

Recent Neurological Studies Supportive of Jung's Theories on Dreaming

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Content:

- Jung's writings – a few statements of theory and observation
 - 1) Dreams – as an expression of the unconscious
 - 2) Symbol as an “emotionally charged pictorial language”
 - 3) Compensation & the Transcendent Function
- Research studies suggestive of neurological support
- Supporting observations from dream case examples

#1 Jung on the Unconscious origin of Dreams:

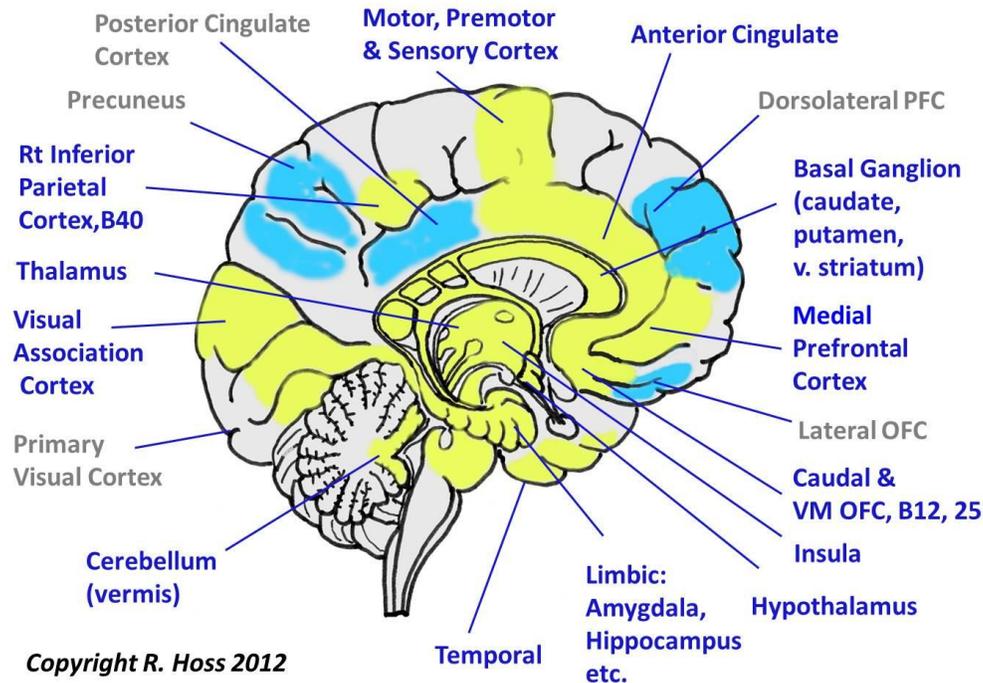
- “Dreams are the most readily accessible expression of the unconscious” (Jung 1971, p29)
- “Dreams are the unconscious processes obtruding on consciousness” (Jung 1971, p283)

Support for the unconscious origin of dreams can be found in various REM state PET and brain scan studies:

- PET Scan Studies of REM Dreaming (in Hobson et.al. 2002, 2003)
 - Maquet, Peters et al. (1996)
 - Braun, Balkin et al. (1997)
 - Nofzinger, Mintun et al. (1997)
 - Maquet (2000 & 2005)
 - Replicated in multiple studies since
- The results have been related to Dream Content: Hobson et.al. 2002, 2003, Pace-Schott 2007, Desseilles et. al. 2010

Figure 1: Active (yellow) and demodulated (blue) brain centers during REM sleep

Centers which are demodulated during REM primarily relate to the executive functions and cortical regions typically associated with waking consciousness. Other centers with high REM activation appear to perform their processing below the threshold of awareness or preceding conscious awareness (Soon 2008).



#2 Jung on 'Symbol' as an Emotionally Charged Picture Language

Jung: "In Dreams the unconscious aspect of an event is revealed, where a concept can express its unconscious meaning ... not as a rational thought but as a symbol, an 'emotionally charged pictorial language'." (Jung 1973 p. 5,30)

Dream Example - The unconscious aspect of any event is revealedas an emotionally charged pictorial language (Hoss, 2005):

Conscious Event: the dreamer just celebrated his 45th Birthday.

