivating a search for a glass of water and providing some neutralisation of the activation generated in the psyche by the instinctual demand of the dehydration, through recathecting (or 'recharging') the original impressions of the glass (Freud, 1911/1963).

It is clear that Freud thought of the concept of cathexis as centrally important to his general theory of the psyche, as it appears in a number of occasions throughout his later work, despite never being systematically or comprehensively reworked at any stage beyond the 1911 definition offered above (Holt, 1962). However, it is important to note that Freud never approved of the term 'cathexis'. He wrote in German and used the term 'Besetzen', which most simply means 'to occupy'. However, this term is difficult to translate, as it has a flexible, pliable meaning in German, which may best be summarized as 'to take something over and use it for some purpose' (Ornston, 1985):

> *"It often calls to mind a military image of capturing and holding some place which is then said to be 'besetzt'. When you ask if an empty seat is taken, you may say, 'Ist dieser Platz besetzt?' Similarly, a telephone line is 'busy' and a role in a play is 'cast'. A fine blouse may be 'besetzt' with lace and a bold young woman might joshingly rebuff an overture by explaining that she is already besetzt." (Ornston, 1985, p. 392)*

The term 'cathexis', adopted from the Greek language, was chosen with some great care by James Strachey (one of Freud's original translators, who together with his wife, collaborated directly with Freud, including receiving analysis from Freud), and is meant to imply the process of 'charging'. Strachey's choice of term has been the subject of some debate in the field, with a number of published papers arguing for and against each side (Ornston, 1985).

The term cathexis appears for the first time in Freud's (1950) 'Project' to denote a certain 'quantity' that a neurone may or may not be filled with. Holt (1962) suggests that this concept bears some similarities to Breuer's statement regarding 'tonic excitation' (Freud & Breuer, 1895/2004; described above), in that this property of cathexis of the neurone facilitates the transmission of current through the neurone, and conversely, where the neurone remains uncathected, the passage of current through the neurone is relatively inhibited. The reduction of the resistance of the contact-barriers enables easier passage of Q into and within the ψ-system (where it may become 'bound'); this system is interposed between the apparatus of sensory perception and that of motor discharge (Freud, 1950).

A central theoretical distinction that is relevant to the term cathexis should be described at the outset of this discussion: the distinction between 'bound' vs. 'free' cathexis (Holt, 1962). A simplistic definition is that 'free' cathexis indicates a state where cathexis moves freely between mental impressions, without stable investment in any particular

impression. This state of ‘free’ or mobile cathexis may be characteristic of what Freud called ‘primary process’. Conversely, ‘bound’ cathexis refers to states where cathexis of mental impressions achieves stability over time and is not easily withdrawn or transferred elsewhere. Bound cathexis is characteristic of the state that Freud called ‘secondary process’ and the central characteristic of what Freud termed the ‘ego’. This secondary process is indispensable to the secondary function of the nervous system described above, in that cathexis should not facilitate the passage of Qn in an aimless manner; rather it should influence Qn through paths that will lead to coherent, coordinated mental and motor activity (Freud, 1950; Freud, 1911/1963).

In the first part of his paper ‘A Critical Examination of Freud’s Concept of Bound Vs. Free Cathexis’, Holt (1962) provides an excellent, detailed, and incisive interpretation of the concept of cathexis, and its historical development in papers by Freud and others. Holt’s focus was on precisely this distinction between bound and free cathexis, and he found that the conceptual distinction was poorly defined and sometimes contradictory in Freud’s writing. In the passage from Freud’s ‘Project’ described above, cathexis seems to be described as a ‘stable’ property that is caught in a neurone. However, Holt found other references to this that also describe the mobile quality of nervous activation (such as the ‘current’ in the above description) as cathexis. He argues that later in Freud’s work, the term cathexis comes to describe the energy of the psychic apparatus in general, whether bound or flowing, creating some confusion about this distinction. Galatzer-Levy (1976) responded to Holt’s (1962) criticism:

> *“Certain of the difficulties with poor definition arise from assuming a coherent development of the concept over the 46 years during which Freud wrote on it. This seems to be a common error in critiques of psychoanalysis (Hartmann, Kris, and Loewenstein, 1953).” (Galatzer-Levy, 1976, p. 55)*

While Galatzer-Levy's (1976) comment is correct, he nonetheless conceded that these concepts are of central interest to the energic theory and the entire theoretical superstructure built on it, and that an inadequately defined construct appears to remain. However, he argued that this is not a reason to discard it; rather, it is a reason to improve on it. Indeed, through a careful reading of Freud's text, Holt (1962) attempted to capture and explain some coherence in the free-bound distinctions and the mechanisms that govern them.

In order to meet the requirements of the secondary function of the nervous system (delaying discharge and channelling activation into planned action), the mechanism of cathexis has to effectively capture or discharge the Qn within the ψ-system. In the description of the 'Project' given here so far, Freud (1950) described cathexis as a 'bound' quantity in the neurone; yet, cathexis seems to have the function of 'facilitating' excitation rather than capturing and inhibiting it. Thus, it seems to fail as an explanation for how Qn becomes retained in the ψ-system (Holt, 1962). However, Holt demonstrated that Freud attempted to describe how the capture of cathexis in a neurone may also capture or stabilise current (and thereby serve the task of inhibition of activation), through a description of 'lateral' cathexes:

> *"…statically charged (cathected) neurones branching off from the main channel, which are thus in a state of enhanced readiness for the transmission of current. A lateral neurone thus defends by serving as a kind of safety valve: it drains off the current that would otherwise have proceeded through the apparatus, since that current is offered less resistance in the facilitated lateral pathway. Such a network of cathected lateral neurones is the ego: "Now the ego itself is a mass of neurones of this kind which hold fast to their cathexis (which, that is, are in a bound condition), and this can occur, no doubt, only as a result of their mutual influence" [Freud, 1950, 323]." (Holt, 1962, p. 485-486)*

This definition provides one of the first formulations of the ‘Ego’ within Freud’s work. The ego was originally conceptualised as a subset of neurones within the ψ-system. This mass of neurones holds a constant elevated level of charge that emerges from the endogenous sources of Qn, terminating in the nuclear neurones of the ψ-system. Nuclear neurones are physically and functionally distinct from the neurones of the ‘pallium’ (a term no longer in use in contemporary neurophysiology), which receive Qn from the ϕ-system. Freud (1950) compared the ego to a system of interconnected pipes, although it is different because the level of activation within it must only be proportionate, not uniform (p336). When excess Qn enters this system from endogenous sources (such as that resulting from hunger), this charge is used up by the corresponding mental and motor activity (such as finding food and eating). This process can alter the internal conditions of the body and reduce the Qn that emerges from endogenous sources, while also seeming to preserve the principle of constancy with some qualification. However, on closer examination there are problems with this account.

2.2.2 Critique

Germine (1988) describes Freud’s state of mind in writing the Project, implying that Freud was essentially in the grip of a cocaine-fuelled obsession, working on his ideas over many sleepless nights and endlessly revising and rewriting. Germine (1988) seems to imply a criticism of the paper from this perspective, citing Freud’s comment that he made some months after completing the majority of his work on it:

> *“I can no longer understand the state of mind in which I hatched out the ‘Project’”*
> *(Freud, 1950, p. 285)*

However, Strachey (in his translators's introduction to Freud, 1950) suggests that the work is tremendously valuable, firstly because of its important place in the evolution of Freud's thinking:

> *" … the 'Project', in spite of being ostensibly a neurological document, contains within itself the nucleus of a great part of Freud's later psychological theories. In this respect its discovery was not only of historical interest; it actually threw light for the first time on some of the more obscure of Freud's fundamental hypotheses." (p. 290).*

Second, Strachey makes a remark regarding its importance on another level that is of central interest to the purposes of this proposal:

> *"It has been plausibly pointed out that in the complexities of the 'neuronal' events described here by Freud, and the principles governing them, we may see more than a hint or two at the hypotheses of information theory and cybernetics in their application to the nervous system. To take a few instances of this similarity of approach, we may note first Freud's insistence on the prime necessity for providing the machine with a 'memory'; again, there is his system of 'contact-barriers', which enables the machine to make a suitable 'choice', based on the memory of previous events, between alternative lines of response to an external stimulus; and, once more, there is, in Freud's account of the mechanism of perception, the introduction of the fundamental notion of feed-back as a means of correcting errors in the machine's own dealings with the environment." (Strachey in Freud, 1950, p. 292-293)*

Given the current knowledge of neurophysiology, a number of Freud's assertions are clearly mistaken and easily critiqued; however, it may be unwise to discard the entire work on the basis of these errors (Pribram & Gill, 1976). Certainly, the level of thought and determination with which Freud approached this theoretical work is evident in its level of

theoretical depth and density. He also articulated a complex and detailed model of the functioning of the mind that may require a similar effort of thought and determination from the reader to internalise. The work defies simple summary and careless critique, as questions raised in one part of the work are often addressed by comments made elsewhere within it. Despite this, a range of problems appear in the text, particularly in its later parts. For the purpose of the present critique, a simplified presentation of only the most relevant aspects of the model is presented next, focusing on aspects that have the greatest conceptual problems: memory, perception, and attention.

2.2.2.1 Memory

Freud (1950) posits that energy (Qn) exists in the nervous system as a baseline minimum quantity that is held in the nerves and enters the system from two sources. Additional Qn enters the nervous system from the organs of sensory perception and from endogenous, somatic sources. This Qn primarily exits the system through motor discharge and to a lesser degree, through the attrition that is presented by the resistance of the nervous apparatus. This resistance is presented primarily by the ‘contact barriers’ between neurones. Qn is channelled through resistance by facilitations (cathexes) that may be temporary or permanent. Permanent (partial) facilitations represent Freud’s description of memory in this paper, or alternately, permanent (differential) changes in the level of resistance of contact barriers.

This theoretical account of memory presents problems for Freud in this paper. First, Freud (1950) attempted to account for the mechanisms of perception and memory, which he conceived of as each requiring a separate apparatus. Freud states that functionally, the apparatus of perception must not allow memory traces to form, just as a photographic lens

must not be altered by the light images that pass through it. Therefore, he concluded that the neurones of the perceptual system ϕ (phi) must be entirely permeable and present negligible resistance to passing Q (and therefore remain unchanged by passing Qn), whereas the neurones of the mnemonic ψ (psi) system should be relatively impermeable; their resistance should be influenced by passing Qn, creating a partial and differential facilitation for future Qn.

At first, Freud (1950) suggested that these two systems must consist of different types of neurones. However, he then discards the possibility that this neuronal differentiation is adequately explained through evolutionary necessity, and stated that no histological evidence supports this claim. He then shifted to suggesting that the neurones themselves are identical, but that the difference lies in the level of Qn that passes through them. He suggested that high levels of Qn render a neurone completely permeable, and therefore free of memory traces (the contact barrier returns to its previous level of resistance), whereas low levels of Qn influence the resistance from the cell and leave it permanently altered producing memory. In support of this argument, he suggested that the Qn in the ϕ (phi) system is high because it is a quotient of exogenous stimulus Q, which is orders of magnitude greater than the intracellular energies in the nervous system. He argued that ψ (psi) system neurones usually only deal with low, 'normal' levels of intracellular Qn.

However, a contradiction seems to appear in his account of pain later in the paper, where he suggests that very high levels of Qn seem to produce permanent facilitations (and thereby, a memory) in the contact barriers:

> *"Pain is thus characterized as an irruption of excessively large Qs into ϕ and ψ … pain no doubt leaves permanent facilitations behind … as though there had been a stroke of lightning." (Freud, 1950, p. 307)*

This criticism may be countered, as Freud (1950) suggests that this is an abnormal operation of the neuronal apparatus:

> *"All contrivances of a biological nature have limits to their efficiency, beyond which they fail" (p. 307).*

It appears to be implied here, that there is an upper limit to the level of Q that may pass through a neurone, while still permitting the contact barrier to return to its previous level. It may be inferred that Qs above that threshold will produce permanent alterations in the neurones, and therefore in memory. However, this account of memory is further problematised when Freud attempts to explain attention and thought, which are seemingly incompatible with the processes that he describes for memory.

2.2.2.2 Attention

Freud (1950) appears to run into serious difficulty when attempting to explain the mechanism of attention and its influence on perception. Freud observes that through the operation of what we call attention, certain perceptions appear to have greater cathectic intensity than others; these are the perceptions that are present in our consciousness.

> *"The outcome of psychical attention is the cathexis of the same neurones which are bearers of the perceptual cathexis." (p. 360).*

The central question that arises is about the mechanism through which attention becomes focussed on specific perceptions. Freud's (1950) intention in this section of the paper reflects his overall intention in the paper. He stated:

> *"It must be possible for what I have termed the secondary processes to be explained on mechanical lines" (p. 360).*

However, this proved to be a difficult task. Freud (1950) argued that the cathexis of perception requires the influence of the ω-system:

> *" … a perception invariably excites co [consciousness] and thus gives rise to indications of quality. To put it more accurately, it excites consciousness (consciousness of a quality) in ω, and the discharge of the ω excitation will, [like] every discharge, furnish information to ψ which is in fact the indication of quality. I therefore put forward the suggestion that it is these indications of quality which interest ψ in the perception." (p. 360).*

This statement creates a hidden problem in Freud's theorizing thus far, which can be referred to as a problem of directionality. The indication of quality and its influence on the ψ-system represent a different directionality of the flow of discharge. He generally indicated that the flow of discharge runs from the sensory or somatic entry points towards the apparatus of motor discharge. The mechanism described here must run in the opposite direction, back towards the prior sub-systems. While there has been no specific prohibition of such a direction of flow (indeed he stated that it must be possible), it does create a problem regarding the temporal ordering of these processes that is not adequately solved in this work. Furthermore, the specific physical means by which this reverse-directional flow takes place is unclear; whether this task requires a specific subset of neurones or is completed through some other manner is not described by Freud.

Another intimately related problem can be described as ‘hierarchical’ in nature. According to Freud (1950), the ω-system is essentially hierarchically super-ordinate to the ϕ- and ψ-systems, in that its contents are essentially determined by the outcome of the functioning of the other, sub-ordinate systems. However, in the mechanism of attention described here, the hierarchically super-ordinate system defines the operation of a hierarchically sub-ordinate system; in other words, a top-down ordering is demonstrated, rather than a bottom-up ordering of operation. This problem presents a challenge that is of central importance to Freud’s entire aim of the ‘Project’ (1950).

Von Bertalanffy (1969/2009) states that in a wide variety of sciences, a range of problems exist that remain unsolvable because they are approached in the same manner as that adopted by the natural sciences:

> *“It was the aim of classical physics eventually to resolve natural phenomena into a play of elementary units governed by ‘blind’ laws of nature. This was expressed in the ideal of the Laplacean spirit which, from the position and momentum of particles, can predict the state of the universe at any point in time. … In contrast to this mechanistic view, however, problems of wholeness, dynamic interaction and organisation have appeared in the various branches of modern physics. … It is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organisation and order unifying them … Again, similar trends appeared in Psychology. While classical association psychology attempted to resolve mental phenomena into elementary units – psychological atoms as it were – such as elementary sensations and the like, gestalt psychology showed the existence and primacy of psychological wholes which are not a summation of elementary units and governed by dynamic laws.” (von Bertalanffy, 1969/2009, p. 31).*

While the example above relates to classical association psychology and gestalt theory, the problem presented was encountered by Freud's (1950) entire aim in writing the 'Project' and represents a manifestation of a general problem that often appears in the biosocial sciences. Freud set himself the task of providing an entirely 'mechanistic' (and inherently 'bottom-up') description of the energic mechanisms of the mind, and thus ran into problems related to forms of order, control, or organisation of the mind as a systemic 'whole'.

It is possible that this problem of organisation, as articulated by von Bertalanffy (1969/2009), manifests itself in Freud's model of the mind in the 'Project' as a problem of hierarchically 'top-down' organisation or of reverse-directional movement (described above). This is the problem presented by the mechanism of attention. The following statement demonstrates Freud's attempt to account for the 'top-down' nature of the mechanism of attention:

> *" [A perception] … excites consciousness (consciousness of a quality) in ω, and the discharge of the ω excitation will, [like] every discharge, furnish information to ψ which is in fact the indication of quality. I therefore put forward the suggestion that it is these indications of quality which interest ψ in the perception. This would seem to be the mechanism of psychical attention." (Freud, 1950, p. 360).*

The term 'quality' refers to Freud's (1950) conception that the ω-system does not receive Qn from the ψ-system, but from another aspect of the nervous transmission of a perception. The concept of 'quality' is poorly conceptualised (Holt, 1962) and relies on another characteristic of the neuronal transmission that Freud referred to as 'period'. 'Period' is an inadequately defined concept described by Strachey (in his introduction to Freud, 1950) as 'obscure' (p. 310); however, this topic is not discussed here. Rather, we should note the

appearance in this description of one of the 'feedback mechanisms' referred to by Strachey in his introduction to the text.

At first glance, it seems that Freud (1950) was able to generate a coherent mechanical account of attention. Assuming that neurones that are excited simultaneously become associated with each other and become a path for the discharge of excitation, he states:

> *"… a perceptual cathexis occurs and, after it, its indication of quality. The intimate facilitation between the two pieces of information will further increase the perceptual cathexis and now a cathexis of the perceptual neurones with attention will result." (Freud, 1950, p. 362)*

> *"As an outcome of biological experience, ψ attention is constantly directed to the indications of quality. These take place, therefore, on precathected neurones and with sufficiently great quantity. The information of quality, thus strengthened, strengthens the perceptual cathexes by its facilitation; and the ego has learnt to make its cathexes of attention follow the passage of this associative movement from the indication of quality to the perception. By this means it is led to cathect precisely the right perceptions or their environment. Indeed, if we assume that it is the same Qή from the ego which travels by the facilitation from the indication of quality to the perception, we have actually explained the cathexis of attention mechanically (automatically).Thus attention leaves the indications of quality and turns to the now hypercathected perceptual neurones." (Freud, 1950, p. 362)*

The term 'hypercathexis' means that the perceptual neurones have *"… receive[d] an extra amount of cathexis"* (Freud, 1950, p330) from the ego. Thus, Holt (1962) referred to hypercathexis as *" … a mobile, freely manipulable energy of attention and consciousness"* (p. 481). However, this cannot mean 'freely manipulable' by conscious (or 'free') will, as Freud

(1950) is attempting to describe an entirely mechanical account of this process. However, the following problem remains: By what means do the conscious system 'select' which indication of quality should have strengthened cathexis, and thereby hypercathect the associated perceptual neurones? Or, following the quote from the paragraph above: how do certain indications of quality come to be precathected, generating attentional hypercathexis of the activating perceptual neurones?

Freud (1950) makes an important move in this paper by attempting to address this problem, which anticipates some of his later theory. In attempting to describe how the mechanism of hypercathexis and attention is governed, Freud makes use of the concepts of 'pleasure' and 'unpleasure', and the principle of the tendency to seek pleasure and reduce unpleasure:

> *"I find it hard to give a mechanical (automatic) explanation of it's [the mechanism of psychic attention's] origin. For that reason I believe that it is biologically determined-that is, that it has been left over in the course of psychical evolution because any other behaviour by ψ has been excluded owing to the generation of unpleasure." (Freud, 1950, p. 360-361)*

In the above quote, Freud is confessing to some difficulty explaining attention from a mechanical perspective. His admittedly speculative statement above carries a potentially worrying interpretation that we are born with a full set of indications of quality that should generate attention. If instead, the mechanism of attention is interpreted as also evolving over the organism's lifespan, which seems far more likely, then it is implied that for an indication of conscious quality to generate attentional hypercathexis, it must be associated with pleasure and/or not be associated with unpleasure. However, it is critical for Freud's (1950) account that the conscious system retains no memory of its own because, similar to the perceptual

system, consciousness should be constantly fresh, just as our ability to perceive stimuli. Thus by Freud's account, the conscious system cannot serve as a storehouse for relevant indications of quality that should furnish attention. However, if it is accepted that the 'memories' of pleasure or unpleasure are retained in the ψ-system, then the role of the ω-system in tuning attention appears to become superfluous; the 'feedback loop' seems unnecessary, as its role remains unexplained.

Freud's description of the influential role of pleasure and unpleasure represent an important move in his work, as the concepts of pleasure and unpleasure make reference to conscious, subjective experience, and do not imply an inherent link with the mechanical terms and model described here. Therefore, it seems against his aim in the paper, to define the development and organisation of the psyche in these terms. However, he does state a clear mechanical correlate of pleasure and unpleasure with the principle of avoiding unpleasure:

> *"Since we have certain knowledge of a trend in psychical life towards avoiding unpleasure, we are tempted to identify that trend with the primary trend towards inertia. In that case unpleasure would have to be regarded as coinciding with a raising of the level of Qή or an increasing quantitative pressure: it would be the ω sensation when there is an increase of Qή in ψ. Pleasure would be the sensation of discharge. Since ω is assumed [above] to be filled from ψ, the hypothesis would follow that when the level in ψ rises the cathexis in ω increases, and when, on the other hand, that level falls the cathexis diminishes. Pleasure and unpleasure would be the sensations in ω of its own cathexis, of its own level; and here ω and ψ would, as it were, represent intercommunicating vessels. In this manner the quantitative processes in ψ too would reach consciousness, once more as qualities."* *(Freud, 1950, p. 312)*

This conception of pleasure and unpleasure and the tendency towards inertia appear logical and resonate with the descriptions in Studies in Hysteria (Freud & Breuer, 1895/2004) in section 2.1.1 above. However, another problem becomes visible here. Freud (1950) soon reported encountering a serious difficulty with this conception. His model clearly requires that perception (and in fact, ψ-memory) be cathected more than usual in order to enter conscious attention. This however, contradicts his requirement that another aspect of secondary process, that of conscious 'thought', must occur at a lower energy level than ordinary perception, without hypercathexis. Aspects of remembering and thinking must not produce hallucination by being confused with perception. Therefore, they must remain at a lower level of cathectic intensity in his model. Furthermore, he suggests that the expenditure of Qn in the process of thinking cannot be too high or it will drain the ego of the capacity to conduct its reasoned activity. Lastly, in his model, thought cannot be of high cathectic intensity or it will change the resistance of the contact barriers and completely alter or even erase memories of perceptions. But the following question remains: If all of these phenomena must be 'low-energy' phenomena in the mind, how can they become conscious or receive conscious attention in the form of hypercathexis?

Holt (1962) argued convincingly that Freud was unable to solve this problem, which Freud (1950) himself admitted that he was unable to adequately address. It is the position of the present thesis that the problems in the model articulated in the 'Project' are not simple errors in theorizing or logic; rather, they are problems that are unavoidable and indeed inevitable given his aims. The problems discussed throughout this section are a direct result of Freud attempting to maintain the integrity of his assumptions through to their logical conclusions, most relevantly the mechanistic regulation of energy operating in the psyche. Here we may find von Bertalanffy's (1969/2009) broad critique of the 'pre-systemic', bio-social sciences manifesting in the difficulties faced by Freud in this paper. By attempting to

demonstrate how the functioning of the system is determined by the basic components of the system (the various types of neurones) and the fundamental laws governing their functioning (quantity, resistance, and association), Freud encountered his greatest difficulty when faced with apparent 'top-down' organisation in his model (attention, hypercathexis, and consciousness). His effort to explain these top-down forms of organisation through an extension of the basic components and laws led to irresolvable internal contradiction.

Recognising some of these difficulties, Freud suggested a radical change. On the final three pages of the 'Project' that were written in 1896, the last pages he wrote before abandoning it and trying to suppress it, he suggests an entirely radical restructuring of his model to attempt to address some of the problems. The extensive scope of the suggested change is indicated in the quotation below:

> *"I now [in my new scheme] insert these ω neurones between the ϕ neurones and the ψ neurones, so that ϕ transfers its quality to ω, and ω now transfers neither quality nor quantity to ψ but merely excites ψ-that is, indicates the pathways to be taken by the free ψ energy. … On this view the perceptual processes would … involve consciousness and would only produce their further psych[ical] effects after becoming conscious. The ψ processes would in themselves be unconscious and would only subsequently acquire a secondary, artificial consciousness through being linked with processes of discharge and perception (speech-association) … An ω discharge, which my other account necessitated … now becomes unnecessary; hallucination, whose explanation always raised difficulties, is now no longer a backward movement of excitation to ϕ … but only to ω. It is much easier to-day to understand the rule of defence, which does not apply to perceptions, but only to ψ processes. The fact that secondary consciousness … lags behind makes it possible to give a simple description of the processes of neuroses. I am also relieved of the troublesome question of how*

much of the strength of ϕ excitation (of sensory stimuli) is transferred to ψ neurones. The answer is: none at all, directly. The Q in ψ depends only on how far the free ψ attention is directed by the ω neurones. … The new hypothesis also fits in better with the fact that the objective sensory stimuli are so minimal that it is hard to derive the force of the will from that source in accordance with the principle of constancy. Sensation, however, [on the new theory] brings no Q at all to ψ; the source of ψ energy are the [endogenous] organic paths of conduction. I also see the explanation of the release of unpleasure, which I need for repression in the sexual neuroses, in the conflict between the purely quantitative organic conduction and the processes excited in ψ by conscious sensation." (Freud, 1950, p. 388-389)

By placing ω (omega) neurons between ϕ (phi) and ψ (psi), Freud now fundamentally restructures the role that consciousness has with the structure of memories, associations and energy transfer that is the ψ (psi) system: consciousness now comes to define perception and memory formation. The ψ (psi) system is unconscious, but can become conscious if connected to energy changes, though how this works is not clarified. Perhaps most serious is that he now states that the ϕ (phi) system does not transfer energy to the ψ (psi) directly at all: however, this energy transfer was the fundamental driving mechanism of his model, without it, he is completely unable to explain why energy moves in the system at all or how memories and associations form. It is clear that these suggested changes would require comprehensive revision of almost the entire theoretical structure that was painstakingly built in the 'Project'. However, as this is the last section he wrote in this paper, the substantial revisions required for these changes were never undertaken (Strachey, Translator's Introduction, in Freud, 1950).

Despite the usefulness of the project and the powerful ideas it contains, it ultimately failed to achieve its aims. However, these ideas are carried forward in Freud's (1900/1991) later work, 'The Interpretation of Dreams'. Holt (1962) suggests:

> *"Thus, even though in this first approximation to a complete model Freud did not clarify his own thinking about the complexly related issues of inhibition, facilitation, and the binding of neurones, he came close enough to making the whole thing work so that when he next tried, in 1900, he achieved a great deal more success." (p. 491-492).*

While there is a shift in the theoretical model described in the next text, the model still has a fundamental reliance on a number of the energic concepts described in the texts above, particularly on those from the 'Project' (Freud, 1950). Furthermore, the next section describes how the text does not adequately solve the problems outlined thus far in the present proposal; rather, it begins just to avoid them.

2.3 'Chapter VII: The Interpretation of Dreams'

2.3.1 Contribution

Chapter VII of Freud's (1900/1991) 'The Interpretation of Dreams' bears many similarities to the ideas generated in the 'Project'. In this text, Freud develops a hierarchical description of agencies, which are 'systems' that constitute the general functioning of the psyche. The lowest level of this hierarchy refers to perception entering the system, moving through successive layers of memory traces of perceptions, which are unconsciously processed until a preconscious gate is reached which allows for access to motor action and consciousness.

> *"All our psychical activity starts from stimuli (whether internal or external) and ends in innervations. Accordingly we shall ascribe a sensory and motor end to the apparatus. At the sensory end there lies a system which receives perceptions [Pcpt];*

at the motor end their lies another, which opens the gateway to motor activity. Psychical processes advance in general from the perceptual end to the motor end." (Freud, 1900/1991, p. 686)

The next layer of the hierarchy consists of a system of memory traces of perceptions. As in the 'Project', Freud argues that this system must be separate from a system of perception. Freud continues to define association similarly to the definition in the 'Project':

"Association would thus consist in the fact that, as a result of a dimunition in resistances and the laying down of facilitating paths, an excitation is transmitted from a given Mnem. element more readily to one Mnem. element than to another." (Freud, 1900/1991, p. 688)

The reason why Freud includes a number of 'Mnem' (mnemonic element, or memory trace) layers in his formulation is because he views any given sensory excitation as able to produce a (indeterminate) number of 'permanent records':

"The first of these Mnem. systems will naturally contain the record of association in respect to simultaneity in time; while the same perceptual material will be arranged in the later systems in respect to other kinds of coincidence, so that one of these later systems for instance, will record relations of similarity, and so on with the others. … It's character would lie in the intimate details of its relations to the different elements of the raw material of memory, that is … in the degrees of conductive resistance which it offered to the passage of excitation from those elements." (Freud, 1900/1991, p. 688)

This last section of the quote seems to indicate that a given conceptual connection, through which various memories may be associated, is not best represented with words (such as a conceptual similarity). Rather, it should be represented by a connection that is defined by similar energic quantities; this was an idea that he conceded was not fully defined at this stage. However, a given conceptual connection may be linked to an earlier proposition that ideas of similar emotional valence are associated with one another in the psyche (Freud & Breuer, 1895/2004).

Towards the motor end of the apparatus, Freud (1900/1991) describes a 'critical agency' that is able to exclude excitatory processes from consciousness and provide a selective gateway to voluntary motor movement, preventing discharge. This critical agency (or system) is the 'preconscious' (or 'Pcs' as he refers to it). Excitatory processes within the Pcs may enter consciousness if certain conditions are met, such as sufficient intensity, and the mechanism of 'attention' is distributed in an appropriate way. The system behind the preconscious is the unconscious ('Ucs'), which only has passage to consciousness through the Pcs. The Ucs excitatory processes can only reach consciousness through modifications of the Pcs system. Freud attempted to generate a theoretical basis for his sexual theory of neuroses, and thus elaborated on the mechanism of repression from consciousness. This is addressed in some detail further in his text.

In addition to his discussion of the temporal ordering of the hierarchy described above, Freud (1900/1991) makes a statement about the governance of this hierarchical system:

> *"This however does no more than fulfil a requirement with which we have long been familiar, namely that the psychical apparatus must be constructed like a reflex apparatus. Reflex processes remain the model of every psychical function." (p. 686).*

Referring to ‘a requirement with which we have long been familiar’ (p. 686), Freud must be referring to the primary function of the nervous system of removing or discharging Qn from the neuronal systems, as described in the ‘Project’, or of discharging surplus excitation as described in ‘Studies in Hysteria’. This statement of the ‘reflex arc’ notion makes no specific mention of a base or default quantity of excitation. However, it seems to be an assumption of Freud’s (1900/1991) that excitation is capable of being retained in the system of ‘unconsciousness’. This presents an apparent exception to his notion of the reflex arc, just as the retention of Qn in the ego presented a problem for his principle of discharge in the ‘Project’:

> *“… this path leading through the preconscious to consciousness is barred to the dream-thoughts during the day-time by the censorship imposed by resistance. During the night they are able to obtain access to consciousness.” (Freud, 1900/1991, p. 691).*

This quote seems to suggest that the unconscious retains its energically-laden ‘thoughts’ throughout the day and night in some way. Consider the following statement:

> *“In which of these systems, then, are we to locate the impetus to the construction of dreams? … in the system Ucs. … when we consider the dream-wish, we shall find that the motive force for producing dreams is supplied by the Ucs.” (p. 691).*

This statement appears as an exception to the initial statement that excitation enters the psyche as perceptual stimuli and proceeds to motor discharge. It is possible to infer from the above quotation (as well as later passages: p. 704) that the unconscious may either retain or even add new energy into the system. In this text, Freud does not emphasize the organic origin of the energy in the Ucs system. He does make one remark about an organic origin of the excitation in the Ucs system, but it seems to imply that the organism may act as

reinforcement of the Ucs wishes only on some occasions. In fact, a later comment (p. 728) seems to suggest that the Pcs also has the capacity to retain some excitation.

The capacity of this Pcs 'gate' in Freud's (1900/1991) theory and its ability to deflect excitement from discharge (thereby retaining it in the nervous system) sets up a problem similar to that described in the 'Project', regarding the directionality of the flow of excitation. This problem is evident in his attempt to explain hallucinatory phenomena in dreams and pathological hallucination in waking life. Freud argued that this phenomenon must involve the retrogressive movement of excitation against the normal flow of direction from perceptual stimuli to motor discharge (he refers to this retrogressive movement as 'regression'). At first, he suggested that the normal direction of flow is weakened during sleep:

> *"During the day there is a continuous current from the Pcpt. Ψ-system flowing in the direction of motor activity; but this current ceases at night and could no longer form an obstacle to a current of excitation flowing in the opposite sense. Here we seem to have the 'shutting out of the external world'" (p. 694).*

However, Freud (1900/1991) then critiqued this position, suggesting that pathological day-time hallucinatory phenomena cannot be explained by this means. He then suggested another process that may enhance his explanation. He suggested that certain powerful memories (especially infantile or early childhood memories) have 'great sensory force', which attracts cathexis that emerges from the unconscious system (he later suggested that sensory perceptions must have this same attractive force – p. 722). He argued that there is a combination of forces that permits regressive flow against the normal direction, involving a push backwards from the censorship of the Pcs and a pull from sensory memories that contain 'great force'. Freud notes that there must be differences in the process of transference of energies between pathological regression and regression that occurs in normal mental life

(p. 698), for example, there is a difference between hallucinating and daydreaming, but he did not elaborate on this at this point. However, it seems clear that he was defining a quantitatively determined process where, through a summative combination of opposing energies (forward against backward), the overall sum defines the resulting psychical state.

2.3.2 Critique

Freud (1900/1991) again had to state the exception to the principle of discharge to retain and purposively direct excitation in the nervous system, due to the 'exigencies of life' (p. 720) (the organism's necessity of directing appropriate adaptive action). In this text, Freud again used the familiar terms, primary and secondary principle, and specifically connected them with the *Ucs* and *Pcs* systems, respectively:

> *"... the activity of the first ψ-system is directed towards securing the free discharge of the quantities of excitation, while the second system, by means of the cathexes emanating from it, succeeds in inhibiting this discharge and in transforming the cathexis into a quiescent one, no doubt with a simultaneous raising of its level. I presume, therefore, that under the dominion of the second system the discharge of excitation is governed by quite different mechanical conditions than those in force under the dominion of the first system" (Freud, 1900/1991, p. 759)*

In seeking to describe which conditions govern this second system, Freud (1900/1991) again recognised the need to describe a hierarchically 'top-down' process that influences these processes and operates against free discharge. It was postulated again that the operation of the preconscious system is directed by the contents of consciousness, particularly by

pleasure or unpleasure. Relative to the description in the 'Project', Freud offered a similar but slightly different description of the governing role of the conscious system in these processes:

> *"… consciousness, which we look upon in the light of a sense organ for the apprehension of psychical qualities, is capable in waking life of receiving excitations from two directions. In the first place, it can receive excitations from … the perceptual system; and in addition to this, it can receive excitations of pleasure and unpleasure, which prove to be almost the only psychical quality attaching to transpositions of energy in the inside of the apparatus. All other processes in the ψ-systems, including the Pcs., are lacking in any psychical quality and so cannot be objects of consciousness, except in so far as they bring pleasure or unpleasure to perception. We are thus driven to conclude that these releases of pleasure and unpleasure automatically regulate the course of the cathectic processes [emphasis in original]" (Freud, 1900/1991, p. 729).*

The central proposal here is that when discharge begins to result in unpleasure, it is opposed through an inhibitory cathexis.

Ignoring the poor definition of the concept of 'quality', Freud's (1900/1991) account faces a problem, in that it attempts to formulate a mechanical explanation of the mechanism of repression that is evident in dreams and neuroses. To this end, he suggested that the second system must retain some form of access to unpleasurable memories, either in order to remember the psychic actions required to avoid them or remove them (repression) or to adaptively learn from experience. This clearly violates the pleasure principle. Freud again tried to demonstrate that this second system must represent an extension of the pleasure principle. He argued that the second system *can* access unpleasurable memories, provided it can inhibit the discharge of unpleasure that comes from them.

However, this argument seems to set up a contradiction that Freud addressed but did not adequately solve. This statement (and it will be shown in later statements as well) seems to suggest a delinking between the pleasure-unpleasure series and the excitation increase-discharge series. Freud's message was that the nervous system must accumulate energy (through an inhibitory cathexis) in order to avoid the experience of associated unpleasure through discharge. However, in his economic theory, unpleasure is firmly associated with the accumulation of excitation. It must be concluded that unpleasure cannot be invariantly associated with the accumulation of excitement. Bereft of this mechanical correlate, pleasure and unpleasure are simply subjective, conscious experiences that have no place in his economic account. Perhaps for this reason, later in the same paper, Freud proposed a slightly different mechanical correlate of the pleasure principle. He generated a notion that the second system seems to involve the transformation of energy, and that pleasure and unpleasure must be associated with different forms of energy and different forms of discharge. This account of the second system suggests that its operation changes the nature of the cathexis, anticipating the mobile-bound distinction that is elaborated on in the text 'Beyond the Pleasure Principle' (Freud, 1920/1955). Holt (1962) also pointed out the resemblance of Freud's idea of a quiescent (or 'bound') cathexis to Breuer's notion of 'intracerebral tonic excitation' that was described earlier in this thesis. This proposition is examined more closely later, with reference to the text 'Beyond the Pleasure Principle'.

At this point, Freud began to shift away from the purely mechanical account of energic distribution, the discharge principle that encountered many problems in the 'Project'. Here, governance began to move under the rule of the experience of pleasure or unpleasure (though Freud was still attempting to articulate a mechanical description of these experiences). But in this account, Freud also recognised difficulty in describing the definitive role of pleasure and unpleasure. Because of the previously mentioned requirement to access

unpleasurable memory, Freud (1900/1991) had to account for why this access should take place at all, if the resulting unpleasurable discharge would prevent it. Freud stated that unpleasurable memory can be accessed by consciousness, if an inhibitory cathexis can prevent the unpleasurable discharge associated with it. Holt (1962) suggested that Freud's description of this inhibitory cathexis must refer to a dispersion of the energies through the ego, perhaps through the 'lateral' cathexes described in the 'Project'. Holt's suggestion raised the following question: How does the preconscious 'know' to perform an inhibitory cathexis on the discharge related to unpleasurable memory without some unpleasurable discharge occurring?

Freud (1900/1991) then suggested that some small amount of unpleasurable discharge must take place, which acts as a 'signal' that activates an inhibitory hypercathexis of attention. This inhibition binds the unpleasurable discharge and allows affect-producing thoughts to enter consciousness, without the unpleasurable affect. However, Holt (1962) claims Freud did not satisfactorily described 'how' the hypercathectic mechanism works or how it achieves this binding of the drive cathexis. Furthermore, he also faces the same apparent contradictory energic requirements as in the 'Project'; the secondary process requires a large amount of bound (or binding) energy while simultaneously needing a small amount available for mobile displacement, in the form of attention or thought. Freud (1900/1991) admits to being unable to fully develop a purely energic description of the governance of the cathectic mechanisms in this text:

> *"I therefore postulate that for the sake of efficiency the second system succeeds in retaining the major part of its cathexes of energy in a state of quiescence and in employing only a small part on displacement. The mechanics of these processes are quite unknown to me" (p. 759).*

How the mechanics of this inhibitory cathexis that allows access to unpleasurable memory 'differs' from one that does not also remains unclear in this text. Freud describes an 'anticathexis' as a constantly reinforced hypercathexis that achieves repression of unpleasurable material by receiving constant organic reinforcement. This capacity to allow conscious access to all memory traces (including unpleasurable ones) is critical to the adaptation of a person to external circumstances. Partly recognising the problems inherent in describing the mechanical regulation of cathectic processes by either purely quantitative determinants or subjective experiences of pleasure or unpleasure, Freud highlighted the problem of explaining the phenomenon of increasing adaptiveness and rationality in thought and consciousness (in other words how cathexis becomes aligned with increasingly adaptive action). This phenomenon was still considered the central function of the second system. In order to account for this, Freud (1900/1991) posited a new process:

> *"But, in order to make more delicately adjusted performances possible, it later became necessary to make the course of ideas less dependent upon the presence or absence of unpleasure. For this purpose the Pcs. system needed to have qualities of its own which could attract consciousness; and it seems highly probable that it obtained them by linking the preconscious processes with the mnemonic system of indications of speech, a system not without quality. … By means of the qualities of that system, consciousness, which had hitherto been a sense organ for perceptions alone, also became a sense organ for a portion of our thought- processes. Now, therefore, there are, as it were, two sensory surfaces, one directed towards perception, and the other towards the preconscious thought processes." (p. 730).*

This account of the conscious experience of thought attempts to explain how thought becomes more adaptive in response to environmental adaptation and less dependent on the pleasure principle by suggesting that the conscious experience is a result of the structuring of

the preconscious and that the mechanisms of thought inherently achieve this. Freud (1900/1991) seems to be referring, in part, to his formulation of thought from the 'Project'; the implication of this may be that the structuring of mechanisms of thought is a biologically inherited capacity that is not governed by a discharge or pleasure principle.

Towards the end of this text, there is a summative remark that appears to contradict the earlier formulation:

> *"It seems probable that in the first instance the unpleasure principle regulates the displacement of cathexes automatically. But it is quite possible that consciousness … may introduce a second and more discriminating regulation, which is even able to oppose the former one … enabling it … to cathect and work over even what is associated with the release of unpleasure." (Freud, 1900/1991, p. 777-778)*

This passage seems to imply that consciousness can govern cathectic processes, beyond the mere experiences of pleasure and unpleasure. Shortly after this passage, Freud states:

> *"The automatic domination of the primary unpleasure principle and the consequent restriction imposed upon efficiency are interrupted by the processes of sensory regulation, which are themselves in turn automatic in action." (p. 778)*

This quote implies that sensory information from the outside world modifies the pleasure principle. This position is stated most succinctly in his 1911 paper, 'Two Principles of Mental Functioning'. In this paper, Freud (1911/1963) refers to this second principle as the 'reality' principle, in which the pleasure principle is primarily modified by circumstances in the external reality, through the organs of perception. However, no complex theoretical structure (beyond that in the 'Project') was developed in that paper or the present one that

articulates this modification in any theoretical depth. Freud's final text that substantially dealt with the subject of the energic mechanisms, the 1920 paper 'Beyond the Pleasure Principle', is discussed below.

2.4 'Beyond the Pleasure Principle'

2.4.1 Contribution

In this text, Freud (1920/1955) opens with a statement that mental events are governed by the pleasure principle, which is automatically regulated by a constancy principle. According to this principle an increase in excitation (that is not in any way 'bound') is felt as unpleasurable and a decrease is felt as pleasurable. In this description, he seems to be reinstating the centrality of an economic constancy principle that governs economic processes. He began to move towards the centrality of pleasure and unpleasure in the previous text (where the link between the two became less clear), and this text seems to imply an inviolable link between the two as well. However, immediately afterwards, he offered a qualification to this linkage, stating that pleasure and unpleasure may have no simple or proportional relation with excitation level, but may be influenced by other characteristics, the most likely of which he considered to be the 'rate' of change of excitation. However, he indicated that there is a possibility that this link might not be confirmed by psychoanalytic research alone:

> *"Experiment might possibly play a part here; but it is not advisable for us analysts to go into the problem further so long as our way is not pointed by quite definite observations." (Freud, 1920/1955, p. 8)*

The reference to ‘bound’ above (suggesting that pleasure and unpleasure depend on the level of ‘unbound’ energy), refers to a distinction that he defined in the seventh chapter of ‘The Interpretation of Dreams’, which assumes significance in the present text:

> *“The indefiniteness of all our discussions on what we describe as metapsychology is of course due to the fact that we know nothing of the nature of the excitatory process that takes place in the elements of the psychical systems, and that we do not feel justified in framing any hypothesis on the subject. We are consequently operating all the time with a large unknown factor, which we are obliged to carry over into every new formula. It may be reasonably supposed that this excitatory process can be carried out with energies that vary quantitatively; it may also seem probable that it has more than one quality (in the nature of amplitude, for instance). As a new factor we have taken into consideration Breuer's hypothesis that charges of energy occur in two forms; so that we have to distinguish between two kinds of cathexis of the psychical systems or their elements—a freely flowing cathexis that presses on towards discharge and a quiescent cathexis. We may perhaps suspect that the binding of the energy that streams into the mental apparatus consists in its change from a freely flowing into a quiescent state.” (Freud, 1920/1955, p. 30-31)*

Thus, Freud addressed the problem found at the end of ‘The Interpretation of Dreams’ that was created by the distinction between bound and unbound forms of energy. He attempted to clarify that the level of ‘unbound energy’ is related to pleasure or unpleasure. However, towards the end of the same paper, he qualified this position by indicating that the pleasure and unpleasure associated with unbound excitatory processes is stronger than that associated with ‘bound’ processes, but is not absent from bound processes.

