THE ORIGIN OF DREAMS: A PSYCHOBIOLOGICAL APPROACH

Joseph Griffin B.Sc.

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Corrections

p	line	
33	17	unsuitable
38	4	keeper'
39	last line	"
42	20	insert 'told'
43	5	there (not their)
49	3 from bottom	delete 'releasing'
63	6	comma after discharge
123	13	spatial
125	13	imagined
126	19	spatial
136	last line	Freud
143	13	Leopold
162	11	insert 'u' in stimulus
167	7th of quote	I
176	11	Hall
187		Strachey

ABSTRACT

This thesis puts forward three hypotheses concerning the origin, meaning and function of dreaming.

Hypothesis no. 1. Dreams are the sensory analogue of emotionally arousing introspections from waking (activated drive - schemata) not manifested or acted out during waking.

Hypothesis no. 2. Dreams de-activate the drive-schemata still active at sleep onset. It is suggested that this releases the resources of the cortex and limbic system to deal with the emotionally arousing contingencies of the next waking period.

Hypothesis no. 3. Evidence is reviewed which suggests that the REM state, which is closely associated with dreaming, evolved to programme instinctive behaviour in the foetus and neonate. It is argued that such programming of genetically anticipated knowledge must necessarily be in the form of incomplete schemata for which analogous sensory components must be identified. It follows that a prime directive of information processing in the REM state is to search for sensory analogues for incomplete schemata. Unlike the genetically anticipated knowledge

the waking introspections do include identified sensory components. It is ,therefore, hypothesized that the activated drive-schemata released during REM sleep will be processed as a sensory analogue.

Evidence in support of these hypotheses is derived from four sources (1) The biological studies of dreaming carried out in recent decades. (2) The author's own dreams and their corresponding waking introspections. (3) Other people's dreams including the analysis of a famous dream of Freud's and also of Jung which demonstrates their metaphorical identity with their known waking concerns. (4) The work of Silberer (1909, 1951) on the 'autosymbolic effect' is analysed to demonstrate the existence of an analogue process that converts introspections from waking into sensory analogues.

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CONTENTS

1. Introduction 6

2. Theoretical and Experimental Background 12

3. The Biology of Dreaming 51

4. The Psychology of Dreaming (1) 82

5. The Psychology of Dreaming (2) 106

6. Freud's Specimen Dream and Jung's House Dream 134

7. Dreams, Creativity and Psychotherapy 156

8. Conclusion and Summary 176

9. References 186

(1)

INTRODUCTION

The recognition that a comprehensive understanding of human nature requires a holistic approach i.e. a recognition of the interdependence of the biological and the psychological has increasingly developed in recent years.. This is commonly referred to as the 'mind-body' approach. In this thesis I hope to show that our understanding of human dreaming can be advanced by such an integrated approach. Traditionally, theories that seek to explain why we dream tend to divide into two broad categories of explanation namely psychological and biological.

Psychological theories tend to be either of a psychodynamic type such as Jung's and Freud's or of an information processing type such as Calvin Hall's cognitive theory or Evan's computer theory. The discovery in (1953) by Aserinksy & Kleitman of the special state of physiological arousal known as 'rapid eye movement' or 'REM' sleep which appears to have a close relationship with dreaming gave a great boost to the biological approach to the understanding of the function of dreaming. Biological theories stimulated by this finding include the Crick and Mitchison (1983) 'elimination of

parasitic connections in the neural net hypothesis' to the 'activation - synthesis' hypothesis of Hobson and McCarley (1977). These biological theories are reviewed in chapter (3) and the psychological theories referred to are reviewed in chapter (2).

The need for an integration of the biological and the psychological approaches to account for the full complexity of human dreaming was apparent to Hudson (1985) when he wrote:

" This evolutionary puzzle (dreaming and REM sleep) and the question of the brain's operating principles are tied together, as Crick and Mitchison correctly assume. What they do not entertain is the possibility of an altogether more sweeping synthetic and at the same time more rigorous explanation, in which these biological considerations are gathered together with another more strictly psychological one; the question of the formal properties implicit in the meaning of dreams themselves. In such a synthesis 'bottom up' and 'top down' theorising about the sleeping brain and its products would knit together, and the conceptual gap within psychology between mechanistic and interpretative modes of explanation would close.....Such a synthesis is as exciting a prospect as any psychology now offers, and eminently achievable - although at present it hovers in mid-distance, still out of reach "

The psycho- biological approach put forward in this thesis seeks to develop hypotheses that can explain the function meaning and origin of dreams by integrating data from both the biological and psychological fields. The biological research to be reviewed in chapter two clearly shows that there is a close relationship between dreams and REM sleep. Dreaming occurs primarily during REM sleep. The REM state occupies the greater proportion of sleep time in the foetus during the last trimester (80%) and in the neonate (67%) and further declines to about 25% in later childhood. The REM state also occurs in mammals. A theory of dreaming that could integrate the ontogenetic and phylogenetic data about the REM state and dreaming would be very attractive. Such a theory is the 'activation - synthesis theory' developed by Hobson and McCarley, which we referred to earlier. However this theory sees dreaming as essentially a meaningless phenomenon resulting from a synthesis of endogenous random brain stimulation. Such a theory cannot ,therefore, provide the kind of integration of the psychological and biological data that Hudson is looking for and, as we have seen, believes possible.

If we could develop a theory of dreaming that would have the advantages of combining the ontogenetic, phylogenetic and psychological perspectives without invalidating the richness of the psychological data, than we might have a very powerful theory indeed. Such a theory would need to

be rigorously formulated and be potentially capable of being falsified or else its explanatory value would be purchased at the expense of its scientific accuracy.

The psycho-biological approach developed in this thesis puts forward three specific and interrelated hypotheses that seek to explain the origin, meaning and function of dreams and their relationship to the REM state. The first hypothesis deals with the origin and meaning of dreams. This hypothesis was suggested by the results of an experiment on dreams reported in chapter one. This hypothesis states that dreams are the sensory analogue of emotionally arousing introspections left unmanifested at sleep onset. The second hypothesis as to the function of dreams follows from the first hypothesis. This hypothesis states that by giving sensory expression to these activated drive schemata (emotionally arousing introspections) they become de-activated. This frees the resources of the cortex and limbic system to deal with the emotionally arousing contingencies of the next waking period.

The third hypothesis seeks to explain why dreams are expressed in the form of sensory analogues. To answer this question we need to turn to the biology of dreaming and the REM state itself. Research is considered (chapter 3) which indicates that genetic information may be

programmed during the REM state in the foetus and in the neonate. Evidence is reviewed which suggests that the REM state which is closely associated with dreaming evolved to programme instinctive behaviour in the foetus and neonate. It is suggested that such programming of genetically anticipated knowledge must necessarily be in the form of incomplete schemata for which analogous sensory components must be identified. It follows that a prime directive of information processing in the REM state is to search for sensory analogues for these incomplete schemata. Unlike the genetically anticipated knowledge the waking introspections do include identified sensory components.

We could therefore expect that if schemata from waking are released during REM sleep that they too would be processed in the form of sensory analogues. Our third hypothesis is, therefore, that dreams are expressed as sensory analogues because data processing in the REM state has evolved to seek sensory analogues for it's completion.

Evidence in support of these three hypotheses is derived from four main sources:

(1) the biological studies of dreaming carried out in recent decades. This is reviewed in chapter two.

(2) The author's own dreams and the corresponding waking introspections of which they are sensory analogues. These are reported in chapters two and three.

(3) Other peoples' dreams including the analysis of a famous dream of Freud's and Jung which demonstrates their analogical identity to their known waking concerns. This analysis of Freud's and Jung's dreams forms the basis of chapter five.

(4) The work of Silberer (1909,1951) on the 'autosymbolic effect' is analysed to demonstrate the existence of an analogue process that converts introspections from waking into sensory dream analogues. This material is described in chapter three.

Research on the relationship between dreams, creativity and problem solving is considered in chapter six. It is concluded that the findings of this research are compatible with the hypotheses presented here.

Some of the material and research findings in this thesis have been previously reported in two papers which I published in the journal 'The Therapist' in 1993. Details are available in the reference section.

THEORETICAL AND EXPERIMENTAL BACKGROUND

Every night when we dream, we enter a world of magic where the rules of physics, propriety and logic no longer reign. A world where one night we can be dining with royalty, conversing with a famous poet or sportsman, or walking down the street with no clothes on and yet on another night we might find we have the ability to fly. Dreams inhabit a mysterious world where experiences can range from the prosaic to wonder, terror and sweet delights. Hardly surprising then, that from the earliest times mankind has had its theories to explain the happenings in this strange world. Hardly surprising either, that dreams should have been thought to be inhabited by gods and devils.

In the bible there are many examples of God advising people by means of dreams. Perhaps the most famous example is Pharaoh's dream of seven fat cows followed by seven lean cows, which Joseph interpreted as indicating that there would be seven years of plenty followed by seven years of famine. The ancient Greeks believed that the gods communicated the future through dreams. It was recognised that not all dreams came true, it was thought

that true dreams came from the Gate of Horn and false dreams from the Gate of Ivory. Later, temples were erected throughout Greece, to encourage, under the guidance of a special priesthood, 'healing dreams' which would indicate what medicine or treatment was appropriate for the dreamer's ailment. Hippocrates placed great emphasis upon symbolism in dreams which he thought indicated particular ailments e.g. dreaming of over-flowing rivers meant an excess of blood.

Aristotle rejected notions of the divine origin of dreams since animals also dreamed. He saw the origin of dreams in the residual sensory impression left from waking experience. Plato noted that our higher reasoning faculties were absent in dreams leaving the way open to the expression of unbridled passion. He asserted that in all people there was a lawless wild beast whose presence can be glimpsed in dreams of passion and anger. It is also possible, according to Plato to have morally superior dreams if reasoning has been appropriately stimulated.

Dreams have played a major role in Islamic cultures. The Koran is said to have been largely revealed to Mohammed in a series of dreams. It is claimed that he frequently interpreted the dreams of his disciples. Dream interpretation became a widespread feature of Islamic culture. An Arabian dream book of the eleventh century

makes mention of several thousand dream interpreters operating at that time. (De Becker, 1968)

The most comprehensive work cn dreams to come to us from the ancient times are the five books of dream interpretation written by Artemidorus who lived in Italy in the second century. He held a sophisticated view of dream interpretation believing that the same dream could have a different meaning depending on the character and circumstances of the individual dreamer. During the middle ages in Europe, dreams fell into disrepute, becoming progressively identified with the devil and sources of temptation.

A more scientific approach to dreams became evident during the nineteenth century. Writers such as Maury (1853) and Strumpell (1877) emphasized the role of somatic stimuli, waking experiences and emotions insufficiently inhibited during sleep, in instigating dreams. The idea of the unconscious had also received wide circulation by this time. It was to take Freud, however, to pull these ideas together, combine them with his theory of neurosis, to provide a systematic theory of dreaming.

Freud's Theory.

Freud's theory of dreams was patterned on his theory of neurosis. He saw the patient's neurotic symptoms as the product of a conflict between a conscious wish and an unconscious repressed wish. The neurotic symptom was seen as an attempt at simultaneously satisfying both wishes. Freud found that patients often talked about dreams during therapy sessions. He saw the dream as the product of a conflict between the wish to sleep and an unconscious repressed wish from early childhood. During waking, these repressed wishes are active in the unconscious but are held in check or restrained from entering consciousness by the censor. During sleep, however, this censor is not as alert as it is during waking, repressed wishes can sometimes get past it if sufficiently disguised, and be expressed in a dream. Dreams are seen as very similar to neurotic symptoms. The dream is the guardian of sleep and it achieves this by allowing the expression of an unconscious wish that would otherwise disturb sleep.

The fact that we wake from a nightmare is seen as the result of the failure of a particular dream to sufficiently disguise the unconscious wishes which are being expressed, and, as a consequence, the censor is aroused to full waking alertness. The disguise which the

unconscious wish wears in the dream, Freud sees as the product of the dream work. This work involves condensation, which means that a particular element of the manifest content represents several dream thoughts. It may involve displacement - a dream element whose manifest significance is far less than the disguised latent significance. A third process involved in the dream work is representation, this involves primarily the translation of a thought into visual images. The final process is symbolization, which involves the replacing of a particular character or action with symbols. This helps to disguise the latent content.

Freud states that the day's residue of problems, worries, unsatisfied wishes or purely indifferent material may act as the entrepreneur for a dream, but that the psychical capital which makes the dream possible is invariably a repressed infantile wish contained in the sub-conscious to which the daytime residue becomes linked.

To discover the meaning of the dream might well be thought nigh impossible given all this distortion, but yet more is to come. The waking mind, according to Freud, gives a secondary revision to the manifest content of the dream in order to give it a logical facade. Despite all this supposed distortion, Freud argues that the real meaning of the dream can be uncovered by free association to each of

the elements in the dream. The free association can unravel the dream work and reveal the latent wish or wishes that instigated the dream. Nowhere in Freud's masterpiece 'The Interpretation of Dreams' does he actually give an example of an analysed dream showing an infantile wish as its source, although he does elsewhere. For the most part, he seems to have been satisfied with an explanation of a dream which posits a repressed wish of recent origin, usually sexual in nature, as the source of the dream.

Jung's Theory.

Jung was a disciple of Freud's who became increasingly disaffected with what he felt to be Freud's doctrinaire approach to the investigation of dreams and neurotic symptoms. Jung came to believe that while Freud's free association method of dream interpretation led to the identification of the dreamer's psychological complexes, it none the less led away from the real meaning of the dream. He could not accept that the meaning of the dream was hidden or disguised to get past a censor so that it could enter consciousness. For him, the symbols in a dream were the natural form in which the unconscious expressed itself. He saw dreams as the unconscious mind's way of correcting distortions and imbalances in the conscious mind. He also saw the unconscious mind as the

repository of the 'collective unconscious', which he described as the archaic consciousness of primitive man from which the consciousness of modern man develops. Just as our body still conforms to a basic pattern that was typical of primitive mammals, so too, our psyche contains within it the basic pattern of the consciousness of primitive man, which he termed the 'collective unconscious'. These archaic elements of the unconscious are sometimes expressed in dreams and are then called archetypes. To identify these 'archetypes' a wide knowledge of ancient myths and legends is necessary, according to Jung.

Although most of Jung's theories have not achieved the degree of acceptance which has been conferred on Freud's theories, it is evident that the increasingly widespread view among dream theorists, that dreams can help our conscious mind come to a more balanced view of our emotional problems, owes more to Jung than to Freud.

The problem solving theory of dreams has been strongly articulated by French (1954, 1964). He sees a recent interpersonal conflict as the focus of problem solving in the dream. The dream substitutes analogous problems which are more suited to non-verbal thinking, characteristic of sleep. He argues that it is more meaningful to work with

a series of dreams rather than single dreams when making interpretations.

More recently, a number of theories of dreaming have evolved in the context of discoveries in the biology of dreaming, which will be reviewed in the next chapter on the biology of dreaming.

Hall's cognitive theory of dreams:

Hall (1953) advanced a cognitive theory of dreaming which he saw as an extension of 'ego psychology'. Dreams, according to this theory, are a continuation of normal thinking processes carried on through the medium of pictures or visual images. His research showed that the subject matter of dreams were the personal concerns of the dreamer rather than the great political issues of the day. He was collecting dreams from students during the last days of the war with Japan, when the first atomic bomb was exploded. Yet, he noted that this catastrophe did not feature in a single dream. He saw dreams as reflecting the dreamer's self conceptions. Hall likens the dream to a work of art. The artist expresses his ideas through some medium be it writing, pictures, sculpture, music or dance. The essence of the endeavour is that the artist succeeds in communicating his conceptions by translating them into a perceptible medium.

In the dream, according to Hall, the dreamer translates his conceptions about his own personal concerns into pictures and thus makes them perceptible. When a thought is made perceptible, Hall says, it is communicated. Unlike the communications of waking life which he notes may have an audience of millions the dream is a private communication with an audience of one. This reminds one of the Talmudic idea of the dream being 'a letter to oneself'.

The interpretation of a person's dreams reveals an honest and undistorted view of the dreamer's self conceptions. Hall suggests that this report is unlikely to be as superficial or as distorted as reports collected during waking may prove to be.

Hall developed his theory of dreaming in the context of a wide ranging collection of data and a content analysis of that data. When one reads the dream accounts he collected and compares them with known concerns of the dreamer, it is difficult not to be impressed with Hall's theory. Yet the theory has not received the attention one might feel it deserved. A recent book on dreaming by a leading figure in the field (Hobson 1988) does not even mention his name.

One reason for this neglect might be, that the theory seems incomplete. That dreamers should be sending

themselves communications in pictures several times a night, which for the most part are forgotten on waking, seems rather wasteful. That nature should create and preserve intricate biological machinery for the purpose of creating works of art to be seen only by one person and than instantly forgotten on most occasions makes little intuitive sense. Yet one cannot deny the strength of Hall's empirical findings.

It will be shown in this thesis that the strength of Hall's empirical approach was also it's weakness. It is hoped to show that a vital part of the dream process, that could potentially complete the missing pieces of Hall's theory, becomes available initially only through inspection of one's own dreams and one's own waking concerns in the manner in which Hall so brilliantly did for other people's dreams.

Scientific Method

There are well established precedents for using ones own dreams in dream research. Both Freud and Jung worked extensively with their own dreams. The method which I used to collect representative samples of my own dreams was also used by Ebbinghaus (1885) in his research on memory. He studied the rate of forgetting of nonsense syllables rehearsed prior to sleeping by waking himself during the

night at regular intervals and testing his recall. His methodical approach and the fact that many of his research findings have stood the test of time demonstrated clearly that scientific method could be applied successfully to one's own subjective experience. Naturally, of course, research findings based on ones own subjective experiences have to be checked against other people's experiences to validate the universality of their application.

Any theory of dreaming that might be put forward as a result of such research, if it is to conform to the highest scientific tradition, would also be expected to be in agreement with the major biological findings of recent decades in this field. One would further expect that the theory would be able to reconcile a more wide ranging set of findings and variables than existing theories. The theory should be able to generate novel predictions that are capable of validation. Furthermore the theory should be capable of falsification i.e. predictions that follow logically from the theory should be capable of being invalidated.

The dream theories that we have so far described fall short of meeting these criteria, in many respects, as will become clear when the various findings of dream research are reviewed later in this paper. There have been a number of reductionist biological theories of

dreaming put forward in recent years. In such theories dreaming is seen as essentially a meaningless epiphenomenon of a biological process. These theories will be critically appraised when we consider the biology of dreaming in the next chapter.

The evidence supporting the specific hypothesis' regarding the origin, meaning and function of dreaming that are put forward in this paper will also be evaluated to see to see to what extent they meet the above scientific criteria.

Experimental Background

This research project began when I drifted back to sleep one morning and found myself dreaming about a castle.

Dream 1

> I start to climb the castle wall, as I get nearer to the top I notice that stones are coming loose and falling down. I felt myself to be in great physical danger of being seriously injured..

I woke up still thinking about the dream and recalled that just before going back to sleep I had been thinking about a memory from childhood. In this memory, I had been playing ball, the ball bounced over a boundary wall and I ran to climb the wall. A stone came loose under my hands and I fell backwards, the stone following me making a large gash in my forehead requiring medical attention.

The dream can be seen as a pictorial representation of part of my earlier thoughts very much as Hall's research suggests. There has been some significant changes, however, made in the dream images. The boundary wall which was just a few foot high in the dream was changed to a castle wall. The single stone that came away in my hand

was changed in the dream to the entire wall beginning to collapse. Perhaps these changes can be ascribed to artistic licence since Hall compares the dream to a form of artistic expression as has been previously noted. Neither is the dream a reflection of a specific ongoing problem but appears to be a translation of my waking thought pattern into an alternate set of images. I resolved to collect more of my dreams and compare them with waking concerns to see if this pattern held good across a series of dreams.

To begin with I recorded my dreams on awakening. It took some time before I acquired the ability to consistently record dreams on awakening. Eventually I became so proficient that I would frequently wake up immediately following a dream sequence and I would record it there and then. It proved much more difficult to be able to recall and reflect on one's thoughts and experiences of the previous day to see if the dream were a reflection of waking concerns. The dream is the more recent experience, rich in sensory impressions and emotional content and at first it can seem very difficult to find any significant correspondence with half- forgotten waking experiences. I found that the best way to find these correspondences was to re-write clearly the scribbled dream accounts, often hastily written on awakening during the night. It is essential to make a record of the dream accounts

immediately on awakening, no matter how memorable the dream may appear to be otherwise within a short space of time it is forgotten. Rewriting my scribbled account of the dream helped to fix it in my memory. I would bring it back to mind a number of times during the course of the day. Almost invariably, a memory of my previous day's experiences would spring to mind which showed an overwhelmingly structural and symbolic correspondence with the events of the dream.

The continuing collection of both my own and other people's dreams and the identification of corresponding waking experiences, over the period of the next nine months indicated that dreams were not simply a continuation of waking thoughts expressed pictorially. Dreams appeared to be concerned with the most emotionally arousing experiences of the previous waking period. These concerns were expressed in symbolical or metaphorical imagery. The following dream told to me by a person to whom I had given some psychotherapeutic support will serve to illustrate the process that I am describing.

The person who reported this dream had recently started a new job involving a training period with other new recruits. This person had also been experiencing a degree of anxiety in his social encounters in the period preceding the taking up of his new job. One of the things

which was causing some anxiety was a sudden nearly uncontrollable desire to laugh at inappropriate moments in company. His inclination to laugh occurred in company when someone spoke very intensely or emphatically. The dreamer would relieve his desire to laugh by making a semi-jocose remark and than laughing at it. However in his new job one or two people had not responded well to this behaviour on his part. Telling me about this problem, I ventured the opinion that perhaps his desire to laugh was due less to his perception of humour in the situation and more to an effort to relieve the anxiety generated in himself by his perception of the tension in the other person. A couple of day's later he reported this dream to me.