Dream: "I dreamed of a car with a license plate that read... HIDE 45 !" **(Unconscious Aspect)**

Dream Example – The unconscious aspect of an event is revealed (Hoss, 2005):

Conscious Event: the dreamer was wholeheartedly embracing a new spiritual belief (it was, however, in conflict with and a threat to the teachings of his Latin American Catholic upbringing).

Dream: "I was in an airplane which landed in a spiral motion on the rim of a large circle in a Latin American village. In the center of the circle was a priest dressed in black with a gun, protecting the village from my intrusion (unconscious aspect)."

Neurological Support for Jung's Statement

The Unconscious Aspect: The unconscious aspect of any event is revealed not as a rational thought but as a Symbol, an “emotionally charged pictorial language”

Demodulation of executive regions (Dorsolateral PFC) as well as regions involved in working memory and conscious reflection (Precuneus and Posterior Cingulate Cortex) = Absence of rational conscious thought & reflection, or recall of waking event .

Picture Language: The unconscious aspect of any event is revealed not as a rational thought but as a Symbol, an “emotionally charged pictorial language”

Inhibition of sensory input and inactive primary visual center (V1) but highly active visual association cortex, temporal and certain pre-motor and sensory areas which process sensory information (in this case forming sensory representations with information that originates totally from within):

- Internally generated information (feelings, memories, concepts) are represented as associations and picture-metaphor (Harmann, 2011)
- Sensory and motor elements appear as fictive movements and sensations as well
- Right Inferior Parietal Cortex which has been shown to be involved in spatial organization and creation of dream imagery – creates representations which are integrated into a dream space (Hobson 2002, 2003)

Emotional Charge: The unconscious aspect of any event is revealed not as a rational thought but as a Symbol, an “emotionally charged pictorial language”

High activity in the amygdale and limbic system (the “emotional brain”) as well as medial and some caudal frontal regions which are involved in emotionally charged actions and decision making has lead to the following conclusions or hypothesis :

- Dreams selectively process emotionally relevant memories via interplay between the cortex and the limbic system [Seligman & Yellen 1987]
- The amygdale (emotion) “orchestrates” the dream plot [Dang-Vu et. al. 2007]
- Imagery contains the “feeling state” of the dreamer [Harmann 2011]
- Activity in these regions may account for the instinctive elements in dreams (Archetypes?) (Hobson 2002, 2003)

#3 Jung on Compensation (Jung 1973 p34, 50)

The general function of dreams - is to “restore psychological balance by producing dream material that re-establishes ..psychic equilibrium”

Compensatory role – to recognize & present our personal motives, and compensate for deficiencies/distortions, to bring the conscious mind back to reality and warn of the dangers of our present course

Example of a Compensating Dream:

Jung: “Dreams present personal motives...bring the mind back to reality...warn of the dangers of our present course”

Dreamer's Waking Life Attitude: *a person with deep fundamental religious beliefs, she frequently tried to suppress a side of herself she considered evil by going through a prayer ritual when she had 'evil thoughts'*

Dream: *"I dreamed that this evil person had come alive again and feared that an "entity" was at work I went through a ritual of exorcism to eliminate the evil person (personal motive), but the more I tried the darker the sky became. Suddenly a voice said, 'stop - you are only making it worse."*

#4 Jung on Transcendent Function

The Transcendent Function is an aspect of the self-regulation of the psyche that makes transition from one attitude to another organically possible - manifesting as a new attitude...
(Portable Jung, p 279)

What is it about dreams that makes transcendence "organically possible"

- Jung: dreams bring conscious and unconscious material together to arrive at a new attitude
- Hartmann (2011): Dreams operate much like the brain learns - **weaving new material into established memory - making new connections** expressed in picture-metaphors that reveal new perspectives & insights

Case Example – evidence of dreams making new connections:

Conscious Attitude: "my husband is the source of our marital problems."