It is also important to note that the definitions of the primary and secondary process have a different emphasis here. The emphasis on definition in this paper is not a distinction between the pleasure principle and the reality principle, but between unbound and bound states. Freud's position in this paper seems to be that the pleasure principle defines activity in both processes (though not inviolably). In addition, while the reality principle must make use of secondary process functioning, it does not appear to be the primary governing determinant of the secondary process; at the very least, its governing role is unclear.

Furthermore, Freud (1920/1955) renews an earlier statement in this text, that the activity of the unconscious system has an unbound quality (where cathexes can be easily transferred, displaced, or condensed), whereas the activities of the preconcious and conscious systems are characterised by more stable bound cathexes. However, Holt (1962) states (though primarily in reference to the 1911 paper 'Two Principles of Mental Functioning) that this difference may be more quantitative than qualitative. The transference, displacement, and condensation that occur in unconsciousness still represent some degree of binding. However, this binding is less stable than that of memory traces in preconscious mental activity. Thus, the different forms of activity of the primary and secondary process (free or bound) are not inextricably linked with the activities of these two systems, unconscious and conscious.

Shortly after making his initial statement about the dominance of the pleasure principle, Freud (1920/1955) qualified it further:

> *"It must be pointed out, however, that strictly speaking it is incorrect to talk of the dominance of the pleasure principle over the course of mental processes. If such a dominance existed, the immense majority of our mental processes would have to be accompanied by pleasure or to lead to pleasure, whereas universal experience completely contradicts any such conclusion. The most that can be said, therefore, is*

> *that there exists in the mind a strong tendency towards the pleasure principle, but that that tendency is opposed by certain other forces or circumstances, so that the final outcome cannot always be in harmony with the tendency towards pleasure. We may compare what Fechner (1873, 90) remarks on a similar point: 'Since however a tendency towards an aim does not imply that the aim is attained, and since in general the aim is attainable only by approximations.…'" (Freud, 1920/1955, p. 9-10)*

The first qualification Freud refers to is the 'reality principle', named in his (1911/1963) paper 'Two Principles of Mental Functioning', and its modification of the pleasure principle. This qualification is stated succinctly here:

> *"We know that the pleasure principle is proper to a primary method of working on the part of the mental apparatus, but that, from the point of view of the self-preservation of the organism among the difficulties of the external world, it is from the very outset inefficient and even highly dangerous. Under the influence of the ego's instincts of self-preservation, the pleasure principle is replaced by the reality principle. This latter principle does not abandon the intention of ultimately obtaining pleasure, but it nevertheless demands and carries into effect the postponement of satisfaction, the abandonment of a number of possibilities of gaining satisfaction and the temporary toleration of unpleasure as a step on the long indirect road to pleasure." (Freud, 1920/1955, p. 10)*

Aside from the later description of how the reality principle is carried into effect through the activities of consciousness and the hypercathexis of attention, the mechanisms of governance of the reality principle are not largely elaborated on here. Regardless, Freud (1920/1955) suggested that the modifications caused by the reality principle can only explain a small fraction of the experiences of unpleasure in an organism. He presented other

experiences, most importantly drive frustration, perception of environmental danger, traumatic experience and the compulsion to repeat (which is the central thesis of his text); the latter two are discussed further towards the end of this section.

In this paper, which is considered one of Freud's most speculative writings, he introduced one of the most controversial concepts of his career: the notion of the death instinct. This concept is one of the least accepted by other psychoanalysts and is described later (Holt, 1962). Because he anticipated that the 'death instinct' concept would not be easily accepted by his peers or society, Freud (1920/1955) began to suggest the limits of the pleasure principle as he engaged in some theoretical footwork to lay the ground for this contentious concept. In doing this, he offered a novel perspective on the governance of the pleasure principle (one which is of central interest to the present proposal as it bears some passing resemblance to systemic theory). According to Fechner (translated from the original German):

> *"In so far as conscious impulses always have some relation to pleasure or unpleasure, pleasure and unpleasure too can be regarded as having a psycho-physical relation to conditions of stability and instability…. According to this hypothesis, every psycho-physical motion rising above the threshold of consciousness is attended by pleasure in proportion as, beyond a certain limit, it approximates to complete stability, and is attended by unpleasure in proportion as, beyond a certain limit, it deviates from complete stability; while between the two limits, which may be described as qualitative thresholds of pleasure and unpleasure, there is a certain margin of aesthetic indifference." (Fechner, 1873, p.94 in Freud, 1920/1955, p. 8-9)*

Strachey (in a translators note in the present text by Freud, 1920/1955) notes that ‘aesthetic’ has an older meaning that refers to sensation or perception. Considering Fechner’s words to support his conception of the constancy principle, its usage here by Freud (1920/1955) also highlights the concept of stability in an organism, equating escalating excitation with organismic instability. While no statement was made that this refers to a ‘systemic’ instability, it still represents a compelling new formulation that the modifications to the pleasure (or constancy) principle may reflect the need for organismic stability, beyond the homeostasis of excitation.

Later, while presenting a relevant formulation of drive repression during development, Freud presents another connection between an organism’s state of stability and excitatory mechanisms:

> *“Another occasion of the release of unpleasure, which occurs with no less regularity, is to be found in the conflicts and dissensions that take place in the mental apparatus while the ego is passing through its development into more highly composite organizations.” (Freud, 1920/1955, p. 10)*

In this quote, Freud seems to imply that psychic development may display properties that are similar to the biological development of an organism, and that phases of change may involve states of instability and excitation and thus unpleasure, alternated with periods of stability. Furthermore, Freud was utilising this understanding to suggest that drive repression may result from this reorganisation, generating another apparent exception to pleasure principle functioning:

> *“Almost all the energy with which the apparatus is filled arises from its innate instinctual impulses. But these are not all allowed to reach the same phases of development. In the course of things it happens again and again that*

> *individual instincts or parts of instincts turn out to be incompatible in their aims or demands with the remaining ones, which are able to combine into the inclusive unity of the ego. The former are then split off from this unity by the process of repression, held back at lower levels of psychical development and cut off, to begin with, from the possibility of satisfaction. If they succeed subsequently, as can so easily happen with repressed sexual instincts, in struggling through, by roundabout paths, to a direct or to a substitutive satisfaction, that event, which would in other cases have been an opportunity for pleasure, is felt by the ego as unpleasure. As a consequence of the old conflict which ended in repression, a new breach has occurred in the pleasure principle at the very time when certain instincts were endeavouring, in accordance with the principle, to obtain fresh pleasure. The details of the process by which repression turns a possibility of pleasure into a source of unpleasure are not yet clearly understood or cannot be clearly represented; but there is no doubt that all neurotic unpleasure is of that kind—pleasure that cannot be felt as such" (Freud, 1920/1955, p. 10-11).*

In the above quote, the drive to pleasure produces its opposite, due to a problem with the developmental synthesis of incompatible forms of discharge and the resultant structuring of discharge mechanisms.

Another apparent exception to the pleasure principle occurs during the course of traumatic neurosis. Specifically, Freud was interested in the purpose of the symptom of intrusive unpleasurable recollection of an event (specifically in the form of unpleasurable recollection dreams), and how it seems to defy the pleasure principle, in that the psychic apparatus spontaneously seems to tend towards unpleasure. He developed a complex and powerful model for the energic conditions that underlie this symptom. However, this model also created tension between the centrality of pleasure and unpleasure and the constancy

principle. His model suggests that, like a unicellular organism whose outermost layer has hardened to protect the vulnerable tissue beneath, the sense organs of a human being provide a protective layer that only allows a fraction of the energies in the environment into the psyche. However, the intensity of the stimulus may exceed this protective capacity, allowing abnormally intense levels of excitation into the psychic apparatus beneath:

> *"We describe as 'traumatic' any excitations from outside which are powerful enough to break through the protective shield. … Such an event as an external trauma is bound to provoke a disturbance on a large scale in the functioning of the organism's energy and to set in motion every possible defensive measure. At the same time, the pleasure principle is for the moment put out of action. There is no longer any possibility of preventing the mental apparatus from being flooded with large amounts of stimulus, and another problem arises instead—the problem of mastering the amounts of stimulus which have broken in and of binding them, in the psychical sense, so that they can then be disposed of." (Freud, 1920/1955, p. 29-30)*

The process of mastery that Freud describes operates as a result of an assumption about the binding capacity of cathected psychic elements:

> *" … we infer that a system which is itself highly cathected is capable of taking up an additional stream of fresh inflowing energy and of converting it into quiescent cathexis, that is of binding it psychically. The higher the system's own quiescent cathexis, the greater seems to be its binding force; conversely, therefore, the lower its cathexis, the less capacity will it have for taking up inflowing energy and the more violent must be the consequences of such a breach in the protective shield against stimuli." (Freud, 1920/1955, p. 30)*

Following this assumption, Freud proposed that the Cs system begins to deploy attentional hypercathexis towards these affected elements of the apparatus on a fairly continual or regular basis. The extra cathexis received raises the quiescent cathexis of the apparatus, providing greater capacity to continue taking up and binding the excess excitation that has been present in the apparatus since the traumatic event.

2.4.2 Critique

Freud (1920/1955) suggested that the requirement for mastery of excessive stimuli represents a process that is independent of the pleasure principle; a suspension of the pleasure principle rather than a contradiction of it, as the ultimate goal is the reinstatement of the pleasure principle and the restoration of a pleasurable state in the organism. However, it seems that this process can be viewed as a re-emergence of the primacy of the constancy principle, though Freud did not view it as such. In other words, the long process of mastery of excessive stimuli appears to serve the purpose of evening out excess excitation (to use Breuer's words).

The phenomenon of binding appears to complicate this reasoning, as excess excitation is reduced through binding. This implies (following his formulation thus far), that it must be in a free state, causing unpleasure within consciousness. However, this appears an impossible state of affairs, as his hypothesis is that excess excitation remains present in the apparatus for some time (he described a symptom that can be retained for weeks or even years). It seems unlikely that it remains free, pressing for discharge throughout that time. It is clearly implied that excess excitation is 'stored' in the apparatus in some way, most likely bound within a memory trace (not within the Cs system, as he expressly states this cannot be the case). Thus, the process he described appears to be unbinding the bound (excessive) stored excitation into

a free form (releasing unpleasure), then binding it in a manner that reduces unpleasure, perhaps permitting a different form of discharge. If this is the case, then there must be different forms of binding, some of which require this unbinding-rebinding process, and that are perhaps more related to unpleasure than others. Therefore, if this process follows the constancy principle (which it appears to) then further theoretical work must be completed to define different types of binding (or different rules for different levels of bound excitation).

Regardless, some tension should be discernible between the primacy of the constancy principle and the pleasure principle, despite Freud's (1920/1955) confident statement in the first paragraph of the work that they are inseparable. The pleasure principle appears to have been initially introduced (the idea already appears in embryonic form in the 'Project') in order to explain modifications to the functioning of the constancy principle (in other words that sometimes discharge is withheld as it produces unpleasure). However, Freud's theorising then changed, stating the primacy of the pleasure principle in defining mental events. Though he attempted to retain a description of the economic correlates of these subjective states, gaps in this description were identified in the critique of 'The Interpretation of Dreams' and in the present text. In this paper, Freud was attempting to generate explanations for a myriad of exceptions to the pleasure principle. The present exception that appears in symptoms of traumatic neurosis appears to be a reinstatement of the primacy of the constancy principle, though it is problematised by the role of binding. In other words, the constancy principle seems to be used to explain modifications to the pleasure principle.

Freud (1920/1955) appeared to further this argument when introducing the central concepts in this paper: repetition compulsion and the death instinct. In order to explain why people recollect or enact unpleasurable experiences from their past, Freud went beyond the description of the mastery of stimuli and suggested that an independent 'compulsion to repeat' (unpleasurable experiences) must be operating in a person's mental life. This compulsion is

deeper and older than the pleasure principle, and may supersede it when defining the course of mental life. Freud provided many examples of this compulsion, including a patient's unconscious enactment of painful past relationships in the transference with an analyst and in other contemporary relationships.

In an attempt to explain the repetition compulsion and its powerful influence on mental life, Freud (1920/1955) posited that the instincts of an individual universally seek to reinstate an earlier state of affairs of that individual. Drive energy, rather than generating change in an organism, seeks to maintain that organism in a constant way of life and change is generated by external circumstances. This last sentence shows the tremendous similarity that this formulation has with Maturana and Varela's (1980) concepts of 'autopoiesis' (the tendency of the organism to maintain a stable structure) and structural coupling (the tendency for that organisation to be inextricably linked with environmental circumstances), where the drive to maintain the organism is akin to autopoiesis, and the change driven through external circumstances similar to structural coupling. This formulation is central to the present thesis and is more carefully presented in chapters 4 and 5.

However, Freud's explanation for this tendency differs sharply from the concept of autopoiesis. When trying to explain why instincts have this character of maintaining the organism in a previously held state, Freud posited that the reason was the death instinct; that the purpose of all life is ultimately to die, and that the previous state of affairs that an organism ultimately intends to return to is oblivion. He suggests that even the self-preservation instinct obeys this dictate, seeking only to ensure that an individual dies in its own organically determined manner, following its inherited course towards death. Freud does modify this statement by suggesting the exception of the germ cells in a sexual reproduction system, which instead of seeking death, seek immortality through becoming a new organism.

He suggested that the erotic instincts (or the ‘Eros’ drive) that emerge from this part of the organism oppose the death instincts in various ways.

This formulation has implications for the energic mechanisms suggested by Freud (1920/1955). First, it suggests that the constancy principle (though it may better be proposed as a discharge principle in this case) serves the death instinct; it serves to return the matter of the organism to an inorganic state without excitation. This formulation appears to reinstate the primacy of the constancy principle and relegate the primacy of the pleasure principle in determining the course of mental life. Freud suggests that the pleasure principle is a tendency that operates in service of a function, which is the constancy principle, itself governed by the death instinct. However, the fundamental question at the heart of the present proposal still remains unexplained: What governs the secondary process of binding? What drives the mental apparatus to bind the excitation rather than discharge it, when binding appears to violate the constancy principle and to sometimes cause or sustain unpleasure and delay pleasure? Freud (1920/1955) was still attempting to insist on the inviolability of the pleasure principle, as described in the following passage at the end of the text:

> *“We have found that one of the earliest and most important functions of the mental apparatus is to bind the instinctual impulses which impinge on it, to replace the primary process prevailing in them by the secondary process and convert their freely mobile cathectic energy into a mainly quiescent (tonic) cathexis. While this transformation is taking place no attention can be paid to the development of unpleasure; but this does not imply the suspension of the pleasure principle. On the contrary, the transformation occurs on behalf of the pleasure principle; the binding is a preparatory act which introduces and assures the dominance of the pleasure principle” (p. 62).*

To explain this concept, he refers to the sexual act where excitation is first accumulated as tension which is subsequently discharged, all in service of mankind's greatest pleasure. This explanation suggests that:

> *"The binding of an instinctual impulse would be a preliminary function designed to prepare the excitation for its final elimination in the pleasure of discharge." (Freud, 1920/1955, p. 62)*

Beyond this statement, there is little information that explains the mechanics of this concept satisfactorily.

At the end of this paper, Freud (1920/1955) himself posed the question as to whether conscious subjective experiences of pleasure and unpleasure faithfully follow the activities of energic discharge and transformation, noting that various forms of tension can be felt in the psyche that may be experienced as either pleasurable or unpleasurable. He did not fully answer this question, though others have stated that energic processes occur at a level of abstraction that may be far removed from what can be discerned from conscious experience (Gill, 1977), including that of pleasure or unpleasure, and that these categories may not be adequate for a formal theory of the governance of excitatory processes.

Indeed, at the end of this text, Freud had failed to provide a coherent and persuasive theoretical structure for the principles that govern the modification of the constancy principle. The role of pleasure and unpleasure, though perhaps important in the theory, are insufficient to explain the cathectic processes alone. Furthermore, the mechanisms of the reality principle and how the need for adaptation to external circumstances may dictate these processes are largely absent from this paper. Their most detailed description was in the 'Project', with the attendant problems noted at that stage. Given the density and detail of the review thus far, the most relevant critical remarks made about Freud's formulation up until this point are briefly

summarised. Subsequently, further developments in the field of psychoanalysis are examined, before articulating the importance of the energic theory within the current field.

2.5 Summary of Critical Remarks

- The principle of constancy does not adequately describe the governance of psychic processes of excitation.

This principle (referred to as constancy, a tendency towards inertia or discharge, or a reflex arc) is variously described as requiring the removal of all excitation, maintaining it at a constant, or maintaining it as low as possible, to a baseline level. Freud expressed uncertainty about which of these possibilities is true. Furthermore, a range of observations seem to indicate that people have an innate desire to raise excitation levels beyond any constant. Alone, this principle cannot explain why the mental apparatus should withhold discharge for any reason (for example through cathectic mechanisms that bind energy). Thus, it must be modified by another principle, whether through avoiding unpleasure through discharge (pleasure principle) or improving adaptive behaviour to external circumstances (reality principle). Problems with these two modifications are summarised next. The inadequacy of this principle may be related to the critique that it is only valid in a closed system, whereas biological systems are more properly classified as open systems (Rosenblatt & Thickstun, 1970; Von Bertalanffy, 1969/2009).

- The pleasure principle does not adequately describe the governance of psychic processes of excitation and its relation to the principle of constancy is inconsistent in Freud’s theory.

This principle alone cannot explain the production of mental phenomena associated with unpleasure without modification. At times it appears that Freud describes the pleasure principle as modified by the principle of constancy, which undermines his view of its stable relation with the constancy principle and creates questions about how the pleasure principle can modify the constancy principle in that case. Furthermore, Freud was compelled to explain some of the failures of the pleasure principle by creating a new concept; he described repetition compulsion and connected it to a death instinct, which was one of his least accepted ideas. Problems with the pleasure principle's modification by the reality principle are examined next.

As the pleasure principle refers to conscious subjective states, its role in governance of excitatory processes requires the interposition of conscious experience in those processes, creating problems of directionality, hierarchy, and chronological ordering of mental processes, which are not adequately solved in his work. Finally, the relation of states of pleasure and unpleasure to levels of excitation appears untenable in its simple form, as Freud had to account for why the mental apparatus accumulates energy. He then defined bound and free forms of energy in the mind, but this cannot adequately solve the problem since both bound and unbound forms of energy are associated with pleasure and unpleasure, and Freud did not adequately describe how some forms of binding may be associated with pleasure and others not. However, Galatzer-Levy (1983) described different accounts of the feeling of pleasure within psychoanalysis and suggested that though problematic, Freud's concept was the most promising at the time of his writing, and refinement of the concept should be pursued.

- The operation of the reality principle and its modification of either the constancy or pleasure principles are not adequately described in Freud's work.

The operation of the reality principle is most fully described in Freud's (1950) 'Project'. There, its operation involves complex feedback circuits with complex operations of thought and poorly defined 'indications of quality' (indications of reality, in others words) within consciousness. Strachey (in Freud, 1950) indicated the strength of the idea of feedback circuits. However, aside from the fact that little empirical evidence supports Freud's formulation, its operation requires the interposition of the pleasure principle, with all of the attendant problems inherent in it. In other words, the reality principle results in unpleasure in order to avoid other unpleasure, and forgoes some pleasure in order to achieve other pleasure. This formulation requires a form of reality testing of thought that is inadequately defined in Freud's work.

- The form(s) of energy in Freud's work are inadequately defined and its (or their) relationship with subjective experience and observable behaviour is problematic.

The form (or forms) of energy referred to in Freud's work are inadequately defined, and its (or their) relationship with other forms of energy (mechanical, electrical, metabolic, or other) is not adequately clarified. Furthermore, a critique has been made that such energy and the processes that characterise it (or at least some of them) may be at a level of abstraction that cannot be inferred from conscious experience or observable behaviour. This abstraction limits their clinical relevance and provides an inaccurate prediction of mental functioning and behaviour (Gill, 1977; Rosenblatt & Thickstun, 1970).

2.6 Further Developments in Psychoanalysis

While a number of instances in Freud's body of work make references or even adjustments to aspects of the energic theory, there is no substantial further revision of the core concepts of governance beyond that traced through the papers reviewed in the current document thus far (Holt, 1962). However, a number of subsequent writers in psychoanalysis have attempted to add to the body of theory on the topic of psychic energy. The most notable examples of these are indicated below, together with the critique that none of these additions to the theory either address or resolve the core critiques described.

2.6.1 Wilhelm Reich

The contribution of Wilhelm Reich to the field of psychoanalysis includes a strong emphasis on energic concepts. Specifically, Reich (1945) posits a conception that resembles Freud's to some extent, but that focuses almost exclusively on the energy of sexual origin. Reich suggests that the sexual instinct gives rise to a passage of energy through the body of a person that seeks expression and release through orgasm. Reich argues that the socialising pressures on the organism require mastery of this energy, and its physical 'capture' in a person's body. Reich's primary contribution to psychoanalysis rests in his description of the 'character armour' of a person. 'Character armour' includes the normal postures, rigidities, and almost mechanised movements that represent a person's stable methods of capture and mastery of the sexual energies (Reich, 1945). In this regard, Reich's theory seems to follow a principle of governance that is most specifically related to Freud's (or Breuer's) 'discharge' tendency.

Reich (1945) related the full range of neurotic disorders, as well as a range of physical disorders, to the damaging effects of these characterological physical defences. For example, he suggested that Freud got jaw cancer not through smoking, but as a result of his character armouring of 'biting down' on his impulses rather than expressing them (Corrington, 2003). This perspective drew criticism from various analysts (including Freud) who felt that he was oversimplifying the processes of the mind and psychopathology (Sharaf, 1994). He developed a form of therapy that involved massaging his patients in order to release blockages in their character structure. Later, in his far more controversial period of work (most of which is rejected by the psychoanalytic community), Reich developed a theory that he termed orgone energy, a life force, or cosmic or spiritual energy that is ubiquitous to the universe. This became the substance of his subsequent research (Sharaf, 1994).

2.6.2 Heinz Hartmann's Neutralisation

Hartmann was a theorist who was interested in the functions of the ego in psychoanalysis, beyond its role in drive conflict. With regard to energy, Hartmann (1964) proposed that energy exists in the psyche in more than one form. One form represents libido in the sense proposed by Freud, representing instinctually-driven energy. He also proposed another form (or mode) of energy that is utilised by the ego for its functions. He suggested that though this energy may have its origin in drive energy, it had undergone a transformation he termed 'neutralisation', delinking it from its instinctual origin and achieving delay in gratification (and therefore discharge). Boesky (1986) highlighted the overlap that this idea has with Freud's notion of energy being fuelled by desexualised libido; however, Hartmann (1964) had clearly developed this notion more systematically, suggesting that neutralised energy was a conceptually different form, with a different mode of operation.

This latter proposition from Hartmann has been supported and critiqued from various quarters. Zepf (2010) questioned the distinction between libido and psychic energy, suggesting an unclear definition of terms. Others have supported the distinction, with one author suggesting that the distinction is best viewed as the difference between energy as a form of 'impetus' that drives psychic functioning and energy as a form of 'fuel' for the ego (Modell, 1963). Kubie (1947) has questioned how this form of neutralisation can take place, and how it can be measured. In a set of experiments that would be unlikely to receive ethics approval in the current age, Lustmann (1957) applied mildly startling auditory stimuli to young babies (up to 8 days old) and cited a colleague (Wolowik, 1927) who applied electrical stimulation to 2 month old infants. Lustmann (1957) concluded that babies experiencing overwhelming pleasure were much less responsive to stimuli in their environment, even to unpleasurable stimuli; babies experiencing overwhelming distress were unresponsive to other stimuli as well. He argued that it was unlikely that the child had the capacity for neutralisation at this early developmental level and argued that there must a limited pool of specific ego-energy (ego-instinct) that is not neutralised from libidinal energy. This conclusion was also drawn by Plaut (1984) and partly by Freud (1950).

Nonetheless, Hartmann's theory attempted to provide an energically based account of the vicissitudes of the ego and provided novel propositions regarding the operation of energy in the psyche. However, beyond agreeing with Freud (1950) that these energic forms are drawn from a limited reservoir, these additions do not address the fundamental problems of governance of these mechanisms that have been highlighted thus far in the present chapter. They also make no overall modification to the principles of discharge or pleasure and unpleasure. In addition, Hartmann does not offer overarching mechanisms of governance of the neutralising process or neutral energy in the psyche, beyond the dormitive principle of

citing their necessity for the adaptive functioning of the individual (overlapping with the reality principle) and the needs of the ego itself.

> *"Hartmann … chose … to emphasize the vicissitudes of psychic energy… the literature … is curiously silent on the question of the taming of affects, the achievements of tolerance for unpleasure and the interrelatedness of affects and drives." (Boesky, 1986, p. 164)*

Indeed, within the later work of Hartmann, a trend appeared amongst a section of psychoanalytic writers including Kohut (1977). These writers expressly moved away from theories of psychic energy in favour of developing the centrality of psychic structures in the definition of psychic functioning, suggesting that the operation of psychic energies is fundamentally determined by structure. Their critique is reviewed in the following chapter.

2.7 The importance of the theory of energic regulation within Psychoanalysis

McIntosh (1986) is unequivocal in his statement about the importance of the concept of psychic energy within the field of psychoanalysis:

> *"The quantitative notion of psychic energy is the most fundamental of Freud's ideas, on which the entire edifice of his thought is built. For him, the activity of the mind consists of nothing but the formation, transformation, storage, and discharge of quantities of psychic energy. Virtually all of his main ideas derive from or depend on this concept, including primary and secondary process, displacement, condensation, reversal, repression, bound versus free processes, defense, instincts, identification—the list could go on much further. All of these consist of processes, states, or structures of quantities of psychic energy." (p. 405).*

Over a period that spanned several decades throughout the middle of the last century, the core concepts of psychic energy within psychoanalysis were at the centre of a heated and prolonged debate within the psychoanalytic field. Swanson (1977) refers to a series of texts in which the concept is criticised, including papers by Apfelbaum (1965), Applegarth (1971), Basch (1973; 1975a; 1975b), Colby (1955), Gardner (1969), Gill (1976), Holt (1965), Klein (1976), Kubie (1947; 1975), Nagel (1959; 1967), Nuttin (1956), Peterfreund and Schwartz (1971); Peters (1960), Rosenblatt and Thickstun (1970) and Rubinstein (1965; 1967). More recent critiques include Gedo (2001), Gill (1983), Ricoeur (1978), Rosenblatt & Thickstun (1977; 1984) and Zepf (2010).

A number of these authors call for a major revision of the theory and even the refutation of this core of energic concepts altogether (Klein's proposed 'theorectomy'). However, Swanson (1977) also refers to a range of papers that defend the importance and usefulness of the energic concepts (referred to below as the 'economic' point of view):

> *" A panel discussion in 1970 … however, reflected a strong, almost unanimous, consensus that the economic point of view has great value for clinical psychoanalysis. Energy concepts were described as essential to explaining and crucial to understanding certain behavioural phenomena. Greenson, Loewenstein, Lustmann, Rubinfine, and others explained how and why they found the economic point of view useful." (p. 603)*

The energic concepts have also received much support from various writers, including Freeman (1997), Galatzer-Levy (1976; 1983), Genovese (2012), Horowitz (1977), Hyman (1975), Plaut (1984), Sjodin (2010) and Wurmser (1977). The proliferation of this debate alone should reflect the importance of this conceptual core in the body of psychoanalytic theory. However, a large proportion of the critiques presented in this body of literature

remain effectively unresolved, despite attempts to advance the understanding of, or revise, the theory. Given that constant evolution and development of theory is a fundamental necessity within the natural and social sciences (Kuhn, 1962), it is a serious difficulty that a conceptual core, which is of such central significance to its field, has remained undeveloped and beset with unresolved contradiction and critique.

In addition to conceptual importance, a primary index is used within psychoanalysis to evaluate theory for its clinical usefulness, particularly within an analytic situation. A useful theory should result in improved clinical understanding of a client and inform a more effective intervention. As indicated previously, while some authors have criticised the clinical utility of energic concepts on the basis that they are far removed from observations (or interventions) that can be made in an analytic situation (Gill, 1976), a number of authors such as Greenson (1967) and Loewenstein (1957) have expressed how their own clinical understanding and intervention have been improved through the use of energic concepts.

In this respect, the privileged position of energic concepts with regard to neurophysiology may have important implications for clinical utility. Reich (1945) highlighted the importance of the reality of the body in psychoanalytic interpretation; he suggested that essentially, the closer that an interpretation is to the physiological reality of the state of the body, the more effective it will be in facilitating change. He cited case material where his interpretations of his clients' 'character armour' resulted in powerful changes in affect and behaviour. Within the present discussion, it may be concluded that when an analyst's interpretation accurately reflects real neurophysiological constraints that regulate psychic energy, this may be of greater utility to the patient than interpretations that are distorted or irrelevant to that physiological reality. Given the arguable importance of energic theories within psychoanalysis a more detailed critique is presented in the following chapter.

CHAPTER 3: Critiques of Freud's Energic Concepts

> *"Drives are mobilized, and hence we have a psychological force ... applied to the psychic apparatus. The latter must therefore accelerate. ... The most immediate consequence is that the psychic apparatus must separate from the patient. For after all the patient is immobilized on the couch and the psychic apparatus is accelerating. Thus after the first few minutes of an analytic session, if all goes well we can assume that the patient's psychic apparatus is flying about the room some-where. Incidentally, the recoil of the patient as the psychic apparatus is emitted is called by analysts a reaction formation; it is an expression of the third law of motion." (Swanson, 1976, p. 140-141)*

The quote above is small section from a humorous paper published by Don Swanson, which displays what he thought was one of the farcical aspects of the energic theory of Freud. Though it is clearly meant as a jest, it reflects what he felt were the unavoidable consequences of trying to apply laws of physics to phenomena which had no basis in physical reality. This critique is one of a wide variety of strongly defended critiques of the energic theory within a debate that has raged since its inception, with papers on this topic continuing to be published in recent years (Genovese, 2012; Zepf, 2010).

The present chapter presents a discussion and evaluation of the critical literature that has been published about the energic concepts, within the field of psychoanalysis. This chapter suggests the core areas in which this theory cannot be defended against the critiques and discusses areas in which it continues to offer a valuable contribution to the field. The chapter begins by exploring the definition of psychic energy and its nature, and the clarity of its central propositions. Questions about evidence or support for the theory are discussed,

including whether it has any explanatory value, and what observations it may be linked to or predict. Next, the practical usefulness of the ideas is explored. Finally, the accuracy of its main assumptions and propositions is discussed, together with attempts at revision made by some authors. The chapter ends with a summary of the core areas that require re-conceptualisation. We begin with the definition of psychic energy.

3.1 Definition

The most immediate problem facing an evaluation of psychic energy is trying to define what it is, whether it is electrical, chemical, kinetic, or heat, or whether it must be behavioural, such as affect or movement or some more abstract, non-physical 'energy' such as instinct, or something else, or more than one of these forms. In a more serious paper than the one quoted from above, Swanson (1977) presented a taxonomy of different types of definitions, and evaluated each in turn. While his short paper does not adequately address many of the key issues, this typology is a useful starting point for discussing the critiques of the definition.

Swanson identified five types of definitions: interactionist, subjective, classificatory, neurophysiological, and abstract (theory, model, or metaphor). Paul Ricoeur's (1977) 'hermeneutic' definition is added to Swanson's 'abstract' framework, as it does not fit neatly into the other types. Swanson's aim was to insist that the only possible interpretation would be one where psychic energy had some neurophysiological correlate. Thus, his definitional frameworks that are reported below reflect this aim.

3.1.1 Interactionist

Swanson (1977) proposed that a particular interpretation of the concept of psychic energy in Freud's work is that it rests on a duality of body and mind, and that the energy can change state between an 'ethereal' non-physical 'psychic' form and a physical form, which is necessary to promote movement or alter the functioning of physical organs. This definition essentially states that psychic energy has no existence (or specific correlate) in the physical universe, and should be renamed with an 'ethereal' definition. Swanson critiqued this concept, as Freud's theory requires that this energy can influence physical phenomena (or vice versa), a conception which he argued is untenable and violates the laws of physics. It should be noted that no authors have specifically defined psychic energy in these terms. Swanson aimed to suggest that if we believe that psychic energy can transform into the physical energy of muscular movement, behavioural affect, or physiological change then it must be accountable in physical terms itself or it will violate the physical law of conservation of energy that is encompassed by the first law of thermodynamics. This criticism has been echoed by Brenner (1982) and Zepf (2010), and is valid in that psychoanalysts who are content with framing psychic energy in non-physicalist terms (but who nonetheless follow Freud in thinking that it can transform into the physical energies described above) must account for the transformation of this energy into the physical energies.

3.1.2 Subjective

This definitional framework refers to the concept of the theoretical terms of psychic energy, referring to the subjective experiences of physical processes:

> *"… we might define "psychic energy," "discharge," and "conversion" in terms of the purely subjective aspects of unknown somatic or neural events. In so doing, we add psychic energy, discharge, conversion, and related concepts to the language of subjective experience." (Swanson, 1977, p. 614)*

As seen in Chapter Two, Freud and Breuer (1895/2004) referred to a number of such examples where energy-like concepts were found in ordinary language to describe subjective experience. Since it is close to the patient's own language, energic terminology may be of clinical importance. This potential clinical usefulness is discussed later in this chapter in section 3.2.2.

While Swanson (1977) conceded the potential clinical importance of *"subjective 'energy-like' feelings"* (p615), he dismissed this approach as a means of defining psychic energy, stating that it is contrary to Freud's aim in producing the theory. Together with Shope (1973), he suggested that Freud was attempting to explain the subjective experiences of energy in the psyche, not merely to add to their descriptive vocabulary or rename these experiences. While it seems correct that Freud was trying to describe processes that are more than just subjective experiences (though they may be subjectively perceived), he did concede that the terms of the theory could have some hypothetical value as subjective descriptors. However, Swanson (1977) went on to reject this descriptive usefulness as well, suggesting that human languages are already rich in descriptions of subjective experience and that Freud's terms are unnecessary. This seems like a sweeping statement; it would be difficult or impossible for Swanson to empirically prove that no one discerns experiences in themselves for which Freud's terms are the best available descriptors, perhaps precisely because his descriptors attempt to link together experiences that otherwise might be thought to be discrete (for example sexual excitement and symptoms of conversion). Arguably, the purpose of psychoanalysis is to facilitate precisely such awareness.

A contrasting viewpoint to Swanson's is that of Schafer (1975), who suggested that the language of energy in Freud's concepts offers a unique description of powerful subjective experiences, precisely because it is congruent with a powerful natural language:

> *"For example, 'She spoke from the heart'; 'Those thoughts keep crowding in on me'; and 'He is an empty person'. This body language is concretistic, i.e. organized around substantive designations of immaterial phenomena and processes, and around such corrollaries of these substantive designations as location, movement, impulsion, quantity, impact and mass." (p. 42)*

Schafer's purpose is to display the 'infant' nature of these perceptions in order to articulate a form of critique. Nonetheless, he views this language as irreplaceable in some ways, because it bridges that archaic natural language with other familiar linguistic traditions:

> *"Thus it is that to stop using Freud's theoretical language is to radically alter our relations with this most intricate, intimate, pervasive and consequential set of mental categories and operations as well as with language traditions that long antedate the tradition of Newtonian, Cartesian and Darwinian models of mind within which Freud fashioned his eclectic mode of conceptualization." (Schafer, 1975, p. 42)*

It cannot be denied that psychic energy can be defined as a description of subjective experience. If only one person does something then it can be done, and if only one person finds something useful, then it is useful. However, Swanson's point is again valid, as psychic energy defined in this way cannot be part of an objective general theory that explains the mind's function, unless there is an account of how subjective experience is transformed into (or transformed from) objective phenomena.

3.1.3 Classificatory

Swanson's (1977) description of this definitional framework is succinct:

> *"In this framework, psychic energy is defined as an abstract concept, having no referent that actually exists, merely useful or convenient for organizing or classifying clinical (introspective) data collected in the analytic setting. It belongs in the category of theory Basch (1973) identifies as classificatory rather than explanatory. In this approach, too, we redefine "discharge into the motor apparatus" as simply a name, or abstraction, under which certain behavioral or introspective data are collected. We similarly treat conversion and related concepts. There is no issue of verification, refutation, or testability of statements, nor, of course, of violating energy conservation, for this framework admits of no theoretical-explanatory claims. Within this framework psychic energy cannot be a useful concept in the sense of explaining anything about the mind or about behavior." (p. 615)*

This author agrees with Swanson that a purely classificatory activity that is devoid of an explanatory, predictive, or application ambition, and not coupled with another level of description is not useful and apparently was not Freud's aim. However, it is not clear to this author which writers have presented such a definition of the energic concepts, that are merely used for the classification of clinical material, with no other function. Clinical information is categorised because there is some use in doing so (such as interpretation, behaviour change, prediction, or theory building), not simply for the sake of classification itself. Thus, the only criterion that needs to be met by such classification is its usefulness, which is addressed later in this chapter in section 3.2.

3.1.4 Abstract (theory or model)

This framework includes the conception of psychic energy as a purely abstract term that is not specifically tied to a known process or structure, but that nonetheless has some theoretical validity as a construct because it helps predict a particular criterion (Swanson, 1977). In this respect, it can be likened to terms that came into use in physics in the last century. For example, concepts such as ‘dark matter’ were introduced, not because anyone knew what dark matter was or how it worked, but because it was ascribed with the physical (and mathematical) properties that allow accurate prediction of the movement of galaxies. The concept of psychic energy could potentially be considered in a similar manner; it may be useful for the prediction of behaviour without requiring its actual nature and properties to be known.

After stating this definitional framework, Swanson (1977) went on to build an argument in which he suggested that Freud’s concepts fail in this respect as well. The core of his argument is that the concepts of psychic energy do not add anything unique to predictions of behaviour. His interpretation of Freud’s theory is that, while a given behavioural manifestation may emerge from an energic necessity, the actual nature of the manifested behaviour cannot be predicted from the energic concepts themselves. For example, while repressed libidinal energy may present in one case as an obsessive preoccupation with cleanliness, it may present in another as conversion in the form of a skin rash, or in another as a specific phobia. In his view, the energic condition necessitates a reaction (a defense) but cannot predict the form of defense. Thus far, his view is compatible with Freud’s (1894/1962) conception presented in ‘The Defense Neuro-psychoses’.

Swanson then added that the only way to predict a person’s reaction to specific stimuli is by examining that person’s previous behaviour. He stated that we predict that a

person will, for example, experience an exaggerated skin rash because that is what we have seen happen to them before. While unable to form a precise prediction in each case, it is possible to predict a 'trend' in behaviour. In short, Swanson said that we predict that a person will likely have skin rashes in the future because they have had skin rashes before. He concluded by suggesting that the concepts of psychic energy have not added any specific information to this prediction that could not be discerned from past behaviour (Swanson, 1977). He went on to make a seemingly strong claim that every prediction that ostensibly uses the concepts of psychic energy, both in literature and clinical practice faces the same situation: that no predictive power is added by the energic concepts that is not already provided by an analysis of a trend in a person's behaviour. He referred to the concept of 'circularity' in his explanation, suggesting that all predictions that involve energic concepts are necessarily circular in this respect. For example, a person will tend to have skin rashes because that person has tended to have skin rashes before. In this regard, he cites a number of Freud's case studies (the case of Paul Lorenz in particular) and generates a brief bibliography of such references to instances in various texts (Swanson, 1977).

Though Swanson (1977) provides a list of references within Freud's case material that presumably demonstrate this circularity, the author contends that Swanson would be hard pressed to prove his expansive claim that *all* energic predictions face such circularity and that the energic concepts are superfluous. First, the class of observations he is referring to – the selection of a particular defense mechanism – surely constitutes only a part of psychic life, and there may well be other domains in which energic concepts do add predictive value. Furthermore, entirely within the domain that is briefly presented by Swanson, there does appear to be a place for some predictive usefulness of the energic theory. That place is in the temporal manifestation or ordering of defensive behaviour; while it may not be possible to

predict which defense will manifest (without knowing the history of the patient), it may be possible to predict *when* it will manifest (or manifest more intensely).

To use a previous example, energic theory alone may not be sufficient to predict that a young man may experience obsessions of cleanliness in response to repressed libido; however, it is expected that this obsession may appear (or at least intensify) in the evening and night after meeting a woman who stimulates an increase in libido. Freud (1912) does indeed refer to such a case, where a young woman who experienced a phobia of micturation (urination) following an encounter with a young man at a concert hall reported feeling clitoral excitement that was connected to a desire to urinate. Being of an exceptionally 'prudish' frame of mind, her attempt to control the sexual sensation extended to an attempt to control the micturative impulse, and after a long struggle she was forced to leave the concert hall. Following this, she developed an increasing fear of urinating when she was in public, until she became incapable of being in public or maintaining social relationships. Within the present discussion, Freud's energic concept would predict that the phobia would escalate in intensity in situations with an increased incidence of stimuli that induce sexual excitement (and hence greater affect or libido requiring control). Most significantly for the present discussion, the young woman's urination phobia intensified socially and in public but was minimal when at home alone at night. This arguably common analytic observation of the timing of the defense supports the predictive relevance of energic theory that goes beyond circularity.

This particular definition of psychic energy has been the subject of much attention in the literature. An evaluation of Freud's attempts to provide an abstract model or theory require a more detailed engagement than that given in Swanson's (1977) brief text, and a fuller discussion of the predictive relevance of energic concepts is revisited after the fifth and last of Swanson's categories is discussed.

3.1.5 Neurophysiological

This framework refers to the assumption that Freud's notion of energy refers to physiological process of the brain and/or body (chemical or electrical or otherwise) that may be known one day, though may not be adequately defined at the present level of knowledge. It also suggests that his aim appears to be to link behavioural and subjective phenomena to these processes. Swanson (1977) argued that this is the only meaningful framework for defining the energic concepts, suggesting that the other frameworks are either impossible or useless and were not Freud's intention. The purpose of his paper appears to be to construct the argument that this neurophysiological framework is the only meaningful definition of the energic concepts, as the paper systematically presents and then discards the alternative four frameworks based on the two criteria of scientific possibility and explanatory usefulness. The first framework is viewed as scientifically impossible and the following three are viewed as adding nothing useful to subjective self-understanding or the explanation and prediction of human behaviour.

As soon as Swanson proposed that the neurophysiological definition is the only meaningful definition, he went on to dismiss the final framework as well. He drew attention to the view that developments in neuroscience at the time (contemporary with the publication of his paper in 1977) did not support Freud's attempts to base his concepts in a neurophysiological explanation. Other authors have also stated unequivocally that given the failure of 'The Project' (1950), Freud's work has not supplied a neurophysiological definition of the concept of psychic energy (Basch, 1976; Gedo, 2001; Rapaport, 1959; Zepf, 2010). Similar to Swanson, their conclusions can be stated as follows: if psychic energy cannot currently be linked to some form of neurophysiological phenomenon, it has failed as a theory. This perspective appears to haunt the energic concepts, and draws from two (potentially related) viewpoints that are addressed in the present section: a monistic view of the mind and

the requirements of positivistic science. Before a critical discussion of these demands begins, the current state of neurophysiological correlates of psychic energy concepts is briefly presented.

3.1.5.1 Potential neurophysiological correlates of psychic energy

Proven neurophysiological correlates of psychic energy are not yet accepted in psychological science (Basch, 1976; Zepf, 2010). However, efforts have been made from a number of quarters to reformulate the framework that was put forward in Freud's (1950) 'Project', and these ideas are briefly presented here. First, Pribram and Gill's (1976) famous re-examination of the 'Project' identified a number of correspondences between the theorising and the then-current knowledge of neuroscience. The authors acknowledged what is perhaps the most obvious error of the project, that it conceived of the intensity of a signal as a quantity that is carried through the nervous system rather than as we currently understand it, a frequency of activation of the nerves. Yet, the authors argue that the 'Project' holds integrity that may be built upon in further theory. The authors use this as an argument for an information-based reformulation of the theory, but along the way they define a system of feedforward and feedback mechanisms that maintain forms of homeostasis in the nervous system, similar to what Freud described. The concept of an information-based re-conceptualisation of Freud's theory is introduced later in this chapter in section 3.3.2.

