

The dream between neuroscience and psychoanalysis

■ M. Mancia¹

University of Milan (I)

Summary

Mancia M. *The dream between neuroscience and psychoanalysis. Schweiz Arch Neurol Psychiatr* 2005;156:471–9.

Neuroscientific interest in dream started in 1953 with the discovery of REM sleep by Aserinsky and Kleitman. Subsequently, psychophysiological findings took the dream into the realm of biology.

The dichotomous model of REM and non-REM sleep is described as a basis for thought-like activity (non-REM sleep) and dreaming (REM sleep). However, psychophysiological research has shown that people dream in all phases of sleep although with different characteristics.

Bioimaging studies indicate that during REM sleep there is activation of the pons, the amygdala bilaterally and the anterior cingulate cortex, and de-activation of the posterior cingulate cortex and the prefrontal cortex. The images suggest there is a neuroanatomical frame within which dreams can be generated.

Various evidence indicates that REM sleep and dream are dissociated events. The latter is induced by complex dopaminergic circuits involving fore-brain mechanisms that do not govern REM sleep. These structures are: the anterior and lateral hypothalamic areas, the amygdaloid complex, the sub-ventral striatal areas, the temporo-occipital areas, the anterior cingulate cortex and the insula. Dreams are abolished by an interruption of these dopaminergic circuits.

Psychoanalysis studies the dream from a completely different angle. Freud believed it was the expression of hallucinatory satisfaction of repressed desires. Today it is interpreted as the expression of a representation of the transference in the *hic et nunc* of the session. At the same time

it also has symbol-generating functions which provide an outlet by which affective preverbal and presymbolic experiences as well as fantasies and defences stored in the implicit memory and part of an early unrepressed unconscious can be represented and made verbalisable and thinkable.

From the psychoanalytical point of view, the dream transcends neurobiological knowledge and looks like a process of internal activation that is only apparently chaotic, but is actually rich in meanings, arising from the person's affective and emotional history.

Keywords: *dream; sleep; psychoanalysis; neuroscience*

The contribution of neuroscience to dreams

At the beginning of the last century, when Freud (1900) had already published his *Interpretation of Dreams*, European psychology seemed more interested in sleep than dreaming. At that time Henry Pieron (1913) defined sleep as a physiological state that was periodically necessary, its cyclic pattern relatively independent of outside conditions, during which there was a complete break in the complex sensory and motor relations between the subject and his or her environment. This past century has in fact seen great steps forward in understanding the neurophysiology of sleep, which Pavlov (1916) pioneeringly proposed was an *active* form of cortical inhibition, though later it was again considered a *passive* event induced either by sensory deafferentation (Bremer, 1935) or functional disactivation of the ascending reticular system (Moruzzi and Magoun, 1949; Moruzzi, 1972). However, there was evidence that it was an *active* state produced by sleep-inducing caudal reticular systems (Batini et al., 1959; Cordeau and Mancia, 1959) or by preoptic basal forebrain structures (Serman and Clemente, 1962).

Correspondence:
Mauro Mancia, MD
Via S. Marta 13
I-20123 Milano
e-mail: mauro.mancia@unimi.it

¹ Neurophysiologist, University of Milan, and Training Analyst of the Italian Psychoanalytical Society.

It was only in 1953 that neurophysiologists started taking any real interest in the mental aspects of sleep. That was when Aserinsky and Kleitman observed a paradoxical phase, which we now know as REM sleep, opening the gates of dreams to physiologists and experimental psychologists. Those researchers noted that children sleeping deeply presented eye movements visible under their eyelids, with twitching of the limbs and a desynchronised EEG tracing like during waking. This phase therefore became known as paradoxical, usually referred to by the abbreviation for *rapid eye movements* – REM.

Neurophysiological research in the 1960s (Jouvet, 1962) clarified the electrophysiological parameters and structures responsible for REM sleep, distinguishing it from the non-REM phases: EEG desynchronisation, atony of postural muscles, rapid eye movements, monophasic waves in the visual system, known as ponto-geniculo-occipital (PGO) waves, and neurovegetative turbulence, involving respiratory and cardiac arrhythmias and changes in blood pressure. The endocrine system too showed significant changes during REM sleep. The cholinergic reticular organisation of the pons was found to be responsible for the ascending and descending events of this important phase, and is therefore the *deus ex machina* of REM sleep.

Around the same time Kleitman's group (Dement and Kleitman, 1957; Dement, 1965) studied mental activity during sleep in healthy volunteers, waking them during REM or non-REM phases. When they were woken at the end of an REM episode, they often reported an experience that seemed logical to be classified as a dream, with rich perceptive-hallucinatory details and strong emotional participation of the dreamer, with self-representations. When they were woken outside the REM phases, their mental activity only consisted of fragments of reality and thought, not organised like in a dream.

The physiological basis was thus laid for a dichotomous REM/non-REM model as the electrical equivalent of different types of mental activity. Subsequently the duration of each REM episode was correlated with the amount of "dream material" narrated (Wolpert and Trosman, 1958), the amount of eye movements with the content of the dream (Dement and Wolpert, 1958) and the specific direction of the eye movements with the spatial organisation of events in the dream (Dement, 1965; Molinari and Foulkes, 1969).