Dream: *"I have a recurrent dream of being terribly angry with my husband, who I am always running away from. These dreams continued until one night I turned around and faced my husband and looked at his face.... **it was my father's face !"***

Case Example – transcendence (compensation for conscious attitude and "manifestation of a **New Attitude** toward oneself and life):

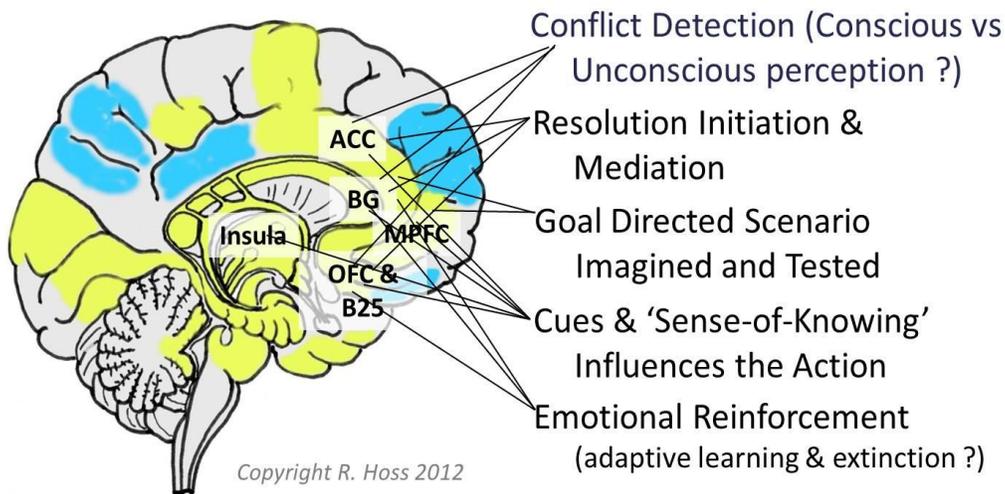
Trauma: *subject was fired from a much needed job. **Conscious Attitude:** "I have no future, it is all over for good"*

Dream: *"I dreamed a building fell on me and I was crushed under the rubble. All went dark and I stopped breathing. I knew I was dead and it was all over, there was no future. Then I became another person in the dream who was strong and determined, and dug my body out of the rubble. Suddenly I came back to life and realized that I could go on."*

What seems to be taking place in this dream?

Dream: *"I dreamed a building fell on me and I was crushed under the rubble. All went dark and I stopped breathing. I knew I was dead and it was all over, there was no future. (**Anomalous Attitude Detected & presented**) Then I became another person in the dream (**Resolution Initiated**) who was strong and determined (**Compensating Cues & unconscious inner 'Sense-of-Knowing'**) and dug my body out of the rubble (**Scenario Tested**). Suddenly I came back to life and realized that I could go on" (**Emotional Reinforcement**).*

Question: Is this potential mental capability during the REM state supported by centers which are active during REM? Researching the literature on the centers known to be active during REM there are five distinct functions that it appears that the brain in REM sleep has the capability of performing.



1) Conflict Detection (presenting “personal motives”): the Basal Ganglia and Anterior Cingulate play important roles in error detection (Falkenstein, 2001; Bush 2000; Allman 2001). The **Anterior Cingulate** also monitors conflict (Botvinick, 1999) and anomalies (Posner 1998; Carter 1998) and acts as part of a more general performance monitoring system that activates when there is a violation in expectancy (Flavio, 2007). **Caudal & Lateral OFC** are involved in inspection of events that deviate from expectation (Petrides, 2007)

2) Resolution Initiation and Mediation: **Anterior Cingulate** mediates action aimed at choosing between conflicting perceptions (Allman 2001). **Basal Ganglia** generates paradoxical behavior metaphors (St. Clair 2005) are thought to be the brain locus for reward-based adaptive action planning and learning (Yamada 2007) and (along with the **Caudal OFC**) are involved in novelty-related decision making.

3) Imagining and Testing of Self-Focused Goal Directed Scenarios (Transcendent Function): **Anterior Cingulate** imagines or observes an outcome and monitors the consequences (Apps 2009; Hayden 2009) and generates expectations of performance of self-related events (Flavio, 2007; it also receives information about a stimulus, selects an appropriate response, monitors the action, and adapts behavior if there is a violation of expectancy (Luu et al 2004). **Medial PFC** is involved in: plan generation (Partiot et al 1995), goal directed behaviors and reward processing (Kringelbach 2005; Vertes 2002), and introspective self-referential behavioral stimulation and rehearsal (Gusnard 2001).