A more contemporary development within the field of neuroscience may also have potential as a means of linking the energic theory with neurophysiology. Many of Freud's claims have consistently appeared to be supported by findings in neuroscience over the last century (Turnbull & Solms, 2007). Findings are appearing in neuroscience at present that also appear to be at least 'compatibly aligned' with some of Freud's energic concepts (Carhart-

Harris & Friston, 2010). Friston and colleagues (Friston, Kilner, & Harrison, 2006) described and measured a characteristic activity of the working brain as a whole: that it seeks to reduce ‘free energy’ in the nervous system (in the form of measurement error) in a manner that is potentially compatible with Freud’s principle of equilibrium or conservation. Their work is described in the following chapter in section 4.2.5.3.

This aspect of their work – which is likely to continue to develop rapidly in the following years – falls within the growing field of ‘systems neuroscience’. It attempts to describe principles of governance of the nervous system that reflect its activity as a whole, rather than just a reductionist analysis of the activity of its neurones or structures. The field of systems neuroscience shares an assumption with general systems theory that was originally articulated by Wiener (1965). This assumption is that systems (such as atmospheric meteorological systems, or weather) that are composed of large numbers of component elements (he uses the concept of air molecules in the atmosphere) have properties that are not practically reducible to the nature and function of their component molecules. Likewise with the brain, the combined activity of many tens of billions of neurones follows principles that are not extrapolated solely from the activity of the neurones (Mitchell, 2009; Wiener, 1965). The importance of the contributions that such system thinkers can make to the debates reviewed below is the subject of the following chapter. Monistic and dualist views of the mind are defined next, on the following page.

3.1.5.2 Monism

3.1.5.2.1 Mind versus Brain

A monistic view of the mind is that the mind and the brain are the same entity; it is a rejection of a dualistic view that the mind and brain are two different entities. Basch (1976) wrote:

> *"… The mental apparatus, a reification of the concept of mind, is an unnecessary construct once the supposed mind/brain dichotomy is seen for what it is, namely, a semantic confusion or paradox …." (p. 385)*

> *"Aristotle taught that soul and body are inseparable since the spirit is only the function of the form. Similarly, a Chinese philosopher of the fifth century A.D. held that the spirit is to the body as the sharpness is to the sharp knife. In these and similar views, the spirit, or, as it was later called, the soul or mind, is equated with the functioning of every cell of a living entity." (p. 400)*

Basch (1976) summarized a critique against the 'false' distinction drawn by Rene Descartes, to whom the concept of mind-body dualism is often ascribed. Basch (1976) and Galatzer-Levy (1976) indicated that in fact, Descartes was a 'mechanist' who viewed the body (and brain) as a machine that is governed by fairly simple laws. Then, in reaction to such reductionism of the mind that Basch (1976) ascribed to religion and Galatzer-Levy (1976) to his perception of the inadequacy of his own theory, Descartes stated that our complex (and 'divine') nature inhabits the machine; the machine cannot encompass our divinity or our complexity. Basch (1976) traced the development of a strong backlash that grew in response to Descartes' dualism, and that Freud taught in institutions that were

determined to reject Descartes' dualism. He argued that Freud's (1950) 'The project for a scientific psychology' reflected the influence of his schooling, as he too tried to define his concept of psychic energy as activation ('Q') moving through the nerves, which seems a monistic project.

Basch (1976) then argued that Freud's mistake was in viewing his concept of psychic energy as a causal entity rather than an illustrative device. When he could not solve the problems that are inherent in 'The Project', he nonetheless retained it as:

> *"the nonmaterial, non-anatomical substrate on which both physical external stimuli and biological needs converged, to be changed into sensations and psychic energy respectively, a process that in turn produced psychological "entities" called thoughts and feelings." (p. 391)*

3.1.5.2.2 Mechanism versus Vitalism

In a thought-provoking examination of the historical development of the energic ideas, Galatzer-Levy (1976) argued that the worth of theories (particularly in still-developing fields) is calculated based on their scientific validation and on an examination of historic-developmental criteria. He ascribed this type of examination in reference to Piaget's (1971) concept as the 'genetic epistemology' of a theory. Galatzer-Levy argued that the historical background of Freud's energic concepts can indicate their worth. He suggested that at the time Freud worked, the distinction was not entirely about body or mind. Rather, it was framed as a tension between 'mechanism' and 'vitalism'. Vitalism refers to the concept that living systems possess 'special' characteristics of design or purpose because they are living and imbued with a special nature or energy. This is opposed to a 'mechanistic' viewpoint

which suggests that living organisms are just mechanisms which can be fully explained from a reductionist standpoint.

Unlike Basch, Galatzer-Levy (1976) suggested that Descartes recoiled from his own mechanistic description, precisely because it was too simple and mechanistic to adequately describe human experience; thus, he added a soul to inhabit the machine. Galatzer-Levy (1976) traces this same reaction to a subsequent historical growth of vitalist theories against overly mechanistic theories; these vitalist theories proposed

> *"the concept that latent 'faculties' or 'principles' or 'forces' or 'powers' cause those hidden activities that are the latent equivalents of visible active life." (p. 47)*

Galatzer-Levy (1976) went on to suggest that prior to his mechanist indoctrination within the Helmholtz school, the young Freud had an idealist perspective in the sense that he sought grand, all-encompassing principles that may explain the phenomena that interested him, rather than resorting to fully reductionist explanation. He also stated that later, like many others working within Freud's historical era, he would

> *"repudiate the romantic and mystical ideas of natürphilosophie while incorporating the search for grand, inclusive principles in their work." (p. 53)*

Holt (1965, 1967) also argued that there is a link between vitalism and energic theory. However, like other writers, he considered this a basis for critique. Galatzer-Levy (1976) however, views this as an important attempt to overcome the limitations of an overly simple mechanist approach to the mind's functioning. He argued that Descartes reacted against his own mechanistic theory, in part because it was inadequately simple. Thus, he seems to have interpreted Freud's energic concept as a response to the inadequacies of mechanistic theories

of his time. Galtzer-Levy seems to have argued that a less mechanistic theory would not require the vitalist reaction from Descartes onwards.

Von Bertalanffy (1969/2009) suggested that the persistence of seemingly 'vitalist' questions of pre-systems theories are an unavoidable consequence of such mechanistic (and reductionist) theories of cause and effect. He argued that systems theory offers a powerful alternative to vitalist ideas when explaining complex phenomena. The following chapter examines how systems theory can address this precise difficulty with mind-body duality, particularly with regard to psychic energy. Below, the nature of the critique is formally articulated.

3.1.5.2.3 Physicalist Reductionism

The opposition to an overly mechanistic view of the mind is found in the critique that the monist view is overly reductionist in its explanation of the mind. Reese (1999) defines reductionism in psychology as follows:

> *"The word 'reductionism' usually connotes reduction from one domain to another – in psychology, reduction of behaviour to physiological processes, of these to chemical processes, of these to molecular structures ..." (p. 4).*

Reduction to neurophysiological phenomena is not the only form of reductionism in psychology. Nonetheless, this form has received the most critical attention and was often opposed by behavioural scientists because its level of abstraction is far from their observations of behaviour (Kandel, 1999; Reese, 1999). The opposition to physicalist reductionism of psychic energy began with Freud. Though Freud's 'Project' (1950) was a serious attempt to create a physicalist paradigm for his work, soon after completing it he

began to respond to criticisms that he could not describe a neurophysiological base for his theory of the mind, by insisting that his observations required a different basis, which he termed the ‘psychological’:

> *“I have no inclination at all to keep the domain of the psychological floating, as it were, in the air, without any organic foundation. But I have no knowledge, neither theoretically nor therapeutically, beyond that conviction, so I have to conduct myself as if I had only the psychological before me” (Freud, 1898/1985, p. 26)*

McIntosh (1986) and Toulmin (1978) marked a continuing shift after this point, where Freud increasingly supported a view that the psychological was distinct from the neurophysiological. However, there was ambivalence about this and a persistence of physicalist terms in his work. Gill (1977) indicated that this claim may have allowed Freud to evade clear failures in his physicalist writings.

Gill (1977) argued that clinical phenomena in psychoanalysis are not reducible to neurophysiological phenomena. He stated that psychoanalysis is composed of two main types of theories: clinical theory and metapsychological theory. Clinical theory refers to the body of knowledge that is related to the clinical practice of psychoanalysis, the observations of psychical and behavioural phenomena, and the process of psychoanalysis. Metapsychological theory refers to general psychological theory that contains the assumptions behind the clinical formulations.

The metapsychology of psychoanalysis has six core assumptions about mental phenomena (Greenson, 1967; Rapaport & Gill, 1959):

1. The ‘topographic ’ assumption, which refers to the idea that mental life is divided into conscious and unconscious states and each state is defined by different modes of functioning

2. The ‘structural’ assumption, which refers to the idea that there are mental structures (such as the id, ego, and superego defined by Freud) that influence mental activity and behaviour

3. The ‘dynamic’ assumption, which refers to the idea that there are psychological forces that act on the mind, causing activity and change

4. The ‘economic’ assumption, which refers to the idea that that there is energy in the mind that limits the extent of certain mental activities and that follows the laws of conservation and entropy

5. The ‘adaptive’ assumption, which refers to the idea that mental activity and structures are shaped by the requirement of adaptation, both to external and internal demands

6. The ‘genetic’ assumption, which refers to the idea that mental phenomena have an origin from which they develop (Greenson, 1967; Rapaport & Gill, 1959)

Gill (1977) states that though this description of the Freudian metapsychology has various elements, debate usually coheres around the economic, dynamic, and in some ways adaptive assumptions, such that most of the debate about ‘the metapsychology’ is essentially about the neurophysiological idea of energy and cathexis and related ideas. Gill has argued consistently that the clinical aspect of psychoanalysis is irreducible to a neurophysiological basis, as these are entirely different concepts with different languages, mechanisms, and

assumptions. He does not support the notion that the metapsychology should be scrapped; McIntosh (1986) aptly describes the consequence of such a move:

> *"Those who advocate such a 'radical theorectomy' … are left with only the 'clinical theory' … which places psychoanalysis on a par with acupuncture as a well-established and defined clinical procedure which works with some frequency, no one knows why." (p. 409)*

Rather, Gill (1976) proposed a metapsychology based on whole-person relations rather than drive-energy relations. While he does believe that the work of defining a neurophysiological metapsychology should be conducted, he argued that psychoanalysts cannot do it, as their methods cannot elucidate the neurophysiological mechanisms under discussion. Zepf (2010) made the following argument with regard to the verbal material of analysis:

> *"Spoken words do not allow the detection of a specific distribution of libido as regards conscious and unconscious representations" (p. 9)*

3.1.5.2.4 Multi-level monism

Rosenblatt and Thickstun (1984) disagree with the argument above, and suggest that psychoanalysts may not be an appropriate choice to define the metapsychology that underlies psychoanalysis, but psychoanalysts nonetheless need to contribute:

> *"Whereas the work of constructing such bridges is certainly not the exclusive domain of psychoanalytic theorists, the responsibility for providing a foundation on which such a bridge may be logically constructed certainly is. Insofar as thoughts and feelings must ultimately be in some way connected with underlying*

neurophysiological events, to advocate a system that is logically and conceptually incapable of articulation with natural science data is to ensure that psychoanalysis itself is irrelevant to the other scientific disciplines" (p. 60)

Nevertheless, these authors also echoed the idea that the physicalist paradigm that was available at the time of their writing was too reductionist. They adopted a position, which holds that the physicalist paradigm and a separate 'psychological' paradigm (such as clinical observation) may be two different levels of abstraction for the same concept:

"Different languages for different levels of abstraction in the same category are not only permissible but necessary to make possible the economical management of concepts. The language of integral calculus permits the manipulation of abstractions that would be cumbersome, if possible at all, using the simpler language of linear algebra. However, it is derivable from and, when necessary, translatable into the other language. Similarly, it is necessary that higher-level hypotheses in any psychology be formulated in psychological terms. To propose the replacement of all theoretical terms by neurophysiological language is analogous to advocating the replacement of calculus by addition and subtraction. However, we concur with Rubinstein (1965) who said, "To account for behavior intelligibly we need a terminology that, although ideally completely translatable to the language of neurophysiology, must yet be sufficiently gross and may thus, at least occasionally, become virtually devoid of concrete neurophysiological meaning" (p. 52)."
(Rosenblatt & Thickstun, 1984, p. 61)

Although what these authors said is important, it is not unique. Toulmin (1978) argued that an epistemology underlying this integrated position both predates and antedates the period of Cartesian Dualism that influenced the philosophical ground ahead of Freud,

who seemed to state a similar position towards the end of his writing career. In ‘The Outline’ for his ‘New Introductory Lectures’, Freud (1933) clearly stated this disjuncture:

> *"We know two kinds of things about what we call our psyche (or mental life): firstly, its bodily organ and scene of action, the brain (or nervous system) and, on the other hand, our acts of consciousness, which are immediate data and cannot be further explained by any sort of description. Everything that lies between is unknown to us, and the data do not include any direct relation between these two terminal points of our knowledge. If it existed, it would at the most afford an exact localization of the processes of consciousness and would give us no help towards understanding them." (p. 144-145)*

Bateson (1982) believed that the level of observable behaviour cannot be reduced to neurophysiological phenomena because each inhabits different levels in the systemic organisation. This comment is another indication of the potential ability of systems theory to address these central debates around psychic energy. This idea is further considered in chapter five of this thesis.

This disjuncture led Toulmin (1978) to draw a comparison between the apparently irreconcilable mind-body duality in psychoanalysis and the wave-particle duality of light in physics. Toulmin’s paper attempts to show that while clinical theory has developed smoothly and continuously since its inception, disruptions in the growth of metapsychology have not. Difficulties were faced regarding the energic concepts following uncertainty and change in the field of physics during the period of Freud’s writing. Toulmin’s interpretation of the development of Freud’s theories is that he was forced to move away from his attempts at a physicalist theory by the need to understand his observations on their own terms. Toulman suggested that this was part of the reason for the smooth development of the theories since

then. He did not suggest that the goal of reaching a physicalist metapsychology be abandoned. However, he argued that the apparently irreconcilable gap between the physical level and the psychological level may represent a science that is in a difficult phase of early growth. He drew a comparison between this mind-body dualism, and the apparently irreconcilable dual nature of light as both wave and particle (Toulmin, 1978), arguing that during this phase of physics, progress had to move forward slowly:

> *"This was a time for patience, caution, and agnosticism: for taking the short view and feeling one's way ahead, rather than making an enthusiastic commitment to long-term certainties." (p. 319).*

> *"Bragg had spoken of the dual character of light as an inescapable but unintelligible necessity—'We have learned to think of light as waves on Monday, Wednesday, and Friday, as particles on Tuesday, Thursday, and Saturday'—but now this duality was built into the very heart and core of physical theory. Light really was like that. It really did have two conjoined but distinct sets of characteristics—wavelike and particlelike—which might seem intuitively to be incompatible, but which were in reality complementary. Once this way of viewing physics had established itself firmly within quantum theory, it could plausibly be reapplied on a larger scale. So, we find Niels Bohr extending the idea of 'complementarity,' as a way of dealing with the mind-body problem also. If the fundamental constituents of the physical world were characterized by an irreducible 'wave/particle duality,' might there not be an equally irreducible "mind/body duality" in the case of human beings? Might not the physical and psychical aspects of the human species (that is to say) be distinct yet conjoined characteristics of humanity, in the same way as the wavelike and particlelike aspects of electrons, light, and the rest?" (p. 320)*

Swanson (1978) wrote a cogent paper, specifically questioning Toulmin's evidence for the assertion that Freud's metapsychology was influenced by changes in physics during his career. He also questioned the validity of a single de-contextualised, speculative comment that was made by a physicist such as Bohr on the subject of mind-body duality. Toulmin's paper also drew a response from Paul Ricoeur (1978), who partly supported Toulmin's claims but attempted to qualify them by suggesting that the metapsychology was not influenced by changes in other fields alone, but by phenomena apparent within the psychoanalytic method as well. Despite this criticism, some uncertainty about the nature (physiological or non-physiological) of psychic energy (and of the mind itself) may be unavoidable in the near future. Toulmin drew attention to work that attempted to integrate these levels, singling out work by Pribram and Gill (1976). Toulmin's (1978) paper concludes that an information theory base for the metapsychology would be an important step forward. This view is shared by many others, including Basch (1976), Federico (1972), Germine (1988) and Rosenblatt and Thickstun (1984). The views of these authors are reviewed in section 3.3.3 later in this chapter. In chapter five, a systems approach is proposed that locates psychic energy in a manner similar to that of some of these authors.

3.1.5.3 The requirements of positivist science

The state of psychoanalysis has been criticised because its methods are unscientific, its propositions without evidence, and its metapsychology inadequate (Grunbaum, 1984). Kandel (1999) argued that for psychoanalysis to have any status as a discipline, it should meet positivistic criteria, such as Popper's (1959) criterion of falsifiability. A body of research work has attempted to accomplish this by finding empirical support for many of Freud's propositions (Turnbull & Solms, 2007). However, as indicated in the previous

section, empirical support for energic hypotheses is limited, particularly regarding a physicalist basis for the theory (Basch, 1976; Gedo, 2001; Rapaport, 1959; Zepf, 2010), despite the work of authors such as Pribram and Gill (1976).

The positivist criterion that a theory should be matched with observations is addressed in section 3.4 later in this chapter; the demand that the theory should match specifically physicalist empirical findings is presented here. Central to some of the positivist critiques of the energic theory is an assumption that the theory requires empirical validation, specifically at the physical or neurophysiological level. As indicated previously, Swanson (1977) argued this point, stating that the requirement that a theory should explain phenomena and not merely predict them is central to this requirement.

3.1.5.3.1 Explanation versus description

However, the criterion of an explanation that is based in physicalism may be a false requirement or at least an overly simplistic requirement. Swanson's (1977) distinction between an 'abstract' definition of psychic energy and a 'neuropsychological' definition rests on the distinction between an explanatory theory and a descriptive model. The latter distinction is superimposed upon another distinction between description on one hand and explanation on the other. Swanson (1977) stated that an abstract model is a description without explanatory value (only predictive), whereas a neurophysiological reduction constitutes an explanation. In this statement he may be conflating physicalist reductionism with theoretical explanation, two concepts which may be distinct. This raises the question of what the distinction between a model and an explanation truly is, or which criteria distinguish an explanatory prediction from a merely descriptive prediction. In short, the difference between explanation and description is important.

The ‘semantic’ view of theories within the philosophy of science (which has gained some significance in recent decades) suggests that there is no fundamental objective difference between a theory and a model; each is a map that represents a territory, and neither is the territory. Theory can be considered a particular class of model (Reese, 1999; Suppes, 1960). Pepper (1972) suggested that a theory is different because it is a description that is grounded in a ‘root metaphor’. While significant challenges to these views have been made from various quarters (Halvorson, 2012; Reese, 1999), Skinner (1931) argued that an explanation is just a part of a ‘fuller description’ of a process that includes a description of antecedent processes. If Skinner’s view is accepted then Swanson’s distinction may be meaningless.

Zepf (2010) suggested that Freud believed that there was a clear distinction between explanation and description and that he was trying to generate an explanation, not merely a description. He referred to a number of Freud’s comments, such as:

> *“We seek not merely to describe and to classify phenomena, but to understand them as signs of an interplay of forces in the mind, as a manifestation of purposeful intentions working concurrently or in mutual opposition (Freud, 1916/1917a, p67).” (Zepf, 2010, p. 8)*

Zepf (2010) argued that Freud’s criterion for what constituted an explanation was that his theory should refer back to something known:

> *“to explain a thing means to trace it back to something already known” (Freud, 1900/1991, p. 511).*

Zepf’s (2010) critique rests on a definition of explanation expressed as follows:

> *"According to the scientific view, explanations necessarily consist of three classes of proposition. The first class relates to the 'explanandum' and describes what was, or is, the case. The explanation – the 'explanans' – consists of two classes of propositions: 'one of these comprises certain propositions … constituting the specific antecedent conditions; the other is a quantity of propositions … setting forth general laws' (Apel, 1964/1965, p. 240). This distinction takes account of the recurring scientific question as to reasons: 'On the basis of which general laws and of which antecedent conditions is, or was, this the case?' (Apel, 1964/1965, p. 240, translated; see also Rubinstein, 1980)." (Zepf, 2010, p. 8)*

Zepf's (2010) critique of the energic theory is that the antecedent conditions (a neurophysiological state) are unknown from the perspective of the psychoanalytic method. Referring to an energic explanation for repression, he stated:

> *"The law must establish not only the existence of the explanandum – the repression – but also the presence of the antecedent conditions, that is, the distribution of forces in cathexis and anticathexis between unconscious representations and those capable of becoming conscious. In addition, the truth of the correlation of these forces as formulated by the general law must be confirmed. This latter condition cannot be realized in an essentially language-bound procedure like the psychoanalytic process in which [nothing] takes place … but an interchange of words between the patient and the analyst (Freud, 1916/1917a, p. 17). Spoken words do not allow the detection of a specific distribution of libido as regards conscious and unconscious representations. That is to say, even when measured against Freud's (1900, p. 511) understanding of how an explanation is defined – to explain a thing means to trace it back to something already known – cathetic-theoretical arguments cannot lay claim to an explanatory status." (p. 8-9)*

The above quote by Zepf (2010) has more than one message. First, it says that the analytic method of research cannot reveal the antecedent conditions defined by the theory; this statement supports Gill's (1983) position that clarifying the physicalist metatheory is beyond the ambit of psychoanalysis. This quote also implies that energy is a physical thing and without empirical observation of the antecedent condition, which is the energy, the energic theory will fail in its aim as an explanation of clinical phenomena.

However, 'going back to something known' does not necessarily imply that what is known must be a neurophysiological antecedent condition. Reese (1999) presented a text in which he attempted to defend the distinction between, and the conceptual integrity of, 'explanation' versus 'prediction' as it pertains to behaviour. He refers to a distinction drawn by Kaplan (1964), who states that there are two forms of explanation: those that are deductive-syllogistic and those that involve the identification of a network or pattern of facts. The first kind of explanation (deductive- syllogistic) attempts to deduce a phenomenon from premises:

> *"One of the premises – the one identified in formal logic as the major premise – is functionally a theory." (Reese, 1999, p. 4)*

Reese (1999) suggested that this form of explanation is typical in the natural sciences, which deal with axiomatic laws that must operate with total certainty. The second kind of explanation is described as identifying a pattern or network of facts:

> *"A phenomenon is explained by a persuasive demonstration or argument that it fits into the network. The network constitutes what Kaplan (ibid.) called a 'concatenated' theory" (Reese, 1999, p. 4).*

Kaplan's (1964) definition of a 'concatenated theory' is similar to a core aspect of the systems approach. Bateson (1972) suggested that systems theory reflects a shift in emphasis towards perceiving 'process'; in other words observing patterns of organisation, rather than 'substance' or 'objects'. Keeney (1983) suggested moving away from a 'paradigm of substance' towards a 'paradigm of pattern'. This important similarity is further discussed in the following chapter.

Kaplan (1964) continued on to acknowledge that this 'concatenated' theory seems similar in notion to a model, but he suggested that they fall in different categories due to one important criterion. As stated by Reese (1999), the difference between this latter type of explanation and a model is the requirement that the proposition should be *abstracted from the data*, a requirement which he ascribed to Marx's 'Capital' that was published in 1976. Reese (1999) stated:

> *"The theory in either type of explanation [deductive-syllogistic or concatenated] must be at least the inductive kind, which is a theory in which the constructs are induced or abstracted directly from data." (Reese, 1999, p. 4)*

Kaplan made this distinction between concatenated explanation and description in formal logical terms in the following definition of a model:

> *"we may say that any system A is a model of system B if the study of A is useful for the understanding of B without regard to any direct or indirect causal connection between A and B. For in that case, A must be like B in some respects: if we wanted to infer that because A has the property p when B has some other property q we would need to know that A and B are somehow connected, according to the specific relation between p and q, while to conclude that B also has the property p, we need only know that A and B are similar in appropriate ways even though in fact they have nothing to*

do with one another. On the other hand, just which ways are appropriate is already limited by the condition that no conditions are imposed on the physical relations between the two systems. The systems must therefore resemble one another as systems, that is, in ways which do not depend on the particular elements of which each consists, or else we would need to know just how elements of these particular kinds effect one another. The resemblance is in terms of the pattern or order exhibited in each system, the information which each contains, in the current idiom, rather than in terms of the configuration of mass and energy in which the information is embodied. In a word, when one system is a model of another they resemble one another in form and not in content." (Kaplan, 1964, p. 258)

The core difference here - in the view of both Kaplan (1964) and Reese (1999) - is that the content referred to by a theory is drawn from data that is observed from a phenomenon. Alternatively, the content referred to by a model is removed from the data of observation, such that that it only describes formal or structural relations, rather than any contents. For example, a model of gravity can be described as follows: the larger the economies of two countries, the greater the level of trade between them; this relation models the characteristic form of the relationship of the force of gravity between two bodies, but the content of the economic description has no relation with the gravitational attraction between bodies. Conversely, if a proposition states that it was the heaviness (mass) and proximity of the two objects that were related to the speed or strength of their moving together, this would be an explanation in Kaplan's distinction, as the proposition is abstracted from the observation.

In this case, what provides the distinction is that the two antecedent conditions of the observation can be measured (the mass of the objects and the distance between them), and by applying a general law a result can be observed. The fact that this theory can refer back to

these antecedent measurements gives it positivistic legitimacy. This description of gravity does not explain how gravity works; rather, it may well be described as a model that predicts the attractive force of objects. However, few would contest that this theory does not meet positivistic requirements. The core of such explanation is that there should be an empirical observation of antecedent conditions that are abstracted from observation. In the case of energic theory there is nothing to suggest that the antecedent conditions *must* refer to a neurophysiological measurement. Section 3.4.2 below, 'A behaviourally-defined statement of the energic hypotheses', attempts to formally state a set of antecedent observations that are not neurophysiological in nature.

At present it must be conceded that some of Freud's statements appear to be non-explanatory in nature. In trying to describe the mechanisms of governance of energic processes – and often citing a frustrating lack of neurological knowledge – he resorted to analogies of electrical circuits and interconnected water pipes, which appears more similar to a model of operation than a theory within Kaplan's (1964) distinction. These descriptions of physical systems may be similar to psychical systems in form but not in content.

3.1.5.3.2 Behavioural (non-physicalist) reductions as explanation

When Freud and Breuer (1895/2004) formally postulated principles, such as the principle of equilibrium or constancy, this went beyond what Kaplan (1964) defined as merely descriptive. They attempted to describe a relationship between various sets of observations, where the principle they describe fits into that network of observations they have made, and that can be induced or abstracted from those observations.

This distinction is a definitive one. Some have argued that energy as a concept in Freud's theory was initially not abstracted from a neurophysiological level (from a physiological form of energy for example), but from an observational (or subjective) level; as reported in Ornston and Chattah (1983), Shevrin stated in a panel discussion that:

> *"… the concept of energy has its roots in experience and demonstrated that experience tells us that energy, force, and work are concepts of a general nature and are not limited to their special application in physics." (p. 692)*

Shevrin argued that in physics, energy is not usually conceived of as a distinct concept. Rather, it is thought of in terms of the phenomena it is bound to, such as temperature, kinetics, or nuclear fission. Furthermore, Wurmser (1977) argued that energy as a concept is entirely anthropomorphic in origin, and that its use in science is correlational. In other words, 'energy' refers to the correlation (or transformation) between the radiation from sunlight and heat from a pavement.

Freud observed that emotions, actions, and subjectively felt intensities of experience can be of a 'high' or 'low' level of intensity. He stated that that those intensities appear to be correlated with other intensities, through other emotions, actions, or subjective experiences and with intensities of stimulation, motivation, or need. It must have seemed to Freud that the one characteristic that all of these various phenomena seemed to share (their level of intensity) could fruitfully be described or defined as 'energy'.

Galatzer-Levy (1976) expressly criticised the view that Freud's energic concepts were abstracted from behavioural observation and introspection, and both he and Toulmin (1978) traced a historical context that persuasively states that Freud drew his energic concepts from physics. However, Freud was also trying to connect energy concepts with his observations

(Zepf, 2010). Thus, he was busy generating a concept of energy that could be abstracted from both.

In conclusion, the energic concepts could meet positivistic criteria if they can be based on an empirical observation of antecedent conditions in the behavioural or introspective domain, and if those observations can be made reliably. Positivism does not expressly require that the measured antecedent condition be neurophysiological, even though it is hoped that one day a link is seen.

Continuing to defend the scientific validity of the 'network' type of explanation, Reese (1999) argued that this type of explanation (based on observations in the behavioural - not neurophysiological - domain) is ubiquitous in psychology:

> *"This is the kind of theory behaviour analysts find acceptable because it refers to a level not much different from the level of observation. Examples of theoretical concepts in this kind of theory include 'private event', 'response class', 'operant' and 'relational frame'. Higher level theories include concepts further removed from the level of observation; examples are 'drive', 'cognitive process', 'intelligence' and 'heritability'." (p. 4)*

While some have challenged Kaplan's use of the term 'concatenated theory', suggesting that these are only descriptions or even 'abstract empirical generalisations', Reese (1999) highlights that these forms of constructs that are induced from observed phenomena, form a broad class of explanation that is common in the field of psychology. To suggest that the energic theory is suspect in that it has not yet been reduced to a physiological construct would be to adhere to a double standard; as such, all such constructs in the field of psychology not yet so reduced to neurophysiological phenomenta should be abandoned for the same reason. Such a construct cannot be evaluated by proving its physicalist reduction.

Rather, it should be evaluated by the reliability of its correlation with observations from within the domain that it is abstracted from.

In this light, the construct of ‘energy’ can be compared to the construct of ‘intelligence’. The concept of intelligence was not originally abstracted from a neurophysiological quantity, but from a range of observations of performance of and adaptation to particular activities and tasks (particularly performance on tests and academic tasks). Intelligence is a characteristic that is common to (or correlated between) all of these observed phenomena. As a concept, its validity has typically been drawn from the stability of these correlations, not from its physicalist reduction. While neural correlates of intelligence and intelligent behaviour have been found, intelligence has not been conclusively described in neurophysiological terms (even at this rapid stage of development in the field of neuroscience). While this indeed forms part of a multi-faceted critique of the concept of intelligence, it has not prevented a great deal of research in the area.

The concept of intelligence does have an apparent advantage over that of energy because it is has a stable and reliable set of observations (test and task correlations). In addition, the critique has regularly been made that the energic concept has not been explicitly tied to a reliable set of observations (Rapaport & Gill, 1959; Zepf, 2010). This particular criticism is addressed later in this chapter in section 3.4.

A further clarification of what constitutes explanation is found in Peterfreund and Schwartz’s text (1971). These authors clarify that for a statement to constitute an explanatory theory about an observation, it should demonstrate that the observation represents one particular manifestation of a more general law. For example, to explain why a balloon popped when a child squeezes it, the answer ‘it is because the child squeezed it and we often see balloons pop when they are squeezed’ would be an example of an empirical generalization.

However, a more general statement, such as ‘gas under pressure may reach a level where the pressure exceeds the structural integrity of the container’ is an explanation. The latter description is an explanation because it demonstrates that the popping balloon is an example of a broad, general law that applies to a wide variety of phenomena. Returning again to Freud’s energic theory, the relevant observations can be explained if they are shown to be the manifestations of a general law. However, it is not necessary to frame that general law in physicalist terms. Instead, it can be framed in behavioural terms or, as described in the following chapter, in terms of systemic laws of form. For all of the above reasons, it is proposed here that the reduction to a neurophysiological level is not a necessary condition for the validity of the energic theory.

3.1.6 Abstract models and theories revisited

Accepting that the development of psychic energy principles can proceed without waiting for neurophysiological evidence is tantamount to accepting work at the level that Freud considered ‘psychological’. Some authors (Modell, 1963; Wurmser, 1977) appear to accept that their definitions are abstract in Swanson’s (1977) sense of the word (descriptions aiding predictions), while still arguing for their predictive or clinical usefulness. However, in line with the discussion presented in the previous section, a number of other authors have proposed the validity of an explanatory approach to defining psychic energy that is non-physiological or psychological. These are reviewed in the following section. The first section defines psychic energy within a hermeneutic epistemology, the second defines it as an operational ‘metaphor’ which may have predictive utility, and the third section reviews formal non-physiological models.

3.1.6.1 Energy within a hermeneutic field

Paul Ricoeur (1977) presented an influential discussion of epistemology within psychoanalysis that appears to be influenced by French studies in linguistic philosophy. Ricoeur's focus was on language, and he argued that psychoanalysis is fundamentally a practice of the spoken word; all that takes place within the psychoanalytic encounter does so through the medium of spoken language. As such, all that psychoanalysis seeks to uncover, including the vicissitudes of the mind, must reside within its representation within language, which imposes its own influence on the analytic process. Ricoeur questioned the possibility of empirical proof of psychoanalytic knowledge because he views psychoanalytic knowing as applying to phenomena that only exist in the intersubjectivity of the analytic encounter (Ricoeur, 1977).

Ricoeur (1978) responded to the paper by Toulmin (1978), and approached the topic of psychic energy in the following way:

> *"... libidinal forces enter into the field of the analytic situation to the extent that they are brought to* language*." (p. 338)*

Ricoeur (1978) argued that a paradox will always exist between energy that is constructed in the intersubjectivity of analysis and the scientific form, and stated that analysis will always have to negotiate the intersubjective form. This is a somewhat conservative formulation of energy that appears to make no claim to a general psychology that exists outside of the analytic situation and potentially resides under the 'classificatory' category within Swanson's (1977) taxonomy, except for claims of clinical usefulness and Ricoeur's attempt to generate criteria for 'proof' claims in analysis that are based on consistency with the theoretical superstructure of Freud's method and ideas (Ricoeur, 1977).

Friedman and Alexander (1983) respond supportively to Ricoeur's epistemology, but seem to deny the paradox that Ricoeur posited. Instead, they present an interpretation of the 'Project' that reifies language as the centre of psychic organisation and the site of the ego's bound energy. However, the purpose of their paper appears unclear at times, and other than attempting to justify a hermeneutic approach to analysis, the meaning of the conclusion is confusing. Grunbaum (1984) has comprehensively criticised the hermeneutic approach and Ricoeur in particular, as being unable to avoid the positivistic critiques that it seeks to ignore. He called Ricouer's work a form of 'ideological surgery' that limits the field of psychoanalysis to a far greater extent than Freud intended.

3.1.6.2 Psychic energy as a metaphor

In a panel discussion, Modell (1963) cautiously expressed the usefulness of a metaphor in the development of science, although he appeared ambivalent about its importance:

> *"Freud used the words 'psychic energy' in two different senses: as a metaphorical description of observable phenomena and as a part of an intellectual construction—a theoretical model of the mental apparatus. He noted that the use of metaphor models and analogies has a respected and essential role in the history of science, but it is imperative that observation be distinguished from intellectual construction. In the history of science observations endure, but theories perpetually change. Modell said, 'We can live with the fact that Freud used the same terms, such as cathexis, primary and secondary process, to refer to both a clinical description and a theoretical model, if we can maintain our own awareness of the distinction. If we permit ourselves to*

become unaware of the distinction between what is observed and observable and what is constructed, we will become lost in the maze of our own theory'." (p. 607)

Expressing a similar concern, Wurmser (1977) cited Home (1966) who

"… accuses psychoanalysis of having applied 'metaphors' to 'meaning,' of understanding these metaphors literally and thus creating 'a metaphysical fact' ... It has become a kind of new religion with new dogmata, that is, basically all of our higher level abstractions are seen as metaphysical statements." (Wurmser, 1977, p. 469)

While the warning to be cautious with the usefulness of metaphors in science should be heeded, Wurmser (1977) presented a far stronger case for the role of metaphors in theory formation, and not merely within clinical work. He adopted an approach that he described as Neo-Kantian and which he attributed to Cassirer (1910/1953) and Langer (1972), which appears to bear some similarity towards a semantic view of the philosophy of science (Suppes, 1960). Wurmser (1977) proposed that metaphors are unavoidable in the history of science, because even positivist concepts such as 'mass' and 'force' are symbols and not facts; though they attempt to symbolize facts, they are 'pseudo-images', 'metaphors', or 'mediating presentations'. He argued that the language of physics, neuroscience, and even mathematics, are in this sense no less metaphorical than psychological metaphors. Wurmser (1977) acknowledged the critique made by Schafer (1975) and others that a problem occurs when metaphors are mistaken for real relations or actual things. Wurmser (1977) applied this approach to psychic energy, drawing on a quote from Cassirer:

"… it appears that energy in this form of deduction is never a new thing, but is a unitary system of reference on which we base measurement. All that can be said of it on scientific grounds is exhausted in the quantitative relations of equivalence, that

> *prevail between the different fields of physics. Energy does not appear as a new objective somewhat, alongside of the already known physical contents, such as light and heat, electricity and magnetism; but it signifies merely an objective correlation according to law, in which all these contents stand. Its real meaning and function consists in the equation it permits us to establish between the diverse groups of processes (Cassirer, 1910, pp. 191-192).” (p. 486)*

This interesting passage states that energy as a concept does not refer to a thing, but to a ‘relationship of equivalence’ that is similar to a correlation. The implication seems to be that energy is that aspect of light, electricity, or heat that all three have in common and that perhaps can be transformed or correlated amongst these components, but that it is not actually a physical component. Wurmser (1977) expressed his own insight best:

> *“The economic model in psychoanalysis is an attempt not to add yet a new physical content to those physical equivalents but to establish metaphorically, by analogy, a similar system "of quantitative relations of equivalence"—some novel form of lawful correlation between emotional phenomena. A good example is the process of displacement (including transference): the oedipal rage at father lived out with equal archaic intensity in a professional rivalry with a superior. Or a step further, when reaction-formation and undoing intervene, the intensity of obsequiousness and submission to the unconsciously hated authority is equivalent in experienced strength to the hatred and rivalry.” (p. 486-487)*

In this respect, Wurmser (1977) argued that energy as a concept is a profound anthropomorphic metaphor, in that it describes relations from the observer’s viewpoint. That is precisely why he considers it entirely appropriate for the use Freud makes of it, and

believes that energy is a perfectly acceptable metaphor for describing psychological and behavioural phenomena.

Nelson (1967) argued that physical energy that is evident in behaviour cannot be the same as psychic energy; however, Wurmser's (1977) point is not congruent with hers, as both physical and psychic phenomena may be described with an energic metaphor. It seems that the question becomes about whether those phenomena are correlated or not. Wurmser's argument supports proceeding with an energic metaphor without describing it as neurophysiological. However, he does argue that the primary criterion of the validity of a metaphor is its usefulness, and the research, action, and theory-building it gives rise to. This subject is addressed later in this chapter in section 3.4 as well as in the concluding chapter of this thesis.

3.1.6.3 Formal models

Galatzer-Levy (1983) and McIntosh (1986) not only argue for the coherence and positivistic acceptability of an entirely psychological (non-neurophysiological) account of the energic hypotheses of Freud, they each also independently seek to state those hypotheses as formal models that are mathematically defined. While neither use measurements to verify these models (in fact this would be difficult), they do convincingly demonstrate that an entirely psychologically defined account of the energic theory can be formulated in coherent and precise terms. These terms are briefly reviewed here as support for the usefulness of energic conceptions and to gain insight into the relative strength or weakness of some aspects of the theory.

Galatzer-Levy (1983) attempted to find a link between the pleasure principle and variational principles within calculus. He described variational principles within calculus as follows:

> *"The calculus of variation studies how a function may be found with some minimum or maximum property. For example (to use the first problem in the calculus of variation which Newton posed in the third edition of the* Principia*), it might be asked (and indeed it is asked in designing ships and airplanes) what shape a surface must have if it is to offer the least* resistance *to forward motion. Another application is to find the shortest path between two points on a surface." (p. 260)*

Galatzer-Levy (1983) proposed combining this variational calculus form with a 'principle of least action' as defined by Euler, to form an equation that can define almost any form of dynamic system. This equation was then used to minimize the following equation described by Galatzer-Levy (1983):

> *"I introduce a quantity, P (pleasure) ... Let a(t) be the individual's action at time t ... E(t) his environment at time t and H(t) his history at time t. ... I shall call P(t) the pleasure at time t and shall postulate only that it is real valued (i.e., its values are ordinary numbers) and ... we assume that P(t) depends only on the individual's present action, current environment, and past history and express this fact as*
>
> $$P(t) = P\,[a(t), E(t), H(t)]$$
>
> *The pleasure principle states that among the admissible functions a(t) there is some function A(t) such that*
>
> $$J = P\,[A(t), E(t), H(t)]$$

is a maximum, where A(t) is the action of the individual ... [which] in strict analogy to the Principle of Least Action, simply states that the individual's behavior is the way described. The reality principle is that A(t) is the function such that

$$K = \int_0^\infty P\,[A(t), E(t), H(t)]dt$$

is maximized. That is, the total of pleasure over all time is maximum." (Galatzer-Levy, 1983, p. 273-274)

This latter equation must reflect that sometimes the action taken, A(t), that maximises pleasure in the immediate is not acted upon by the individual, but is delayed for future pleasure. Thus, Galatzer-Levy (1983) rewrote the equation to state that the A(t) must maximise pleasure over *all* time, explaining why pleasure may be delayed for a later, more significant pleasure. Galatzer-Levy also noted that the actual solution may involve an alteration of the environment E(t) or of history H(t), which is how the act of repression is present in the model. Furthermore, he anticipated a critique because psychoanalytic theory argues that mental functioning is differentially dominated by either the pleasure or reality principle at different times. To account for this he added a weighting function of pleasure at different times that depends on the weighting of pleasure at a particular time W(t); the equation resolves into either the pleasure principle equation or the reality principle equation, both of which are reported below:

"The idea of a 'weighting function' W(t) that puts greater importance on various times in the future may be introduced. Multiplying P(t) by W(t) results in various times being weighted more heavily. (This function is generally 0 beyond the life expectancy of the individual.) The general form of a regulatory principle which then becomes A(t) is such that

$$\int_{t}^{\infty} W\ (\tau)P[A(\tau), E(\tau), H(\tau)]d\tau$$

is a maximum. If W(t) is chosen so as to be close to 0 for values different from t, then the behavior is increasingly dominated by the pleasure at time t. We can see that if W(t) approaches a value 0 except at time t, the value of the integral depends only on P at times t. (This can be done rigorously using the so-called Kronecker δ function. Specifically, using the W(t) = δ(t)

$$\int_{t}^{\infty} \delta(t)P[B(\tau), E(\tau), H(\tau)\tau = P[B(t), E(t), H(t)]$$

On the other hand, if W(t) = 1 then

$$\int_{t}^{\infty} W(\tau)P[B(\tau), E(\tau), H(\tau), H(\tau)]d\tau = \int_{t}^{\infty} P[B(\tau), E(\tau), H(\tau)]d\tau$$

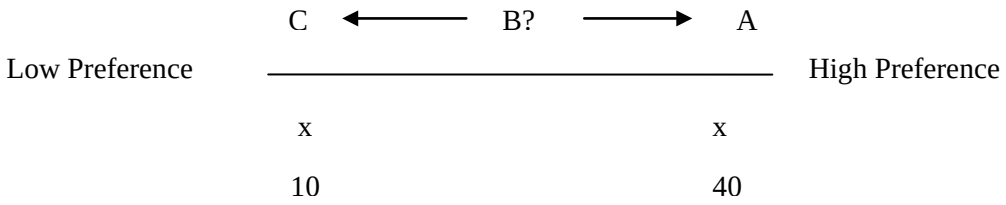
Thus, the two principles of mental functioning are special instances of the general regulatory principle." (Galatzer-Levy, 1983, p. 278)

Galatzer-Levy (1983) continued to examine analyses (and equations) and the reader is referred to this interesting paper. He acknowledged that this model is far from complete, that aspects of mental functioning are clearly not addressed by it, and that it is not a systemic model as it has no elements of feedback or stability; rather it is presented as a representation of a specific process or action of mental life. Furthermore, this model was not tested; to the author's knowledge this model has not been applied to any data and cannot make truth claims. Rather, it is an intellectual exercise that merely presents an aspect of the energic theory in mathematical form, in order to show that it is coherent and to demonstrate that it requires no

neurophysiological data in order to function. All of the terms in the equations are psychological, behavioural, or environmental phenomena.

