

# LINGUISTICS IN THE UNDERGRADUATE CURRICULUM

Linguistics as an Experimental Discipline

by

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## PREFACE

The Linguistics in the Undergraduate Curriculum (LUC) project is an effort by the Linguistic Society of America (LSA) to study the state of undergraduate instruction in linguistics in the United States and Canada and to suggest directions for its future development. It was supported by a grant from the National Endowment for the Humanities during the period 1 January 1985-31 December 1987. The project was carried out under the direction of D. Terence Langendoen, Principal Investigator, and Secretary-Treasurer of the LSA. Mary Niebuhr, Executive Assistant at the LSA office in Washington, DC, was responsible for the day-to-day administration of the project with the assistance of Nicole VandenHeuvel and Dana McDaniel.

Project oversight was provided by a Steering Committee that was appointed by the LSA Executive Committee in 1985. Its members were: Judith Aissen (University of California, Santa Cruz), Paul Angelis (Southern Illinois University), Victoria Fromkin (University of California, Los Angeles), Frank Heny, Robert Jeffers (Rutgers University), D. Terence Langendoen (Graduate Center of the City University of New York), Manjari Ohala (San Jose State University), Ellen Prince (University of Pennsylvania), and Arnold Zwicky (The Ohio State University and Stanford University). The Steering Committee, in turn, received help from a Consultant Panel, whose members were: Ed Battistella (University of Alabama, Birmingham), Byron Bender (University of Hawaii, Manoa), Garland Bills (University of New Mexico), Daniel Brink (Arizona State University), Ronald Butters (Duke University), Charles Cairns (Queens College of CUNY), Jean Casagrande (University of Florida), Nancy Dorian (Bryn Mawr College), Sheila Embleton (York University), Francine Frank (State University of New York, Albany), Robert Freidin (Princeton University), Jean Berko-Gleason (Boston University), Wayne Harbert (Cornell University), Alice Harris (Vanderbilt University), Jeffrey Heath, Michael Henderson (University of Kansas), Larry Hutchinson (University of Minnesota, Minneapolis), Ray Jackendoff (Brandeis University), Robert Johnson (Gallaudet College), Braj Kachru (University of Illinois, Urbana), Charles Kreidler (Georgetown University), William Ladusaw (University of California, Santa Cruz), Ilse Lehiste (The Ohio State University), David Lightfoot (University of Maryland), Donna Jo Napoli (Swarthmore College), Ronald Macaulay (Pitzer College), Geoffrey Pullum (University of California, Santa Cruz), Victor Raskin (Purdue University), Sanford Schane (University of California, San Diego), Carlota Smith (University of Texas, Austin), Roger Shuy (Georgetown University), and Jessica Wirth (University of Wisconsin, Milwaukee).

## Introduction.

The defining property of a discipline is the body of questions it asks about some aspect of the universe. Linguistics, although relatively young as a distinct discipline (a century or so), has embraced such age-old questions as: how is language represented in the mind?, how is language learned?, how is meaning conveyed by language?, what is the origin of language and speech? The personality of a discipline, however, is determined in part by how it goes about getting answers to its questions. Disciplines are thus commonly characterized as "soft" or "hard" depending on the methods they use to obtain the evidence needed to support or reject the candidate answers (hypotheses) put forth. Literary criticism is a good example of an unabashedly soft discipline; evidence cited for a particular view is seldom so definitive or convincing that reasonable individuals are prevented from offering competing views. Chemistry, on the other hand, merits the reputation of being a hard science because the range of acceptable evidence in support of a particular claim is drawn rather narrowly. Although the history of science tells us that no answers are forever secure, those obtained in the hard disciplines by means of experimental methods tend to have a much longer life-span.

Linguistics is on the verge of becoming an experimental discipline and an undergraduate linguistic major that is tailored to reflect this has the opportunity of:

- attracting a wider range of students to the major
- relating the subject matter of linguistics to the "real" world in a way that makes it more exciting to students
- challenges students to address more deeply problems of philosophy (epistemology) and philosophy of science than they would in disciplines not experiencing a transition in methodology.
- provides students with conceptual knowledge and practical skills which will open up to them a wider range of jobs and/or graduate school options after graduation.

## The Essence of Experimentation.

Since there is much controversy over the nature of 'experiments' and even whether linguistics can ever be experimental, I had best define a few terms.

What is essential for experimentation is, first, an attitude and, second, a plan of action based on that attitude. The attitude consists simply of awareness that the world is not necessarily as it may seem, i.e., that our sense-impressions and therefore the opinions and beliefs based on them may be faulty. Given this attitude, one then needs to plan--to contrive--a study of the world in a way which compensates for anticipated sources of error. An experiment is a contrived observation. The contrivance may amount to being in the right place at the right time to make a crucial observation. An example is Eddington's test of Einstein's claim about the bending of the path of light near large masses; he traveled to the Gulf of Guinea when a solar eclipse would occur to see if a given star that should have been hidden behind the sun could actually be seen as its light curved around the sun. More often the experimenter himself contrives the circumstances giving rise to the events

that will be observed. An example is Pasteur's famous test of his anthrax vaccine by administering it to one group of sheep exposed to the disease and withholding it from another similar group. Making observations on many similar events compensates for unpredictable individual differences which might hide the object of the search; making similar observations on an experimental (treated) group and on a control (untreated) group are representative of the lore that experimenters in many different fields have accumulated over the centuries. Experimentation, then, amounts to taking as much care as possible to refine one's beliefs. Thus, to counter some common misconceptions: experimentation does not consist exclusively of data-gathering, whether with instruments or not and it is not an activity that ignores theory (or more properly, 'hypothesis') construction. Experimentation, properly viewed, is driven by theory and its results feed back into theory-making in a continuous loop.

Of course, trying to understand the behavior of living systems is more difficult than that of material systems since the former is subject to many more influences than the latter and it is accordingly more difficult to isolate one or a few of these factors while controlling the rest. It is even more difficult to study voluntary behavior such as speech and language which is shaped by a host of physical, psychological, and social influences. Nevertheless, as Claude Bernard, the "father of experimental medicine", remarked:

Experimentation is undeniably harder in medicine than in any other science; but for that very reason, it was never so necessary, and indeed so indispensable. The more complex the science, the more essential it is, in fact, to establish a good experimental standard, so as to secure comparable facts, free from sources of error. [Bernard 1865 (1957: 2-3)]

Many linguists have come to the same conclusion and have begun the difficult task of trying to 'establish a good experimental standard' in linguistics. These efforts have born fruit; there is now a growing arsenal of experimental techniques of proven value for many kinds of linguistic hypotheses and there is a growing reliance on experimental results to resolve issues in the field. Several leading linguistics departments in North America have experimental linguistics as their major focus or as an important element in their program, e.g., University of Alberta (Edmonton), University of Connecticut, Brown University, Yale University, Ohio State University; excellent opportunities for experimental linguistics are available at the University of Wisconsin, University of Minnesota, University of Pennsylvania, University of Texas at Austin, UCLA, Univ. of California--Berkeley, University of California--San Diego, Cornell, Indiana University, New York University, among others.

#### What sorts of experiments are done?

Many linguistics experiments do not require expensive equipment (see Appendix A) although computers, various transducers, and other equipment may enlarge the range of experimental techniques permitted as well as make it easier to gather the evidential data faster and in greater volume.

The following examples of experiments done to test hypotheses in various sub-fields in linguistics are only meant to be suggestive of the range of techniques which have been successfully employed and which could be done by undergraduates in a program that had made only a modest investment in equipment. It is not suggested that these specific studies be repeated--although it often has considerable pedagogical value, not to mention scientific value, to replicate experiments previously reported.

#### A. Phonetics.

The experimental approach to linguistic questions has its longest history and best-established tradition in the domain of phonetics, with substantial but isolated pieces of research on the physical structure of speech sounds being done in the 18th and early 19th century and a self-sustaining tradition developing in the late 19th century (Rousselot 1892, 1897-1901). One of the most important contributions of modern experimental phonetics, armed as it is with instruments for detailed acoustic analysis and synthesis of speech, is the elucidation of the physical cues used by listeners to identify the units of speech (words, syllables, phonemes). This research has yielded sufficient information on the acoustic building blocks of speech that it is now possible to offer commercial systems which synthesize speech from unrestricted text input (of a given language). Details of the listener's task in decoding speech have emerged which would never have been suspected from formally-based speculation or from analysis by the unaided ear. For example, it is now clear that even for so-called "minimal" phonemic differences in language--such that between "pin" and "bin"--there is not just one acoustic cue but multiple cues carrying the distinction. Current interest in this area focusses on how listeners integrate these multiple cues and whether the integration process is driven by purely auditory constraints (the properties of the ear and the neurological apparatus serving it) or whether the listener's prior experience--particularly with the structure of his own native language--plays a part.

Fujimura, Macchi, & Streeter (1978) investigated one aspect of this in an experiment in which artificial intervocalic consonant clusters were created by splicing together taped syllables like 'eb' and 'de' yielding 'ebde'. When the interval between these two syllables is short, listeners tend to hear only one consonant, the second of the two, that is, the joined sequence sounds like 'ede'. However, there was a significant difference in the reactions of Japanese and English listeners to such sequences: the Japanese reported 'ede' in higher proportion than the English listeners presumably because their language permits no medial consonant clusters of this sort whereas English does (e.g., in "rubdown"). In addition to showing that the prior language experience of listeners determines how they integrate multiple cues in speech, this study also sheds light on the mechanisms which gave rise to the sound change whereby word-medial consonant clusters such as that in Latin nocte(m), "night", became Italian notte (Ohala, in press). Specifically, it suggests that the change could occur when a listener, as in the Fujimura et al. study, failed to detect or to rely on the cues for the first of the two consonants and, when repeating the word himself, reproduced it with the two sequential stops replaced by a single long stop.

## B. Phonology

If phonetics studies how speech sounds are produced and perceived, phonology studies the behavior or patterning of speech sounds. It seeks answers to its questions in phonetic, psychological, and sociological factors.

