

## **Comments**

### **Comment by Kohlrausch:**

You show in Fig. 1 of your paper that the performance in sequential frequency discrimination depends on the separation between the two stimuli. In particular, you show that performance initially improves with the temporal separation between the two intervals and that the ISI for optimal discrimination performance is larger for long than for short stimuli. Since this might have a strong impact on how frequency JNDs are usually measured, I would like to know whether this initial build-up of performance is due to the strong randomization of the stimulus frequency in the first interval, or whether it also occurs in conditions with a (nearly) fixed frequency of the reference stimulus?

### **Reply:**

Recently, we conducted a variant of experiment 1 in which the second tone presented on each trial had a fixed frequency, 1000 Hz. The first tone, therefore, had only two possible frequencies, with a geometric mean of 1000 Hz. There was again a “6 cycles” condition and a “30 cycles” condition. We found once more that, for short ISIs, performance increased when the ISI increased. This time, however, the optimal ISI appeared to be the same – about 500 ms – in the “6 cycles” and “30 cycles” conditions. We believe that the different outcome of experiment 1 can be ascribed to our use of a roving procedure (frequency randomization) in this initial experiment.

### **Comment by Cusack:**

Your finding that performance was much reduced at small ISIs is reminiscent of a phenomenon known as the “attentional blink” that is well established in the visual literature (Raymond, Shapiro and Arnell 1992), and which has also been shown in audition (Duncan, Martens and Ward 1997). When a rapid stream of stimuli (e.g., letters) are presented and two detection tasks performed (e.g., report the white letter in a stream of black ones and then say whether an X is present), performance on the second is much reduced for a few hundred milliseconds after the appearance of the first target. This is usually attributed to a brief withdrawal of attention during processing of the first target. Something similar might possibly explain your findings at short ISIs. If this, or some other attentional phenomenon have an effect, then modifying the perceptual organization so that the first and second sounds form a single object might improve performance.

Duncan, Martens and Ward (1997) Restricted attentional capacity within but not between sensory modalities. *Nature*. 387: 808-810.

Raymond, Shapiro and Arnell (1992) Temporary suppression of visual processing in an RSVP task: An attentional blink? *J. Exp. Psychol.: Hum. Percept. and Perform.* 18: 849-860.

**Reply:**

The experimental situations in which an “attentional blink” phenomenon has been observed are very different from our experimental situation. First, our subjects were not required to make absolute judgments on single stimuli but to compare two successive stimuli. Second, our subjects knew precisely when these two stimuli would occur: as mentioned in our paper, a countdown was displayed on the computer screen during both the ISI and the inter-trial delay when the ISI exceeded 1 s. Thus, we don’t think that our results have something to do with the attentional blink phenomenon. However, the fact that the optimal ISI was so long in the “30 cycles” condition of experiment 1 and the “Steady” condition of experiment 2 may well be due in part to attentional factors because we found that if the frequencies of the two stimuli are no longer varied randomly, in a wide range, from trial to trial, the optimal ISI is shorter (cf. my reply to Armin Kohlrausch’s comment). A possible interpretation of this effect is that more time is needed for an optimal perception of the pitch of the first stimulus if the frequency of this stimulus is largely unpredictable.