Neural correlates of melodic prediction violations: similarities to language processing

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The concept of "prediction" is frequently evoked in studies of both music and language processing, and it has been suggested that predictive mechanisms may be shared between the two domains. However, very different paradigms are used to examine the neural correlates of prediction in music and in language. In ERP studies of language, the effects of violating certain predictions have recently been examined by manipulating sentence contexts. Predictions for a specific word occur when a context constrains strongly for a certain continuation; these predictions can be violated even when a sentence is continued with a different plausible word. These violations have been observed to elicit a late anterior positive ERP component. In contrast, studies of prediction violations in music have mainly used incongruent events (e.g., out-of-key notes) and have not manipulated the contextual constraint of sequences. Here, we created a musical paradigm that more closely resembles those used in language studies. Participants listened to short novel melodies that either did or did not lead to a strong prediction for a particular note to come next. Plausible (in-key) target notes that violated this strong prediction elicited a late anterior positivity compared to the same target notes in non-constraining melodies, with no trace of the early right anterior negativity that has often been associated with musical expectancy violations. The anterior positivity to melodic prediction violation strongly resembles the ERP effect seen in language studies of prediction violation, suggesting that prediction may be a process that functions similarly in the two domains.