Computational Ergonomics

(Talk #8)

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'Ergonomics' is the science of how human interacts with his / her surroundings through responses and performance. Knowledge in ergonomics helps bio-medical engineers to design and develop applications to assist human. 'Computational Neuroscience' is the science of modeling human brain. Computational neuroscientists seek to study the brain by building a "brain". Knowledge on how the brain works has been used to develop working biological plausible models (software or hardware) of specific neural structures that can simulate the correct neural responses in human. A review of literature indicates that studies of ergonomics are mostly focusing on higher level tasks such as hand-eye co-ordination tasks while biological plausible computational neuroscience models have mostly focus on lower level tasks related to perception. This talk explores the potential of taking advantages of knowledge from both fields under the name of 'Computational Ergonomics'. Two examples will be used to illustrate the proposed discipline of 'Computational Ergonomics'. The first one is the simulation of visually induced motion sickness (VIMS) (Figure 1) and the second one is the simulation of auditory alarm detection in the presence of auditory noise (Figure 2). The objective is to study a system of work by building a simulated "system of work".

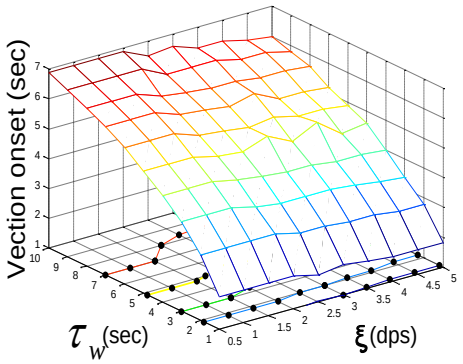

Figure 1. Simulated levels of vection onset time as functions of individually tunable model parameters τ_w and ξ. These two parameters are the time constants associated filters modeling visual and vestibular interactions.

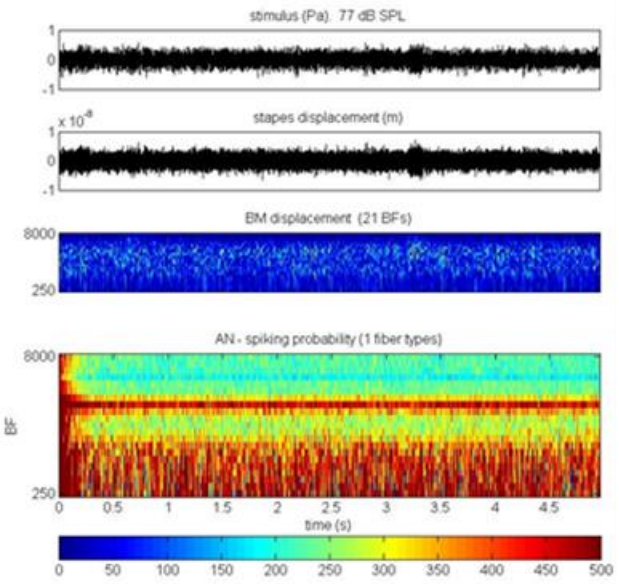

Figure 2. Simulated displacements of stapes, basilar membrane and the auditory nerve spiking probability of a 77dBA recorded train noise with a 56dBA recorded alarm.