### Sound Change Studied in the Laboratory.

The study just cited which helps us to understand how a word-medial -ct- cluster could become -tt- (that is, due to listeners' misapprehensions) also illustrates how it is possible now for linguists to study one important form of speech sound behavior, sound change, in the laboratory. This constitutes as significant a breakthrough for linguistics as happened to astronomy when that field learned how to study the behavior of distant objects in the universe via controlled laboratory investigations. Neither has direct access to the object of their study but both can observe and manipulate in their labs the same phenomena (in miniature) which gave rise to the things they are trying to understand. Laboratory studies of sound change have been able to duplicate and obtain some understanding not only of attested sound changes but also of their relative incidence (vis-a-vis other potential sound changes) and their directionality (Ohala 1974, 1983a). These results, moreover, have application in the area of automatic speech recognition (ASR) insofar as it highlights the source of confusions in speech and how listeners try to compensate for them (Ohala 1985, 1986a).

### Sound Symbolism.

In general, linguists recognize an arbitrary, purely conventional, connection between meanings and the sound sequences that carry the meanings. Thus the same object may be 'cup' in English, 'tasse' in French, and 'pyala' in Hindi. Nevertheless, there seems to be a small fraction of every language's vocabulary where the constituent sounds convey certain basic meanings in a more direct way and, moreover, showing the same sound-meaning correlation in several unrelated languages. For example, the vowels in 'teeny', 'wee', expressive words meaning "small", crop up in words with the same meaning in other language, e.g., French 'petit', Spanish 'chico', Japanese 'chiisai'. In one of the first psycholinguistic studies focussing on phonological questions, the American linguist Edward Sapir (1929) presented several native speakers of English and a few native speakers of Chinese with pairs of made-up words such as 'meel' and 'mal'--identical except for their vowels--and asked them to assign them as names to smaller and larger versions of objects, e.g., a table. In about 80% of the responses, both from English and Chinese speakers, vowels like 'ee' were chosen for the smaller item, lending support to the notion that there is a universally recognized connection between certain speech sounds and certain fundamental semantic categories. There has been considerable interest in this area recently and many experimental studies have replicated Sapir's findings and have explored other aspects of the phenomenon (Ohala 1984). Besides its inherent theoretical interest, this is an area with potential applications in such diverse areas as advertising (construction of product names) and stylistics, especially the analysis of poetry. A bibliography of experimental studies in sound symbolism is given in Appendix B.

After the vocal tract and the history of languages, perhaps the next great frontier to be explored in linguistics is the language user's mind, that is, what is in mind of the speaker which enables him to exhibit mastery of a language. Although barely out of its infancy--perhaps, 'adolescence' would be apt--studies of psychological mechanisms serving the phonological side of language are growing both in numbers and in the sophistication of the techniques. A relatively accessible method is concept formation in which subjects learn to classify presented words (or sentences) into various categories via simple feedback (signalling "right" or "wrong" to each response) (Jaeger 1980, 1986; Jaeger & Ohala 1984; Ohala 1983b). This has been used to test the claim that in English the affricates 'ch' and 'j' (e.g., at the beginning of 'choose' and 'juice') are psychologically single sounds even though physically they consist of stop-plus-fricative sequences (phonetic [tʃ] and [dʒ]). Using the concept formation technique, subjects were taught to classify words into those starting with clusters (e.g., 'stash', 'flow') and those starting with single consonants (e.g., 'thin', 'ship', 'fee')--even though some of these were spelled with two consonants. When words beginning with affricates were introduced (and where no feedback was given to subjects' responses), subjects overwhelmingly put them in the category of words starting with single sounds, thus supporting the tested hypothesis. Questions of this sort--and many more complex--arise every time a phonemic analysis is proposed for a language; it is now possible to resolve these issues through experimental means.

Appendix C provides a bibliography of experimental studies primarily in this area.

### C. Morphology

Many of the issues in morphology are closely tied up with those in phonology, especially in the case of languages such as English which have a rich inflectional and derivational system, e.g., how do speakers of English compute the phonetic differences in the English plural, e.g., in 'cat[s]', 'dog[z]', 'finch[əz]', as a function of the phonetic ending of the singular form? It is not feasible to go into detail here on the competing hypotheses but one issue concerns whether it is possible to posit just one psychological process for pluralization: a single marker, say [z], which then gets modified by rule as just indicated. Berko (1958) elicited the plurals of made-up words from English speakers (from pre-school age up to adults). (Made-up words were used instead of existing words to circumvent any claim that plural forms were known via rote memorization of all previously-heard plurals.) For her younger subjects she showed pictures of imaginary animals and prompted them as follows: "Here is one wug; now there are two of them. There are two \_\_\_\_\_" (where the child was encouraged to complete the last sentence). She found that her young subjects performed significantly less accurately with forms such as 'tors' than 'wugs', both of which should have taken the [z] form, thus suggesting that at least in its initial development the process of pluralization may not be unitary. Recent experimental work in morphology still uses such elicitation techniques with success as well as more elaborate methods (Bybee & Pardo 1981; Bybee & Slobin 1982).

#### D. Syntax; Semantics

The issues that occupy syntax and semantics are quite complex and most have not been subjected to experimental study--even though some of the earliest experimental psycholinguistic studies addressed issues that were topical in syntactic theory of the day (Osgood & Sebeok 1965; Flores d'Arcais & Levelt 1970). Nevertheless, considerable ingenuity--but not necessarily complex procedures or instrumentation--has been shown by workers in this area.

Blumenthal and Boakes (1967), for example, required subjects to memorize sentences of the type 'John is eager to please' and 'John is easy to please', i.e., with similar surface structure but with hypothesized different deep structures ('John' is the logical subject in the first sentence but is the logical object in the second), and then explored the effectiveness of the first noun ('John' in the above example) as a prompt for the recall. They found that "words functioning as logical subjects were significantly more effective prompts than words functioning as logical objects." Since the surface structure was identical in all pairs, the results lent support to the hypothesized difference in deep structure. Further support for such deep structures came from studies of ambiguous sentences, some of which derive their ambiguity from having more than one possible deep structure, e.g. 'they deplored the shooting of the hunters.' MacKay (1966), in a sentence-completion task, found subjects took longer to supply endings to ambiguous partial sentences presented to them than to non-ambiguous ones. This suggests that in hearing or reading one constructs all possible deep structures before arriving at a single interpretation of a sentence.

Other representative examples of experiments in this area include Sachs (1967), Jarvella (1971), Baker, Prideaux, & Derwing (1973), Berlin & Kay (1969), Carden & Dieterich (1981); reviews are given by Slobin (1979), Glucksberg & Danks (1975), and Prideaux (1985).

#### E. "Hyphenated" Linguistics.

Experimentation in some of the newer sub-areas of linguistics is characterized by impressive creativity. In a classic experiment, Labov (1966) demonstrated the existence in New York City of dialectal differences determined by social class, specifically the retention or dropping of 'r' after vowels. Entering three department stores catering to different social classes, he and his assistants asked the clerks for the location of some department that had previously been determined to be on the fourth floor. The responses of the clerks ('faw $\theta$  flawr' or 'faw $\theta$  flaw') showed progressively higher percent of r-retention as one went from the working class store to the one catering to the highest class customers. Further experimental studies in sociolinguistics may be found in Labov (1972a,b). For other areas of hyphenated linguistics, see Read (1971) and Locke (1983) for language acquisition, Caplan (1987) for neurolinguistics, Ehri (1984, 1987) for reading and spelling acquisition.



## F. Summary of Experimental Areas.

In the preceding survey I have emphasized the kind of experiments where the experimenter contrives the situation under which observations are made; there is also the potential for the other type of experiment: nature's experiment, as it were, where the observer just has to arrange to be in the right place at the right time to make the observation. Large collections of naturally-produced speech errors, for example, have provided crucial evidence relevant to issues in many domains in linguistics (Fromkin 1973, 1980; Stemberger 1983; Shattuck-Hufnagel 1986). Baars & Motley (1976) have developed ways of eliciting speech errors in the laboratory. Using them they have demonstrated, for example, that some sort of lexical editor must play a role in speech production since subjects--given equal opportunities to spoonerize words where the rearrangement would produce existing words and where they would produce nonsense (e.g., "barn doors" when spoonerized would yield the existing words "darn bores", whereas "dart board" if treated similarly would only yield the nonsense sequence "bart doard")--spoonerized the first type significantly more often (Baars, Motley, & MacKay 1975).

Appendix D provides a list of selected works that could serve as texts in courses of various kinds dealing with experimental linguistics.

### Pedagogical Advantages of an Experimental Approach to Linguistic Issues.

Linguistics is noted for instilling in students a capacity for what is known as 'critical thinking'. This is doubly the case with experimental linguistics. As is common to all linguistic work students must examine data in detail to determine what generalizations they can draw from them but with an experimental approach they must in addition conceive of ways of testing those generalizations--devise ways to obtain new data which would successfully differentiate between competing generalizations.

The experimental approach is not universally endorsed among linguists (nor was it endorsed by all practitioners of medicine and physiology in the mid-19th century; see Helmholtz 1877 [1971]--such may be a natural feature of disciplines undergoing changes in methodology). Some have argued that linguistics cannot be an experimental discipline, cannot achieve the level of prediction of the "hard" sciences, and that it deals with propositions that are inherently untestable (Itkonen 1978; Lass 1980; for an opposing view see Ohala 1986b, 1987a,b; Ohala & Jaeger 1986). Students who approach linguistics experimentally will have to face these issues and also question very deeply their own and others' assumptions about such fundamental philosophical notions as what it means to 'know' something, the relative merits of knowledge derived from sense data vs. reason--or both-, what 'certainty' means, and even how well language or mathematics do at representing the world. They will have to delve into the history of linguistics and--in an enlightened curriculum--the history of other sciences, e.g. physics, chemistry, geology, biology. In this way a properly designed undergraduate major in linguistics with an experimental emphasis could provide a truly outstanding "liberal" education, covering hard and soft sciences as well as history and philosophy while at the same time involving students directly in reshaping linguistic science. (See Appendix E for a selected bibliography on history and philosophy of science.)

It is inevitable when learning about the experimental techniques suitable for the testing of linguistic hypotheses that students will learn about concepts and methods in other disciplines, e.g., psychology, computer science, statistics, mathematics, and--insofar as they give instructive examples of the success of experimentation--the history and practice of 'hard' sciences such as physics, chemistry, and biology. This feature of experimental linguistics in an undergraduate curriculum may also allow it to attract a wide range of students--in terms of background and temperament.

