

SPECULATIONS IN "TEMPORAL DELAYS IN INCORPORATION  
OF EVENTS INTO DREAMS": A REPLY TO ROLL<sup>1</sup>

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*Summary.*—Previously we pointed out similarities between patterns of delayed incorporations of daytime stimuli into dreams and delayed memory processes in rats. In commenting upon this article, Roll argued that this reductionistic leap is unwarranted. We contend that it would be remiss not to make note of this potential connection, especially in view of recent major contributions of animal research to the understanding of REM sleep and dreams. We also suggest that the disruption-avoidance-adaptation model constitutes a preferable psychological explanation for the dream-lag effect than Roll's psychoanalytic model of repression and repetition compulsion.

In a recent article (Powell, Nielsen, Cheung, & Cervenka, 1995), data were presented which indicated that, in addition to daytime events often being incorporated into dreams of the immediately following night, there sometimes occurs a resurgence of such incorporations several days later. Subjects in the experiment were shown an emotionally arousing video and then recorded their dreams at home for seven nights. Dreams were subsequently rated for the likelihood that some aspect of the video had been incorporated. For subjects who showed strong evidence of incorporation, mean likelihood of incorporation ratings followed a U-shaped pattern with significantly higher scores on Nights 1, 6, and 7 than on Night 4. The similarity of this temporal pattern with REM sleep patterns observed in rats exposed to various learning experiences was noted, and the role of the hippocampus as a possible neural mechanism for delayed incorporations was discussed.

It should be noted that the experiment was confounded by the fact that all of the subjects had viewed the film on a Friday evening, leaving open the possibility that a day-of-week factor may have somehow influenced the pattern of incorporation that was observed. However, the effect was large in magnitude and followed a pattern of incorporation similar to that obtained in other studies which were not confounded in this manner (Jouvet, 1979; Nielsen & Powell, 1989; Sophie & Gross, 1994). Efforts are now underway to replicate these results using a nonconfounded design.

In commenting upon our article, Roll (1995) has argued that we made

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too great a reductionistic leap in speculating upon similarities between the dream-lag effect and the delayed effects sometimes seen in REM sleep and memory consolidation studies with rats. There are, of course, significant differences between the brains of rats and humans and between processes of memory consolidation in rats and humans, but it should also be recognized that the similarities which do exist may reflect shared processes fundamental to memory. Whether this is correct, it seemed remiss not to inform readers of these similarities and the manner in which they might be related. Connecting our data with these neurophysiological findings in animals seemed particularly warranted given the effects of such findings on elucidating the possible functions of REM sleep and, by extrapolation, dreaming (e.g., Winson, 1990). Research on sleep function has traditionally benefited from cross-disciplinary collaboration and synthesis, including concurrent studies of sleep and memory processes in both rats and humans (e.g., Smith, 1995).

Roll also argued that our data are highly consistent with a psychoanalytic model of defensive reaction. According to this model, the dreamer is initially "overwhelmed by the material" which is then repressed for several nights until, in keeping with the principle of repetition compulsion, it is again allowed to intrude. However, there is at present no experimental evidence that, following a period of "repression," an individual will begin to dream repeatedly about a target stimulus, which the concept of repetition compulsion seems to imply. Experimental support for the concept of repression is also highly controversial (e.g., Loftus, 1993). On the other hand, processes of delayed memory consolidation in both rats and humans have at least been empirically verified. Moreover, the clearest evidence for the dream-lag effect was obtained in an experiment which assessed incorporations of the experience of sleeping in a sleep laboratory (Nielsen & Powell, 1989, Experiment 2), an experience which, although possibly somewhat stressful, would be difficult to characterize as "overwhelming" the dreamer.

Roll claimed that our "over-reliance on reductionistic explanations is made especially obvious by the absence of explanations consistent with non-physiological psychological theory" (p. 481). However, our article does include a discussion of the psychological "disruption-avoidance-adaptation" (DAA) model by Wright and Koulack (1987). According to the DAA model, there is an oscillation between incorporation of a stressful event into one's dreams in an attempt to process and master the experience and avoidance of such incorporation to prevent ongoing disruption of sleep patterns. This model is well-articulated and parsimoniously explains the results of our experiments as a function of such straightforward mechanisms as the tendency to avoid stress and the biological need for sleep. Although Freud (1900/1953) also considered the influence of such mechanisms on dreaming, he made no hypothesis about their relationship to delayed incorporations.

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