Comments

Comment by Carlyon:

It is worth noting that the largest component to overshoot measured psychophysically is produced by frequency components of the masker that are remote from the signal. This component is generally attributed to the onset (and offset) of the masker interfering with signal detection at short delays via a more central mechanism. There is a small on-frequency component to overshoot (for example that observed when the masker and signal are pure tones of the same frequency), and this may be due to adaptation.

Reply:

You raise a couple of important issues. The intent of our presentation was to present a conceptual model of the *biological* role of the medial efferents in hearing. As such, we began this work with a discussion of the characteristics of *natural ambient acoustic* environments. In trying to discern that role, one *must* consider primarily those stimuli likely to have contributed to evolution of the system (broadband, relatively low level continuous noise). It is clear, given the extant physiological literature, that the medial efferents mediate the process of cochlear adaptation and, as a result, act to increase the signal-to-noise ratio for brief acoustic signals by suppressing the OHCs response to sustained noise stimulation. Given the binaural representation of the MOC, it suggests to us that the MOC serves a critical role in sound localization. Our point in relating the adaptation process to "overshoot" was simply to point out that the adaptive effects the MOC can be observed psychophysically.

Comment by Viemeister:

There is a large literature on overshoot, much of which includes thoughtful discussions of the possible role of the efferent system. For a recent review and provocative psychophysical data suggesting a decrease in cochlear amplification due to efferent activity, see Strickland (2001).

Strickland, E. A. (2001) The relationship between frequency selectivity and overshoot. J. Acoust. Soc. Am. 109, 2062-2073.

Reply:

You are absolutely correct in pointing out the substantial literature attributing overshoot to auditory adaptive mechanisms. Your point, however, serves to highlight the differences in the approaches. In the paper you mention, for example, Strickland proposes some hypothetical mechanisms (likely mediated by the efferents) that act on the cochlear active mechanisms to produce overshoot. Our

approach was to accomplish the same thing beginning with existing physiological data (Liberman *et al.* 1996). By relating overshoot to MOC rapid adaptation, a known, well characterized physiological process in humans and non-human animals, our intent was to counter a frequent suggestion in the physiological literature that the MOC has, apparently, little effect on perception (the 20-dB of "overshoot" being at least as large as any MOC-mediated physiological effect). Using the physiological approach has a number of benefits, we believe, in providing precise descriptions of mechanisms, estimates of time constants, etc.