The Problems with Activation-Synthesis Theory

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[For a more recent overview of the debate surrounding activation-synthesis theory, see Refocusing the neurocognitive approach to dreams: A critique of the Hobson versus Solms debate (2005).]

Abstract

Dream content is more coherent, consistent over time, and continuous with waking emotional concerns than the activation-synthesis theory would predict. It cannot easily accommodate the fact that children under age 5 have infrequent and bland dreams even though they have normal Rapid Eye Movement (REM) sleep. It is not consistent with the fact that there are patients with forebrain lesions who do not dream even though they have REM sleep. A neurocognitive perspective should focus on the forebrain system of dream generation and begin with the findings on dream content in adults and the developmental nature of dreaming in children.

Introduction

A large body of findings with the Hall/Van de Castle coding system (Domhoff, 1996; Domhoff, 1999a; Hall & Van de Castle, 1966) shows that dreams are more coherent, consistent over time for both individuals and groups, and continuous with past and present waking emotional concerns than the activation-synthesis theory, with its emphasis on brainstem-driven bizarreness, can accommodate. (Hobson, 1988; Hobson, Pace-Schott, & Stickgold, 2000; Hobson, Stickgold, & Pace-Schott, 1998) In addition, Foulkes' (1982; 1999) laboratory discovery of low levels of dreaming until ages 9-11 joins with Solms' (1997) findings with brain-lesioned patients in demonstrating that REM sleep is insufficient for dreaming. A new neurocognitive theory of dreaming therefore should
begin with the hypothesis that Foulkes' developmental findings may correlate with the maturation of the forebrain system of dream generation first uncovered through creative neuropsychological detective work by Solms. In addition, the findings with the Hall/Van de Castle system on the lifelong persistence of various kinds of negative dream content suggest there is a "repetition dimension" in people's dream life (Domhoff, 1993; Domhoff, 1996) that may relate to the temporal-limbic and frontal-limbic origins of dreaming in Solms' model.

The Brainstem/Bizarreness Commitment

Hobson et. al. present interesting ideas that may explain away much of the "dreaming" in NREM sleep. However, they do concede there is enough dreamlike mental activity in NREM sleep to challenge the strict equation of dreaming and the REM stage of sleep, especially late in the sleep period. The empirical dream psychologists who abandoned the REM sleep/dreaming equation decades ago in the face of contradictory evidence summarized by Berger (1967; 1969), Foulkes (1966; 1967), and Hall (1967) did not ask for much more than what is now granted in these articles. The Hobson group is wrong to chastise psychologists for focusing on the cognitive level when the constant changes in their own model show that their comprehensive mind-brain isomorphism is extremely premature.

It is regrettable that Hobson et. al took so long to broaden their theory in the face of contradictory evidence available long ago (Vogel, 1978), but it is possible that the "state" transition at sleep onset and the greater activation late in a sleep period explain much dreamlike NREM mentation. The disappointment is their continuing brainstem commitment. In the face of the new and old findings synthesized by Solms to show that brainstem activation is not sufficient for dreaming, and in some unknown percentage of cases may not even be necessary, it would seem that research relating the forebrain system to many different aspects of dream content should now be the primary focus of mind-brain isomorphists.

Hobson et. al. justify their desire to keep the brainstem at the forefront of their theory on the basis of a commitment to a mind-brain isomorphism. However, this insistence also may be due to their strong belief that dreams are bizarre and discontinuous, although one of their own studies reported "discontinuities" in only 34% of 200 dreams (Rittenhouse, Stickgold, & Hobson, 1994). Most others who have studied large samples of dream reports from groups and individuals see dreams as even more like realistic (Dorus, Dorus, & Rechtschaffen, 1971; Foulkes, 1985; Snyder, 1970; Strauch & Meier, 1996). For example, Hall (1966) concluded that only 10% of 815 home and laboratory reports from 14 adult males had at least one "unusual element," using a scale that can be found in Domhoff (1996). In studies comparing REM reports to samples of waking thought collected from participants reclining in a darkened room, the waking samples were rated as more dreamlike (Reinsel, Antrobus, & Wollman, 1992; Reinsel, Wollman, & Antrobus, 1986).
To support their focus on brainstem activation and the bizarre nature of dream content, Hobson et. al. have to challenge several different sets of impressive findings. First, they reject Foulkes' (1982; 1999) conclusions on the low levels of REM dreaming in young children with the claim that these children are not able to communicate in words about their dreams. But Foulkes' data show that the rate of recall correlates with visuospatial skills, and that there are older children with good communication skills and poor visuospatial skills who do not recall very many dreams in the laboratory. It is more likely that young children do not dream often or well by adult standards, a conclusion favoring a cognitive theory of dreams.