These psycho-physiological investigations led to the idea that REM sleep was the neurophysiological basis or "neurobiological frame" within which dreams could be organised. The EEG de-

synchronisation itself reflects neocortical activation that is a basis for perceptive and cognitive activity and for activation of the memory, all events common to dreaming. The eye movements were interpreted as the motor equivalent of hallucinatory activity that would be enough to create a dream space. The monophasic PGO waves recorded in the visual system were considered to be the electrical reflection of a form of decoding and reading information arising within the nervous system, which the dreamer then experienced as visual hallucinations (see Mancina, 1996).

Psychophysiological research during REM sleep subsequently showed that the geometric-spatial and emotional aspects of the dream are mainly organised in the right hemisphere (Antrobus et al., 1983; Bertini and Violani, 1984), while the left hemisphere is involved more in its narration. More sophisticated observations, taking account of the experimental setting, the dreamers' expectations and how they narrated their dreams on waking, showed psychophysiologicalists that there was complex mental activity not only in the REM phase, but also while falling asleep and in non-REM sleep. The different results reflect methodological differences but also how the dream is interpreted. Starting out from an extremely broad definition like that given by Fromm (1951), according to which any mental activity during sleep can be considered a dream, to more restrictive ones such as that proposed by Bosinelli and Franzini (1986) who describe a dream as a mental experience involving estrangement and unreality, vivid perception, personal participation of the dreamer but inability to examine reality, and loss of voluntary control of the thought process.

If you ask a young sleep volunteer to tell you everything that passed through her or his mind just before waking, a high percentage of those woken in either REM or non-REM sleep describe an experience that we hardly hesitate to call a dream. While falling asleep too, one goes through a hallucinatory state with the same sort of mental images as in other sleep phases. Thought becomes fragmented as voluntary control of reality is gradually lost. This allows bizarre, regressive contents to intrude, laying the foundations for dreams. These contents grow into the visual and auditory images that build up the hypnagogic hallucinations amply described in the literature (Bosinelli, 1991).

An analysis of the mental activities that go on as you fall asleep, however, finds differences from those in other sleep phases: the spatial structuring of the dream-like state is different, and so is the level of the dreamer's personal participation. Antrobus (1983) suggested that the number of

words used to narrate the dream(s) might be the most efficient basis for analysing the psychological differences in the two phases, REM and non-REM sleep. Another might be the number of representations of the dreamer him- or herself in REM sleep compared to the falling-asleep stage (Bosinelli et al., 1974).

Current psychophysiological findings confirm that the human mind produces dream-like experiences in all phases of sleep, the characteristics and contents in the REM or non-REM phases depending more on the length of the “story”, hence the number of words needed to narrate it, than on the quality of the happenings. Antrobus (1986) too agreed that people dream in all phases of sleep, though only REM sleep offers the conditions of cortical activation that guarantee enough recovery of memory for long narrations of the scenarios. The rapid cortical activity found in REM sleep (40 Hz) (Llinas and Ribary, 1993) suggests there may be more room in this phase for cognitive activity. Descriptions from volunteers who have been woken up also present a higher degree of linguistic organisation after REM sleep than after the other phases.

It does appear, therefore, that the lower level of cortical activation in non-REM sleep leads to dreams with less capacity for elaborating on material stored in the memory, and the dreamer has less capacity for narrating them. This research shows up differences in cognitive functions during sleep: people are more able to remember and describe the experiences of REM sleep; they use more words to tell the dreams, whose content tends to be stranger and more bizarre. Cognitivists such as Antrobus (1983), Foulkes (1985) and Cavallero (1991) consequently consider REM sleep as the phase most likely to produce dreams, for several reasons: (a) the cerebral cortex is strongly activated, like in waking, so it can recuperate memories more easily; (b) the associative cortex participates in the symbolic organisation of the experiences typical of dreams; (c) the activated brain is capable of generating “multimedial” happenings, like during waking.

However, since people dream in REM and non-REM sleep – though to different extents –, Bosinelli’s group suggested the brain may have a single system for dream production active, in all phases, from falling asleep to waking up. This theory, however, has its opponents who insist there are *qualitative* differences, in the level of bizarreness and the more emotional aspects, between dreams in the various phases of sleep; they suggest that dreams are generated by two mechanisms that operate separately in the brain in REM or non-REM sleep.

This brings us back to the old REM/non-REM dichotomy, though in a blander form. There is also a third idea, according to which “undetected” REM-like processes are active in non-REM sleep, producing dreams (see Nielsen, 2003).

It is clear in any event that our mind does not rest, even during sleep. The mental activity changes, basically because the dreamer’s self has a different relation with reality. Perceptive reality is replaced with hallucinatory reality, self-representations and strong emotional participation in the dream events. Although there is no substantial difference between mental events during the stages of falling asleep, REM and non-REM sleep, psychophysiological research confirms that dream-activity in REM sleep is livelier, with greater reference to the contents of the memory, more bizarre imagery and a longer narration than in the other biological frames of sleep.

