from Békésy on has been careful to point out. I find numerous data in the literature that meet these requirements.

Corso requests that investigators use more adequate statistical tests of the validity of their hypotheses. That is a reasonable request, but unfortunately, the ability of a statistical test to confirm a particular theoretical distribution depends heavily upon the cleverness of the scientist in formulating the correct theoretical alternatives to be considered. When I look at how well Stevens has managed to fit a one-parameter model through the data collected by Corso [figure 10 in the article by Stevens (*2*)], I am more impressed by the evident fit than I am by Corso's disclaimer because he found a chi-square test to be not significant. The chi-square is not the proper test when one is predicting observations of 0 and 100 percent. More to the point, the tests performed by Corso assumed both that the results should be linear and that the observer manages a constant, fixed-decision criterion. Both of these assumptions are suspect, and neither are very important for the underlying hypothesis.

Finally, Corso asks about the analysis of absolute thresholds and of the physiological evidence. In both these cases, I do not follow his arguments. My understanding of the quantum theory does not allow me to make testable predictions about its effect on measures of absolute threshold, so I am somewhat surprised to read that Corso has managed to bridge that theoretical gap, derive the predictions of the theory, and find the data not to be confirmatory. The physiological data are simply not convincing, one way or the other. Many discrete physiological phenomena exist, such as the number of neural responses that occur in response to a signal. Many continuous phenomena exist, such as the time between successive neural responses. At the moment, I find the physiological data to be supportive of whichever of the theories one wishes to believe.

I still find it impossible to reach any firm conclusion about the nature of the underlying sensory processes. I am not ready to agree with Stevens' view that the matter is settled, even though it was nice to see some of my old data resurrected and spoken of so highly. But I certainly find myself quite unimpressed by the counterarguments presented by Corso. Moreover, despite the years that have passed since the original investigations, and despite the growth of our understanding of psychophysics in general, there have been almost no experimental studies directed at this problem in approximately 10 years. The rise of signal detection theory has indeed given new sophistication to the analytical techniques and understanding of the contemporary psychophysicist (*4*). It has also led to an almost complete lack of attention to the analysis of basic noise-free detection phenomena. The subtle nature of the discrete mechanism, if it exists, will require direct attack with carefully designed experiments. It is unlikely to appear as a side effect in the study of a different problem. Moreover, when one uses sophisticated pay-off measures and probabilistic presentations of signals, techniques which are such an essential part of experiments done in the tradition of signal-detection theory, there is almost guaranteed less stability in the maintenance of a decision criterion. Decision strategy appears to be at the heart of the matter in distinguishing between continuous and discrete sensory states. Krantz (*5*) offers a thorough analysis of the situation and suggests several possible experimental tests. New data are needed which examine both operating characteristics and conditional response probabilities.

In summary, I find Corso's rebuttal to the article by Stevens does not help in selecting between the competing theories. The paper by Stevens was useful, for it put together in one convenient place most of the favorable arguments and data. Were I forced to choose sides, I would clearly lean in favor of a quantal hypothesis, but I would prefer not to do that. It is my belief that the issue is a fundamental one, as yet unresolved one way or the other (*6*).

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References and Notes

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6. Were S. S. Stevens able to read my reply, I am sure that he would respond to me with the same patient voice that I have heard so many times, demonstrating that we certainly did not need more data, for did not his article indicate the large amount of supportive data that already exist? Moreover, he would probably be sure to remind me that Millikan only needed to measure the charge of the electron once: the failure of others to replicate that measurement says more about the difficulties of the experiment (and the skills of the investigators) than of the truth of the observation. And so it would have continued. My feeling is simply that it would indeed have been better had Stevens been able to reply in his own behalf.
7. I thank David Green, R. Duncan Luce, Edward Newman, and Didi Stevens for their helpful comments.

5 June 1973

Biological Proportions

McMahon (*1*) has given an excellent demonstration of the structural principles limiting the proportions of organisms and, consequently, the metabolic rates, by using data for terrestrial mammals and tree trunks. It is not clear from his discussion, however, whether his argument is equally applicable to aquatic organisms, which are under very different structural constraints. Tensile strength is often more important than buckling or bending limits in aquatic forms.

His correlation of metabolism with body weight raised to the ¾ power rather than total body surface seems less easy to generalize. In plants, support is not a metabolically active process. Also, plants and many aquatic animals have greatly expanded surface areas to increase absorption of energy or material (*2*); in these organisms surface area may be relatively more significant to function (*3*) and thus metabolism than in the organisms discussed by McMahon.

The application of engineering principles to biological problems shows great promise, as McMahon has demonstrated. I hope that he will extend his work to a greater variety of organisms.

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