Students' familiarity with experimental methods will make them eligible for a wider range of jobs and a wider range of disciplines for further, advanced study. Undergraduates are currently obtaining entry-level jobs in the speech and language technology industry. Linguistics undergraduate students with such training are also highly successful in gaining admission to programs of advanced training in library science, speech pathology, and pre-medical training, and, of course, linguistics itself (in addition to areas where experimental training is of less value, e.g., law, business administration, modern languages).

#### Necessary Resources.

Although it is possible to do some form of experimental linguistics on a very modest budget and with little outlay for equipment, it is far easier and imposes fewer limitations on the type of experiments that can be undertaken if there are adequate resources.

The following would be desirable:

Tape recorders plus associated equipment: earphones, amplifiers, loudspeakers, tape splicing equipment.

Sound-treated room (for recording).

Micro-computer system for digitizing, viewing, editing, analysis, and synthesis of speech and other audio signals; programs for obtaining reaction times, tabulating subjects' responses, performing statistical analyses.

In addition, a supply of motivated subjects is desirable, where motivation is typically provided by giving students academic credit for their participation or by paying them. In many cases, however, linguistics students themselves are not suitable as subjects in linguistics experiments because they might easily figure out the hypothesis being tested and come to the task with certain biases.

Some of these facilities may already be in place in other departments, e.g., psychology, speech and hearing science. In general, there would be considerable advantage to involving faculty from other departments in the implementation of a curriculum featuring experimental linguistics.

## Library Resources.

In addition to the usual journals covering theoretical and descriptive linguistics, a program in experimental linguistics should ideally augment their holdings to include the journals listed in Appendix F.

## Bibliography (of works cited in text).

- Baars, B. J. & Motley, M. T. 1976. Spoonerisms as sequencer conflicts: Evidence from artificially elicited errors. *Am. J. Psychol.* 89.467-484.
- Baars, B. J., Motley, M. T., & MacKay, D. G. 1975. Output editing for lexical status in artificially elicited slips of the tongue. *J. Verbal Learning & Verbal Behavior* 14. 382-391.
- Baker, W. J., Prideaux, G. D., & Derwing, B. L. 1973. Grammatical properties of sentences as a basis for concept formation. *J. of Psycholinguistic Research* 2.201-220.
- Berlin, B. & Kay, P. 1969. Basic color terms. Their universality and evolution. Berkeley: University of California Press.
- Bernard, C. 1957. An introduction to the study of experimental medicine. Transl. by H. C. Green. New York: Dover. [Orig. pub. as *Introduction à l'étude de la médecine expérimentale*. Paris: J. B. Bailliere et Fils, 1865.]
- Blumenthal, A. L. & Boakes, R. 1967. Prompted recall of sentences. *J. Verbal Learning & Verbal Behavior* 6.674-676.
- Bybee, J. L. & Pardo, E. 1981. On lexical and morphological conditioning of alternations: a nonce-probe experiment with Spanish verbs. *Linguistics* 19.937-968.
- Bybee, J. L. & Slobin, D. I. 1982. Rules and schemas in the development and use of the English past tense. *Lg.* 58.265-289.
- Caplan, D. 1987. *Neurolinguistics and linguistic theory*. Cambridge: Cambridge University Press.
- Carden, Guy & Dieterich, Thomas G. 1981. Introspection, observation, and experiment: An example where experiment pays off. In P. D. Asquith & R. N. Giere (eds.), *Proceedings of the 1980 Biennial Meeting of the Philosophy of Science Association*. Vol. 2: Symposia. East Lansing, MI: Philosophy of Science Association. 583-597.
- Ehri, L. C. 1984. How orthography alters spoken language competencies in children learning to read and spell. In J. Downing & R. Valtin (eds.), *Language awareness and learning to read*. New York: Springer Verlag. 119-147.

- Ehri, L. C. 1987. Learning to read and spell words. *J. of Reading Behavior* 19.5-31.
- Flores d'Arcais, G. B. & Levelt, W. J. M. (eds.) 1970. *Advances in psycholinguistics*. Amsterdam: North Holland.
- Fromkin, V. (ed.) 1973. *Speech errors as linguistic evidence*. The Hague: Mouton.
- Fromkin, V. (ed.) 1980. *Slips of the tongue, ear, pen, and hand*. New York: Academic Press.
- Fujimura, O., Macchi, M. J., & Streeter, L. A. 1978. Perception of stop consonants with conflicting transitional cues: A cross-linguistic study. *Language & Speech* 21.337-346.
- Glucksberg, S. & Danks, J. H. 1975. *Experimental psycholinguistics. An introduction*. Hillsdale, NJ: Lawrence Erlbaum.
- Helmholtz, H. 1877. *Das Denken in der Medicin; English translation: Thought in medicine*. In R. Kahl, ed., 1971. *Selected writings of Hermann von Helmholtz*. Middletown: Wesleyan University Press. 340-359.
- Itkonen, E. 1978. Linguistics: Nonempirical and empirical. In W. U. Dressler & W. Meid (eds.), *Proc. 12th Int. Congr. of Linguists*. Innsbruck: Universität Innsbruck. 157-158.
- Jaeger, J. J. 1980. Testing the psychological reality of phonemes. *Lg & Sp* 23.233- 253.
- Jaeger, J. J. 1986. Concept formation as a tool for linguistic research. In J. J. Ohala & J. J. Jaeger (eds.), *Experimental phonology*. Orlando: Academic Press. 211-237.
- Jaeger, J. J. & Ohala, J. J. 1984. On the structure of phonetic categories. *BLS* 10.15-26.
- Jarvella, R. J. 1971. Syntactic processing of connected speech. *Journal of Verbal Learning & Verbal Behavior* 10.409-416.
- Labov, W. 1966. *The social stratification of English in New York City*. Washington, D.C.: The Center for Applied Linguistics.
- Labov, W. 1972a. *Sociolinguistic patterns*. Philadelphia: University of Pennsylvania Press.
- Labov, W. 1972b. *Language in the inner city: Studies in the Black English vernacular*. Philadelphia: University of Pennsylvania Press.
- Lass, R. 1980. *On explaining language change*. Cambridge: Cambridge University Press.

- Locke, J. L. 1983. Phonological acquisition and change. New York: Academic Press.
- MacKay, D. G. 1966. To end ambiguous sentences. Perception & Psychophysics 1.426-436.
- Prideaux, G. D. 1985. Psycholinguistics. The experimental study of language. New York: Guilford
- Ohala, J. J. 1974. Experimental historical phonology. In: J. M. Anderson & C. Jones (eds.), Historical linguistics II. Theory and description in phonology. [Proc. of the 1st Int. Conf. on Historical Linguistics. Edinburgh, 2-7 Sept. 1973.] Amsterdam: North Holland. 353-389.
- Ohala, J. J. 1983a. The direction of sound change. In: A. Cohen & M. P. R. v. d. Broecke (eds.), Abstracts of the Tenth Int. Congr. of Phonetic Sciences. Dordrecht: Foris. 253-258.
- Ohala, J. J. 1983b. The phonological end justifies any means. In: S. Hattori & K. Inoue (eds.), Proc. of the XIIIth Int. Cong. of Linguists, Tokyo, 29 Aug.-4 Sept. 1982. Tokyo. [Distributed by Sanseido Shoten.] 232-243.
- Ohala, J. J. 1984. An ethological perspective on common cross-language utilization of F0 of voice. Phonetica 41.1-16.
- Ohala, J. J. 1985. Linguistics and automatic speech processing. In: R. De Mori & C.-Y. Suen (eds.), New systems and architectures for automatic speech recognition and synthesis. [NATO ASI Series, Series F: Computer and System Sciences, Vol. 16] Berlin: Springer-Verlag. 447-475.
- Ohala, J. J. 1986a. Phonological evidence for top-down processing in speech perception. In: J. S. Perkell & D. H. Klatt (eds.), Invariance and Variability in Speech Processes. Hillsdale, NJ: Lawrence Erlbaum. 386-397.
- Ohala, J. J. 1986b. Consumer's guide to evidence in phonology. Phonology Yearbook 3.3-26.
- Ohala, J. J. 1987a. Experimental phonology. Proc. Ann. Meeting, Berkeley Ling. Soc. 13.207-222.
- Ohala, J. J. 1987b. Explanation, evidence, and experiment in phonology. In: W. U. Dressler (ed.), Phonetica 1984: Proc. of 5th International Phonology Meeting, Eisenstadt, Austria. Cambridge Univ. Press.
- Ohala, J. J. In press. The phonetics and phonology of aspects of assimilation. In M. Beckman & J. Kingston (eds.), Proceedings of First Conference on Laboratory Phonology.

- Ohala, J. J. & Jaeger, J. J. 1986. Introduction. In J. J. Ohala & J. J. Jaeger (eds.), *Experimental phonology*. Orlando, FL: Academic Press. 1-12.
- Osgood, C. E. & Sebeok, T. A. (eds.) *Psycholinguistics. A survey of theory and research problems*. Bloomington: Indiana University Press.
- Prideaux, G. D. 1985. *Psycholinguistics. The experimental study of language*. New York: The Guilford Press.
- Read, C. 1971. Pre-school children's knowledge of English phonology. *Harvard Educational Review* 41.1-34
- Rousselot, L'abbe P. J. 1892. *Les modifications phonétiques du langage, étudiées dans le patois d'une famille de Cellefrouin (Charente)*. Paris: H. Welter.
- Rousselot, P. J. 1897-1901. *Principes de phonétique expérimentale*. Vol. 1. Paris: H. Welter. [Vol. 2, 1901-1908. Paris: H. Welter.]
- Sachs, J. S. 1967. Recognition memory for syntactic and semantic aspects of connected discourse. *Perception & Psychophysics* 2.437-442.
- Sapir, E. 1929. A study in phonetic symbolism. *J. Exp. Psych.* 12.225-239.
- Shattuck-Hufnagel, S. 1986. The representation of phonological information during speech production planning: Evidence from vowel errors in spontaneous speech. *Phonology Yearbook* 3.117-149.
- Slobin, D. I. 1979. *Psycholinguistics*. 2nd ed. Glenview, IL: Scott, Foresman & Co.
- Stemberger, J. P. 1983. *Speech errors and theoretical phonology: A review*. Bloomington: Indiana University Linguistics Club.