In view of the greater role of REM sleep in dream organisation, Hobson and McCarley (1977) and Hobson et al. (1998) proposed what they called *activation-synthesis* hypothesis as a brain mechanism for producing dreams. They suggested that in REM sleep the brain is actually a generator of the dream state; the motor is the pons, which stimulates the brain from inside, producing information that is projected to the forebrain and limbic system, which then elaborate it to recover recollections stored in the explicit memory so as to build the plot of the dream and ensure the dreamer’s emotional participation.

This theory implies that: (a) the primary energy responsible for the dream is physiological, produced internally by the pontine generator, determined genotypically rather than psychologically; (b) elaboration of the information from the pons (*deus ex machina* of the dream) and its synthesis is done by the forebrain, aimed at organising the perception in the form of a hallucination, and self-representation; this structure is also responsible for emotions, retrieval from the memory and cognitive elaboration of the dream; (c) the brain in REM sleep can be compared to a sophisticated computer looking for key words, to integrate phenotypic data obtained through experience with genotypic stimuli; (d) the content of the dream that makes its way through our consciousness is neither unconscious nor deformed by censorship, as Freud would have had us believe, but is a *chaotic process* of self-activation starting from the pons, where the content of the dream originates, with all its bizarreness and the other features Freud called the work of dreams.

Hobson et al. (2003) have now suggested that (a) visual hallucinations are due to self-activation of the visual part of the brain, due to output from

the pons which also activates the parietal cortex needed for spatial organisation of the dream; (b) the emotions in a dream are due to activation of the amygdala which involves other limbic and paralimbic structures; (c) oneiric delirium, loss of self-awareness and the illogical experiences of a dream are due to aminergic de-modulation and inhibition of the dorsolateral frontal cortex. This led Hobson et al. (2003) to radicalise this concept, stating that the mind during dreaming is simply the self-activated brain.

Bioimaging has supplied interesting information on the activation of various brain areas during REM sleep. On the assumption that this was the phase when people dreamed most, some researchers directly correlated activation and inhibition in certain brain areas with the production of dreams. This resulted in a significant neuropsychological contribution that has cast light on the brain areas and structures involved in dream organisation. In humans, positron emission tomography (PET) shows the following areas activated during REM sleep: the pontine tegmentum, the amygdaloid nuclei on both sides, the left thalamus, the cingulate cortex and the right parietal operculum, this last region being important for spatial construction; limbic activation might be the neurophysiological substrate for the emotional components of the dream (Maquet et al., 1996).

Earlier, Braun et al. (1997) had helped make a structural distinction between the mechanisms of waking and REM sleep, confirming the activation in REM sleep of limbic and paralimbic areas, including the insula, the cingulate cortex and that of the medial temporal lobe. Later, the same group (Braun et al., 1998) observed increased activity during REM sleep in the hippocampus and parahippocampal gyrus, and the extra-striatal cortex. The dorsolateral prefrontal cortex, striatum and orbital cortex are all deactivated during this phase of sleep.

In a study to demonstrate the importance of REM sleep in the process of memorisation, Maquet et al. (2000) noted that waking experiences influenced specific brain areas during subsequent sleep. In particular, the brain areas activated during a waking-hour task were significantly more active during REM sleep, indicating that memory traces are processed during this phase in humans. However, Huber et al. (2004) sustained that specific areas of the cerebral cortex were able to memorise a sensory-motor experience from the daytime waking hours also during that night's synchronous sleep. This suggests that while dreaming, in REM or other phases of sleep, a person can recover

from the memory events from her or his waking hours. This is what Freud (1900) called daytime residues.

These results are particularly interesting when compared with more recent findings from Anderson et al. (2004). They found that *voluntarily forgetting* mental experiences, a process comparable to Freudian repression², is accompanied by increased activity in the dorsolateral prefrontal areas and a parallel reduction in hippocampal activity. This pattern is the opposite of that in dreaming, where hippocampal activity increases and dorsolateral frontal activity diminishes (Braun et al., 1998).

