



Seminar

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*The Emerging Cognition of the Fetus and Neonate:
Language, Music, Emotions, and Possible Implications*

Tuesday, 7 February, 11:15 a.m.

In the Thunberg Lecture Hall
SCAS, Linneanum, Thunbergsvägen 2, Uppsala
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S W E D I S H
C O L L E G I U M
for ADVANCED STUDY

ABOUT MINNA HUOTILAINEN

Minna Huotilainen holds an MSc and Ph.D. from Aalto University in Espoo, where she studied engineering, acoustics, signal processing, brain research, and medical physics. She worked as a Poste Verte Fellow at the Institut national de la santé et de la recherche médicale (INSERM) in Lyon, studying intracranial and oscillatory brain activity. She has also held a fellowship at the Helsinki Collegium for Advanced Studies at the University of Helsinki. Her major experimental findings have been made at the University of Helsinki's Cognitive Brain Research Unit. Her research interests include memory, learning and attention in fetuses, infants, children and adults, the effects of music and other cultural hobbies on brain development and cognitive skills, the effects of stress on cognition and the use of neuroscientific methods in natural working and learning situations.

Huotilainen is best known for her work on human fetuses showing that both melodies and words can be learned prior to birth and the brain responses related to this learning can be observed after birth (2013, 2005). She has also demonstrated the effects of musical hobbies on toddlers' and children's brains (2012, 2013, 2014). Her work on job burnout shows changes in cognitive functioning due to stress (2014, 2016).

At SCAS, Huotilainen will be continuing her work on fetal and neonatal cognition and the effects of music on infant development.

ABSTRACT

Cognition can be understood as a collection of mental actions or processes that are needed to acquire knowledge and understanding using the senses, thought, and experience. During ontogenesis, cognition *emerges* via neural development, exposure to stimuli and via learning and acquisition of skills and memories. In my neuroscientific research, the key components of human cognition emerging during the fetal and neonatal periods are related to the acquisition of early skills for language, music, and emotion perception from audition. There is increasing evidence of highly developed feature extraction and memory functions revealed by early brain recordings in humans. For example, memory traces for typical stress patterns or repeated word forms of the mother's native language are systematically acquired prior to birth. In music, neonatal musical preferences and skills form the basis of universal musicality - traits that appear in a great majority of musical systems in different cultures. Neonates possess fast abilities for statistical learning and acquire new words and melodies quickly without effort. Emotional sounds presented to neonates evoke physiological responses similar to those seen in adults experience the emotions in question, and elicit strong brain responses correlated at an individual level to prenatal emotional events. As a possible implication of such recent findings, we may need to reconsider our view on the hominization of the human fetus, possibly changing the moral and legal rights of fetuses. The issue is complicated by the conflict between fetal and women's rights and thus requires a large, multidisciplinary and societal discussion.