4) Cues and “Sense of Knowing” Influences the Dream Activity (Compensation): **Anterior Cingulate** detects conditions under which errors are likely to occur (Carter 1998) and provides cues to other areas of the brain (Allman 2001). **Insula** is involved in subjective feelings, perceptual decision making and sudden insight, it guides or biases behavior in emotionally guided decision making. Craig suggests that the anterior insular cortex contains a representation of the self at each moment in time and acts as a comparator between these points in time a i.e. a subjective awareness of self is generated and is able

to compare feelings of the past, present and future. (Craig 2009). **Basal Ganglia** motivates to seek eventual rather than immediate reward (Packard 2002); **Medial PFC** self-monitors learning, provides a 'sense of knowing' and retrospective confidence judgment (Marley, 2009); **OFC** is involved in regulating planning behavior based on reward/punishment so as to change ongoing behavior (Kringelbach 2005; Bechara 1994).

5) Emotional Reinforcement and Adaptive Learning (Transcendence): **Anterior Cingulate** observes and monitors performance (Carter, 1998) and outcome to select an appropriate response based on anticipating & valuing rewards (Bush, 2002); The dorsal part of the ACC seems to play a key role in reward-based decision-making and learning (Bush et al 2002), emotional self-control as well as focused problem-solving and adaptive response to changing conditions. (Allman 2001). **Basal Ganglia** - are thought to be the brain locus for reward-based adaptive action planning and learning (Yamada 2007) selecting which response to make or inhibit (Lieberman 2000) ; **Caudal & VM OFC** involved in decision making, expectation and regulating our planning behavior so as to change our ongoing behavior (Kringelbach 2004); Caudal Orbofrontal, and **B25** is central to extinction learning (Quirk 2010);

If these five functions are operating during REM sleep then they should be evidenced in some manner in the actions taking place in dreams.

Dream Observation #2 (Hoss, 2005):

Event: Offer of teaching appointment in an area he had been away from many years.

Conscious Attitude: *"There is no way I can resurrect my old talents, they are gone forever"*

Dream: *"I was wandering through a desert and saw an old rusty car. I looked inside and found a man who was not moving. I was going to give him up for dead (**conflict detected**), but my unknown companion urged me to wake the man (**resolution initiated, compensating cues**). I argued that it was useless (**mediation**) but after much discussion reluctantly gave in and shook the man (**scenario tested**) When I did, both the man and the car came to life (**compensation**) and the car transformed into a newer car"(**emotional reinforcement**).*

Dream Observation #3:

Corp Executive – his company was restructuring and eliminating top execs. He was holding on to the hope of staying (due to fear of not finding anything elsewhere and his retirement) by exploring uncertain internal positions that were open to him, but none were aligned with his career goals so he feared his career was ending. The dream changed him. After the dream he accepts an external potion (which turns out be exceptional) and walks out the door.

*Dream: I am a passenger in a boat on a dark underground river trying to find a way out and a 'position' in the windows where I can see daylight (**conflict detected**). The tour guide appears behind me and points to an opening in front that I had not seen before (compensation) and says "you can walk out that door" (**imagined resolution & cues**). I didn't understand what he was telling me, but finally at his constant urging (**mediation**) I walked out the door (**scenario tested**). When I did the boat emerged from an ice cave into a bright beautiful sunlit setting of calm water (**reinforced**).*

Concluding Remarks:

- There is evidence from PET studies that the landscape of brain activation in REM has an effect on dream content as might be anticipated based on the role those centers play in the waking state.
- Further research findings on those centers are suggestive that the dreaming brain has the potential capacity to operate in a manner supportive of Jung's observations.
- Such conclusions can only be deductive because at this point there is no data to show exactly what brain centers are activating, nor exactly what role they play, during any specific REM dream scenario – but the overall picture looks promising.

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