Influence on frequency selectivity by existence of the cue sound

Shunsuke Kidani (0610029)

School of Information Science,
Japan Advanced Institute of Science and Technology

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We have excellent ability of listening. That one is selective listening. This ability is that we can listen the object sound in plural sound. Then, if we have prior information of the object sound, it becomes easy for us to perform discrimination. Previous study of selective listening has inquired by faculty of discernment. We know that this faculty will improve, when there is prior information over a signal. However, they must be distinguished frequency selectivity by attention as previous study above and frequency selectivity in peripheral auditory sysytem.

There is one of the studies on discrimination power that has study of Botte(1995). This study is shown that it becomes easy for subject to discriminate from the siganl in the noise by showing the cue sound. He studied for the range to which the cue sound affects discrimination. This range is called attention filter. The width of this attention filter is shaper than the auditory filter. However, it is not confirmed whether a cue sound as attention to auditory filtering affects the characteristics of their difference or not. Therefore, the aim of this study is to investigate dependence of the existence of cue sound for the frequency selectivity by estimate of auditory filters.

The frequency selectivity of auditory system plays a significant role in many aspect of auditory perception. This refers to the ability to resolve

the sinusoidal components in a complex sound and is also referred to as signal decomposition or frequency analysis. This ability is conceptualized as a bank of bandpass filters, referred to as auditory filterbank. In general, the frequency selectivity has been measured by studying various masking experiments and then estimating auditory filters from these studies. It is well-known that the characteristics of the estimated auditory filter are affected by a sort of masking and the effect of suppression.

The first step of this study is to measure that masked threshold in the notched-noise with/without the cue sound, and to estimate that auditory filter shapes from these data based on the power spectrum model for masking. The next step is to explain the influence on frequency selectivity by existence of the cue sound. This influence is shown by the comparison of shapes of auditory filters that is estimated on the first step.

In the first step, we measured the masked-threshold in the notched-masker with/without the cue sound. The signal frequency was 1 kHz and the signal level was 10 and 20 dB SL. $f_{u,max} - f_{u,min}$ and $f_{l,max} - f_{l,min}$ are noise-width and $0.4 \times f_c$(Hz). The width of notch is $\Delta f_c / f_c$. Symmetrical condition of the notch were $\Delta f_c / f_c = 0.0, 0.05, 0.1, 0.15, 0.2, 0.3, 0.4$, and asymmetrical condition were $(0.05, 0.25)$, $(0.1, 0.3)$, $(0.2, 0.4)$, $(0.25, 0.05)$, $(0.3, 0.1)$, $(0.4, 0.2)$. A three interval three alternative forced choice (3AFC) method with a three-up one-down adaptive procedure was used in these experiments.

In the next step, we estimated the shape of auditory filter using the rate of change of masked-threshold. The result shown that shape is the different either with the cue sound and without the cue sound. The Q_{10dB} and Q_{3dB} values with cue sound was large compared without cue sound. So, we estimated the shape of auditory filter using roex auditory filter. The result shown that shape with cue sound is shaper than without cue sound.

In this study, the progress in the frequency selectivity using prior information was admited. In additionaly, the range of influence is near of signal frequency.