

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

OCT 17 1980

Dr. John M. Chowning
Department of Music
Stanford University
Stanford, CA 94305

Dear Dr. Chowning:

REF:BNS-8022478

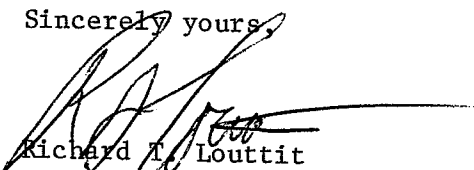
I regret to inform you that the National Science Foundation is unable to support your proposal entitled "Auditory Distance Perception Under Natural Sounding Conditions."

Several factors are considered in evaluating each proposal submitted to the Foundation. Of these, scientific merit is the most important. Other factors of importance include the relation of the proposed research to other research in the area and the distribution of funds among the various areas of the biological and behavioral sciences. Many meritorious proposals cannot be funded simply because of the limited amount of money available for the support of basic research.

If you desire further information concerning the scientific evaluation of your proposal, please write or call Dr. Terrence R. Dolan, Program Director for Sensory Physiology and Perception - (202 357-7428). Copies of reviews solicited from experts in this field as well as the advisory committee's summary statement are enclosed. These are for your personal use and are not made available by the Foundation to anyone else. They may be helpful to you in understanding the Foundation's action and also in preparing future proposals.

Although we were unable to support this proposal, we would be pleased to consider any future proposals you may wish to submit.

Sincerely yours,



Richard I. Louttit
Director, Division of
Behavioral and Neural Sciences

Copy To: S. Maxine Yoshimoto
Contract Officer

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

Chowning BNS 80-22478
Schubert

The panel statement:

"Although both ad hoc reviewers and panel members were more enthusiastic about this proposal than about the previous submission by the same authors, the consensus remained that it should not be funded at this time. Although several criticisms are made in the ad hoc reviews, three of them were emphasized in the panel discussion. 1) The general development of the proposal was so unlike the work of Professor Schubert that it was difficult to believe that he had had a significant role in preparing it. Under the assumption that this conclusion was accurate, it seemed likely that he, the most qualified auditory scientist on the project, would also have little effect on the actual conduct of the work. 2) The stimulus conditions to be manipulated have relevance mainly to loudspeaker produced sounds and listening in reverberant spaces. While interesting issues, studies of these topics may not have great generality for our understanding of binaural hearing, auditory localization, or distance perception. 3) The investigators, other than Professor Schubert, have no record of published research on auditory capabilities. That they could bring it to the point of publication in a refereed journal is not at all clear. Had some of the pilot work, to which they so frequently refer, been published in appropriate journals, this concern would be greatly relieved."

The Sensory Physiology and Perception Program concurs with the recommendations of the panel. Although at least one of the reviewers was very positive, most of the reviews were in agreement in the lack of enthusiasm for the proposal. The Program is skeptical also about the role Professor Schubert played in preparing the proposal. His "mark" is not easily detected. The Sensory Physiology and Perception Program recommends declination.

PROPOSAL NO. BNS 80-22478	INSTITUTION Stanford University	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR Chowning/Schubert	NSF PROGRAM Sensory Physiology and Perception	
TITLE		

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

The Principal Investigator's strength is not in this field. They present subthreshold qualifications for this research. The problem is an interesting one, but the probability of success from this heterogenous team is extremely low.

RATING: ☐ EXCELLENT ☐ VERY GOOD ☐ GOOD ☒ FAIR ☐ POOR

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PROPOSAL NO. BNS-8022478	INSTITUTION STANFORD UNIV	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR CHOWNING JOHN M	NSF PROGRAM SENSORY PHYSIO & PERCEPTN	

TITLE

AUDITORY DISTANCE PERCEPTION UNDER NATURAL SOUNDING
CONDITIONS

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

QUALITY OF THE PROPOSED RESEARCH (INCLUDING BUDGET AND INSTITUTIONAL CAPABILITY):

I find myself not positively disposed toward this application, There are a number of reasons. The primary one is that I do not see sufficient evidence of productivity from this group to warrant additional funding. On p. 46 it is revealed that the group is presently under four NSF grants with staggered starting dates beginning in March 1979. And throughout the text of the proposal are comments about past experiments and pilot studies done on the general topic of reverberation. Yet when we check the vita of the principal investigator we find only two publications in a refereed journal. These facts produce two reactions from me. One is that these people seem to be attempting to substitute a stable of relatively small grants for a center or project grant--something they probably could not get funded. Note that the PI only plans to devote 2% of his time to the project. His truthfulness betrays him. The fact probably is that he is PI because he is the boss; his vita certainly reveals no knowledge or continuing interest in psychophysics, psychoacoustics, or movement perception. Also note that the budget (p. 19) for this project contains more money for a graduate student (Sheeline) than for all save one of the four nominal principals; this does not give me confidence that these experiments

