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Relation between Rhythmic Ability and Phonological Manipulation Ability

The Speech Communication Group at the Research Lab of Electronics investigates the production and perception of speech by humans and machines. One topic in interest is the relationship between human's ability to produce speech and the ability to learn rhythmic patterns. A number of lines of evidence support the hypothesis that rhythmic ability (e.g. the capacity to find the beat in an auditory pattern) and speaking ability might be related. For example, several different types of language disability respond to regularly rhythmic stimuli in therapy, including aphasia, stuttering and motor control problems. The goal of this project is to test the hypothesis that one's capability in phonological manipulation is positively related to one's beat-keeping ability. To this end, members of the Speech Communication group designed a set of tasks that measure different aspects of rhythmic ability (such as free tapping and synchronized tapping), and a second set of tasks that measure different aspects of phonological manipulation ability (such as reading readiness tasks). Behavioral responses to these tasks have been recorded for 30 speakers, and once they are scored it will be possible to test the hypothesis that these two sets of abilities are correlated in typical healthy young speakers.

Specifically, my task in this UROP is to score the performances of a number of subjects on the following experimental tasks: i). Free tapping: the subject is asked to tap regularly at his/her preferred rate, given no stimulus; ii). Free syllable repetition: the subject is asked to say "pah" repetitively given no sound stimulus; iii). Synchronized tapping: the subject is asked to tap in synchronization with a fast, medium or slow periodic sound stimulus; iv). Synchronized syllable repetition: the subject is asked to say "pah" in synchronization with the same set of sound stimuli. From the resulting sound files I will calculate for each subject his/her mean preferred tapping and syllable repetition rate and the synchronization offsets between his/her responses and stimuli, i.e. how much earlier or later the responses occur compared with stimuli. The degree of variation on these four tasks will provide an estimate of the participant's rhythmic ability.

My personal motivation for participating this UROP is to learn the basics in the representation and perception process of sound. I have been very interested in how human listeners perceive and produce various sounds, especially musical sounds. I believe this UROP, which deals with simple beat patterns, will offer me a good introduction to the world of sounds.