A similar goal was pursued by McIntosh (1986), though he proceeded from the field of economics and the theory of games, rather than variational calculus. He began with an economic assumption that a ‘good’ is a thing which is of value to an actor, and further stated that:

> *“von Neumann and Morgenstern (hereafter abbreviated as N-M) were able to develop their celebrated proof, that given the assumed ability of the actor to form preferences among a set of goods, each good could be assigned a number which was a quantitative indication of its degree of preference, as compared to preferences for other goods. In other words, the proof shows that it is possible (in principle) to establish a numerical preference scale and to assign to each good a number which indicates its position on this scale. ... Arbitrarily, let us assign a value of 10 to C and 40 to A. (We could instead choose any other two numbers, as long as A is greater than C.) Where does B stand on this scale?*



> *... If B were equal in preference to a 50% chance of C combined with a 50% chance of A, then intuitively we would expect B to be located halfway between A and C. However, we have assumed the equality of preference to be at a combination of a 33½% chance of C combined with a 66⅔% chance of A; so we should expect B to be closer*

to A than to C. The exact location can be determined by combining 33⅓% of C (3⅓) with 66⅔% of A (26⅔). So if C is 10 and A is 40, B must be 30; that is, B is located two-thirds of the way from C to A.

C	B	A
x	x	x
10	30	40

... In essence this is the way in which utility numbers are assigned to preferences by the N-M proof." (McIntosh, 1986, p. 411-414)

McIntosh (1986) indicated that this proof presents quantities of desire on an 'interval scale' and allows the interval between desires to be quantified (such as centigrade temperature). An interval scale is stronger than an ordinal scale (which merely ranks desires against one another), but weaker than a ratio scale (which a neurophysiological measure may have potentially given, similar to mass, time, or money). As such, within the boundaries of this approach, the difference between a psychological model and a potential neurophysiological model is the difference between an interval and a ratio scale; quantitative modelling is possible in a psychological model, but intervals must be added between amounts rather than amounts themselves (McIntosh, 1986).

He then stated that any desire can be indicated with a number on an interval scale and that:

"The analysis is still at a very elementary level, but already it is necessary to part company from economic theory, for from the psychoanalytic point of view desires have the important property of variability. The desire for an object typically fluctuates

in intensity. ... Since desires are constantly changing, we need a benchmark against which to measure these changes. For this we will adapt a concept much used in the Project (1895), and introduce the idea of a threshold of desire ... motor activity lessens the intensity of the desire, which is to say that the magnitude of the number associated with the desire will diminish. If at one moment during this discharge activity the magnitude is n1A and at a later moment it is n2A, then the interval n1A − n2 A measures the magnitude of the diminution of the desire, that is, the amount of psychic energy discharged. ... At some point the intensity of the desire will be insufficient to motivate further activity. ... I will here assume that there is a minimum level of excitation below which further discharge does not occur. This point will be called the threshold of depletion: the level below which desire will not eventuate in activity. ... The concept of psychic energy can now be defined, as follows: The quantity of psychic energy (Q) invested in an object (A) at a given time (t) is measured by the interval between the numerical value of the desire and the numerical value of the threshold of depletion. (Symbolically, QAt = nAt − nTd)." (McIntosh, 1986, p. 416-418)

McIntosh (1986) clarified that this system does not measure psychic energy; rather it refers to the subjective experience that something is more or less desired, and serves as an argument for how such as a subjective experience can be quantitative in conception. From this basis, he went on to show how a number of Freud's energic concepts can be represented in mathematical terms, such as the principle of the conservation of energy:

"(QA = QB & Qd). (The quantity of A equals the quantity of B plus the quantity discharged in the transformation.)... Generalizing, for every psychic transformation, the quantity of the initial state(s), less the quantity expended in the transformation, equals the quantity of the resulting state(s)." (McIntosh, 1986, p. 422)

McIntosh's (1986) further statements are not reviewed here. His purpose in this paper was the same as Galatzer-Levy's (1983) reported above, which is to render a coherent expression of Freud's energic principles that are drawn entirely from psychological terms (in this case subjective experience) without a neurophysiological term. Again this is not evidence of any sort, nor a tested model, but an intellectual exercise to demonstrate the same principle.

While Wurmser (1977) was attacking Kubie's (1947) critique of psychic energy (in that its language is made up of physicalist metaphors that are confused with facts), the warning serves equally well for viewing the above two models with caution:

> *"But is ... [Kubie's statement] ... in any way less metaphorical than the points of view, the metaphors and models, attacked by him? Langer* (1972) *speaks of 'the currently fashionable computer jargon,' the 'engineering metaphors of "automation" and information theory' (pp. 50, 263), and of the 'cult of borrowed mathematical terms,' emphasizing that the 'emulation of physical science naturally leads to premature attempts at mathematical expression of known or presumed regularities in* behavior' *based on the faith that 'the dress of* mathematics *bestows scientific dignity no matter how or where it is worn' (1967, pp. 38-40). The criterion is, as we shall note later, how stimulating for research, how fruitful such a new conglomerate of metaphors ordered around the key concepts of 'coded signal' and '*symbolic *process' will prove to be." (Wurmser, 1977, p. 468-469)*

This last sentence serves as a point of departure from the current evaluation of the definition of the energic theory, leading us into the next major section of the present chapter. This section deals with the evaluation of the energic theory from the point of view of its usefulness in various fields.

3.2 Usefulness

The present section presents a critical discussion about the usefulness of the energic concept in various fields, including stimulating research and theory building as well as clinical utility.

3.2.1 Theoretical and research usefulness

Wurmser (1977) argued that a key criterion for evaluating a scientific metaphor is its usefulness in stimulating research and theory-building. A number of authors have stated in a general manner, that the energic theory is a core pillar throughout most of Freud's theoretical structure, and that many concepts were used in his theory and the theory-building of subsequent psychoanalytic theorists (Hyman, 1975; McIntosh, 1986; Nelson, 1967). Theories of defense, repression, motivation, and affect were all initially built on this structure, though changes and shifts have occurred (Nelson, 1967).

Various authors have tried to clarify the usefulness in more specific terms. Freeman (1997) attempted to generate a theory to explain psychosis in energic terms, noting the defensive function of the psychotic symptoms in terms of mechanics of energy and rethinking the work of 'self-psychology' theorists in this regard. Others have attempted to use an altered version of the theory in an information-systems approach to explain behaviour (Federico, 1972; Gardner, 1969; Peterfreund & Schwartz, 1971; Rosenblatt & Thickstun, 1984). Hyman (1975) indicated that the energic theory is a critical theory for dreaming, in that it presents a comprehensive view of how various excitations (nervous or sensory) transform the dream experience. In addition, Nelson (1967) indicated that the energic theory gave rise to the structural theory (reviewed later in this chapter) of id, ego, and superego, as it was

necessitated by the gaps of the energic theory; a similar viewpoint is offered by Horowitz (1977):

> *“Whether Freud's metapsychological viewpoints and their "quantitative" assumptions retain sufficient usefulness to generate new questions and lead to new observations as well as new theoretical constructs may be measured by using the test case of the development of self-object differentiation concepts and the problem of narcissism. The study of the development of self- and object representations is a contribution to the study of structure formation. Rapaport (1960) had said, "the study of the process of psychological structure formation seems to be the prime requisite for progress toward dimensional quantification. We must establish how processes turn into structures, how a structure once formed, changes, and how it gives rise to and influences processes" (pp. 98-99).” (p. 571)*

These authors note the place of the energic theory in a continuous line of development of the metapsychology of psychoanalysis. Despite these acknowledgements of the usefulness of the theory, Galatzer-Levy (1983) noted that the desired growth of this aspect within psychoanalysis has not materialised, perhaps because of limitations of neuroscientific methods and their integration with psychoanalytic thought. He also argued that the potential of this area of the theory is underappreciated and underutilised, and that future theorists may make more of the energic theory and its implications for the field; the present thesis has this goal.

3.2.2 Clinical utility

Much more attention has been paid to the clinical utility of the energic theories, with authors arguing on both sides of a strong debate. Some authors have indicated the usefulness of basing interpretations on such theory, including Loewenstein (1957) and Greenson (1967). In contrast, a number of authors have stated that energic theories have little clinical utility or that their clinical usage is problematic or misleading to the patient (Kubie, 1947; Wallerstein & Applegarth, 1976). The first statement is linked to the common criticism that energic concepts, such as cathexis, libido, and equilibrium, are not induced or abstracted from clinical observation, and in fact are so abstractly removed from clinical observation that they are not observable (Rapaport, 1960). For example, an analyst cannot observe an idea that is cathected with psychic energy, or observe unbound cathectic energy. Wurmser (1977) suggested that the more abstract an idea is, the less clinically useful it is. While a full discussion of the observations connected with the energic theory takes in section 3.4 of this chapter, the relevance of this criticism for the analytic situation was highlighted by Kubie (1947). Kubie stated that since quantitative concepts are far from observations in an analytic situation, quantitative interpretations are not provided to the patient, making them clinically unnecessary.

Contradictory comments are found in Shevrin (1984), Sjodin (2010) and the panel discussion reported in Modell (1963), where some analysts such as Ostow claimed that they regularly conceive of a number of clinical observations in quantitative terms:

> *“Tonic ego functions are manifested by an increase in the rate and amount of activity, an increase in self-esteem and a decrease in self-observation. A state of deficiency of energy is manifested in a complementary way; there is a decrease in intensity of*

discharge, a reduction of object pursuit, an increase in narcissism, and a decreased sensitivity to object-relating affects." (Modell, 1963, p. 609-610)

Shevrin (1984) indicated that interpretations that are made to patients may have a quantitative character. Certainly, interpretations in analysis may refer to quantity in a direct sense in statements such as: 'that was a very powerful moment for you', or 'it all feels like too much to bear'. Holt (1967) and Schafer (1973) also indicated that quantitative interpretations may be made to the patient, and both argued that quantitative interpretations that are drawn from the energic theory may be overly mechanistic. Shafer (1975) proposed that interpretations should instead feature an action language, in which the analysand is constructed as an active adult agent, rather than as being in the passive, infantile position encouraged by a mechanistic self-understanding.

Nelson (1967) argued that the energic concepts have an important contribution to make to understanding non-verbal events in psychoanalysis, in terms of the affective interaction between an analyst and a client. She stated:

"... one frequently gains the impression that the therapeutic encounter bypasses the conscious ego, effecting precisely such shifts of energy which are only subsequently accorded verbal explication by the patient. Over the years it has become possible to identify the characteristics of a "good" paradigmatic session—one which promotes insight and a feeling of integration. In such a session, vivid contrasts tend to develop between aggressive, humorous, rivalrous, or angry interchanges and meditative, almost pastoral calms in which the patient, rather than the therapist, produces one or two significant interpretations. The dynamics of such sessions require to be understood more in terms of cathectic shifts than of content ...." (p. 1)

Galatzer-Levy (1976) indicated how the principle of constancy might guide clinical thinking in psychoanalysis, by comparing this concept of energy to how it guides research and theory-building in physics. He cited the comments by renowned physicist Richard Feynmann who stated that:

> *"The notion that a quantitative something is conserved seems central to physics (Feynman, 1965). Feynman (1964) has offered the analogy of a mother looking for her baby's blocks to explain how the physicist experiences the concept of energy conservation. He observes that the mother assumes that the blocks have not disappeared and then goes about discovering where they are. She always assumes that they must be somewhere. He observes that the physicist makes a similar assumption in looking for a quantitative something which is conserved." (p. 43)*

This is a useful formulation of how a quantitative-minded analyst would think about a client; this approach leads an analyst to generate an account of what happens to intensities of emotion and behaviour that disappear or seem absent in a person's clinical presentation. If a client seems under-emotional regarding a topic or curiously unresponsive in their behaviour to a specific situation, like Feynmann, we search for where this energy may have gone and what transformation may have taken place. Likewise if a client seems unexpectedly over-emotional or over-active in terms of behaviour, we tend to think of this energy as though it was acquired (or transformed) from a hidden source. One also considers whether the surprise is the result of a false expectation on the part of the analyst, and then searches for the source of that expectation. For example, if it seems that a patient is overwhelmed with anger at their child but suppressed it, and then reports to the analyst that they are feeling inordinately angry at an 'underdog' political party at present (without being aware of the connection), the therapist goes in search of the origin of the affective intensity. Upon finding it, he or she may choose to interpret it to the patient as follows: 'so it felt better to let it out like this'. This

interpretation demonstrates an energic relation; however, even if the interpretation does not show this relationship, it has emerged from a relationship that is perceived through energic theory and may become the patient's theory about himself or herself. Thus, similarly to Feynmann's analogy, the energic theory appears to have potential to directly (and uniquely) inform analytic methods. However, the criticism can be made that the usefulness of the theory has not been approached in a systematic and comprehensive analysis.

3.3 Accuracy of assumptions and propositions

This section examines the accuracy of energic theory with regard to its assumptions and propositions, and whether they fit or contradict existing observations, knowledge, or data in this field and other fields. This section reviews the problem of apparent violations to the constancy principle and the related critique that is implicit in the structural approach to the mind (and the significance of the meaning in shaping energy), including alternative formulations that have emerged from these critiques.

3.3.1 Violations of the constancy and pleasure principles

Energic theories have often been critiqued because people regularly observe apparent violations of the constancy principle. For example, organisms often appear to act in a manner that raises their overall level of energy, not solely to discharge the excess energy or maintain equilibrium. Freud recognised this problem in 'Beyond the Pleasure Principle' (1920/1955), where he attempted to explain it with a shift towards the pleasure-principle and then the death instinct. The problems with this explanation are discussed in the previous chapter. Freud also suggested that these fluctuations may be regulated by a 'reality' principle, but his explanation in the 'Project' (1950) begs the question of how that principle is governed.

Others such as Rosenblatt and Thickstun (1970) have indicated that this observation invalidates the constancy principle. While they explain that the failure of the constancy principle may be partly due to the 'structuralist' critique that is reviewed below, they also argue that such a principle of constancy can only hold in a closed system where there is no transaction with an outside environment. They argue that human beings are far more appropriately classified as open systems that have transactions with the outside environment. They conclude that constancy is not an applicable characteristic for such open systems. However, this may be a problematic conclusion. Von Bertalanffy (1969/2009) also stated that 'static' equilibrium cannot be a characteristic of an open system. However, he stated that dynamic equilibrium (with a constantly changing base state) can be a way to conceive of systems. This persistence of the equilibrium characteristic is argued most strongly by Galatzer-Levy (1976):

> *"Certain of the objections to psychic energy are based on a misunderstanding of the nature of conservation principles. For example, the objection that energy conservation does not apply to 'open systems' since, in general, conservation concepts do not apply to open systems is based on a fallacy. Some open systems may be more simply handled by other methods (von Bertalanffy, 1968); e.g., steady-state equations are used in the description of the dynamics of chemical reactions (Moore, 1962). However, conservation applies to open systems. The conservation equation must, of course, be corrected to include a term involving the flux across the boundary of the system. … Thus the open-system critique is simply incorrect." (p. 53-54)*

He also argued that the tendency towards equilibrium can be considered a global characteristic of a system despite 'local' variations, using a vivid analogy:

> *"Laws that govern global processes determine local processes, and the global process may be regarded as the "sum" of local processes. This, however, does not imply that the global law will have an obvious consequence locally. As a trivial example, a rubber ball dropped and allowed to fall under the influence of gravity will be seen in the course of its history to be moving upward. This does not contradict the fact that the force on the ball is downward, or that its ultimate fate is to lie on the ground." (Galatzer-Levy, 1983, p. 281)*

Approaching the concept of a limited pool of psychic energy, Lustmann (1957) also argued that open system biology indicates that an open system can have a fixed amount of energy within it at a given point in time, though it may change over time. In fact, Galatzer-Levy's (1983) mathematical model operates by assigning a level to P (pleasure) at a given point in time, reflecting this principle.

It may have to be assumed that the closed system critique of psychic energy is wrong, and a more sophisticated model may account for the open nature of the system. Systems theorists such as von Bertalanffy (1969/2009) argued that the fluctuations of energy in a system may not serve a principle of equilibrium, even dynamic equilibrium; rather, dynamic equilibrium occurs due to the principle of systemic self-governance. This point is reviewed more fully in the following chapter.

As indicated above, this may have been part of the reason for Freud's shift to pleasure as the guiding principle rather than energy equilibrium. But, this move cannot explain why people sometimes seem to seek out unpleasure. As previously discussed, Freud's (1920/1955) explanation that the organism seeks out unpleasure in order to sustain an internal state has potential as an explanation. However, it is inadequate in its current form. Furthermore, the core problem that was indicated in the previous chapter is that the relationship between

energy and pleasure is unclear. Though Freud initially attempted to explain this as discharge (Freud, 1950) and as a rate of discharge (Freud, 1950; Freud, 1920/1955), examples can be found in which unpleasure is explained with these terms as well. Plaut (1984) argued that energy is unable to account for pleasure or unpleasure and puts forward the necessity of structure; this is the subject of the following critique.

3.3.2 The structural critique of the energy principles

A core assumption of Freud's energic theory is that the phenomena it attempts to explain, which is the apparent intensity of observable behaviour, affect, subjective intensity of emotion, or levels of physical variables, should be correlated with one another to some extent. In other words, Freud's theory predicts that the greater a person's physical state of hunger, the more intense their subjective feeling of hunger or distress will be (or defended against), and the more intense their apparent affect or level of food-seeking (or apparently aimless) behaviour will be. While this may be the case, it is an artefact of common human experience that this correlation is far from clear in many instances; for example, a person who gets hit does not always exhibit anger. Returning to Plaut's (1984) point about pleasure above, what makes a high level of unbound energy pleasurable in one case and unpleasurable in another is unclear.

This is the basis of the concept of structuralism in psychoanalysis: the metapsychological notion that there must be 'structures' in the psyche that interpret meaning from stimuli, whether they are somatic, external, or psychic (Rapaport & Gil, 1959). Hartmann (1950) described the importance of networks of channelling and transforming psychic energy for understanding clinical phenomena, and conceived of the ego as a network of such structures. Rapaport (1960) went further and suggested that such ego structures are

not passive and inert channels for energy, but possess energy of their own. Bieber (1980) argued that this development in psychoanalysis is a step towards cognitive psychology, suggesting that this is demonstrated in Piaget's move from his initial interest in psychoanalysis towards a 'structural' theory of schemas that are networks of interpretation. Bieber (1980) suggested that psychoanalysis is in fact a cognitive theory. Furthermore, Hartmann (1956) argued that Freud also recognised this necessity, which informed a 'structural shift' in his work, away from a purely energic theory towards a theory of structures exemplified in the id, ego, and superego.

Regardless of how structures are conceived of in the ego psychology of Hartmann (1950) and Rapaport (1960), the structural idea is linked to the notion that energy is never separable from a phenomenon that it is part of. Similar to physics, where there is no such thing as energy that is not an aspect of heat, kinetics, or nuclear energies, Horowitz (1977) stated that psychic energy may not be separable from the phenomena whose intensity it describes, such as instincts or emotion. In other words, the energies that influence mental processes can be qualitatively different in their manifestations, instead of a homogenous neutral energy that can only vary in its amount. Furthermore, these qualitative differences give rise to interpretations and meanings that affect their subsequent transformations (Ornstein & Chattah, 1983). In this case one strong energy causes pleasure and another causes displeasure because of their different meanings. This perspective is similar to an information theory approach to energy (Rosenblatt & Thickstun, 1984). In information science, energy is conceived of as 'information' that is quantified by the extent to which it transforms structure. An information science approach to the ego may involve viewing it as a system regulating such transformations (Rosenblatt & Thickstun, 1984). This perspective has been argued by a number of writers to necessitate the metapsychology of psychoanalysis

based on information science (Basch, 1976; Federico, 1972; Rosenblatt & Thickstun, 1984). Some of these proposed models are reviewed in a later chapter.

The adoption of an information science approach to energy has important consequences for Freud's energic conception. Wiener (1965) described an emerging shift in scientific enquiry by making a distinction between an older form of engineering, which was concerned with the power of energies such as in the steam engine, and a newer form, which focused on information, communication, and control. He described these as power engineering and control engineering respectively. It has been argued that Freud's energic theory was based on 19th century physics, which was of the order of power engineering, concerned with the magnitude of energies, and captured and channelled within a system (Gedo, 2001; Toulmin, 1978).

Some have viewed this approach as having great potential for reconciling knowledge within psychoanalysis with developments from within neuroscience (Hartmann, 1956). Nelson (1967) argued for the superiority of the structural hypothesis over the energic one, and developed a sophisticated approach to linking structures with neural circuits that involves a complex pattern of activation of different systems. However, some authors have warned against a premature correlation of mental structures (and hence energy) with neural circuits, using the analogy of hardware and software of a computer:

> *"In the language of present-day computing, psychoanalysis is in effect concerned with software, from which it is not possible to ascend to the hardware, although no software could run without the latter; the two spheres are, however, completely different and absolutely not isomorphic: neither can be understood on the basis of the other." (Genovese, 2012, p. 133)*

While some advocates of the information approach suggest discarding Freud's conception of the energic hypothesis (Gedo, 2001; Rosenblatt & Thickstun, 1984), others urge caution:

> *"It may well be that the dynamic, economic, and structural viewpoints of psychoanalysis cannot be easily separated. It is my view that the metapsychological points of view, though having differing theoretical weights, are not divisible. They are simply three facets of the same explanatory concept based upon the data of conflict. The concepts of drive, controlling mechanisms, and conflict interdigitate. In the current structure of psychoanalytic theory, the 'quantitative' assumptions are embedded in its very fabric. A question is raised whether they can be ripped away without dispensing with the whole of the theory. Some think that this can be done easily. If that is so, we ought to be able to find alternative explanations for all the initial evidences for the theory. So far, none have appeared that have the simplicity or aesthetic claim of Freud's metapsychology. There is a high degree of internal consistency of psychoanalytic hypotheses and a relatively close fit between those hypotheses and the data acquired by the analytic case-history method and its unfolding as a process." (Horowitz, 1977, p. 563-564)*

The view taken in the present work is that the quantitative element of a theory (whether an information theory or otherwise) is the most applicable element of the theory, when it is believed that it is the systemic element most responsible for the changes that must be explained. To use an analogy, rain is always caused by a multitude of factors including temperature, humidity, pressure, and local air movement. However, if the current rain is best explained by a change in temperature, then a theory of temperature and its effects becomes the most applicable in that situation (though not all that is required). This is also true of psychic energy; if the magnitude of energy of a particular psychic phenomenon is most

responsible for a change in a subjective state, behaviour or otherwise, then a quantitative theory becomes most applicable. For example, if a person becomes aggressive at their job because their ego cannot adequately regulate the intensity of their frustration towards their boss then a quantitative theory may be the most applicable theory to explain this phenomenon.

Some authors have developed their structural criticism in a different direction than that of information theory. Andrade (2003) focussed on affective structures of the mind, and suggested that affect is a more appropriate basis of a metapsychology for psychoanalysis, a move that is stated more strongly in Zepf (2010). While the work of these authors is drawn from the legitimate 'structural' criticism of the energic theory, adopting affect as the core of metapsychology rather than energy may only delay the criticism rather than avoid it. If affect is viewed as determining behaviour rather than energy, the question then becomes 'how does affect cause behaviour, if not through an energic transformation?'

Gill (1983) suggested moving away from a 'mechanic' view altogether, stating that stimuli are interpreted and given meaning, not only by structures or substructures of energy transformation (or affect), but by a whole person. He suggested that the metapsychology in psychoanalysis must be based on a person who engages in whole person relationships, rather than drive-to-drive relations or otherwise. While Gill (1983) may have made an important point about holism, and the person (or system) as whole does exert a holistic influence on process, the theory risks appearing homuncular or at least appearing to argue for 'free will' in a sense, which is anathema to the determinist theories under discussion.

The next section evaluates the energic theories from the viewpoint of another criticism, which is the link between the theory and observation.

3.4 Links to observations

Rapaport (1960) highlighted the problem of how to link the energic theory with observations that can be made in an analytic situation. As indicated previously, some authors have stated that the terms of the theory are abstract and removed from observed experience. As demonstrated in the previous chapter, Freud and Breuer (1895/2004) highlighted a number of examples from case material, as well as hypothetical ones, that are connected with the theories. However, the onus falls upon theorists to indicate in a systematic way, the observations associated with energic terms. The role of these observations in empirical validation is also discussed.

3.4.1 Observations explained by the energic theory

In the section '3.1 Definition' above, the criteria of positivist science were introduced in terms of a physicalist assumption about the necessity of neurophysiological evidence. It was then indicated that while that assumption may not be immediately necessary, the concepts should nonetheless be clearly connected with the specific observations that they are required to explain. The previous chapter highlighted the conversion symptoms and those of psychic trauma, which Freud argued necessitated an energic theory, though this has recently been challenged by Zepf, 2015).

Horowitz suggested that the primary observation that requires energic explanation is that of conflict. Horowitz (1977) argued that that clinical data regarding conflict is what first necessitated an explanation that had a quantitative factor. What is meant by conflict is essentially a contest between fantasy material of the mind emerging within consciousness and resistance against the conscious emergence of that material, a blocking action. Essentially, a

competitive relation between elements necessitates quantities in opposition, with a victor arrived at summatively. Horowitz (1977) continued on to state that the energic concepts were in fact inferred or abstracted from this observation (a point echoed by Shevrin in a panel discussion reported by Ornstein and Chattah, 1983). This point was persuasively critiqued by Galatzer-Levy (1976), who along with others (Basch, 1976; Toulmin, 1978) argued that the terms were abstracted from developments in contemporaneous advancements in physics and applied to observations. However, Horowitz's (1977) point was well made, that the observation nonetheless requires explanation and any competing theory would have to explain this as well, or at least deny the validity of the observation. He stated that up until the time of his writing, no satisfying competing theory had been offered. Freud certainly attempted to employ his physics-derived terms to explain this observation, and the next observation that it gave rise to, which was displaceability.

Horowitz (1977) reported the formulation that was drawn from Rapaport (1960):

> *"The assumption of psychological energies and their origin in drives was suggested by the 'observation that recall of traumatic experiences, when accompanied by affect, results at times in the disappearance of symptoms and anxiety, and at other times in their replacement by other symptoms and anxiety equivalents.' This suggested that 'a displaceable and transformable quantity was involved in the psychological processes underlying symptom formation' (pp. 76-77). Before the development of the concept of unconscious forces, this 'quantity' was conceived of as affect, which by a hydraulic model could be dammed up (leading to anxiety) or shunted to another channel (leading to symptoms). After Freud 'developed the concept of drives, this quantity was conceived of as drive energy (cathexis)' (p77). The evidence that 'blocking a drive action results in behavior different in direction and form from that expected …*

became the evidential ground for the assumption of psychological energies and of a conservation principle pertaining to them' (p. 77)." (p. 560-561)

This quote connects to a point that was made previously by Wurmser (1977) about the nature of energy as a metaphor in science. He stated that energy as a concept is always inseparable from its form (fire, nuclear energy, and accelerating plane) except insofar as it can transform from one type to the next; hence, energy really refers to the correlation between one form of energy and another. Returning to psychic energy, it could be argued that this energy is not separable from its forms, such as affect (Andrade, 2003). However, Wurmser (1977) argued that energy is an entirely appropriate metaphor for referring to these relationships between affect, behavioural intensity, and somatic need. He stated that, like in physics, the only quantity that these forms have in common is a quantitative intensity, which Freud believed could transform from one manifestation to another in line with the law of conservation. In other words, the energic theory attempted to explain an apparent correlation between these different intensities, which is similar to physics.

Freeman (1997) argued that the intransigence of delusional thinking and other psychotic symptoms also demand a quantitative explanation, though few others have stated this. Basch (1976) echoes Einstein's statement that a theory cannot be proven by the observations it is meant to explain. While the kinds of observations above may potentially be explained by energic theory, they do not constitute supportive evidence.

3.4.2 A behaviourally-defined statement of the energic hypotheses

It has been previously argued that the demands of positivism require some form of evidence, even if it is behavioural and not neurophysiological in nature. In this regard,

aspects of the energic theory must be represented as general hypotheses in order that they may be discussed in terms of existing data and future research (other specific predictions can be found in Rapaport, 1960 and Kubie, 1947). As such, following previous discussions of psychic energy, the core assumptions and some propositions are stated as empirical hypotheses before they are discussed. Before beginning, it must be noted that these hypotheses are stated with regard to a number of different domains, including intensity of affects, level of psychomotor activity, thoughts (including preoccupation or frequency), and subjective experience (potentially behaviourally measurable by self report). This preponderance of terms is due to the fact that in Freud's theory, energy has been described as a facet of many different domains of behaviour and experience. Kubie (1947) provided a brief (critical) summary:

> *"... quantitative guesses are misleading and lead to dependence on the easy figure of speech which implies that all differences in conduct, feeling, personality or symptoms are due to something greater or something less. People are more or less secure, more or less rigid, more or less obsessional, more or less hysterical, more or less confident, more or less conceited, more or less domineering. All of this is verbal shorthand, not always valid even as description, and usually meaningless as explanation. ... Let us consider how many variables there may be. (1) There are quantitative variations of external stimuli, and corresponding variations in quantities of overt responses to stimuli, or of conscious and unconscious affective responses, and variable quantities of control of these responses. (2) Presumably there are varying quantities of internal (i.e., instinctual) drives which in turn can be countered by varying quantities of inhibition, or of compulsive exaggeration (cf. Freud's 'illusory strength of instinct' [3, p. 87]), or varying quantities of cathexes, excitation, resistance, defense, or repression. (3) In symptom formation and the processes by which symptoms*

precipitate out of conflict, we find assumptions as to varying amounts of isolation, repression, projection, displacement, reaction formation, rationalization, identification, compensation, idealization, sublimation, and the like." (p. 514)

Kubie (1947) acknowledged that this is not a complete list. However, it is sufficient (he believes) for his purpose, which was to demonstrate how hopelessly broad the definition is. Without sharing his view, the categories that he named are summarized as: behaviours, emotions, personality characteristics, external stimuli, levels of control, and internal drives (perhaps observable as somatic states). Note that few other writers refer to personality characteristics in energic terms (a notable exception is Reich, 1945) and this category will not be retained in the current statement, though it might require specific attention as a subject elsewhere.

These are general hypotheses of the energic theory framed in empirically verifiable terms:

1. Two otherwise discrete behaviours, emotions, stimulus events, or subjective or physical states (henceforth read this as phenomena), are posited as being in relation to one another

2. A relation of cause or a 'demand characteristic' - one phenomenon (typically, but not necessarily, a physical state, emotion, stimulus event) is viewed as antecedent to the other (typically behaviour, emotion, or subjective state)

3. The level of intensity (subjective or behavioural) of the two phenomena is correlated to some meaningful degree (whether proportionate or not)

4. A relation of ‘discharge’ – the intensity (or extent) of the consequent phenomenon will be correlated (to some degree) with a reduction of the intensity of the antecedent phenomenon (or at the very least, halts or slows an escalation of the antecedent phenomenon)

A brief examination of these hypotheses leads to the following comments. First, it should be noted that these general hypotheses are presented with their broadest possible definitions that include a wide range of phenomena (reason may be found to restrict this range later). Furthermore, the first two hypotheses appear to reflect a taken for granted aspect of human existence: that one phenomenon causes another. It may seem strange that someone might set up an experiment that proves that if a person gets hit, the event may make them feel angry, because it seems an obvious fundamental aspect of human life. Nonetheless, this prediction would be of an inductive rather than deductive nature, in that the anger is likely but not certain due to the influence of attributed meaning, a point which is discussed later in section 3.3.2. Regardless, people are likely to believe that the anger they see is caused by the assault and is a response to it. The fact that this theory may seem to predict something obvious is not a weakness of the theory; this is a potential strength of Freud’s theory, in that it tries to provide an account of something that is fundamental to human emotion and behaviour.

The third hypothesis appears sensible while simultaneously revealing a problem. It appears sensible that, the louder and unexpected noise is, the faster our heartbeat, the stronger our feeling of fear, and the more intensely we seek out the source. Generally, the more someone antagonises people, the angrier they get, and the more effort they require to control themselves. While this is taken for granted in many ways compared to the first hypothesis, it may seem less strange (and perhaps necessary) to subject this hypothesis to empirical validation, using quantitative assessment, even if only subjective self-report.

The first problem that appears from this statement is that quite often the reaction is not proportionate or even adequately correlated with the ‘cause’. To use an old analogy, the energy involved in calling out the word ‘bomb!’ in a movie theatre is not meaningfully proportionate with the ensuing energy activated in the theatre. This represents the critique of meaning: that the intensity of a response is not necessarily correlated with the cause, but with the meaning associated with the cause. Furthermore, the intensity of the response is subject to interpretation and meaning; a person angered by an insult who responds only with silence may feel that their point has been made far more forcefully than it would have been if they had shouted and raved. Yet, a different person may only feel satisfied if they insult the other person back. This point has been made by a number of authors from the structural viewpoint (reviewed previously in section 3.3.2), many of whom argue that energic theory should be replaced with information theory as it deals with issues of interpretation (Federico, 1972; Gardner, 1969; Rosenblatt & Thickstun, 1984).

Another problem that is partly related to the first is that Freud’s theory may not refer to such a wide array of phenomena. In the ‘Project’ Freud (1950) suggested that the intensity of a stimulus can be transformed into psychic energy and subsequent discharge, but this did not seem to continue throughout later texts. Rather, the instincts (still perceived as emerging from somatic origins) were conceived of as the typical antecedent phenomena, up to ‘Beyond the Pleasure Principle’ (1920/1955) and beyond. Freud also continued to describe an affect as the antecedent cause, which Andrade (2003) suggested should always be considered the antecedent cause (whether the source of affect is instinctual, experiential, or otherwise). All of these authors agree that there must be an intervening step between external events (and perhaps even physical states) and their hypothesized transformation into behaviour, subjective experience, or otherwise. Whether that intervening step should be considered psychic energy (Freud, 1950) – which cannot address the problem of interpretation or

meaning - or as subject to interpretation and meaning in the form of affect (Andrade, 2003), information (Federico, 1972; Gardner, 1969; Rosenblatt & Thickstun, 1984), or an irreducible interpreting person (Gill, 1983) remains undecided.

The fourth ('discharge') hypothesis most fundamentally represents the uniqueness of the energic theory. The concept that a behaviour or expression of affect will reduce the demand characteristic of an antecedent phenomenon (causing its reduction, slowing, or halting) represents the conceptual core of the energic approach, precisely because it represents the 'explanation' of other observations. If this hypothesis can be empirically demonstrated, it would serve as 'proof' of the theory and this is proposed as a research agenda for the energic theory. However, it suffers the same problem faced by the third hypothesis, the problem of individual interpretation and meaning, complicating efforts to create standardised experimental procedures and measurement of results. With regard to interpretation and meaning, Ricoeur's (1977) position should be considered, which is that observations made within the analytic process are interpreted within the intersubjective process of analysis, and only have meaning within this setting.

This concern introduces a final problem when faced by both the third and fourth hypotheses above, which is that of measurement. While it has been argued in Modell (1969) that other scientific fields (such as medicine) have proceeded on the basis of clinically estimated quantitative observations, Kubie (1947) argued the necessity of objective measurement. He concluded that most of the phenomena he described were unmeasurable at the time of his writing, though at the time of his writing, the phenomenal growth of psychometrics over the latter part of the 20th century had not yet taken place. Nonetheless, the question of measurement also remains unanswered. Galatzer-Levy (1983) makes the following point with regard to his calculus model (reviewed previously in 3.1.6.3):

> *"The problem of the 'testability' of the general regulatory principles is equivalent to testing the hypothesis that human behavior is ordered. (The situation obviously changes when P is specified.) However, the whole issue of 'testability' seems to me to reflect an archaic view of the philosophy of science which unfortunately has been taken as normative by some psychoanalysts." (p. 283)*

While Galatzer-Levy (1983) also questioned the insistence on quantitative measurement to prove the obvious, his bracketed comment in the quote above nonetheless reveals the potential power that measurement could have in prediction; if the assignment of pleasure (P) to the equation were quantified, the prediction of action (A) would become clearer.

From all of the above statements, it may be argued that the energic theory can be stated in hypothetical terms that are potentially testable and even measureable. However, serious problems with individual interpretation and meaning as well as measurement present a significant challenge to this research agenda.

3.5 Conclusion

The present chapter has reviewed a wide range of critiques of the energic theory, including its definition, its relation with neurophysiology, its empirical status, the correctness of its propositions, and its links with observation. It has been argued that, while the energic theory does not have to be related to neuroscience at present in order to have some form of empirical validity (though it will hopefully be later), it does nonetheless have to be stated in clear verifiable terms (such as the models reviewed) and connected with a number of observations, preferably through empirical research. Furthermore, the structural criticism of

the energic theory is retained as a valid criticism, necessitating further work to improve the theory. The following chapter introduces the main proposition of this thesis, which is the role of systems theory in making the necessary adaptations to the energic theory.

CHAPTER 4: Systems theory as a reformulation of psychic energy

The previous chapter highlights the state of development of the theory of psychic energy in psychoanalysis. It also paints a picture of this situation as one in which the theory is both too central to the metapsychology of psychoanalysis and has too many compelling possibilities to be ignored, but that also has many conceptual problems that remain unaddressed. The purpose of this chapter is to introduce a different perspective on this situation, which may move the theory forward appropriately.

Grobbelaar (1989) presented a thesis in which he argued that the problems that beset the core elements of Freud's theoretical superstructure are not the fault of poor theorizing , but the lack of a systems theory epistemology available to Freud at the time of his writing. Furthermore, he suggested that the core assumptions and propositions of systems theory offer a key reformulation of the metapsychological basis of psychoanalysis, one which may hold the promise of integrating the entire field.

4.1 The potential of systems theory to strengthen weaknesses in psychoanalytic theory

Grobbelaar's (1989) argument begins with the statement that research within psychoanalysis is faced with the challenge that it constitutes three different but interdependent fields of activity:

> *"It is a technique for the enquiry into psychological processes, it is a method of treatment, and it is also a theory about the information gained during the enquiry and*

treatment. Any attempt to revise a part of the corpus has to be done within the context of the whole." (Grobbelaar, 1989, p. 3)

"[These difficulties]… are compounded by the inconsistent way in which the theory is formulated. The logical inconsistency of the Freudian statement makes it very difficult to … draw the conclusion reached in one specific area through into other areas … [T]he failure of Freud's metapsychological theory to integrate all the part theories results in a theoretical fragmentation which defies any attempt at a cohesive, consistent and inclusive statement of the essentials of the theory. This situation must in part be responsible for the development of so many psychoanalytic schools of thought that one is often tempted to think that there are as many theories as there are analysts." (Grobbelaar, 1989, p. 3-4)

Though Grobbelaar (1989) did not specifically refer to the concept of psychic energy in this passage, he did highlight the central role it is supposed to play in the metapsychology of psychoanalysis; all parts and aspects of the theory must eventually be tied back to it and should be logically consistent with it. The theory of psychic energy has clearly failed in this regard. These failures, the fragmentation of the theory, and the research problem of psychoanalysis have been attributed to its theoretical structure by a number of authors (Cioffi, 1986; Farrell, 1981).

Grobbelaar (1989) went on to point towards the growing phenomenon (at his time of writing) of attempting to address some of the theoretical weaknesses of the Freudian statement through systems theory. He argued that these attempts have not been as comprehensive or explicit as necessary:

"… the application of systems theory has been used mostly as a heuristic device where it was directly applied to Freudian theory (Gedo & Goldberg, 1973), or

> *systemic principles are implicitly used in a theoretical reformulation of a small aspect of Freudian theory (Freud, A., 1965; Kohut, 1969). … At the same time they also indicate the need for a more extensive application of systems principles to Freudian theory (Gedo & Goldberg, 1973)." (p. 5)*

Freud's celebrated translator Strachey (writing in Freud, 1950), indicated that the roots of systems theory concepts (including cybernetic 'feedback loops') were present in Freud's early thinking. However, systems theory has been more expressly connected with the 'ego psychologists' in psychoanalysis, including Hartmann, Kris, Loewenstein, and later Kohut (the reader is referred back to chapter two for a synopsis of this shift in the psychoanalytic field). Their work represents the beginning of a move away from the central role of 'instincts' and towards the ego as a form of organisation in the mind (Grobbelaar, 1989). This has also been interpreted as a move away from energy and towards 'structure' in understanding the mind (Bieber, 1980; Hartmann, 1956).

Gedo and Goldberg's (1973) 'Models of the Mind' attempts to fragment the metapsychology of Freud's work, suggesting that the complexity of mental and behavioural phenomena are unlikely to be captured within a particular grand model, which all other 'part-models' should connect back to. Rather, they suggested that the various approaches to metapsychology that are discernible in Freud's and other authors' texts are best conceived of as differing models that are applicable to different situations, on an ad hoc basis. As such, their position is not to use any proposition of systems theory as a core metapsychological principle in psychoanalysis, but to solve specific problems, such as replacing Freud's death instinct with a 'self-definition' principle (Gedo & Goldberg, 1973). However, in his preface to Gedo and Goldberg's (1973) text, Grinker suggested that the authors do recognise the centrality of a self-system in their understanding of the psychological models, referring to his own work where he calls for a unified theory in psychology. Grinker attempts to

reconceptualise Freud's topographic theory from a systems perspective, describing the central role of the concept of *process* in both approaches.

> *"These 'concepts of process' constitute an important corrective addition to Freudian theory where extensive use is made of concepts of force, primal unmoveable first causes and anthropomorphic descriptions of internal psychological processes. This has become increasingly unacceptable as the 20th century scientific paradigm has shifted towards the views reflected in Popper's statement: 'The universe now appears to be not a collection of things, but an interacting set of events or processes' (Popper & Eccles, 1977,p7)." (Grobbelaar, 1989, p. 9)*

This point is significant in the present study as a core problem of the energic theory, in that the energic theory was conceived of in terms similar to that of a then-prevailing theory of physics which involved objects that are subject to forces. This point was effectively ridiculed by Swanson (1977) in the opening quote of the previous chapter.

While these efforts reflect a tendency towards reshaping Freudian metapsychology with systems principles, they are incomplete or not explicit, as Grobbelaar (1989) suggests. Some of these attempts are reviewed at a later stage, such as attempts to use an information systems theory approach to psychoanalysis. The following section represents an introduction to the field of systems theory. This introduction outlines the core innovations that later form the basis of the reconceptualisation of Freud's energic theory. This chapter then revisits the work of others in the field of psychoanalysis and psychic energy in particular, which displays some of the characteristics of systems theory.

4.2 An introduction to systems theory

Though the field has no precise boundaries, systems theory as applied in psychology could be understood as consisting of three main areas of study: 'general' systems theory, cybernetics (including information theory), and applied fields of systems theory (such as systems therapy). This thesis is primarily concerned with theoretical underpinnings; thus, only concepts from the first two broad fields are reviewed next. These concepts focus on the similarity of systems, systems epistemology, the self-organisation of systems, and cybernetics and the self-regulation of systems.

4.2.1 Similarity in systems

Von Bertalanffy (1969/2009) drew attention to a growth of activities in a range of different sciences that seemed to have a common trajectory. He noted firstly that scientists in various fields including physics, biology, engineering, economics, and sociology were finding problems (and solutions to those problems) that bore remarkable resemblance to one another. For example, he demonstrated that the logistic curve (see Figure 1 below) shows the same answer for two different questions:

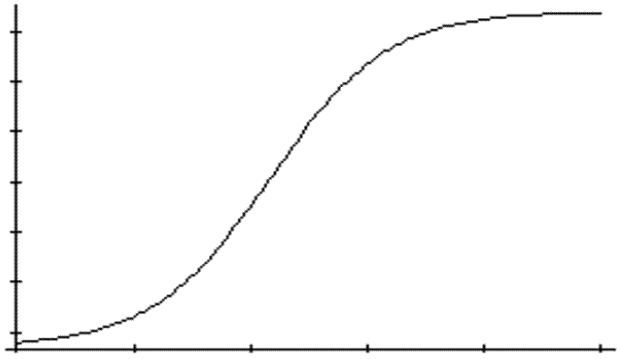


Figure 1: A logistic curve

> *"In Chemistry, this is the curve of an autocatalytical reaction, i.e., a reaction, in which the reaction product obtained accelerates its own production. In sociology, it is the law of Verhulst (1838) describing the growth of human populations with limited resources. … In this sense such laws are 'a priori,' independent from their physical, chemical, biological, sociological, etc., interpretation. In other words, this shows the existence of a general system theory which deals with the formal characteristics of systems." (von Bertalanffy, 1969/2009, p. 62-63)*

There are many other phenomena that follow the pattern of a logistic curve. Further, the logistic curve is just one pattern; in the same chapter, von Bertalanffy (1969/2009) described other patterns, such as the exponential function or competitive relation; charted stability and fluctuation in patterns such as 'loop', 'node', or 'cycle'; and considered principles such as summativity, segregation, and centralisation (some of these ideas are defined and developed at later stages in this thesis). All of these represent patterns of behaviour of a wide variety of different types of 'systems', which nonetheless have the same pattern.

