INTRODUCTION

Music can stimulate rhythmic movements as when we tap our feet or nod our heads to the beat of a song. Movement entrainment is also specific to auditory as opposed to visual cues1. Behavioral studies have also shown that auditory cues can facilitate timely and co-ordinated movements in those with motor disorders2.

An accent, a point of beat intensification, can be a perceptual cue that emphasizes important events in a rhythm, contributing to the saliency of "the beat", or metric organization3. Regularly occurring accents can also create a temporal expectation that enables the listener to accurately anticipate when the next beat will occur4.

Question: What is the neural basis for the entrainment of movement with auditory cues?

Behavioural hypothesis: Certain features of rhythms, such as accent structure, can be an effective cue in modulating movement.

IMRI Hypothesis: Parametric manipulation of cue saliency as it influences motor behaviour, will reveal neural regions mediating auditory-motor integration.

METHODS

Subjects: 11 right-handed (6 male) healthy volunteers with no musical training.

Stimuli and Conditions: Parametric modulation of sound intensity accents, creating a waltz or triple meter structure.

Dependent Measure: Tap Duration

RESULTS

A Conjoint analysis data reveals three candidate regions that may participate in auditory-motor integration: ventral premotor cortex, insula, and supplementary motor area. A conjunction analysis of connectivity data sets reveals three candidate regions that may participate in auditory-motor integration: ventral premotor cortex, insula, and supplementary motor area.

DISCUSSION

The saliency of a rhythm’s motor organization as manipulated via intensity accentuation can modulate tapping behaviour; though all tones were of equal duration, louder tones were reproduced significantly longer in duration.

Bilateral auditory and dorsal premotor cortices respond in a positive linear manner as a function of increasing meter structure.

A functional connectivity analysis indicates that auditory and dorsal premotor cortices are not directly functionally connected. Auditory-motor interactions may thus be modulated via other cortical regions as is suggested in the conjunction analysis.

REFERENCES