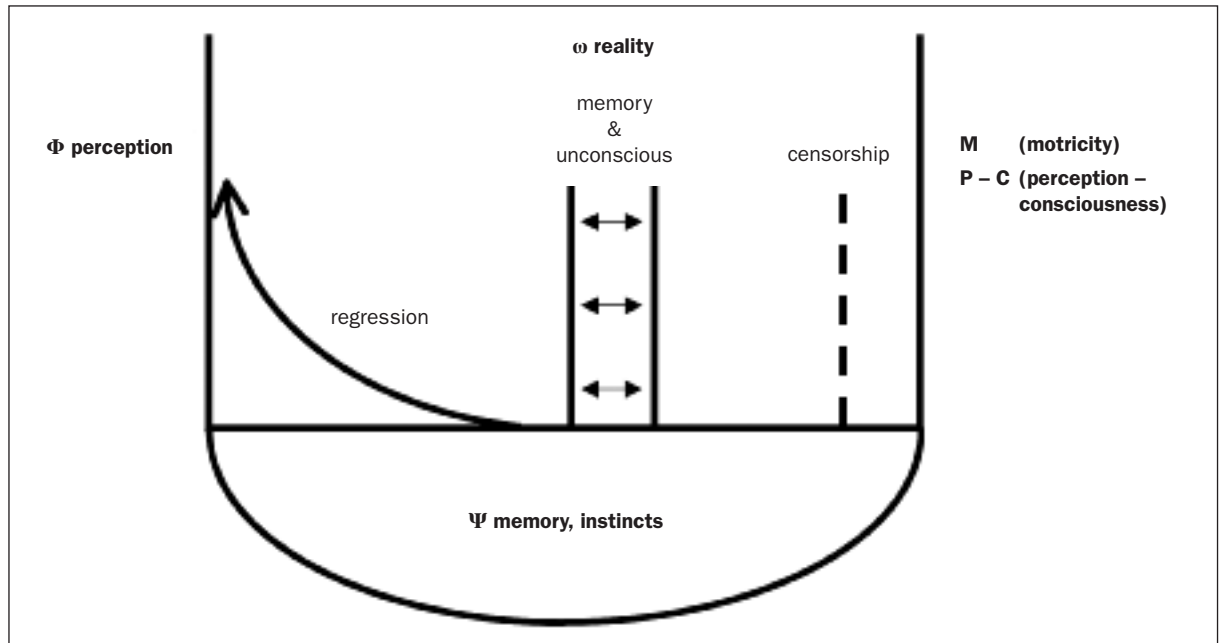
This recent picture holds out hope that neuropsychology using bioimaging will provide some satisfactory explanation for repression (Freud, 1915a), which sets up the dynamic unconscious (Freud, 1915b), and of the opposite process, "return of the repressed" which, as lost material is dug out of the memory, permits dreams to surface.

Neuropsychological investigations using bioimaging on patients with brain lesions (Solms, 1995) found that dreams and REM sleep develop in separate parts of the brain: dream organisers are not regulated only by the pons, since patients with extensive lesions to this region still dream. However, lesions to the forebrain and corresponding associative cortices prevent dreams. People with lesions to the temporo-occipital associative cortex still dream, though with some loss of the hallucinatory component, while patients with damage to the limbic structures cannot distinguish between dreams and reality, and may live a virtually continuous dream-like existence. Solms (1999) suggested there may be a dissociation between dreams and various brain activation states. People do in fact dream when dopaminergic circuits in the ventromedial anterior brain are activated, which might explain the genital reactions in males and females during REM sleep (see Mancini, 1996).

In a summary of various clinical experiments, Solms (2003) stated that: (a) dreams and REM sleep can be dissociated as dreaming is linked to forebrain mechanisms that do not govern REM sleep; (b) the forebrain structures responsible for

2 One objection might be that Freudian repression is unconscious whereas repressing by "forgetting" is conscious. Anderson et al. (2004) might therefore be referring more to this conscious model than to true repression. However, in a footnote to their paper, Anderson et al. observe that some authors (Erdelyi, 2001) sustain that the strict distinction between unconscious and conscious repression was in fact a distortion of Freud's theory, upheld by Anna Freud. Freud himself used the term to indicate either an unconscious or a conscious process.

Figure 1 Drawing representing the synthesis of the two models for the brain/mind relationship proposed by Freud in the *Project for a Scientific Psychology* (1895) and *The Interpretation of Dreams* (1900). For explanation, see the text.



dreaming are the anterior and lateral hypothalamic areas, the amygdaloid complex, the subventral striatal areas and the cortical areas of the occipito-frontal limbic system, the anterior cingulum and the insula; (c) the primary visual areas and the dorsolateral prefrontal cortex are disactivated during dreaming in REM sleep; (d) dream imagery is not due to chaotic activation of the pons, but to forebrain organisation that builds up the cognitive process. This mechanism is generated by a dopaminergic circuit that can be activated in any phase of sleep. Bischof and Bassetti (2004) described the total abolition of dreaming in a 73-year-old woman with focal lesions to the temporo-occipital areas, more severe in the right hemisphere.

These findings suggest that disruption of the dopaminergic circuit involving temporo-occipital areas, particularly in the right hemisphere, may abolish sleep; this would be an expression of a disconnection syndrome (Geschwind, 1965).

The dream in psychoanalysis

Dreams in Freud's time

In 1895, a period of great changes in Freud's scientific thinking, he shifted away from the exact sciences' approach to venture on the sands of the universe of the mind. This move paralleled a shift in personal identification: from Breuer, strict guardian of the scientific method, to Fliess, whose

approach was less tightly bound to scientific rigor. The *Project for a Scientific Psychology* bears witness to this, as does the mind-brain relation model Freud set up as the foundation for his concept of the dream – to which he returned, modifying it, in chapter 7 of the *Traumdeutung (Interpretation of Dreams)*.