The explanation put forward by von Bertalanffy (1969/2009) for this similarity is that all of these phenomena involve processes that are made up of a number of components that interact with one another in particular kinds of relationship; this is in fact the definition of a system, as Weiss stated (in Koestler & Smythies, 1969):

> *"… a rather circumscribed complex of relatively bounded phenomena which, within close bounds, retains a relatively stationary pattern of structure in space or of sequential configurations in time, in spite of a high degree of variability in the details of distribution and inter-relations among its constituent units of lower order." (p. 11)*

The fundamental assumption of systems theory is that systems – regardless of what units they are composed of – have characteristics that are imposed by the characteristics of the system; these characteristics include the number of units, their relative complexity and degree of heterogeneity (or lack thereof), the nature of relations between them, and any environmental limitations imposed on them. The application of this fundamental assumption to various fields represents the recognition that a given phenomenon can be constituted by (or part of) a systemic process that may be similar to other systems. This recognition allows for some measure of explanation and prediction of a phenomenon (von Bertalanffy, 1969/2009).

An earlier, similar recognition led some scientists, including Bode, Mosteller, Tukey, and Winsor (1949) to suggest that every group of scientists working together on a problem (regardless of the particular field) should have a scientific 'generalist' on the team, a person specialising in thinking on a systems level rather than specialising in the particular phenomenon at hand. A similar view to this is found in Wiener's writing (Wiener, 1965).

Working largely independently from von Bertalanffy, Gregory Bateson exemplified this form of thinking in his understanding of social systems in his distinguished social science career (Grobbelaar, 1989). In his anthropological work, Bateson regularly (and self-consciously) used a conception of the form of one system to understand another. The most famous example of this is in his study of the 'Iatmul' people of New Guinea:

> *"The Iatmul social system differs from ours in one very essential point. Their society completely lacks any sort of chieftainship … the control of the individual was achieved by what I called "lateral" sanctions rather than by "sanctions from above." … the subdivisions of the society … had virtually no means of punishing their own members. I had a case in which a ceremonial house owned by a particular junior age grade had been defiled, and though the other members of the grade were very*

angry with the defiler, they could do nothing about it. I asked whether they would kill one of his pigs or take any of his property ,and they replied "No, of course not. He is a member of their own initiatory grade." If the same thing had happened in the big senior ceremonial house which belongs to several grades, then the defiler would be punished. His own grade would defend him but the others would start a brawl. I then began looking for more concrete cases which could be compared with the contrast between this system and our own. I said, "It's like the difference between the radially symmetrical animals (jellyfish, sea anemones, etc.) and the animals which have transverse segmentation (earthworms, lobsters, man, etc.)." … we know that some sort of asymmetrical relation obtains between the successive segments, that each segment would, if it could … form a head, but that the next anterior segment prevents this. … we find in most such animals a serial difference … between the successive segments. Their appendages, though they can be shown to conform to a single basic structure, differ one from another as we go down the series. … In contrast with this, in the radial symmetrical animals, the segments, arranged around the center like sectors of a circle, are usually all alike. … I could now look again at the Iatmul material to determine whether the relationship between the clans was really in some sense symmetrical and to determine whether there was anything that could be compared with the lack of metameric differentiation. … I found that so far as opposition, control, etc. between the clans was concerned, the relations between them were reasonably symmetrical … I made the point that in our society with its hierarchical systems … when a group secedes from the parent society, it is usual to find that the line of fission, the division between the new group and the old, marks a differentiation of mores. The Pilgrim Fathers wander off in order to be different. But among the Iatmul, when two groups in a village quarrel, and one half goes off and

founds a new community, the mores of the two groups remain identical. In our society, fission tends to be heretical (a following after other doctrines or mores), but in Iatmul, fission is rather schismatic (a following after other leaders without change of dogma)." (Bateson, 1972, p. 85-87)

In addition to exemplifying a form of what von Bertalanffy (1969/2009) called 'segregation' properties of systems, this lengthy quote exemplifies a key aspect of systems thinking, in which an understanding of how one system works can be mapped onto another system with a similar form (Gray, Dahl, & Rizzo, 1969). Systems thinking embraces such comparison of form, which can further our grasp of the more poorly understood system of the two being compared. The example above draws on a verbal (or even visual) model of the systems involved and not on mathematical models, as in von Bertalanffy's example above; however, the underlying concept is equivalent. This approach to social science reflects a shift of focus from substance to form, which Bateson (1978) considered fundamental to a systems approach; this is a shift from understanding material phenomena on the basis of a reductionist analysis of their material composition, to an understanding of their holistic organization.

A general criticism can be made here of this sort of application of analogy, which is a key subject of critiques of systems theory. Laszlo (1983) noted that systems theory faces a criticism that it is a 'pseudoscience' that may promote superficial analogies that mislead scientific enquiry. Von Bertanlanffy (1969/2009) argued that this is the central aim of general systems theory - to generate a framework for 'regulating' the systems conceptions. While Bateson (1978) argues against a totally 'inductive' data-driven approach of rigid empiricism, he is clear about the importance of subjecting the claims of his approach to empirical validation.

Returning to Freud's energic theory, he attempted to construct analogies of this kind when describing the functioning of psychic energy. The comparisons between the energic mechanisms and a steam engine (a pressure-release mechanism), or the lateral cathexes of the ego and a system of interconnected pipes (a distributive mechanism) are analogous in this sense (Freud, 1950). The core analogy posited by ''The Project for a Scientific Psychology' (Freud, 1950) was intended to describe a bridge between the energies of subjective intensities of emotion and behavioural activation on the one hand, and the chemical and electrical intensities of the nervous system on the other. In addition to the problems with internal logical consistency and the physiological accuracy of this analogy that are detailed in the previous chapters of this thesis, this attempt was critiqued from a different perspective in the following passage by Bateson (1978):

> *"The nineteenth century scientists (notably Freud) who tried to establish a bridge between behavioural data and the fundamentals of physical and chemical science, were, surely, correct in insisting upon the need for such a bridge, but, I believe, wrong in choosing 'energy' as the foundation of that bridge" (p. 28)*

Bateson (1978) was suggesting that the bridge was built "to the wrong part of the dichotomy by directing it to the fundamentals dealing with substance" (p28). He went on to say:

> *"The conservative laws for energy and matter concern substance rather than form. But mental process, ideas, communication, organization, differentiation, pattern and so on, are matters of form rather than substance. Within the body of fundamentals, that half which deals with form has been dramatically enriched in the last thirty years by the discoveries of cybernetics and systems theory. This work is concerned with*

building a bridge between the facts of life and behaviour, and what we know today of the nature of pattern and order." (p. 31)

Bateson's point is a key proposition of the current thesis, that the principles of organization of energy in psychoanalysis cannot be found in the mechanisms governing 'substance' or matter. Instead, they are framed as a principle of pattern or form. While Bateson (1978) rejected the notion of energy as a bridge in the above passage (because it is conceived of as 'substance' rather than form), the present work argues that energy is useful as a concept of 'form'.

The concept of psychic energy in psychoanalysis can be considered 'valid' if it describes a *form* of relations in observed phenomena, and in no way does it need to refer to a *substance* of some kind; in this way, all of the critiques that demand that the physiological *substance* of psychic energy (whether chemical, electrical, or otherwise) must be empirically demonstrated, appear unnecessary and can be avoided. Given the criteria outlined by Peterfreund and Schwartz (1971) in the previous chapter, the concept of energy as form is considered *explanatory* if it can be integrated with a more general law of form that applies to a wider range of phenomena (which is the goal of systems theory). In other words, a systems theory explanation would describe the form of the system, and explain how a system behaves in a particular way by stating that it is because it has a particular set of components, with a particular set of relations between them (as all systems constituted in this way would show these behaviours).

Next, this thesis examines the epistemological innovations that have been suggested by some systems theorists.

4.2.2 Systems epistemology

The lengthy passage from Bateson (1972) that was quoted earlier in this chapter regarding his thoughts about the Iatmul people shows hints of other key elements of Bateson's writing; namely, the foregrounding of his thought process and his way of knowing his subject. Bateson's (1972; 1978) work focussed on producing an innovation of epistemology, not simply an extension of objective knowledge. This approach is exemplified in his reports of his unorthodox teaching methods for his subject. While some theorists within the systems paradigm retained a relatively traditional positivist approach in their studies (though they too required new methods), others seized the opportunity to explore the epistemological possibilities offered by the then-burgeoning systems way of seeing the world (Grobbelaar, 1989).

Laszlo (1983) and von Bertalanffy (1969/2009) have suggested that a systems approach was necessitated by the vast amount of information that was being generated by many sciences, and the need to order, define, and communicate knowledge amongst this flood of information. Bateson (1978) suggested that even when studies focussed on one particular phenomenon (such as a social interaction), the variety of methods, approaches, and practices inevitably generated a wide variety of types of information on the topic, which were often at different levels of abstraction. In this instance, he suggested it becomes staggeringly difficult to assess the relative importance of all of these abstractions in influencing the process that is being investigated and to determine how these various elements combine to form the observed process (e.g. a social interaction). The sections below outline epistemological innovations that are presented as a means of coping with these large amounts of data.

4.2.2.1 Circular causality

The notion of circular causality is a cybernetic epistemological concept that draws from the proposition that causation within a self-regulating system emerges from the activities of that system, and does not follow a linear pattern of causality as in traditional scientific epistemology (a view that there is a linear change of causes that leads to effects) (Skyttner, 2005). While propositions regarding self-regulating principles of organisation are reviewed later in this chapter, the epistemological proposition of circular causality is introduced here, as circular causation is partly determined by the act of drawing a distinction:

> *"Consider the illustration of a man hitting a baseball with a bat. The conventional way of understanding that scenario is to see a separate creature called a 'man' using a clearly demarcated physical object called a 'bat' to unilaterally hit another separate chunk of matter called a 'ball'. If we see the man-bat-ball scenario as a product of our drawing distinctions , then we are free to order the sequence of events in any way we choose. We might even argue that balls cause bats to be hit. The point is that a world can be discerned in an infinitude of ways depending on the distinction one establishes. Drawing a circle through the man, bat and ball reveals a different pattern of organisation. From this perspective, seeing the ball as causing the bat to move the man's arms is as logical as the typical occidental sequencing in which a man hits a ball with a bat. Yet neither of these views is complete: a focus on the circular or recursive organization of these events, rather than any particular lineal sequence, is the more complete view of cybernetics." (Keeney, 1983, p. 19).*

There is no correct starting point or end point when going around the circle. Any of these processes (man, bat, or ball) can be an entry or exit point for describing the activity of

the system (Keeney, 1983; Skyttner, 2005). This is most necessary when many ‘causes’ influence a system that do not helpfully arrange themselves in a linear way.

This approach addresses, in part, Swanson’s (1977) critique that psychic energy cannot give an explanatory theory for psychic phenomena, as he says that the theory of psychic energy can only state that a certain relationship between a stimulus and a psychological response or behaviour has existed before and therefore will exist again. In this case, systems theory is similar to what Kaplan (1964) called a concatenated explanation, where a result is viewed as emerging from an organised network or pattern of influences rather than a linear one. Freud attempted to describe a form of organization in the psyche, stating that the response is not due to the stimulus, but to the form of psychic organisation of which the stimulus becomes a part. In this respect, Freud was explaining that a behavioural or psychological response is caused by organisation of an energy distribution system, not by a stimulus.

4.2.2.2 The observation of observation

Bateson (1972) suggested that the first act of knowing is to draw a distinction. By making a distinction between similar concepts or objects (or parts of objects) or proximal events an observer hopes to create the possibility of perceiving a pattern. Spencer-Brown (1973) stated that in making a distinction, the observer hopes to indicate one side of the distinction as primary, and connect it to other distinctions. This represents an epistemological claim that the observer constructs what he or she observes through the initial distinction and subsequent constructions it demands:

> *"The traditional view is that a therapist treats a client through a given intervention. However it may be useful for a therapist to imagine a client's behaviour as an intervention. His interventions … attempt to provoke the therapist to come up with a useful directive or solution. In this 'reverse view' the therapist's behaviour is problematic when he fails to help the client. Treatment is successful when the client provokes the therapist to say or prescribe the appropriate action." (Keeney, 1983, p. 19)*

By shifting 'primacy' onto the other pole of the client-therapist role distinction, a very different interpretation of the therapeutic process unfolds, though its implications are not further explored here. This led both Keeney (1983) and Bateson (1978) to highlight the importance of the observer observing her own knowing or observation, in order to understand how the observer comes to order what is being observed, identifying the distinction she draws and the manner in which it orders subsequent perceptions of the phenomenon.

4.2.2.3 Punctuation and the recursive nature of knowledge

The focus on this observation attempts to perceive 'punctuation' or how we identify pattern in sequences of events (Watzlawick, Beavin, & Jackson, 1967). Keeney (1983) suggested that the first step, drawing a distinction, is followed by making a description, which initiates a recursive process between the acts of distinction and description. Each such recursion is a punctuation of the stream of thought about a phenomenon. How a stream of events is punctuated depends on the original distinction of the observer and the 'frame of reference' for that observation.

4.2.2.3.1 Frames of Reference

Watzlawick and his colleagues describe how *"ordering sequences in one way or another creates what, without undue exaggeration, may be called different realities"* (Watzlawick et al., 1967, p. 62). In this way, a set of events that are described within one frame of reference may be restated within another frame as having an entirely different meaning; when a therapist supplies this new frame, the technique is called 'reframing'.

Returning to Freud's application of his energic theory to his observations (such as hysterical symptoms following a traumatic event or neurosis following excitation), it seems clear that his frame of reference for this was a then-dominant perception of physics that described motions of force, conservation, and energy transformation. This frame of reference may not have been the most fruitful to apply. This is similar to an argument made by Toulmin (1978) that was reviewed in the previous chapter. If Freud had had a more contemporary frame of reference (such as the information systems perspective of energy that is reviewed later), the theory explaining these observations may have differed.

4.2.2.3.2 Logical typing, patterns of order, and the recursive nature of knowledge

The concept of a 'frame of reference' as stated above, introduces the notion of hierarchy in description; there is a description of an event, and then a description of the frame of reference of that event. Referred to in the previous chapter, Peterfreund and Schwartz's (1971) definition of 'explanation' within science is again relevant here, in that explanation must ultimately involve 'levels' in its expression:

> *"Because any individual event, thing, or process is explained when it is shown to be only a particular instance of the generality embodied in a natural law or theory,*

> *something is explained scientifically by showing that it can be incorporated into a deductive system in which it appears as a conclusion from other more general laws." (p. 28)*

Thus, in the various sciences, explanation tends to move towards higher levels of abstraction from observations. Cybernetic epistemology suggests that this is a repeating recursive process between observation and description, with each step becoming further abstracted from the initial observations. Keeney (1983) describes this recursive nature of knowledge production as follows:

> *"The starting point of epistemology is therefore an observer drawing distinctions in order to observe. What an observer observes can be described. Here an interesting situation arises – namely, descriptions are themselves drawing of distinctions upon what we observe. A recursion thus enters: we draw distinctions in order to observe and subsequently, we draw distinctions in order to describe what we observe." (p. 24)*

Therefore, this move towards increasing levels of hierarchy that is further abstracted from observation is fundamental to science and scientific explanation. Systems epistemology attempts to draw the observer's attention to the nature of this process (Keeney, 1983).

Once this production of increasing levels of abstraction in description and explanation is perceived, the idea that what is described at one level is not the same thing as what is described at another can be perceived. This is highlighted by the paradox of the Cretan, which states: 'all Cretans lie'. Logical paradoxes such as this gave rise to Russell's 'Theory of Logical Types' (from Whitehead and Russell, 1910/1963), which necessitates the definition of different levels as types of logic that cannot be mistaken for one another; the statements of lying Cretans are of a different level than that of the frame of reference of the Cretan observer. The conflation of these two levels could be considered an error of logical

typing; though a page, a book, and a multivolume encyclopedia are connected, they are also not the same thing (Keeney, 1983).

Thus, Keeney (1983) outlines a recursive pattern of description of a dance. The initial description is of a simple action: *"For instance, the right foot of a dancer may move forward while the shoulders lean back and the head turns to the right"* (p. 41). Several instances of these descriptions are punctuations that are organised at a higher level of abstraction or category of action, in this case a 'dance'. Such a category of action gains coherence at a higher level of abstraction, such as 'choreography', as in a type of job such as ballet or ballroom dancing.

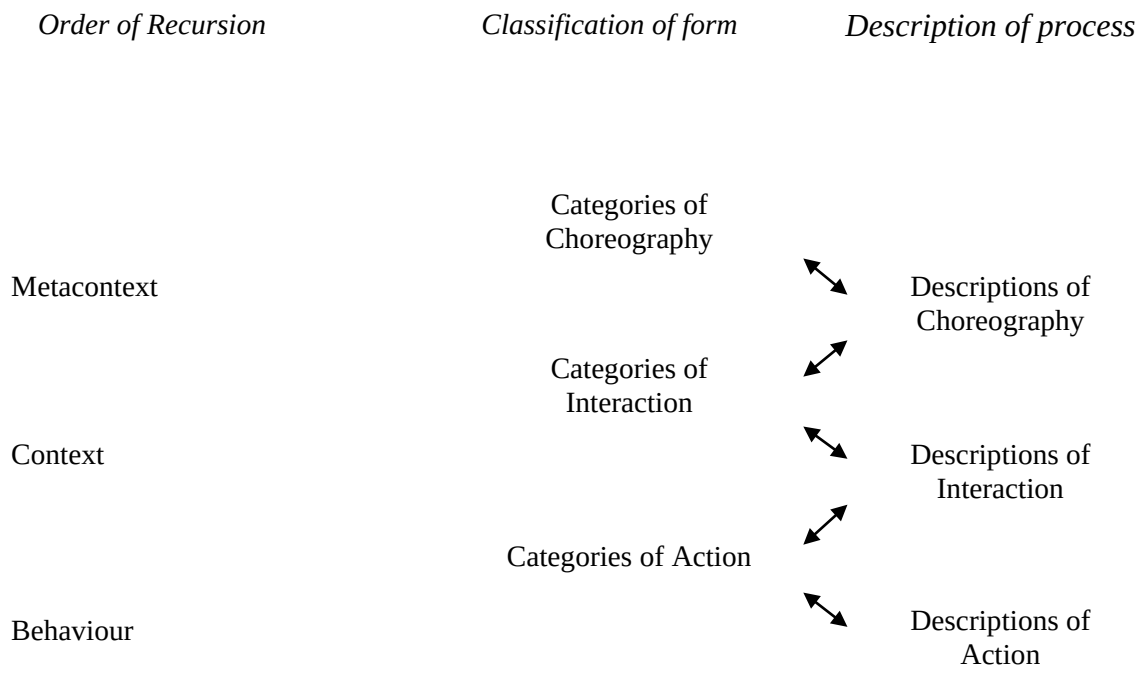


Figure 2: Orders of recursion in description of process and classification of form, after Keeney, 1983, p. 41

The above formulation echoes Keeney's aim of understanding the therapeutic exchange. As such, the middle level focuses on interaction between people as a pattern of organisation. However, this level need not focus on interaction between people, and may

describe interaction between behaviours and stimuli or other behaviours, which may be related to simple behaviour at the lowest level. Placing the phenomena that are addressed by Freud's energic theory into such an arrangement gives a picture such as the figure below, which shows how recursive abstractions from behaviour can be made from Freud's perspective:

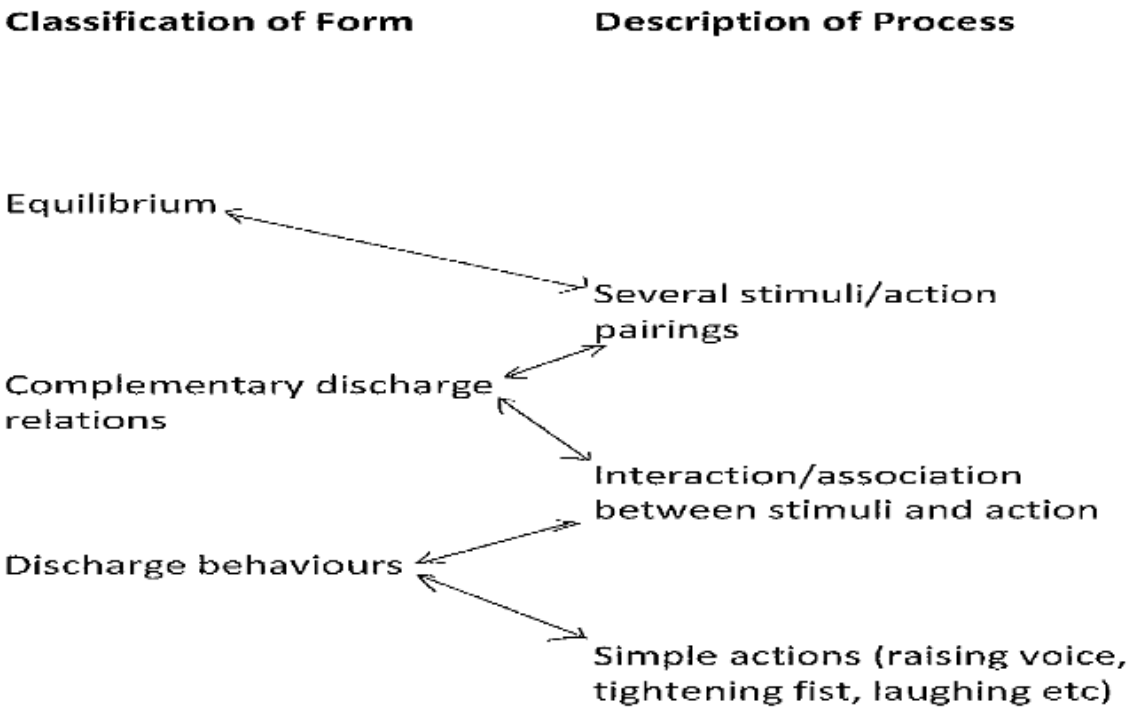


Figure 3: A recursive description of Freud's basic energic hypothesis

In one of Freud and Breuer's (1895/2004) earliest examples (reviewed in chapter two) of the general who smashes the vase after a frustrating visit with the king, the smashing action of his hand is a simple action. Together with a grimace, a snarl or other connected behaviours, this is part of a discharge behaviour. This behaviour is associated with a complementary stimuli (in this case frustration from the failed meeting) where the stimuli 'charges' energy and the action discharges it, and subsequent actions show a reduced energy

level. Several such pairings can be understood as a pattern of maintaining equilibrium, or a related concept.

What is highlighted in this arrangement firstly pertains to a point made in the previous chapter, that the concept of equilibrium in Freud's theory was generated with regard to the observable domain of behaviours and environmental stimuli. The effort put forward in 'The Project' (Freud, 1950) to explain equilibrium with regard to nervous activation represents an effort to link it to a more general theory of the conservation of energy in thermodynamics (Toulmin, 1978). Second, the progressive abstraction in the acts of description and distinction are highlighted here, such that 'equilibrium' in this arrangement is at a different level of abstraction than the simple behaviours that may be associated with it. The significance of the difference between these levels is demonstrated in the following quotation by Bateson found in Keeney (1983):

> *"You cannot stop a crime by punishment. All you get is better criminals, because crime isn't an action. Crime is not the name of an action – crime is a category or context of action. The things which are categories of action do not obey the reinforcement rules the way action obeys the reinforcement rules." (p. 21)*

Thus, Bateson advocated for the use of Russell's notion of logical types in his descriptions and the necessity of avoiding a conflation of different levels of description. This epistemological development in systems theory has bearing on a criticism of the energic theory that was reviewed in the previous chapter: this criticism states that discharge behaviours are not strictly correlated with changes in the form of physical energy (Basch, 1976; Swanson, 1976). In particular, Swanson's (1976) humorous description of the psychic apparatus bouncing around the room reveals such an error of logical typing, and though Swanson's intention is to critique the energic theory, his description more pointedly

demonstrates this problem of logical typing. In order to understand this, Grobbelaar's (1989) description of the relations within and between different levels of a system that can describe a human being is presented:

> *" ... the view which is currently maintained by convention can be seen to constitute some sort of hierarchy with at its lowest level the inorganic domain, at the next level the organic, and finally at the highest level, the informational domain (Stoker, 1969). Although the components and their properties differ from one level to the next, the person as a system is constituted by the relations which obtain between the components at the same level as well as between components on different levels which defines the person as a unity. Furthermore it is clear that the organization at the lowest level sets the parameters for the recursive ordering of components/elements at the next level, so that the organization at the inorganic level will be reflected in a general way at the organic level, and in an even more indirect way at the informational level ... Freudian theory is an attempt to identify the common human patterns at the inorganic and organic levels which determine the informational (psychological)." (p. 134-135)*

Grobbelaar (1989) went on to offer a description of the expression of energy at these different levels:

> *"Freudian theory furthermore hypothesised that, at the inorganic level, the principles of organisation which emerge from the energic interactions are the tendencies towards tension reduction and homeostasis, which are reflected at the organic level as the pleasure principle, and at the psychological level as the hallucinatory wish-fulfilment and the process Freud described as censorship." (p. 136)*

While these three levels (inorganic, organic, and informational) are often presented in this conventional hierarchy, this is not necessary. Bateson (1978) describes an infinite regress of subsets, with each system built on subordinate systems and in turn subordinated to others. A system can be defined at the level of the observer's choosing.

Given the distinctions displayed above (which are returned to later in this chapter), Swanson's (1976) jokes regarding accelerating psychic apparatuses attempt to apply the energic relations that are obtained at the inorganic level to relations that are obtained at the organic and informational level. Thus, his argument suffers the same problem as the observer trying to evaluate the comment from a Cretan that all Cretans lie.

This brief introduction to systems epistemology and logical typing is not complete; some aspects of this epistemology that are more directly bound to cybernetics are addressed later in this chapter in section 4.2.4.2. However, this thesis now moves to the next proposition of systems theory, which is related to the self-organisation of systems.

4.2.3 Self-organisation of systems

4.2.3.1 A criticism of vitalist theories of systemic organisation

Von Bertalanffy (1969/2009) argued that systems theory was the long-awaited antidote to vitalism. As discussed in the last chapter with regard to Descartes, 'vitalism' is a term that is often used as criticism; it refers to any explanatory concept which suggests that living beings are organised (whether psychologically, physiologically, socially, or ontogenetically) by a mysterious, often supernatural form of agency (Basch, 1976; von Bertalanffy, 1969/2009). Vitalism may be invoked when there is a need to explain forms of organisation that appear in biological phenomena that cannot be explained by any existing

means, particularly the overly ‘mechanistic’ theories of the century preceding von Bertalanffy’s work.

> *“In the world view called mechanistic, which was born of classical physics of the nineteenth century, the aimless play of the atoms, governed by the inexorable laws of causality, produced all phenomena in the world, inanimate, living and mental. No room was left for any directiveness, order or telos. … The only goal of science appeared to be analytical, i.e. the splitting up of reality into ever smaller units, and the isolation of individual casual trains. Thus physical reality was split up into mass points or atoms, the living organism into cells, behaviour into reflexes, perceptions into punctual sensations, etc. Correspondingly, causality was essentially one-way: one sun attracts one planet in Newtonian mechanics, one gene in the fertilized ovum produces such and such inherited character … mental elements are lined up, like the beads in a string of pearls, by the law of association, by the law of association. … We may state as characteristic of modern science that this scheme of isolable units acting in one-way causality has proved to be insufficient … notions of teleology and directiveness appeared to be outside the scope of science and to be the playground of mysterious, supernatural or anthropomorphic agencies … Nevertheless, these aspects exist, and you cannot conceive of a living organism … without taking into account what variously and rather loosely is called adaptiveness, purposiveness, goal seeking and the like.” (von Bertalanffy, 1969/2009, p. 45)*

The problem that von Bertalanffy (a biologist) was referring to is perhaps most pronounced in the study of living systems; hence the term vitalist. Mechanistic explanations are inadequate to explain the emergence of complex forms of organisation in living systems, such as the apparent self-regulation of an organism’s body. The power of systems theory to overcome this gap in explanation does not rely on positing any unseen agency or principle.

Instead it relies on processes that appear as emergent properties of systems (von Bertalanffy, 1969/2009).

4.2.3.2 Differentiation and hierarchy in systems

A defining element of many systems is that they are composed of large numbers of relatively simple components with relatively simple relations between them; yet, they seem capable of complex forms of behaviour. Examples include the complex behaviour of weather patterns given the simplicity of air molecules and their capacities for behaviour and interaction, the capacities of the behaviour of ant colonies given the relative simplicity of individual ants, and the complex behaviour of humans given the relative 'simplicity' of neurons (Mitchell, 2009).

One of the problems of a traditional, reductionist approach has been attempting to understand the complex behaviours of the system as a whole by focussing on the basic elements and the relations between them. This focus has led to attempts to prove that this knowledge is sufficient to build a linear chain of causation that may explain even the most complex phenomena. This approach has been insufficient as Bertalanffy (1969/2009) has argued.

However, scientists have increasingly accepted the idea that even simple elements with simple interrelations can produce complex forms of behaviour, particularly when there are large numbers of those elements. Currently, many fields explore this theme in a variety of ways; the systems theory presented in this thesis is one of those ways. There is however, much philosophical (and some methodological) overlap (Mitchell, 2009). For example, the study of cellular automata in computer science shows how a simple set of instructions that are

applied to a simple (though large) two-dimensional grid of points that can each occupy different states and relations between them, can develop very complex outputs that demonstrate complex forms of order (Wolfram, 2002).

Weiss (in a symposium presentation reported in Koestler and Smythies, 1969) stated that the differentiated and hierarchical ordering of systems in the biological realm is necessitated by the huge number of elements that such systems usually contain. As explained by Grobbelaar (1989):

> *"… for example the brain contains about 10^{10} cells, which in turn contains 10^{15} micromolecules. The organisation of these elements (or they may also be called subsystems) is bound by the organisation of the next higher system. One of the important qualities of this hierarchical order is that the degrees of freedom of any one subsystem is contained in the relative invariance of which it is a subsystem." (p. 105)*

However, the fundamental question is about how this ordering of the system comes about, particularly the hierarchical ordering of a system, in the absence of any overarching 'vitalist' organising force. Within the broad field of system theories, von Bertalanffy (1969/2009) and Bateson (1978) argued that segregation (or segmentation) is an inherent property of many systems that develop such differentiation in their structure as an 'organic' result of their operation.

Gray, Duhl, and Rizzo (1969) described processes of structure formation in systems, discussing the emergence of hierarchy in particular. They described interrelated processes of progressive differentiation, segregation, mechanisation, and centralisation. Progressive differentiation is a primary process or characteristic of a system that tends towards higher organisation of whole systems, through segregation into differentiated subsystems. Progressive mechanisation of some of these parts results in some parts becoming 'leading'

parts of the system, and changes in these parts will cause significant changes in other more mechanised parts. These leading parts then become centralised and jump to a higher level of organisation, causing stratification and hierarchy. Therefore, based on the assumption that differentiation is a primary process in a system, stratification and hierarchisation become inevitable results of the differentiation of parts.

Nobel prize-winner Ilya Prigogine described dissipative structures which develop in systems that are far from thermodynamic equilibrium. For example, a temperature difference across a liquid may spread linearly through conduction across its volume if the temperature difference is near equilibrium. However, when further away from equilibrium, 'hexagonal' convection structures form in order to dissipate the difference through the liquid. Prigogine argued that such spontaneous forms of order, necessitated by systems that are far from equilibrium can be found in a variety of other systems, where transactions with the environment push the system far from equilibrium and generate a novel structure (Prigogine & Stengers, 1984).

Such environmental influence (the necessity that a system should be 'open') may be a precondition of self-organisation:

> *"All self-organising systems are open systems, by a continuous influx of matter/energy and information. This implies that such systems are built against a surrounding disorder of much higher probability. ... [the first] stage of self-organisation is a kind of spontaneous pattern formation, denoting rudimentary information processing. Consequently, systems which are unable to organise themselves exhibit no sign of information processes. Systems in balance or equilibrium, by definition do not self-organise. Neither do chaotic systems which have*

no memory of the past. The system has to be in a critical state, just at the edge of chaos." (Skyttner, 2005, p. 304)

The expression 'at the edge of chaos' is not used lightly. This expression refers to a statement by Waldrop (1992) where he was referring to the state of a system in which small changes in the inputs of a system can have large effects. A well-known example of this is 'the butterfly effect', or sensitivity to initial conditions in the field of chaos theory (Mitchell, 2009, Waldrop, 1992). Here, mathematical systems can be defined where a critical input value always leads to a particular 'attractor state' of a particular value, or oscillation between critical values; once the critical value exceeds a certain point it no longer settles on an attractor final endpoint, but on chaos (Mitchell, 2009). The quote above therefore suggests that the system be significantly far from equilibrium, but not in chaos.

Biologists Maturana and Varela (1980) presented their famous concept of autopoiesis to explain living systems (both organisms and their ecologies). The term 'autopoiesis' essentially means 'self-making' and the authors argued that all livings systems have this characteristic. This characteristic refers to the observation that a living system specifies the organisation and function of its components in such a way that the organisation is the product of that functioning. As such, the system reproduces and maintains itself as a result of its own functioning (Maturana & Varela, 1980). As in the point made by Skyttner (2005) in the quote above, the open nature of the system is also viewed as critical in their conception of self-making, in that they present the concept of 'structural coupling'. This is the notion that the organisation of a system is coupled to the organisation of its environment, such that its autopoietic functioning is reciprocally connected to systemic elements in the environment. A change in the environment must force a change in the organism, and a change in the organism must result in a different relationship with the environment or it must perturb the environment. In this way, structural differentiation of a system occurs as a direct result of structural

coupling, such that the system becomes increasingly complex due to the complexity of its environment (Maturana & Varela, 1980).

The concept of autopoiesis and the phenomenon of self-organisation of systems in general are intimately connected with the notion of the self-regulation of systems (and cybernetics), which is addressed in the next section. However, it is noted here that the present phenomenon of progressive differentiation might explain the emergence of mental 'structures' more effectively than the effort made by Freud in 'The Project' (1950). In 'The Project', Freud tried to explain the distinction between the psychic systems, ϕ (phi), ψ (psi), and ω (omega) as resting on congenital sets of physiologically different nerves in discrete locations. This supposition is currently known to be false. However, if we suppose that the network of huge numbers of nerves (despite being homogenous) and relations that obtain between them, can nonetheless form differentiated 'structures' in their activity, much as Wolfram's (2002) cellular automata do, this view of 'structural' differentiation through development is in line with some contemporary thinking in cognitive neuroscience that large distributed networks of nerves become functionally distinct through development (Sporns, 2012).

4.2.4 Cybernetics and self-regulation

Freud's original formulation of psychic energy was that it is governed by a state of equilibrium or homeostasis (Freud & Breuer, 1895/2004). The concept of equilibrium has the purpose of understanding energic states of various systems; however, systems theory clarifies some limitations of the concept of equilibrium as a mechanism of self-regulation in systems. The concept of equilibrium is explored before examining the advances offered by cybernetic theory.

4.2.4.1 The limits of equilibrium

Systemic equilibrium refers to a state in which the components and structure of a system appear to reach a state where little or no change occurs. For example, over time a gas becomes evenly distributed within a container or a temperature difference across a liquid resolves into an even distribution of temperature. The criticism has often been made that equilibrium can only characterise closed systems; however, open systems that have relatively stable environmental conditions can also obtain a stationary state, even a system that cycles through a repeating set of values, sometimes referred to as dynamic equilibrium (Prigogine & Stengers, 1984; von Bertalanffy, 1969/2009). Keeney (1983) recognised this as a key characteristic of a wide variety of systems; they fluctuate (or cycle) within a particular set of bounds around a particular state or value.

The power of the equilibrium concept in understanding systemic self-regulation lies in the fact that it seems to act as an ‘attractor’ state in various systems. In other words, regardless of the starting position of a particular system, it may end up at the same attractor state (Prigogine & Stengers, 1984). This phenomenon is an example of what is referred to as equifinality: the idea that the same result can be reached by a range of different paths. Von Bertalanffy (1969/2009) suggested that many systems displayed this characteristic and that this must be caused by the conditions of the system and environment, and not be the result of a mysterious vitalist process. Once reaching the attractor state, little or no change takes place. There may be times when the system drifts slightly away from the equilibrium state, but it always returns to that attractor value (Prigogine & Stengers, 1984). This process is referred to as homeostasis in some systems.

Alone, equilibrium (or homeostasis) is not an adequate explanation for why a system settles into a particular pattern. To say that a system settles into a particular state because of equilibrium or homeostasis may be what Keeney (1983) refers to as a 'dormitive principle'. A dormitive principle is where a description of state is mistakenly used as an explanation for that state. Equilibrium or homeostasis simply describe a phenomenon, they do not explain it.

Attempts to explain the existence of attractor states in the field of thermodynamics have drawn on the field of probability mathematics. If a container is mentally divided in half and the number of gas particles in either half of the container is counted, it is expected that the attractor state would contain an equal number of particles in both sides of the container. In other words it is expected that the gas would be evenly distributed throughout the container. The attractor point is the state of highest probability; the state in which the largest possible arrangements of gas particles is found:

> *" ... if N=8, there is only one way of placing the eight particles in a single half. There are, however, eight different ways of putting one particle in one half and seven in the other half, if we suppose the particles to be distinguishable, as is assumed in classical physics. Furthermore, equal distribution of the eight particles between the two halves can be carried out in 8!/4!4! = 70 different ways ... Likewise, whatever the value of N, a number P of situations called complexions in physics may be defined, giving the number of ways of achieving any given distribution N_1,N_2. ... For values of N of the order of 10^{23} values found in macroscopic systems, the overwhelming majority of possible distributions corresponds to the distribution $N_1 = N_2 = N/2$. For systems composed of a large number of particles, all states that differ from the state corresponding to an equal distribution are thus highly improbable." (Prigogine & Stengers, 1984, p. 123)*

Boltzmann (1886) connected this concept with the second law of thermodynamics (that any system tends towards maximum entropy), when associating entropy ‘S’ with the number of complexions, or the number of ways of reaching the state.

This work on probability and entropy provides a basis for explanation of equilibrium and homeostasis in closed thermodynamic systems. However, given this thesis’s focus on humans as open systems, the situation regarding open systems is more pertinent. As such, Boltzmann’s explanation can be extended to open systems with a modification. An open system, rather than maximising entropy, can be seen as minimising the related concept of *free energy* (F):

> *“ ... F = E – TS, where E is the energy of the system and T is the temperature ...This formulation signifies that equilibrium is the result of a competition between energy and entropy.” (Prigogine & Stengers, 1984, p. 126)*

The concept of ‘free energy’ is intriguing in terms of the goals of the present project, as it represents a form of energy that could be defined in terms of a physical energy and in terms of a state of probability. It is not a physical energy; rather, it defines a relation of form. Furthermore, there appears to be an intriguing similarity between what Freud described as the necessity to reduce or remove unbound cathexis from the nervous system in favour of bound cathexis. These similarities are addressed later in section 4.2.5.3, where the concept of free energy is viewed in relation to concepts from information science and Karl Friston’s concept of free energy in particular (Friston, Kilner, & Harrison, 2006).

The applicability of such thermodynamic formulations of equilibrium to living systems is limited both physiologically and especially in terms of psychological functioning. Processes of feedback that are characteristic of open systems change the equations for maximising free energy into more complex, non-linear systems. Furthermore, Prigogine and

Stengers (1984) clarified that the development of structures in living organisms seem to violate entropic principles and that Darwin's principle of selection appears incompatible with the law of maximum entropy. To attempt to address this problem, Prigogine described the principles of structure formation in systems that are far from equilibrium, as reviewed in section 4.2.3.2 'Differentiation and hierarchy in systems'. However, at this stage, the point is to indicate the limitations of thermodynamic concepts such as equilibrium in explaining self-regulation in organisms, particularly self-regulation of psychological functions in human beings. This thesis examines the potential of cybernetics in this regard.

4.2.4.2 Cybernetic self-regulation

The term 'cybernetics' was coined by a group of scientists that Norbert Wiener was a prominent member of; the term was adapted from a Greek word that means 'steersman'. Briefly put, the field of cybernetics refers to the science of how a system regulates or controls itself. Towards the end of the Second World War, Wiener was tasked with designing anti-aircraft and anti-missile machine gun systems that could predict the flight path of an object and aim itself to intercept; a fully automated self-aiming gun was developed. This task raised the core problems of control engineering that led Wiener and his colleagues to develop a science of control (Wiener, 1965).

In doing this, Wiener referred to a distinction between what were thought to be two eras in engineering history. Prior to the era of his own work, he stated that engineering was primarily concerned with managing great quantities, such as the yield of a steam engine, the weight carried by a vehicle, or the speed of an aircraft. He referred to this era as that of *power* engineering. He suggested that during the time of his work, a new focus came to the fore, which was not as focussed on dealing with quantities of power, but on 'governance' and the

channelling of control. Thus, the focus was on communication and feedback within a system, a field he referred to as *communication* engineering (Wiener, 1965). As such, a large section of cybernetics is concerned with information including environmental and internal information 'sensed' by a system, actions taken in response and the concept of feedback, the return of information from the action as a change in the sensory field, and therefore the adjustment of action. This description represents the concept of a *feedback loop*, which is central to the notion of self-regulation of a system (Skyttner, 2005).

The distinction by Wiener above reveals the core problems of Freud's energic theory. Freud's description of the energic theory is that its governance is dependent on power intensities alone (although he did utilise the concept of feedback in his formulation, as indicated by Strachey in Freud, 1950). This project agrees with Grobbelaar (1989) that a cybernetic theory is missing from the Freudian theory, and particularly from the energic theory. Energy in the psyche must be influenced by information processes; otherwise, the intensity with which a person responds to someone calling fire in a movie theatre would correlate highly with how loudly that person said it. Cybernetics as a field may offer the conceptual tools that are necessary to improve our understanding of how energic processes are governed in the psyche.

Bateson (1972) enthusiastically adopted the scientific challenge that was posed by cybernetics, and stated that the behaviour of a system is determined by the restraints on that system and that cybernetics is, in a sense, a study of predictions that are based on restraints. As such, explanations in cybernetics are always 'negative'; explanations are not about the driving force behind systemic behaviour, but about the terms of such restraints. While the physical sciences focuses on the restraints posed by energy, Bateson stated that the behaviour of a system is defined by three different kinds of restraints: alternatives, feedback, and redundancy.

