



## 1. ABSTRACT

A long preoccupation of psychoacoustic research has been to determine the best of the ear's ability to detect, discriminate and identify sounds. This study follows in kind by attempting to determine the best of the ear's ability to identify the sounds of impact produced by the simplest of resonant objects (blocks, bars, plates and membranes). We hypothesized that best performance would be achieved by professional percussionists who have had many years experience striking objects to achieve desired nuances in sound.

## 2. METHODS

### Listeners

Five percussionists and five non-percussionist musicians were recruited as participants from the School of Music at the University of Wisconsin. Additionally, 10 non-musicians were recruited from the University at large. Listeners in musician group had been playing an instrument for more than 10 years whereas those in non-musician group had little or no experience playing a musical instrument.

### Stimuli

The stimuli were impact sounds of woodblock, metal bar, metal plate, and stretched membrane. They were synthesized according to the equations of motion derived from a simple physical model which has been used in past studies and evaluated psychophysically [see Lutfi et al. (2005) JASA 118, 393-404 and McAdams et al. (2004) JASA 113, 1306-1320]. They were played over headphones to listeners seated in an IAC sound-attenuated chamber.

### Procedure

In a standard two-interval, forced-choice procedure, with and without feedback, listeners were asked to judge the impact sound corresponding to (1) the greater force of impact, (2) the harder of two mallets, (3) the denser of the two objects struck, and (4) the point of mallet contact closest to the center of the object. Percent correct scores were obtained in 50-trial blocks.

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## 3. RESULTS AND CONCLUSION

Without feedback, the three groups of listeners performed similarly well for tasks 1-3; percussionists slightly out-performing the other two groups on tasks 1 and 2. For task 4 all three groups showed a high frequency of reverse labeling without feedback, often judging the mallet contact closest to center of the object to be that of the one closer to the edge. Providing feedback after each trial produced an immediate and dramatic improvement in the performance of all three groups on all tasks except 1 with the result of little remaining differences in performance across the three groups. Generally, the results provide little support for the hypothesis that professional percussionists are significantly more adept than the rest of us at judging the properties of impact sounds.

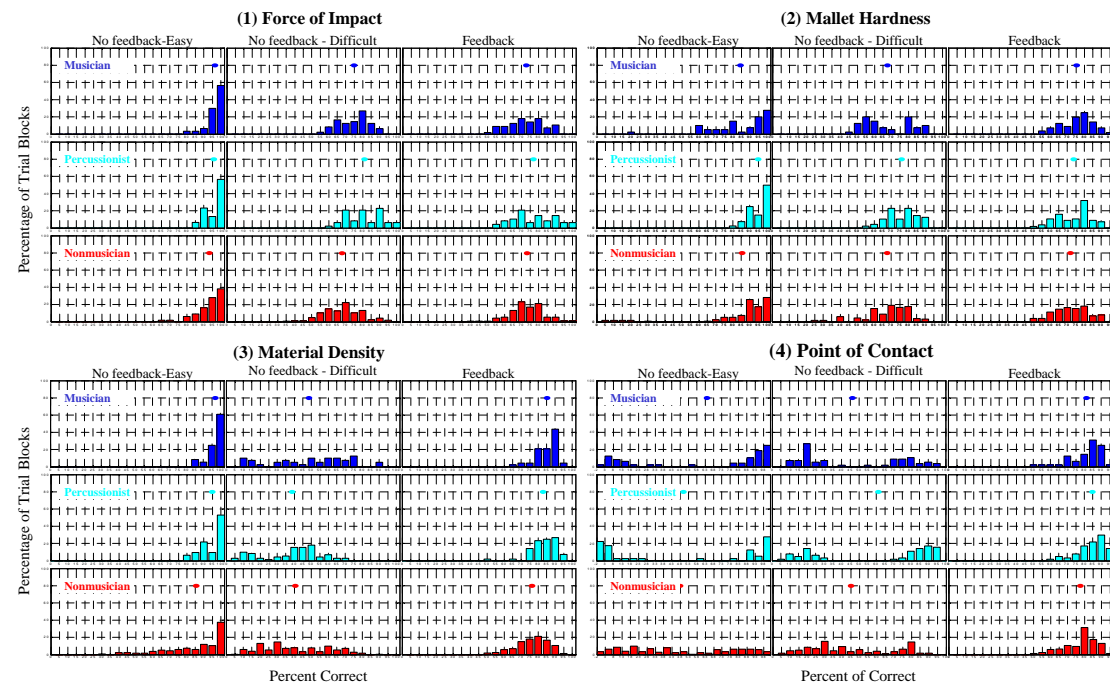


FIG. 1: Distribution of percent correct scores for each listener group and each task. Filled circles give mean performance in each case.