Figure 1 summarises Freud's progress between 1895 and 1900 on the topic of the organisation of the memory and the unconscious, and the role of the latter in the production of dreams. There is the Φ system, responsible for perception; the Ψ system, containing memory and instincts; and the ω system, representing reality. On the right-hand axis Freud puts movement (M) and the perception-consciousness system (P-C). Outside stimuli reaching the gateway of perception (Φ) run along the abscissa, reaching movement according to the reflex scheme drawn up by Sherrington (1906); at the same time, however, they are deposited in the memory, where they integrate themselves with the world of instincts to create the unconscious psychic system (Ψ). In the waking state, reality (ω) guides progress along this path. In sleep, however, with the inhibition of movements and loss of contact with reality, the psychic energy built up in the Ψ system cannot proceed towards M and is obliged to regress towards the gateway of perception (Φ) which, pushed from inside as it were, sets up a perception with no external object, i.e. hallucination. Through this regressive path the hallucination can satisfy the repressed desire. On the basis of this model Freud formulated his definition of the *dream as*

a hallucinatory satisfaction of a desire repressed in infancy.

In chapter 7 of the *Interpretation of Dreams* Freud elaborates the model further with ordinates for the memory, the unconscious and the censorship. Dreams not only provide hallucinatory satisfaction of a repressed desire: they enable the unconscious to pick its way through censorship to reach the P-C system. However, to manifest itself to the conscious mind, the unconscious has to undergo the distortions and transformations imposed by the censorship. This is what causes the *rhetoric* of dreams, meaning the difference between its manifest and latent contents.

The censorship executes the main work of dreaming, preventing the unconscious gaining direct access to the conscious mind. Censorship creates a dream as the primary event, but also makes us forget it. The primary event cannot be known as such, but we can gain access to the secondary event through narration which transforms the representations of the dream into a system with linguistic significance. Censorship, however, always has the main job in the work of dreams: condensation, displacement, symbolisation and dramatisation (for a full description of these functions of censorship, see Mancia 1996).

The work of the dream is permeated with affectivity and builds a bridge to the events of infancy, making it possible to transcribe the contents of the memory from the child's earliest affective experiences. Freud defines this emotional recovery of memories as *Nachträglichkeit* – a “rewriter of memory”. The concept stretches to the implicit memory too and its specific transcription of experiences forming the structure of the unrepressed unconscious (Mancia, 2003; 2004a). We shall come back to these points further on.

Freud's concept of *Nachträglichkeit* embodies what he considered the aim of work on dreams: to transcribe the history of traumatic events from a patient's childhood that might explain a neurosis. Thus, Freud proposes using the dream to re-write the patient's true life story, as faithfully as possible. This meant he could base his dream-reconstruction work on the historical, autobiographic memory and the events from the past irrupting in the analytical relation, even if in *Screen Memories* (1899) he cast doubts on whether we have precise recollections of our infancy or more likely “recollections” constructed on what we remember of it. He comes close here to the more recent idea of the implicit memory (Mancia, 2000; 2003), from which we cannot recall events and which therefore cannot hide anything repressed. This is another point we shall come back to.

In 1937, in *Constructions in Analysis*, Freud goes back to the past surviving into the present as the basis for the analytical relation and the work of (re)construction of things forgotten, starting from the traces they have left behind. In the 1930s, then, he shifted back to his original definition of the dream – thirty years earlier in 1895–1900 – as the hallucinatory satisfaction of a desire repressed in infancy – though with some exceptions. His theory is still valid as a whole, but two conditions need re-considering: dreams referring to traumatic experiences and those evoking painful recollections of infancy. He thus admits that his theory may need modification, to permit the dream to be seen as an *attempt* at fulfilling a repressed desire. His theory is safe but cannot stand up to the evidence produced by advances in psychoanalytical thought.

Dreams after Freud

In the 1930s, Melanie Klein (1932) radically transformed Freud's instinctual energy model, replacing it with a relational model. This metapsychological change of the mind brought far-reaching changes in the concept of the dream and how it could be worked on in analysis. The importance of affective relations, primarily linked to primary experiences, suggested repression was no longer the trigger that put our mind to work in dreams, but more likely a dynamic relation between affective representations (internal objects) that have precipitated and layered themselves in the unconscious in early infancy yet manifest themselves through the primary processes of splitting and projective and introjective identification.

Though not explicitly, the Kleinian unconscious that manifests itself in dreams is therefore no longer linked to repression but to the splitting and projective identification that Klein introduced into clinical work and is one of the most important features of current psychoanalysis. Klein is also credited with giving the dream a major part in the economy of the mind, where it represents the various stages of development that can surface in the transference.

Thus the dream becomes an internal theatre (Resnik, 1982) where a person's mind is represented by people relating among themselves (the intrapsychic dimension) who give rise to a meaning that is then carried out into the outside world and external relations (the intersubjective dimension) (Meltzer, 1984).

The theory of internal objects has had considerable heuristic utility, bringing values into the psychoanalytical dimension of the mind, making

oneself responsible for the state of one's internal and external objects, giving new meaning – basically relational – to the concept of unconscious fantasy, hence to the deepest significance of dreams. This shift at the top constituted an important movement in psychoanalytical thought, replacing Freud's instinctual energy model based on desire and its repression with a relational model based on more complex modalities in the organisation of the personality and the mind's unconscious functions. From this starting point, work on dreams implies finding out the state of the patients' internal objects, their conflicts and defences.

