

Brain activity revealed when watching a feature film

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Human brain functions have been studied in the past using relatively simple stimuli, such as pictures of faces and isolated sounds or words. Researchers from Aalto University Department of Biomedical Engineering and Computational Science have now taken a highly different approach: they have studied brain functions in lifelike circumstances.

In their new study, published in [PLoS ONE](#), the group examined how the brain processes the film *The Match Factory Girl* by Aki Kaurismäki.

Films have been previously used to study [brain activity](#), but the brain activity patterns have been integrated over the whole duration of the film, and thus time information is lost. This is like compressing a whole film into just one frame. In some studies, scientists have looked at dynamic brain activity, but focusing on a single brain region at a time.

The Aalto University scientists on the other hand study the full brain activity patterns with the time resolution allowed by functional magnetic resonance imaging. This way it possible to find out which events in the film cause changes in the brain activity, and which brain areas are activated at each moment.

This analysis revealed, for example, that parts of a brain network that usually respond to speech also become activated during other types of communication, such as writing. Some other areas of the network were very selective to speech.

The researchers combined two complementary approaches to disclose the brain activity. One based on dependencies of activation in different parts of the brain, and the other begins from detailed analysis of the visual and acoustic features of which the film is composed.

The results revealed brain networks in which activity follows remarkably well the complex model of the auditory and visual features of the film. For example, brain activity in the auditory cortex followed the soundtrack extremely well over the whole length of the film, and viewing the motions of characters' hands reliably activated widespread areas of the brain.

"Our study opens new ways for studying human brain functions. Many brain areas that process sensory information reveal their principles only if sufficiently complex and naturalistic [stimuli](#) are used," explain researcher Juha Lahnakoski and Professor Mikko Sams from Aalto University Department of [Biomedical Engineering](#) and [Computational Science](#).

The new methods also make it possible to study brain mechanisms' underlying behaviour in normal everyday conditions – by simulating them in films.

More information: Lahnakoski JM, Salmi J, Jääskeläinen IP, Lampinen J, Glerean E, Tikka P, and Sams M. (2012) Stimulus-Related Independent Component and Voxel-Wise Analysis of Human Brain Activity during Free Viewing of a Feature Film. *PLoS ONE* 7(4): e35215. [doi:10.1371/journal.pone.0035215](https://doi.org/10.1371/journal.pone.0035215)

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