

On the interaction between moving – breathing – talking

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Our daily life is full of complex sensorimotor actions which are done simultaneously. For example, walking and talking at the same time. These actions have different demands on respiration. In this talk we will address the relation between body motion, respiration and spontaneous speech. The demands on oxygen supply increase in repetitive body motions and coincide with a high breathing rate. In contrast, breathing rate is rather low during speech production allowing the speaker to realize long speech streams of several words or phrases with an intended linguistic structure.

Our work addresses the interaction between these simultaneous actions and their competition with respect to respiration. Furthermore we show to what extent various repetitive motions can shape the temporal structure and rhythm of the spoken text via breathing. To do so, two different experiments were carried out combining motion capture, breathing and acoustic recordings in various single tasks (speaking only, moving only) and dual tasks (speaking and moving simultaneously).

In a first experiment, subjects were instructed to bike with a comfortable rate while sitting on an ergometer. The resistance of the bike was changed from 70 W to 140 W, which affected the muscular effort to move, the demands on the respiratory system, and the temporal structure and complexity of the speech sequences.

In a second experiment subjects produced either cyclical arm or leg motions using a Minitrimmer. Since arm gestures are often synchronized with speech production, we expected stronger effects of arm movements than legs movements on speech production.

The results of these experiments will be discussed in line with previous work on the interference of body motion on cognition and vice versa. A novel perspective is taken by combining motion and speech production via respiration.