RECENT RESEARCH ACHIEVEMENTS OF THE PRINCIPAL INVESTIGATOR(S):

OVERALL
RATING:☐

EXCELLENT

☐

VERY GOOD

☐

GOOD

☐

FAIR

☒

POOR

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would receive much attention if funded. (Nor does the fact that there is less money requested for subjects than for computer maintenance.) I disapprove of this strategy on a number of grounds; primary among them is that all their time must be spent on writing new proposals, renewals, and annual reports. There must be very little time left over for work, and partial confirmation of this expectation comes from the vitas; little has apparently come from the grant money already allocated.

The slim vitas along with the numerous claims of previous experiments and pilot studies do not lead me into feeling that this is a competent group of professional scientists; there is an aroma of dilettantism about the whole enterprise. They talk as if knowing how to synthesize waveforms is the same as knowing how to do psychophysical experiments, and it isn't. Perhaps out of sensitivity to a possible (or past?) criticism of this sort, Dr. Schubert--for whom I have great respect--is included as a co-PI, yet I refuse to believe that he had much to do with the preparation of this proposal, and of course, that naturally produces concern that he will be similarly ignored were the project funded.

I admit that there is probably a "cultural" difference here; most of the applicants come from a performing tradition, not an experimental one. But it does not seem right to me to apply different standards to them than to people trained as scientists, given that they are applying for money to do scientific research. The experiments proposed are not bad. They involve measurements that could prove of interest. (One must have reservations about the casualness with which subject selection and training are treated (p. 15) and about any eventual write-ups that might appear given that the work of Nabelek, Scharf, Zurek, Wightman and Grantham, and others has been ignored in the proposal. But these reservations aside for a moment, the basic experiments are not so bad.) Indeed, I have the feeling that if I had read about them in a proposal from a single investigator who appeared as if he were really going to work on the problem and who had a demonstrated record of getting what he did do published, I probably would have given it a reasonably high score along with some suggestions for improving techniques, etc. But that isn't the case here and my low scores are meant to indicate my pessimism that this group can or will follow through on the research. I guess I am not convinced it is a problem that really interests them for theoretical or practical reasons; it appears to be something they realize they can do--at the level of stimulus generation at least--and so they have written it up as one in a series of overlapping grant proposals. This is not behavior I believe should be encouraged. If the group accepts that I am not atypical of the referees, reviewers, and readers they eventually hope to communicate with, then my suggestion is that they settle down with one or two small research ideas, investigate them fully enough to be able to develop a coherent story about them and their relations to other, related effects, and then publish those data and that story. In a nutshell, they should develop a scientific track record if they expect to impress psychoacousticians (as opposed to other musicians or other computer scientists), and if they expect to get additional NSF support. I believe Dr. Schubert could be helpful to them in achieving this goal were they to really involve him in their projects, as opposed to using him as just a figurehead co-PI.

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PROPOSAL NO. BNS 80-22478	INSTITUTION	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR Chowning	NSF PROGRAM	

TITLE

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

QUALITY OF THE PROPOSED RESEARCH (INCLUDING BUDGET AND INSTITUTIONAL CAPABILITY):

Auditory localization is traditionally studied under such impoverished stimulus conditions that a lot of the interesting and important factors are excluded from consideration. These investigators are in a good position to help correct this deficiency, and I am enthusiastic about all three phases of their proposed project.

One can generate some minor quibbles: is a 36KHz sampling rate adequate? Do we have to be content with the statement that "no significant reverberation is ~~not~~ audible" in the "sound-dampened" room? Are the investigators unable to produce the desired range of proximal stimuli using only 2 speakers rather than the proposed 4?

Iterative adjustments of stimulus parameters would be valuable since there will surely be interactions. The study of how a deviation in one parameter affects the optimal settings of others might yield interesting estimates of null stimuli analogous to the concept sometimes ~~used~~ used in the analysis of color vision. The briefly mentioned factor analysis of individual differences would be less likely to be successful in yielding ~~this information~~.

RECENT DEVELOPMENTS OF THE PRINCIPAL INVESTIGATOR(S):

I hope the studies will be done under a sufficient range of conditions to assure reasonable generality of the findings. For instance, in the matching experiments it could be quite relevant how close the subjects are allowed to get to a physical match, and in what ways the best approximation differs from a physical match.