#### Journal Abbreviations Used Appendices:

BLS	Proc., Annual Meeting, Berkeley Linguistics Society
CLS	Proc, Regional Meeting, Chicago Linguistic Society
JASA	Journal of the Acoustical Society of America
JSHR	Journal of Speech and Hearing Research
JVLVB	Journal of Verbal Learning & Verbal Behavior
Lg	Language
Lg & Sp	Language & Speech

APPENDIX A: BIBLIOGRAPHY OF EXPERIMENTS WHICH CAN BE REPLICATED USING LITTLE MORE EQUIPMENT THAN A TAPE RECORDER\*

(\*The extra equipment includes: additional tape recorders, splicing equipment, a source of noise--which may be on a tape--, response buttons, earphones, etc.)

- Ali, L., Gallagher, T., Goldstein, J., & Daniloff, R. 1971. Perception of coarticulated nasality. *JASA* 49.538-540.
- Brown, R. W. & Hildum, D. C. 1956. Expectancy and the identification of syllables. *Lg* 32.411-419.
- Bruce, D. J. 1958. The effect of listeners' anticipations on the intelligibility of heard speech. *Lg & Sp* 1.79-97.
- Chananie, J. D. & Tikofsky, R. S. 1969. Choice response time and distinctive features in speech discrimination. *J. Exp. Psych.* 81.161-163.
- Chapin, P. G., Smith, T. S. & Abrahams, A. A. 1972. Time factors in perceptual segmentation of speech. *JVLVB* 11.164-173.
- Desmarais, F. 1976. Durational cue in vowel perception. *Lingua e Contesto.* 43-63.
- Denes, P. 1955. Effect of duration on the perception of voicing. *JASA* 27.761-764.
- Efremova, I. B., Fintoft, K. & Ormestad, H. 1965. An experimental study of tonic accents in East Norwegian. *Norsk Tidsskrift for Sprogvidenskap* 20.5-17.
- Elugbe, B. & Hombert, J.-M. 1975. Nasals in Ghotuo: /lenis/ or [short]? In C. A. Ferguson, L. M. Hyman, & J. J. Ohala (eds.), *Nasalfest: Papers from a symposium on nasals and nasalization*. Stanford: Language Universals Project. 167-173.
- Fodor, J. A. & Bever, T. G. 1965. The psychological reality of linguistic segments. *JVLVB* 4.414-420.
- Fowler, C. A. 1981. Perception and production of coarticulation among stressed and unstressed vowels. *JSHR* 46.127-139.
- Fry, D. B. 1955. Duration and intensity as physical correlates of linguistic stress. *JASA* 27.765-768.
- Fujimura, O., Macchi, M. J., & Streeter, L. A. 1978. Perception of stop consonants with conflicting transitional cues: A cross-linguistic study. *Language & Speech* 21.337-346.
- Garrett, M., Bever, T., & Fodor, J. 1966. The active use of grammar in speech perception. *P&P* 1.30-32.

- Grimm, W. A. 1966. Perception of segments of English-spoken consonant-vowel syllables. JASA 40.1454-1461.
- Harrel, R. S. 1958. Some English nasal articulations. Lg. 34.492-493.
- Hecker, M. H. L., Stevens, K. N., & Williams, C. E. 1966. Measurement of reaction time in intelligibility tests. JASA 36.1188-1189.
- Householder, F. W., Jr. 1956. Unreleased PTK in American English. In M. Halle (ed.), For Roman Jakobson. The Hague: Mouton. 235ff.
- Howes, D. 1957. On the relation between the intelligibility and frequency of occurrence of English words. JASA 29.296-305.
- Huggins, A. W. F. 1964. Distortion of the temporal pattern of speech: interruption and alternation. JASA 36.1055-1064.
- Huggins, A. W. F. 1972. Just noticeable differences for segment duration in natural speech. JASA 51.1270-1278.
- Huggins, A. W. F. 1972. On the perception of temporal phenomena in speech. JASA 51.1279-1290.
- Jaeger, J. J. 1980. Testing the psychological reality of phonemes. Lg & Sp 23.233-253.
- Jaeger, J. J. 1984. Assessing the psychological status of the Vowel Shift Rule. J. Psycholinguistics Res. 13.13-36.
- Jarvella, R. J. 1971. Syntactic processing of connected speech. JVLVB 10.409-416.
- Ladefoged, P. & Broadbent, D. E. 1960. Perception of sequence in auditory events. Q. J. Exp. Psychol. 12.162-170.
- Lane, H. 1963. Foreign accent and speech distortion. JASA 35.451-453.
- Lee, B. S. 1950. Some effects of side-tone delay. JASA 22.639-640.
- Lieberman, A. M., Harris, K. S., Eimas, P., Lisker, L., & Bastian, J. 1961. An effect of learning on speech perception: The discrimination of durations of silence with and without phonemic significance. Lg & Sp 4.175-195.
- Lieberman, P. 1963. Some effects of semantic and grammatical context on the production and perception of speech. Lg & Sp 6.172-187.
- Lintz, L. B. & Sherman, D. 1961. Phonetic elements and perception of nasality. JSRH 4.381-396.
- Lisker, L. 1957. Closure duration and the intervocalic voiced-voiceless distinction in English. Lg 33.42-49.



- Lotz, J., Abramson, A. S., Gerstman, L. J., Ingemann, F., & Nemser, W. J. 1960. The perception of English stops by speakers of English, Spanish, Hungarian, and Thai: A tape-cutting experiment. *Lg & Sp* 3.71-77.
- Lyublinskaya, V. V. 1966. Recognition of articulation cues in stop consonants in transition from vowel to consonant. *Soviet Physics--Acoustics* 12.185-192.
- Malécot, A. 1956. Acoustic cues for nasal consonants: An experimental study involving tape-splicing technique. *Lg* 32.274-284.
- Malécot, A. 1960. Vowel nasality as a distinctive feature in American English. *Lg* 36.222-229.
- Meyer-Eppler, W. 1950. Reversed speech and repetition systems as means of phonetic research. *JASA* 22.804-806.
- Mohr, B. & Wang, W. S.-Y. 1968. Perceptual distance and the specification of phonological features. *Phonetica* 18.31-45.
- Ohman, S. E. G. 1966. Perception of segments of VCCV utterances. *JASA* 40.979-988.
- Pickett, J. M. 1958. Perception of compound consonants. *Lg & Sp* 1.288-304.
- Pickett, J. M. & Decker, L. 1960. Time factors in perception of a double consonant. *Lg & Sp* 3.11-17.
- Pickett, J. M. & Pollack, I. 1963. Intelligibility of excerpts from fluent speech: Effects of rate of utterance and duration of excerpt. *Lg & Sp* 6.151-164.
- Pollack, I. & Pickett, J. M. 1963. The intelligibility of excerpts from conversation. *Lg & Sp* 6.165-171.
- Pols, L. C. W. & Schouten, M. E. H. 1978. Identification of deleted consonants. *JASA* 64.1333-1337.
- Sadler, V. 1961. Effect of succeeding vowel on consonant recognition in noise. *Lg & Sp* 4.133-138.
- Savin, H. B. 1963. Word-frequency effect and errors in the perception of speech. *JASA* 35.200-206.
- Savin, H. B. & Bever, T. G. 1970. The non-perceptual reality of the phoneme. *JVLVB* 9.295-302.
- Schatz, C. D. 1954. The role of context in the perception of stops. *Lg* 30.47-56.
- Schouten, J. F., Cohen, A., & 't Hart, J. 1962. Study of time cues in speech perception. *JASA* 34.517-518.

- Stowe, A. N., Harris, W. P., & Hampton, D. B. 1963. Signal and context components of word recognition behavior. JASA 35.639-644.
- Strange, W., Verbrugge, R., Shankweiler, D., & Edman, T. 1976. Consonant environment specifies vowel identity. JASA 60.213-224.
- Sumby, W. H., Chambliss, D., & Pollack, I. 1958. Information transmission with elementary auditory displays. JASA 30.425-429.
- 't Hart, J. & Cohen, A. 1964. Gating techniques as an aid in speech analysis. Lg & Sp 7.22-39.
- Wang, W. S.-Y. & Fillmore, C. J. 1961. Intrinsic cues and consonant perception. JSHR 4.130-136.
- Warren, R. M. 1961. Illusory changes of distinct speech upon repetition--The verbal transformation effect. British J. Psychol. 52.249-258.
- Warren, R. M. 1970. Perceptual restoration of missing speech sounds. Science 167.392-393.
- Warren, R. M., Obusek, C. J., & Ackroff, J. M. 1972. Auditory induction: perceptual synthesis of absent sounds. Science 176.1149-1151.
- Wintiz, H., Scheib, M. E., & Reeds, J. A. 1972. Identification of stops and vowels for the burst portion of /p,t,k/ isolated from conversational speech. JASA 51.1309-1317.
- Wright, J. T. 1975. Effects of vowel nasalization on the perception of vowel height. In C. A. Ferguson, L. M. Hyman, & J. J. Ohala (eds.), Nasalfest: Papers from a symposium on nasals and nasalization. Stanford: Language Universals Project. 373-387.

