

ACOUSTICS2008/442
Efficient coding of a xylophone sound using spikogram
non-redundent coding

Rolf Bader

University of Hamburg, Institute of Musicology, Neue Rabenstr. 13, 20354 Hamburg, Germany

Sensory systems try to use the incoming data most efficiently. Studies of Lewicki et al. lately showed, that a representation of a spike train just representing the sound and not having any redundancy is how the auditory system of the cat represents incoming sounds. To compare this theory with musical instruments, a xylophone sound was analyzed in terms of a spikogram. Here, gammatones of a 64 channel filterbank with different attack and decay values are superposed in a way to reconstruct the original sound. Only those gammatones were used which are needed to result in the sound used as input and so no redundancy is present in the analysis of the sound. It was found, that the most reasonable fit of the gammatone shape with the empirical data indeed made the representation most efficient and so the xylophone sound is most easily represented by the auditory system. Although more analysis are needed here, musical instruments could show up to be built in a way to fit a most efficient coding by listeners and so fulfill a middle-of-the-road rule of not too much and not too few information so that listeners are interested in but not overtaxed by the sounds.