OVERALL
RATING:☐

EXCELLENT

☒

VERY GOOD

☐

GOOD

☐

FAIR

☐

POOR

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PROPOSAL NO. BNS-8022478	INSTITUTION STANFORD UNIV	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR CHOWNING JOHN M		NSF PROGRAM SENSORY PHYSIO & PERCEPTN
TITLE AUDITORY DISTANCE PERCEPTION UNDER NATURAL SOUNDING CONDITIONS		

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

QUALITY OF THE PROPOSED RESEARCH (INCLUDING BUDGET AND INSTITUTIONAL CAPABILITY):

This is one of the best indicated and formulated research proposals I have seen this year (about 11). The investigators are uniquely qualified and their institutional capabilities are fully adequate.

The budget estimates seem reasonable.

The principles have been very creative in the past and

RECENT RESEARCH ACHIEVEMENTS OF THE PRINCIPAL INVESTIGATOR(S):

significant original contributions may be expected.

The work has implications for acoustic aids for the blind!

OVERALL
RATING:

EXCELLENT



VERY GOOD



GOOD



FAIR



POOR

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PROPOSAL NO. BNS-8022478	INSTITUTION STANFORD UNIV	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR CHOWNING	JOHN M	NSF PROGRAM SENSORY PHYSIO & PERCEPTN

TITLE

**AUDITORY DISTANCE PERCEPTION UNDER NATURAL SOUNDING
CONDITIONS**

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

QUALITY OF THE PROPOSED RESEARCH (INCLUDING BUDGET AND INSTITUTIONAL CAPABILITY):

The research should be supported. In my view, the heart of the matter is to be found on pages 15 and 16. The six general questions on p. 15 are significant; answers to these will be worth having. I see no reason why they should not be forthcoming; the Principal Investigators are able and the apparatus and procedures they describe are adequate. I am less impressed by the curve-fitting that is proposed than by the ANOVA. I would guess that some interactions will prove significant.

All in all, the proposal is a good one.

RECENT RESEARCH ACHIEVEMENTS OF THE PRINCIPAL INVESTIGATOR(S):

OVERALL
RATING:☐

EXCELLENT

☒

VERY GOOD

☐

GOOD

☐

FAIR

☐

POOR

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BNS '80-22478

The current proposal to study auditory distance perception is very similar to the applicant's proposal of last year.

Much of the criticism I raised over the previously proposed experimental techniques have now been resolved or clarified and this generally improves the likelihood that the innovative (yet still untried) experimental methods will be effective. The research is original, interesting, fairly well thought-out, and requires sophisticated and specialized signal processing techniques, hardware, and technique expertise which are all, perhaps, uniquely available within this group. As such, this work could not easily be carried out elsewhere. There is one major issue, however, concerning the objectives of the research which I feel warrants considerable attention and clarification in as much as it relates to the interpretation and utilization of the experiment results.

It appears to me that the procedures proposed for preparing and presenting stimuli over two to four loudspeakers will be generating stimuli which do not occur in nature. Consequently, listener responses to these stimuli may or may not be similar to responses to sounds which are perceived in "natural" listening. Therefore, the information which is to be collected on the parameters required to receive these simulations of room reverberation and to generate controllable percepts of auditory distance may not necessarily be of direct use to psychoacousticians and auditory scientists who require information on natural listening in rooms. Moreover, if binaural listening to reverberation evokes a totally different response than does monaural listening (as regards direct signal timbre, reverberation time and coloration) then one would guess the distance judgement would also be effective in simulated "unnatural" sound fields. To sum up these remarks, while I suspect that the results for the simulation experiments will relate in some way to natural listening, additional experiments might be necessary to indicate how much they do. Otherwise, the proposed set of experiments will mostly provide interesting information on the "unnatural", but not uncommon, situations of multiple loudspeaker information.

It is also worth mentioning that whereas the progress report in "Work to Date" is interesting, it is also slightly disappointing in as much as both the preliminary investigations dealing with the adequacy of the room simulation in the verification of the experimental methods for stimulus preparation and adjustment (that were proposed last year) have not been carried out. It is, therefore, impossible to assess the efficacy of the proposed method.

Regarding the budget, the financial requests are relatively modest for salaries (which appear quite reasonable) and no additional equipment is requested. The remarkable facilities at CCRMA are uniquely suited to carry out the proposed research.

Both the P.I.'s are well respected in their particular fields: Dr. Chowning has long been known for his original contributions to simulating naturally occurring acoustic signals and Dr. Schubert for being an authority on hearing, speech science, and auditory perception. However, more effort will come from the research associates, Moorer and Grey, who are both creative and capable researchers. They have made several important contributions in applying computer techniques to the study of complex

Overall, I think the research is worthwhile and interesting, but unfortunately, slightly restricted in application and general interest.