## APPENDIX B: EXPERIMENTAL WORKS ON SOUND SYMBOLISM

- Bentley, M. & Varon, E. J. 1933. An accessory study of "phonetic symbolism." *Am. J. of Psych.* 45.76-86.
- Brackbill, Y. & Little, K. 1957. Factors determining the guessing of meanings of foreign words. *J. Abnormal & Soc. Psych.* 54.312-318.
- Brown, R. W. & Nuttall, R. 1959. Methods in phonetic symbolism experiments. *J. Abnormal & Soc. Psych.* 59.441-445.
- Brown, R. W., Black, A. H., & Horowitz, A. E. 1955. Phonetic symbolism in natural languages. *J. Abnormal & Soc. Psych.* 50.388-393. [Repr. in: R. Brown. 1970. *Psycholinguistics. Selected Papers.* New York: The Free Press. 258-273.]
- Butcher, A. 1974. "Brightness" and "Darkness" and the dimensionality of vowel perception. *J. of Phonetics* 2.153-160.
- Chastaing, M. 1958. Le symbolisme de voyelles: significations des "i". I & II. *J. de Psych.* 55.403-423; 461-481.
- Chastaing, M. 1962. La brillance des voyelles. *Archivum Linguisticum* 14.1-13.
- Chastaing, M. 1964. Nouvelles recherches sur le symbolisme des voyelles. *J. de Psych.* 61.75-88.
- Chastaing, M. 1965. Dernières recherches sur le symbolisme vocalique de la petitesse. *Revue Philosophique* 155.41-56.
- Davis, R. 1961. The fitness of names to drawings. A cross-cultural study in Tanganyika. *Brit. J. of Psych.* 52.259-268.
- Fischer-Jørgensen, E. 1967. Perceptual dimensions of vowels. In: To honor Roman Jakobson. Vol. 1. The Hague: Mouton. 667-671.
- Fischer-Jørgensen, E. 1968. Perceptual dimensions of vowels. *Z. f. Phonetik...* 21.94-98.
- Fischer-Jørgensen, E. 1978. On the universal character of phonetic symbolism with special reference to vowels. *Studia Linguistica* 32.80-90. [Also in: *Ann. Rep. Inst. of Phonetics, Univ. of Copenhagen.* 1978. 12.75-89.]
- Fox, C. W. 1935. An experimental study of naming. *Am. J. Psych.* 47.545-579.
- Greenberg, J. H. & Jenkins, J. J. 1966. Studies in the psychological correlates of the sound system of American English. *Word* 22.207-242.
- Greenberg, S. & Sapir, J. D. 1978. Acoustic correlates of 'big' and 'thin' in Kujamutay. *Proc., Ann. Meeting, Berkeley Ling. Soc.* 4.293-310.

- Heise, D. R. 1966. Sound-meaning correlations among 1,000 English words. *Language & Speech* 9.14-27.
- Holland, M. & Wertheimer, M. 1964. Some physiognomic aspects of naming, or maluma and takete revisited. *Perceptual and Motor Skills* 19.111-117.
- Irwin, F. W. & Newland, E. 1940. A genetic study of the naming of visual figures. *J. Psych.* 9.3-16.
- Johnson, R. C., Suzuki, N. S., & Olds, W. K. 1964. Phonetic symbolism in an artificial language. *J. Abnormal & Soc. Psych.* 69.233-236.
- Klank, L. J. K., Huang, Y.-H., & Johnson, R. C. 1971. Determinants of success in matching word pairs in test of phonetic symbolism. *JVLVB* 10.140-148.
- Kolers, P. A. 1953. Interlingual word associations. *JVLVB* 2.291-300.
- Kunihara, S. 1971. Effects of the expressive voice on phonetic symbolism. *JVLVB* 10.427-429.
- Langer, J. & Rosenberg, B. G. 1966. Learning verbal referents of phonetic symbols. *J. of Personal and Soc. Psych.* 3.427-437.
- Maltzmann, I., Morrisett, L. & Brooks, L. 1956. An investigation in phonetic symbolism. *J. Abnormal & Soc. Psych.* 53.245-251.
- Markel, N. N. & Hamp, E. P. 1960. Connotative meanings of certain phoneme sequences. *Studies in Linguistics* 15.47-61.
- Miron, M. S. 1961. A cross-linguistic investigation of phonetic symbolism. *J. Abnormal & Soc. Psych.* 62.623-630.
- Newman, S. S. 1933. Further experiments in phonetic symbolism. *Am. J. of Psych.* 45.53-75.
- Oakeshott-Taylor, J. 1984. Phonetic factors in word order. *Phonetica* 41.226-237.
- Oyama, T. & Haga, J. 1963. Common factors between figural and phonetic symbolism. *Psychologia* 6.131-144.
- Peterfalvi, J.-M. 1965. Les recherches expérimentales sur le symbolisme phonétique. *Am. J. of Psych.* 65.439-473.
- Peterfalvi, J.-M. 1970. Recherches expérimentales sur le symbolisme phonétique. Paris.
- Sapir, E. 1929. A study in phonetic symbolism. *J. Exp. Psych.* 12.225-239.
- Solomon, L. N. 1959. Search for physical correlates to psychological dimensions of sounds. *J. Acous. Soc. Am.* 31.492-497.

- Tarte, R. D. 1974. Phonetic symbolism in adult native speakers of Czech. Lg. & Sp. 17.87-94.
- Tarte, R. D. & Barritt, L. S. 1971. Phonetic symbolism in adult native speakers of English: three studies. Lg. & Sp. 14.158-
- Taylor, I. K. 1963. Phonetic symbolism reexamined. Psych. Bull. 60.200-209.
- Taylor, I. K. & Taylor, M. M. 1962. Phonetic symbolism in four unrelated languages. Canad. J. Psych. 16.344-356.
- Taylor, I. K. & Taylor, M. M. 1965. Another look at phonetic symbolism. Psych. Bull. 64.413-427.
- Tesmer, H. 1933. Experimentelle euphonische Untersuchungen einzelner Vokale und Silben. Halle.
- Thorndike, E. L. 1945. On Orr's hypothesis concerning the front and back vowels. Brit. J. of Psych. 36.10-14.
- Usnadze, D. 1924. Ein experimentelle Beitrage zum Problem der psychologischen Grundlagen der Namengebung. Psychologische Forschung 5.24-43.
- Vetter, H. J. & Tennant, J. A. 1967. Oral-gesture cues in sound symbolism. Perceptual & Motor Skills 24.54-
- Weiss, J. 1963. Role of 'meaningfulness' vs. meaning-dimensions in guessing the meanings of foreign words. J. Abnormal & Soc. Psych. 66.541-546.
- Weiss, J. 1963. Further study of the relation between the sound of a word and its meaning. Am. J. Psych. 76.624-630.
- Weiss, J. 1964. The role of stimulus meaningfulness in the phonetic symbolism response. J. Gen. Psych. 70.255-263.
- Weiss, J. 1964. Phonetic symbolism re-examined. Psych. Bull. 61-454-458.
- Weiss, J. 1966. A study of ability of English speakers to guess the meaning of non-antonym foreign words. J. Gen. Psych. 74.97-106.

APPENDIX C: WORKS IN EXPERIMENTAL PHONOLOGY

- Anisfeld, M. 1969. Psychological evidence for an intermediate stage in a morphological derivation. *JVLVB* 8.191-195.
- Anisfeld, M. & Gordon, M. 1968. On the psychophonological structure of English inflectional rules. *JVLVB* 7.973-979.
- Anisfeld, M. & Tucker, G. R. 1967. English pluralization rules of six-year old children. *Child Development* 38.1201-1217.
- Armbruster, T. E. 1978. The psychological reality of the vowel shift and laxing rules. *Diss. Abstracts Int.* 39(3,A).1516-1517. [1978 Univ. of Calif., Irvine Doc. Diss.]
- Aronoff, M. & Anshen, F. 1981. Morphological productivity and phonological transparency. *Canadian J. of Ling.* 26.63-72.
- Aronoff, M. & Schvaneveldt, R. 1978. Testing morphological productivity. *Annals of the New York Acad. of Sciences* 318.106-114.
- Baird, R. 1973. Children's phonological rules: a failure to replicate. *Language Learning* 23.223-230.
- Baker, R. G. & Smith, P. T. 1976. A psycholinguistic study of English stress assignment rules. *Lg. & Sp.* 19.9-27.
- Baker, R. G. & Smith, P. T. 1976. Sound patterns and spelling patterns in English. In: R. N. Campbell & P. T. Smith (eds.), *Recent advances in the psychology of language*. London: Plenum Press. 361-376.
- Baker, W. J., Prideaux, G. C. & Derwing, B. L. 1973. Grammatical properties of sentences as a basis for concept formation. *J. Psycholing. Res.* 2.210-220.
- Beddor, P. S., Krakow, R. A., & Goldstein, L. M. 1986. Perceptual constraints and phonological change: A study of nasal vowel height. *Phonology Yearbook* 3.197-217.
- Berko, J. 1958. The child's learning of English morphology. *Word* 14.150-177.
- Briere, E. J. 1968. A psycholinguistic study of phonological interference. The Hague: Mouton.
- Browman, C. P. 1978. Tip of the tongue and slip of the ear: implications for language processing. *Working Papers in Phonetics (UCLA)* No. 42.
- Brown, R. W. 1956. Language and categories. Appendix to J. S. Bruner, J. J. Goodnow, & G. A. Austin, *A study of thinking*. New York: Wiley.

- Brown, R. W. & Hildum, D. C. 1956. Expectancy and the identification of syllables. *Lg.* 32.411-419.
- Brown, R. W. & McNeill, D. 1966. The 'tip of the tongue' phenomenon. *JVLVB* 5.325-337.
- Bryant, B. & Anisfeld, M. 1969. Feedback versus no-feedback in testing children's knowledge of English pluralization rules. *J. Exp. Child Psychol.* 8.250-255.
- Bybee, J. L. & Pardo, E. 1981. On lexical and morphological conditioning of alternations: a nonce-probe experiment with Spanish verbs. *Linguistics* 19.937-968.
- Bybee, J. L. & Slobin, D. I. 1982. Rules and schemas in the development and use of the English past tense. *Lg.* 58.265-289.
- Campbell, L. 1977. Generative phonology versus Finnish phonology: retrospect and prospect. *Texas Linguistic Forum (Austin)* 5.21-58.
- Campbell, L. 1980. The psychological and sociological reality of Finnish vowel harmony. In: R. Vago (ed.), *Issues in vowel harmony*. Amsterdam: John Benjamins. 245-270.
- Campbell, L. 1986. Testing phonology in the field. In: J. J. Ohala & J. J. Jaeger (eds.), *Experimental phonology*. Orlando, FL: Academic Press. 163-173.
- Carroll, J. B. 1971. Measurement properties of subjective magnitude estimates of word frequency. *JVLVB* 10.727-729.
- Cena, R. 1978. *When is a phonological generalization psychologically real?* Bloomington: Indiana Univ. Ling. Club.
- Chananie, J. D. & Tikofsky, R. S. 1969. Choice response time and distinctive features in speech discrimination. *J. Exp. Psych.* 81.161-163.
- Chao, Y.-R. 1934. The non-uniqueness of phonemic solutions of phonetic systems. *Bull. Inst. History and Philology, Academia Sinica* 4.363-397.
- Charles-Luce, J. 1985. Word-final devoicing in German: Effects of phonetic and sentential contexts. *J. Phonetics* 13.309-324.
- Crowder, R. G. 1978. Memory for phonologically uniform lists. *JVLVB* 17.73-89.
- Cutler, A. 1976. Phoneme-monitoring reaction time as a function of preceding intonation contour. *Percep. & Psychophysics* 20.55-60.
- Cutler, A. 1980. Productivity in word formation. *CLS* 16.