Dream 2

"I am in church and I want to go up to read the gospel but people keep getting in my way. Suddenly Terry Wogan is standing on the altar. The church has a wall dividing the altar from the main body of the church where the audience is seated. Now I am at the other side of this wall and I am urinating. Terry Wogan can see what I am doing (but no one else can) and is laughing at me. The people in the church assume I have cracked a joke and all start laughing."

The correspondence between the subject's waking experience and the dream is fairly selfevident. Terry Wogan standing beside him stands for the public image other people have of him. He thinks people see him as a witty personality like the television star, Terry Wogan, whom he had recently seen in person and who shares his Irish nationality. People, therefore, perceiving him to be a witty personality like Terry Wogan, assume him to have cracked a joke when he laughs, but he is really laughing at his own embarrassment. Note the connection with the common vulgar expressions 'pissing myself' to denote a state of tension and the phrase 'pissing myself laughing' to denote a state of uncontrollable laughing.

The church setting is also very appropriate because this person sees himself as a religious person, whose has a responsibility to promote 'the gospel'. His problem relating to people is making it difficult for him to fulfil that responsibility. This is symbolically expressed in the opening sequence of the dream, when he tries to go up to the altar to read the gospel but people keep getting in his way. The barrier in the dream between himself and the people who can see Terry Wogan laughing, but not him urinating can be seen as an analogy for the dichotomy of himself as other people see him in company i.e. 'laughing' and as he really is i.e. 'pissing himself'.

The dream can be seen as a metaphorical expression of the dreamer's waking anxiety from the perspective that I had put to him. Thus this dream would appear to confirm Hall's theory that dreams express the dreamer's self conceptions. The dream does as Hall says convert the dreamer's concepts into perceptions. Hall says that in so doing the dreamer succeeds in communicating his ideas very much as the artist can be said to have communicated his ideas when the work of art has been created. The idea that nature makes all of us spend hours every night creating works of art, for the mostpart instantly forgotten, for apparently no other reason than 'art for art sake' seems less than convincing. Surely dreams, however aesthetically pleasing, serve some adaptive function for the organism?

The most surprising finding from my research, so far, was that the dream always gave metaphorical or symbolical expression to waking concerns. This applied not just to concepts but to people as well. For example a husband who was perceived to behaving in a dominating manner was replaced in the dream by a forceful school master known to the dreamer. Up to this point in my exploratory research, having decoded several dozen of my own and other people's dreams, it seemed time to adopt a more systematic approach to dream collection. There was no evidence that the dreams that had been collected and decoded were representative of dreaming as a whole. It could be argued

that the dreams that spontaneously cross the threshold into waking consciousness are in some way more memorable or more coherent than the average unremembered dream. We know from the experimental dream research of recent decades (reviewed in the next chapter) that dreaming is strongly associated with a state of active brain arousal, occurring about every ninety minutes during sleep, and referred to as 'rapid eye movement sleep' or REM sleep. The REM periods tend to be shorter at the beginning of the night and to get longer as the night progresses. I decided to set my alarm clock for two hours earlier than normal and to record any dreams that I could at that time recall.

When the alarm went off, I immediately wrote down any dreams that I could recall. Often a dream would be easily recalled but equally often only a vague memory of dreaming would come to mind. I discovered, to my surprise, that very often the act of writing down the few details of the dream that could still be recalled would serve to bring back to mind a clear memory of further dream material. I also continued to record any dreams I could remember on normal awakening. I found that it was important to record all dreams irrespective of how irrelevant or even nonsensical they might appear to be at the time of recall. Later those apparently meaningless image sequences made perfect sense, when the waking

experience to which they related was identified. On some mornings I recorded up to five dreams on other mornings only two dreams might be recorded, in which case several themes might be recorded within a dream and the dream sequence would consequently be unusually long. This method of dream collection was maintained for a period of three weeks.

This study found that the subject matter of the recorded dreams, as expected, related to my waking concerns. This study again supported our previous finding that dreams are not simply a visual expression of personal concerns but are a metaphorical visual translation of those waking concerns. The dream themes appeared to relate to those events of the previous day which caused me most concern and it expressed those concerns metaphorically. That dreams use metaphor has been noted by many theorists but that all dreams use metaphor is a new finding. My research indicates that not only do all dreams use metaphor but that the entire dream sequence is a metaphorical expression of a waking concern. This means that everybody and everything that is perceived in the dream sequence is an analogous substitute for some person or thing in waking life. In other words the waking plot is preserved but the locations, the props and the entire cast is replaced. The dreamer is aware of himself in the dream because that is awareness not perception, but where the

dreamer has been objectifying his own identity or part of it than that identity is represented by someone else in the dream. We saw an example of this in the second dream that was described where the part of the dreamer's persona was played by Terry Wogan.

We are not seeing metaphor being used as a dramatic device to highlight certain principles or concepts as it might be used in the creation of a work of art but rather the translation of the waking concern into an analogous sensory scenario. The following dream can be used to illustrate the process;

Dream 3, Scene 1

> I got my hair cut in a new style that had spikey hair sticking up in the air. A man passes me by as I walk down the road, he sticks his hand out in the manner of a referee at a football match and calls out 'that hair style doesn't suit you' I feel crestfallen and I immediately flatten my hair.

Scene 11

> I have put on a new Harris tweed suit. It looks very good except that it has a kind of skirt wrapped around the trousers. I feel a bit embarrassed about this feature. I detach the skirt and look in the mirror and think to myself that it looks ok now.

The previous day I had bought two sweatshirts in a street market without the facilities to try them on. On the way home thinking about my purchase I reflected that one of the sweatshirts might look too young on me because of the two white bands across the body which made it look rather like a football shirt. I concluded that it would definitely not suit me and that I would have to get rid of it. These thoughts are expressed in the dream by means of their translation into an analogical sensory scenario. In the dream, the unsuitable 'too young' style of sweatshirt is replaced by a new style of haircut. I had recently seen a young man get this new style of haircut while I waited at the hairdressers. This image expresses my expectation that the sweatshirt would be more suited to a younger person. The person sticking his hand out like a referee and telling me that the hairstyle was unsuitable expresses my feeling that the sweatshirt was unsuitable. By behaving like a referee in a football match he makes a visual reference to my waking thought that the sweatshirt looks like a football shirt. By flattening my hair I get rid of the hairstyle just as in waking life I had resolved to get rid of the sweatshirt.

Scene two in the dream relates to my purchase of the second sweatshirt. I had hesitated to buy the second sweatshirt because the pastel colour seemed to me to be a shade more usually worn by women. On further reflection I

rejected this sexist attitude and decided that if I liked it I would buy it. On the way home, I reflected that unlike the other sweatshirt this one would suit me. Later that evening, by chance I saw a t.v. programme about the island of Harris and the manufacture of Harris tweed. The programme concluded with a display of Harris tweed suits, the style of which I thought unorthodox although I liked the fabric. We can clearly see that the analogy used in the dream came from the t.v. programme. Interestingly Freud maintained that part of the manifest content of the dream came from the waking experience of the previous day, which in the case of this dream can be seen to be true. What this research shows is that the latent content of a dream also comes from the experience of the previous day.

The Harris tweed suit stands for the second sweatshirt as will become clear. The skirt wrapped around the trousers is an analogy for my sexist views concerning the colour. My removing of the skirt is analogous to my discarding of my sexist views concerning the colour. My expectation that the sweatshirt would look all right, is made manifest in the dream when I look in the mirror and note that the suit looks well on me, now that the skirt has been discarded. There is also a pun in the analogy of suit for the sweatshirt because this is the sweatshirt that I anticipated would suit me.

We can see therefore that the two dreams represent in an analogical sensory form my thoughts and feelings concerning the purchase of two sweatshirts. Up to this point, our findings indicate that dreams represent our waking concerns expressed in an analogical sensory format. If this hypothesis is correct than in principle it ought to be possible to predict one's own dreams from an inspection of one's own waking concerns. In practice of course there are a number of questions raised and difficulties attendant on such an experiment. Would it be possible to maintain the continuous self monitoring that the identification of likely waking concerns might require? Would this process of self monitoring and prediction affect the dream process? A further problem is the necessity of devising a means of collecting the night's dreams.

Notwithstanding these potential difficulties, I resolved to carry out the experiment. In order to get as complete a collection as possible of the night's dreams I woke myself every two hours by means of an alarm clock and recorded whatever dreams I was then able to recall. The predicted themes, based on a reflection of the concerns that had occupied my attention during the day, were written down prior to going to sleep. The next morning I had recorded three dreams.

The first dream theme related to a domestic incident of the previous day, which was one of the predicted sources of dream material and was an accurate symbolic representation of my perception and emotional reaction to the incident. The next two dream sequences portrayed different aspects of a predicted theme which related to my reflections concerning the theory of dreams discussed here. I had been rereading my notes on the previous years research on dreams which included a summary of existing dream theories. I again noticed how Freud mentioned that the previous day's experiences were reflected in the manifest content of the dream. Freud referred to this as the "day's residue". I noticed how in my own collection of dreams, there was usually an item or two in the manifest content of the dream that was related to the previous day's experiences. It would appear, however, that he had not observed that the latent content was also a reflection of the previous day's experiences.

I reflected that Jung's concept of the 'shadow' might have been derived from observing the self as object metaphorically expressed in dreams, as in the Terry Wogan character in dream 3. I further noticed that other dream researchers were also investigating dreaming from the perspective of finding the adaptive significance of dreams. The 'sentinel hypothesis' had been put forward by Snyder (1966). This hypothesis sees sleep as putting the

animal at risk from predators. Periodic activation of the brain by the REM state followed by a brief awakening may leave the animal better prepared to deal with danger. Even if such an adaptation has taken place, it can scarcely account for the complexity and metaphorical nature of human dreaming. Ullman (1959) has put forward similar thoughts with regard to human dreaming. He sees dreaming as possibly preparing humans for the kind of reality they are likely to encounter on awakening. This hypothesis will be seen to be incompatible with the evidence about dreaming that is reported in this thesis.

One of my major waking preoccupations that day, therefore, was a consideration of other theorists work and points of similarity that existed between their work and mine. I wondered if it would be necessary when I reported on my research to detail these points of correspondence. Reviewing the day's activities for my dream predictions, It seemed likely to me that my preoccupation with studying other dream theories that day might well become a theme that featured in my dreams that night. As expected, one of my dreams that night did indeed reflect that theme. The dream is as follows:

Dream 4, Scene 1.

> We are searching for buried treasure under a pile of bricks in a field. I'm wondering will we divide the treasure between us or is it a case of 'finders keepers'.

Dream 4, Scene 2.

> Then it seems we are back in time, a time shortly after a christlike figure has lived. Now it is a well that we are digging, we have a bottle of water with us. Someone finishes the bottle off. I am aware that everything will be alright because the well will be full in twelve hours.

The first scene of the dream obviously relates to my reading of other people's theories and wondering whether I should pointout the parallels with certain aspects of my own ideas on dreams. The symbol of the buried treasure is an appropriate symbol for the searching for the meaning of dreams given that I place a high value on such research. The christlike figure in the second scene refers to Freud whose photograph has always brought biblical associations to my mind. The pile of bricks relates to the present state of Freud's theory as I see it i.e. collapsed in ruins.

The well is a symbol for creativity and the specific creativity and involved in the discovery of the meaning of dreams. This is an appropriate symbol not only because one has to dig under the ground to find water and one also has

to dig, as it were, under the manifest content of the dream to find the latent content. But also because a well had recently come to my attention as a symbol of creativity in Chinese literature.

The bottle of water which had been present during our digging refers to the parallels between other theorists' work and my own that I have already mentioned. A bottle of water is a small amount compared to a full well of water. The parallels between other theorist's work and my own represent small discoveries about the dream process. In the dream, I don't mind who drinks the bottle of water i.e. I don't mind who gets the credit for these discoveries. The well will be full in twelve hours i.e. in twelve hours I will have my night's collection of dreams which I expect to be full of creative insights.

The final dream relates to the experiment itself.

Dream 5

> We are looking for buried eggs. There's a hen nearby. Someone finds a single egg buried near the hen. This egg was very close to the surface. I say " It's probably been there for days but that there's still a pile of eggs buried somewhere."

The hen represents the REM state or dream generator. The egg that was found only lightly buried near the surface relates to the manifest content of the dream. It is found near the hen lightly buried meaning that it is easily identified with the dreamer's waking experience. This relates to those aspects of the manifest content, which Freud had observed relate to the dreamer's waking experience of the previous day. The egg appears to me to be old, this is because the observation about the manifest content was made by Freud many years ago. The pile of eggs that I am looking for refers to the dream themes identified the night before which I expect to be found buried in my nights dreams. Chickens develop from the genetic code hidden in the egg and in a very real sense dreams can be decoded to show that they are a translation of specific information from the past into a new sensory structure.

This dream can be seen as a clear metaphorical expression of my hopes and reflections of the day before concerning the dream experiment that I was planning. The dream is not a wish fulfilment, as might be expected from Freudian theory, it doesn't show me finding the eggs rather it expresses my expectation that the dream themes will be found 'buried' in the night's dreams. We can see clearly that the dream does not go beyond the waking thought in another medium as Hall's theory might lead one to expect.

This dream like the other dreams that have been analysed is the translation of waking experience into a sensory metaphorical analogue.

The results were therefore supportive of the hypothesis tested. Two of the three recorded dreams related to predicted themes. One dream related to the experiment itself. On the other hand I had predicted five dream themes three of which failed to manifest as recorded dreams. This might be because I failed to record the relevant dreams. It could also be because they didn't result in dreams. I continued the experiment for another four night's. I successfully predicted two or three dream themes each night. As the experiment progressed I recalled a far greater number of dreams and it became clear that whilst I could predict some dream themes, unpredicted dream themes also featured in dreams. Whilst these dreams were metaphorical representations of waking concerns it was by no means clear why they should have been chosen to be dream themes in preference to my predicted themes. A further complication to emerge was that even when a predicted theme featured in a dream I had not usually attempted to predict the particular aspect of that waking concern that would be featured in a dream. My predicted dream themes tended to be fairly general whilst there expression in a dream would be much more specific.

At the conclusion of the experiment, I had mixed results. The results had convincingly supported the hypothesis that dreams were metaphorical expressions of waking concerns, but on what basis those waking concerns were chosen to be the subject matter of dreams was unclear. I had assumed that the most pressing waking concerns would form the subject matter of dreams and indeed had used that as the criterion on which to base my predictions of what waking concerns would form the basis of dreams. Some of the dreams from the experiment showed that was not the case. Not only did less important waking concerns become the subject matter of dreams but a major concern which I had expected to form the subject matter of at least one dream did not feature at all in an extensive night's collection of dreams. It seemed likely that if the basis on which waking experiences were selected to form the subject matter of dreams could be identified that this might provide a significant clue as to why we dreamed.

I continued to collect and decipher my own dreams and those told to me by other people over the next twelve months in the hope of identifying some criterion that would identify the basis on which waking experiences became the subject matter of dreams. Although the many dreams which I had collected and decoded over this period continued to provide evidence that dreams are sensory analogues of waking experiences no clue emerged as to what selection

criterion was being used. The fact that some of our dream predictions, based on the perceived importance of the waking concern, successfully predicted dream themes shows that the perceived importance of the concern may be one of the criteria being used. But there must be some modifying factor also involved. I next decided to write up my research findings to date. Whilst doing so, the significance of one of my predicted dream themes that failed to materialise as a dream suddenly became apparent.

By the third day of the experiment to predict my dreams, I was finding the whole process extremely stressful. The increasing tiredness, together with the effort of constant reflection on the previous night's dreams were taking their toll. I found myself getting increasingly short tempered and irritable. The experiment was also proving stressful for my wife whose sleep was being disturbed by me waking up and turning light on to record my dreams. This stress bomb finally exploded on the third night as we were about to go to bed. My wife and I had heated verbal exchanges.When I finally got into bed having given full vent to my frustrations, I reflected that this row with my wife in which I (temporarily) perceived her to have changed from a supportive ally to a hostile and unsympathetic critic of my research must surely form the basis of a dream. I hastily added this theme to my list of dream predictions.

However, it was clear the next day that the 'row' was in no way reflected in my dream experiences recorded that night. It may well have been that I failed to record the dream in which this theme was expressed. However I had recorded five dream sequences from that night and I could not help contrasting the failure of this theme to manifest itself with the number of times the theme of the experiment itself was featured during the first night's dreams. Was there some significant way in which these two waking concerns differed that might account for the reason why one was apparently repeatedly selected to have various aspects of it explored in a dream whilst the other was apparently ignored? Yes there was!

During the row with my wife, I discharged my feelings which of course was not possible with the feelings aroused by the prospect of the experiment. These highly aroused feelings relating as they did to an event in the future could not be discharged in the present. In the dream I can search for the buried treasure, I can search for the buried eggs, I can dig the well. Feeling is being used here in the sense of a drive towards or away from experiencing a particular sequence of stimuli.

A previous argument with my wife that became the subject matter of a dream came back to mind.

Dream 6

I'm wearing punk type coloured spectacles which I refuse to change, since I have already paid for them. I'm aware that my wife is telling her mother that I'm unwilling to change them.

This dream is based on my experience prior to going to sleep. Following a disagreement with my wife, I saw myself as the injured party, my wife indicated that she was willing to forget the incident. Perceiving myself as the injured party i.e. 'having paid the price', I feel unwilling to change my aggressive perspective. This is metaphorically represented in the dream as my unwillingness to change my 'punk spectacles'. I reflected that my wife must see me as being unwilling to makeup and forget about the issue. I reflected to myself that I was the injured party and therefore entitled to my viewpoint i.e.'I had paid the price'

My wife's mother appears in the dream sequence as a stand-in for my wife's objective self telling her subjective self that I am unwilling to change my perspective, just as I had imagined her doing before I went to sleep. Clearly in the scene described, unlike in the previous disagreement, I had not yet expressed my feelings and views on the situation. I have already noted that everybody and everything perceived in a dream is a

metaphorical or analogical replacement for somebody or thing from waking. Yet my wife's identity doesn't change in the dream. The reason is that I don't actually see her, I am aware of what she is doing. I know she is close by but I don't actually perceive her in the dream. Her objective self i.e. the self I had imagined her talking to, is analogically represented in the dream by her Mother with whom she enjoys a close relationship. This dream is, therefore, a metaphorical acting out of my introspected but unexpressed views and emotions concerning a disagreement with my wife.

The experience that resulted in a dream was one that involved the arousal of feelings which were not acted out or given expression. This than is the qualifying criterion that I had been searching for in my dream research. My previous research had indicated that dreams were a metaphorical reflection of emotionally arousing concerns of the previous day. But what criterion or rule was used to select between those emotionally arousing concerns, the specific dream themes I had, hitherto, been unable to identify. What becomes the subject matter of dreams is not our emotionally arousing concerns per se but our unexpressed emotionally arousing views about those concerns. The new hypothesis that we have arrived at can be stated as follows:

Dreams are a sensory analogue of emotionally arousing introspections (activated drive-schemata) not manifested or acted out during waking.

My hypothesis differs from Freud's theory in that: (A) The origin of the dream lies in conscious introspections and not in 'subconscious infantile impulses': (B) Dreams are not disguised or distorted wishes, they are sensory analogues of unexpressed emotionally arousing introspections from waking. My hypothesis has in common with Freud's theory the idea that dreams have a latent meaning.

My hypothesis has in common with Hall's cognitive theory the suggestion that dreams relate to the conscious emotional concerns of the dreamer. Unlike Hall's theory which sees the dream as a continuation of waking thought in another medium, my hypothesis specifically states that the dream is a replay of certain previous emotionally arousing thoughts from waking. It also differs from Hall's theory in that it specifically predicts that all dreams are expressed in the form of a sensory analogue.

A review of previously collected dreams and the waking experiences on which they were based proved to be compatible with this new hypothesis. For example if the reader considers dream number 3, in which I purchased two

sweaters in a street market without facilities to try them on, it can be clearly seen that the resultant dream sequences were metaphorical translations of my anticipated reactions to how the sweatshirts would look when I tried them on. In this instance the introspections were anticipating my future reactions to trying on the sweatshirts, these anticipated reactions did not take place because when I tried the sweatshirts on they were too small and I gave them to my wife. Thus the anticipated reactions did not take place at all during waking, they were however expressed in the form of a sensory analogue in the dream.

The continued collection of my own and other people's dreams, over the next several years, identified a number of reasons why the emotionally arousing introspections that result in dreams do not become manifest during waking. These include the fact that the anticipated experience may still be in the future at the time of sleep onset. Another reason is that the dreamer when awake had been introspecting about emotionally arousing events from the past that could not become manifested in the present. A further reason is that the dreamer when awake may have wrongly anticipated how certain events would turn out. I also found that dreams can result from introspections about emotionally involving television programmes. In the chapter on the psychology of dreaming

examples of dreams resulting from these types of experiences will be given.

What then is the function of dreams? The research reported in this thesis suggests that dreams involve emotionally arousing introspections translated into sensory analogues. The dreamer acts out his introspected scenario from waking in the form of a sensory analogue. I hypothesise that this de-activates the activated drive schemata (emotionally arousing introspection) from waking. The dream by releasing these programmes of activation frees the resources of the cortex and limbic system to attend to the emotionally arousing contingencies of the next waking period.

I am therefore putting forward two hypotheses:

Hypothesis no. 1 - Dreams are a sensory analogue of emotionally arousing introspections (activated drive schemata) which are still active at sleep onset.

Hypothesis no. 2. - The expression of these activated drive schemata as a sensory analogue de-activates them thus releasing ~~releasing~~ the cortex and limbic system from having to maintain a readiness to respond to stimuli associated with these programmes of activation.

This second hypothesis raises an important question as to why the brain converts the activated drive schemata into a sensory analogue. I seek to answer this question in the next chapter when I review the major findings of the research into the biology of dreaming.

In carrying out this review of previous research both in the next and subsequent chapters I am mindful of the advice of Farr (1993) discussing the scientific method " once you have the right theory though, it can be used to reinterpret what is already known.....It is not so much new evidence as new thinking that is called for .....It is foolish to ignore what we already know from experimental research". It is my aim, therefore, not only to introduce new data in support of the hypotheses which I have put forward but also to demonstrate the wide support that can be found from existing experimental research for these hypotheses.

