CHANGING THE PACING STIMULUS INTENSITY DOES NOT AFFECT SENSORIMOTOR SYNCHRONIZATION

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INTRODUCTION

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 (negative asynchrony, NA). A plausible explanation for NA relies on the idea that action control in synchronization tasks is concerned with achieving subjective more than objective synchrony.

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 kinestetic-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 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.

Does manipulating the intensity of the pacing stimulus (changing perceptual latency) affect timing in sensory-motor synchronization with isochronous stimuli?

METHOD

We tested 10 participants (19 and 24 years; *M*=20.8 years) from the University of Finance and Management in Warsaw.

TASKS

Tapping task **-** participants had to produce short-duration force pulses with their index finger on a force transducer along with isochronously presented auditory stimuli (9 dB, 11 dB, 23 dB, 56 dB and 82 dB)

| | | | | | ... **IOI = 800 ms**

Simple RT task **–** participant had to respond as fast as possible with their index finger on a force transducer after auditory stimuli (9 dB, 11 dB, 23 dB, 56 dB and 82 dB) were presented IOIs were unequal

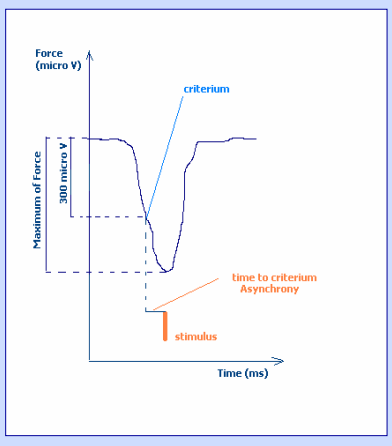
| | | | | | ...

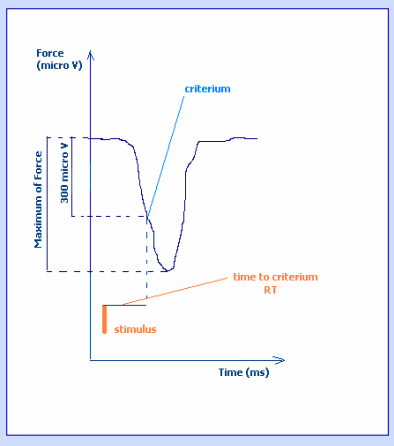
IOI = randomly varied around 800 ms

MEASURES

- Difference between the time of occurrence of the pacing stimulus and the moment when the produced force is larger than 300 μV.

Asynchrony (ms) **vs.** **Reaction time (ms)**



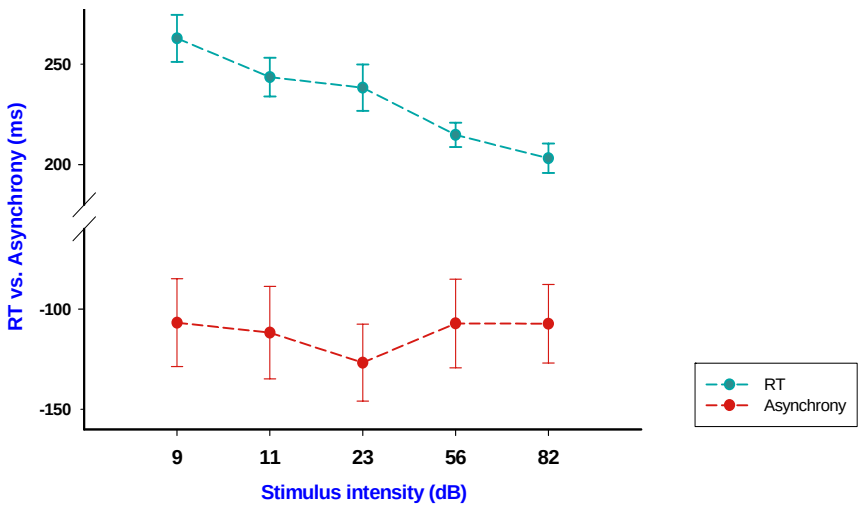


- **Maximum force (μV).**

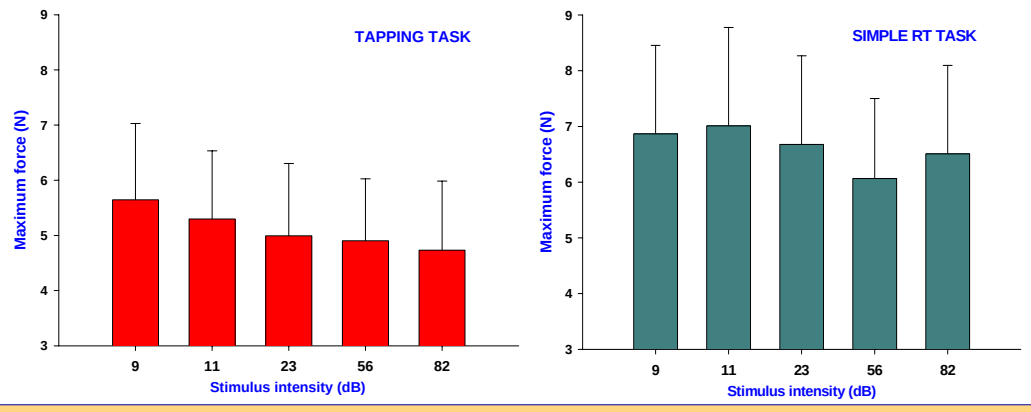
RESULTS

- **The effect of stimulus intensity varied as a function of the task, as shown by a significant *Stimulus intensity x Task* interaction (*F*(4,36) = 15, *p* < .001).**
- **RT was smaller with increasing intensity (*F*(4,36) = 30, *p* < .001). However, changing the intensity of the pacing stimulus did not affect synchronization.**
- **When intensity increased maximum tapping force decreased (*F*(4,36) = 4, *p* < .05).**

RT vs. ASYNCHRONY AS A FUNCTION OF STIMULUS INTENSITY



MAXIMUM FORCE AS A FUNCTION OF STIMULUS INTENSITY



CONCLUSIONS

- Increasing stimulus intensity reduces RTs.
- In contrast, changing the intensity of the pacing stimulus does not affect synchronization. Still, when intensity increases maximum tapping force decreases.
- 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 trajectories).
- In addition, these findings suggest that timing of action in synchronization and RT tasks may be mediated by different mechanisms.

REFERENCES.
Aschersleben, G. (2002). Termporal control of movements in sensorimotor synchronizations. *Brain and Cognition,* **48**, 66-79.
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