- Cutler, A. 1981. Degrees of transparency in word formation. *Canadian J. of Ling.* 26.73-77.
- Cutler, A. 1986. The phonology and psychology of speech recognition. *Phonology Yearbook* 3.161-178.
- Daividsen-Nielsen, N. 1974. Syllabification in English words with medial sp, st, sk. *J. Phonetics* 2.15-45.
- Daividsen-Nielsen, N. 1975. A phonological analysis of English sp, st, sk with speecial reference to speech error evidence. *J. Int. Phonetic Assoc.* 5.3-25.
- Derwing, B. L. 1976. Morpheme recognition and the learning of rules for derivational morphology. *Canadian Journal of Linguistics* 21.38-66.
- Derwing, B. L. 1977. Is the child really a 'little linguist'? In: J. Macnamara (ed.), *Language learning & thought*. New York: Academic Press. 79-84.
- Derwing, B. L. 1979. Pyscholinguistic evidence and linguistic theory. In G. D. Prideaux (ed.), *Perspectives in experimental linguistics*. Amsterdam: John Benjamins. 113-138.
- Derwing, B. L. 1980. English pluralization: A testing ground for rule evaluation. In G. D. Prideaux, B. L. Derwing, & W. J. Baker (eds.), *Experimental linguistics. Integration of theories and applications*. Ghent: E. Story-Scientia. 81-112.
- Derwing, B. L. & Baker, W. J. 1976. On the re-interpretation of linguistics and psychology. In: R. N. Campbell & P. T. Smith (eds.), *Recent advances in the psychology of language*. London: Plenum Press. 193- 218.
- Derwing, B. L. & Baker, W. J. 1977. The psychological basis for morphological rules. In: J. Macnamara (ed.), *Language learning and thought*. New York: Academic Press. 85-110.
- Derwing, B. L. & Baker, W. J. 1979. Recent research on the acquisition of English morphology. In P. Fletcher & M. Garman (eds.), *Language acquisition: Studies in first language development*. 1st ed. Cambridge: Cambridge University Press. 209-223.
- Derwing, B. L. & Baker, W. J. 1980. Rule learning and the English inflections (with special emphasis on the plural). In: G. D. Prideaux, B. L. Derwing, & W. J. Baker (eds.), *Experimental linguistics*. Ghent: E. Story-Scientia. 247-272.
- Derwing, B. L. & Baker, W. J. In press. Assessing morphological development. In P. Fletcher & M. Garman (eds.), *Language acquisition: Studies in first language development*. 2nd ed. Cambridge: Cambridge University Press.



- Derwing, B. L. & Nearey, T. 1986. Experimental phonology at the University of Alberta. In J. J. Ohala & J. J. Jaeger (eds.), *Experimental Phonology*. Orlando: Academic Press. 187-209.
- Derwing, B. L. Nearey, T. M. & Dow, M. L. 1986. On the phoneme as the unit of the "Second Articulation". *Phonology Yearbook* 3.45-69.
- Derwing, B. L., Prideaux, G. D. & Baker, W. J. 1980. Experimental linguistics in historical perspective. In G. D. Prideaux, B. L. Derwing, & W. J. Baker (eds.), *Experimental linguistics*. Ghent: E. Story-Scientia. 1-13.
- Dinnsen, D. A. & Charles-Luce, J. 1984. Phonological neutralization, phonetic implementation and individual differences. *J. Phonetics* 12.49-60.
- Ehri, L. C. 1984. How orthography alters spoken language competencies in children learning to read and spell. In J. Downing & R. Valtin (eds.), *Language awareness and learning to read*. New York: Springer-Verlag. 119-147.
- Ehri, L. C. Forthcoming. Sources of difficulty in learning to spell and read. In M. L. Wolraich & D. Routh (eds.), *Advances in developments and behavioral pediatrics*. Greenwich, Conn.: Jai Press.
- Ehri, L. C. & Wilce, L. S. 1986. The influence of spellings on speech: Are alveolar flaps /d/ or /t/? In D. Yaden & S. Templeton (eds.), *Metalinguistic awareness and beginning literacy*. Exeter, NH: Heinemann Educational Books.
- Elman, J. L. 1978. Spanish noun and adjective stress assignment: A non-phonological account. In J. P. Lantolf, J. M. Guitart, & F. Frank (eds.), *Colloquium on Spanish and Luso-Brazilian Linguistics*. Washington, D.C.: Georgetown University Press. 1-18.
- Elugbe, B. & Hombert, J. M. 1975. Nasals in Ghotuo: /lenis/ or [short]. In C. A. Ferguson, L. M. Hyman, & J. J. Ohala (eds.), *Nasalfest: Papers from a symposium on nasal and nasalization*. Stanford: Language Universals Project. 167-173.
- Esper, E. A. 1925. A technique for the experimental investigation of associative interference in artificial linguistic material. *Lg. Monog.* No. 1.
- Esper, E. A. 1966. Social transmission of an artificial language. *Lg.* 42.575-580.
- Fink, R. 1974. Orthography and the perception of stops after s#\_. *Lg. & Sp.* 17.152-159.
- Foss, D. J. & Swinney, D. A. 1973. On the psychological reality of the phoneme: perception, identification, and consciousness. *JVLVB* 12.246-257.

- Fourakis, M. & Iverson, G. K. 1984. On the "incomplete neutralization" of German final obstruents. *Phonetica* 41.140-149.
- Fourakis, M. & Port, R. 1986. Stop epenthesis in English. *J. Phonetics* 14.197-221.
- Fox, R. A. & Terbeek, D. 1977. Dental flaps, vowel duration and rule ordering in American English. *J. Phonetics* 5.27-34.
- Freedman, J. L. & Landauer, T. K. 1966. Retrieval of long-term memory: 'Tip-of-the-tongue' phenomenon. *Psychonomic Science* 4.309-310.
- Goldstein, L. 1977. Three studies in speech perception: features, relative salience, and bias. *Working Papers in Phonetics (UCLA)* No. 39.
- Greenberg, J. H. & Jenkins, J. J. 1964. Studies in the psychological correlates of the sound system of American English, I and II. *Word* 20.157-177.
- Greenberg, J. H. & Jenkins, J. J. 1966. Studies in the psychological correlates of the sound system of American English, III and IV. *Word* 22.207-242.
- Gudschinsky, C. S. 1958. Native reactions to tones and words in Mazatec. *Word* 14.338-345.
- Gudschinsky, S. C., Popovich, H. & Popovich, F. 1970. Native reaction and phonetic similarity in Maxakali phonology. *Lg.* 46.77-88.
- Hanson, G. A. 1963. A factorial investigation of speech sound perception. *Scandinavian J. of Psychology* 4.123-128.
- Hanson G. A. 1964. A further factorial investigation of speech sound perception. *Scandinavian J. of Psychology* 5.117-122.
- Harrison, D. S. 1979. The effect of phonology and morphology on the productivity of vowel alternation behavior. *Diss. Abstracts Int.* 39 (9,9).4616. [1978 Princeton Univ. Doc. Diss.]
- Hayes, J. R. & Clark, H. H. 1970. Experiments on the segmentation of an artificial speech analogue. In: J. R. Hayes (ed.), *Cognition and the development of language*. New York: John Wiley & Sons. 221-234.
- Healy, A. F. & Cutting, J. E. 1976. Units of speech perception: phoneme and syllable. *JVLVB* 15.73-83.
- Herbert, R. K. 1975. Reanalyzing prenasalized consonants. *Studies in Afr. Ling.* 6.105-123.
- Hoijer, H. 1957. Native reaction as a criterion in linguistic analysis. Reports for the 8th Int. Congr. of Linguists, Oslo, 5-9 August 1957. Oslo: Oslo Univ. Press. 112-121.

- Hombert, J.-M. 1973. Speaking backwards in Bakwiri. *Studies in Afr. Ling.* 4.227-236.
- Hombert, J.-M. 1976. Word games: some implications for analysis of tone and other phonological processes. *Working Papers in Phonetics (UCLA)* 33.67-80.
- Hombert, J.-M. 1986. Word games as a source of evidence for phonological claims. In: J. J. Ohala (ed.), *Experimental phonology*. Orlando, FL: Academic Press. 175-186.
- Horowitz, L. M., White, M. A., & Atwood, D. W. 1968. Word fragments as aids to recall: the organization of a word. *J. Exp. Psychol.* 76.219-226.
- Hsieh, H.-I. 1970. The psychological reality of tone sandhi rules in Taiwanese. *CLS* 6.489-503.
- Ingram, J. C. L. 1980. Perceptual dimensions of phonemic recognition. In G. D. Prideaux, B. L. Derwing, & W. J. Baker (eds.), *Experimental linguistics*. Ghent: E. Story-Scientia. 273-291.
- Jackson, F. H. 1973. An experimental study of English word stress. Paper read at LSA Ann. Meeting, San Diego.
- Jaeger, J. J. 1980. Categorization in phonology: an experimental approach. Doc. Diss., Univ. of Calif., Berkeley.
- Jaeger, J. J. 1980. The psychological reality of the phonemes revisited. *Rep. of the Phonology Lab. (Berkeley)* 5.6-50.
- Jaeger, J. J. 1980. Testing the psychological reality of phonemes. *Lg. & Sp.* 23.233-253.
- Jaeger, J. J. 1984. Assessing the psychological status of the Vowel Shift Rule. *J. of Psycholinguistic Res.* 13.13-36.
- Jaeger, J. J. 1986. Concept formation as a tool for linguistic research. In J. J. Ohala & J. J. Jaeger (eds.), *Experimental phonology*. Orlando: Academic Press. 211-237.
- Jaeger, J. J. 1986. On the acquisition of abstract representation for English vowels. *Phonology Yearbook* 3.71-97.
- Jaeger, J. J. & Ohala, J. J. 1984. On the structure of phonetic categories. *BLS* 10.15-26.
- Jarvella, R. J. & Snodgrass, J. G. 1974. Seeing ring in rang and retain in retention: On recognizing stem morphemes in presented words. *JVLVB* 13.590-598.
- Jenkins, J. J., Foss, D. J., & Greenberg, J. H. 1968. Phonological distinctive features as cues in learning. *J. Exp. Psych.* 77.200-205.