THE BIOLOGY OF DREAMING

In the past thirty five years, sleep research has turned into a major scientific enterprise and a wealth of new biological data has emerged. A major stimulus to research in this area was the finding by Aserinsky & Kleitman (1953) that there was a regular change in a sleeping subject's electroencephalogram reading (E.E.G.). These are recordings of the electrical brain patterns by means of electrodes placed on the skull. Their research showed that sleep consisted of two discrete phases which alternated periodically throughout the night rather than the continuum which had previously been assumed. One phase which occurred about every ninety minutes was accompanied by rapid eye movements and for that reason was called REM sleep.

A more detailed study by Dement and Kleitman (1957) confirmed that REM sleep occurred about every ninety minutes and occupied, on average, one and a half to two hours of total sleep time. Subjects awakened from REM sleep were able to recall a dream on eighty percent of occasions whereas subjects awakened from non-REM sleep, later to be called slow wave sleep (SWS), were only able to recall a dream around seven percent of occasions. It

was suggested that the small percentage of dreams recalled from SWS might represent memories of dreams persisting from earlier REM phases. They also noted that recordings from SWS could be further divided into four stages (I-IV) according to progressive changes in the slow wave pattern.

The relationship between dreaming and non-REM sleep is not as clear cut as Dement's and Kleitman's (1957) paper suggests. Dreaming does occur outside REM sleep. In fact about sixty percent of non-REM awakenings result in reports of mental activity of some sort. More often than not, these reports have the characteristic of a dream fragment, if not a dream scenario (Foulkes 1985). At other times, thinking seems to be of a recursive kind, not going anywhere. Foulkes goes on to suggest that non-REM dreaming may often reveal a breakdown in the same processes that serve fluent dreaming in REM sleep. The processes of dream formation in non-REM sleep may show, therefore, a lesser engagement of the dream production system that operates at full flow during REM sleep proper.

Jouvet and Michel (1959) identified a further indication of REM sleep when they noted that the state was also accompanied by an inhibition of antigravity muscles i.e. tonic immobility. Their research was carried out on cats. It soon became apparent that the REM state was characteristic, not only of humans but also of nearly all

viviparous mammals. It has even been found in birds, though lasting only for brief periods of time. The lack of muscle tone identified by Jouvet and Michel and recorded by the E.M.G. (electromyograph), together with the recording of eye movement by the E.O.G. (electro-oculograph) and, of course, brain waves recorded by the E.E.G. (electro-encephalograph), is now the internationally agreed system by which sleep phases are recorded.

An important distinction was made by Moruzzi (1963) when he noted that stage REM could be divided into tonic components which persist for the entire duration of stage REM and phasic components which usually occur in association with periodic bursts of rapid eye movement within stage REM. Tonic phenomena include the rapid E.E.G and the tonic dropout of antigravity muscles. Phasic phenomena include the occurrence of ponto-geniculate-occipital spikes (P.G.O.), short term fluctuations of autonomic behaviour and the presence of myoclonic twitches and generally increased fine muscle activity. The tonic phenomena can be characterized as the background upon which phasic activation is superimposed (Hartmann 1967).

Gassel et al (1964A) observed that superimposed upon the tonic inhibition of antigravity muscles were increased phasic inhibitions as well. The phasic components are not

strictly confined to stage REM, P.G.O. spikes have been observed in the lateral geniculate nucleus prior to stage REM (Dement 1968). The work of Jouvet (1967) has established that tonic and phasic components are based upon different anatomical mechanisms. He has shown that under certain conditions tonic and phasic components can be separated. Dement (1968) concluded that an important principle was suggested by these results namely that at least two distinct neurological systems were responsible for stage REM, a system that generates the phasic events, particularly P.G.O. spikes, and a system that produces the tonic phenomena, particularly the REM state itself.

The importance of these findings is that they suggest that a number of processes come together during a full blown REM state, which may also occur discretely at other phases of sleep. Thus the similarity in the E.E.G. between descending stage I at sleep onset and REM sleep, and the fact that dreams have been recorded from both stages, might mean that there is a similar form of data processing going on in the cortex in both stages. As Foulkes suggests, sleep onset dreaming may well mean a partial engagement of the dream production system at that time, whereas in REM sleep, we see the full engagement of this system.

Dement (1960) was responsible for the first systematic studies of REM deprivation. Using human subjects, who were awakened at the onset of a REM phase, Dement succeeded in curtailing the amount of time spent in REM sleep. He found that on recovery night there was a marked increase, compared to baseline, in the amount of time spent in REM sleep. Further studies showed that, not only was there an increase in REM sleep time, but also an increase in the frequency of phasic events (Ferguson & Dement 1968). Dement found that sometimes when an animal (cat) was gently aroused at the onset of a REM period, the REM period could be effectively derailed while allowing a discharge of a large number of P.G.O. spikes. Two days of this procedure was followed by a very small or non-existent rebound. These results indicated the crucial factor in REM sleep deprivation - compensation was phasic events rather that tonic events i.e. rather than the REM state per se.

A further important finding reported by Dement was that prolonged REM deprivation in cats brought about an increase in the general level of arousal, especially primitive emotions such as sex and rage. He had expected that the REM deprivation would lead to hallucinations accompanied by the discharge of P.G.O. spikes. However, administration of the drug paca-chlorophenylalanine (P.C.P.A.) to REM deprived animals leads, within a few

days of being on the drug, to the appearance of P.G.O. spikes during waking, hallucinatory behaviour and a markedly accentuated drive state. The animals underwent a profound personality change resulting in hyper-sexuality, rage behaviour and hyperphagia. However, as time goes on, the spike discharge becomes evenly dispersed throughout waking and sleeping and the animal becomes very lethargic.

These findings suggested to Dement that there were two systems of drive discharge and that there was a drive reservoir which could become depleted. The first method of drive discharge is during waking by drive oriented behaviour. The second method of drive discharge is by means of P.G.O. spikes. The two systems do not operate at the same time because P.G.O. spikes are not observed in animals when executing drive oriented behaviour or in P.C.P.A. treated animals when they are making a drive oriented response. These results led Dement to conclude that the primary role of REM sleep was in providing a 'safety valve' outlet for the discharge of the drive system. However, Dement was not entirely happy with this notion because he wrote elsewhere "it seems naive to suggest that the REMs exist in the adult organism to prevent the nervous system from becoming over excitable". The major evidence which Dement has accumulated to suggest two types of drive discharge system still stands, and we shall see that the function of the second drive discharge

system is far more vital and sophisticated than that of a 'safety valve outlet' rejected by Dement.

Dement was also one of the co-authors (Roffwarg, Muzio and Dement, 1966) of a very different theory of the function of the REM state. This is the so called ontogenetic hypothesis put forward to explain one of the most surprising discoveries about REM sleep. Research has shown that REM sleep occurs most frequently in the young and decreases as we get older. During the last trimester of pregnancy the fetus spends up to eighty percent of sleep time in REM sleep. This declines to sixtyseven percent at birth, declines further to approximately twentyfive percent later in childhood and stays at approximately this level to old age, where it declines still further. The amount of REM sleep at birth is directly related to the maturity of the animal. Those species born with their brains and physical abilities well developed, show little REM sleep. In contrast, species who are born very immature show high levels of REM sleep. A species such as the guinea pig, which is well developed at birth, shows only about fifteen percent REM sleep, whereas the rat, which is born blind and immobile, shows over ninteyfive percent REM sleep. The rat quickly matures and, within one month, REM sleep has declined to thirty percent of total sleep time. Dement and his colleagues concluded that the primary role of REM sleep is

in the very young and that it may be providing stimulation to the developing cerebrum in the stimulus poor intrauterine environment. There can be little doubt that any comprehensive theory of REM sleep must be able to explain, not only REM sleep in adulthood, but also it's preponderance during gestation and early childhood.

Dement's idea of two methods of drive discharge has also been used by Vogel (1979) to explain his finding that subjects, suffering from endogenous depression, showed an improvement in their condition when deprived of REM sleep. For a sustained improvement, REM sleep deprivation has to last for about three weeks. Vogel's argument suggests that these patients may have been discharging too much drive through REM sleep, and that by preventing REM sleep, we are increasing the drive motivation available to the subject when awake. He suggests that while REM sleep deprivation shows some arousal effects in normal subjects, these effects are not as dramatic as with depressed subjects, because normal subjects are already near the ceiling for excitability. To support this idea, he refers to the well established finding that anti-depressant drugs, which suppress REM sleep, have little effect on normal people, yet depressed people can have their drive or motivation lifted by these REM depressing drugs. Vogel concludes that one of the functions of REM sleep is to modulate drive oriented behaviour so as to permit greater

flexibility in the expression of instinctive behaviour in higher organisms i.e. to damp down instincts. Whilst I have to agree with Dement that this idea of damping down instincts is rather crude, nonetheless, Vogel's idea that two methods of drive discharge might be linked to instinctive behaviour and the required flexibility in the expression of behaviour in higher mammals, will be seen to have some merit.

The so called 'activation synthesis theory' has been put forward by Hobson and McCarley (1977) and Hobson (1988). They see dreaming as the result of the cortex's attempt to make sense of the random barrage of signals sent from the lower brain. The dream synthesis that we create may reveal something of how our personality habitually operates, according to the authors of this theory. The random testing of pattern generators, may also serve a maintenance and developmental function. It is now quite apparent, as Hobson's and McCarley's, and other research makes clear that the REM state is controlled by mechanisms in the lower brain. It is also clear that dreaming in the REM state is more intense during bursts of rapid eye movements and other phasic signals. Evidence to be reported in this paper seriously questions that dreaming is a result of a synthesis of random signals.

We dream in order to forget, is the idea put forward by Crick and Mitchison (1983). They suggest that dream sleep may be an un-learning process, a way of removing unwanted or parasitic forms of associations in the neo-cortex. This may arise during structural growth of the cortex, through modification of the existing associational network, as a result of experience. The stimulation which the cortex receives during REM sleep may excite these parasitic modes, rather than normal patterns of associations which need highly specific signals to stimulate them. A mechanism of reverse learning is then thought to adjust the synapses that underlay these modes so that this pattern of activity is less likely to occur in the future. It is suggested that in our dreams we observe these modes being stimulated. Hudson (1985) notes that the clear implication of this theory is that people who frequently recall dreams should be more "addled in their wits" than non - recallers, a finding unsupported by research.

The 'computer' theory of dreaming was introduced by Evans and Newman (1964) and expanded by Evans and Evans (1983). This theory sees REM sleep as programming the brain. During REM sleep, the brain is disconnected from the outside world by inhibition of antigravity muscles and sensory imput, thus it can be compared to an off-line computer. The brain contains a myriad of programmes which can be updated during this offline time of REM

sleep. This proposal has the advantage of seeing the REM state as a positive state with specific accomplishments. It also has the merit of allowing us to see REM sleep, in the neonate and young, as a time when the 'soft-ware' of the brain is programmed.

This theory has similarities with the theory put forward by Jouvet (1978), whom we have mentioned previously in connection with the discovery of the inhibition of antigravity muscles during REM sleep. He suggests that REM sleep has the role of programming the central nervous system (C.N.S.) for the purpose of maintaining or organising instinctive behaviour. He argues that the programming of instinctive behaviour on a continuous basis, rather than a once and for all basis, during development would enable a more efficient expression of instinctive behaviour. Since the original programming must interact with the animal's experience, then REM sleep might allow either the original programming to be re-asserted (nature over environment) or the effects of the experience to modify the programming (environment over nature). Jouvet has shown that REM sleep is controlled by a very primitive part of the brain and that when the neo-cortex is removed REM sleep still occurs although not slow wave sleep. He has also shown that when a small area of the mid-brain is ablated cats seem to act out their dreams (Jouvet 1965, 1977). Following this operation, animals

during REM sleep, indulge in stereotyped behaviour such as chasing or attacking an invisible object, displaying fright behaviour or indulging in grooming or drinking behaviour.

Consistent with Jouvet's theory, is the observation that newly born babies display what appear to be sophisticated expressions of emotions during REM sleep, such as perplexity, disdain, scepticism and mild amusement, which are not observed during waking (Roffwarg, Muzio and Dement 1966). Young babies smile in REM sleep weeks before social smiling can be observed (Hunt 1989 p.27). It has been suggested by Hobson(1989) that, because new born babies know how to breathe and swallow as soon as they are born, these behaviours have been learned in REM sleep. He notes that observation of fetal lambs has shown breathing movements of the chest wall in REM sleep, even though, of course, there is no air to breathe. It's possible that behaviours are being programmed or rehearsed in REM sleep which will only appear later in social life when appropriate sensory analogues have been identified. However, Jouvet's theory is less plausible when we consider the older child and the adult REM sleep. No analysis of the dreams from REM sleep has shown a consistent pattern of interaction between waking behaviour and what might be considered rehearsal of instinctive drives or behaviour.

If we leave the mystery of dreaming aside for the moment and consider Dement's and Jouvet's research findings together, a nice integration becomes possible between the role and function of REM sleep in the fetus and the neo-nate. Dement's research suggests that there are two systems of drive discharge, the normal waking system and an alternative system that operates during REM sleep. If we also consider the dominance of REM sleep in the fetus and neo-nate then drive discharge, via instinctive behaviour patterns, may well be providing needed stimulation to the developing cortex as well as programming a schematic knowledge of these instinctive programmes, to enable the cortex to exercise an influence over their future expression.

Dement has identified the P.G.O. spikes as the key indicator relating to this drive discharge in the REM state. More recently, it has been shown by Morrison (1983) and Morrison & Reiner (1985) that these P.G.O. spikes are in fact part of an alerting or orientation response which in the waking state accompanies the perception of novel stimuli, and is associated with an inhibition of behaviour, activation of the cortex and other processes characteristic of the REM state. The intense endogenous production of these orientation responses during sleep, may account for many of the phenomena of the REM state itself, and it's preparation of

the cortex for the processing of anticipated significant stimuli, which in the REM state, at least in the fetus and neonate, may be the release of genetically anticipated stimuli or instinctive behaviour patterns.

Instinctive behaviours can be regarded as inherited schemata (Piaget 1971) which allow a prepared response to anticipated stimuli which the animal expects to encounter in it's future environment. The anticipated stimuli can have their parameters only partially specified in order to allow for the range of variation which individual members of a species may expect to encounter within their habitat. The genetic description of specifically anticipated stimuli has to allow for the range of variation that will be encountered within specific stimuli. The more unspecified the parameters of genetically anticipated stimuli (and responses as well), the greater will be the flexibility in the animal's behaviour, and the greater can be the environmental learning component of the instinctive behaviour.

The variation of shape, size composition and location of nests built by birds of the same species, shows how wide a variation there can be in the execution of what appears to be a highly controlled instinctive behaviour (Walker 1983). Consider how their unique vocal pattern is used by many mammals for mutual recognition of parent and

young. The genetic schema cannot include the specific voice pattern that a particular parent or offspring will have. The schema has to be sufficiently indeterminate that any example from the potential range of voice patterns to be encountered by an individual is capable of being selected and recognised as an analogue of that schema. If then the sensory parameters of instinctive schemata can only be partially specified by approximate models at best, this means that analogues from the world of sensory experience have to be identified to complete the schemata.

There can be little doubt (as Jouvet notes) from the study of monozygotic twins reared together and apart, that the expression of intelligence and personality in humans is to some extent influenced by genetic factors. It is probably fair to say that for the human species, the parameters of genetically inherited schemata are the least defined, and so the wide latitude in the identification of environmental analogues permits the greater flexibility in the expression of human behaviour.

We know that there is a genetic substrata to language acquisition for example, the so called language acquisition device (Vygotsky, 1934), or deep structure (Chomsky, !957). The native language is acquired as a social analogue which completes the genetically programmed

language acquisition schemata. Bruner (1986 p.78) tells us that it was "Vygotsky's genius to recognise the importance of language acquisition as an analogue". As human behaviour and culture shows sc much diversity and flexibility, we would, therefore, expect to find in humans a very subtle and sophisticated analogical thinking process, to facilitate the identification and assimilation of the cultural analogues which complete the genetically influenced parameters of our behaviour patterns and perceptions.

Spearman , in his major work, 'The abilities of man' (1927), identified two fundamental processes which he called 'eduction of correlates' or analogical thinking and 'eduction of relationships' or abstract thinking. The measurement of analogical thinking ability in some form is now a standard part of almost all intelligence tests. We use analogical thinking to understand and make sense of our world. When we encounter a new experience, we try to find something from our past experience that is analogous to the new experience. This applies just as much to scientists trying to make sense of their observations. For example, the analogy of waves is used as one model to make sense of the properties of light. The model of the atom at one time was thought to be analogous to planets orbiting the sun.

A special ability of the creative scientist is to make sense of a hitherto puzzling phenomenon by being able to perceive analogies across a wider range of experiences i.e. to make analogies between experiences that most people would regard as disparate. A beautiful example of the great physicist Niels Bohr demonstrating just this ability is given by Bruner (1986). Apparently Bohr told him that the idea of complementarity in physics arose from the impossibility of considering his son simultaneously in the light of love and in the light of justice! He was in this predicament because his son had just voluntarily confessed that he had stolen a pipe from a local shop. This paradox brought to his mind the trick figure of the vase and the face often used to illustrate texts on perception. Depending on which aspect you view first, i.e. figure or ground, you can see a vase or a face but not both simultaneously. He immediately saw the analogy between this situation and the impossibility of thinking simultaneously about the position and the velocity of a particle, which led him to formulate his complementary principle which says that, if you measure velocity of a particle, this precludes you from measuring it's position at the same time and vice-versa.

In this example, we can see that Bohr had an activated drive schema to make sense of this paradox. His on- going experience is being monitored in terms of this drive

schema. This leads him to pay particular attention to the dilemma with his son i.e. love versus justice, which is an analogue of his physics dilemma. This analogue is still a dilemma because he doesn't see a resolution to it. However, he has now shifted the dilemma into a completely different field, which brings to mind the analogy of the figure/face paradox. This analogy does suggest a resolution, in that it provides a sensory analogue or model, where we can have mutually exclusive but complementary perceptions of the same object.

The above example illustrates how a great scientist uses analogical thinking to make sense of experience, and in so doing reflects a process that everybody uses to make their experience of the world comprehensible. We try to find analogies between new experiences and our existing schemata. We also use metaphors or analogies to try to convey the subjective quality of our own experience to others. There can be little doubt that we utilise analogical thinking as a basic tool in understanding and in flexibly communicating the meanings we discern in our experiences.

Dement tells us that the development of the sensory apparatus in the human fetus and in the new born makes it very unlikely that there is a psychical content to their REM sleep. Indeed, the theory which is being developed

here here would not expect such a psychical content as that must await the identification of the appropriate analogical sensory experience. What then are we to make of the REM sleep of adults and children which is accompanied by the rich sensory experience that we call dreaming? The model of REM sleep which we have put forward on the basis of the experimental biological evidence, suggests that REM sleep in the fetus and neonate programmes instinctive behaviour i.e. genetically anticipated experience. Since the anticipation of sensory experience cannot actually be that specific future experience, it must be an analogue of that future sensory experience i.e. incomplete schemata which are completed by the identification of analogous sensory experience.

Since the dreams of REM sleep have a sensory content, it follows that if they too are based on anticipated drive schemata, then those schemata must have had a sensory component already assimilated prior to expression in REM sleep i.e. dreams are the analogical expression of anticipated experiences or activated drive schemata from waking. Dreams must be based on anticipated experiences from waking life that cause drive activation i.e. arousal of the autonomic nervous system which is not de-activated by the occurrence of those anticipated experiences or activated drive schemata. An activated drive schema from waking, unlike a genetic schema, in order to exist must

have a sensory description or content based on the activation of the individual's sensory memory. This means that its release during REM sleep will lead to an analogical sensory experience or dream which, of course de-activates that drive schemata, as it has achieved its function of sensory representation.

If we consider Morrison's findings, referred to previously, of the similarity between P.G.O. spikes and the eye movement potentials of the orientation response, it will be seen that the release of the activated drive schemata during REM sleep is but a further extension of this similarity. The REM state can be seen as a specialised form of the orientation response (Hunt 1989). The correspondence between the orientation response and the REM state includes, not only, the similarity of the recordings of the P.G.O. spikes to the recording of eye movement potentials of the orientation response, but also extends to the cortex, the behavioural inhibition, elevated brain temperature, fixation of attention, hippocampal theta rhythms and even poikilotherapy which are features of both states.

The orientation response prepares the organism to respond to what may be significant new stimuli. Perception is a constructive process and hence we sometimes mis-perceive people and things e.g. mistakenly thinking we recognise

someone, or seeing objects and shapes that turn out to be different to what we first thought they were. In other words, perception is our best informed guess at what we think we are seeing, hearing etc., in a given situation. During sleep, the P.G.O. spikes as part of an endogenously produced orientation response pattern, alert the organism to process information regarding significant new stimuli. In fact, sensory information from outside is being actively inhibited at this time (Hobson, 1988). In the absence of outside information, the brain can only base its 'best guess' on significant information that it is actively anticipating i.e. the activated drive schemata, and hence these are released during REM sleep and analogically processed as real perceptions.

Our consideration of the biological research has led to the formulation of the same hypothesis to explain the origin of dreams that we derived from our preliminary psychological research reported in chapter one. This hypothesis has an immense advantage over earlier theories because it is not only applicable to the phylogenetic data, i.e. data from different species, but it also integrates the ontogenetic data from fetus to neo-nate and adult. It makes a specific prediction as to the form of REM dreams i.e. analogical and that their origin lies in anticipated experiences or activated drive schemata that remain active at sleep onset. Before reviewing the

evidence from a psychological testing of the theory, let us look at the advantages which this view of REM sleep confers from the evolutionary viewpoint.

