

9th International Conference on Music Perception and Cognition

Alma Mater Studiorum University of Bologna, August 22-26 2006

Changing the pacing stimulus intensity does not affect sensorimotor synchronization

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When we synchronize our finger or hand movement with an external stimulus (e.g. a metronome) our taps typically precede the external events by a few tens of milliseconds (NA, negative asynchrony). Representational models (e.g. Aschersleben, 2002) make the hypothesis that synchronization is established at a central level where the action movement code has to coincide with the representation of external events. To explain NA, it is assumed that processing times for generating the kinesthetic-tactile tap code and for generating the auditory or visual stimulus code are different. In order for these codes to coincide at a central level, the taps should precede the stimuli by approximately the amount of difference between the processing time needed to build the representation of the information in the two afferent systems. Accordingly, Aschersleben et al. (2001) showed that manipulation of perceptual latency of somatosensory information incoming from taps by changing the effector (hand vs. foot) resulted in changes of the amount of NA. Similarly, manipulation of the pacing stimulus intensity should also affect NA. To test this hypothesis 20 participants had to produce short-duration force pulses with their index finger on a force transducer along with isochronous auditory stimuli (IOI = 800 ms). For comparison, a simple RT task using auditory stimuli with unequal IOIs was also performed. It is well known that intensity changes affect RTs. Intensity of auditory stimuli was manipulated from near-threshold to strong. Results showed that increasing stimulus intensity did not affect NA whereas the same manipulation reduced RT. In the synchronization task the time of occurrence of maximum tapping force did not change with intensity of the pacing stimulus. Still, when intensity increased maximum tapping force decreased. These findings are not consistent with representational theories. To understand NA, movement properties other than taps' occurrence time should be taken into account (e.g. force). In addition, these findings suggest that timing of action in synchronization and RT tasks are mediated by different mechanisms.

Key words: Synchronization, Negative asynchrony

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