Hobson et. al. reject Foulkes' findings on the banality of the few dreams his young participants did report by saying the laboratory situation is not conducive to typical dreaming, but Foulkes (1979; 1996; 1999) already has answered that claim very effectively. More generally, they overstate the differences between home and laboratory dreams. This is shown most recently in a reanalysis using effect sizes (Domhoff & Schneider, 1999) with the original codings from the most comprehensive study of this issue, which was carried out by Hall (1966) with 11 young adult male participants who each spent three to four consecutive weeks sleeping in a laboratory bedroom in a house in a residential neighborhood.

Hobson et. al. denigrate the findings on the everyday nature of most dream content by saying that psychological measurement has not been adequate, but they have not demonstrated that their evolving rating scales for the slippery concept of bizarreness can be used reliably across laboratories. Furthermore, they ignore most of the findings with the Hall/Van de Castle system, which has shown high reliability when used by researchers in many different countries and produced results that have been replicated several times (Domhoff, 1996; Domhoff, 1999b) However, Hobson et. al. do note the Hall/Van de Castle findings on emotion in dreams, which anticipate their own findings of more negative than positive emotions, more reports of emotions in women's dreams, and no gender differences in the distribution of emotions (Merritt, Stickgold, Pace-Schott, Williams, & Hobson, 1994).

In their effort to emphasize differences between REM and NREM reports, Hobson et. al. argue against any control for length of report. In so doing they do not seem to realize this problem is handled without loss of data by the indicators based on percentages and ratios that are now standard in the Hall/Van de Castle system (Domhoff, 1999b; Schneider & Domhoff, 1995-2000).

Strong support for the use of the Hall/Van de Castle content indicators in resolving disputes about the nature of REM and NREM reports is provided by a study Hall carried out three decades ago, but that was only recently reported by Domhoff and Schneider (1999). When NREM reports from early and late in the sleep period were compared with REM reports, several of the usual differences appeared. For example, the "cognitive activities percent" (the number of cognitive activities divided by the total number of all activities) was 20% in NREM reports, but only 11% in REM reports. Conversely, the "verbal activity percent" was 37% in REM reports, but only 22% in REM reports.
However, the NREM reports from after the third REM period of the night were more similar to REM reports than early NREM reports on a summary measure for a wide range of Hall/Van de Castle categories. These results are consistent with the recent theorizing by Hobson et. al.

Hobson et. al. call for studies of dreams at home to obtain a more realistic sample of dream content, but they overlook the replicated longitudinal results with the Hall/Van de Castle system, which show that dream content can be constant for individual adults over years and decades, something that might not be expected if dreaming is as chaotic and bizarre as they claim (Domhoff, 1996). One of these longitudinal studies showed that the dreams of "the Engine Man," used by Hobson (1988) to show the bizzareness of dream structure, are highly consistent in content over just a three-month period. His dreams are also below the male norms on key social interactions, and continuous with his waking life in terms of the people and activities in his dreams (Domhoff, 1996).

**Conclusion**

If the most methodologically sound descriptive empirical findings were to be used as the starting point for future dream theorizing, the picture would look like this (1) dreaming is a cognitive achievement that develops throughout childhood (Foulkes, 1999); (2) there is a forebrain network for dream generation that is most often, but not always, triggered by brainstem activation (Hobson et al., 1998; Solms, 1997); and (3) much of dream content is coherent, consistent over time, and continuous with past or present waking emotional concerns (Domhoff, 1996). The activation-synthesis theory espoused by Hobson et. al. cannot encompass these three findings. A new neurocognitive theory of dreams is therefore needed (Domhoff, 2001).