Jouvet, (1978) suggests that REM sleep, homoiothermia and the flexibility of instinctive behaviour are linked. Jouvet notes that homoiothermia, which gives more freedom of behaviour to higher vertebrates, was accompanied by a "complexification of the brain" and that REM sleep may have evolved to permit more freedom in the expression of instinctive behaviour.

Let us consider the evolutionary pressures that led to the emergence of REM sleep. The ability of mammals and birds to keep a constant internal temperature conferred great advantages on them in terms of mobility but at a great energy cost. This has been calculated for mammals at more than a fivefold increase in basic metabolism (Karasov & Diamond 1985). Such a massive increase in energy expenditure must obviously be compensated for by a corresponding increase in energy supply. This could hardly have been achieved by simply extending the time spent looking for food. What was required was a matching increase in productivity i.e. a more productive return between the energy expended in seeking food and the energy gained by the acquisition of food. One part of this would be to cut down on the wasteful time e.g. times when prey

or other sources of food are not available; this can be seen as one of the functions of the slow wave sleep. If one reduces energy expenditure by cutting out non-productive time, this helps prevent needless waste of energy. It doesn't actually increase the energy available, remembering that a massive increase in energy gained is required to compensate for the demands of homoiothermia. Clearly there was a need to develop the ability to employ this new high powered energy system in more productive ways.

Such a process or ability needed to be capable not only of inhibiting particular drives, if the analysis of the organism's total situation vis a vis other drives and the external environment should warrant it, but also it had to be capable of motivating continued directed behaviour by means of goal expectations. This, of course, is the function ascribed to greatly expanded neo-cortex in mammals (Wulst in birds). MacLean (1982) writes "A remarkable feature of the neo-cortex is that it evolves primarily in relation to systems receiving and processing information from the external world, namely the exteroceptive, visual, auditory and somatic systems. it was as though the neo-cortex was designed to serve as a more objective intelligence in coping with the external environment".

For this objective intelligence to operate, it must have a detailed knowledge or access to information about the instinctive programmes. If these instinctive programmes are to allow for individual and environmental variation then this would involve incompletely specified models for which sensory analogues would have to be environmentally identified. The evidence suggests that the function of REM sleep in the fetus and neo-nate is the programming of these genetically anticipated patterns of stimulation.

This still leaves the further problem that once a drive schema has been activated, it can normally only be deactivated by the actual carrying out of the programmed behaviour by the central nervous system (C.N.S.). When the cerebral cortex inhibits an activated drive schema or when it activates a drive schema through goal expectations and fails to deliver the projected goal, the resources of the cerebral cortex are employed either in the inhibition of that programme and/or in focussed attention directed towards the achievement of that goal. Clearly to avoid overloading of the information processing resources of the neo-cortex, resulting in a deterioration of the neo-cortex's ability to influence the autonomic nervous system (A.N.S.) and/or in it's ability to handle newly arising emotionally arousing contingencies, it would be advantageous to have a means of de-activating the activated drive schemata which have remained unsatisfied,

either because of direct neo-cortex suppression or because the expectations were not capable of being achieved. REM sleep can fulfil this function by allowing the activated drive schemata 'left over' from waking to be vicariously run, thus de-activating them and releasing the data processing potential of the neo-cortex to deal with the next waking period's emotionally arousing contingencies.

Thus we can see the beautiful economy of nature. The same process that programmes instinctive behaviour, i.e. genetically anticipated patterns of stimulation, can also be used to de-activate 'left over' anticipated patterns of stimulation from waking i.e. activated drive schemata. As the waking anticipated stimulation has a sentient content, it's analogical processing in REM sleep, leads to a full sensory simulation which de-activates the activated drive schemata. Thus nature can accomplish two essential functions with the same process.

This theory leads, of course, to a prediction of the consequences of REM sleep deprivation. Our theory would predict that if an animal were deprived of REM sleep then this would result in the animal's A.N.S. becoming more aroused, a more direct expression of the animal's instinctive drives with increasing inability to control or to express instinctive behaviour patterns appropriately. This would also apply, of course, to human beings,

although we might expect that social constraints would help people control the expression of those desires. From a phenomenological perspective, we would expect a person deprived of REM sleep to feel that he was being led on by events, that his ability to independently analyse and decide for himself matters of personal importance was impaired, that he was more easily influenced and especially to sense an increasing inability to cope with stress i.e. increasing numbers or intensities of activated drive schemata.

Experiments on REM deprivation have been carried out on animals and humans. Perhaps the most consistent finding has been that both humans and animals deprived of REM sleep show a rebound in REM sleep time when allowed to sleep normally following the deprivation. The pressure to have REM sleep can even be observed during the deprivation experiments. On the first night seven awakenings at the onset of REM sleep may be sufficient to deprive a subject of REM sleep but by the fifth night thirty awakenings might be necessary to prevent the subject from going into stage REM sleep. The REM rebound phenomenon does seem to indicate a biological pressure or need for REM sleep.

Overall though the results were a disappointment to the experimenters who had expected to see hallucinations and gross personality disturbances. Indeed we shall see that

the results were very much in line with what we would expect from the hypothesis developed in this paper. REM deprivation resulted in higher autonomic arousal as indicated by the following facts:- (a) An increase in heart rate from 160 beats a minute to a mean of 200 beats a minute after thirty days of REM deprivation following a lesion in the nucleus pontis caudalis which entirely suppresses REM sleep in the animals concerned (Jouvet, 1965); (b) A lowering of seizure threshold for convulsions in rats following REM deprivation for six days (Cohen & Dement, 1965); (c) In cats suffering REM deprivation, a lowering of the auditory recovery cycle was reported by Dewson and co-workers (1967); (d) Dement (1967) reported that drive oriented behaviour was greatly enhanced in cats following REM deprivation (using a mechanical method), the speed of eating was nearly twice as fast as normal speed and some of the cats showed disturbances of normal sexual behaviour indulging in compulsive mounting of anaesthetized male cats. Psychometric tests of human subjects showed a significant elevation of expression of need and feeling, together with a significant increase in pathogenic verbalizations (Dement et al, 1976). These findings clearly indicate that REM deprivation results in an increase in autonomic arousal together with an enhancement of particular drive states which is what would be expected from the theory outlined in this thesis.

The effects of REM deprivation on autonomic arousal in humans is much less than in animals. This may be partly because less stressful methods are used in humans and which may be less efficient than the mechanical methods usually used with animals (Horne, 1988). Hypnotic drugs such as tranquillizers inhibit REM sleep to varying extents, again without any gross disturbances in the behaviour of normal subjects being observed. However, dreaming does occur to some extent outside of the REM state. It may be that REM suppressing drugs are merely displacing dreaming into another sleep stage. We also need to know whether these drugs cause a reduction either in number or intensity of the activated drive schemata left unmanifested at sleep onset, thus reducing the need for REM sleep.

Antidepressant drugs also inhibit REM sleep. Interestingly, the therapeutic effects of antidepressant medication may actually depend on their ability to suppress REM sleep. Vogel and collaborators have shown that REM deprivation can in fact be helpful in the treatment of endogenous depression (Vogel 1979). He also found that those subjects who failed to show an improvement following REM deprivation were also less likely to respond to antidepressant medication. A possible explanation for these findings is that REM deprivation lowers the threshold or triggering drive states during

waking thus making it easier for subjects suffering from endogenous depression to become motivated out of their apathy when awake.. Such an explanation would be consistent with the theory of dreaming and the REM state being developed in this paper.

Humans have a much greater neo-cortex proportionally than most animals, one role of which is the inhibition of drive orientated behaviour and another role is the anticipation of when that drive orientated behaviour can be appropriately applied. There is obviously an inter-dependence between the resources of the cortex devoted to the inhibition of drive orientated behaviour and the resources devoted to the anticipation of circumstances where that drive orientated behaviour would be appropriate. This theory of dreams and REM sleep would predict that to discover the real effect of REM sleep deprivation you would have to study not only human performance on various tasks, but the study must be carried out in the context of activated drive schemata. It would be under the stress of monitoring increasing numbers and/or intensities of activated drive schemata to discover appropriate conditions for their release, that we would predict a decline in efficiency of performance as a result of REM deprivation.

Unlike most other theories that seek to account for the function of REM sleep in adults, for whom the findings of REM deprivation studies are a major problem, this theory not only explains the effects so far discovered but also makes specific predictions as to how those effects could be better demonstrated.

We have discussed how the REM state is characteristic of most mammals. The REM state is known however to be absent in adult dolphins and perhaps whales. This may well be an adaptation to having to live in water. The REM state is also absent in the adult of the primitive egg laying mammal, the duck- billed platypus. Interestingly, both these species also have a huge neo-cortex totally disproportionate to what would be expected. It may well be as Crick (1983) has observed that this hugely unexpected neo-cortex may actually be a necessary consequence of not having REM sleep. In fact, this theory states that REM sleep is necessary to maximise the efficiency of data processing of emotionally relevant stimuli in the cortex. It would not be surprising, therefore, that the absence of REM sleep would necessitate a corresponding increase in the amount of cortex to compensate.

The theory of REM sleep which is developed here is applicable not only to humans but to other species as

well. It can also explain the predominance of REM sleep in the neo-nate and fetus. It can account for the effects of REM sleep deprivation and predict how those effects could be enhanced. It predicts that analogical thinking would be a major feature of human thinking, which the evidence clearly confirms. The theory also makes specific predictions about the content and form of dreams, and is testable at a psychological level.

For the first time also we have a theory of dreaming that is not only consistent with the major biological facts of dreaming but also gives us an explanation for the occurrence of symbolism in dreams. Symbolism is one of the most noted phenomena of dreaming yet the major theories which have been put forward to explain the recent biological data such as Hobson's & McCarley's activation synthesis theory or Crick's neural net theory cannot explain it's occurrence. The theory which is put forward in this paper provides a logically coherent explanation of symbolism in terms of the analogical expression of the activated drive schemata and further predicts that this symbolical (analogical) form will apply to the full content of the dream. The psychological evidence will be reviewed next and it will be seen that it strongly supports the theory developed in the preceding chapters.

THE PSYCHOLOGY OF DREAMING (1)

SILBERER'S AUTOSYMBOLIC EFFECT

The psychological investigations reported in chapter one suggested that dreams arose from emotionally arousing expectations that failed to become manifest while the person was awake. The emotionally arousing introspections that gave rise to these unfulfilled expectations I have referred to as 'activated drive schemata'.

The hypothesis which I have put forward, based on the psychological and biological evidence so far considered, says that these activated drive schemata are translated into sensory analogues during dreaming. It may be possible to accumulate a lot of convincing evidence in support of this hypothesis and however convincing such evidence might be we would still ideally like to see a demonstration of this translation process actually taking place. It may be possible to do just that.

As mentioned previously, Foulkes found that dreaming is not completely confined to the REM state but had been recorded from other stages of sleep as well. Foulkes suggested that the REM state shows a maximum involvement of the dream production system which can also have a

lesser involvement in other sleep states. This idea is also compatible with the evidence that some of the processes of the REM state can also be activated at other times.

P.G.O. spikes appear during other sleep phases, on occasions outside of the REM state. The analogical thinking which this paper suggests is the essence of data processing during REM sleep also, of course, manifests itself at other times. Foulkes has noted that short dreams can appear during sleep onset, i.e stage I sleep, which is a time when the E.E.G of the cortex is very similar to that of the REM sleep in humans. Often at this period subjects experience the startle response and jerk awake. The startle response is an intensification of the orientation response manifested with P.G.O. spikes. Foulkes has suggested that these less than full blown dream periods, such as occur at stage (I) sleep on occasions, may be a kind of revving up of the dream production engine that could throw light upon the dreaming process which is most characteristic of REM sleep. Surprisingly, the crucial research was already carried out in Freud's lifetime by a colleague of his, called Silberer (1909,1951). Silberer discovered that if, when he felt drowsy, he tried to master some anticipated intellectual task, a point came when the feeling of drowsiness would temporarily overcome him. He would awaken a few moments

later and realise he had dreamt a symbolic representation of his anticipated intellectual schema. He called this the 'auto symbolic effect'. Some examples will make this effect clear.

"My thought is: I am to improve a halting passage in an essay." This results in the following dream fragment, "I see myself planing a piece of wood." Here we see the anticipated behaviour replaced with an analogical sensory representation of that behaviour. i.e. in the dream fragment he is metaphorically smoothing out the rough passage in the essay.

In another example, he is thinking of human understanding as "probing into the foggy and difficult problem of the 'mothers' in Faust, part II". This results in the dream fragment "I stand alone on a stone jetty extending out far into a dark sea. The water of the ocean and the dark and mysteriously heavy air unite at the horizon". Silberer explains that the jetty extending out into the dark sea corresponds to probing into the problem. The unity of the air and water at the horizon, symbolises, as with the mothers, "all times and places shade into one another, so that there are no boundaries, no here and there above or below". Again we can see that this dream fragment provides a clear analogical sensory representation of his

introspections or anticipations concerning the solution to the proposed problem.

In yet another example he is "trying to think of the purpose of the metaphysical studies I am about to undertake". He decides that the purpose is to "work my way through ever higher forms of consciousness; that is levels of existence, in my quest after the basis of existence". He then dreams that "I run a knife under a cake as though to take a slice out of it". The cake in question has a number of layers, corresponding to levels of consciousness. The running of the knife through the layers of the cake is an analogy for working through the levels of consciousness. The knife has to be pushed under the cake to remove a slice, corresponding to getting at the basis of consciousness. Here we have another example of his anticipations being converted into an analogical sensory representation. Silberer called this type of dream symbol a material symbol because it dealt with the 'material' he was contemplating.

He also described what he called 'functional' symbolism, which he thought related to the state of consciousness of the dreamer. An example he gives is when he tries to recall what he was thinking about but finds that he has lost the connecting link. He dreams of "a piece of type setting with the last few lines gone". The key point that

Silberer's description misses is that the dream sequence is not simply symbolic of his state of consciousness but rather of his introspection or anticipation concerning his state of consciousness. The dream fragment is a sensory analogical representation of his introspection or anticipation of having lost the connecting thread of his argument.

In a further example he is thinking about something but "pursuing a subsidiary consideration, departs from the original theme". When he attempts to return to it, he dreams the following fragment: "I am out mountain climbing. The mountains near me conceal the farther ones from which I came and to which I want to return". This dream fragment is a clear sensory analogical representation of his anticipated mental journey.

In another example he says "before falling asleep I want to review an idea in order not to forget". He dreams "suddenly a lackey in livery stands before me as though waiting for my orders". Silberer tells us that in this instance he experiences no difficulty in thinking, and "expect to carry out my task". This example is very interesting because it introduces a higher level of complexity than previously seen. The subject wants to carry out a certain task and anticipates that he will have no difficulty doing it. His anticipation then includes a

reflection of the subject as object, i.e. there is the self that is anticipating, lets call it self (1), that he will, self (2), have no difficulty in carrying out the task. In the dream fragment self (1) is of course himself, the self we are aware of. The livery man waiting for instruction is self (2) that will be able to carry out the task without difficulty. This dream fragment is again an analogous sensory image of the subject as object willing to carry out the instruction.

Silberer noted a third category of the autosymbolic effect arising from somatic phenomena. An example he gives is that he has a sore throat and fever, which forces him to swallow saliva steadily. Each time he is about to swallow he sees a picture of a water bottle he is supposed to drink from. Clearly each swallow has become a consciously anticipated behaviour, and the water bottle is a sensory analogy for the mouth holding the saliva.

Its interesting to note in this last example that we are really not dealing with symbols, if we take symbols to stand for something abstract that otherwise can't be represented sentiently. Clearly a mouth with saliva is not an abstract concept. What we are dealing with is a sensory analogical process that can apply both to abstract concepts and sensory concepts.

Silberer was in fact a supporter of Freud, and he tried to make his findings compatible with Freud's dream theory by arguing that the intellectual apparatus may not be able to support certain ideas for intellectual as well as affective reasons. He suggested that whenever a thought or idea proved too difficult to be supported by a given state of consciousness, as when we are drowsy, regression to a symbolic process of thinking takes place, because this required less effort. In order to keep his findings compatible with Freud's, he suggested that the symbolization process could also be caused by Freud's mechanism of repression.

This analysis of Silberer's findings shows that the underlying principle in all his categories is the occurance of introspections and that these introspections are translated into sensory analogues. This occurs even when the type of thinking involves physical sensations such as swallowing rather than abstract thoughts. What we are observing therefore is a switch over from logical information processing to analogical information processing.

Freud treated Silberer's contribution rather warily in his book, "The Interpretation of Dreams". He was, of course, aware that it was a two edged sword. On the one hand, it gives first class evidence for the process of

symbolization taking place, on the other hand, what is being symbolized is straight forward conscious material and not sub-conscious material that is a threat to the ego, which is the function of dream symbolism according to Freud. It may be for this reason that Freud diverts the reader into a consideration of Silberer's functional category, which as we have seen is a distinction of little relevance because it has been shown that the same process of introspection underlies all three categories that he identified.

The question that needs to be asked is do we need a second mechanism like Freud's theory to explain dreams or can the process observed in Silberer's research during hypnagogic sleep of anticipated experiences being converted into analogous sensory experience actually be applied to dreams proper recorded from other areas of sleep. The psychological evidence reviewed in chapter one and the analysis of the biological evidence carried out in the last chapter leads us to anticipate that the same process is taking place in dreams proper. There can be a partial engagement of the dream production system during hypnagogic sleep. This involves a switch from logical to analogical sensory processing of a schema currently being contemplated. During REM sleep, on the other hand, the firing of the P.G.O. spikes (orienting responses anticipating new stimuli) in the lower brain stem,

triggers the release of the most potent activated drive schemata from waking, and their conversion into analogical sensory based experiences, which de-activate those schemata.

Before leaving Silberer's important work, it should be noted that his research has confirmed two of the main aspects of the theory of dreaming which is being put forward in this paper. Firstly, that the symbolism or analogy relates to the entire dream scene and everything in it. This includes even the dreamer when he has been thinking of 'himself' as object. The Freudian view sees only part of a dream or certain images as symbolic. Secondly, Silberer's findings also beautifully illustrate the actual conversion of the activated drive schema into a sensory analogue. Due to the discovery of Silberer's autosymbolic effect, it is possible to observe both the formation of the activated drive schema and it's conversion into a sensory analogue, which in REM dreams proper are separated in time, taking place here as a continuous whole.

It was the writer's serendipitous re-discovery of Silberer's auto-symbolic effect that led to the research on dreams reported in this thesis. This dream was described in chapter one, dream (1). The reader may recall that the dream involved me thinking about a traumatic

incident from my childhood involving falling off a wall and than dreaming a sensory analogue of that waking recollection. I was fortunate that my waking thoughts involved sensory images as opposed to abstract thoughts so that it was apparent from the start of my research that dream images appeared to involve a translation of certain waking introspections into sensory analogues rather than being simply a pictorial representation of abstract thoughts as both Hall's and Silberer's work inclined them to suppose.

It was, however, to take many years research before the relationship between waking and dream images, as outlined in this and subsequent chapters were elicited. During the course of this research, hundreds of dreams were collected over a period of several years, both my own and later those of relatives, friends and volunteers. By using an alarm clock set at two hourly intervals, I would wake up a number of times during the night and write down any dreams I could remember. After some time, I became so proficient at waking up after dreaming that I would wake up spontaneously four or five times a night and be able to recall dreams. To ensure a representative sample of dreams, I would systematically collect my dreams for a period of a week or longer. The dreams were compared to a detailed examination of my experiences during waking hours. Other people's dreams and waking experiences were

also examined to ensure the general applicability of the evidence for this hypothesis.

It was found that rarely does a dream on first examination reveal its corresponding waking experience. It is almost impossible for our logical mind to separate itself from the rich sensory immediacy of the dream, to consider every element and person (apart from ourself unless considered as object) as a replacement for something else. It is necessary for the logical mind to structurally examine the dream, to ask questions about who such a person could be representing, what a particular behaviour sequence could be representative of in the previous days experience etc. If after such a stepwise examination, the corresponding waking experience hasn't suggested itself, and more often than not it won't have, its best to leave the problem alone for a while, and our analogical thinking process may start to work on it. If you consciously think about the dream and what it might mean, every so often, then in my experience sooner or later the analogous waking experience will pop into your head, and an examination will show that the dream is in fact its sensory analogue. It will be clear that the dream is not simply a sensory analogue of some event from waking but is a sensory analogue of our introspections concerning that event.

We will continue the demonstration of that relationship by analysing some fairly straightforward dreams and than in the next chapter we will be able to begin to identify some of the rules by which this process operates.

Dream 7

"I am travelling in a car with my brother. I said that I had made an offer to buy a house in the area and that I had the key in my pocket. My brother was non-committal about the house as we walked through it. To my surprise there was a huge room at the back of the house. The end wall was completely made of glass and a swimming pool was set in the floor. My opinion of the house's value immediately increased. We went out into the garden and looked at the back. The rear view of the house looked enormous compared to the front. In the dream I never actually saw my brother, I was just aware of his presence.

The previous day I told my brother about a house I had made an offer on. He expressed reservations about the proposed purchase because he thought the price was rather high. I argued that the area where the house was located was becoming increasingly popular and that a house there could be expected to increase in value in the near future. Although I impressed myself with the argument, my brother remained unimpressed. I reflected to myself that the property might be worth even more than I was offering.

My brother can appear as himself in the dream because I am aware of his presence without actually seeing him or hearing him. The dream makes analogically manifest what I anticipated would happen with regard to the house. It

does this by letting me show the property, which I made an offer on, transformed to represent the way I had anticipated it would be affected by the changing market. The house increased in size by means of an extra large room, analogous to the anticipated increase in value of the house. The swimming pool is an analogous way of showing that it had gone 'up market'. The rear view of the house was much bigger than the front, i.e. with hindsight one could see how much the property and hence the property value had increased. The effect of seeing the extra large room at the rear of the house was to make me increase my valuation of the house, just as in the waking situation the effect of my anticipation of what the market forces would do to the value of the house, made me mentally reflect that the house was probably worth more than I had offered.

We can clearly see, therefore, that this dream in an analogous form simulates experiences which I anticipated when awake, but could not experience because the anticipated events lay in the future.