- Kent, R. D. 1973. Imitation of synthetic vowels and some implications for speech memory. *Phonetica* 28.1-25.
- Kontra, M. & Ringen, C. 1986. Hungarian vowel harmony: The evidence from loanwords. *Uralic Altaic Yearbook*.
- Koriat, A. & Lieblich, I. 1974. What does a person in a 'TOT' state know that a person in a 'don't know' state doesn't know. *Memory and Cognition* 2.647-655.
- LaRiviere, C., Winitz, H., Reeds, J., & Herriman, E. 1974. The conceptual reality of selected distinctive features. *J. Sp. & Hearing Res.* 17.122--133.
- Ladefoged, P. & Fromkin, V. A. 1968. Experiments on competence and performance. *IEEE Trans. on Audio & Electro-acoustics.* Au-16.130-136.
- Lehiste, I. 1975. The role of temporal factors in the establishment of linguistic units and boundaries. In: W. Dressler & F. V. Mares (eds.), *Phonologica 1972.* München: Wilhelm Fink. 115-122.
- MacKay, D. G. 1972. The structure of words and syllables: evidence from errors in speech. *Cognitive psych.* 3.210-227.
- MacKay, D. G. 1976. On the retrieval and lexical structure of verbs. *JVLVB* 15.169-182.
- MacKay, D. G. 1978. Speech errors inside the syllable. In: A. Bell & J. B. Hooper (eds.), *Syllables and segments.* Amsterdam: North Holland. 201-212.
- MacKay, D. G. 1978. Derivational rules and the internal lexicon. *JVLVB* 17.61-71.
- MacWhinney, B. 1975. How Hungarian children learn to speak. *Doc. Diss., Univ. of Calif., Berkeley.*
- MacWhinney, B. 1975. Rules, rote, and analogy in morphological formations by Hungarian children. *J. Child Lang.* 2.65-77.
- MacWhinney, B. 1978. The acquisition of morphophonology. *Monog. of the Soc. for Res. in Child Development.* Serial 174, vol. 43, Nos. 1-2.
- Malecot, A. 1960. Vowel nasality as a distinctive feature in American English. *Lg.* 26.222-229.
- McCawley, J. D. 1979. Remarks on Cena's vowel shift experiment. In: P. Clyne et al. (eds.), *The elements: a parasession on linguistic units and levels.* Chicago: Chicago Ling. Soc. 110-118.
- McCawley, J. D. 1986. Today the world, tomorrow phonology. *Phonology Yearbook* 3.27-43.

- McNeill, D. & Lindig, D. 1973. The perceptual reality of phonemes, syllables, words, and sentences. *JVLVB* 12.419-430.
- Meara, P. & Ellis, A. W. 1981. The psychological reality of deep and surface phonological representations: Evidence from speech errors. *Linguistics* 19.797-804.
- Moskowitz, B. 1973. On the status of vowel shift in English. In: T. E. Moore (ed.), *Cognitive development and the acquisition of language*. New York: Academic Press. 223-260.
- Motley, M. T. & Baars, B. J. 1975. Encoding sensitivities to phonological markedness and transition probability: Evidence from spoonerisms. *Human Communication Research* 2.351-361.
- Motley, M. T., Baars, B. J. & Camden, C. T. 1983. Experimental verbal slips studies: A review and an editing model of language encoding. *Communication Monographs* 50.79-101.
- Murrell, G. A. & Morton, J. 1974. Word recognition and morphemic structure. *J. of Exp. Psychol.* 102.963-968.
- Myerson, R. F. 1976. A study of children's knowledge of certain word formation rules and the relationship of this knowledge to various forms of reading achievement. Doc. Diss, Harvard Univ.
- Myerson, R. F. 1976. Children's knowledge of selected aspects of Sound pattern of English. In: R. N. Campbell & P. T. Smith (eds.), *Recent advances in the psychology of language*. New York: Plenum Press. 377-402.
- Nearey, T. M. & Hogan, J. T. 1986. Phonological contrast in experimental phonetics: Relating distributions of production data to perceptual categorization curves. In J. J. Ohala & J. J. Jaeger (eds.), *Experimental phonology*. Orlando, FL: Academic Press. 141-161.
- Nessly, L. 1974. English stress and synchronic descriptions. Doc. diss., Univ. of Michigan. [University Microfilms No.75-10246.]
- Nessly, L. 1975. *Experimental phonology and English stress*. Bloomington: Indiana University Linguistics Club.
- Nessly, L. 1977. On the value of phonological experiments in the study of English stress. In L. M. Hyman (ed.), *Studies in stress and accent*. [Southern California Occasional Papers in Linguistics No. 4] 121-144.
- Ohala, J. J. 1974. Experimental historical phonology. In: J. M. Anderson & C. Jones (eds.), *Historical linguistics II. Theory and description in phonology*. Amsterdam: North Holland. 353-389.

- Ohala, J. J. 1981. Speech timing as a tool in phonology. *Phonetica* 38.204-212.
- Ohala, J. J. 1981. The listener as a source of sound change. In: C. S. Masek, R. A. Hendrick, & M. F. Miller (eds.), *Papers from the parasession on language and behavior*. Chicago: Chi. Ling. Soc. 178-203.
- Ohala, J. J. 1981. Articulatory constraints on the cognitive representation of speech. In: T. Myers, J. Laver, & J. Anderson (eds.), *Proc. Int. Symp. on the Cognitive Representation of Speech*, Edinburgh, 1979. Amsterdam: North Holland. 111-122.
- Ohala, J. J. 1982. The phonological end justifies any means. *Papers from the Pleanry Session, 13th Int. Congr. of Linguists*, Tokyo. 199-208.
- Ohala, J. J. 1986. Consumer's guide to evidence in phonology. *Phonology Yearbook* 3.3-26.
- Ohala, J. J. & Jaeger, J. J. (eds.) 1986. *Experimental phonology*. Orlando, FL: Academic Press.
- Ohala, J. J. & Ohala, M. 1974. Experimental methods in phonology. *Acta Linguistica Hafniensia* 16.229-230.
- Ohala, J. J. & Ohala, M. 1986. Testing hypotheses regarding the psychological manifestation of morpheme structure constraints. In J. J. Ohala, & J. J. Jaeger (eds.), *Experimental phonology*. Orlando, FL: Academic Press. 239-252.
- Ohala, M. 1974. The abstractness controversy: Experimental input from Hindi. *Lg.* 50.225-235.
- Ohala, M. 1975. Nasals and nasalization in Hindi. In: C. A. Ferguson, L. M. Hyman, & J. J. Ohala (eds.), *Nasalfest: Papers from a symposium on nasal and nasalization*. Stanford: Language Universals Project. 317- 332.
- Ohala, M. 1983. *Aspects of Hindi phonology*. Delhi: Motilal Baranrsidas.
- Ohala, M. & Ohala, J. J. In press. Psycholinguistic probes of native speakers' phonological knowledge. In: W. U. Dressler (ed.), *Phonologica 1984*. [Proc. 5th International Phonology Meeting, Eisenstadt, Austria.] Cambridge Univ. Press.
- Palermo, D. & Eberhart, L. 1968. On the learning of morphological rules: an experimental analogy. *JVLVB* 7.337-344.
- Palermo, D. & Howe, H. 1970. An experimental analogy to the learning of past tense inflection rules. *JVLVB* 9.410-416.
- Palermo, D. & Parrish, M. 1971. Rule acquisition as function of number and frequency of exemplar presentation. *JVLVB* 10.44-51.

- Pertz, D. L. & Bever, T. G. 1975. Sensitivity to phonological universals in children and adolescents. *Lg.* 51.149-162.
- Pike, K. L. 1947. On the phonemic status of English diphthongs. *Lg.* 23.151-159.
- Port, R. F. & O'Dell, M. L. 1985. Neutralization of syllable-final voicing in German. *J. Phonetics* 13.455-471.
- Read, C. 1971. Pre-school children's knowledge of English phonology. *Harvard Educational Rev.* 41.1-34.
- Reid, H. 1977. Testing psychological reality of phonological rules. Master's Thesis, Univ. of Brit. Columbia.
- Rubenstein, H., Richter, M. L., & Kay, E. J. 1975. Pronounceability and the visual recognition of nonsense words. *JVLVB* 14.651-657.
- Rubin, D. C. 1975. Within word structure in the tip-of-the-tongue phenomenon. *JVLVB* 14.392-397.
- Sapir, E. 1933. The psychological reality of phonemes. *J. Psych. Norm. et Path.* 30.247-265.
- Savin, H. B. & Bever, T. G. 1970. The non-perceptual reality of the phoneme. *JVLVB* 9.295-302.
- Schane, S. A. & Tranel, B. H. 1970. Experimental design on the psychological reality of a natural rule in phonology. *Studies in Language and Language Behavior* (Univ. of Mich.). Pp. 1-17.
- Schane, S. A., Tranel, B., & Lane, H. 1974. On the psychological reality of a natural rule of syllable structure. *Cognition* 3.351-358.
- Shattuck-Hufnagel, S. 1986. The representation of phonological information during speech production planning: Evidence from vowel errors in spontaneous speech. *Phonology Yearbook* 3.117-149.
- Shattuck-Hufnagel, S. & Klatt, D. H. 1979. The limited use of distinctive features and markedness in speech production: evidence from speech error data. *JVLVB* 18.41-55.
- Sherzer, J. 1970. Talking backwards in Cuna: the sociological reality of phonological descriptions. *Southwestern J. Anthropol.* 26.343-353.
- Slowiaczek, L. M. & Dinnsen, D. A. 1985. On the neutralizing status of Polish word-final devoicing. *J. Phonetics* 13.325-341.
- Smith, P. T. 1973. Feature-testing models and their application to perception and memory for speech. *Q. J. Exp. Psych.* 25.511-534.

