Following the music to the memories
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The evocation of autobiographical memories and associated emotions by music counts among the most poignant experiences associated with music. Accordingly, excerpts of music can serve as potent retrieval cues with which to study the functional architecture of autobiographical memory. Converging evidence suggests that the neural aspect of the medial prefrontal cortex (MPC) is a region where music and autobiographical memories might be ideomotorically expressed. This study tested the hypothesis that ideomotory evocation of autobiographical memories might occur in the MPC. Using a panel of musically trained subjects, the study used three to five tonal clusters to evoke autobiographical memories. The study compared the evocation of autobiographical memories with the evocation of musical memories and with a control condition in which no music was presented. The study found that the evocation of autobiographical memories was associated with greater activation in the MPC than was the evocation of musical memories or the control condition. The study also found that the evocation of autobiographical memories was associated with greater activation in the right prefrontal cortex (PFC) than was the evocation of musical memories or the control condition. The study concluded that ideomotory evocation of autobiographical memories might be associated with greater activation in the MPC and right PFC than is the evocation of musical memories or the control condition.

Methods
Pre-screening and memory characterization: Thirty 30s excerpts from edited Top 100 US hits and R&B charts. Randomly selected from a pool of 4,160 songs using a weighed randomization scheme. Subjects were not informed whether the song was familiar or not whether it evoked a weakly or strongly autobiographical memory or no clear memory at all. Ratings following each excerpt:
- Degree of attention toward the memories (5 pt scale)
- Ratings following each excerpt:
- Familiarity, Autobiographical Salience, Affect

Figure 1. Design matrices for two subjects illustrate the statistical models that were used. The contrast in which the Familiarity, Autobiographical Salience, and Valence regressors showed moderate to strong effects were combined. They were combined because of the strong correlations among these variables for all subjects. Thus, in red, yellow, and magenta showed greater activation when the song was familiar, strongly autobiographically salient and evoked a positive emotion.

Group-level analyses of task effects and parametric variation in subjective variables

Figure 2. Individual effects of familiarity (green), autobiographical salience (red) and affect (purple) (valence) (blue). For purposes of comparison, the gray subplots show the baselines of the RMP condition shown in Figure 3.

Figure 3. Individual effects of familiarity (green), autobiographical salience (red) and affect (purple) (valence) (blue). For purposes of comparison, the gray subplots show the baselines of the RMP condition shown in Figure 3.

Conclusions
Dorsal medial prefrontal cortex exhibits properties of an area that binds together music with autobiographically salient memories, in that it responds more strongly during autobiographically salient songs and it also follows the structure of the music, predominately for songs that are autobiographically salient. Left VLPFC shows similar properties. The effects of familiarity and autobiographical salience (encoded in the left hippocampus) and tonality-tracking were distributed across a number of prefrontal, temporal, and occipital areas, as would be expected given the interactions of frontal memory retrieval with content representations in posterior cortices.