



# The Role of Cerebral Resonance Behavior in the Control of Music Performance



## Hypothesis

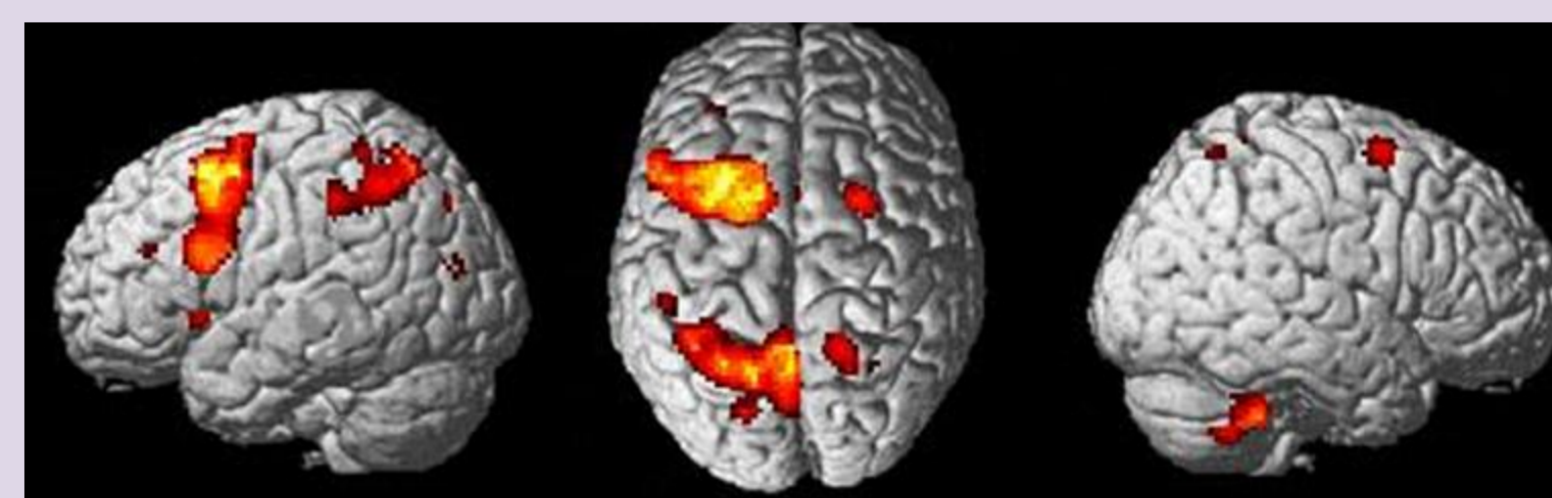
While listening to music, non score-dependent musicians will exhibit the recruitment of pre-motor and parietal cortical fields normally active while playing.

Score-dependent musicians will exhibit this recruitment to a lesser degree.

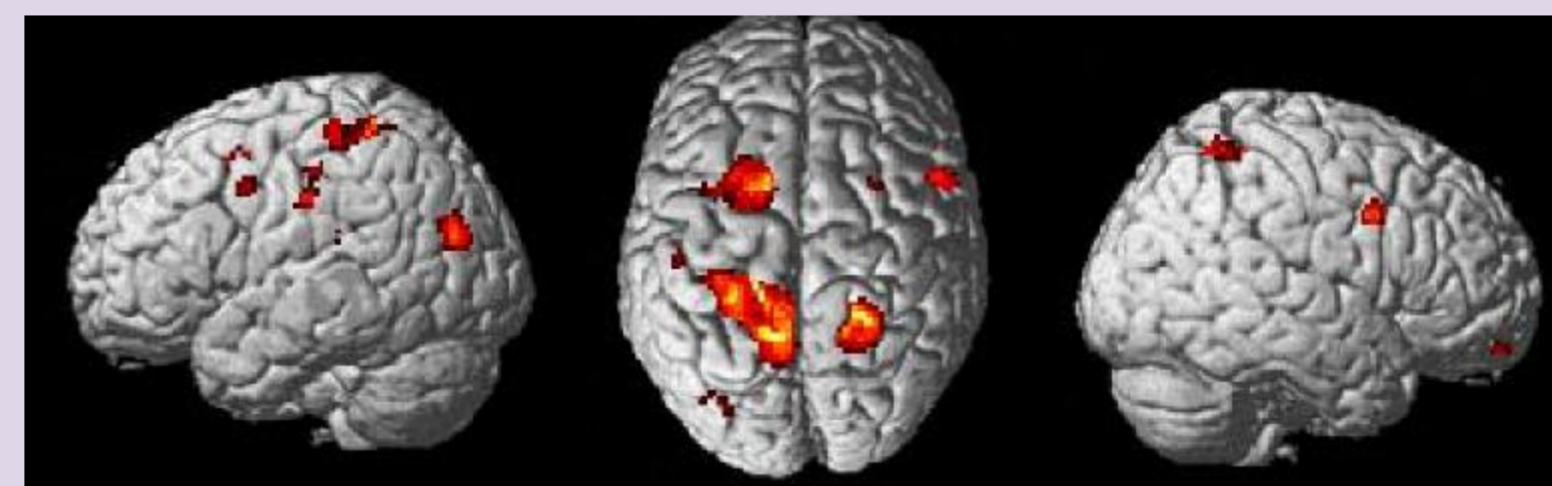
The organization of goal-directed movement is particularly embedded in parietal-pre-motor circuitry (de Jong et al. 2001). Sensory stimuli facilitate this system to express 'resonance behavior', the virtual replication of observed behavior in the brain. It is plausible that listeners map what they hear onto their own motor representation of the music, which would explain why people either hum along with the melody of a popular song or tap the beat. The ability of non score-dependent instrumentalists to play by ear in various tonalities could be the manifestation of enhanced motor resonance behavior.