The theoretical model of the mind has thus been transformed and enriched, and the dream has acquired a new purpose, studied by the last generation of analysts (Bion, 1962; Money-Kyrle, 1978): it has become a basic tool of knowledge. The proposed model can be considered *epistemological* and is based on an elegant statement by Money-Kyrle (1961) who said that if man is his representation of the world, and this is identified with his consocitive dimension, the dream – representing man's inner world – is itself a source of knowledge.

In 1962 Bion formulated a task for the dream, executed by the *alpha* function: this was to transform sensory, emotive and emotional experiences reaching the mind during waking hours in the form of *beta* elements into thoughts in the dream. This turned the dream into a tool the mind uses to work over sensory experiences and convert them to thought. This permitted a valuable continuity of mental functions in the passage from waking (dominated by fantasies) to sleep (dominated by dreams). Bion overturned Freud's relation between dreams and unconscious, maintaining that censorship and personal resistances in the dream were not the product of the unconscious, but tools dreams use to create and distinguish the conscious from the unconscious.

This epistemologic aspect of the dream raises the question of a person's *need* to dream. If dreaming is essential for knowing oneself and one's objects, the mind needs these to mobilise itself and grow. One of the purposes of the dream might therefore be to produce knowledge through the world of representations. Freud (1900) had guessed this when he compared dreams to a newspaper under a dictatorship: it has to come out every night but, as it is not allowed to tell the truth directly, it has to mask it between the lines. We can use the same metaphor, except that for us the dream that comes out every night has to tell the truth even if it is distorted, to show the dreamer's affective state; this is connected – as if by a bridge – to his early experiences, but at the same time reflects her rela-

tionship with the analyst as regards the patient's mind and his or her objects, and the analyst's mind with his or her own personal and countertransference affects. Today, therefore, we can consider the dream a real experience that represents the dreamer's inner world in the immediate present and therefore expresses the whole of the transference.

The analyst can use the dream to recognise the splits, identifications, denials, idealisations, fears and defences, aggressions and seductions activated by the patient, and can employ them in work on the dream. This work involves various parts: interpretation, decoding the manifest and translating it to the latent, exploring, hypotheses, second thoughts, re-working, moves and waiting like in chess; all with the aim of gaining knowledge – and making the patient gain knowledge – of the internal objects and their dynamics in relation to the patient's earliest experiences, the defences set up in response to the pressures of the transference and action towards the outside world. This complex work on dreams is possible thanks to the relational context that has its part in the organisation of the dream.

Taken in the right context and viewed in the here and now of the analytical setting, the dream is a most valuable aid for grasping a given moment in the transference, selecting the emerging affects and assembling the pieces of the relational mosaic into a *construction* on which to attempt an interpretation. At the same time, however, dreaming makes it possible to bring early experiences to the surface and give them new meaning, to "up-date" them to the present. Thus the dream can be seen as the most creditable and reliable tool in what Freud called *Nachträglichkeit*, referring to reassigning significance to some past experience, even if it was preverbal and presymbolic, by re-writing the memory (with or without the actual recollection). This is the true work of *reconstruction* on dreams (Mancia, 2003; 2004a, b).

Dreams in psychoanalysis today

The discovery of the implicit memory and the unrepressed early unconscious (Mancia, 2003; 2004a) and their connections with the experiences of early infancy – sometimes traumatic – has given the dream another, particularly valuable, dimension in theory and clinical practice.

The dream is so important because, besides the various modalities of transference that rely on the patient's voice and language (which I call the "musical dimension" of the transference; Mancia,

2004a), it transforms symbolic experiences that were originally presymbolic and preverbal so they can be expressed verbally and thought about. To this extent the dream, through its representations, can create psychic figurability (Botella C. and S., 2001), helping fill the representation gap of the unrepressed unconscious.

This new function of the dream not only opens up the transference in the immediate present, helping with the work of *construction* in analysis, but also allows a *reconstruction* that enables patients to transcribe their life story, as it relates to their identity, and to recuperate the “history” of their unconscious from their earliest significant preverbal and presymbolic experiences, which they could never recollect³. This involves some broadening of Freud’s *Nachträglichkeit*, which he conceived as a “transcription” of the memory of events in the distant past connected to the patient’s life story, hence to her or his explicit memory. This therefore involved reconstruction of an event that had really taken place, brought to the surface through the recollection, using the dream, which is the best possible means of de-repression.

We are now in a position to extend this concept of *Nachträglichkeit* to the implicit memory too, hence to a process of transcription of unrepressed emotional experiences that cannot be recalled but have marked the infant from its very first encounters with its mother. In this light, *Nachträglichkeit* includes the early events that Freud (1915a) wrongly believed were subject to primary repression but that today we consider as laying the groundwork, together with fantasies and defences, for an early, unrepressed unconscious that can influence the infant’s mind and subsequent processes of repression (Mancia, 2003; 2004a).

Therefore, psychoanalysis currently sees the dream not only as a window open onto the transference (Mancia, 2000), or as a real experience that represents the dreamer’s inner world in the immediate present, thus expressing the transference as a whole (Joseph, 1985; Mancia, 2004a), but also as a symbolic transformation of a presymbolic happening that the patient can re-live emotionally in analysis, even without the actual recollection. In addition, the dream creates images, mentally compensating for the lack of figurative coverage, filling the gaps in the dreamer’s affective and emotional history linked to her or his earliest experiences, filed away in the implicit memory.