Dream 8

scene 1

"I am walking with someone, whom I'm aware must be my wife. We are walking off the main road, through lovely countryside. Suddenly the ground gets very marshy. I warn my wife that we must be very careful picking our steps and try to get back to the main road without losing our footing.

scene 11

I go to an experimental theatre, I am aware that I am accompanied by my wife. We arrive early for the play. On the way out we find that members of the staff have pulled back the floors by means of mechanical levers. We have to try to cross the open space by balancing ourselves on the metal bars which supported the floor. I tell one of the young actors to put the floor back and that he should have some manners, as I assumed he had some talent."

The first dream scene represents my initial anticipation of the consequences of buying a house in a particular suburb. Whilst the idea was very attractive i.e. like walking through the countryside, it was still a long way from the really popular areas i.e. 'off the main road'. If we didn't 'pick our steps carefully', we might buy in an area where it could later prove difficult to sell and find ourselves on very dodgy ground i.e. in 'marshy ground'. This would make it difficult to move back to a popular area if it proved necessary i.e. 'try to get back on the main road'. The second scene makes manifest other anticipations I had during waking about going to look for a new house. I thought we could 'experiment' with looking for a house, although, we were going 'early', i.e. because we couldn't yet afford one. The floor being pulled back, analogically represents the floor being taken from under us, which was how I felt when I actually looked at the price of prospective houses. We would have to do a very fine financial balancing act, (represented by the physical balancing act in the dream), if we were to

proceed further now that the floor had been taken from under us, (metaphorically speaking), by the huge cost of houses. On further reflection, I thought to myself, the agents are bound to have a few houses in our price range. There was no need for me to feel embarrassed talking to them. I could afford to be quite assertive. This is expressed analogically in the dream, when I tell the young actor to put the floor back, as I assumed he had some talent, i.e. houses in our price range. We can see, therefore, that this dream makes manifest in an analogical format, those experiences which I anticipated having when my wife and I went looking for houses. My wife could appear in the dream as herself, because her presence was intuited rather than directly perceived. This was possible, of course, because she was not playing a direct role in the dream, and consequently there was no need for her to be perceived.

Dream 9

"I'm on a car ferry travelling from Ireland to England. I'm aware that I'm a member of a group of undesirable aliens whom the secret service or army would like to arrest and persecute. I cuddle into a position in a corner beside my sister. Suddenly, I notice two official looking gentlemen, one in some sort of army uniform (jumper) and the other in plain clothes, standing near us, although they don't appear to see us. I'm about to leave when a member of our lot signals to me to stay where I am. The signal however is ambiguous and I still move off. My sister stays behind as I head in the direction where some of our group are staying at

the head of the boat. I am jumped on by the two officials referred to earlier who grab me about the shoulders and say they have already arrested the people I was heading towards."

The dream relates to experiences encountered the previous day when my wife and I went to Windsor Safari Park. I was afraid that the orangutans would attack and damage the car by leaping onto the bonnet (they would then be more than shoulder high). All the cars were in convoy driving through the compound. We had recently travelled to Ireland and our car, like all the other cars, was driven onto the car ferry in convoy fashion and garaged in compounds. This, of course, was the source of the boat analogy used in the dream. From the point of view of the orangutans, I felt that we were intruders i.e. 'undesirable aliens'. The car in front of us stopped. It wasn't clear whether we should try and bypass it or stay behind (hence the ambiguous signals in the dream). I suddenly notice orangutans on our left; one of them had a thick mane around his neck (corresponds to the army jumper worn by one of the officials in the dream - note also pun with jumper as I was afraid he would jump on the bonnet). I urged my wife (sister in the dream) to move forward but she seemed unaware of the danger. In the dream I did actually walk forward, which is analogous to my anticipation when awake of driving forward, but which I could not do because my wife was driving. An orangutan

did actually jump on the car a couple of places ahead of us. When we did begin to move, the two orangutans near us suddenly became aware of our presence and appeared, to me, to be about to attack my side of the car. In the dream, the anticipated attack does actually take place, when the two officials grab me about the shoulders. The attack on the car ahead of us corresponds to the sequence in the dream where the officials say to me they have got my friends stationed ahead of me.

Once again we can see a clear analogical relationship between the events of the dream and the emotionally arousing anticipated events of the previous day which did not take place.

Dream 10

> "I'm sharing a house with three brothers who are members of the famous pop group called 'The Bee Gees'. One of the three brothers looks much younger than the other two. I like them but I feel a little uneasy, something of an outsider. I'm looking out from the window of the house at two of them hurling. I pick up a hurley; I quickly drop it in case they see me as I don't feel myself to be good enough to play hurling with them."

This dream shows how a television programme can provide the manifest content of a dream whilst a second television programme more closely identified with can provide the

latent content of a dream. The manifest content was inspired by a television programme I saw about 'The Bee Gees' returning to England to buy a house and live here. The latent content was inspired by another television programme in which there was a scene with which I strongly identified. The programme was an episode in a soap opera which glamorously portrayed the world of diamond merchants and dealers. In the series, a family of two brothers and a nephew control the family business. A share in the family business was offered to a key employee. I could not help imagining that if I were the employee, while I would be flattered by the offer, I would always feel a bit of an outsider and perhaps a little embarrassed to push my own point of view.

'The Bee Gees' pop group analogically represent the three men involved in the glamorous and lucrative business of diamonds. The house that we are all sharing represents the family business. The game of hurling is an analogy for running a family diamond business. Hurling is a game associated with my youth in Ireland, a national sport at which I was never very good and did not enjoy playing competitively. In the dream, the game of hurling in which I do not participate, expresses the feelings that I anticipated I would have, if I were the man in the television programme being offered a share in my employer's family business. It expresses the feeling that

I would not be able to be a full participant in the 'game' of running the family business, due to my being an outsider.

There is also the connection between the fact that only two brothers were playing the game of hurling and the fact that in the television programme, one brother was a silent partner in the business. The young brother in the dream corresponds to the nephew in the television programme. This dream, therefore, illustrates how the feelings which are anticipated or introspected upon by identifying with a character in a television programme are expressed in an analogical form in a dream, thus releasing the resources of the cortex which had been monitoring the environment for the occurrence of suitable stimuli to express those feelings.

Dream 11

> "There was a christmas present on the top of my wardrobe all beautifully wrapped up, waiting for christmas. There was also a beautiful doll. Daddy got the doll down for me and I nursed it in my arms."

The above dream was told to me by my six year old daughter. When I asked her if it was a new doll, she said she'd never held it before but mummy had let her see it many times. As she recalled the dream she held her arms

as if gently holding the doll or a baby and had a beatific smile on her face. She said she could remember exactly how the doll felt to her as she held it in her arms. The previous day her mother had taken her shopping. They had gone to look at prams for the baby which her mother was expecting in seven weeks. The children's toy department was on the same floor. My daughter asked if she could have a toy. Her mother refused because it was not christmas yet.

The dream is an analogical manifestation of the anticipated event, triggered by this experience. The anticipation of her christmas present, which is stored on top of our wardrobe until christmas day arrives (her wardrobe in the dream) and her other anticipation triggered by shopping for the baby. Her mother told her often that she is having this baby for her and encouraged her to feel the baby move when it kicked her. In the dream, I analogically represent her mother handing her the baby by getting the doll down from the top of the wardrobe for her. The fact that she knew her mother had let her see the doll many times before, means she was aware of her mother letting her "feel the baby many times before". The fact that her mother is mentioned means that she was not actually perceived directly in the dream, but she was simply aware that it was her mother who allowed her to see the doll i.e. feel the baby. The baby is due before

christmas and can also be actually anticipated (i.e. the doll in the dream) unlike presents which must be wrapped up and remain an unknown quantity until christmas arrives.

Dream 12

> "I was writing a letter to my husband on stripy paper. I realised that it is all wrong to send it on stripy paper. It should be more romantic, it should be on flowery paper."

The dreamer of the above dream went on to explain that the pattern of the stripy paper corresponded exactly to the lining of her baby buggy. A complaint her husband had made a couple of nights previously had been on her mind to the effect that these days, she always wore her unatractive winceyette pyjamas to bed. She wore these pyjamas because of the ease of access for breast feeding her baby.

Her introspections concerning her husband's complaints led her to realise that she was sending a wrong message to her husband by wearing those pyjamas, to the effect that she was more interested in the baby than in romantic experiences. This is analogously expressed in the dream by writing a letter to her husband on striped paper that matches the baby's buggy lining. She realises in the dream that this is all wrong and that she should be writing on "romantic flowery paper". The dreamer also

revealed that the letter she was writing was in the form of a collage rather than writing per se. At the start of the letter she used a picture of an 'eye' to stand for 'I'. This again is an analogous way of showing that her message is a non-verbal one i.e. to the 'eye'. This dream, then, is a clear analogous sensory representation of the dreamer's waking introspections concerning her husband's criticism.

Dream 13

> "I'm taking a tube journey. My two oldest sons get out at the Park stop. I go on to Mansion House stop. I feel awful I must get back to the Park stop."

The previous day the dreamer had visited a new play school in order to assess whether she thought it worth while registering her baby's name for a place there in the future. The new playgroup was rather regimented and alien to her artistic temperament (she's an artist by profession). Later that day a friend praised the school discipline methods saying the children were not allowed to use polish, until they had first mastered how to fold their duster properly. This really made her even more convinced that the school was unsuitable for her son, and caused her to reflect that she must go and register her son at the playschool near the park, which her second son currently attends, and which her eldest son also attended

before transferring to school proper, also beside the park.

The dream analogically simulates her introspections concerning these events. In the dream she is taking a tube journey whereas in real life she actually walked. Mansion House is the name of a famous brand of polish and so analogically represents the new playschool with its special attitude towards the use of polish. Mansion House also sounds very like Manor House which is a tube station and also the place where her uncle died. Again, this expresses her attitude towards the new playschool, which she sees as killing the child's creative impulses. Her negative feelings towards the new playschool and her desire to go back to register her son in the park playschool, which her other sons attended, is analogically represented in the dream by her unpleasant feelings at discovering she is on her way to Mansion House, and that she must get back to Park station where her sons have already got off. Again, we can see this dream is a clear analogical sensory simulation of her introspection concerning her reaction to her visit to a new playschool.

It can therefore be seen that the 'autosymbolic effect' identified by Silberer to be operating in the images which he saw during periods of drowsiness is identical to the analogical translation mechanism that we have hypothesized

to be operating in the dreams of REM sleep proper. Silberer's work provides the great service of demonstrating the actual existence of the analogical sensory translation process, the existence of which I was led to hypothesize by my analysis of the biological and psychological evidence.

THE PSYCHOLOGY OF DREAMING (2)

The evidence considered so far comes mainly from the biological field, Silberer's work on the dream sequences from sleep onset and my own research into dreams. The biological evidence suggests that during REM sleep genetic behaviour may be programmed in the fetus and neo-nate. We would not expect any such programme to have psychical content, partly because the brain is unlikely to be sufficiently developed to be able to entertain psychical content, and partly because genetic programmes (i.e. genetically anticipated patterns of stimulation) of necessity involve only partially specified models to which the animal is programmed to seek a sensory analogue that satisfies as far as possible the anticipated parameters of those models.

The more open or less defined the genetic schema, the greater can be the cultural or environmental learning component. As human beings show the greatest amount of cultural learning and the most flexible behaviour responses, it is suggested that they also ought to show a sophisticated analogical thinking process. There is

substantial evidence, as previously outlined, to support this conclusion.

During REM sleep in the fetus and neo-nate instinctive behaviours, which are anticipated patterns of stimulation, may be analogically programmed to find suitable sensory analogues for their completion. When dreams start to accompany REM sleep, it seems likely that we are no longer dealing with genetically anticipated schemata awaiting identification of suitable sensory analogues from waking experience. We must be dealing with anticipated schemata from waking life which do, of course, have a psychical content and consequently for which sensory analogues can be identified or constructed from sensory memory when these schemata are released during REM sleep and analogically processed as real stimuli. The fact that these released drive schemata are converted into sensory analogues means that they are now completed and are no longer activated. This releases the resources of the cortex which had been employed in monitoring the environment for a suitable opportunity for their expression.

It was also noted that REM processes and dream production are not all or none phenomena but can show a lesser involvement during stages of sleep other than REM sleep. During sleep onset the brain can go into the analogical

data processing mode and a currently conscious schema can become represented as a sensory analogue. The work of Silberer has shown a number of examples of this process taking place. During REM sleep proper, however, the firing of the P.G.O. spikes, which are internally generated orienting responses to significant new stimuli, signals the release of activated drive schemata from waking which are processed as real stimuli, in the form of sensory analogues, and thus de-activiated.

The research to be described will show further evidence that dreams are introspections made manifest through their analogical sensory simulation. When we introspect, we model a behaviour sequence or patterns of stimuli which, if accompanied by autonomic arousal, will remain as an activated drive schema unless de-activiated by encountering appropriate stimuli, either in real life or as sensory analogues during REM sleep. It will be shown that there are many reasons why an activated drive schema may not be experienced in real life. These include, for example, introspections concerning events that may still be in the future; events that were wrongly anticipated; emotionally arousing experiences from the past which have been re-activated as an introspection by some event in the present. It may also have been decided not to carry out a particular activated drive schema for some reason. Such activated drive schemata may include experiences of other

people in real life or from television and books that we find emotionally arousing, and which may cause us to introspect what those patterns of stimuli would feel like to experience, without, of course, actually experiencing them for real.

Therefore the subject matter of dreams is as complex and varied as our introspective lives and, in fact, allows us to experience our introspection in the form of a sensory analogue that is sometimes called symbolism or metaphor. In this chapter a number of structurally more complex dreams will be analysed to show how the analogical sensory translation process still operates according to the same rules however complex the waking introspections may be.

Dream 14

> "My sister's husband died. My sister was concerned that the paper work relating to two properties which he had wanted to leave her had not been properly completed. She wanted me to correct the paper work but I refused saying that it would be wrong and would be immediately spotted."

In the dream I was actually aware of my sister's frustration at the possibility of being disinherited, yet I felt that there was nothing I could do about it. I am quite close to my sister and I have always admired her ability to write well. The previous day I had been

thinking about two scientific theories I was working on and I reflected that given the state of my notes, no one would be able to understand the theories were I to die. I further reflected that if I were to rush and write up the theories now I would probably get them wrong. There is, therefore, the 'me' that is imagined to be dead lets call this self (1) There is the 'me' that is imagining that self dead and who is feeling frustration at the thought of the work being incomplete, and who then experiences a desire to complete the work quickly in order to get rid of the feeling of frustration - lets call this 'me' self (2) Finally there is the 'me' who reflecting on this desire of self (2) experiences a desire to not carry out this behaviour because it would result in the work being wrongly completed and would be shown to be incorrect by fellow researchers - lets call this 'me' self (3).

The dream makes manifest this imagined situation, the three levels of self reflection personified appropriately. There is self (1) who is imagined to be dead personified by my brother-in-law who has suffered from a heart condition. There is self (2) personified by my sister who being the wife of my brother-in-law is the closest person to him. My sister is also appropriate for this self, as she takes a keen interest in my own research. She and I have a great rapport and it is easy for me to identify with her feelings. This leaves the way clear for the

emotions experienced by self (3) to be actually experienced directly by myself in the dream.

The analogy between the waking and dream experiences is as follows. Firstly, my introspection caused a desire to get my work corrected, in order to relieve the feeling of frustration I experienced at the thought that my 'will' would be frustrated if I were to die now. I could experience the emotion in the dream because I could closely identify with my sister's frustration at her husband's will being incorrectly completed. This coincides with my thoughts in the waking situation that my 'will' would be frustrated if I rushed completion of the the theories, I was working on, as they would be incorrectly formulated. Just as my sister in the dream experienced the desire to have her husband's will corrected by me, in the waking situation I too experienced a desire to write out my theories correctly. In the dream I decided that corrections to the will would be immediately spotted, likewise in the waking situation I decided that to try and write out the theories 'correctly' would probably lead to errors in their formulation that would be immediately spotted by other scientists. This dream, then, beautifully represents by appropriate analogies the contradictory emotions and levels of self reflection that resulted from my anticipation of my own death.

Dream 15

"I am watching a couple, Sam and Janice, committing suicide. Those around them seem powerless to help. They are breathing in carbon dioxide, sitting in their chairs they seem wrapped up in their own experience. I know I have to and want to say something meaningful to them. I think about saying if there is a next life I will see you there, but I am not happy with the phrase. I put my arms around Sam, I say to him "I love you", then I put my arms around Janice and say "I love you". Janice reacts and says "why am I doing this then?". I carry her quickly away from the poison gas. I notice Sam has become more alert, and I shout to someone to get him too. They are both rescued just in time."

Sam and Janice stand for two clients, whom I shall call Sheamus and Sandra, for confidentiality reasons. I had been thinking a lot about them previous day. Their attempted suicide analogically represents the way their emotional problems were killing their happiness (one of them had previously attempted suicide). Two days previously, I had attended an advanced workshop on psychotherapy in which the trainer talked about the importance of not just being a master of techniques but of doing therapy with a "heart". The night before the dream I was working on Sheamus' case notes and felt that the next session would be a critical one, when hopefully a breakthrough would take place.

I also reviewed Janice's case notes. Although she had made good progress, I felt that certain metaphorical (i.e. analogical) phrases and disproportionate affects pointed towards a disassociated traumatic memory that was still influencing her present behaviour. I anticipated that if this was the case, it was critical for her future happiness that such a traumatic memory be de-traumatised and I would explore this possibility in our next session.

Putting my arms around them in the dream and saying "I love you" is, of course, an analogical way of expressing my anticipation of doing therapy with them i.e. therapy 'with a heart' that the trainer in the workshop two days previously had talked about. My initial thought of saying "if there is a next life I will see you there" is rejected by me in the dream as this approach appears to be not only 'heartless' but in contrast, ineffective. Therapy with 'a heart' analogically represented by the phrase "I love you" does prove effective in both cases. The phrase "I love you", actually came from a wedding anniversary card I bought my wife a couple of days previously. It showed a street of shops and clubs with signs everywhere saying 'I love you'. This phrase appears in the manifest content by virtue of it's appropriateness and recent prominence.

Sam stands for Sheamus in the dream, both are of Irish extraction, work with their hands and are of a similar

age. Janice represents Sandra in the dream, both are of English middle class background and have the same qualities of femininity about them. Janice responds first to my intervention in the dream just as in real life Sandra has shown more rapid progress. Sam and Janice both respond to my interventions and their lives are saved, analogous to real life where I anticipated my therapeutic intervention would improve the quality of Sheamus' and Sandra's lives.

In the dream I call to someone (whom I don't see) to rescue Sam, just as I anticipated in the psychotherapeutic intervention I had planned, that Sheamus might regress to an incident when he was young involving the death of a person, about which he felt guilty, and to have him imagine the dead person giving his views about what happened in a way that would absolve him of his guilt i.e. rescue him. This is the reason why I don't see the person that I call to help him in the dream i.e. because he is dead and the client is going to imagine his presence. This dream, therefore, represents an analogical enactment of my anticipated experiences of the previous day concerning two client's future therapy.

Dream 16

"We are going to a party, my family are there. I am walking along the road with my cousin and all our aunts and uncles. We call into a shop for sweets. My cousin gets served but the girl

behind the counter doesn't seem to understand my instructions. She keeps getting the wrong bar of chocolate and seems very rude. We go into another shop and I get an old fashioned bag of maltesers, (small balls of honeycomb covered in milk chocolate), which we eat. We then see other aunts, and my mother, walking up the road. All my aunts look as though they have been put through a chocolate machine, they all appear as different types of chocolate. I notice that my mother appears as my favourite chocolate. she is some distance behind my aunts. I am annoyed that they are not waiting for her. My family are talking about a presentation skirt length (it comes all ready to make up in a box) that had been given to them by granny. It is decided to give it to me. I try it on and it fits me perfectly."

The dream is based on the following waking experiences:-

(1) A member of her family invited her to a party the previous day. The anticipated party provides the setting for the dream.

(2) The previous day she had been a senior nurse on her ward and was accompanied by an inexperienced junior nurse who seemed unable to carry out correctly the instructions given to her and had been rather insolent. This analogy is represented in the dream by her difficulty in getting served by the rude shop assistant.

(3) The old fashioned bag of chocolates relates to her weakness for eating chocolate (she had actually bought some on the way home from work the previous evening). The 'old fashioned' relates to her view that this weakness has been handed

down through the generations in her family.

(4) The image of her aunts and mother as bars of chocolate relates to a conversation she had a couple of days earlier with her boyfriend concerning her diet and weight. He said unless she was careful she would continue to put on weight as all her family were overweight - hence her perception of her aunts and mother as bars of chocolate - chocolate is very fattening. These ideas were re-stimulated (i.e. introspected) by her guilty feelings at buying chocolate on her way home.

(5) Another theme in the dream is the annoyance she feels when she sees her mum falling behind her aunts and her aunts not waiting for her. This reflects her concern for her mum who recently had heart trouble. She felt annoyed when she learned that her aunts were rushing to their doctors to have their hearts checked without waiting to see how her mum got on. Thinking about her Aunt's weight led her to recall her annoyance with her Aunt's recent behaviour at learning about her mother's ill health.

(6) The final theme is that of the presentation skirt fitting given by her grandmother which fits her perfectly. Her aunts and her mother inherit their figure from her grandmother. The 'perfectly

fitting' skirt is an analogy for inheriting the family 'figure' caused through liking sweet things, which she thinks she has inherited.

What is really interesting about this dream is not just that it is another illustration of how waking introspections and anticipations which cause emotional arousal which is not de-activated by the occurrence of the introspected or anticipated events, are analogically manifested in a dream, but that it provides the exception that proves the rule concerning dreams being analogous representations of anticipated experiences. All our examples of dreams have illustrated the rule that everything perceived in a dream is an analogical representation of something else connected with a waking event. This rule is not, of course contradicted by those dreams where the dreamer is aware of a person's presence without actually perceiving them in a dream. The difference with this dream is that her mother and her aunts actually appear as themselves, but the dreamer's introspection of them as being overweight as a result of their liking for sweet things, is analogically made manifest by having their bodies turned into different types of chocolate.

