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Mismatch field to tone pairs: Neuromagnetic evidence for temporal integration at the sensory level.

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Abstract

The mismatch field (MMF) to minor pitch changes in two experimental conditions was studied. Standard tones of 1000 Hz and deviant tones of 1050 Hz both of 50 ms duration were delivered in single tone condition. Paired tones of the same duration were used in the paired tone condition. The standard tone pair consisted of two 1000 Hz tones, whereas the deviant tone pair was composed of a 1000 Hz tone in the first position and a 1050 Hz tone in the second position with a silent interval of 15 ms between the two. Standards of 90% and deviants of 10% probability were presented in random order and with a randomized interstimulus interval between 600 and 900 ms. The source analysis showed a more lateral location for the MMF obtained in the paired tone condition (MMF.P) compared to the MMF elicited by the single deviants (MMF.S). The source location of both the MMF.P and MMF.S turned out to be significantly anterior relative to the sources of the M100. The increased stimulus repetition in the paired tone condition (two times more stimuli than in the single tone condition) lead to a strong suppression of the field amplitude and of the dipole moment of the M100, while this effect could not be seen for the MMF. The data demonstrate a fundamental difference between the processes reflected by the M100 and the MMF: while the M100 represents the processing of every individual tone, the MMF reflects the change detection of the paired stimuli as unitary events, forming a perceptual group. The different sources of the MMF.P and MMF.S also support an integrated processing of the paired stimuli.