The first restraint, alternatives, is defined in terms of probability. When describing this, Bateson (1972) built on the work of Wiener (1965) who framed the activity of a system in terms of probability as well. For example, if a six-sided die is rolled, the restraint of alternatives informs us that there are only six possibilities and these possibilities limit the system more than the overall energy restraints (Bateson, 1972):

> *"Probability, being a ratio between quantities which have similar dimensions, is itself of zero dimensions. That is, the central explanatory quantity, information, is of zero dimensions. Quantities of real dimensions (mass, length, time), and their derivatives (force, energy, etc.) have no place in cybernetic explanation. The status of energy is of special interest. In general in communication systems, we deal with sequences that resemble stimulus-and-response rather than cause-and-effect. When one billiard ball strikes another there is an energy transfer such that the motion of the second ball is energised by the impact of the first. In communication systems on the other hand, the energy of the response is usually provided by the respondent. If I kick a dog, his immediately sequential behaviour is energized by his metabolism, not by my kick. Similarly, when one neuron fires another, or an impulse from a microphone activates a circuit, the sequent behaviour has its own energy sources. Of course, everything that happens is still within the limits defined by the law of energy conservation. The dog's metabolism might in the end limit his response, but in general, in the systems with which we deal, the energy supplies are large compared with the demands upon them; and long before the supplies are exhausted, 'economic' limitations are imposed by the finite number of available alternatives, i.e., there is an economics of probability. This economics differs from an economics of energy or money in that probability – being a ratio – is not subject to addition or subtraction but only to multiplicative processes, such as fractionation. A telephone exchange at a time of*

emergency may be 'jammed' when a large fraction of its alternative pathways are busy. There is, then, a lower probability of any given message getting through." (Bateson, 1972, p. 408-409)

The above quote presents a critical assumption of systems theory and information theory (which is addressed in a later section) and represents a critical assumption of the present project as well. With this statement, the concept of psychic energy must move away from a quantity of energy in the physical world such as heat or motion, and accept all of the criticism of Freud's theory, which states that psychic energy cannot be such a form of energy (Basch, 1976; Swanson, 1977).

Another restraint is redundancy. This form of restraint refers to the limitations that are imposed on alternatives that are given by what is already in a 'message'. In other words, if someone needs to find the last letter in the word ORANG-, there are less than twenty-six alternatives to choose from due to the information that is already present. Likewise, one can make a more probable guess regarding the meaning of a message with some words missing, such as: 'sadly, ___ dog ran ___ and never returned. Similarly, the presence of a tree suggests that there are roots, and rain may suggest clouds (Bateson, 1972).

The final restraint is feedback, which is of central significance in cybernetics in that it adds a necessary level of explanation, over and above equilibrium (the limits of which were addressed above). However, this concept has many problems associated with it. Dell (1982) defined feedback as:

"... the introduction of a system's output into part of its internal behaviour so as to 'correct' (i.e. negative feedback), or amplify (i.e. positive feedback), the behaviour of some target variable." (p. 27)

When defining these two types of feedback, Dell (1982) challenged a predominant view that feedback only maintains a system (a concept that is essentially the same as homeostasis). He suggested that in order to keep a target variable at a constant, change might be initiated in the whole system. This latter part represents another aspect of cybernetic epistemology, the notion of 'instigatory' causation, as opposed to a linear sequence of causative events. Returning to the example of the dog being kicked that was presented above, the kick reflects this form of instigatory causation. The kick does not cause the dogs response (the response is caused by the structure and state of the living system), but it has have an instigatory influence on the whole living system that is the dog.

Keeney (1983) suggested that there is a form of positive feedback in a system. However, Keeney also made a distinction between different levels of a system, suggesting that what appears to be positive feedback must be part of a broader negative feedback loop on a higher order. This point is based on Keeney's position that as there are different levels of order of a system, so there are levels of order of feedback, which is how he attempted to explain the apparent presence of positive feedback.

Grobbelaar (1989) argued that both Dell's (1982) and Keeney's (1983) efforts to clarify the concept of homeostasis using feedback were 'misdirected', suggesting that Maturana and Varela's concept of autopoeisis is a more powerful explanation. He argued that the tendency governing the stability or change of a system is not equilibrium or even dynamic equilibrium. However, he agreed with Maturana and Varela that it is best governed by *"... the tendency of all systems to maintain their organisation" (Grobbelaar, 1989, p112)*. In addition, he cited the following quotation from Maturana and Varela (1980):

> *"The 'living' organisation is a circular organisation which secures the production or the maintenance that specify it in such a manner that the product of this functioning is*

the very same organization that produces them. Accordingly a living system is an homeostatic system whose organisation has its own organisation as the variable that it maintains constant through the production and functioning of the components that specify it." (p. 48)

Grobbelaar (1989) concluded his argument by drawing on the work of Weiss (in Koestler & Smythies, 1969), and Maturana and Varela (1980) that endorsed the following description of a recursively-ordered hierarchical system: the organization of a system interacts with its constituent components in an infinite regress of subsets , so as to maintain that organisation. In this formulation, he rejected Keeney's concept of levels of feedback and suggested that a feedback loop is *"... a specific process at a specific level in any one system." (p. 117).*

As Strachey argued (in Freud, 1950), this concept of feedback appeared early in Freud's formulation of psychic functioning, and energy-based regulation in particular. In 'The Project', Freud (1950) clarified that an energic state in the psychic apparatus causes a motor action that discharges it; if that action results in the reduction of activation stemming from the body (in other words if the body is less deprived and reduces the demand drive on the psychic apparatus), then that action is 'remembered'. When the state of deprivation occurs again, stoking activation in the psychic apparatus, the motor image is recalled (and the action is tried again). This process is the basis of cathexis, as the energy captured in the motor image and its associated sensory stimuli (e.g. drinking a glass of water). Should the recollection of the motor image and its associated action fail to reduce the activation caused by deprivation, a new action is generated. This continues until a new action is found that reduces the activation, which will in turn be effected. This feedback loop is central to Freud's conception of organismic stability. However, as described in the second chapter, Freud (1950,

1920/1955, 1900/1991) argued that this feedback loop was subsumed under a principle of equilibrium.

The key change to Freud's theory (and the fundamental change proposed in the current statement) presented here is that the concept of equilibrium has always had problems, and that the core statement of the principle of governance of energic mechanisms is best expressed as the tendency to maintain its organisation (not the tendency towards equilibrium).

This reformulation of psychic energy has an advantage that is specifically outlined by Grobbelaar (1989):

> *"Maturana's formulation of the homeostatic principle contains two extremely important insights which constitute major advances over Freudian theory. Firstly, the homeostatic principle is manifested in the maintenance of the circularity of organisation, and not in a simple tendency towards tension reduction. Tension management can be, and usually is, a sub-class of the activities maintaining homeostasis, but with the tendency towards homeostasis linked to the maintenance of systemic organisation rather than tension reduction, it becomes possible to explain theoretically why some organisms are sometimes stimulus-seeking, and will tolerate and even seek increases in tension levels. ... And secondly, by linking the development of organization to the functioning of the components themselves, the use of a teleological explanation is avoided." (p. 151-152)*

Some of the implications of this formulation are explored in the following chapter, and how it can be applied to the novel understanding of human behaviour with a focus on the analytic setting and the treatment condition.

The work of Heinz Kohut (1977) on self-psychology may overlap with the principle being developed here. As described in the previous chapter, the growth of the ego psychologists' focus on structure in the psyche, and on the ego in particular, can be seen as culminating in Kohut's work on the self. Kohut builds a theory with a core metapsychological principle, in which the self has 'integrity' needs and these needs are a core motivator in a person. Kohut (1977) stated that when a person perceives the central organisation of the self as threatened it results in a 'disintegration anxiety', which poses a demand characteristic on the person psychologically and behaviourally; this demand then forces actions to preserve the self. This action to maintain the self is a fundamental aspect of Kohut's work, and may reflect this tendency to maintain structure, within the analytic field.

The field of cybernetics has different strands and there are two strands that have been considered at odds with one another. The strand of self-regulation that has been reviewed thus far (particularly the concept of autopoiesis) is sometimes considered at odds with theories that perceive control of the system as lying with a central controller that processes information and selects action (Ashby, 1947). For this reason, information processing approaches to cybernetics have historically been poorly integrated with an approach like Maturana's (2002) autopoiesis. However, some writers have attempted to utilize such an information processing approach to formulate psychic energy and this approach is reviewed next.

4.2.5 Information theory and information processing

This section addresses two slightly different aspects of information. The first aspect deals with the concept of information processing, while the second deals with formal

information theory (which is a mathematical approach). A conceptual approach to information processing in the notion of psychic energy is discussed first.

4.2.5.1 An information processing approach

Historically, the concept of information processing is drawn from a particular conception of what information is; it is an applied field of computer science that has had a huge influence on psychology, particularly during the ‘cognitive revolution’. The growth of computers into mainstream life during the 1960s and 1970s had an influence on how psychologists conceptualised the mind , leading them to apply the approach that computer scientists had towards computer systems to understanding how the mind worked (Estes, 1978). One of the most recognisable products from this approach is the ubiquitous flow or ‘decision-tree’ diagram that depicts particular discrete functions in a system. These functions are often depicted with discrete sequential phases, and with feedback loops or integration points.

Within cognitive psychology, researchers have often aimed to demonstrate an empirical basis for these discrete functional entities and stages, both in terms of predictive validity of the functions they describe (often in a wide variety of applied fields) and trying to map such systems onto identifiable parts of the nervous system. This approach also highlighted the question of how to define information (Estes, 1978).

As indicated in the previous chapter a number of theorists within the psychoanalytic field have called for an integration of concepts from the information processing approach (Colby, 1955; Gedo, 2001; Rosenblatt & Thickstun, 1984). In addition, some grand attempts at such synthesis have taken place, some of which are explored shortly (Peterfreund &

Schwarz, 1971; Pribram & Gill, 1976). First, the reader is briefly reminded of the definition of information and the implication that this definition has for both the energic theory and psychoanalytic theory in general.

As described in chapter three, information in psychoanalysis has been linked to a 'structural approach', which developed partly in opposition to a purely energic approach to understanding psychic functioning and behaviour. The structural approach criticised the idea that psychological phenomena were the result of quantitative summation of competitive and cooperative (or neutral) energies in the psyche, by arguing that there must be abiding structures that influence or transform the energy. This conception is inseparable from an informational perspective in that, in an information science approach energy is conceived of as 'information' that is quantified by the extent to which it transforms a structure (Rosenblatt & Thickstun, 1984). In this manner, energy can have 'meaning', which will clearly influence a person's behaviour and psychological state.

This approach can address the criticism that the energy released by a person shouting 'fire' in a theatre has little to do with the stimulus intensity of the sound of the word 'fire', as meaning plays a role in the response. A number of formulations of information processing have appeared in the psychoanalytic field (De Beaugrande, 1984; Federico, 1972; Palombo, 1978; Peterfreund, 1980; Peterfreund & Schwarz, 1971; Pribram & Gill, 1976) and some of these (those that address the key issues under discussion here) are briefly reviewed next (though Federico's contribution is reviewed after the following section because it has an additional mathematical component)

4.2.5.1.1 Peterfreund and Schwarz, 1971

In their book, Peterfreund and Schwarz presented a detailed argument for the integration of an information processing approach, and sketched a model of how this approach could modify core psychoanalytic concepts (Peterfreund & Schwartz, 1971). The work is ambitious in the sense that it attempts to cover a lot of ground and rework many concepts in one text, which is both an advantage and a disadvantage.

The basic assumptions and propositions of the model are given in seven points that are summarized below:

- The nervous system is an information processing system.
- The organism has inborn nerve circuits associated with ‘programs’; there are hierarchical information processing systems regulated by feedback and they can mature with development. The organism has inborn storage capacity for information.
- Information that enters during development modifies the programming.
- Subjective experiences correlate with, or are parallel to, the activity of programs. Due to large capacities, the manifestation of psychological phenomena can be infinitely diverse.
- Pathology is due to defective or abnormal programming that is incompatible with a desired goal.
- ‘Ego functions’ (including control, adaptation, organization, and integration) are optimised information processing systems.
- Good psychoanalysis reveals the characteristics of a complex feedback – regulated system (Peterfreund & Schwartz, 1971).

Examined from a metatheoretical perspective, the real addition of their model to Freudian theory is the addition of ‘structures’ (which they think of as the ‘programs’ stored in memory) and also to show how all of those program systems are not unitary. Peterfreund and Schwartz conceive of the notion of a singular ego as problematic, and think that there are a range of programs with functions that collectively perform what are perceived as ego functions. They tend to think of instincts in the same way, as programs whose functioning is activated by stimuli (demands stimuli from the body or environmental stimuli (Peterfreund & Schwartz, 1971).

The other primary addition to the theory is a regulation mechanism that keeps bringing the programs closer to reality, or an ‘optimum’ level of functioning, and a greater sophistication and complexity (Peterfreund & Schwartz, 1971). As such, it is similar to a common perspective in information processing theory, called ‘Bayesian inference’, which is reviewed later. However, it is not clear from their work *why* the psyche follows this imperative towards optimal functioning, other than just being so because of evolutionary necessity. However, they do refer to a homeostatic imperative often, and sometimes survival and self-preservation; they view a form of organismic stress as driving such development. The role of ‘energy’ in their work seems to vary between at times being something under the control of the programs (not influencing them) and at other times having a kind of ‘demand’ characteristic; this problem is not fully resolved in their model.

The passage below seems to indicate an ‘economy of alternatives’ (discussed above) without overtly specifying this as a core determinative principle throughout the work:

> *“In order to further our understanding, it is helpful to compare two thermostatic systems, one programmed to go on at 69 degrees and off at 71 degrees, the other programmed to go on at 65 degrees and off at 75 degrees. The resultant activity*

indicates that the first system is more highly 'motivated' to maintain the temperature at 70 degrees than is the second. The first system seems to 'press for discharge' more than the second; it is a system that is more rigid, less flexible, less 'tolerant' of deviations than the second." (Peterfreund & Schwartz, 1971, p. 180)

This is a fairly compelling analogy for how an economy of alternatives in terms of information can provide a core regulatory principle that governs the appearance of physical energies in the body.

4.2.5.1.2 Pribram and Gill, 1976

This work entitled 'Freud's 'Project' Re-assessed: Preface to Contemporary Cognitive Theory' (Pribram & Gill, 1976) re-examines Freud's project in order to highlight many of the ideas it had that appeared to be supported by then-contemporary ideas and findings in cognitive neuroscience. The authors sought to uncover interesting formulations in the text that might address significant problems in understanding cognitive and neurological functioning. Large sections of the work are devoted to demonstrating the depth of ideas in 'The Project', but a number of distinctions are presented early in the work that provide intriguing possibilities regarding the goals of this thesis. These insights are presented in two parts; this first part is discussed now and the second part is discussed in the next section as it references concepts that are presented later.

In terms of reviewing 'The Project', Pribram and Gill constructed a potential graphic description of the information processing system as it is portrayed in Freud's (1950) text:

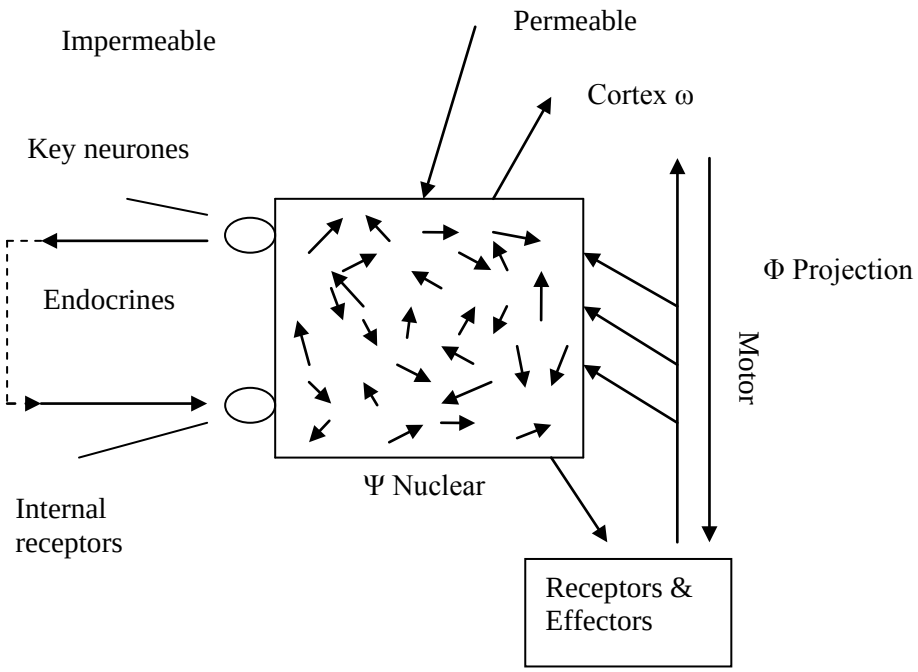


Figure 4: A model of Freud's 'Project', after Pribram and Gill, 1976, p. 12

A detailed discussion of this representation is beyond the scope of this thesis (the reader is referred to chapter two). However, the authors attempt to show that there is a detailed and complex information processing model present in Freud's (1950) 'Project'.

One significant addition that the authors make to what has already been presented here is the distinction between the concept of feedback and that of feedforward. As discussed previously, feedback involves the situation where a system's output is projected back as an input that can then lead to a correction of output, and this process continues. In contrast, a feedforward system has no such mechanism; such a system receives no information about its output and runs its 'programmed' course regardless of what the outcome of that action is. Alternatively, a feedforward mechanism is one where a particular stimulus condition triggers a particular output in a system. As such, the behaviour of such a system depends on the complexity of its 'programming', in terms of the range of different stimuli it can sample and the range of different responses it can provide (Pribram & Gill, 1976).

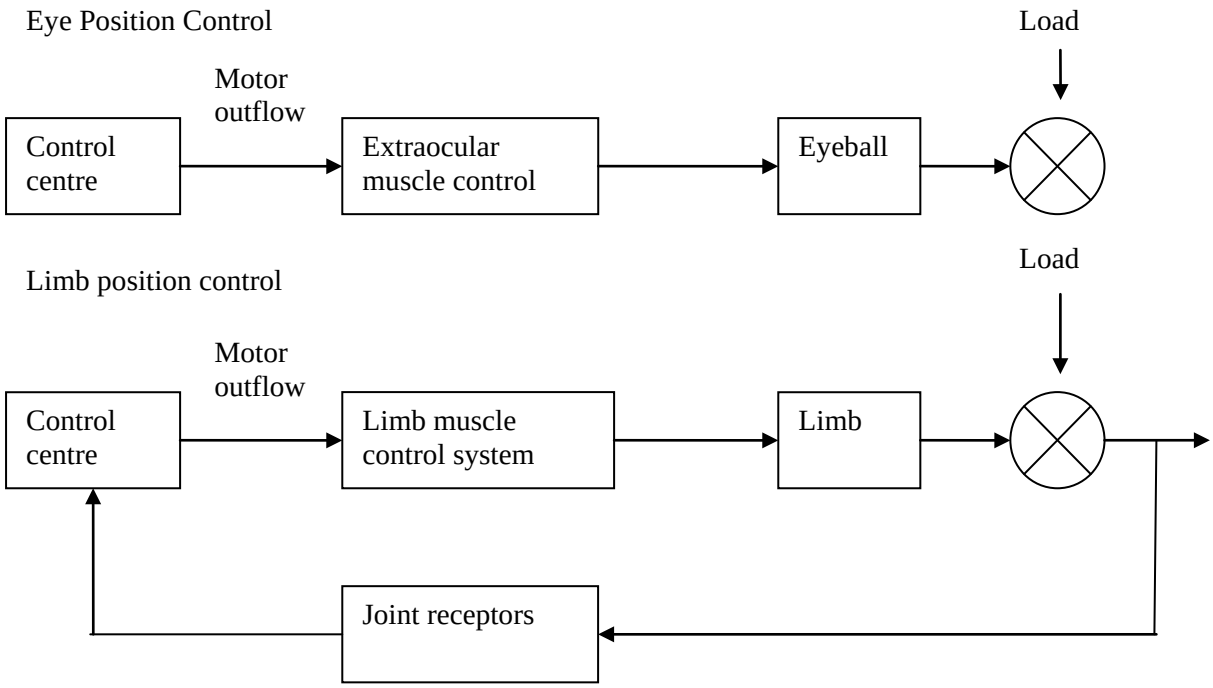


Figure 5: Feedforward and feedback, after Pribram and Gill, 1976, p. 24

In figure 5 above, eye position is an example of a feedforward mechanism while limb positioning refers to a feedback mechanism. The first point that Pribram and Gill make about these mechanisms is that most complex systems are made up of an amalgam of both types, and not one or the other. The implication is that a system as complex as the human nervous system or psyche is likely also made up in the same way.

> *"Two types of combinations have been extensively studied. In one, feedback processes become associated, multiply linked with each other, producing an extremely stable system resistant to change (i.e. they exhibit inertia). … Biologically, physiological drive systems have been found to display this type of organisation. … Complex combinations based primarily on feedforward processes are ubiquitous; they constitute our computer technology. For the most part, such combinations contain feedbacks as well. Biologically, combinations of feedforwards occur in parallel … and constitute one class of cognitive processes … When feedback loops are included,*

hierarchical sequential arrangements called plans or programmes are constituted … Parallel and hierarchical processing mechanisms provide the foundations of contemporary cognitive theory …." (Pribram & Gill, 1976, p. 24-25)

This quote seems to imply, in a persuasive manner, that a regulatory mechanism that is based solely on homeostasis and feedback may be inadequate to serve as the core principle of regulation of the psychic apparatus.

In this particular arrangement, the authors consider the feedback-feedforward distinction potentially useful to understand the primary and secondary processes of the psyche. Recall that the primary process represents the pleasure-unpleasure principle (although it should be noted that these authors criticise the fact that Freud should have distinguished between quantities of affect, which are subject to regulatory processes and meaning or interpretation of pleasurable or unpleasurable states). Pribram and Gill (1976) agreed with Freud that primary principle functioning is based on associative linking in the nervous system rather than goal-directed activity; they suggest that this form of functioning primarily fits 'feedback' type systems that are regulated by homeostasis.

On the other hand, secondary process thinking, which involves nervous system functioning directed towards adaptive behaviour and inhibitory self-restraint and is based on memory, is more closely aligned with feedforward mechanisms (though it is of the complex nature described above and contains feedback in hierarchical parallel processing). Agreeing with Freud, the authors refer to complex systems that combine these feedforward and feedbackward characteristics; these systems seem to shift between being dominated by one type and the other. As Freud suggested the psyche seemed at times dominated by either the primary or the secondary process.

Furthermore, they seem to suggest that the limited number of available channels in the nervous system mean that these two types of processing inherently compete. This is how the inhibitory function of secondary processing works; it essentially ‘wipes out’ the primary processing activity and replaces it. They feel that this mechanism may also explain repressive functioning (Pribram & Gill, 1976).

This book raises a number of interesting possibilities (another of which is discussed in the next section). However, these possibilities are largely undeveloped after the opening sections of the book. The majority of the book attempts to uncover the complexities of Freud’s text, rather than developing these hypotheses in a thorough manner, beyond applying them to Freud’s concepts (such as repression, dream states, language-based consciousness, and thinking). Before returning to important aspects of their contribution, the next section introduces the formal, mathematical aspects of information theory, which are important for reviewing other contributions to this field.

4.2.5.2 Quantifying information

Pierce (1980) describes information theory as a mathematical field that seeks to measure information and establish mathematical principles that describe and predict processes of information transfer and the limitations. Information gained its impetus with the seminal work of Claude Shannon who worked for Bell laboratories. This lab was involved in developing and refining technologies that could effectively transmit information from one place to another, and the measurement of these processes was of great importance. As Boltzmann has used probability mathematics to explain the thermodynamic properties of gas, Shannon (together with Wiener and perhaps others) defined information in terms of probability and entropy (Pierce, 1980; Wiener, 1965).

In this formulation, the level of information contained in a message is defined in terms of its probability. A totally predictable event that has a probability of 1 contains no information. The result from rolling a six-sided die has a probability of 0.16 and contains significantly more information. In other words, the more unexpected or improbable an event, the greater amount of information it carries. An event with a low probability such as 0.000031 carries a large amount of information. What is meant by 'entropy' in this situation is essentially the negative of information; if information is a measure of the level of organisation in a message, entropy is a measure of its disorganisation. Therefore, an unexpected event has high information and low entropy, whereas a state of high entropy is entirely expected and contains no information, only noise (Pierce, 1980; Shannon, 1948; Wiener, 1965).

As such, the amount of information in a message may often be quantified in terms of 'bits'. A bit refers to a piece of information which is either 0 or 1 (the binary language of computers). In this way, information can be quantified in terms of the average number of bits that are required to communicate or transmit this state. Therefore, the bits required to transmit the information of a coin toss is 1, which is given by $\log_2 2 = 1$ since the coin has only two possible states. For a condition that has eight possible states, the number of bits becomes $\log_2 8 = 3$ or three bits. The most typically used measure of information is Shannon entropy, which is given by:

$$H = -\sum_{i=1}^{n} p_i \ log \ p_i \text{ bits per second}$$

The significance of this shift into information processing theory is first, that it quantifies information and provides a basis for empirical scientific enquiry. More pertinently, the quantification of information serves to provide a different basis for describing an economy to which the mind is subject, rather than the economy of energy in the traditional

sense. Treating energy as information within this approach may offer a different basis for Freud's claims than that provided by a physical metaphor of energy.

While, some writers have stressed that energy and information are not the same thing (Peterfreund & Schwartz, 1971), there has been much effort to conceptually and empirically connect the probability mathematics of both thermodynamics and information theory, though these efforts have proven*" ... more interesting than fruitful" (Pierce, 1980, p. 24)*. There is nonetheless a tendency within the field of physics to refer to energy as information, and energy transfer as information transfer (Pierce, 1980). Next, key texts that explore these matters are reviewed.

4.2.5.2.2 Pribram and Gill, 1976, revisited

The use of entropy and probability as measures of information by the likes of Shannon and Wiener (reviewed above) raise the complex question of whether a concept of energy will have any role in an account of regulation of psychic phenomena. Pribram and Gill (1976) argued that a traditional conception of energy may have a role to play in a model of an information based system:

> *"Because of the success of information measurement in communication systems there have been periodic attempts to re-evaluate the psychoanalytic metapsychology (viewed as an intrapsychic communications network) in 'information processing' terms. … we feel that despite the merit of these attempts, there is also considerable danger that energy concepts such as mental work and effort basic to the development of any coherent cognitive theory … be ruled out before they are given adequate trial." (p. 25-26)*

In this regard, the authors drew attention to a core characteristic of a feedback-based information processing system: that there must be a form of comparison between input (which also includes the feedback from the output) and a form of expectation about that input, followed by a subsequent modification of expectations in the system. In this manner, a system 'learns' and steadily adapts to its environment (Pribram & Gill, 1976).

As a result of this function, it is typical for such a system to produce an 'error' signal, which is the difference between the expected information and the actual information. This error signal then becomes the benchmark for a process through which progressive changes in behaviour of the system are evaluated in terms of whether or not they reduce the error. The 'goal' of the system is to reduce this error as much as possible; this represents a state of 'equilibrium' to which the organism tends (Pribram & Gill, 1976). The process described here is critical to a process called 'Bayesian inference', which is defined later in this chapter in section 4.2.5.3. The authors state:

> *"Confusion has arisen because there has been a tendency to label 'error', the mismatch signal, 'information'. But 'error' has nothing in common with Shannon-Weaver 'information': the amount of information contained in a message does not depend on processing its errors. … Information is a measure of variety; redundancy (repetition), a measure of the constraints. Information thus refers to the content of a communication while redundancy reflects the context or code in which information is communicated. Feedback organisations constrain systems to equilibrium. Thus the error becomes a term denoting redundancy or lack thereof, not information. … In short, feedback mechanisms are error-processing organizations constrained to equilibrium and thus energy concepts such as 'load', 'power', 'work', 'effort', 'degrees of freedom', and 'dependence' or 'association' as measures of constraint, are applicable." (p. 26-27)*

While the authors developed this distinction with regard to their feedback/primary process versus feedforward/secondary process distinction, they did not fully explore what role an energic description might play compared to an information-based description. This problem is returned to later; first, a model based on the above quantification is reviewed.

4.2.5.2.1 Federico, 1972

Federico suggested that an information processing model can be built from Freud's theory that recasts the Freudian psychic apparatus as an information processing model in which cathectic energy is bound or released according to the structures constituting the system. He described it visually as in figure 6 below.

In Federico's (1972) model, data (he refers to this as 'eco-info') consists of two components, an energy component (measured in CE units) and an information component measured in bits, the amount of which is given by:

$$\Sigma \text{ pi log2 pi}$$

He states:

> *" … where pi is the expected subjective probability of a particular datum to reduce tension based upon past utility. pi is a function of the number of possible alternate pieces of data that the Ucs. has in storage which it considers in regard to reducing a particular pain or increasing a particular pleasure. The amount of secondary information is given by:*
>
> $$\Sigma \, qi \, log2 \, qi$$

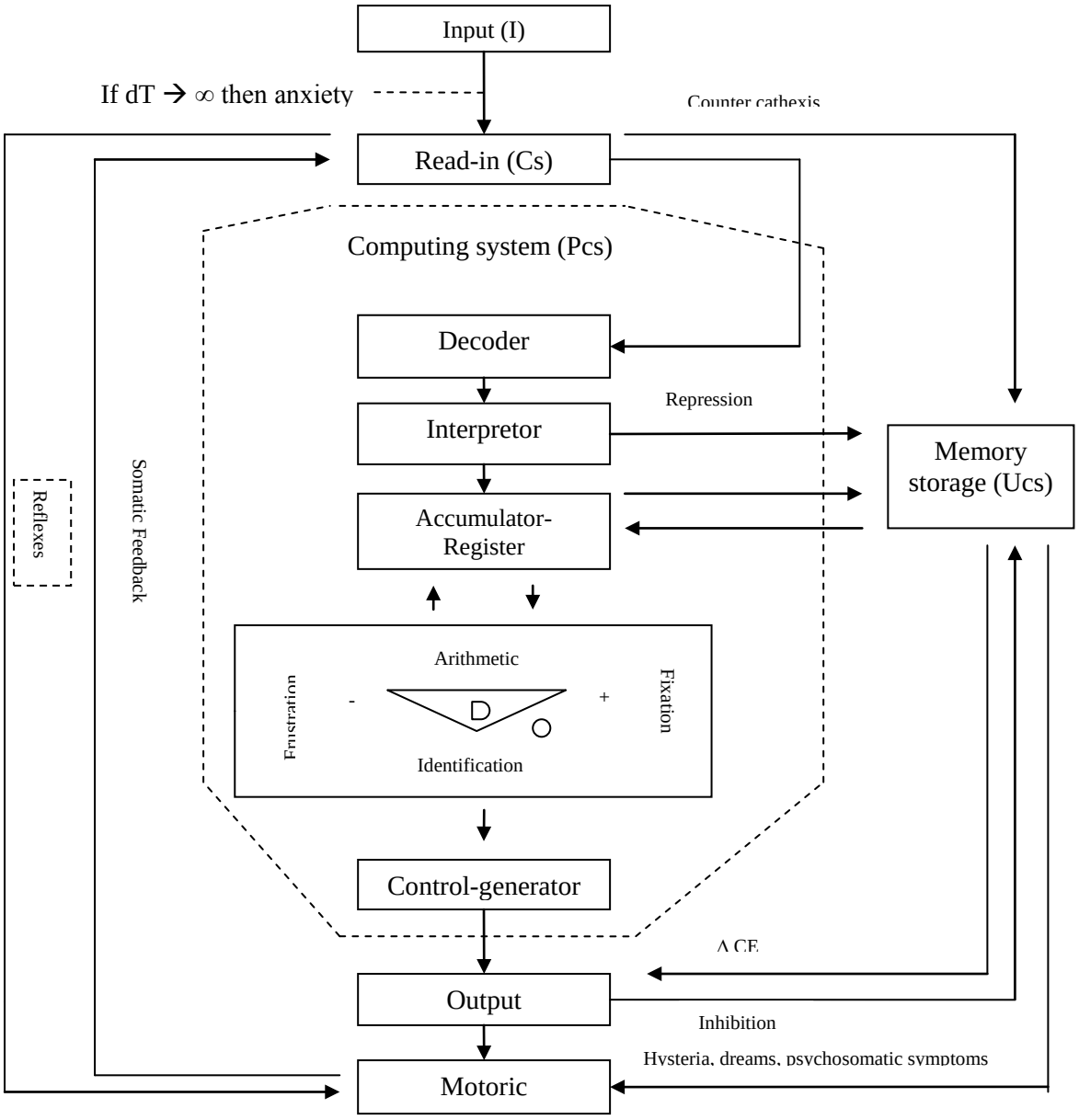


Figure 6: An information processing model of cathectic energy regulation after Federico, 1972, p. 124

where qi is the present subjective probability that a particular datum will reduce tension. qi differs essentially from pi in that qi is a more "objective" estimate of the probability than pi because it has just entered the PA. qi is the probability based upon present "perception," whereas pi has been stored in the Ucs. for some time interval.

While in memory-storage, pi does not remain constant but changes as a function of time." (Federico, 1972, p. 122)

In this system, the output from the decoder unit gives the information of the actual subjective probability (qi), after which in the arithmetic unit, this is compared against expected subjective probability (pi), according to the following equation:

$$\sum p_i log_2 p_i - \sum q_i log_2 q_i = D = 0.$$

If D = 0 it means that the subjective probability that data will reduce tension is the same the objective probability based on present perception, implying a perfect relationship between the contents of the unconscious and the external environment. In this situation, cathectic energy (CE) will either reduce pain or increase pleasure because the psychic apparatus (PA) fits the external environment so well.

If D > 0 it means that the subjective expectation that a datum will reduce tension is an overestimate: the secondary information suggests that other possibilities to reduce tension exist in the environment. The CE must then be slit over all of these possibilities, resulting in les being available to the PA.

Finally, if D < 0, it means the more objective, secondary information indicates that a given piece of data has a greater probability of reducing tension than that subjectively predicted by the unconscious. The control unit now initiates the behavioural functions of the motoric unit. If the CE is not sufficient, then the balance must be drawn from the unconscious/memory-storage system. If this is still insufficient then the PA fails to reduce tension, resulting in rising frustration (pp. 125).

Federico's model exemplifies the same core characteristic of the feedback-based information processing models referred to earlier above. This has some similarity to Bayesian

inference (which is introduced in section 4.2.5.3 below), but it is not the same. In Federico's formulation the ability of information to reduce tension is compared to the expectation that the data should reduce tension. However, the equation concerns the information itself and this seems to create a problem, as this type of comparison only works if tension reduction is measured. If tension is not measured, then the 'actual probability that information will reduce tension' (pi) will be unknown. If tension reduction is known, there is no clarity on how the organism knows it. In the 'Project', the current tension is compared to the past tension (though it may only exist in the psychic apparatus as information). If the current tension is lower than the motor action that is associated with it, then the change is remembered and attempted again in future.

Another problem with the model is that it states a limited pool of energy that lies in the memory storage facility (and unconscious system). This runs counter to Freud's formulation, suggesting as Federico does that energy is 'stored' in memory or the unconscious and such a statement must explain this form of storage. Furthermore, Federico states that incoming data is broken into information (in bits) and cathectic energy units (this follows Freud's assumption that sensory input provides energy to the system). It is not clear what happens to these cathectic energy units, if they are stored in the memory storage or not; in the diagram above an arrow runs from the memory-storage box, indicating 'counter-cathexis' and perhaps indicating that it is suppressing the unconscious. However, this is not the only role of stimulus energy in Freud's formulation, and it is not clear from Federico's model how this energy is accounted for.

The final core problem is the statement that the only expectations that are updated by experience in this account of the psychic apparatus are the expectations regarding tension reduction. He stated that the functioning of the interpreter and the arithmetic function follow 'programs' in the psyche. These programs are never updated in this formulation and this may

be tantamount to suggesting that our interpretation of sensory data is not altered through experience (beyond its capacity to reduce tension). However, this formulation may be intended to show the processing of energic phenomena, not general psychic phenomena. If so, it may be criticised as ignoring the role that Freud gives to energic phenomena, which is that they regulate the general apparatus to a large degree. Despite these problems (and others that may be found in a more lengthy analysis), Federico's model presents some interesting ideas that are worthy of further consideration for researchers with similar goals.

4.2.5.3 A free energy principle

While the texts discussed above refer to work within the field of psychoanalysis to adopt information processing models into psychoanalytic understanding, there have been ongoing developments outside of the field of psychoanalysis in this regard. One of the most recent and increasingly influential of these is the free energy principle, which has been used by neuroscientist Karl Friston and his colleagues and contemporaries to provide a global theory of the regulation of brain function and organismic behaviour (Friston, 2010). This principle is reviewed here partly because of its contemporary popularity and the high level of interest in this model, but also because in the present author's eyes, it has great unrealised potential to address a number of the weaknesses in regulatory theories discussed up until now and to influence metapsychological assumptions in psychoanalysis.

The free energy principle integrates a number of the systemic principles reviewed in this chapter, and presents a proposition for the governance of the nervous system that bears similarity to some of Freud's claims and incorporates information theory, structural coupling, and cybernetics in a mathematical model that uses the same probability calculus that physicists such as Prigogine used to model the behaviour of gases or liquids in steady states.

The free energy principle is a form of Bayesian inference, which is a statistical approach to modelling how a learning system updates its propositions about the world. In the Bayesian approach, a posterior probability is calculated from a prior probability multiplied by a likelihood ratio. In other words, if there is an expectation about an event occurring, it can be compared to the real likelihood of its occurrence (measurable after an event) to give an updated probability. In other words, every new piece of information that is received alters the probability of what events will take place, and therefore updates expectations of those events (Friston, 2010).

Therefore, a succession of such calculations is referred to as Bayesian updating, and refers to how, as we gain new evidence our models about the world are continually updated and our expectations come closer the real likelihood of events occurring. Active inference refers to a situation where the organism (or brain) compares its model for the causes of events with the available data, and then acts to minimise the discrepancy by altering the inference (Friston, 2010).

The free energy principle goes a step further than Bayesian updating, in that the organism can do more than just alter its inferences; it can also act on the environment (or at least change how it samples the environment in terms of its senses). The free energy concept essentially suggests that the effect of this discrepancy (whether changing inference or acting) can be modelled according to the free energy principle. The mathematical equation that measures free energy is more complex than those equations reviewed previously in this thesis, and requires an above average understanding of mathematics. Thus, it is not discussed in considerable detail here. Rather, the model is presented in brief (though the reader is referred to Friston, Kilner, & Harrison, 2006, for a more detailed description).

In the context of the present discussion, the 'free energy' (F) of an open system is calculated by the same equation that is used in thermodynamics (reviewed above):

$$F = E - TS$$

in which free energy (F) of a system is the energy (E) of a system minus the entropy (S) (multiplied by the temperature in this case). In thermodynamics it describes the work that can be extracted from a system. However, Friston (2010) had a different view than Pribram and Gill (1976). He stated that this definition is not the same as a thermodynamic quantity; thus, any thermodynamic conception of energy is inappropriate to the notion of free energy, which is defined in information terms as 'prediction error'. The nature of the measurement and its error is slightly complicated and is represented in Friston, Kilner, and Harrison (2006) as two terms:

$$F = -\int q(\vartheta)\ ln\frac{p(y;\vartheta)}{q(\vartheta)}d(\vartheta)$$

$$= -\langle \ln p(y;\vartheta)\rangle_q + \langle \ln q(\vartheta)\rangle_q$$

In this equation, ϑ represents environmental conditions that impact the system (the environment as it 'really is'), while q(ϑ) represents an ensemble density of physical states of the system and of particular environmental conditions that impact that system (it represents the probability density that a particular environmental condition would be selected from an infinite number of possibilities given the system's states). Here, y represents the sensory information about the environment and the term $p(y;\vartheta)$ refers to a generative density:

> *"…from which one can generate sensory samples and their causes. The generative density factorises into a likelihood and prior density $p(y|\vartheta)p(\vartheta)$, which specify a generative model. This means the free energy induces a generative model for any*

system and an ensemble density over the causes or parameters of that model." (Friston, Kilner, & Harrison, 2006, p. 73).

The crudest way to explain this model is by describing how free energy is constituted by adding the system's state of surprise given a particular environmental condition (a fish being out of water would constitute a highly surprising state given that its nervous system reflects that it is in water), plus the probability of a system's sensory input given particular causes (the probability that a fish's senses would reflect that it is out of water, given that it is out of water).

This equation can be rewritten in a number of different ways, but two of the most important ways show its dependence on the internal states of the system and on the action taken by the system's effectors (such as fins of a fish). The first rearrangement that demonstrates the free energy's dependence on the internal states of the system λ can be written as:

$$F = -\ln p(y) + D(q(\vartheta;\lambda)||p(\vartheta|y))$$

The first term in this equation refers to the probability of the systems sensory input, given hidden environmental causes. The second refers to a Kullback-Leibler divergence term that measures the difference between the ensemble density and conditional density of the causes. It can be seen that minimising this term (that is, minimising free energy) means changing the ensemble density to become the same as the conditional density. In other words, the ensemble density of the system's internal states λ should become an approximation of the posterior probability of the causes of the sensory input. Assuming the validity of a free energy principle, the nervous system implicitly seeks to correctly infer the causes of sensory input and updates its own propositions in line with sensory data (Friston, Kilner, & Harrison, 2006).

The second possible rearrangement of the free energy term demonstrates its dependence on the action taken by the system α, or how its sensors sample the environment:

$$F = -\langle \ln p(y(\alpha)|\vartheta)\rangle_q + D(q(\vartheta)||p(\vartheta))$$

> *"In this instance, only the first term is a function of action. Minimising this term corresponds to maximising the log probability of the sensory input, expected under the ensemble density. In other words, the system will reconfigure itself to sample sensory inputs that are the most likely under the ensemble density. However, as we have just seen, the ensemble density approximates the conditional distribution of the causes given sensory inputs. The inherent circularity obliges the system to fulfil its own expectations. In other words, the system will expose itself selectively to causes in the environment that it expects to encounter. However, these expectations are limited to the repertoire of physical states the system can occupy, which specify the ensemble density. Therefore, systems with a low free energy can only sample parts of the environment they can encode with their repertoire of physical states. Because the free energy is low, the inferred causes approximate the real environmental conditions."* *(Friston, Kilner, and Harrison, 2006, p. 74)*

Restated in purely verbal terms, the free energy principle states that a 'self-organising' system (one that inherently resists or opposes entropy, such as living organisms or the brain) will function to minimise its free energy. Free energy (which can be understood broadly as prediction error) will be *increased* under two conditions: first if it accurately perceives that it is in a surprising state, and secondly, if it incorrectly perceives or models its environment. Both of these scenarios can operate at the same time. As such, the minimisation of free energy can be achieved in two ways: by reducing the surprise of an organism's state (by

taking an action) or by bringing its internal perception or model in line with environmental reality (Friston, 2010).

Regarding the first method, if a fish finds itself outside of water, this could be a 'surprising' state. In this case, surprise (and therefore free energy) could be reduced by an action that puts the fish back in water. However, that may be achieved (or on a much longer time frame, by evolving physiologically such that its inner state will not be far from expected in this 'out-of-water' situation). Regarding the second route, the fish attempts to restructure its inner predictions of the world to include states of being out of water, to reduce the surprise in that manner (or learn the causes of this state and how to avoid them).

The free energy principle has advantages over other models discussed previously. First, it describes the 'equilibrium' states of the organism or system in terms of a set of probabilities across both of its own inner states and its environment. This form of systemic regulation can therefore be viewed as a way of modelling the concept of 'structural coupling' (Maturana & Varela, 1980), in that the equilibrium state depends on a particular balance between the system and its environment, not only an inner equilibrium state. This also addresses Freud's initial concern about how an organism modifies its 'pleasure principle' towards a 'reality principle'; the realities of the external world are inherently part of the organismic equilibrium.

The second advantage is in that it provides an explanation of the growth of the 'reality principle' of the organism's functioning. Based on a purely 'tension management' model, Freud could never satisfactorily explain how increasingly complex cognitive states develop. The free energy principle shows that the tendency is not ultimately towards tension management, but towards the internal propositions about the causes of sensory stimuli moving closer the real causes. This aspect also models the 'autopoietic' or self-making aspect

of the system, ever increasing its complexity to reflect the complexity of the external environment and its own internal states. Furthermore, the free energy principle reflects Bateson's cybernetic perspective that the system is regulated by a constraint that is an economy of alternatives. Friston's formulation is defined in terms of probability densities of states that the system can occupy.

Lastly, the free energy principle improves on Freud's formulation in that it recasts thermodynamic energy as information, which has 'meaning' for the organism. The energic response of people in a movie theatre when someone says 'fire' may not be dependent on how loudly they say it. However, it may have much to do with the 'surprise', similar to how a fish is 'surprised' at being out of water. The free energy principle also improves upon pure information processing accounts of psychic functioning, such as Pribram and Gill's (1976) and Federico's (1972), in that it contains regulatory mechanisms that explain steady state of the system, which those approaches lack.