This makes clear that what is going on in the dream is not a symbolic replacement in order to disguise identity a la Freud, but rather an analogical manifestation of the introspected waking perception. Usually this involves the replacing of the waking person by someone else who stands in an analogical similar relationship to the dreamer, but the fact that the body of the person introspected about when waking can be used to express the analogy whilst leaving the person's identity intact, shows that the dream expresses itself in analogies rather than in symbolic disguise.

The next two short dreams also show how a person's body can be used to express an analogical relationship with a waking perception, whilst letting the person's identity remain the same.

Dream 17

> "I am pushing a bundle of old branches down to the cellar, the head of the upstairs tenant keeps appearing and disappearing at the centre of the heap of old wood."

The person who told me this dream had been lying in bed the previous evening listening to the noises being made by the upstairs tenant. He tried to dismiss this person from his mind with the thought of what a useless load of rubbish that person was. This is expressed analogically

in the dream when he pushes the tenant in the shape of a bundle of old wood down the cellar - the cellar because that is where we store 'old rubbish'. Here again the person's identity stays the same, but their body represents in an analogical form the emotionally arousing introspections concerning how the dreamer views the tenant as a person i.e. as a useless load of rubbish. His attempt to dismiss him from his mind is represented by his pushing him down into the cellar.

Dream 18

> "I saw a relative lying on a bed, his body is emaciated beyond recognition, only his face was familiar. I told myself that there was no need to worry because now he now could start to eat properly again and regain his weight loss."

The previous evening this relative telephoned me and told me that he was going on a starvation diet for forty days. From my knowledge of this person, I knew that any attempt to dissuade him would only make him more confirmed in his action. I reflected to myself that he should survive a month without food and then he could build his strength back up again.

This dream expresses, in the simplest and most obvious way possible, the essence of the introspection. As human

thinking is often metaphorical or entails a degree of abstraction, the dream analogue which has to be expressed as sensory perceptions, appears to be a metaphorical or symbolical representation. The person seen as a load of rubbish, turned into a load of firewood in the dream. Aunts whose excess weight is seen as being caused by eating too many sweet things are seen turned into different bars of chocolates. In most instances what is anticipated or introspected is not a change in a person's identity or how we imagine them physically, rather the person is part of an anticipated pattern of stimulation and the REM search for an analogue results in replacing all the people and objects in the anticipated or imagined scene with an analogous cast of characters, objects and behaviours.

In every case, the existing model that is programmed in the REM state is treated as though it is an incomplete or approximate model for which a more complete analogue must be sought from the world of sensory memory or experience. The dream that has just been described shows this process at work in the most simplest and obvious way. What has been anticipated in the waking situation is not a change in the dreamer's, or other people's behaviour or personality, or an anticipated scene, but simply a change in a person's physical appearance. The analogue that is identified during REM sleep does not require a new

identity, but that his present body be changed into an analogous form that would be representative of the anticipated image. In the event, the image that is chosen is the sort of body one sees on television documentaries of people starving in the third world. This dream then illustrates clearly the REM process of replacing the 'given' model with an analogically appropriate model using sensory memory.

Dream 19

> "Mummy I was upset last night, I had a bad dream. I dreamt I was in the car and it burst into flames."

This dream is included because the analogy with the waking experience is so immediately obvious. The dream was recounted by a twelve year old girl with Down's syndrome, to her mother who is a friend of mine. The previous day her daughter had gone on an outing with other children on a hired bus. They had to abandon the bus when smoke started coming from the engine. The dream is clearly an analogical recreation of the experience which the young girl must have pictured in her mind. The bus is replaced by her parent's car, the smoke is replaced by flames - perhaps anticipating that the relief bus which took them home might also be found to have smoke coming from the engine.

The next dream is interesting because it shows how a psychological theory is translated into a sensory analogue.

Dream 20

> "I'm walking down the street. I see a man throwing stones. I tell him off. He directs his attack at me. I run and start screaming for a policeman. The man runs after me. Now there is a policeman on the scene. The man who threw stones starts to talk loudly to the policeman, using emotive language blaming me. I reflect I had better speak up quickly or this guy would convince the policeman he was right. I start to shout loudly as well. I'm aware that the policeman can't listen to both of us at the same time, but at least I'm preventing the other guy from winning over the policeman to his viewpoint. The policeman says he will arrest both of us if we don't sort it out between us. I talk to the other guy and explain what the policeman said because he obviously didn't understand what was said. He is then prepared to be friendly.
>
> I go into the car park to get my bicycle as I live some distance outside the town. I find that my bicycle isn't there and I must have left it at home. I can't remember how I got into town. I must have got a lift from someone else, without thinking how I was going to get home. I realise that without my bicycle I have no means of getting home. I walk out of the car park and as I do so, I repeat to myself the sentence that I used to explain to the other fellow what the policeman had meant. The fellow is walking behind me and he repeats what I said. I feel embarrassed and ignore him."

The previous evening I had been reading a book on the lateralization of the brain by Blakeslee (1980) which described studies which showed that the left and right cerebral hemispheres process information differently. I

read of a patient who had undergone the split brain operation (severing of the corpus callossum which joins the left and right cerebral hemispheres together, in order to relieve severe epilepsy) whose right hand signalled his wife to come and help, even as his left hand pushed her aggressively away. It seems that strong emotions may be more associated with the right hemisphere. The right hemisphere, of course, controls the left side of the body and vice-versa.

I read of another patient who had his right cerebral cortex completely removed and who, as a consequence, was unable to find his way back from the bathroom. Other examples were given which showed that spatial intelligence and sense of direction is primarily a right hemisphere activity. Right hemisphere activities also appeared to be more involved in motor skills such as getting dressed. Following certain tests designed to stimulate the right hemisphere, subjects were observed to go into a dreamy state where they spoke little, sometimes didn't respond to their own name, but carried out the tests even more efficiently. It seems rather as though the subjects had gone into a trance state. Left hemisphere consciousness on the other hand (our normal state) is much more sensitive to speaking and comprehending language with a skill not possessed by the right hemisphere. (To talk of 'right and left hemisphere consciousness' is to take

speculation beyond that justified by the experimental evidence in the view of many psychologists. My dream is not concerned with an objective view of the evidence but rather with my subjective reactions to the views presented in Blakeslee's book).

The two hemispheres compete for dominance at any one time. As the left hemisphere has a slight genetic advantage (except in a small percentage of lefthanders) for language development, it becomes primarily the language brain whilst the right hemisphere becomes more able at processing spatial data. Usually the hemisphere that is best qualified for a particular task takes control.

Finally I read about stuttering. Experimental evidence was cited which showed that some stutterers don't have a well defined left hemisphere dominance for language. Blakeslee in the book, quotes a study by Jones (1966) of four patients who had stuttered since childhood. Each of the four had a damaged speech area on one side of the brain. The damage was of recent origin and unrelated to stuttering. A Wada test showed that the speech was controlled by both hemispheres; after the damaged area was surgically removed, the patients ceased stuttering and regained normal speech. The patient's stuttering was evidently caused by both hemispheres having developed a capacity to control speech. A post-operative Wada test

showed that speech was now controlled by one hemisphere only. It was easy to imagine that the false starts which a stutterer makes when he tried to speak could be caused by both speech areas trying to speak at once.

The dream makes manifest my introspection concerning these aspects of brain lateralization, as the following points make clear:-

(1) The man throwing stones as I walk down the street represents the aggressive potential of the right hemisphere as shown in the example of the 'split-brain' man whose left hand tries to attack his wife, even as his right hand seeks her help. I reprimand the man in the dream representing the left hemisphere, which is what I imagine the previous evening would actually happen in that situation.

(2) In the next dream scene, I call a policeman representing 'control of the brain'. When the policeman arrives the stone-throwing man talks loudly in emotive language to try to get the policeman to accept his version of events. The man's emotive language represents the right hemisphere's better ability to understand the emotive connotations of language. I (the left hemisphere consciousness) realise that I will have to compete with this guy if I am to prevent the policeman from accepting

his viewpoint. This scene analogically represents the competition between the two hemispheres to win control. The policeman says that if we can't sort it out between ourselves he will arrest both of us (arrested development).

(3) I (left hemisphere) have to explain to the man (right hemisphere) the meaning of what the policeman has said, thus analogically demonstrating the left hemisphere's better language comprehension and expression. Following my explanation, the right hemisphere is prepared to be friends, analogically demonstrating that the hemisphere best qualified to take charge, usually does.

(4) In the next scene, I go into the car park to get my bicycle only to find that it's not there and I have no idea how I arrived there or how I'm going to get back. I assume someone else (right hemisphere) must have given me a lift. This scene analogically represents the left hemisphere's dependence on the right hemisphere's superior spatial ability and sense of direction. In explaining the unconscious mind I often use the example of riding a bicycle as an acquired skill that has become an unconscious motor programme, something we do without thinking about it. In the same way, Blakeslee suggests we depend on the right hemisphere to take us to and from familiar places without having to think about it. In the

example given in the book the person who had their right hemisphere removed could not find their way back from the bathroom. At first it seems rather surprising to look for a bicycle in a motor car park, until we realise that the dream is using the motor car park as an analogical image to represent the right hemisphere's greater involvement in our unconscious motor programmes which the brain has acquired, such as cycling and getting dressed. Note also that we look for a 'space' to park our motors in a car park, and these programmes are concerned with 'spacial' intelligence.

(5) The final scene represents the last point in my previous night's reading that I introspected about, namely the possible influence of brain lateralization on the development of stuttering. When a person stutters they repeat the same syllable or word over and over again. This is represented analogically in the dream when I repeat the same sentence I had said previously. This sentence is repeated again by the stone-throwing man following me i.e. 'right hemisphere'. This scene then is an analogical representation of the stutterers having language ability controlled by both sides of the brain and the dual control causing interference by repeating the same words or syllables. The fact that I (left hemisphere) say the sentence twice, and the right hemisphere, represented by the man following me, repeats

the sentence only once, analogically demonstrates the greater involvement of the left hemisphere in language production. In the dream I feel embarrassed by the repetition of the sentence and ignore it. This is what the stutterer usually does, he presses on with what he is trying to say despite his embarrassment caused by the repetition.

When I first recalled this dream in the early morning, I thought it was an incomprehensible jumble of images, but from previous experience I know that this is a typical and misleading reaction derived from our left hemisphere's logical thinking. The ability to discover analogies seems to be a right hemisphere activity. I forced myself to record the dream before I forgot it. When I started to think about the possible meaning of the dream a little while later, and also reflected on what I had read and did the previous day, I quickly saw the analogy with the reading I had been doing the evening before about the left and right hemispheres. I didn't see all of the analogies straight away. I stimulated my analogical thinking process by thinking about the dream's possible meaning, and then waited to see what would result. A couple of hours later the meaning of the car park i.e. parking place for motor programmes flashed into my mind. A little later the meaning of the repeated sentence, i.e.

its analogical relationship to stuttering, flashed into my mind.

The decoding of the dream's analogies requires the ability to break down the dream into individual scene and to consider what the possible meaning of those scenes could be in the light of our previous day's activities. This process will stimulate an on-going analogical search that may lead to the discovery of where the meaning lies. Finally, we have to compare the individual components of the dream to the components of the introspective waking experience that has been identified to see how good a fit there is. Sometimes the fit is simply not good enough i.e. components left unmatched. The analogical search has to continue until a satisfactory match between the components of the two patterns are found, before we can be sure that we have identified the analogous waking introspective experience on which the dream is based. It will be seen later when we consider dreams and creativity that these processes are similar to the processes involved in creative discoveries and problem solving.

Since this dream is concerned with the relationship between the right cerebral cortex and the left cerebral cortex, this is an appropriate place to consider a study by Hoppe (1977) relevant to this point. He reports on a

study of 12 commisirotimised together with a patient (Mrs. G.) whose right cerebral hemisphere had to be totally removed due to recurrent glioma. Mrs. G. reported a dream in which a doctor and a psychiatrist drove her to a restaurant and treated her to a lobster and martinis - exactly as it had happened in working life. Our theory would lead us to suggest that Mrs. G. must have relived the experience in her waking imagination, and consequently the experience became manifest in a dream, but without a right cerebral hemisphere it was not translated into an analogical experience. This finding fits very neatly with the evidence that the right cerebral cortex is biassed in favour of processing analogical and metaphorical thinking, whilst the left cortex is biassed in favour of digital language and logical analysis (Bogen, 1969, Watzlawick, 1978).

Hoppe's study of the twelve commissirotomized patients' dreams showed that they appeared to be conscious daydreams without symbolization. If this observation is correct it again suggests waking introspections giving rise to dreams which, as a result of severing the right hemisphere from the left, may retain their original format and are not, therefore, converted into analogical sensory experiences.

Dream 21

"I am treking through America with David Niven and a younger man. Presently I am in a toilet with a door which is half made from glass, school children can look in. I see some blood on my clothes and I realise my period has started. I go into a shop to purchase sanitary towels. The shop assistant was not very helpful. He tries to sell me things I don't need and seems reluctant to sell me what I want. By the time I get what I want, I am getting very worried as it is getting very late and dark outside."

The subject who told me this dream thought it was related to a television play she saw the night before, in which a school teacher appeared to rush out of the classroom because her period had started. The television programme provides part of the analogy expressed in the manifest content of the dream but more importantly it served to reactivate the memory of the traumatic events of previous weeks. The dream deals with events which she anticipated might have happened,and the emotions which were stimulated by the anticipation of those events during the preceding few weeks. The dreams can be analysed as follows:- David Niven represents her husband in the dream. He was at that time reading a biography of David Niven, although unlike her husband David Niven was an old man at this time, this can be seen as a pun for her 'old man'. The younger man stands in for her young family doctor with whom they had started a series of investigations to find out the cause

of their infertility - hence the trek through America, land of pioneers and explorers of unknown territory.

A few weeks previously at the hospital where she worked as a staff nurse, she suddenly developed a severe pain in her pelvis and had to stop work. (Note the analogy with the television programme where the young teacher rushes out of the classroom because her period had started). She was admitted to a ward with a door which had shutters on the outside which could be pulled back allowing the nurses to look in. These nurses were mainly student nurses. The door with the shutters, which the student nurses could pull back and look through, is analogically expressed in the dream by the half glass door which the school children could look through.

The unhelpful shop assistant refers to the medical registrar who continued to explore a diagnosis of ectopic pregnancy, despite her conviction that this could not be the case. The subsequent operation, showed that she had endometriosis involving the rupturing of blood filled cysts near her reproductive organs, hence the analogy of her period starting. In the dream she starts to get worried when she realises it is getting late and she is still waiting for the correct article to absorb the blood. In the real life situation she was discharged from hospital and an operation was scheduled for the following

week. Continued pain, whilst waiting for the operation, made her fear that the operation might come too late, hence her worry in the dream that it is getting late and dark outside.

We can see, therefore, that the dream expresses in analogical form her re-activated anticipation or introspection of the events leading up to her operation. The memory of those traumatic events in the recent past was re-activated by an event in the present (i.e. the television play).

We shall shortly see that Freud's 'specimen dream' of 'Irma's Injection' follows exactly the same pattern and had Freud realised this fact, he would have been instantly able to disprove his own theory of dreams.

FREUD'S SPECIMEN DREAM & JUNG'S 'HOUSE DREAM'

We will now take a look at Freud's specimen dream "The dream of Irma's injection". This is the key dream sequence in Freud's book "The interpretation of dreams". Using historical evidence it will be shown that the traumatic but very relevant events in Freud's life which occurred in the preceding months and the trauma which was reactivated the night before his dream by the remarks of a visiting friend provide the key to understanding this dream. With the aid of these facts it will seen that an explanation of Freud's dream emerges that is far different from the explanation arrived at by Freud himself. It will be seen that Freud's dream is a precise metaphorical re-enactment of specific historical events in his life concerning which he was much troubled. The dream is as follows;

> "A large hall - numerous guests, whom we were receiving -among them was Irma. I at once took her on one side, as though to answer her letter and to reproach her for not having accepted my solution yet. I said to her: If you still get pains it's really your own fault! She replied: if only you knew what pains I've got in my throat and stomach - it's choking me - I was alarmed and looked at her. She looked pale and puffy. I thought to myself that after all I must be missing some organic troubles. I took

her to the window and looked down her throat, and she showed signs of recalcitrance like women with artificial dentures. I thought to myself that there was really no need for her to do that - she then opened her mouth properly and on the right I found a big white patch: at another place I saw extensive whitish grey scabs upon some remarkable curly structures which were evidently modelled on the turbinal bones of the nose - I at once called Dr, M. and he repeated the examination and confirmed it. Dr. M. looked quite different from usual, he was very pale, he walked with a limp and his chin was clean shaven.... My friend Otto was now standing beside her as well, and my friend Leopold was percussing her through her bodice saying: she has a dull area low down on the left. He also indicated that a portion of the skin on the left shoulder was infiltrated (I noticed this as he did), in spite of her dress....M. said 'there's no doubt about it it's an infection, but no matter dysentery will supervene and the toxin will be eliminated'.... We were directly aware, too, of the origin of the infection. Not long before, when she was feeling unwell, my friend Otto had given her an injection of a preparation of propyl propyls,.... propionic acid.... trimethtylamin (and I saw before me the formula for this printed in heavy type).... Injections of that sort ought not to be made so thoughtlessly.... and probably the syringe had not been clean."

Freud had this dream on the night of the 23rd-24th July 1895. He regarded this dream and his interpretation of it as so significant that he called it his 'specimen dream' and devoted some fourteen pages to its analysis in his book "The Interpretation of Dreams". He even wrote to his close friend Fliess on the 12th, June 1900:- "do you suppose that some day a marble tablet will be placed on the house, inscribed with these words: In this house on July 24th 1895, the secret of dreams was revealed to Dr. Sigmund Freud". From Freud's discussion of the background

to the dream we know that on the previous day he received a visit from an old friend who was also the family paediatrician, whose name was Dr. Oskar Rie. Earlier in his career he had been Freud's assistant and collaborated with him on a scientific paper. In Irma's dream Freud calls him Otto. Otto had come direct from Irma's home where he had been staying with her and her family. Freud asked him how Irma was and he replied "she's better but not quite well". Freud was annoyed by Otto's reply as he fancied that he detected a reproof in the reply to the effect that he had promised the patient too much. He gave no indication to Otto of his feelings but that night he worked late, writing out a case history to give to Dr. M. (Dr. Josef Breuer, a senior colleague and a collaborator with Freud on a book on Hysteria).

Freud goes on to give lengthy associations to each element in the dream and, finally, concludes that the main instigating force for the dream was a wish to exonerate himself from any blame for the lack of complete success in the treatment of Irma's condition. This is achieved by (a) blaming Irma herself for not accepting his solution (b) because the pains were organic in nature they were not therefore treatable by psychological means and (c) because Otto had caused the pains by giving her an injection with a dirty needle. The above reasons are, as Freud himself noted, mutually exclusive. The dream also

gave him his revenge on Otto by making him responsible for Irma's condition.

From the evidence which has so far been recounted, we are aware that all the elements in a dream stand for something else, with the exception of where someone's presence is felt but not perceived. We can, therefore, conclude that Freud's explanation for the dream, based as it is on the manifest characters, is wrong. However, on the basis of a paper by Schur (1966) in which previously unpublished letters of Freud to his friend Wilhelm Fliess are included, we can with some certainty identify the true meaning of Freud's specimen dream.

We learn from these letters that Freud had treated a young woman named Emma Eckstein, a spinster aged 27, in March 1885 for hysterical nose bleeds. He called his friend Fliess, a nose and throat specialist, to examine her to see if there was a somatic basis to her illness. Fliess had not only operated on Freud himself but was also at this time Freud's major confidant and expressed complete confidence in Freud's theories. Fliess travelled from Berlin to Vienna to examine Emma and operated on her nose on the 4th March. Freud wrote to Fliess telling him that the swelling and bleeding hadn't let up and that a foetid odour had set in. He goes on to say that he called in

another surgeon G. who inserted a tube to help the drainage.

Four days later he writes again to Fliess telling him that profuse bleeding had started again and as surgeon G. was unavailable he had called in surgeon R. to examine Emma. While cleaning the area surrounding the opening, R. suddenly began to pull at a thread, and before either of them had a chance to think, at least half a meter of gauze had been removed from the cavity. This was followed by profuse bleeding. A piece of iodoform gauze had been left by Fliess in the cavity some two weeks earlier. This had interfered with the healing process and was the source of the foetid smell. He goes on to say that the leaving of the gauze was an unfortunate accident that could have happened to the most careful surgeon and he reassures Fliess of his complete confidence in him.

On the 28th March 1895 he again writes to Fliess reassuring him about Emma's condition but by April 11th he is again writing to Fliess telling him that Emma's condition has deteriorated. There was a further highly dangerous haemorrhage and that these were "gloomy times, unbelievably gloomy" and that he was "really very shaken".

On the 20th April he replies to a letter from Fliess, telling him that his suggestion that they could have waited was completely impractical, indeed if the surgeon had sat around and waited, Emma would have "bled to death in half a minute". However, he goes on to reassure Fliess that he remains for him "the prototype of the man in whose hands one confidently entrusts one's life and that of one's family".

These traumatic events occurred some three months prior to the Irma dream on the night of the 23rd July 1895. These must have been profoundly anxious times for Freud. A patient was in danger of losing her life as a result of a mistake made by a surgeon he had recommended who also happened to be (at that time) his closest friend. Freud's confidence must have been badly shaken.

Indeed we may well suspect that it was because of these traumatic events that he was so sensitive to what he felt was an implied rebuke in his old friend Otto's remark about Irma's treatment. No doubt his reaction of staying up late to write out her case history in order to justify himself, also helped to bring back in full force to his mind the traumatic events which we have recounted. In fact Schur noted, when he published these letters of Freud to Fliess, that there were many resemblances between the traumatic events recounted in the letters and Freud's

dream of 'Irma's injection'. However without the benefit of the theory developed in this thesis he was, perhaps, unlikely to do the full structural comparison which is necessary to show that the dream of 'Irma's injection' is a precise analogical restatment of the traumatic events of Emma's treatment. It is a re-enacted analogical scenario of those events with Freud's introspected views about Fliess' blame made abundantly clear to everyone, including Fliess.