Rating: Good to Very Good

PROPOSAL NO. BNS-8022478	INSTITUTION STANFORD UNIV	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR CHOWNING JOHN M		NSF PROGRAM SENSORY PHYSIO & PERCEPTN
TITLE AUDITORY DISTANCE PERCEPTION UNDER NATURAL SOUNDING CONDITIONS		

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

QUALITY OF THE PROPOSED RESEARCH (INCLUDING BUDGET AND INSTITUTIONAL CAPABILITY):

See attached.

RECENT RESEARCH ACHIEVEMENTS OF THE PRINCIPAL INVESTIGATOR(S):

OVERALL
RATING:☐

EXCELLENT

☐

VERY GOOD

☒

GOOD

☐

FAIR

☐

POOR

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John M. Chowning

Auditory Distance Perception Under Natural Sounding Conditions

This proposal requests support for a one-year research project in the area of auditory psychophysics, specifically auditory distance perception. It is a revision of a proposal submitted last year; this reviewer provided an appraisal of the earlier proposal as well. (A copy of the previous review is attached for reference.) As before, the project is to be directed by John Chowning, with collaboration from John Grey and James Moorer. Comments on the qualifications of these three individuals are in the previous review. In the current proposal, Earl Schubert is listed as co-P.I. Schubert is a senior scientist, with a distinguished international reputation in psychoacoustics. His active participation in the project is essential, and strengthens it considerably. In the opinion of this reviewer, given the areas of training and expertise of the other investigators, the project will succeed, as a study of perception, only to the extent that Prof. Schubert directs the design of the experiments and the analysis of the results.

The research plan is nearly identical to that proposed earlier. However, while the changes are slight, they are important and strengthen the proposal noticeably. First, the proposed project duration (and budget request) has been halved, making the request a more modest one. Given uncertainty about just what may come out of the research, support of this one-year project seems reasonable, since it would give the researchers a chance to collect pilot data and test their experimental procedures. Second, previously omitted details of experimental procedures (e.g., how order of testing is to be handled) and data analysis have been included. The experiments in all three sections of the work now seem much more clearly conceived and likely to provide interesting and meaningful data. Part B of the research, which previously was the weakest, has been strengthened by the addition of three initial experiments designed to determine appropriate parameter values for stimuli in the later experiments, and by the considerations of ratio as well as interval scales of distance. Finally, the P.I. has clearly made an attempt (p. 12, p. 15) to set forth specific, testable hypotheses that might guide the work, and to structure the analysis and interpretation of the results. In the opinion of this reviewer the attempt was at least partially successful. The P.I. should be encouraged to continue with this effort.

It is only partly clear to this reviewer what the proposed research can tell us about the auditory processes which underlie the perception of distance. However, it now appears that the data to be gathered would be at least very interesting. Thus, in spite of reservations expressed earlier, most of which still apply, I now support funding of the project.

PROPOSAL NO. 80-22478	INSTITUTION Stanford University	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR Chowning, John M.	NSF PROGRAM Sensory Physiology & Perception	

TITLE
Auditory Distance Perception Under National Sounding Conditions

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

This proposal requests support for a one-year project in which the authors would investigate the contributions of auditory reverberation, sound pressure, and frequency spectrum to the perception of auditory distance (in enclosed spaces). In the first part of the study they will have subjects manipulate individual properties of the stimulus through fairly elegant digital-synthetic procedures to achieve various perceptual results. In the second part, listeners will adjust the variables found to be most perceptually critical in part A to examine their role in determining perceptual distance. The general procedure in all cases is a method of adjustment in which stimulus parameters are manipulated to match the perceptual quality of fixed-parameter alternating sounds. Although the experiments seem basically interesting they appear to constitute a series of pilot studies which would eventually lead to full scale experiments if they could be done with some more rigorous psychophysical methods. It is not to say that the method of adjustment cannot be a useful technique, but rather that there are certainly important questions about the listeners' resolving power that might be answered better by other procedures. One of the biggest objections to this work is that the authors seem opposed to either casting their research ideas or the description of their methods in normal psychoacoustic form. The proposal in general sounds as though it was prepared by someone not trained or previously experienced in psychophysics of psychoacoustics and in reading the bibliographies I find this is the case, with the surprising exception of Professor Earl Schubert, who is a widely respected scientist in this field. This last is a bit of a mystery since it is hard to see how Schubert's potential contributions to this work are represented in the proposal. It seems entirely unlike either his scientific style or any prior work that he has done, at least to this reader's knowledge. I am afraid that I must recommend that the authors try a few of these things on their own, since they appear to have the necessary apparatus available to them, and then, if they have some promising results, that they publish them in a refereed journal thus benefiting from the scrutiny of their co-workers in the field. They might then be in a position to propose a larger scale project, incorporating those studies discussed in this proposal that are not attacked during the pilot phase of the work.

3.5

RATING: ☐ EXCELLENT ☐ VERY GOOD ☐ GOOD ☐ FAIR ☐ POOR

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