While free energy may not refer to a thermodynamic type of tendency (Friston & Stephan, 2007), it does define the fundamental form of regulation of the behaviour of an organism as obeying an ultimately quantitative imperative (though it is defined in informational rather than thermodynamic terms). Thus, it may be useful to explain (or at least model) a number of the observations that Freud made, which he believed require an energic perspective to explain.

While links have been drawn between the free energy principle and Freud's theory (Carhart-Harris & Friston, 2010) and interest in this concept has emerged from psychoanalytic quarters, it has not yet been embraced within psychoanalysis in a systematic manner. Furthermore, questions have been raised about whether the free energy principle

represents a fully ‘unified’ or global theory or model of brain and behavioural functioning (Huang, 2008; Friston, 2010).

The position of this thesis is that even if the free energy principle is wholeheartedly accepted, its role in explaining and predicting human behaviour and the functioning of the psyche would be necessary but not sufficient. By analogy, it can be compared to the role of the influence of gravity in describing the motion of objects flying in the air; while gravity will always exert and influence every motion of an airborne object, it is not the only vector that does this. A range of other factors may do this, one or some of which may be of far greater interest in describing a particular motion. In the same way, the free energy principle, even if accepted, would exert its influence on every aspect of the psyche and behaviour (as Freud thought the pleasure-unpleasure principle did). However, it may often not be a principle of greatest interest when explaining a specific psychic or behavioural phenomenon.

Nonetheless, it is also the position taken by this project that the concepts involved in the free energy principle deserve greater attention by the psychoanalytic field, including the implications it has for psychoanalytic metapsychology and as an explanatory principle of data observed in an analytic situation. Some comments are made in this regard in the next chapter of this thesis.

However, one comment can be made here regarding defense and the unconscious. One question that might be asked of the free energy principle is about a special case of when there appears to be resistance to a person changing their internal models in line with reality. Psychoanalytic observation literature is replete with clients and analysts who resist altering their propositional models of reality and who instead seem to retain irrational (or even psychotic) and maladaptive inner states. While this could, in part, be explained by the proposal that people may prefer to use action or alter the sampling of their sensory organs to

maintain the predictive validity of their inferences (the way people seem to choose to see and hear only what they want to), more attention to explaining how the free energy principle explains such a case would be of core interest to the psychoanalytic field.

Finally, it should be noted that the free energy principle may be better described as a model rather than an explanatory theory, as it is more like a map than a territory. This is because it specifies a relationship between constructs, but has not yet offered a decisive theory explaining how this relationship has come about in the natural world. As described in the next chapter the notion of autopoiesis and self-production may have a role to play in providing this explanatory element, in the form of a tendency towards patterns in the workings of the nervous system. Before ending the current chapter, later developments in systems theory are briefly reviewed.

4.3 Systems theory in the present

The brief remainder of this chapter reviews the eventual fate of systems theory and what remains of this field in the present day. It also reviews present-day innovations, which may develop a form that is suitable for application within psychoanalysis. One of the difficulties in charting the progress of systems theory is that it did not seem to remain a coherent or growing field after the late 1980s. Rather, a group of subdisciplines that constituted aspects of systems theory (whether they preceded systems theory, were born of it, or were merely associated with it) have continued down divergent paths, some of which have shown growth as fields (Mitchell, 2009).

> *"Like the research program of the cyberneticists, these ideas [of general systems theory] were very appealing, but attempts to construct a rigorous mathematical*

framework – one that explains and predicts the important common properties of such systems – were not generally successful. However, the central scientific questions posed by these efforts formed the roots of several modern areas of science and engineering. Artificial intelligence, artificial life, systems ecology, systems biology, neural networks, systems analysis, control theory and the sciences of complexity have all emerged from seeds sown by the cyberneticists and general systems theorists. Cybernetics and general systems theory are still active areas of research in some quarters of the scientific community, but have been largely overshadowed by these offspring disciplines." (Mitchell, 2009, p. 298)

The last of the offspring disciplines mentioned by Mitchell (2009) is her own field, which is the science of complexity. This field is a collection of diverse approaches that try to understand how complex forms of order manifest within nature, a field as ambitious in scope as systems theory but with a slightly different focus. These approaches include information theory (and information processing theory), the latest fruits of which are reviewed above; network science, which includes the work on cellular automata that is reviewed with regard to self-organization above, as well as approaches within dynamic systems mathematics, computation, and evolution.

One hypothesis put forward by Mitchell for the fragmentation of systems approaches is the sheer diversity of systems found in nature. To focus on generalities across all systems may be of limited utility; a focus on common aspects found in many (rather than all) systems may provide more utility, and focusing on more narrow characteristics of specific types of systems may be the most useful approach. As such, psychoanalysis may only usefully draw on systems-type research from a limited set of fields, such as those drawn on in the present project. However, this project has only touched the tip of the iceberg in terms of systems

concepts that are being generated in a diverse set of fields, and psychoanalysis could benefit from the work being done in any number of them.

4.4 Conclusion

The present chapter presents an introduction to the core concepts of systems theory, reviews a number of findings that have emerged from the broad field, and explores what other writers have done to incorporate these ideas within psychoanalysis. It is hoped that the reader is convinced of the potential usefulness of these concepts and fields and sees future directions that that have not been addressed by the current thesis. The next chapter attempts to state more formally (but in a preliminary way) a systemic perspective on the organisation of energic mechanisms in the psyche.

CHAPTER 5: A Systemic reformulation of the energic concept in Freud's theory

This chapter presents a formulation of a metapsychological principle for psychoanalysis that is a restatement of the role originally played by the energic theory in Freud's psychoanalytic theory, from a systems theory perspective. The chapter begins with the primary goal of the present work, which is a systemic formulation of the energic hypothesis. This formulation is positive in the sense that it is not only a critique of what may be wrong with the energic theory to date, but is a formulation of theoretical principles. Many of the statements here may be recognised (and referenced) as the work of some of the theorists which have earlier been reviewed, and are presented as propositions of the current statement, though some parts of the statement are novel. Following this, the limitations and benefits of the model are described. Finally, the chapter examines the observations that the psychoanalytic theory of psychic energy was supposed to explain in Freud's account, in order to demonstrate how the new formulation may be used to explain them.

5.1 A systems reformulation of the energic theory

This section outlines a model of governance of the phenomena explained by the energic theory in Freud's work; this model is based on systemic principles and epistemology. It begins with a general formulation of the human being as a system, and then focuses on those specific aspects of the human system that are described as energically governed by Freud.

5.1.1 Assumptions regarding recursive levels of systemic organisation

Grobbelaar (1989) clarified a systemic description of the human organism in that it is not constituted by invariably delimited levels, but by an infinite regress of subsets which could be defined at a variety of levels. Then, drawing on a fairly traditional three-level distinction (such as that found in Stoker, 1969), he stated that the human organism can be divided into three levels: an inorganic level, an organic level, and an informational level. He adds:

> *"Although the components and their properties differ from one level to the next, the person as a system is constituted by the relations which obtain between components on the same level as well as between components on different levels which defines the person as a unity. Furthermore it is clear that the organisation at the lowest levels sets the parameters for the recursive ordering of components/elements at the next level, so that the organization at the inorganic level will be reflected in a general way at the organic level, and in an even more indirect way at the informational level." (Grobbelaar, 1989, p. 135)*

In the above quote, he was adopting Keeney's (1983) notion of recursive organisation of levels of a system to make sense of the given hierarchy of inorganic, organic, and informational levels. He applied this formulation to the example of energy, making the following statement:

> *"Freudian theory furthermore hypothesized that, at the inorganic level, the principles of organisation which emerge from the energic interactions are the tendencies towards tension reduction and homeostasis, which are reflected at the organic level as the pleasure principle, and at the psychological level as hallucinatory wish fulfilment and the process Freud described as censorship." (p. 136)*

He added a further qualification, that the organization at any one level is determined by the parameters that are set at the lower levels and by the added restrictions imposed by the relations at that level. In other words each level contains the organisation of that below, and adds a new layer of organisation. Following Weiss (in Koestler and Smythies, 1969), it is suggested that the invariant principles of organisation of the level above come to limit the degrees of freedom of the level below, which indicates a reciprocal determinism between levels of the system.

Regarding the origin of this hierarchical organisation, Wiener and Schadé (1965) avoid a vitalist or top-down origin of the formation of the structure by suggesting that each successive higher level is understood as emerging spontaneously over time through the activities of the level below. Though Grobbelaar (1989) accepted the concept of levels of organisation of the system, he rejected Dell's (1982) conception of second- or third-order cybernetics which proposes that each successive higher level of organization involves its own distinct level of feedback. Instead, he suggested that feedback loops exist at every level of the system, as well as between and across levels within the infinite regress of subsets.

Applying these assumptions to the nervous system of human beings, the nervous system holds a special place in information exchange within an organism. Organisms with and without nervous systems are distinguished by their ability to act; action (and especially behaviour) distinguishes organisms with and without nervous systems. This suggests that nervous systems are best considered a recursively higher form of organisation than the organic level, one which, following Grobbelaar (1989), must add at least one new element of organisation over and above that required to be a living organism. The present project therefore adopts a 'three-level' description of the human system (inorganic, organic, and informational), as presented in Figure 7 below.

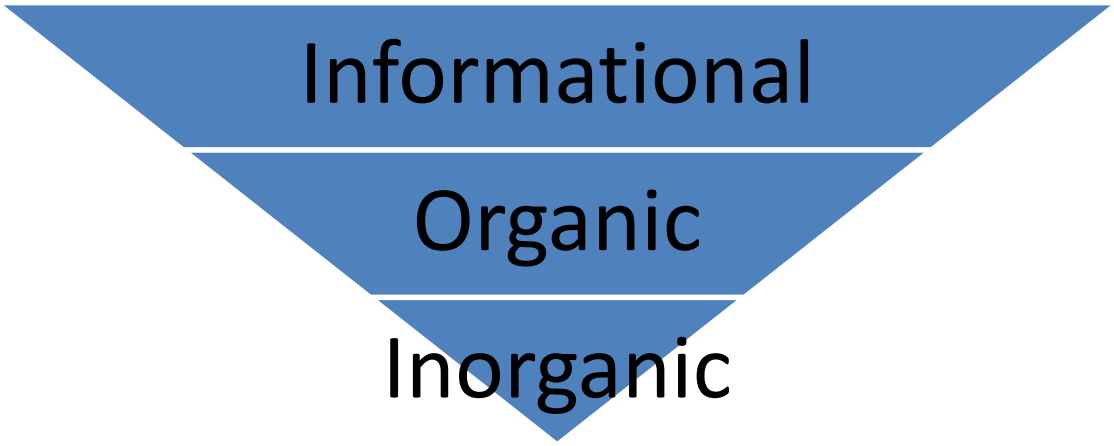


Figure 7: Levels of organisation of energy in the psychic system

An inverted pyramid is chosen for the current model as it reflects increasing levels of complexity of organisation of successively higher levels of the system. As noted at the start of this section, the operation of activities at any level is determined not only by the components and principles of organisation at that level, but also the components and principles of organisation of the level below (Grobbelaar, 1989). Following Weiss (in Koestler and Smythies, 1969), the invariant principles of organisation of the level above come to limit the degrees of freedom of the level below. Finally, following Keeney (1983), the nature of energy in the hierarchy is understood as recursively constituted through these different levels of organisation. These assumptions underlie the formulation in Figure 8 found below.

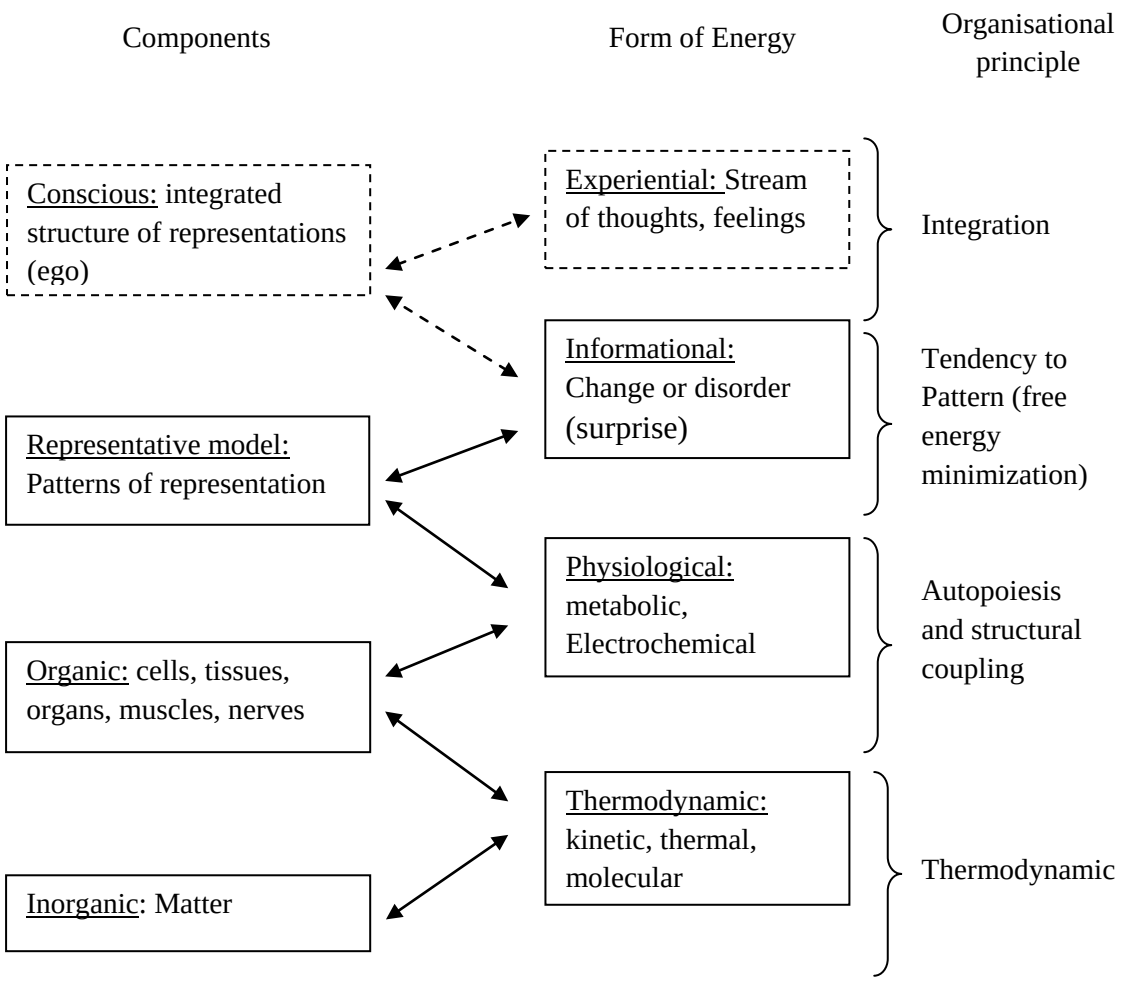


Figure 8: Energy at different levels of recursive organisation of system

This diagram presents the conceptualisation of how ‘energy’ is present at recursively higher levels of organisation of the system (the boxes at the highest level are outlined with a dashed line as they may not necessarily constitute a separate level, and require different consideration). An explanation of these different levels is offered next.

5.1.2 Components, energy, and organisation at three levels of the human system

5.1.2.1 The inorganic level

In this model, at the inorganic level, energy is understood as the core thermodynamic energies described in physics, and is regulated by the laws of thermodynamics as far as they are understood. While there are many principles of energy transformation in physics, the laws of thermodynamics are regarded as overarching principles that govern all forms of energy (above the subatomic level that is, which is not included in this formulation) that include an upper limitation imposed by the law of conservation of energy and an overarching tendency towards entropy (bound with the direction of time). These principles must therefore be reflected in the level above as well.

5.1.2.2 The organic level

Energy at the organic level is physiological and is constrained by the nature of the physiological components and the relations between them. These include the chemical furnaces of glucose and oxygen, all of the chemical and kinetic changes in tissues and membranes, electrochemical messaging in neurons, and the energy requirements of structural change that are demanded by growth and development. The law of conservation of energy of the inorganic level, is reflected at this organic level by the upper limitation of available metabolic energy from respiration and all of the transformations that it undergoes in the activities of cell organelles and membranes, vascular and muscle tissue, and the neuronal work. The law of entropy is observed in the living system in various ways. For example, a muscle can become fatigued through overuse (the muscle becomes non-functional through the buildup of lactic acid which is exported as entropy out of the muscle tissue and as the

depletion of calcium ions), tissue can become weakened through strain or disease, and an organism will steadily approach death. However, one aspect of living systems appears to violate the law of entropy (though it only does so in appearance, as explained later); this aspect is related to a new form of organisation found at the organic level, which is autopoiesis.

Maturana (2002) explains that what constitutes a living system is a process that occurs in the molecular realm in which molecules participate in the creation of structures (and boundaries) with operations that produce the same base molecules in a continuous circular process. This process is self-maintaining and this is the definition of autopoiesis. Maturana believed that this is what distinguishes organic matter from inorganic matter. He suggested that it is a closed form of organisation that is nonetheless open to the flow of molecules in the environment. In other words, it is organisationally closed while thermodynamically open. An important distinction is that autopoiesis defines a form of organisation of a living system, not its specific structure. Living systems can have very different structures; however, all are functionally subordinated to the process of molecular autopoiesis, which is expressed through the observed tendency towards homeostasis.

Maturana (2002) argued that change to the structure came from two sources: through the history of the organism in the form of evolution and changes to its DNA, and through the specific history of the organism through a reciprocal relation of adaptation with its environment that Maturana and Varela (1980) termed structural coupling. Though Maturana (2002) held that the closed autopoietic organisation of a living system does not intersect with the environment, he argued that they are inseparably coupled with one another, such that a change in one induces a change in the other. In this manner, an organism is always perfectly fit to its niche (or it is not a living organism).

While Maturana (2002) argued that the notion of autopoiesis refers to a specific phenomenon that only occurs on the molecular level of living systems, this concept has been explored by thinkers in other fields and applied to other phenomena. This has brought new conceptions of autopoiesis to the foreground. One such conception comes from the more contemporary field of complexity theory (Fernandez et al., 2013). In this approach autopoiesis is considered a variable that can vary in terms of a ratio of complexity of the living system relative to its environment, such that a greater complexity ratio means a more 'autopoietic' system. This viewpoint has an implication for structural coupling, in that it is suggested that the complexity of the environment may instigate the complexity of a living system. This may explain the apparent paradox that living systems appear to oppose or violate entropy by becoming increasingly more complex over time, though it is indeed no paradox at all. The increasing complexity may be instigated by the chaos or complexity of the environment, which alters a living system through the process of structural coupling.

5.1.2.3 The informational level

5.1.2.3.1 Autopoiesis as a tendency towards increasing pattern and order

It is an error to think that information exchange in an organism is limited to the nervous system. An organism can be said to operate on a principle of information exchange down to its most simple components, whereby the metabolism taking place in a unicellular organism can be understood as a form of information processing (Bitbol & Luisi, 2004; Friston, Levin, Sengupta & Pezzulo, 2015). The nervous system of an organism nonetheless represents a quantum leap of information exchange in an organism. This leap necessitates an understanding of the organisational principles that it adds to the system.

Following the recursive organisation suggested by Grobbelaar (1989), in which the activity of components of a specific level of organisation is subject to the principles of organisation of the level below and the principles of organisation at the current level, it can be proposed that the activities at the informational level are subject to the principles of autopoiesis and structural coupling as much as they are to the principles at their own level (described later). In other words, the activities of the nervous system, as part of the autopoietic organisation of a living system, must serve autopoiesis as much as other structures (such as organs) in the living system. They form part of a system that maintains molecular self-production. It is therefore proposed that the nervous system can no more escape the organisational influence of autopoiesis than the heart or the lungs can, without autopoiesis coming to an end. Furthermore, as part of that living system, the nervous system is also subject to the principle of structural coupling. Therefore it can't escape the influence of an organism's environment on that autopoietic structure, any more than any other part of the living system can. Therefore, it is suggested that the activity of the nervous system *must have a tendency towards maintaining a pattern of activity that supports the autopoiesis of the living system*. This is reflected as a tendency towards maintaining organization in the activity of the mind at the informational level.

This tendency to order is viewed as a direct consequence of the extent to which the activity of the nervous system can influence the activity of the rest of the structure of the living system (i.e. the body). If the activity of the nervous system is in a state of disorder, that disorder will enter the living system insofar as the nervous system is influencing it. Such physiological disorder is inherently threatening to the autopoietic organisation of the living system and prompts homeostatic change that feeds back to the nervous system activity in a variety of ways. Such feedback could take the form of emotion (displeasure); disruption of neural activity through reduced metabolism in the brain (due to resources being used

elsewhere in the body, for example); or various changes in its neurochemical state, shifts of attention, and a variety of other such mechanisms. In this manner, the nervous system must have this tendency to reduce disorganisation over time and increase patterned activity, as a direct consequence of autopoiesis.

It must be noted however, that disorganisation of nervous system activity is a constant feature of existence, due to the changing environment and changes in the body caused by growth and development, such as puberty, pregnancy, menopause, and illness or injury. Thus, the patterns of activity that are formed over time through the influence of this tendency, may continue to shift over time, according to shifts such as those described above. However, despite changes to the actual states of organisational patterns of activity, the tendency towards pattern formation (congruent with autopoiesis) is invariant.

5.1.2.3.2 Nervous system activity as an associative or representative model

In addition to the principles of autopoiesis and structural coupling that emerge from the level below, the activity of the nervous system adds its own organisation at the informational level, over and above that of the organic level. This new form of organisation is association, or more specifically, the creation of a representative model of a living system in the subsystem of neuronal activity. This state of affairs reflects Ashby's (1947) theorem, where he suggests that a good controller is one that contains a model or representation of the system it controls. Of all the subsystems in the human system, the nervous system is the only one that holds such a representation of the rest of the system.

Through this principle of association, specific activities (or patterns of activity) in the nervous system become associated with specific states in the rest of the living system (and

with other parts of itself), through both afferent and efferent projections. As such, physical energies and states of the body (and in fact in the nervous system itself) can become 'represented' in this way. The term representation may be problematic in that it implies a 'homuncular' viewer of the representation in the mind (in other words, what it is represented 'to'). The principle is better termed association, which means that a connection is stored between one activity and another. However, one could say that the coherent structure of associations formed through experience is a 'model' of the rest of the system. This form of organisation is described next.

The nervous system establishes its order of pattern in the following way: an entirely new state of the living system generates disorder in nervous system activity. This disorder is reduced through reciprocal feedback with the living system, resulting in a new pattern of mental activity, which comes to 'represent' that stimulus. Subsequent presentations of the same stimulus evoke the new pattern (rather than evoking disorder). For example, in an infant who sneezes for the first time, this stimulus from the body generates disorder in the nervous system, which in turn impacts the functioning of the body (e.g. through the sympathetic nervous system). This altered physical state feeds back to the mind in one of a wide variety of ways (perhaps resulting in neural activation and intense vigilance for a few moments). This neural pattern becomes associated with the physical stimuli, such that the following time it happens, the pattern is evoked rather than disorder. This reduces the impact of the physical state of the body. Over time these associations become integrated into a structured pattern of associations, which is the definition of the Freudian ego within the present formulation.

To give an example of the growth of this structured pattern of associations that is the ego: through interactions with a tennis ball, an infant or toddler will steadily come to generate a set of associations regarding the characteristics of the ball that will predict its size, weight, movement, and interaction with other objects. Over time, this associative structure will

become fully coupled with the structure of the related environment. The associative structure 'fits' the sensory information about the ball sufficiently, thus, it no longer needs to update this structure significantly. As a result of this process, a distinction is generated to distinguish an object that is a ball (that is the sum of its active associations about the ball) from the 'background' of the environmental information. These predictions about the ball define characteristics of it that are found in a wide range of objects and create relations between them. For example, a child learns that a wide range of objects come to show 'gravitational' behaviour and a relationship is established between all of these objects, such that the child comes to expect that not only do balls fall, but other objects fall as well. Furthermore, a distinction comes to be drawn between these and objects that do not fall, such as birds or a television picture that may seem to be hovering in space.

Beyond this fairly simple level of concrete objects, objects of a more abstract (or at least more complex) nature are also formed, such as people, emotional states or patterns in social groups. As a result of the workings of the tendency of increasing pattern, structural coupling, and the development of the representative model through association, an increasingly stable 'universe' of objects comes about with fairly strong threads of relations connecting many or even most of them; this is the result of the person's developmental experience. If people see a tennis ball that never falls, it is not only that part of their representative models of the universe that deals with tennis balls that becomes uncoupled with the environment; most of their associations about gravity are now uncoupled as well. The disorder in neural activity created by a free-floating tennis ball is a measure of the extent of the child's representative models for themselves, and their environment, that cannot integrate this information. Thus, a change in their associative structure is demanded through a feedback loop with their bodies.

Lastly, although the above example relates to an external object, the associative structure that is effectively a representative model of the living system is fully part of the entirety of the associative structure of nervous system activity that is the ego. Information that disrupts that pattern generates disorder, creating a new pattern. For example, the first time a person watches a movie where they see someone's leg being severed by an accident in a car, the stimulus information may associate with the persons' representation of their own leg in their own body and throw this representation into disorder. Insofar as this representational disorder influences the physical system, it generates feedback that changes the pattern and adds to its complexity. As a result, the body's systemic response to such a stimulus is likely to be reduced over time, as the disorder of the representative model is reduced by its new capacity; in this way, a person appears to become less affected by such stimuli over successive exposures.

In this formulation energy is understood as present in the activities of the nervous system as *disorder*. Furthermore, it is not regulated as Freud suggested, by a tendency towards discharge or maintenance at equilibrium (even a dynamic equilibrium). Rather, it is regulated by a tendency to reduce disorder in the nervous system activity directly, due a feedback loop (or a complex set of feedback loops) within a broader autopoietic living system, the whole human body. This is the central claim of this dissertation. Furthermore, the ego is defined here as a structure of associations coupled with a representative model of the body that becomes increasingly complex over time to reduce disorder in nervous system activity.

5.1.2.3.3 Free energy minimisation as a model of disorder reduction

Referring to the presentation in the previous chapter, Friston's (2010) model of free energy minimisation provides a powerful mathematical model that describes a process that

bears strong resemblance to the present formulation. The reader may recall from the last chapter that Friston's (2010) model presents a process of Bayesian inference and updating through experience that reflects the current view. In other words, each new experience results in either an action or an updating of the pattern of predictions, such that it becomes more complex. When a sensory input does not fit the body of predictions reflected in the nervous system organisation, the information is a surprise or prediction error and modelled as free energy in Friston's (2010) equation. The principle of free energy minimisation effectively models the tendency to reduce this surprise over time, which fits the current formulation in terms of the form of relations. Rather than a representative associative structure being coupled with the environment of the nervous system activity through a tendency towards reducing disorder and building pattern and structure, Friston's model suggests that a predictive structure is updated by environmental input through a tendency towards minimising surprise and thereby improving predictions.

Friston's (2010) model is superior to the current formulation in the sense that it is formally stated (in a precise mathematical term), is connected to a range of empirical observations, and is successfully applied to a range of applications (Friston, 2010; Friston, personal communication, 13th July 2015; Friston, Kilner, and Harrison, 2006). It also precedes (and has influenced) the present formulation. The present formulation attempts to add explanatory value by expressing this tendency as resulting from the overall autopoietic organisation of the body, though Friston and Stephan (2007) do acknowledge Maturana and Varela's (1980) work as an antecedent to Friston's model.

It is also proposed here that Friston's work contains a core epistemological assumption, which emerges from a tradition of information theory that proposes a predicting receiver of information. While this draws on a respected tradition in perception research that stems back to von Helmholtz's notion of unconscious inference (Helmholtz, Gullstrand,

Kries & Nagel, 1909), there is a ‘homuncular’ element to the assumption of an actively inferencing agency in the mind. This agency forms a part of the approach that Maturana (2002) expressly rejected in his reflections on his theory of autopoiesis that was originally formulated in Maturana and Varela (1980). However, both the tendency towards reducing nervous system disorder and the model of free-energy minimisation, as they are presented here, have certain benefits in terms of addressing the weaknesses in Freud’s theory; these benefits are addressed next.

5.1.2.3.4 Advantages of the disorder minimisation concept

Before moving on to a consideration of consciousness at the informational level, this thesis states the implications of the principles given at the levels described for the aims of this thesis. Given all of the principles put forward thus far, it seems best to reformulate the psychic energy described by Freud (in many but not all cases) as represented on the informational level as disorder. Likewise, his concept of a tendency towards minimising energy or maintaining it as a constant is expressed by the principle of the tendency to minimise disorder at the informational level. The qualification ‘in many but not all cases’ is added above, as his use of the concept may refer to other forms of energy on other levels, such as the organic level. However, the constancy principle that was sought in the nervous system in ‘The Project’ (Freud, 1950) is best expressed as the minimisation of disordered activity on the informational level. Recasting the constancy principle as a minimisation of disorder (determined by principles of autopoiesis and structural coupling) has several benefits for addressing the host of criticisms of the concept that were raised in chapters two and three.

First, the problem of the need for a neurological correlate is removed, as the physical correlate of informational disorder is clear: a pattern of distribution of frequency of action

potentials throughout the pathways of the nervous system (or rather a lack of pattern in such distribution). Simultaneously, the need for psychic energy to be considered ‘ethereal’ is resolved, as it refers to an ‘abstract’ quantity of disorder that, in the case of the free energy minimisation theory, is measurable (or rather, modelled) by variational calculus, as anticipated by Galatzer-Levy (1983). It must also be linked to physical properties of nervous system activity. Furthermore, the ‘structural’ criticism of Hartmann (1956), Rapaport (1960), and others is addressed, in that the variation of ‘energy’ is clearly linked to meaning; the reaction of an audience to the word ‘fire’ spoken in the movie theatre no longer needs to be connected to how loudly it is said. Instead, it is explained by its disruption of the representative model of the living system that is coupled to the stimulus, given the autopoietic tendency (or what Friston, 2010, refers to as the requirement of avoiding a phase change).

The tendency towards reducing disorder also avoids apparent violations of the constancy principle in that an increase in activation need not be avoided by the organism (and may indeed be actively sought), provided such stimulus does not engender disorder in the representative model of the body in the psyche. Furthermore, the principle meets Peterfreund and Schwarz’s (1971) criterion for constituting an explanatory theory, in that the tendency towards pattern formation is drawn from the principle of autopoiesis. This principle is proposed as a general law (constructed from general laws) of which its Freudian expression in thought, affect, and behaviour is a specific instance. The problem of the mind-body (or monist-dualist) debate is also resolved as the current model views the informational level as a higher level of organisation within the same organic (or even inorganic) substrate.

The question of the demands of positivistic science and proof of claims remains, though strides have been made in linking the free energy principle to empirical data (Friston, 2010), despite criticism from Huang (2008). The present theoretical usage of the tendency

towards pattern and reducing disorder in this thesis is still unverified and remains a focus of future work. Nonetheless, it is hoped that the usefulness of the present formulation in addressing much of the criticism about the energic theory has been clarified at this point.

5.1.2.3.5 Consciousness and language at the informational level

It should be noted that the discussion this far has not yet presented a formulation regarding conscious perceptions of energy and intensity, and some effort is made here to extend the present formulation to address the conscious experience of energy. The phenomenon of consciousness provides a special challenge to the present formulation, as it must draw on organising principles beyond those presented here. Thus, it may merit consideration as a higher level of organisation, as implied by the diagram in Figure 8 above. However, the principles of consciousness as they are considered here are really an extension of the principles of the informational level, of which consciousness may be considered a special or even leading part. The nature of the organisation of consciousness as it concerns psychic energy is discussed next.

Grobbelaar (1989) sought to distinguish the organisation of consciousness from the homeostasis of the nervous system or pleasure principle of the organic level. He termed his informational level a psychological level and discussed organisational principles that go beyond homeostasis and the pleasure principle and by logical extension, beyond the tendency towards pattern in nervous system activity in the current formulation. He considered this higher form of organisation a representation in the form of language, viewed it as central to the phenomenon of consciousness, and sought to critique those aspects of the Freudian theory of repression that might better be explained from a systems theory perspective.

Human beings are relatively unique in the sense that language becomes a leading part of the structural pattern of organisation at the informational level. Grobbelaar (1989) presented an argument that this language-based organisation is integral to consciousness. Grobbelaar's (1989) argument essentially critiques the notion of repression to the unconscious as the work of some form of repressive agency or a 'preconscious gate', as Freud articulated in Chapter VII of 'The Interpretation of Dreams' (1900/1991). He argued that rather than positing the existence of a top-down agency (the origin and mechanism of which Freud found difficult to explain) it is more defensible to think in a bottom up manner with Wiener and Schadé (1965). In such a bottom-up view, the entry of unconscious material into the *preconscious* (which is where the real barrier is found) is considered as occurring due to the activity of lower level elements (unconscious material) themselves within the organisation of relations that exist between them. In other words, given a system where the lower level is the unconscious subsystem and the upper level is the conscious (or rather preconscious) subsystem, it is better to consider that the entry into the preconscious is determined by the nature of the organisation between the unconscious elements, rather than being imposed by a selection agency that operates from above the unconscious system.

Following Wiener and Schadé (1965), Grobbelaar (1989) suggested that the interaction between the lower level elements would spontaneously (and recursively) create the higher level organisation; he stated:

> *"… the principles determining the perception of thoughts will be inherent in the thoughts themselves. Stated differently, if the organization of the ideational domain does not allow for the representation of certain ideas, thoughts or memories, then they cannot become conscious." (p. 139-140)*

In other words, the organisation of the lower level elements determines whether information is integrated within the higher level organisation (consciousness) or remains unintegrated or 'unconscious'. He rejected the notion that exclusion from consciousness is imposed by some higher agency with an unclear origin.

Consistent with the notion of the formation of an associative representational structure in the universe of experience described above, Grobbelaar's proposition can be restated by suggesting that only that which is represented within the structure of the associative representative model can be conscious. If no association exists in the structure that can integrate information that enters the psyche, that information must exist as disorder (or surprise to use Friston's formulation), and therefore cannot be represented in conscious experience (though it can feed back to the organic level in some way). Furthermore, the connection is made to Freud's concept of the ego; in Grobbelaar's model the ego is that part of the psyche that is organised by language. In the present formulation (which agrees with Grobbelaar's) it is also understood as a structure that is built from associations, which becomes associated with language structures in nervous system activity in the case of humans.

In his own formulation, Grobbelaar (1989) referred to the role of representation as the form of organisation that is critical for consciousness (or more precisely, preconsciousness):

> *"Defence and censorship is therefore not the result of some judgement made by the ego of acceptability of the new developments in a value judgemental and anthropomorphic sense, but it is rather a case of the current patterns of organization being unable to give representation to the new developments, and these new feelings, cathexis etc. perforce remaining outside the organized patterns (ego) and consistently threatening this organization, since for it to become part of the organized patterns, the patterns will have to change." (Grobbelaar, 1989, p. 157-158)*

This statement seems to reflect the notion described above, that information may generate disorder in nervous activity, which is understood as a threat to the structure (formulated) as the ego. However, his use of the word 'representation' is critical in this quotation because of the role which he argued that language has in defining the organisation and generating pre-conscious images. For this, he drew on Freud's conception in 'The Unconscious' (1915/1957) where he clarified that psychic material becomes pre-conscious when connected with the word-image, which was originally based on an older paper on aphasia (Freud, 1891/1953). In this paper, Freud argued that a word is constituted by a set of associations between a sound-image, letter-image, motor-speech image, and motor-writing image. Grobbelaar (1989) stated:

> *"These word presentations are built up out of kinaesthetic, auditory and visual elements of experience … object presentations are built up in very much the same way out of different tactile, kinaesthetic, auditory and visual experiences. The word-presentation becomes linked to the object-presentations through a process of associative learning which allows for the object to find conscious representation" (p. 146)*

He represented this as a diagrammatical model as in figure 9 below.

Grobbelaar's (1989) formulation describes the role of language in representation. This specific principle is related to consciousness and adds its own form of language-based organisation, termed integration. Therefore, the present project describes the principle of integration as the aspect of the structure of associations of the representative model in the system that is organised by language in human beings or other systems of representation, such as visual or musical forms (Grobbelaar, 1989). In this way language may be considered

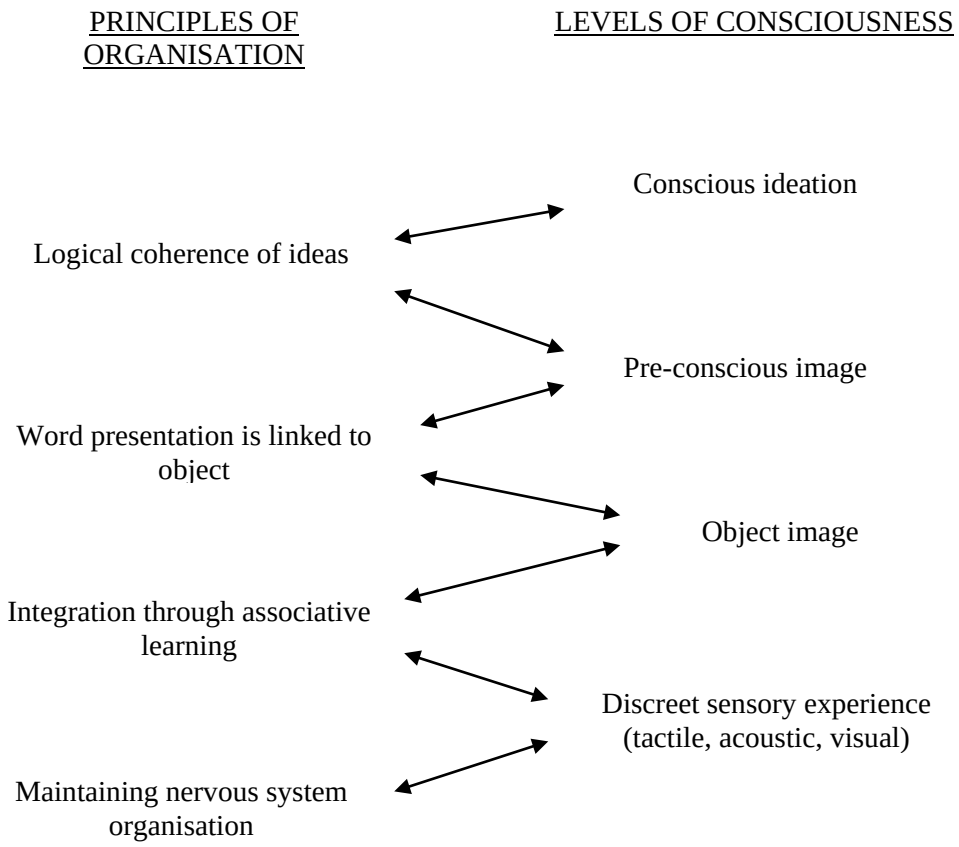


Figure 9: Grobbelaar's model of recursive organisation of conscious ideation, after Grobbelaar, 1989, p. 147

a leading part of the integration process within the structure of associations, as the nervous system is a leading aspect of the organic organisation, which adds its own principles of organisation. As an integrated pattern of activity becomes entrenched in the nervous system, and as word-presentations become associated with them, a new form of organisation is determined by the principles of organisation of language.

Language has this important role for a number of reasons, three of which are highlighted here. First, just as the nervous system converts all of the diverse forms of organic activity into a homogenous form with the same form of expression (action potentials) within the same substrate (neurons), language has a similar effect at a high level of organisation. Language can convert any type of information or association into a homogenous form, with

the same form of expression within the same substrate; that substrate is words. Second, language is important because it is a prominent (though not the only) vehicle for representation of self-awareness, which is a requirement of consciousness. As stated by Maturana and Varela (1980), humans *"… include as a subset of their possible interactions, interactions with their own internal states (as states resulting from external and internal interactions) as if these were independent entities, generating the apparent paradox of including their cognitive domain within their cognitive domain." (p. 13)*

The apparent paradox here is resolved in the same way that the apparent paradox of the Cretan stating that 'all Cretans lie' is resolved; by recognition of an error of frames of reference (Keeney, 1983). In this regard, the cognitive processes (here understood as informational processes) are represented at a potentially higher level in the information domain, at a higher level of recursion within a different form of organisation (i.e. language).

Third, language is an important form of organisation, in that it is organised by a system that is superordinate to the organism; this system is a society or a culture. Language is patterned by processes that occur at a social level, of which individual minds are components. Only at this level can a human being be 'mirrored'. Friston and Frith (2015) described a process through which two speakers can generate a synchrony of inner brain states. They described how two speakers attempt to generate predictions of their own behaviour as well as the other's: only through *" … a shared narrative or dynamic that both brains subscribe to, they can predict each other exactly, at least for short periods of time" (Friston & Frith, 2015, p. 2)*. Thus, the principle of free energy minimisation is found at the level of linguistic organisation as well. Friston (personal communication, 13th July 2015) stated that the development of a language follows a principle of free energy minimisation that operates scale-free at the cultural level.

As a result of the organisation of a representative structure that uses language, a system of components emerges that are representations. Thoughts become representations that bind together sensations, actions, emotions, and plans. The energy described here refers to changes in thought (and emotion) that take place in the stream of conscious ideation. In addition, all of the forms of energy described previously, including those found at lower levels of organisation, become represented within conscious experience including: disorder as intensity and/or displeasure, as well as all of the subjective states that are normally associated with energy, such as tension, effort, and intensity. It is beyond the scope of this thesis to explain precisely how this translation of informational processes into affective conscious experience takes place, as this matter is not settled in any field of science. However, interesting contemporary ideas that are relevant to this thesis may be found on this topic in Friston, Joffily, Feldman, Barrett, and Seth (2013). In their text, the authors propose that emotions have their roots in inaccuracies of prediction, in which the emotional response becomes the organism's 'best guess' as to how to respond; the emotions as they are experienced are based on predictions of interoceptive information (Friston et al., 2013; Seth, 2013).

An important limitation of the present formulation is that it does not offer an account of attention in energic terms or the role of attention in organising energic processes and in forming consciousness. However, it is suggested here that the changes in thought and ideation described as energy at the conscious level, are effectively equivalent to shifts in the contents of attention. Freud (1950) described this form of energy as 'hypercathexis', whereby specific word-presentations or experiences become fixated or distinguished from the background of thoughts or experiences. However, it is difficult to integrate this poorly understood aspect of Freud's theory (see Holt, 1962) into the present formulation, beyond stating that it may be reflected in the current formulation. This concludes the reformulation of

the energic theory, which has been the primary goal of this project. In the next section, the limitations of the current formulation are discussed in more detail, as well as its strengths and benefits for psychoanalytic theory.

5.2 Evaluation of the systemic reformulation of energy

5.2.1 Limitations of the present model

A number of key limitations of this model have already been mentioned. Perhaps the most obvious of these are the weaknesses of the formulation of consciousness and the fundamental difficulty of explaining how conscious experiences originate. This is potentially necessary, as conscious experiences of pleasure and unpleasure may need to be regarded as a different form of organisation of energy that requires further principles that are present here. While the capacities of language and self-awareness in representation are important in understanding consciousness, they must not be overstated and they are not complete. Furthermore, as stated previously, the phenomenon of attention requires further explanation than that provided here.

This thesis has also given insufficient attention to the place of emotions, and their relation to the energic forms. With regard to free energy minimisation, the speculative text by Friston, Joffily, Feldman, Barrett, and Seth (2013) described emotion as what the organism perceives as the best available response to inaccuracy in predictions. However, their technical account leaves questions unanswered, which remain unanswered in the present account as well. The challenge of explaining the conscious experience of emotions is part of the problem that is referred to in the paragraph above. It must be understood that this model cannot be presented as a model of the mind, because the complexities of psychic experiences cannot be

extrapolated from these principles and levels alone. Even when following a totally determinist systemic epistemology, it must be understood that processes in the psyche do not fully fit into discrete levels as described here, and complex processes of feedback operating at a variety of levels (and across them) upon a variety of specific mental phenomena, belie a model such as this. Rather than understanding the current model as a model of the mind, it should be considered a model of various forms of energy (or rather transformations and changes) that operate in the mind, and one that may be somewhat oversimplified.