3 For my definition of the work of *construction* and *reconstruction*, see Mancia 1990.

References

-
- Anderson MC, Ochsner KN, Kuhl B, Cooper J, Robertson E, Gabrieli SW, et al. Neural systems underlying the suppression of unwanted memories. *Science* 2004;3:232–7.
-
- Antrobus J. REM and NREM sleep reports: comparison of world frequencies by cognitive classes. *Psychophysiology* 1983;5:562–8.
-
- Antrobus J. Dreaming: cortical activation and perceptual thresholds. *J Mind Behav* 1986;7:193–212.
-
- Antrobus J, Ehrlichman H, Wiener M, Sollma H. The REM report and the EEG: cognitive processes associated with cerebral hemispheres. In: Koella W, editor. *Sleep*. Basel: Karger; 1983. p. 49–51.
-
- Aserinsky E, Kleitman N. Regularly occurring periods of eye motility, and concomitant phenomena during sleep. *Science* 1953;118:273–4.
-
- Batini C, Moruzzi G, Palestini M, Rossi GF, Zanchetti A. Effects of complete pontine transection on the sleep-wakefulness rhythm: the midpontine pretrigeminal preparation. *Arch Ital Biol* 1959;96:1–12.
-
- Bertini M, Violani C. Cerebral hemisphere, REM sleep and dreaming. In: Bosinelli M, Cicogna P, editors. *Psychology of Dreaming*. Bologna: Clueb; 1984. p. 131–5.
-
- Bion WR. *Learning from Experience*. London: Heinemann; 1962.
-
- Bischof M, Bassetti CL. Total dream loss: a distinct neuropsychological dysfunction after bilateral PCA stroke. *Ann Neurol* 2004;56:583–6.
-
- Bosinelli M. Il processo di addormentamento. In: Bosinelli M, Cicogna P, editors. *Sogni: figli d'un cervello ozioso*. Torino: Bollati Boringhieri; 1991. p. 249–70.
-
- Bosinelli M, Cicogna P, Molinari S. The tonic-phasic model and the feeling of self-participation in different stages of sleep. *Int J Psychology* 1974;1:35–65.
-
- Bosinelli M, Franzini C. Psicofisiologia del sonno. In: Stegagno L, editor. *Problemi di psicofisiologia*. Torino: Boringhieri; 1986.
-
- Botella C, Botella S. La figurabilité psychique, Coll. Champs Psychanalytiques. Lausanne: Delachaux et Niestlé SA; 2001.
-
- Braun AR, Balkin TJ, Wesenten NJ, Carson RE, Varga M, Baldwin P, et al. Regional cerebral blood flow through the sleep-wake cycle. *Brain* 1997;120:1173–97.
-
- Braun AR, Balkin TJ, Wesenten NJ, Carson RE, Varga M, Baldwin P, et al. Dissociated pattern of activity in visual cortices and their projections during human rapid-eye-movement sleep. *Science* 1998;279:91–5.
-
- Bremer F. Cerveau isolée et physiologie du sommeil. *CR Soc Biol (Paris)* 1935;118:1235–41.
-
- Cavallero C. Recenti sviluppi dello studio sperimentale sul sogno: l'approccio cognitivista. In: Bosinelli M, Cicogna P, editors. *Sogni: figli d'un cervello ozioso*. Torino: Bollati Boringhieri; 1991. p. 354–71.
-
- Cordeau JP, Mancia M. Evidence of an electroencephalographic synchronization mechanism originating in the lower brain stem. *Electroenceph Clin Neurophysiol* 1959;11:551–64.
-
- Dement WC. Does rapid-eye-movement sleep have a function? In: Jouvet M, editor. *Aspects anatomo-fonctionnels de la physiologie du sommeil*. A Symposium. Paris: CNRS; 1965. p. 567–604.
-
- Dement WC, Kleitman N. The relation of the eye movements during sleep to dream activity: an objective method for the study of dreaming. *Exp Psychol* 1957;53:339–46.
-