## Preliminary results

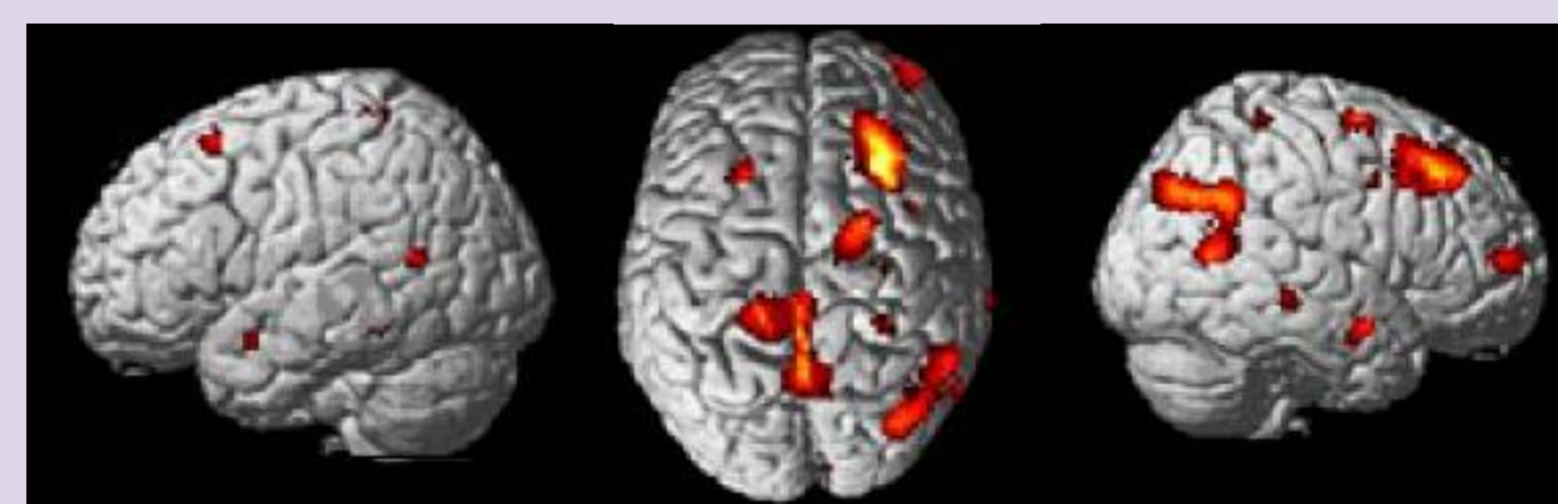
### Motor imagery vs. explicit judgement



$p < 0.001$  (uncorr.) /ext. 8



$p < 0.001$  (uncorr.) /ext. 8



$p < 0.05$  (non-significant)

Non score-dependent musician  
subject 1

Score-dependent musician  
subject 2

Non-musician  
subject 3

## Methods

### Study population

1. Non score-dependent musicians
2. Score-dependent musicians
3. Musically unskilled controls

### Experimental conditions

1. Motor imagery  
vs.
2. Explicit judgement
3. Familiar music  
vs.
4. Unfamiliar music

### Data acquisition & analysis

3T fMRI will be used to measure task-induced Blood Oxygen Level Dependent (BOLD) responses indicating neuronal activations. The analysis will be performed with Statistical Parametric Mapping.

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