

Auditory Perception of Biological Movements: an evidence of cognitive specificities from sound synthesis

Thoret, E., Aramaki, M., Kronland-Martinet, R., Velay, J. L., and Ystad, S

In this study, we investigated whether friction sounds produced by drawing movements enable the recognition of dynamic and geometric characteristics of biological movements. In a first experiment, friction sounds were real-time synthesized and modulated by the velocity profile of a drawing gesture. Results revealed that subjects associated a biological movement to sounds that were modulated by velocity profiles complying with the $1/3$ power law. This result demonstrates that biological movements can be recognized through the auditory channel. Going further, two other experiments investigated whether such sounds can adequately reveal the underlying drawn shape. Two association tasks that were made with recorded and synthesized friction sounds revealed that geometric shapes, that induce human kinematics to produce different velocity profiles during the drawing process, are discriminable through timbre variations. These three experiments provide a new original evidence of the specific treatment of biological motion kinematics through a sensory channel never previously used for this purpose.

[1] Thoret, E., Aramaki, M., Kronland-Martinet, R., Velay, J. L., and Ystad, S. (2014). From Sound to Shape: Auditory Perception of Drawing Movements, *Journal of Experimental Psychology: Human Perception and Performance*