Psychoacoustic and neurophysiologic investigations of auditory continuity

Propositions of the thesis

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1. Understanding of lower-order aspects of hearing is essential for studying more complex aspects. Highly controlled synthetic stimuli mimicking schematic auditory scenes are ideally suited for establishing such basis.

2. Natural environments produce stimuli that are acoustically redundant. In order to produce intact and familiar percepts, the auditory system has to selectively compress, smooth, and delay the sensory input.

3. Restoration of fragmented sounds depends on the presence of acoustical energy in a critical time-frequency window. The dimensions of this window are determined by the fragmented sound.

4. Representations in the primary auditory cortex are abstract: They encode perceptual rather than acoustical properties of auditory stimuli.

5. Perceptual analysis of acoustic edges depends on top-down modulations in auditory cortex that are mediated by neural oscillations in the theta band.

6. Auditory restoration does not ‘fill in’ neural activity in the auditory cortex.

7. The validity of empirical evidence depends on whether the data meet the assumptions of the statistical tests that are applied, especially for small datasets. Therefore, neuroscientific studies should generally verify these assumptions or use larger samples.

8. Artificial hearing devices would perform better in noisy environments if they were built of adaptive spectral-temporal filters that pass transient noise components for subsequent restoration purposes.

9. A conversation in a noisy scene, as for example on the train, runs more smoothly when the agents do not listen to loud music on their MP3 players shortly before.

10. Implementation of restoration mechanisms in electric guitar pickup systems could compensate for inaccurate string holdings and thereby ensure full and sustained chord experiences.

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