Given that this model describes different forms of energy, the energy related to consciousness is less clearly defined than that at other levels. It is described as changes in ideation and emotion, but there is not as clear a definition of what constitutes these energies as there is with the lower three levels. This adds complexity around whether consciousness should be regarded as a (leading) part of the informational level (which may be considered to have two levels), or whether it refers to a recursively higher form of organisation rather than just a part of the representative associative structure. This is further complicated by the observation that language is structured according to something that is partly outside of the organism (the social system). Finally, the problem of what constitutes experience is unanswerable here.

On another front, the need to create a simplistic model of psychic energies may have lost much desirable complexity through theorising and explanation. The present author used only a limited set of systemic principles to build the model, and as such has not made sufficient use of a heterogeneous body of literature regarding systemic principles when articulating the current model (nor has a growing body of information regarding the free energy principle been utilised). In addition, future work may need to integrate a great wealth of knowledge that is not presented here in order to produce a more complex and differentiated apprehension of these processes within the psyche.

The principle of autopoiesis of the organic level is not an explanation of the processes that creates life. In creating this term, Maturana and Varela (1980) attempted to focus the definition of 'life' on those aspects which are most common to all living beings. However, this is not an explanation or a full description. Instead, it must be understood that the selection of autopoiesis as the principle characteristic of the organic level is the result of the fact that the processes that constitute life and maintain living organisms are not fully (or better) understood. Efforts have been made to define autopoiesis as a particular process, such as work attempted within complexity theory. In one such effort (found in Fernandez, Maldonado & Gershenson, 2014 and Gershenson, 2013), autopoiesis is understood as a quantity that is a ratio of complexity of an organism to the complexity of its environment. However, while such accounts may deepen our understanding of autopoiesis, in some senses they only defer the problem of the explanation. The same problem may be extended to the limits of what is known about thermodynamic and physical energies of the inorganic realm.

Finally, not all of Freud's (and indeed Breuer's) observations regarding energic principles can be explained from the explanatory framework that is offered here. This point is examined more closely in section 5.3 below, and various aspects of its role in the theory are revisited. Hence, the theoretical reformulation presented here is incomplete. Further work must be done to address different elements of energic theory within psychoanalysis.

5.2.2 Benefits of the model

The benefits of this model have been partly addressed in the section that introduces the 'informational' level above. Those comments are summarized here before addressing more general benefits of the model.

The problem of the need for a neurophysiological correlate of energy is addressed, as the physical correlate of psychic energy refers to a pattern of distribution of frequency of action potentials throughout the pathways of the nervous system, forming the physiological basis of the informational level. It also refers to changes in organic state, such as muscular movement or shifts in organ function at the organic level. Simultaneously, Swanson's 1977 critique that psychic energy seems to be considered a merely abstract construct is also addressed, particularly with regard to the free energy principle, which refers to a quantifiable state of surprise that is reflected by variational calculus, as anticipated by Galatzer-Levy (1983). Besides its quantifiable characteristic, this concept can also be linked to physical correlates (Friston et al., 2006).

The 'structural' criticism of Hartmann (1956), Rapaport (1960), and others is addressed by the principle of the tendency towards pattern, as disorder is determined not only by the physical strength of a stimulus but rather the effect of coupling that stimulus with the associative structure of the representative model, which gives it its 'meaning'. With regard to the criticism of Freud's constancy principle, there are many observations of organisms (especially humans) that seek to raise their apparent level of tension or energy. This critique is addressed by the principle of autopoiesis, which suggests that an organism seeks to maintain its organisation, not some arbitrarily determined optimum level of energy. Provided physical or organic energy does not engender disorder in the nervous system, it is not avoided.

The criticism that the theory of psychic energy is just a description and not an explanation, is addressed. The principle of disorder reduction meets Peterfreund and Schwarz's (1971) criterion for constituting an explanatory theory, in that it is a general law (constructed from general laws) of which its Freudian expression in thought, affect, and behaviour is a specific instance. In this way, it is viewed as a specific expression of the

principle of autopoiesis, though the limitations of the explanatory value of the concept of autopoiesis have been expressed.

The problem of the mind-body (or monist-dualist) debate is also addressed, as the current model views the highest level of the system above as a different level of organisation in the same organic (or even inorganic) substrate. Rosenblatt and Thickstun's (1984) suggestion that different languages are required for different levels of enquiry (such as between arithmetic and calculus) is retained in the model; each level requires its own formulation of principles of organisation and is constituted by different components and therefore different forms of energic transformation.

In addition to these comments that partly reflect comments made earlier in the thesis (in section 5.1.2.3.4 above), further comments are offered here as well.

The problem of 'vitalism' that can be found when trying to explain the origin of top-down psychic mechanisms that are necessary to govern energy (such as a preconscious gate opposing a stimulus in Freud, 1900/1991) is addressed in Grobbelaar's (1989) formulation which states that the organisation of each level of the system can develop from the functioning of the level below, as demonstrated by Wiener and Schadé (1965). Furthermore, the reductionist criticism of neurophysiological determinism of psychic functioning is addressed by the present model. While the constraints of the organic level limit what can occupy the informational level, the principles of organisation of the informational level are not solely from the principles of organisation of the body. The various levels are determined by a range of principles as well as a variety of feedback loops, many of which couple the organism with environmental states (including social and cultural states at the highest level).

Ricoeur's (1977) hermeneutic critique suggests an epistemological limitation that energy is only knowable through its linguistic presentation. This critique shares some parallel

with the conscious level that is articulated in this model, based on Grobbelaar's (1989) formulation of the necessity of language for organisation and consciousness in the mind. While there is some overlap in these viewpoints, they draw on different epistemological backgrounds and this potential overlap should not be overstated. A similar remark may be made with regard to the notion of energy as a metaphor in theorising as well as subjective experience (Wurmser, 1977).

Beyond the limitations and advantages discussed thus far, two important criteria for evaluation must be addressed. The first criterion is the utility of the theory in explaining the core observations made by Freud regarding the energic theory. The second criteria is the utility of the theory in generating new observations and explanations within the field of psychoanalysis, and in stimulating new research in psychoanalysis and other fields within general psychology. The usefulness of the present formulation in stimulating research is discussed in the conclusion following this chapter, whereas the application of the current model to explain Freud's core observations of the energic theory is addressed next.

5.3 Freud's Observations of Ego Functioning Explained by the Current Model

The model presented above provides a framework for describing the Freudian ego in energic terms. The organisational principles described above at the 'psychological' level of the system (the informational and conscious levels) are essentially the principles of organisation of the ego, which themselves are rooted in the organisational principles of the body at the organic level. The ego is thus defined as the structure of associations that represent the body and environment (and the relations found between and within these domains).

This section presents a number of discrete categories of observations that formed the core observations which Freud's energic theory was meant to explain. In each case, the category of observation is described, including how the observations necessitate a quantitative-based explanation such as Freud's energic theory. In each case, the present systems-theory reformulation of the energic theory is then employed to show how it could explain these observations.

It should be noted that this is not a fully exhaustive list. Freud's theory underwent constant change in his career and different observations were made at different points that supported different tropes of the theory, such as the observations related to 'hypnoid states' made with Breuer (Freud & Breuer, 1895/2004) which Freud later disavowed. The focus here is mostly on core observations that form the foundation of the main part of Freud's work. Furthermore, the headings used in the following section (and the concepts they represent) are of the present author's making and are not drawn from psychoanalytic theory; they are chosen merely to highlight and categorize observations.

Each category of observation below is discussed separately, though they are not discrete in Freud's theory. In Freud's theory the observations categorised below are linked, in that they reflect the operation of the 'ego' in psychoanalysis. Freud (1923/1961) defined the functions of the ego broadly, suggesting that it perceives conditions in external reality and channels the drive and affective energies to maximise adaptation to that reality. In this respect the metapsychological role of the energic theory is to provide the basis of operation of the ego (its drive, structure, and limitations), and all of the various functions that it has. In this regard, while the observations below reflect discrete categories, they are nonetheless linked by the theory as instances of operation of the ego. It is hoped that this may give clarity as to how the current reformulation may also not only explain each of the following observations, but also link them together within a coherent theoretical structure.

5.3.1 The discharge chain (demand-discharge-relief)

This title refers to a set of three observations that were considered to be linked by Freud (Freud & Breuer, 1895/2004). The first observation is a ‘demand’ state in which behaviours or psychic phenomena are understood as signs that a demand was acted upon the psyche as a result of a deprived state (the source of which was viewed as originating from the body). These signs could refer to heightened physical activity, heightened emotional expression, increased vigilance, sweating, shaking, and many others. Note that in Freud’s initial formulations (Freud, 1950; Freud & Breuer, 1895/2004), he argued that the demand state could follow stimulation from either sensory stimuli from the environment or internal somatic stimuli.

This demand state is followed by a ‘discharge’ action, a behavioural or psychic phenomenon (or several), which has the purpose of discharging the pressure of the demand state. This may involve a ‘normal’ action such as orgasm, eating, striking someone or shouting, or cathartic weeping, or more ‘abnormal’ responses such as fainting, spasm, or conversion symptoms. Note that the ‘signs’ of the demand state are themselves also attempted ‘discharge’ actions. These ‘discharge’ actions are distinguished by the observation that they bring about the following state of relief to some extent, rather than failing to bring about discharge, such as those acting as ‘signs’ of the demand state above. Finally, the result is a ‘relief’ state which is characterised by fairly normal or default behaviour of a person, where the signs of demand are absent or less energised than normal, such as becoming sleepy or falling asleep.

Freud understood these to be causally linked in a linear way: the demand causes the discharge and the discharge causes the relief. Though the specifics of the explanation underwent change in different readings (these were reviewed in chapter two), the core

message was that the demand takes the form of an increase in some sort of energy; the energy exceeds the capacity of some form of substrate (nerves, blood vessels, etc.) or threshold of unpleasure (later in Freud, 1920/1955) to contain or channel it, requiring a psychological or behavioural response to achieve the discharge.

The implication of this for Freud's metapsychology was clarified in Rapaport and Gill's (1959) paper as the 'economic' principle: there is psychic energy and it is subject to the laws of conservation and entropy and can be transformed. The energic theory is also partly reflected in the 'dynamic' principle: there are forces in the psyche that have direction and magnitude, and their overall effect may or may not be the simple algebraic combination of their individual effects. What is not clarified in Rapaport and Gill's (1959) paper, but is nonetheless indicated in the Freudian texts referred to above, is the assumption that there are energic thresholds for specific states or behaviours. Lastly, this discharge nature (whether successful or not) is ubiquitous to behaviour. The 'gravity' metaphor from the previous chapter is employed again here, in that the energic mechanism plays a role in every behaviour (as gravity influences every object movement), even if it is not the most interesting or significant explanatory factor for a given behaviour. It is also the basis for the defense mechanism in Freud's theory; without the notion of the discharge chain, psychoanalysis is essentially without an explanation for the defense mechanisms, unless it is accepted that particular psychic material is unacceptable to the self in a way that has nothing to do with any quantitative factor.

In the present model, the discharge chain is explained as the removal of disorder rather than the removal of activation. In the current model, demand is presented to the system in terms of disorder in the activity of the nervous system. Note that it is the autopoietic organization of the organism, which offers a constraint on the states that can be occupied by it, that determines whether stimulus results in order or disorder: it is when

information is received that the body's state is disrupting the representative model, that disorder (or surprise) increases. As such, demand is generated by information in the form of disorder, that demands a change in the associative structure or representative model of the organism. The relief (and demand-reduction) does not occur because of a 'discharge' of energy through pattern formation. Rather, it is due to a reduction in the disorder in the nervous system feeding back to the organic level. Thus, through this application of the tendency towards reducing disorder, Freud's observations that are inherent to the discharge chain remain intact and explained.

5.3.2 The transformative point

Linked to the idea above of a threshold at which a given psychic phenomenon or behaviour is activated by energic demand, is the notion of a transformative point for any given stimulus: when the stimulus exceeds a certain level of intensity or duration, it gives rise to a new behaviour or phenomenon in the psyche. This notion can take the form of Freud's idea of a stimulus barrier, where if sensory stimuli exceed a particular level of intensity, they give rise to the characteristic forms of discharge trauma (Freud, 1920/1955; Freud, 1892/1963). It can also take the form of 'conversion' where internal stimuli reach a critical point and convert into somatic symptoms (Freud & Breuer, 1895/2004). From a metapsychological perspective, without the notion of a threshold or transformative point, Freud's energic theory fails to explain why discharge behaviours do not always instantly follow the first sign of a stimulus, rather than having the appearance of some level of tolerance. The notion of a transformative point is therefore linked to the notion that there is an ability to tolerate energic demand.

While the demand for the transformation emerges from the disorder of nervous system activity, within the present reformulation, the notion of a transformative point must refer to some limitation being reached in terms of the change that is possible at the organic level. The structure of the organism, subordinated to the autopoietic principle, places limitations on the change that can take place at the organic level. When the disorder at the level of nervous system activity that is exported to the organic level reaches a limitation that is determined by the structure of a living system, change at the organic level takes place and feeds back to the neural level. As such, a range of limitations act on the potential activity of the psyche. As Bateson (1972) described, cybernetic explanation always refers to constraints to alternatives of psychic function. In this case, transformation of response to a demand must occur when a boundary or limit to that response is being approached or reached on the organic level. This includes the physical limits of the nervous system, including its rate of fire, its metabolism, over-activation in the form of epilepsy, and many others.

For example, in a situation where a person is trying to speak calmly to someone who is persisting in being aggressive towards them, they may feel escalating feelings of frustration and anger until the transformative point is reached. When the transformative point is reached the person feels unable to control their frustration and expresses it. Within the present formulation, this example is explained in the following way: the changing physical state associated with the anger (in an escalating feedback loop with disorder in the nervous system) reaches a point where a boundary such as heart rate is reached. Transformation must always occur due to a boundary or constraint being reached. This formulation of transformation as following boundaries or limits being reached may represent an important addition for stimulating observations in analysis; this is partly addressed in the conclusion of this thesis.

Besides the explanation for the transformative point (which refers to organic limits being reached) offered in this section so far, there is another aspect of the current

reformulation which can explain the apparent tolerance of the ego before transformation takes place. This lies in the fact that the nervous system can generate the same pattern of activity from different states of incoming information provided they are sufficiently similar. For example, the somatic stimuli related to fear may be similar enough to excitement if it is within some limited parameter that it may generate a pattern of activity related to excitement and be interpreted as excitement, though there may be some measure of disorder or error in this 'best guess' patterning as described by Friston, et al (2013). However, once the afferent somatic information moves beyond a parameter of recognition as excitement, this pattern of activity falls away, resulting in either disorder or patterning related to fear. The same may be said of environmental stimuli. A person seeing an image of a wolf for the very first time may generate a mental pattern related to that of a dog (especially dogs they have encountered that seem similar to wolves), though some measure of disorder or error may be present in the nervous system activity (this disorder or error is similar to the notion of disequilibrium that motivates accommodation in schemas as described by Piaget, 1971). However, once the wolf's movement or behaviour generates information that cannot be contained within the patterning related to dogs, disorder ensues and the transformation point occurs.

5.3.3 The resource pool

The above sections expose an apparent potential contradiction in Freud's theory, where stimuli entering the psyche are both a source of energy for, as well as a demand on, the resources of the psyche; these resources are energically defined as well. In the original formulation (Freud, 1950), the energy that enters the system through the senses or from the body forms the basis for the psychic system's energy that is used for all of its functioning. However, that same energy is also the 'demand' described in the discharge chain above. That

demand is counterpoised to a ‘resource pool’, a form of energy in the psyche that can negate or channel the ‘demand’ form.

The ‘resource pool’ in Freud’s formulation is the energy of the ego that is enabled to act as countercathexis to the energy of the environmental stimuli (and perhaps the somatic stimuli as well). This countercathexis involves a channelling of the stimulus energies, which is the nature of its tolerance with regard to those energies. Lastly, this energy is referred to here as a ‘pool’, for two reasons. First, it is like a pool in that the resource energy is somehow stored or kept in the structure of the ego; Freud (1950) suggested that it is similar to the neuronal equivalent of a system of interconnected pipes within which the energy circulates. Second, it is like a pool in that it is finite at any given time; failures of the ego are sometimes described as an insufficiency of the energy available to the ego for its functions (Freud, 1950; 1895/2004).

The theoretical account of this energy has never been satisfactorily resolved in psychoanalysis. Freud (1950) described it as the energy from the internal or somatic stimuli, though this is also the source of demand. The only manner in which this account of Freud’s can be consistent is if it is accepted that when the stimuli from the body are below a critical threshold, they add to the resource pool, whereas they become a demand over a certain threshold. In the famous ‘Introductory Lectures in Psychoanalysis’, Freud (1916/1963) described the ego energy as desexualised libido, suggesting that it was the somatic-origin libido that had been transformed. This notion, while explored by others such as Hartmann (1956), has never been fully accepted (Zepf, 2010).

To link this concept to particular observations, this idea should be followed logically. There may be two ways in which the resource pool is inadequate. It may be inadequate because of competition for resources where a large demand is made on those resources, such

as fighting against unwelcome libido, physical illness, demanding work, or other sources of stress. The other alternative is that there may be a problem with the transformative mechanism that allows the energy to be transformed into resource energy, though no account of this is given in Freud's work. Following this, the 'resource pool' concept would be used to explain observations where people appear to have a lower threshold for transformation. In other words tolerance appears lower and discharge actions will take place more easily and quickly when particular demands on the person's resources can be identified. This would be related to observations, such as the fact that someone might become aggressive more easily in response to minor frustrations, while facing increased work demands. It should be clear that this observation demands a quantitative component regarding the phenomena.

In the present account, the capacity of an organism to tolerate stimuli (external or interoceptive) is understood on more than one level. On an organic level, the limitations to tolerating stimuli are metabolic and structural, including the physical limits of what a person can do, or the extent to which their body can change or adapt to stimuli. This was described in the section above on the 'transformative point'. On an informational level, the 'resource pool' is the complexity of the associative structure and its representative model of the living system, also similarly to that described with regard to the 'transformative point' above. Ashby's (1947) theorem regarding 'requisite variety' states that a controller needs to be at least as complex as its environment. This can be described from complexity theory, because if the information representing the environment can occupy ten different states, then the controller should be able to occupy at least ten different states as well. In this regard, the extent of the resource pool (the 'strength' of the ego) at any given moment is the extent of the information it can integrate in its structure (including its language structure); it is limited by the fragmentation of disorder (states that cannot be integrated into its structure).

A secondary point is that this capacity for integration is not only determined by the structure of the associations (including language), but also by an activational component, or whether the nervous system is at an optimum level of activation. This concept is similar to Breuer's notion of intracerebral tonic excitation (Freud & Breuer, 1895/2004). However, while this activational component may represent a core element of the psychoanalytic theory of energy (and while we may know some of its neurological mechanisms, such as the action of the neuromodulator Glutamate), it has not been addressed by the formulation in this thesis and is a limitation of the present work. Future work should address this 'activational' component further.

5.3.4 The stimulus as motivation

Freud (1950) understood stimulation from the somatic or external stimuli as providing the fundamental driver of behaviour and mental activity. In this way, he understood that the intensity of behaviour or affect is correlated with the intensity of a somatic or external stimulus. As such, the more intense the stimulus (hunger or a loud noise) the more intense the behaviour or affect associated with it. The reader is reminded of the well-worn examples given previously for the critique that the behavioural intensity is not correlated with the stimulus intensity. As Bateson (1972) suggests, the reaction of a dog to being kicked has more to do with the dog than the kick. However, despite this valid criticism, there is some form of relation between the stimulus intensity and the response intensity, even if that tendency is a weakly probabilistic one. We do have an intuition that someone who is hungry will much more vigorously and determinedly engage in behaviour to get food than someone who is less hungry. Therefore, an alternative to Freud's theory should nonetheless attempt to explain such a weakly probabilistic relation, which implies quantity. An improvement on

Freud's conception should also explain the phenomenon of the dog's behaviour in Bateson's (1972) example.

Noting the reservation that was expressed previously, that the intensity of stimuli may only have a weak, probabilistic influence on the intensity of behavioural or affective responses, the stimulus (external or interoceptive) can nonetheless act directly as a motivating agency in the current reformulation, as they are a source of disorder that motivates action to reduce the disorder. In this regard, the intensity of a stimulus has a relationship (though again, not necessarily linear) with the level of disorder. A loud noise such as an explosion produces input in the nervous system that generates interoceptive stimuli that are far from the normal state of the representative model of the body. A loud sound produces greater disorder than a weak sound, and therefore provides a stronger motive for affect and/or behaviour.

5.3.5 Competitive and cooperative arithmetic

Continuing from the notion of the resource pool described above, is the idea that there is competition between relative energies and relative demands, which is settled according to a quantitative calculation to determine which is the most powerful or of the greatest intensity. For example, given that a person may have two conflicting motivations in a particular situation, it is expected that one of these will be greater in magnitude than the other, and will win out after being 'pitted against' the other.

Freud (1900/1991) conceived of forces moving in opposite directions, against one another, with the more energetic force overcoming the less energetic one. This concept involves the addition and subtraction of definite quantities, though he was unable to explain (beyond his earlier effort in 'The Project') in what substrate this takes place, how the energies

are constituted, and precisely how they act on one another. This concept also extends to the cooperation of energies, and to motivations increasing when two motivations appear additive. Both of these observations, competitive and cooperative arithmetic, clearly imply quantities.

Within the present formulation, the overall level of disorder in nervous system activity that is caused by information can be viewed as an additive sum of the disorder that stems from various sources. In this regard, it is not hard to see that sources of stress (which will be related to disorder) can add to one another. As a result the feedback to the organic level is significantly greater and prompts a stronger response; this can be cooperatively additive in the sense defined here. In the same manner, a response that appears to reduce disorder that stems from one source may also generate surprise with regard to another element in the associative structure. In its simplest form, a person who is forced to choose between hunger and eating something undesirable (such as decaying food) exemplifies such a situation. In this case the pattern related to the plan to eat the food will reduce the disorganisation due to the hunger, but will disrupt the model of the body in terms of its anticipated effect on the stomach and mouth. This viewpoint overlaps with the notion of cognitive dissonance (Festinger, 1962), where such a discrepancy forces either a change in behaviour, a change in the incompatible cognition, or the generation of new cognition that reduces the dissonance.

5.3.6 Cathexis and binding

The concept of cathexis explains how a person develops a lasting ‘investment’ of energy in a mental representation, usually of an object, person, or situation. In the language of the ‘Project’, the mental representation of an object (or of an action towards it) becomes associated with discharge and relief, and as such ‘cathects’ the object with progressively

more energy over time (if it continues to successfully discharge demand). According to Freud, this cathexis may manifest itself as a heightened energic state (excitement) when the object is present, anticipated, or signified through stimulus. Freud (1911/1963) also indicated that the cathected object would appear within consciousness (or be hallucinated) due to the escalation of the demand to which it is attached.

According to Freud (1917/1957), perhaps the most obvious presence of a cathexis is indicated when the object or person that is cathected is either in danger of being lost or is already lost. When a highly cathected object is in danger of being lost it is met with great motivated effort to retain it. This is observed in the urgency and desperation to persuade an ambivalent lover not to leave them or to save a sick family member's life. Freud (1917/1957; 1920/1955) argued that the basis of this effect lies within the binding nature of 'cathexis'. In 'Beyond the Pleasure Principle', Freud (1920/1955) attempted to clarify that a difference between pleasure and unpleasure may depend on whether energy is bound within a cathexis (giving pleasure) or unbound and unattached to any mental representation (leading to unpleasure). Though this distinction is critiqued by Freud himself in the same paper, and thoroughly undermined in Holt's (1962) detailed analysis, it may be linked to his position in 'Mourning and Melancholia' (Freud, 1917/1957), where the energy that starts to become unbound from the object is inherently unpleasurable and provides the energic motivation for the basis to hold on to the object.

Similarly in the latter paper, Freud (1917/1957) provides a moving account of how a person in mourning for a lost object experiences moments of intense pain as they recall an experience with the person who has died. Freud felt that at that moment, an amount of the energy that was cathected in the object comes free resulting in the intense pain. He suggested that the long period of mourning moved in these painful steps, though he admitted to not knowing why the liberation of that energy should cause the pain that it does. Despite its

incompleteness, the energic theory provides one of the few persuasive efforts at a theoretical account of the behavioural and psychic sequelae of mourning (or loss in general). From this a ‘lag’ characteristic of cathexis is evident. A cathexis may outlive its object in a sense, and may even be ‘maladaptive’ in certain conditions. As such, an alternative to an energic theory (particularly an alternative to cathexis as a concept) must explain the everyday observation that the excitement and other responses described above toward an object should continue for some time after the object is gone.

Within the present model, a cathexis refers to a situation where an object that is distinguished from a background becomes integrated into the associative structure of an organism. The object is coupled with the representative model of the body (and thereby subject to the autopoietic principle), and comes to reduce the disorder that emerged from a stimulus. In this regard, a cathexis may be understood as a pattern of activity that is a mental representation, or an associated set of representations that are associated with certain types of stimuli. This pattern essentially ‘captures’ or binds the disorder generated from a somatic demand state. The ‘intensity’ of the cathexis is a measure of the reduction in disorder that is bound by these representations. In an abstract manner, the intensity of the cathexis can be understood as the amount of disorder that would be present in nervous system activity (and change on the organic level), if the representation were absent. Thus, it is possible to understand that this hypothetical disorder (and the organic stimuli associated with it) has been ‘bound’ within the representation(s).

A classic example refers to an infant that is hungry. The disorder that is engendered by the physical state of the hunger is reduced by the arrival of the mother to offer feeding. The object of the mother (or the action of feeding) now exists as a representation in the psyche that becomes activated in the future by the same interoceptive stimulus of hunger. This object can reduce the disorder that emerges from that hunger to some extent. This is

additive in the sense that the same object becomes part of associations that are related to a wide variety of stimuli. The object of the mother (or a set of actions related to her) becomes the representation that binds disorder that stems from a wide range of stimuli, such as hunger, cold, heat, discomfort, pain, loneliness, and a need for stimulation.

This formulation may also resolve the critique by Holt (1962) who highlighted the problem in Freud's conceptions of bound versus free cathexis. He showed that at times in Freud's account, cathexis is described as unbound energy (and binding as an obstacle to cathexis) and at other times cathexis is described as a binding of energy. The present formulation offers a manner of resolving this problem. The latter situation where cathexis is understood as binding the 'unbound' disorder, has already been explained above. However, the former situation - where cathexis is viewed as free or unbound - can be explained differently. In this case, the binding of free cathexis may be viewed a competitive arithmetic situation where the evocation of a mental representation that reduces disorder from one source, generates disorder of its own and feeds back to the organic level. This stops when the representation is no longer evoked.

This latter description lays the foundation for understanding Freud's concept of anticathexis, which refers to an energy deployed in 'opposition' to a stimulus and keeping it unconscious. As Freud defined it, such an energy would seek to repress the object (or the affect or action associated with it) from consciousness with a direction of ego-energy that is opposed to it (Freud, 1915). In the current formulation and in its simplest form, anticathexis refers to a situation where a stimulus has no representation in the structural model and cannot achieve representation (such as in language) or consciousness; this is the position described by Grobbelaar (1989). As stated previously, this must remain as disorder, which may feed back to the organic level or change the pattern of the structure. Returning to an example described in the third chapter of this thesis, Freud (1894/1962) described the case of the

young woman who mistook her genital excitement for a desire to urinate. In this case the association to sexual ideas activated by the interoceptive information disrupted the representative model of her body (as it existed in her ego) because it causes disorder. Associating the stimuli with urinating instead relieves the disorder engendered by the unintegrated sexual excitement; it then becomes entrenched in her ego, eventually leading to a fear of leaving home because there are no toilets nearby (in other words, there is no way to enact the representation of urinating).

The current formulation may also account for the 'lag' phenomenon in releasing cathexis described at the outset of this chapter. Returning again to the example of the mother and the infant, if the mother were to disappear, the cost for the child in terms of the failure of perhaps most of its representational structure (ego) coupled with most of its lived experience would be enormous; the disorder would be much greater than if the mother were present. Thus, signs of her absence may generate disorder and may not become integrated into the representational structure, remaining unconscious but feeding back to the organic level. Such signs (information) could be anticathected as they continue to remain unintegrated in the ego in the future.

While it is hoped that the present formulation has potential as a basis for understanding cathexis and anticathexis, this is more complex in the case of hypercathexis. Hypercathexis should refer to a special energy of attention that activates a particular cathexis (represented by a word-image or logical stream of ideas following Grobbelaar, 1989) bringing it within consciousness. However, Freud's (1950) explanation of how hypercathexis revolves around 'qualities' of consciousness was unclear, and the hypercathexis notion was not clearly explained (Strachey in Freud, 1950; Holt, 1962). Hypercathexis must surely refer to the activation of representations (presumably built on language representations) of thoughts and emotions, within the limitation of informational channels of attention. However,

the question of whether the mechanism that governs this activation requires a new principle of organisation, beyond the principles of tendency to pattern and autopoiesis articulated here, must remain unanswered in the present project. This problem was highlighted with regard to the ‘resource pool’ section above, where a need for an activational component of the ego was expressed.

The present section has attempted to clarify how the present formulation might offer a means of explaining a number of the Freudian observations of ego functioning, though some limitations were pointed out as well. The following section which is the conclusion of this thesis, seeks to propose directions that future research might take based on the current reformulation.

CHAPTER 6: Conclusion

6.1 Overview

The central problem statement regarding the state of the energic theory in psychoanalysis that was proposed by this thesis was stated as follows:

The principles of governance by which processes relating to psychic energy and excitation are regulated, are inadequately developed in the field of Psychoanalysis.

This problem was fully articulated in the chapters two and three of this thesis. After the introductory first chapter, the second chapter presented an account of the evolution of the concept of psychic energy in the field of psychoanalysis. The chapter chronologically traced the development of the concepts of psychic energy and their role in the broader psychoanalytic theory, and provided insight into how various terms of the theory were developed as responses to problems that Freud (and other authors) perceived and grappled with. While other forms of critique were also highlighted in this chapter, the particular focus was on critiques of the internal consistency of the theory. These centered around the problem that the principle of constancy or discharge cannot be fully explained, nor can observations which appear to violate the principles be fully explained either. Freud's attempts to replace it with a regulatory mechanism of pleasure (and unpleasure) failed too, as it could not be adequately linked to the discharge or constancy principles. The chapter also briefly reviewed some other contributions to energic theory from other authors such as Reich (1945) and Hartmann (1956), but these did not solve the core problems of the theory.

The third chapter presented a discussion and evaluation of the critical literature that has been published about the energic concepts, within the field of psychoanalysis. This

chapter addressed core areas in which the energic theory has clearly failed while also discussing areas in which it continues to offer a valuable contribution to the field. The chapter began by exploring the definition of psychic energy and its nature, and the clarity of its central propositions. Questions about evidence or support for the theory were discussed, including whether it has any explanatory value, and what observations it may be linked to or predict. The practical usefulness of the energic ideas was explored, and the accuracy of its main assumptions and propositions was discussed. The chapter ended with a summary of the core areas that require re-conceptualisation. The most prominent of these was the definition of energy, as well as the problem of its physical correlate, and the problem of the meaning and the information theory critique of the energic theory. The chapter demonstrated that the energic theory has sufficient usefulness to retain, but enough core problems that demand reformulation.

Grobbelaar's (1989) proposition that the systems theory perspective in psychology may provide an important addition to psychoanalytic theory, was adopted as a basis for addressing this problem in Freud's energic theory. He suggested that Freud's theoretical structure was limited by a pre-systemic epistemology, and that systems theory approaches may be usefully incorporated within psychoanalytic theory in order to solve some of the theoretical problems. Thus, following Grobbelaar's proposition, the research question adopted by the current study was as follows:

How may assumptions and concepts of systems theory and cybernetics be used to reformulate the psychoanalytic principles of governance of energic processes of the psyche?

This question was addressed in the fourth and fifth chapters of this thesis. The fourth chapter presented an introduction to the field of systems theory, including its core propositions, epistemological interventions and the innovations related to cybernetics and

information science. This introduction outlined the core innovations in systems theory that form part of the basis of the reconceptualisation of Freud's energic theory that is proposed in the fifth chapter. These were primarily the notion of recursive self-organisation explicated by Keeney (1983) and Grobbelaar (1989), as well as Maturana and Varela's (1980) notions of autopoiesis and structural coupling, and the treatment of energy as Shannon-Wiener information in the cybernetic field (culminating in Friston's notion of free energy minimisation).

These theories were employed in the fifth chapter which presented a formulation of a metapsychological principle for psychoanalysis that is a restatement of the role originally played by the energic theory in Freud's psychoanalytic theory, from a systems theory perspective. This reformulation stated that the principle of constancy or discharge should be replaced with a principle of maintaining organisation and pattern in the nervous system. This tendency was explained as emerging recursively through the operation of autopoiesis at the organic level of the living system. The additional organisational principle of the nervous system was given as representation (or association) which was employed to demonstrate the increasing development of the ego through the brain's structural coupling with the environment and the body. This allowed the use of information theory as a means of modelling energy as informational disorder, and the integration of Friston's (2010) theory of free energy minimisation as a means of modelling both the tendency towards pattern as well as the updating of the pattern similar to Bayesian updating.

The chapter discussed both the benefits and limitations of the formulation given and ended by returning to the original Freudian observations which the energic theory was meant to explain, and demonstrated how the current formulation might explain the same phenomena.

6.2 Directions for future research

Following the theoretical viewpoint presented in this thesis, the implications it may have for future research are described below, and constitute the recommendations of the current project. The following section cannot be considered to be exhaustive due to the limitations of the scope of the current project. Rather, it is hoped that this section can raise interesting questions and clarify the direction that further research should take.

6.2.1 Case studies

Future work could take the form of detailed case studies from real analytic material that highlights how the current formulation of energic theory might be made use of in a clinical situation. While the benefits of the current reformulation have been explored in terms of solving theoretical or meta-theoretical difficulties, case study research could address the question of its usefulness in application, specifically in the clinical situation of psychoanalysis. In this regard, the point is not to show how it would explain various common phenomena, which has been the task of the above section. Rather, the potential of the current model in either generating novel observations or generating novel theoretical explanations (and hence predictions) that are relevant to the clinical situation should be explored.

If the primary propositions of the current formulation are accepted, then the scope for novel observations, explanations, and predictions in clinical situations and general research goes beyond those that can be derived from the propositions given in this chapter. If the fundamental tenet of the present thesis is accepted, which is that psychoanalytic dynamics may be explained from a systems or information-based perspective, then any theoretical

constructs within the broad systems or information-based approaches could be utilised to generate novel observations in the clinical situation and beyond.

6.2.2 Proof of claims

A set of observations were described at the end of the fifth chapter, and represent a set of behavioural observations that Freud's energic theory attempted to explain. These observations may not be universally accepted as factual and would benefit from being demonstrated empirically. At the end of chapter three, an effort was made to show how such claims could be presented as behavioural hypotheses that may be tested empirically. In this way, concepts such as the discharge chain, resource pool, and cathexis may be tested behaviourally. Operationalising these claims and testing them is a priority for future work. Beyond behavioural testing of these hypotheses however, the model requires theoretical proof of its fundamental assumptions and claims. While further knowledge from physics and biology can improve understanding of the inorganic and organic levels of the model, this model requires proof primarily regarding the informational level of organisation and consciousness. Proof is required for the principles of organisation, components, and relations described here, and for the relationships between these levels of organisation.

Regarding the free energy principle, there is already a developed body of knowledge that supports the principle of free energy minimisation and it is constantly growing. The principle also has potential to provide a coherent and integrated explanation for the currently 'patchy' body of existing data in neuroscience that is explained by isolated and disparate theoretical claims, which are poorly integrated with one another (Friston, 2010). Regarding the claim of an associative structure or representative model, a mathematical relationship is

required that can express the concepts similarly to how they are expressed in the free energy model.

This is also true of cooperative and competitive relations. In some senses, data on motivation may serve to illustrate such relations, including approach-avoidance conflict and decisional conflict (Coombs & Avrunin, 1988; Townsend & Busemeyer, 1989), data drawn from behavioural measures such as the decisional conflict scale (O'Connor, 1995), and neurological measures such as the role of the hippocampus (Bach, et al, 2014). However, scope remains for developing measures that more closely fit the current formulation, and that attempt to isolate the behavioural and neurological processes involved in cooperative or competitive relations between different elements of an associative structure.

Proof of the role of organisation of associative structure through language is critical for the claims made regarding consciousness. Beyond case studies such as those found in Grobbelaar (1989), a wide range of advances in neuroscience have found evidence for an organizational role of language in a wide variety of perceptual, motor, and cognitive tasks (particularly from a predictive processing perspective as in Lupyan & Clark, 2015), and in self-awareness, especially higher levels of consciousness or self-awareness (Morin, 2006). However, this question is far from settled philosophically and empirically, and is an important direction for future enquiry.

In addition to the requirement of evidence of the organisational principles, the present project has made claims regarding the nature of the relationships between the levels, and therefore between the forms of organisation and components between the levels as well. The primary claim made in this regard is a form of bottom-up determinism, in that the components of a given level and the relationship between them spontaneously give rise to the level above, such that inorganic matter gives rise to organic matter, which gives rise to a

nervous system, and hence an informational realm. In this way, this deterministic relationship should be proven, such that a change in structure at a lower level will produce change at higher levels. While it is not easily arguable that a change at the molecular level will change the structure of the body, it must be clarified how changes in organic activities produce disorder in neural patterning. However, beyond the deterministic relationship there may be other aspects of the relationship between levels that may stimulate further study; this is addressed in the next section.

6.2.3 Magnitude, order, chaos, and complexity

In addition to the determinism in the relationship between levels, there are other aspects of the relationship between levels that deserve study. These aspects include relationships of magnitude, order, chaos, and complexity (which lies between order and chaos). In terms of magnitude, it is assumed by the model that the energy found at each level of organisation is of lower comparable magnitude than that below. In this way, the energies of ion transfer and muscle activity are less than the atomic energies of the matter, and like Maxwell's demon (Mitchell, 2009), the metabolic cost of the informational system is low relative to that of the overall organic system. However, beyond these differences in overall magnitude there are other relations to levels of order in the relative systems. Complexity theory, an offshoot of systems theory, suggests that complexity is a variable that is between chaos and order that can theoretically be measured, though there are debates about how to go about this (Mitchell, 2009). Fernandez et al. (2014) have shown how autopoiesis can be expressed as a ratio of complexity of an organism relative to its environment. Thus, it seems to be a logical extension of this idea that each higher level of organisation in the model should have a higher relative level of complexity of organisation than the level below. Such

complexity may be measurable in similar ways as that reported in Fernandez et al. (2014), and this may represent an interesting direction for future work.

Should this proposal be proven or at least accepted, this may lead to predictions that may be based on the model presented. An example is to show how a person with a lower complexity (greater order) at the informational level in their knowledge and use of language (such as limited vocabulary and sentence structure, or lower pragmatic range) may exhibit lower complexity (greater order) of behaviour at the organic level. At the informational level, this may refer to lower complexity of the associative structure, which may also imply a generally greater state of disorder in nervous system activity at times in response to various stimuli. It may also mean greater efforts to construct a more ordered, less complex environment. At the organic level, this may refer to reduced variability and range of behaviour, as well as lower cognitive and emotional flexibility. Note that the lower complexity at the informational level is not viewed as causative, but as predictive of the lower-level phenomena.

A similar set of predictions may be made with regard to chaos (or entropy). Here, higher chaos at any level (including in the environment) is likely to be correlated with chaos at all higher levels (even if weakly) though the cause of such chaos may vary. The relationship is likely to be non-linear and possibly exponential, with chaos at the lowest order related to increasing levels of chaos at each subsequent level. To provide an extreme example, if a person's body encounters a major trauma such as being hit in the leg by a moving car, the disorder predicted at the organic system level is higher than that at the inorganic level. Likewise, the disorder at the informational level will likely be very high. In particular, consciousness may have little recognisable order, at least for a short time. A less extreme example is physical fatigue, which is expected to be accompanied with more nervous system disorder, and often more chaotic emotional and cognitive functioning. In these ways, the

model permits measurement of complexity, order, and entropy to examine the relationship between phenomena experienced by a person. This may represent an interesting approach to research.

6.2.4 Reality testing and psychosis

The present model may have an important contribution to a theory of reality testing, both within psychoanalysis and in general psychology. Reality testing is often conceived of as a competitive relationship between fantasy and external stimuli (Hurvich, 1970). Within the present formulation, this suggests a state of uncoupling between the universe of representations in the ego (which tend to generate fantasy in the absence of sensory information) and information from the environment. Therefore, within the present model, reality testing can be defined directly in terms of a quantitative variable of disorder. Reality testing could be functional when disorder is low and deficient when disorder is high. This definition is flexible in that it provides a basis for different types of reality testing and reality testing failure. For example, a definition of psychosis, which is a gross deficiency of reality testing, can be understood as a general failure of the associative structure (ego). Alternatively, the ‘normal’ irrationality of people in day-to-day life can be understood as the failure of more specific elements of the associative structure, such as a committed football fan whose association to his team is that they always win, in spite of information to the contrary. He will experience greater disorder of neural activity when his team loses than a person whose associations are more closely coupled with the environment.

Freeman, et al, (2008) developed a virtual reality assessment technique for quantitatively assessing paranoia in response to a standardised stimulus that was founded around measuring inaccuracy in subjects’ perceptions of virtual characters on a train ride.

This method is founded on defining paranoia as inaccurate perception. As such, the present approach to reality testing leads to significant treatment considerations, whereby constructing predictable unsurprising environments for psychotic patients is a key element of treatment (particularly in a community residential setting). This approach to studying reality testing and psychosis may be an interesting (and practically useful) direction for future research.

6.2.5 Steady states and dynamic systems applied to ‘energic’ extremes

Prigogine and Stengers (1984) described a process where a system that moves beyond its normal steady state parameters may generate new dissipative structures that tolerate conditions that are further away from equilibrium than the previous steady state. They gave the example of liquid that is subjected to an increasing temperature differential across its volume. In this case, the system normally distributes the heat through conduction between particles. However, should the temperature differential reach a certain point, convection structures will form within the liquid allowing the system to operate at a new steady state that is further from equilibrium.

In addition to the application as a model for understanding crisis and change, models such as this one may also be applied to a wide range of psychological and behavioural phenomena. A core example may refer to people who occupy higher ‘plateaus’ of extremity, such as athletes. There is an expression that ‘the difference between a professional and an amateur in the sports world is how much pain you can take’. For example, hard-working athletes in a serious training regime may report toleration for levels of physical pain far in excess of what they were able to tolerate before. Within the present understanding, this must imply some change in the representational model of the body that integrates interoceptive stimuli. The dissipative structures model may be a useful explanation for the change in the

associational structure that is engendered by sustained exposure to extremes of stimuli. Such an understanding may be applied to people who sustain exposure to different types of extremes, such as soldiers in active duty adapting to fear, people experiencing chronic exposure to traumatic events (adapting to distress), and working in a high-stress environment (such as air traffic controllers adapting to stress).

Linked to this idea, is the notion that increased tolerance in one respect of the representational structure may be paid for by reduced tolerance in others (due to the limitations of the 'resource pool', such that people who have gained these capacities may have heightened sensitivities in other respects, such as to distraction or social stimuli such as criticism. Thus, the concept of an economy of information processing may provide a useful approach to modelling such behaviour, and a range of systems theory models (such as a dissipative structures model) can be applied to these 'energic-type' situations.

The above examples are not complete; rather, they comprise a preliminary set of recommendations for directions that future research can take. The real potential may be much wider than explored here. The final remark of this dissertation follows.

6.3 The Future of Systems Theory and Psychoanalysis

When Grobbelaar initiated his statement to reformulate psychoanalysis within systems theory, he suggested that such theoretical change must be a long process that cannot (and should not) be accomplished quickly:

> *"A detailed reformulation of all the Freudian theoretical constructs in terms of systemic concepts is at this stage neither possible, nor is it desirable. It is not possible because of the vast number of constructs which need individual understanding, while*

an assessment of the reformulation that would reflect the Freudian intention and theoretical context would also be necessary. This can only be accomplished in ongoing process and not in the initial statement." (Grobbelaar, 1989, p. 133)

The present project aimed at a specific theory, the energic theory, and attempted to examine it from the systems perspective. Therefore, the present project cannot be a definitive statement about the psyche or psychoanalysis. Rather, it is hoped that it may inspire the ongoing evolution of psychoanalysis within the rapid advances of knowledge that are taking place in the broader psychological field today.

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