- Dement WC, Wolpert E. Interrelation in the manifest content of dreams occurring on the same night. *J Nerv Ment Dis* 1958;126:568–78.
- Erdelyi MH. Defense processes can be conscious or unconscious. *Am Psychol* 2001;56:761–2.
- Foulkes D. *Dreaming: A Cognitive-Psychological Approach*. Hillsdale, NJ: Erlbaum; 1985.
- Freud S. Project for a Scientific Psychology. SE 1; 1895.
– Screen Memories. SE 2; 1899.
– The Interpretation of Dreams. SE 4–5; 1900.
– Repression. SE 14; 1915a.
– The Unconscious SE 14; 1915b.
– Constructions in Analysis. SE 23; 1937.
- Fromm E. *The Forgotten Language*. New York: Holt; 1951.
- Geschwind N. Disconnection syndromes in animals and man. *Brain* 1965;88:237–74 and 585–644.
- Hobson JA, McCarley RW. The brain as a dream generator: an activation synthesis hypothesis of the dream process. *Am J Psychiatry* 1977;134:1335–48.
- Hobson JA, Stickgold R, Pace-Schott ET. The neuropsychology of REM sleep dreaming. *Neuroreport* 1998;9:R1–R14.
- Hobson JA, Pace-Schott EF, Stickgold R. Dreaming and the brain: toward a cognitive neuroscience of conscious states. In: Pace-Schott EF, Solms M, Blagrove M, Harnad S, editors. *Sleep and Dreaming. Scientific Advances and Reconsiderations*. Cambridge: Cambridge University Press; 2003. p. 1–50.
- Huber R, Ghilardi MF, Massimini M, Tononi G. Local sleep and learning. *Nature* 2004;430:27–8.
- Joseph B. Transference: the total situation. *Int J Psycho-Anal* 1985;66:447–54.
- Jouvet M. Recherches sur les structures nerveuses et les mécanismes responsables des différentes phases du sommeil physiologique. *Arch Ital Biol* 1962;100:125–206.
- Klein M. *The Psycho-Analysis of Children*. London: The Hogarth Press; 1975 [1932].
- Llinas R, Ribary U. Coherent 40 Hz oscillation characterizes dream state in humans. *Proc Natl Acad Sci U S A* 1993;90:2078–81.
- Mancia M. In the Gaze of Narcissus. London: Karnac Books; 1993 [1990].
– Sonno e sogno. Roma-Bari: Laterza; 1996.
– Sulle molte dimensioni della memoria: neuroscienze e psicoanalisi a confronto. *Psiche* 2000;2:181–93.
– Dream actors in the theatre of memory: their role in the psychoanalytic process. *Int J Psychoanal* 2003;84: 945–52.
– Sentire le parole. Archivi sonori della memoria implicita e musicalità del transfert. Torino: Bollati Boringhieri; 2004a (Feeling the Words. Resonant archives of the implicit memory and musicality of the transference. London: Routledge; 2006. In press).
– Il sogno e la sua storia. Venezia: Marsilio; 2004b.
- Maquet P, Péters J-M, Aerts J, Delfiore G, Degueldre C, Luxen A, et al. Functional neuroanatomy of human rapid-eye-movement sleep and dreaming. *Nature* 1996;383:163–6.
- Maquet P, Laureys S, Peigneux P, Fuchs S, Petiau C, Phillips C, et al. Experience-dependent changes in cerebral activation during human REM sleep. *Nature Neuroscience* 2000;3:831–6.
- Meltzer D. *Dream Life. A Re-Examination of the Psycho-Analytical Theory and Technique*. Perthshire: Clunie Press; 1984.
- Molinari S, Foulkes D. Tonic and phasic events during sleep: psychological correlates and implications. *Percept Mot Skills* 1969;29:343–68.
- Money-Kyrle R. *Man's Picture of His Worlds*. London: Duckworth; 1961.
– The Collected Papers of Roger Money-Kyrle. Perthshire: Clunie Press; 1978.
- Moruzzi G. The sleep-waking cycle. *Ergebn Physiol* 1972;64:1–165.
- Moruzzi G, Magoun HW. Brain-stem reticular formation and activation of the EEG. *Electroenceph Clin Neurophysiol* 1949;1:455–73.
- Nielsen TA. A review of mentation in REM and NREM sleep: “covert” REM sleep as a possible reconciliation of two opposing models. In: Pace-Schott EF, Solms M, Blagrove M, Harnad S, editors. *Sleep and Dreaming. Scientific Advances and Reconsiderations*. Cambridge: Cambridge University Press; 2003. p. 59–74.
- Pavlov I. Donnée sur la physiologie du sommeil. *CR Soc Biol* 1916;1079–84.
- Pieron H. Le problème physiologique du sommeil. Paris: Masson; 1913.
- Resnik S. *Psicosi, gruppi, istituzioni. Quaderni di psicoterapia di gruppo 2*. Roma: Borla; 1982.
- Sherrington C. *The Integrative Action of the Nervous System*. Cambridge: Cambridge University Press; 1952 [1906].
- Solms M. New findings on the neurological organization of dreaming: implications for psychoanalysis. *Psychoanal Q* 1995;44:43–67.
– Dreaming and REM Sleep are Controlled by Different Brain Mechanisms. Annual Meeting of the American Academy for the Advancement of Science, Anaheim, California, 25th March 1999.
– Dreaming and REM sleep are controlled by different brain mechanisms. In: Pace-Schott EF, Solms M, Blagrove M, Harnad S, editors. *Sleep and Dreaming. Scientific Advances and Reconsiderations*. Cambridge: Cambridge University Press; 2003. p. 51–8.
- Sterman MB, Clemente CD. Forebrain inhibitory mechanisms: cortical synchronization induced by basal forebrain stimulation. *Exp Neurol* 1962;6:91–102.
- Wolpert EA, Trosman H. Studies in psychophysiology of dreams. I. Experimental evocation of sequential dream episodes. *AMA Arch Neurol Psychiatry* 1958;79:603–6.