CFADAGA2004/194
Perception of the envelope beat rate of inharmonic, complex temporal envelopes

C. Füllgrabe and C. Lorenzi
Laboratoire de Psychologie Expérimentale - UMR CNRS 8581, Université René Descartes Paris 5, 71 Av. Edouard Vaillant, 92774 Boulogne-Billancourt, France
christian.fullgrabe@univ-paris5.fr

Listeners can detect slow, sinusoidal variations in the depth of sinusoidally amplitude-modulated (SAM) stimuli. Here, the SAM stimulus of rate fm acts as a carrier (or '1st-order') SAM, and the slow variation in depth of rate fm' - referred to as '2nd-order' SAM - corresponds to a beat in the temporal envelope (Lorenzi et al., 2001). Recent studies have suggested that 2nd-order SAM detection is mediated by the detection of a modulation distortion product at fm'. This suggestion was tested by transposing to the temporal-envelope domain the paradigm used by Schouten et al. (1962) to study the perceived pitch of inharmonic SAM tones. In the present study, listeners were asked to estimate the 2nd-order rate evoked by a 2nd-order SAM white noise using an adjustment procedure. The 2nd-order rate fm' was fixed at 5 Hz. The 1st-order rate fm corresponded to 15, 20, 35, or 60 Hz (i.e. the 3rd, 4th, 7th, or 12th harmonic of fm'), or was shifted in frequency by df (ranging from -/+ 25-100 % of fm') relative to these frequencies, making the complex envelope inharmonic. The data indicate that the perceived 2nd-order rate is mainly shifted at the lowest 1st-order rates, contradicting the notion that listeners use only a distortion product when perceiving 2nd-order SAM rate. However, the observed shifts were smaller than what would be predicted if the perceived 2nd-order rate were entirely based on the 1st-order envelope periodicity. The results are discussed in light of the model developed by Ewert et al. (2002).