The setting for the dream is the party to be held the next day to celebrate his wife's birthday. Among the guests is Irma who Freud takes aside to rebuke for not having accepted his solution. Freud tells us that Irma (a name used by Freud to protect the patients identity) was a young widow and a friend of the family. Masson (1984) has produced evidence from a number of sources which identify Irma as Anna Hammerschlag, a young widow whose husband died a year after their marriage, and who was the godmother of Freud's daughter Anna. She was briefly treated by Freud at this time. This manifest dream character of Irma-Anna was an analogical replacement for Emma Eckstein as will become clear.

Freud's friend Fliess propounded a bizarre theory that the nose and sexual organs were intimately connected and that somatic symptoms, allegedly arising from masturbation,

could be cured through nasal surgery. Both Irma-Anna and Emma were referred by Freud to Fliess for nasal examination. Fliess as we have seen recommended and carried out nasal surgery on Emma Eckstein, to remove the turbinate bone in her nose with near fatal consequences. Fliess who was at that time an inexperienced surgeon advocated this entirely unnecessary operation on the grounds that it would help her recover from what his theory said were the harmful effects of masturbation. Following the operation Fliess returned to Berlin. No doubt Freud was irritated, as in the dream, when following the operation she still complained of somatic symptoms. When he examines Irma in the dream she shows signs of recalcitrance; in his letter to Fliess of the 4th March 1885, he tells him that he encountered "resistance to irrigation".

The throat in the dream is, of course, an analogy for the nose. This is made quite clear in the dream when he looks down her throat and sees structures similar to the turbinal bones of the nose. Freud tells us (ibid p.117) that it was Fliess who had drawn scientific attention to the relationship between the turbinal bones and the female sex organs. Freud goes on to tell us in the dream that his examination revealed 'a big white patch' and 'whitish grey scabs' upon these structures i.e. the operation site. He at once calls in Dr. M., (from his association to the

dream this is known to be Dr. Breuer), a senior colleague of his, who confirms his examination. This parallels the events recounted to Fliess in his letter of the 4th March 1885, where he says that because of the pain and oedema he let himself be persuaded to call in Dr. Gersuny who said that access to the cavity was restricted and inserted a rubber tube to help drainage.

Freud notes that Dr. M. did not have his usual appearance but possessed the physical characteristics of his older half brother. In his letter of the 8th of march, Freud tells Fliess that Dr.Gersuny had behaved in a rather rejecting way towards him during his visit. This explains why the character in the dream standing for Gersuny, is a composite of Dr. M. and Freud's half brother, both of whom, Freud tells us in his associations to the dream, had recently rejected a suggestion which he had put to them.

We are next told that Otto was standing beside the patient. Otto (Dr. Oskar Rie) is the analogical replacement for Fliess in the dream. It's not surprising that Otto should have been Fliess' analogical substitute. Both men were friends of Freud, both were doctors, both had a professional relationship with Freud and his family and both had been involved in Freud's theoretical work.

Following the visit of Dr.Gersuny, i.e. Dr.M. of the dream, Freud wrote a series of letters to Fliess making him aware of each step in the developing crisis. We can see, therefore, how in a metaphorical sense he was standing beside the patient. In line with this view, Otto doesn't do anything from this point except observe what is going on.

Next in the dream sequence, we learn that Freud's friend Leopold is examining Irma. In Freud's letter of the 8th March 1895 we learn that he had to call in a Dr.R. to examine the patient because Dr.G wasn't available. We can see that the structure of the dream is working out exactly as it did in real life. In the dream, Dr. Leopold's examination indicates that a portion of the skin on the left shoulder was 'infiltrated'. Freud could see the infiltration in spite of Irma's dress. In the real life situation, Dr.R. pulled at something like a thread and a piece of gauze was removed - an 'infiltration' as it was a 'foreign body' (Freud's phrase as used in his letter) that should not have been left there from Fliess' operation.

Following this incident in the dream, Dr. M. intervenes again and gives the opinion "there's no doubt it's an infection ....etc." We have already shown that Dr. M. (Breuer) is the analogical substitute for Dr. Gersuny and, in real life, we again know from Freud's own letter of the

8th march to Fliess, that Dr. Gersuny did come the next day and assist Dr.R. in attending the patient.

We come next to perhaps the most important element of the dream sequence, Freud says "We were directly aware too of the origin of the infection. Not long before, when she was feeling unwell, my friend Otto had given her an injection of a preparation of propll, propyls.....propionic acid Trimethylamin (and I saw before me the formula for this printed in heavy type).....injections of this sort ought not to be made so thoughtlessly....and probably the syringe had not been clean".

The first thing to note is the time sequence 'not long before' i.e. before the sequence of visits analogically represented in the dream which, of course, corresponds exactly to the sequence in real life. Fliess had carried out his abortive operation before the sequence of other doctor's visits were set in train. Everybody in the dream, including Otto (i.e. Fliess), is aware that Otto is to blame, that he had been thoughtless and probably negligent in that the syringe wasn't clean. Freud may have felt protective feelings towards his close friend Fliess, following the discovery of Fliess' mistake, as indicated in his letters to him. The dream makes clear, however, that by the night before the dream, Freud had come to see that Fliess had been professionally negligent, and that

the other doctors who were subsequently called in, were also aware that it was Fliess who had been professionally incompetent. It would have been natural for Freud to review these events, from the point of view of who was to blame, on the night before his dream, as he was concerned that night with writing a defence of his own professional conduct in the case of another patient, whom he had also referred to Fliess for treatment.

The injection of Propionic acid .....Trimethylamin is again an analogy. Propionic acid is described in pharmacological reference books as having a 'putrid and rancid odour'. Freud in his letter to Fliess describes Emma's lesion as having a 'foetid' odour. I have been told by a medical friend that gauze left overly long in a wound gives rise to a 'particularly foul smell of rotting flesh.' The Trimethylamin again refers to Fliess. He had told Freud that it was one of the products of sexual metabolism. Fliess' operation removed the turbinate bone in Emma's nose in order to alleviate the deleterious effects of masturbation which he claimed gave rise to a 'nasal reflex neurosis'. We can see that this formula points the finger of blame at Fliess for being responsible for the foul smelling lesion in Emma's nose which resulted from his abortive operation.

Freud's dream of 'Irma's Injection' is therefore, a metaphorical simulation of the traumatic events of the 'Emma affair' in which everybody is made aware of where the blame really lies i.e. with Fliess. It is also apparent that Freud's sensitivity to the assumed criticism of his professional conduct, implied by Otto's remarks of the night before, re-awakened the trauma of his recent involvement in the 'Emma affair'. This patient nearly lost her life following her referral , by him, to his friend Fliess for unnecessary and unorthodox surgery. Just as he wrote the case history of Irma that night to make clear that he was not responsible for her continuing symptoms (recall that he had also referred her to Fliess), so the dream also makes clear that it is Fliess and not himself who is responsible for the mistreatment of Emma. In fairness to Freud it should be noted that he had complete faith, at that time, in what he thought was Fliess' unrecognoised genius and that his referral of patients to Fliess was done in good faith.

Little wonder then that Freud should have been so sensitive to what he saw as the implied criticism, made by his friend Dr. Oskar Rie, of his treatment of their mutual friend Irma. Indeed, as we have already noted, Freud felt so sensitive to this 'criticism' that he stayed up to write her case history. The case of Emma Eckstein

cannot have been very far from his mind as he addressed that case history to his mentor Dr. Breuer in order to, in his own words, 'defend myself'. He had referred both patients to his friend Fliess and one of them nearly lost her life as a result of Fliess' bizarre theories and incompetent surgery. Freud's introspections about that nearly fatal case including his acknowledgement of Fliess' blame are analogically expressed in his dream of 'Irma's Injection' exactly as predicted by the theory of dreaming presented in this thesis.

The meaning of another famous dream, this time dreamt by Jung, will now be considered in the light of the theory developed in this thesis. This dream and his interpretation of it, was as important in the development of Jung's theory, as Freud's interpretation of the dream of 'Irma's Injection' was in the development of his theory. In his biography (1964) Jung says "One (dream) in particular was important to me, for it led me for the first time to the concept of the collective unconscious". The dream is as follows:-

Jung's House Dream

"I was in a house I did not know, which had two stories. It was 'my house'. I found myself in the upper storey, where there was a kind of salon furnished with fine old pieces in Rococo style. On the walls hung a number of precious old paintings. I wondered that this should be my house and thought 'not bad'. But then it occurred to me that I did not know what the lower floor looked like. Descending the stairs, I reached the ground floor. There everything was much older I realised that this part of the house must date from about fifteenth or sixteenth century. The furnishings were medieval, the floors were of red brick. Everywhere it was rather dark. I went from one room to another thinking 'now I really must explore the whole house.' I came upon a heavy door and opened it. Beyond it, I discovered a stone stairway that led down into a cellar. Descending again, I found myself in a beautifully vaulted room which looked exceedingly ancient. Examining the walls, I discovered layers of brick among the ordinary stone blocks, and chips of brick in the mortar. As soon as I saw this, I knew that the walls dated from Roman times. My interest by now was intense. I looked more closely at the floor. It was of stone slabs and in one of these I discovered a ring. When I pulled it, the stone slab lifted and again I saw a stairway of narrow stone steps leading down to the depths. These, too, I descended and entered a low cave cut into rock. Thick dust lay on the floor and in the dust were scattered bones and broken pottery, like remains of a primitive culture. I discovered two human skulls, obviously very old, and half disintegrated. Then I awoke."

Interestingly, Jung was on a voyage to America with Freud in 1909 when he had this dream. On hearing the dream, Freud pressed Jung to uncover any wishes in connection

with the two skulls, obviously thinking that a death wish was the key to an understanding of the dream. Jung reports, that to satisfy Freud, he lied and said that they reminded him of his wife and sister in law. Freud appeared relieved on hearing this; no doubt because he thought Jung wasn't harbouring a death wish against him.

To Jung the house represented an image of his psyche. At the beginning of the dream he is on the first floor, the salon, which represents normal consciousness. The remaining floors represent different levels of consciousness. The cave represents the most primitive level of all, the consciousness of primitive man, which still lies buried in our unconscious. It was but a short trip for Jung to go from this analysis to his idea of a 'collective unconscious' i.e. a common store of vague racial memories and archetypes. Jung thought that these archetypical images could surface in dreams.

We are fortunate, as we were with Freud's dream, in having details of what Jung was much preoccupied by in the days prior to the dream. In his biography, Jung tells us that in the days prior to the dream "certain questions had been on my mind". Those questions were "On what premise is psychology founded? To what category of human thought does it belong? What is the relationship of it's almost exclusive personalism to general historical assumptions?"

For Jung to be so preoccupied with these questions, means that he introspected a lot about them, an activity that would result according to my theory, in dreams about his imagined explorations of these questions. It will become clear that Jung's dream can be seen as a metaphorical exploration of the last question, namely psychology's relationship to historical assumptions. Jung's exploration of the house in the dream is a metaphor for his introspective exploring of this question.

The house as Jung saw clearly is, of course, a metaphor for the psyche. The dream starts off with Jung being in a house he doesn't know, but yet it is his own house. The fact that the house is his own house represents the 'almost exclusive personalism' aspect of the question which Jung is exploring i.e. the house is his personal property just as the psyche is also a personal attribute. Yet he doesn't know the house, just as in real life he doesn't yet know the answer to his question about the psyche.

Each floor of the house corresponds to a different historical period. At the start of the dream Jung finds himself on the first floor of the house corresponding to the most recent historical period. This is quite a civilised period as can be seen from the eighteenth century style 'fine old pieces' of furniture together

with 'precious old paintings' suggesting that the contribution from the great masterpieces of the past had been retained and valued in this period. The fact that the furnishings, as Jung has noted, are mainly eighteenth century and rather old fashioned suggests Jung saw a time lag between historical influences and their manifestation in the psyche. It is relevant to note that, as Jung descends through the floors, the age of the building goes back further and further into the past. When Jung descends to the ground floor he finds that this part of the house must date from the fifteenth and sixteenth century. The furnishings are medieval and the floors are made of red brick. The fact that everywhere was rather 'dark' reminds one that we are dealing with the period of 'the dark ages' i.e. from the medieval period back to the end of the Roman empire.

Jung next descends a stone stairway that leads down to the cellar. He notes that the walls date from the Roman times, made as they were from 'stone blocks' and mortar which had 'chips of bricks' in it. The fact that the architecture of the room displays a beautifully vaulted room, suggests that Jung regarded the contribution of this period to the evolution of the psyche as a high minded one. 'The beautifully vaulted room' reminds one, of course, of a church and that we are dealing with the historical period in which christianity i.e. Roman

catholicism became dominant. Jung's father was a christian minister and Jung was well aware of the influence of the spread of christianity (Roman catholicism) in this period. The fact that this floor is unfurnished and no artifacts are seen, unlike every other floor of the building, also suggests that the contribution of this period is a non-materialistic one.

In the final sequence of the dream, Jung discovers a stone slab with a ring in the floor, that can be pulled up to reveal 'a narrow stone stairway' leading down to a low cave cut into the rock. This part of the building corresponds to prehistoric times. Jung has described the cave as looking rather like a 'prehistoric grave' and such graves are, of course, one of our chief sources of knowledge of those times. In the dream, Jung sees two half disintegrated human skulls and scattered bones in the thick dust of the grave, together with the remains of broken pottery. (Pottery vessels containing supplies for the journey into the next world often accompanied ancient burials.) This last floor of the house is in fact an underground stone cave, so that it is the only floor of the house that is not man made suggesting that the psyche of primitive man is as nature constructed it i.e. largely uninfluenced by 'historical assumptions'.

From this analysis of the dream it is clearly apparent that Jung's dream was not an intimation from a wise unconscious of the hitherto undiscovered existence of the 'collective unconscious'. It was simply a metaphorical representation of the question which Jung was introspectively exploring when awake, namely the relationship between personal psychology and history. Jung's interpretation of the dream arises because he hasn't realised that the dream is a metaphorical representation of the relationship between two variables, history and psychology . By focussing on only one of those variables, namely the psyche, Jung almost inevitably concluded that the other variable (history) was the answer. In his own words, "my dream was giving me the answer", by showing him the many levels of historical consciousness (i.e. the collective unconscious) still operating beneath the individual's personal consciousness.

Ironically, in a contribution to a book which he made just before he died (Jung etc al 1968) he offered a different explanation for the dream, this time focussing on the other variable in the dream i.e. history. He now saw the dream as representing a history of his intellectual development, the tomb with the skulls and bones corresponds to his paleological interests, the ground floor dating from the middle ages corresponds to the influence of his parents 'medieval concepts', the first

floor corresponds to more recent intellectual influences. This analysis, however, misses out the basement dating from Roman times.

If Jung had related his first analysis based on the psyche and his second analysis which focussed on historical development to the question he had been introspectively exploring prior to the dream, namely the relationship between these two variables, then he analysis might have turned out rather differently. It might have shown, as our analysis has shown, that his dream was an analogical representation of his waking introspections concerning the relationship between personal psychology and history.

We can now see the reason why the patients of Jungian analysts tend to dream dreams that appear to confirm Jungian theory while the patients of Freudian analysts tend to dream dreams that confirm Freudian theory. The subject matter of dreams are emotionally arousing introspections that remain unmanifested in the external world. Patients will introspect about their problems in terms of the theoretical framework in which the therapist sets them. This theoretical framework will be represented metaphorically or symbolically in the patient's dreams. The analyst then takes this symbolical representation of his own theory as evidence for the correctness of that theory. Just as Jung introspecting about the possible

relationship between the the psyche and history, had a dream in which those waking thoughts were metaphorically re-presented. He than put forward the dream images which were a metaphorical restatement of that waking speculation as evidence for the veracity of that same speculation. This position is not too dissimilar to a person who has a certain theory about human nature and than commissions the making of a film in which people act out his ideas. Subsequently, forgetting the origin of his film, he offers the same film as independent evidence for the correctness of his theory of human nature.

DREAMS AND PROBLEM SOLVING

(1) CREATIVITY AND DREAMS

The relationship between creativity and dreams has long been a matter for speculation. There are many recorded an ecdotes of dreams helping people to solve problems. This research is a case in point, it was inspired by a dream. An earlier attempt to explain the origin of dreams had been abandoned when I could see no way that the cross-species REM findings and the apparent complexity of human dreaming could be meaningfully intergrated. It was the perceived relationship between my own dream one morning and my waking introspections of a few moments earlier (see Dream 1) which suggested to me that there might be a lawful relationship between waking experience and dreaming and, that for an as yet unexplained reason, symbolism or metaphor might be the form in which that relationship had to be expressed. It was to take a further ten years research before the integration of these variables as presented in this thesis evolved.

That dream, however, is not directly comparable to other dreams which apparently gave rise to the solutions of

problems because in these dreams the actual content of the dream has a direct relationship with the problem being solved. Take for example one of the most famous anecdotes of all in this regard, Kekule's discovery of the structure of the benzene ring, one of the most important discoveries in the history of chemistry. He had been trying for some years to solve the problem of the molecular structure of benzene. He relates:-

"Then one afternoon I turned my chair to the fire and dozed. Again the atoms were gambolling before my eyes. this time the smaller groups kept modestly in the back ground, my mental eye, rendered more acute by repeated visions of this kind, could now distinguish larger structures of manifold conformation: long rows, sometimes more closely fitted together: all twining and twisting in a snake like motion. But look! What was this? One of the snakes had seized hold of its own tail, and the forms whirled mockingly before my eyes. As if a flash of lighting I awoke .... Let us learn to dream gentlemen". (Arthur Koestler, The Act of Creation).

The snake swallowing its own tail suggested to Kekule that the structure of this organic compound might be a closed ring. Would we be right in concluding from this that the dream solved the problem for Kekule which his waking conscious mind could not? This theory suggests an

interpretation of the events of the dream as follows: Kekule had worked hard on the problem trying out many different solutions but without success. He feels he is getting nowhere. He sits by the fire and starts to doze. The dream which follows expresses his frustration concerning the problem. He sees the 'manifold conformation; long rows, sometimes more closely fitted together:' i.e. the numerous solutions he had tried, some more closely fitting the solution than others. 'All twining and twisting in snake like fashion' - this suggests his continuing attempts to fashion or model the correct shape of the structure. 'What was this? One of the snakes had seized hold of its own tail, and the forms whirled mockingly before my eyes' - we see here an analogical expression of Kekule's frustration. His attempts at a solution are just going around in circles, the problem is making a fool of him i.e. mocking him.

Although the dream represents Kekule's frustration at not being able to find the correct solution to the problem, the image in the dream of going around in circles breaks him free from his mental set of linear solution to the problem and opens the possibility of a circular structure as providing the solution. Are we to assume then that it was pure coincidence that led to the selection of the image of the whirling circle to represent the feelings of frustration? Research by Dement (1972) suggests an answer

to this problem, but first we must consider how the creative process works.

The recognised stages in the creative process are preparation, incubation, illumination and verification (Wallace, 1926). We all have had experience of working on a problem (preparation), then leaving the problem aside, perhaps going for a walk (incubation) then suddenly a solution hits us (inspiration) and, of course, we have to check the solution (verification). The characteristic mode of functioning of the cognitive unconscious which 'incubates' the problem, is a holistic approach to the problem. The solution doesn't come from a logical analysis of the problem, although such an analysis is necessary in the preparatory stage, but in re-arranging the elements into a new pattern or seeing the existing pattern from a different perspective.

The process can be seen clearly at work when we apply the theory of dreams presented in this paper. First we study all the elements of the waking dream (preparation), then we leave it aside for a period of incubation and if necessary keep repeating this process until illumination comes. Then we verify the solution. We look to see if the underlying pattern or structure in the waking and dream experience are the same. Does each of the elements of the dream have the same emotional connotation for us as

each of the elements in the waking experience? Recognition of hidden structures or patterns is typical of creative problem solving.

It appears that successful problem solving in a dream may be a pretty rare phenomenon. Dement (1972) reports a study in which five hundred undergraduate students over three consecutive classes were given one of three problems to solve. They were told to study the problem for fifteen minutes before going to sleep and to record any dreams remembered in the night. If the problem had not been solved, he was to work on it for another fifteen minutes in the morning. The total number of problem solving attempts was one thousand one hundred and forty eight. It was judged that eighty seven dreams related to the problem and the problem was solved in a dream on only seven occasions. One of the problems was as follows:- "The letters O,T,T,F,F ... form the beginning of an infinite sequence. Find a simple rule for determining any or all successive letters. According to your rule, what would be the next two letters of the sequence?" The next two letter are S,S, The letters represented the first letters used in spelling out the numerical sequence one, two three, four, five, six , seven etc.

The following dream is one of those in which the problem was solved. "I was standing in an art gallery looking at

the paintings on the wall. As I walked down the hall, I began to count the paintings one, two three, four, five. But as I came to the sixth and seventh, the paintings had been ripped from their frames! I stared at the empty frames with a peculiar feeling that some mystery was about to be solved suddenly, I realised that the sixth and seventh spaces were the solution to the problem."

With a second problem, no dream was classified as actually solving the problem but twelve dreams were classified as 'mode of expression dreams'. The problem was to consider the letters H,I,J,K,L,M,N,O. the solution to the problem was one word 'water i.e. H to O or H2O. An example of a 'mode of expression' dream is as follows:- "I had several dreams, all of which had water in them somewhere. In one dream I was hunting for sharks. In another I was riding waves at the ocean. In another I was confronted by a barracuda while skin diving. In another it was raining quite heavily. In another I was sailing into the wind". This student had solved the problem to his own satisfaction before going to bed, with the word alphabet.