- Smith, P. T. & Baker, R. G. 1976. The influence of English spelling patterns on pronunciation. *JVLVB* 15.267-285.
- Snodgrass, J. G. & Jarvella, R. J. 1972. Some linguistic determinants of word classification times. *Psychonomic Science* 27.220-222.
- Stanners, R. F., Jastrzemski, J. E., & Westbrook, A. 1975. Frequency and visual quality in a word-nonword classification task. *JVLVB* 14.259-264.
- Stanners, R. F., Neiser, J. J., Hernon, W. P., and Hall, R. 1979. Memory representation for morphologically related words. *JVLVB* 18.399-412.
- Steinberg, D. D. & Krohn, R. K. 1973. The productivity of vowel alternation in English derived forms. *Working Papers in Linguistics* (U. of Hawaii) 5.6.23-47.
- Steinberg, D. & Krohn, R. 1975. The psychological reality of Chomsky and Halle's vowel shift rule. In: E. Koerner (ed.), *The transformational paradigm and modern linguistic theory*. Amsterdam: John Benjamins. 233-259.
- Stemberger, J. 1981. Morphological haplology. *Lg.* 57.791-817.
- Stemberger, J. P. & Lewis, M. 1986. Reduplication in Ewe: Morphological accomodation to phonological errors. *Phonology Yearbook* 3.151-160.
- Stemberger, J. P. & MacWhinney, B. 1984. Extrasyllabic consonants in CV phonology: A experimental test. *J. Phonetics* 12.355-366.
- Taft, M. & Forster, K. I. 1975. Lexical storage and retrieval of prefixed words. *JVLVB* 14.638-647.
- Templeton, S. 1979. Spelling first, sound later: The relationship between orthography and higher order phonological knowledge in older students. *Research in the Teaching of English*. 13.255-264.
- Thumb, A. & Marbe, K. 1901. *Experimentelle untersuchungen über die psychologischen Grundlagen der sprachlichen Analogiebildung*. Leipzig: Wilhelm Engelmann.
- Triesman, M. 1978. Space or lexicon? The word frequency effect and the error response frequency effect. *JVLVB* 17.37-59.
- Twaddell, W. F. 1935. On defining the phoneme. *Lg. Monog. No.* 16.
- Vitz, P. C. & Winkler, B. S. 1973. Predicting the judged "similarity of sound" of English words. *JVLVB* 12.373-388.
- Wang, H. S. 1985. On the productivity of vowel shift alternations in English: An experimental study. Univ. of Alberta, Edmonton doc. diss.
- Wang, H. S. & Derwing, B. L. 1986. More on English Vowel Shift: The back vowel question. *Phonology Yearbook* 3.99-116.



- Warren, R. M. 1961. Illusory changes of distinct speech upon repetition--The verbal transformation effect. *British J. of Psychol.* 52.249-258.
- Warren, R. M. 1970. Perceptual restoration of missing speech sounds. *Science* 167.392-393.
- Warren, R. M. 1971. Identification times for phonemic components of graded complexity and for spelling of speech. *Percep. & Psychophysics* 9.345-349.
- Warren, R. M. 1976. Auditory illusions and perceptual processes. In N. J. Lass (ed.), *Contemporary issues in experimental phonetics*. New York: Academic Press. 389-417.
- Warren, R. M. 1982. *Auditory perception. A new synthesis*. New York: Pergamon.
- Warren, R. M. & Obusek, C. J. 1971. Speech perception and phonemic restorations. *Percep. & Psychophysics* 9.358-362.
- Warren, R. M., Obusek, C. J., & Ackroff, J. M. 1972. Auditory induction: Perceptual synthesis of absent sounds. *Science* 176.1149-1151.
- Warren, R. M. & Warren, R. P. 1966. A comparison of speech perception in childhood, maturity, and old age by means of the verbal transformation effect. *JVLVB* 5.142-146.
- Warren, R. M. & Warren, R. P. 1970. Auditory illusions and confusions. *Scientific America*, (Dec.) 223.30-36.
- Wickelgren, W. A. 1965. Distinctive features and errors in short-term memory for English vowels. *J. Acous. Soc. Am.* 38.583-588.
- Wickelgren, W. A. 1966. Distinctive features and errors in short-term memory for English consonants. *J. Acous. Soc. Am.* 39.388-398.
- Willis, C. 1971. Synthetic vowel categorization and dialectology. *Lg. & Sp.* 14.213-228.
- Wright, J. T. 1975. Nasal-stop assimilation: testing the psychological reality of an English MSC. In: C. A. Ferguson, L. M. Hyman, & J. J. Ohala (eds.), *Nasalfest: Papers from a symposium on nasals and nasalization*. Stanford: Language Universals Project. 389-397.
- Yarmey, A. D. 1973. I recognize your face but I can't remember your name: Further evidence on the tip-of-the-tongue phenomenon. *Memory and Cognition* 1.287-290.
- Zimmer, K. 1969. Psychological correlates of some Turkish morpheme structure conditions. *Lg.* 46.309-321.

Zimmer, K. E. & Abbott, B. . 1978. The k/Ø alternation in Turkish: Some experimental evidence for its productivity. J. Psycholinguistic Res. 7.35-46.

Zutell, J. 1979. Spelling strategies of primary school children and their relationship to Piaget's concept of decentration. Research in the Teaching of English 13.64-80.

APPENDIX D: BIBLIOGRAPHY OF WORKS THAT COULD BE USED AS TEXTS IN COURSES ON  
EXPERIMENTAL LINGUISTICS.

- Clark, H. H. & Clark, E. V. 1977. Psychology and language: Introduction to psycholinguistics. New York: Harcourt, Brace, Jovanovich.
- Deese, J. 1970. Psycholinguistics. Boston: Allyn & Bacon.
- Flores D'Arcais, G. B. & Levelt, W. J. M. (eds.) 1970. Advances in psycholinguistics. Amsterdam: North-Holland/American Elsevier.
- Fodor, J. A. & Bever, T. G. 1974. The psychology of language: An introduction to psycholinguistics and generative grammar. New York: McGraw-Hill.
- Glucksberg, S. & Danks, J. H. 1975. Experimental psycholinguistics: An introduction. Hillsdale, NJ: Lawrence Erlbaum.
- Hatch, E. M. 1983. Psycholinguistics: A second language perspective. Rowley, MA: Newbury House.
- Hörmann, H. 1971. Psycholinguistics. New York: Springer-Verlag.
- Ohala, J. J. & Jaeger, J. J. (eds.), 1986. Experimental phonology. Orlando, FL: Academic Press.
- Phonology Yearbook, Vol. 3 (1986), Theme issue: The validation of phonological claims.
- Prideaux, G. D. (ed.) 1979. Perspectives in experimental linguistics. Amsterdam: John Benjamins.
- Prideaux, G. D. 1985. Psycholinguistics. The experimental study of language. New York: The Guilford Press.
- Prideaux, G. D., Derwing, B. L., & Baker, W. J. (eds.) 1980. Experimental linguistics: The integration of theories and applications. Ghent: E. Story-Scientia.
- Slobin, D. I. 1979. Psycholinguistics. [2nd ed.] Glenview, IL: Scott, Foresman.

APPENDIX E: SELECTED READINGS ON HISTORY & PHILOSOPHY OF SCIENCE

- d'Abro, A. 1927/1950. The evolution of scientific thought. Dover
- Boas, M. 1962. The scientific renaissance. 1450-1630. Harper & Row.
- Bernard, C. 1957. An introduction to the study of experimental medicine. Dover.
- Dampier, W. C. 1966. A history of science. [And its relations with philosophy and religion]. Cambridge Univ. Press.
- Hall, A. R. 1965. From Galileo to Newton. 1630-1720. Harper & Row.
- von Helmholtz, H. 1971. Selected writings of... Ed. by Russell Kahl. Wesleyan Univ. Press. [Esp. "The scientific researches of Goethe" and "Thought in medicine".]
- Jaffe, B. 1930. Crucibles. The lives and achievements of the great chemists. New York: Simon & Schuster. [Also in abridged and in paperback: Crucible the story of chemistry. Fawcett.]
- Koestler, A. 1960. The watershed. [A biography of Johannes Kepler.] Anchor. Science Study Series. S16. [pb].
- Medawar, P. B. 1967. The art of the soluble. Methuen & Co.
- Roger, E. M. 196?. Physics for the inquiring mind. Princeton Univ. Press.
- Singer, C. 1959. A short history of scientific ideas to 1900. Oxford Univ. Press.
- Weisskopf, V. F. 1979. Knowledge and wonder. [The natural world as man knows it.] 2nd edition. MIT Press. [pb].

APPENDIX F: SELECTED JOURNALS RELEVANT TO EXPERIMENTAL LINGUISTICS

Acustica  
Am J. of Psychology  
Applied Psycholinguistics  
Cognition  
IEEE Transactions, esp. those on Audio & Electroacoustics  
IRAL (Int'l Rev. of Applied Ling.)  
J. Acoustical Society of America  
J. of Child Language  
Journal de Psychologie Normale et Pathologique (Formerly, J. de Psychologie)  
J. Experimental Psychology  
J. of the International Phonetic Association  
J. of Phonetics  
J. of Psycholinguistic Research  
J. of Speech & Hearing Disorders  
J. of Speech & Hearing Research  
J. of Verbal Learning & Verbal Behavior; now: Language & Memory.  
Language Learning  
Language & Speech  
Perception & Psychophysics  
Phonetica  
Phonology Yearbook  
Psychological Reviews  
Speech Analysis  
Studia Phonologica (Kyoto)  
TESOL Quarterly  
Zeitschrift fur Phonetik und Sprachwissenschaft...