

The missing target: Evidence of a tone's inability to contribute to the auditory foreground.

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A number of cues have been identified as contributing to formation of perceptual objects or streams across frequency and time. Here we investigate the specific influence of ITDs and frequency proximity on the grouping of an ambiguous target tone with competing temporal and spectral grouping cues.

The stimuli were repetitions of a three-tone sequence, consisting of a pair of pure tones followed by a harmonic complex. The harmonic complex was spectrally shaped by a synthetic vowel formant, producing the percept of a repeating vowel that occurred at a rate one-third that of a separate, ongoing stream of pure tones. The vowel was generated such that its perceived identity depended on whether or not one particular harmonic (the “target”) was perceived in the complex (shifting the vowel from /eh/ when the target was perceived in the complex to /ih/ when the target was not perceived in the complex). Similarly, the perceived rhythm of the ongoing tone stream was heard as “regular” when the target was heard in the stream and “galloping” when the target was not in the stream. The ITDs and frequencies of the tones making up the stimuli were manipulated to explore how spatial and frequency cues influence across-time and across-frequency grouping.

Results show that the degree to which the target influences the vowel identity does not predict the degree to which it influences the tone stream rhythm. In some conditions, the tone is heard prominently in the tone stream and not in the vowel. However, in other conditions the target tone is not heard strongly in either the vowel or the tone stream. This phenomenon provides an interesting counterpart to the well-known duplex percept, in which a spectral component can contribute to two percepts simultaneously; in the present case, the “orphaned” tone contributes to neither percept. [Supported by ONR N00014-04-1-0131 and NIH DC05216.]