We have already mentioned that the type of holistic thinking that creative problem solving involves is the antithesis of everyday analytical approach. Rather than breaking a problem down, it involves looking at the entire problem from a different perspective. This is also the

type of thinking required to solve the problems in Dement's study. We have also noted how this type of creative problem solving is often facilitated by taking a break from the problem and getting into a relaxed frame of mind (incubation) and then the solution often 'hits' us. It may well be that the dream can, in a sense, provide the relaxed frame of mind in which a solution cam emerge. An individual's analogical thinking process may have arrived at a solution before dreaming, but he is either too tired or more likely too set in an analytical mode of thinking, for the solution to emerge.

Dixon (1981) has reported experiments where a subliminal stimulus appears in a subsequent dream. Dixon argues that in these cases the stimulus doesn't possess enough energy to get as far as waking consciousness so it emerges in the less controlled consciousness of the dream. Perhaps a similar phenomenon exists as far as dream problem solving is concerned. A solution that doesn't possess enough energy to break through into consciousness, either because of existing cognitive sets being too rigid or because the person is not in a suitably relaxed frame of mind, may become manifest in a dream sequence.

How the solution will become manifest will depend on how the person anticipates what will happen in his dream. In the first example given, the subject has the solution

expressed clearly in an analogous setting. He is looking at paintings in an art gallery, this is an analogy for his anticipation of looking at the images in the dream. The sixth and seventh paintings had been ripped from their frames symbolizing the missing two letters which had to be found in order to solve the problem. He expects the problem to be solved in a dream. He looks at the blank paintings with a feeling that some mystery is going to be solved. He realises that the sixth and seventh spaces are the solution to the problem.

This dream then is an analogical representation of what this student anticipated would happen in a dream that night. This student's analogical thinking process had probably arrived at a correct solution before the dream occurred. Consequently the anticipated solution provided in the dream was an accurate analogy of the correct solution. This is in contrast to the great majority of dreams that were reported which concern the problem but in which the correct solution did not emerge.

In the second example that is given, the student wrongly thought that he had solved the problem before going to sleep. In that case, this theory of dreams would lead us to expect that, for the solution to appear in the dream, it would have to be incorporated into the on-going imagery of other dream themes since he no longer anticipated a

solution in his dream. This would be very similar to the subliminally presented images previously mentioned which were incorporated into the ongoing dream sequences. This student reported having had several dreams in which water was the main symbolism. However, the dreams were not about the problem, or about water being the solution to the problem, but rather the symbol was used to express a personal concern for the future, a fear that he was heading into 'dangerous waters'. This students analogical thinking process had arrived at the correct solution namely 'water' but because the student wrongly believed alphabet to be the solution, it did not emerge into waking consciousness and like a subliminally presented stimulus it was favourably disposed to be incorporated into the symbolism or analogies of a dream, expressing a different waking anticipation.

Similarly with Kekule's dream, no doubt his analogical thinking process had arrived at a correct solution but a suitable frame of mind for its emergence may not have arrived before Kekule fell asleep, or because his conscious mental sets were too rigid to permit the solution to emerge, so the solution was favourably disposed to be incorporated into the symbolism or analogy expressing some waking anticipation in a dream. In this case Kekule's fear that the problem was making a fool of him is expressed appropriately by the snake chasing its

own tail, 'mockingly' going round in circles. Thus we see that dreams in which problems are solved, do not present a difficulty for the theory of dreams presented in this paper; indeed it has been shown that such solutions emerge in a form that is in accordance with what would be predicted from this theory.

(2) DREAMS, METAPHORS AND PSYCHOTHERAPY

The evidence presented in this thesis shows that dreams are an analogical or metaphorical acting out of the introspections that give rise to drive schemata which remain active at sleep onset. It has also been shown that metaphorical communication is an intrinsic part of the way human beings understand and communicate their experience. The question arises as to whether this new understanding of dreaming leaves a role for dreams in psychotherapy.

Dreams are metaphorical expressions and metaphorical expression may be more widespread in waking life than is generally realised. A sudden burst of song, for example, very often is also a metaphorical expression of how a person is feeling about a certain issue. A woman who didn't want to get pregnant, though her spouse wanted her to, was frequently heard to sing, 'what do you get when

you fall in love, you get enough germs to fill an ocean, that's what you get for your devotion.' As a nurse, this lady was well aware that the average male ejaculation contains millions of sperm, i.e. "enough germs to fill an ocean"- If you don't want to get pregnant.

On another occasion a friend was worried about his job, when his wife read out loud a number of suitable job vacancies from the paper, the friend suddenly sang: "Through the eyes of love you can see a thousand stars". The metaphorical connection between the stars and the job opportunities is obvious. Congratulating a relative, who had come to live with the writer, on his new meaningful role in life, he suddenly sang: "what would you do if I sang out of tune, would you get up and walk out on me". The song metaphorically expresses his worry as to how the writer might react towards him, if his new occupation didn't work out. A friend who was known to be worrying about his business overdraft was frequently heard singing: "I've sold my soul to the company store".

Once one becomes sensitised to the prevalence of metaphor in the communications which people make, one may be surprised to discover that an apparently irrelevant anecdote which a friend or relative suddenly feels inspired to tell, may be an actual metaphor for how they feel about an aspect of your relationship with them, which

they are consciously reluctant to communicate. The writer recently conducted a weekend workshop at a small residential college. A couple whom the writer knew quite well were also spending the weekend at the college at the invitation of one of the workshop participants who lived in the college. As the weekend progressed it became evident that our mutual friends felt somewhat excluded from what was going on. Yet it was felt, at that stage, inappropriate to invite them to participate in the workshop. At the end of the weekend the writer was speaking to one member of the couple when she suddenly felt impelled to tell him the following anecdote:-

> "We recently visited some old friends, John and Julia Clare whom we hadn't seen for some time. We hadn't been invited to see them, we just decided to call on them on the spur of the moment. They were very cool, John said that he was expecting friends that had been invited around. i didn't know why he should have treated us like this, especially when you consider how often he has visited us and brought his friends around to our house."

My friend looked at me intently as she told me this anecdote and seemed satisfied on noting the writer's perplexity as to why anyone should behave so unreasonably. Her anecdote is a perfect metaphorical description of her frustration at not being invited to participate in the seminar. It may well be, that this unconscious communication of her frustration at being excluded from the weekend workshop obviated the need for

her to have a dream that night to de-activate the activated drive schema underlying her frustration.

The use of metaphor has been part of ancient teaching traditions since time immemorial. Such stories can have multiple levels of meaning and were designed to bypass the limitations of the conditioned mind in order to allow a more objective assessment of the message contained in the story (Shah 1964). There is the story of the village where all the residents were blind, and an elephant, a creature unknown in those parts, wandered into the village one day. One villager felt it's leg and decided the animal must be some kind of walking tree, another felt it's rough skin and argued that it must be a still living dinosaur, whilst another felt it's trunk and argued that it was some kind of reptile. Each of the blind investigators perceived one part out of many and each had perceived that part in a biassed way. Each was convinced that his theory was correct.

This story, on one level, beautifully illustrates and brings home to a person the fallacy of jumping to conclusions from inadequate data in a way that digital language could never do. The increasing use of metaphor in psychotherapy today owes much to the work of the late Dr, Milton Erickson, the American psychiatrist, generally acknowledged as one of the greatest clinical

hypnotherapists, and one of the most effective psychotherapists of his generation. He believed that appropriate metaphors can bypass the limitations of conscious mental sets and mobilize the resources of the unconscious mind for therapeutic change. (Erickson M.H., 1980, Rosen S. 1982).

The dream which a patient brings to a therapist may be a powerful metaphorical statement of how the patient sees himself, his problem or his relationship to the therapist. Three dreams which were told to the writer during a psychotherapy workshop which he was conducting can illustrate this point. Participants were asked if they had any dreams that they would like help in understanding. The first dream is as follows:-

> "I'm walking along a beach accompanied by a man I know, although I didn't see his face. There are 21st century buildings along the beach. Although somewhat fearful,I accompany the man into the sea for a swim. Our movements stir up a lot of muddy water, which arouses a monstrous fish which chases us. The fish follows us into a 21st century building, where, to the relief of both of us, the man stabs it to death with a Knife."

The dreamer felt the dream was significant but felt alienated from the meaning offered by her therapist. Her therapist's explanation was that the monster represented her emotional self which didn't want to make decisions, and the man represented the decisive part of her which the dream showed was now taking charge. The dreamer felt that she would want to understand the emotional side of herself not kill it. She also mentioned that her therapist belonged to a school of psychotherapy that regards itself as taking insights from Freud and Jung a major step further.

Although it is not possible to be entirely certain what the dream means, it seems likely on the basis of evidence discussed in this paper that the dream is a metaphorical reflection of the dreamer's introspection concerning her therapy. The 21st century buildings reflect the ideological belief that this therapy is a more evolved form than other current forms of psychotherapy. The man accompanying her stands in for her therapist. The swim in the sea, stirring up muddy water, refers to her therapy and the investigation of the "not pleasant" experiences in her past which she said took place during the sessions with her therapist. The monstrous fish is a metaphor or symbol for what might be uncovered during this investigation of her murky past i.e. stirring up the dirty water. The fact that the man kills the monstrous fish in

the 21st century building reflects her belief, that this futuristic psychotherapy would be able to get rid of any emotional monsters that might be released. The dreamer on hearing this explanation felt that it intuitively made sense, and was much relieved. Had her therapist been able to correctly interpret her dream it would have reassured the client, let the therapist know the client's fears and positive expectations, and not alienated the client, which the wrong interpretation offered succeeded in doing.

The second dream was a recurring dream which the dreamer had on a number of occasions for many years. The dreamer had recently completed her training as a psychiatric nurse. The dream is as follows:-

> "There is an old castle, with a central court yard, I am three storey's high on an external stone landing that runs around the outside of the building. i am running away from a man who is chasing me. Part off the pathway ahead of me has collapsed, there are stones lying around. I am trying to make my way past the broken part of the landing by walking close to the building."

If we examine the dream from the point of view of an analogy or metaphor for the way she sees something happening in her life, then the dream obviously relates to a recurring anxiety that she has. The dreamer is under stress from two sources, her unknown pursuer and the collapse of the pathway ahead of her. The fact that this dream has been repeated for a number of years indicates

that either a particular situation keeps recurring or the dreamer has a characteristic way of perceiving challenging situations.

In either case, the dream gives a picture of how this dreamer sees herself reacting in certain situations that straight forward questioning would not reveal. The dream is not only an accurate metaphor of a given situation in the dreamer's life, it also presents the therapist with a powerful metaphor that can be utilised in the client's therapy, as will be demonstrated with the next dream.

The third dream is also a repetitive dream, that was very enjoyable for the dreamer, but had recently changed and taken an unpleasant turn. The dream is as follows:-

> "I find the pony, which I used to have when I was young, and on which I won many riding events. I again mount the pony wondering if it still has retained it's racing ability. To my joy and surprise it has still got it's old ability."

The dreamer recalled having had this dream on a number of occasions with intervals of up to one year. Some months ago he had again dreamt about his pony, but the dream had changed:-

"I find my pony in a neighbour's field, the pony is dying, there is nothing I can do to save it. I feel a great sense of loss."

The dreamer had been given this pony by his father, it was by far the best of a series of ponies he had been given. He had been very successful in winning competitions with this pony. He very much regretted when his father sold the pony because he had got too big for it.

From what the dreamer had said about the pony being associated with achievement and personal success it seemed likely that the first dream metaphorically reflected periods of his life when the dreamer had surprised himself by rising to some challenge.

Information was elicited from the dreamer that supported this explanation, and the dreamer further noted that he was undergoing changes in his career, and that he at present felt insecure since he was only part-time employed and doubted that he would be able to succeed in obtaining fulltime employment in his new chosen career. The change in the dream can be clearly seen to be a metaphorical representation of his introspected self doubt. Again these dreams give a vivid picture of the dreamer's predicament that a word description on its own could not

display. Furthermore the powerful personal metaphor of the pony could be utilised in many ways to help the person find the personal resources needed to make the best of the possibilities within his present situation. It is important to note that this dreamer's pony is not dead, and that should he find the personal resources to rise to his present challenge, he might well find himself re-discovering his pony healthy and strong in a future dream.

Although a person is conscious of the contents of their introspections, they may not have the objectivity to distance themselves from them to perceive the influence of those introspections on how they experience their life. The dream, when perceived as a metaphor, may provide that sense of distance and realness that enables the dreamer to perceive his situation with a new objectivity. It can further provide the therapist with an insight into the dreamer's situation, which verbal language would find difficult to convey. It also gives an honest perception of how the dreamer really feels. It can provide a powerful metaphor which the therapist may choose to use in his therapeutic intervention by reframing the implications of the metaphor so that it has a positive outcome. The sense of wonder and of unknown personal resources which can be evoked in a client by discovering that a part of them has the ability in dreams to create powerful

metaphorical visions relating to their problems should also not be overlooked.

To understand the origin, meaning and function of dreams is to realize that most dreams may be routine productions, whose goal is usefully accomplished though they are not consciously recalled. This need not blind us to the potential insights that can be gained from those metaphorical productions whose beauty, bizarreness or dramatic intensity enable them to cross the threshold into waking consciousness. The bath can be allowed to empty on most occasions without a second glance, on those occasions when someone pauses to take a second look, it may be that the baby is still in the bath.

CONCLUSION AND SUMMARY

In the introduction to this thesis there is a quotation from Professor Hudson's (1985) book on dreaming, in which he concludes that what is needed is a synthesis of the biological and psychological perspectives which would provide a more "rigorous explanation" because it would unite the "formal properties implicit in the meaning of dreams" with the "biological considerations" of dreaming. The theory of dreams set out in this paper attempts to do just that.

The research began with a hypothesis, similar to that put forward in Hall's (1953) cognitive theory of dreaming. This sees dreams as expressing in a pictorial medium a continuation of waking thought processes involving personal concerns. The continuing collection of both my own and other people's dreams and the identification of the corresponding waking experiences made clear that dreams were not simply a continuation of waking thoughts expressed pictorially. My analysis showed that dreams were an analogical or metaphorical expression of what appeared to be the most important waking concerns of the previous day.

In line with this hypothesis I set out to predict the themes of my dreams on the basis of the most personally important or emotionally involving concerns of the previous day. There was a limited degree of success with this experiment. Some of my predicted dream themes materialised as dreams. What did become clear from this experiment was that dreams did represent waking concerns. That these waking concerns were expressed in the form of a sensory analogue. However the failure of certain important waking concerns to feature in my recorded dreams strongly suggested that the hypothesis was incomplete. An examination of predicted dream themes that failed to materialise indicated that only those concerns which caused emotional arousal, which was not expressed, became the subject matter of dreams.

From this preliminary research emerged my first hypothesis namely that dreams represent unmanifested emotionally arousing introspections (activated drive schemata) from the previous day expressed in the form of a sensory analogue.

My second hypothesis follows from this hypothesis. It states that the function of dreams is to de-activate these emotionally arousing schemata so that the resources of the cortex and limbic system can be released to deal with the emotionally arousing contingencies of the next waking

period. My third hypothesis deals with the reason for the expression of these activated drive-schemata in the form of sensory analogues. To suggest an answer to this question a review of some of the biological and evolutionary evidence was necessary.

The scientific evidence which shows that dreaming and the REM state are closely allied, but not exclusively so, was reviewed. The REM state occurs periodically throughout sleep and is characterised by bursts of rapid eye movement, inhibition of antigravity muscles and an inhibition in the processing of external sensory data. Vivid dreaming usually accompanies REM sleep in adults and children.

The REM state in the human fetus occupies most time during the last trimester of pregnancy and the time spent in REM sleep progressively decreases after birth reaching a plateau in adulthood of around 20% of overall sleep time before declining still further in old age. The predominance of the REM state in the fetus during the final stages of pregnancy and it's subsequent decline is characteristic of nearly all mammalian species and avian species. This finding supports Jouvet's (1978) theory that the REM state exists for the programming of instinctive behaviour. His research also showed that when animals had a small piece of their brain ablated that

inhibited behaviour in the REM state, animals acted out stereotypical instinctive behaviour patterns during REM sleep. The smiling, grimacing and sucking movements which young babies show during REM sleep, even before social smiling occurs, lends further support to Jouvet's view.

It was noted that instinctive programmes of behaviour could have their parameters only partially specified in advance in order to allow for individual variation in available stimuli. This means that the animal must be programmed to find environmental analogues to the genetically anticipated stimuli.

As instinctive behaviour is much less obvious in humans, it is to be expected that humans would show a sophisticated and flexible analogical thinking process to enable the carrying out of genetically influenced parameters of our behaviour. Evidence was reviewed which supported the view that analogical thinking is an essential part of the way humans understand and communicate their understanding of the world. Chomsky's idea of the deep structure of language, and a genetically programmed universal grammar underlying individual languages, was also seen to be compatible with this idea.

The research of Dement, (1968) which shows that the REM state provides an alternative system of drive discharge

was discussed. It was seen that this could be reconciled with Jouvet's view of REM sleep and the programming of instinctive behaviour. Drive discharge via instinctive behaviour patterns in REM sleep could be providing stimulation to the developing cortex as well as programming a schematic knowledge of instinctive programmes to enable the cortex to exercise an influence over their future expression.

Morrison (1983) has shown that the P.G.O. spikes (the 'sine qua non' of the rem state according to Dement) are in fact part of a general orientation response which alerts the cortex to process important new stimuli. The fact that the processing of outside stimuli is being actively inhibited at this time may lead the P.G.O. orientation responses to trigger the release of the activated drive schemata or anticipated patterns of stimulation of genetic or environmental origin.

It was noted that the release of anticipated genetic schemata would not result in sensory or psychical content since psychical content would be the appropriate environmental analogues. Yet during the REM state in adults and children sensory content i.e. dreaming does occur. If anticipated schemata are being run during REM sleep with psychical content then they must be environmentally anticipated schemata i.e. anticipated

schemata from waking life. This review of the biological evidence leads to the conclusion that the dreams of REM sleep should be a programmed analogical or metaphorical transformation of anticipated waking schemata or activated drive schemata left unsatisfied at sleep onset. The de-activating of these activated drive schemata during dreaming would of course free the resources of the cortex which had been actively inhibiting and/or monitoring the environment for a suitable opportunity for their release. This would increase the capacity of the cortex, to efficiently handle emotionally arousing contingencies during the next waking period.

The fact of dream occurrence outside of the REM state per se was discussed in terms of Foulkes' idea of a dream production system that could become partially engaged outside of the REM state. This idea was supported by the fact that some of the concomitants of the REM state can occur at other sleep stages, the E.E.G. at sleep onset in humans, for example, is very similar to that of REM sleep proper. Brief dreams are sometimes reported from this stage of sleep. Foulkes suggested that the study of the partial engagement of the dream production system at the other sleep stages might be able to throw light on full blown dream episodes that accompany the REM state proper.

Surprisingly such an approach had been investigated in great detail, with personal experimentation, by a colleague of Freud's called H. Silberer (1909). His studies showed that if he concentrated when drowsy on a particular idea, he would dream a symbolic representation of that idea and he would immediately arouse and record the symbolic transformation of his waking introspection. An analysis of Silberer's work was made, which showed that a currently anticipated or activated drive schema was being converted into an analogical sensory representation exactly as predicted by the theory developed in this thesis. An example of the writer's independent confirmation of these findings was also given. Silberer's research has the merit of not only providing striking evidence in support of the theory put forward, but actually shows the activated drive schema and its conversion into an analogical sensory counterpart taking place as a continuous movement in time. Thus demonstrating that the dream image is an analogical sensory representation of a specific waking schema.

There follows an analysis of fifteen diverse dreams showing that they are sensory analogical representations of anticipated experiences or activated drive schemata from waking.

An analysis of Freud's famous specimen dream of "Irma's Injection" was carried out using historical data. This analysis of Freud's dream showed the activated drive schema or emotionally arousing introspection of which the dream was an analogical expression. Due to the completeness of the historical record in the case of Jung's famous 'House' dream again, it was possible to identify the emotionally arousing introspection or activated drive schema of which it was an analogical sensory expression.

The relationship between dreams and creativity was also explored. It was shown that in those instances where solutions to scientific problems appeared in dreams, they appeared as part of the analogical expression of an activated drive schema from waking, and thus emerged in a form that was consistent with the theory presented.

The possible role of dreams in psychotherapy, in view of the findings in this paper, was also explored. A number of uses for dreams in psychotherapy were identified. Dreams may provide a view of how the client sees himself and his problem that could not be gained from questions alone. Dreams can also provide powerful therapeutic metaphors. Dreams can also confer a degree of objectivity which may enable a person to review their own introspective processes, and to perceive how they

influence their feelings, behaviour and expectations. The discovery that they have a part of themselves that create powerful metaphorical representations of their inmost thoughts can be life enhancing for some clients.

A theory of dreams and REM sleep has been put forward in this thesis which integrates the apparently diverse biological and psychological facts together with the genetic and phylogenetic data. It provides a new insight into human thinking and the special function of analogical or metaphorical thought in human affairs.

The evidence suggests that the REM state in the fetus and neonate permits the programming of instinctive behaviour i.e. genetically determined schemata anticipating patterns of stimulation that require the identification of appropriate environmental analogues for their completion. The continuance of the REM state into adulthood permits the de-activation of the activated drive schemata, arising from environmentally anticipated stimulation that has not been experienced during waking, through their analogical sensory simulation in dreams.

The evidence presented in this thesis indicates that the origin of dreams lies in those emotionally arousing expectations that remain unsatisfied at sleep onset, and whose analogical expression in dreams releases the

resources of the cortex that had been monitoring the environment for a suitable opportunity for their expression, to be available to deal with the emotional contingencies of the next waking period.

It is interesting to reflect that the diversity and the richness, the profundity and the beauty to which human dreaming has given expression has derived from a process, which evolved in the first instance, to programme instinctive behaviour. In the final analysis, human dreaming can be seen as a mirror that reflects back in analogical sensory form, the unmanifested hopes fears and reflections that occupied the dreamers' introspective life while they were awake.

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