ACOUSTICS2008/110
Interactions of frequency components of multi-component envelope following response in a beluga

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The envelope-following response (EFR) in odontocetes is composed of overlapping ABRs produced by each cycle of rhythmic sound stimulus at a rate of a few hundred cycles per sec. It has been shown recently (Finneran et al., JASA 2007, 121: 1775) that a complex stimulus consisting of a few carriers modulated by different rates produces a complex EFR composed of components reproducing all the modulation rates. Using this technique, interactions between different components of complex EFR were investigated in a beluga whale Delphinapterus leucas. When all carriers of the complex stimulus were equalized by SPL, the interaction depended on both the SL of carriers (their level relative the threshold) and inter-carrier frequency spacing. Addition of components of higher SL (at low-threshold frequencies) dramatically reduced the amplitudes of other EFR components, especially at short frequency spacing. The leading factor of this reduction was decreasing of the modulation depth of each of the carriers when the overall power of the stimulus increased by additional components. The threshold estimate of each carrier little depended on the number of components; however precision of threshold determination fell down with increasing the number of stimulus components due to the reduced amplitudes of EFR components.