

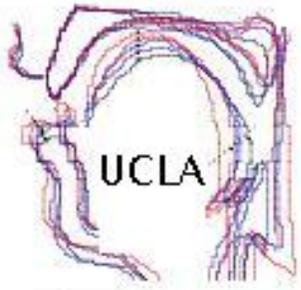


# Sheila Blumstein: a career overview

Pat Keating

UCLA

Brown Linguistics Department, 1974-1979





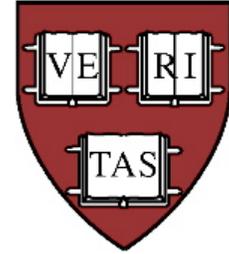
# University of Rochester, 1961-1965



One of the first two honors  
graduates in Linguistics

Sheila, Tim Smith sends his regards!

# Harvard University, 1965-1970



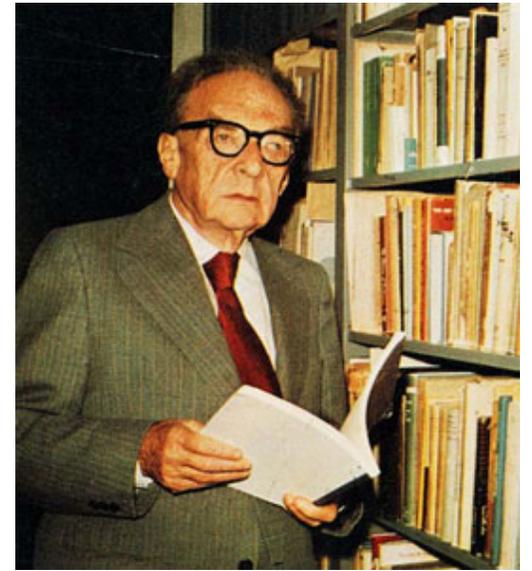
- **1971: John Haiman** (Linguistics Program, Macalester College)  
Dissertation: *Targets and Syntactic Change*
- **1970: Sheila Blumstein** (Dept. of Linguistics, Brown University)  
Dissertation: *Phonological Implications of Aphasic Speech*
- **1970: Guy Carden** (Dept. of Linguistics, University of British Columbia)  
Dissertation: *Logical Predicates and Idiolect Variation in English*

Sheila, regards from John Haiman and Guy Carden!

# Roman Jakobson, 1886-1982

Harvard 1949-1967, MIT 1957-1970

Visiting Professor at Brown, Spring 1969, Winter 1971



**1941:**



*The Linguistic Problems of Aphasia, 1955:*

“Nothing comparable to the minute linguistic observations of infants of various countries has been performed with respect to aphasics. Nor has there been any attempt to re-interpret and systematize from the point of view of linguistics the multifarious clinical data on diverse types of aphasia.”

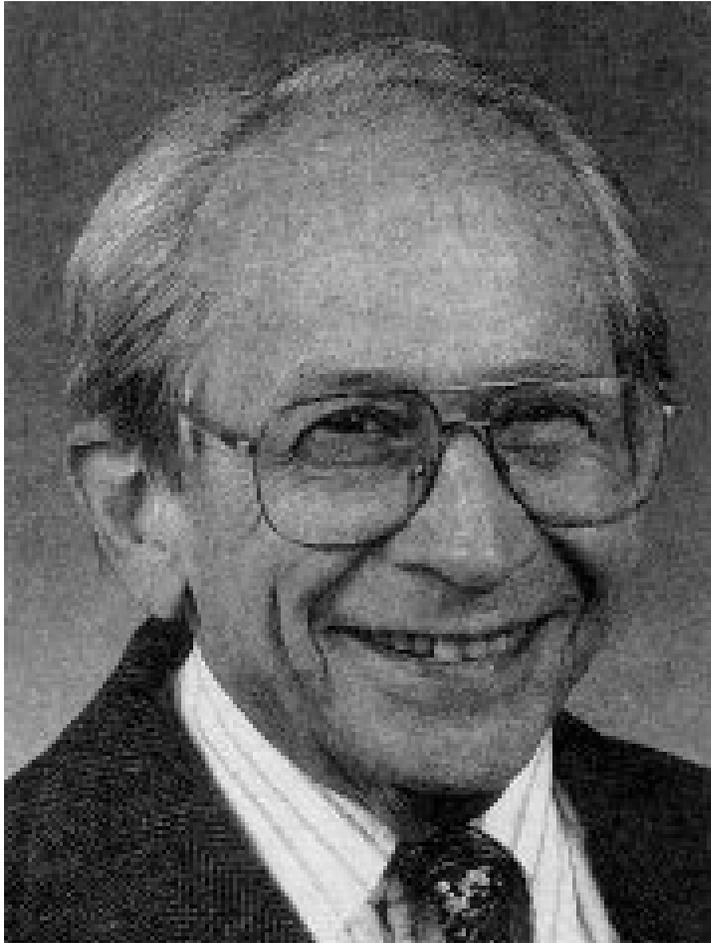
# What did Jakobson think this would take?

Linguists applying “purely linguistic criteria to the interpretation and classification of aphasic facts” (...) “should be familiar with the technical terms and devices of the medical disciplines dealing with aphasia; then, they must submit the clinical case reports to thorough linguistic analysis; and, further, they should themselves work with aphasic patients in order to approach the cases directly and not only through a reinterpretation of prepared records which have been quite differently conceived and elaborated.”

He had to wait 10 years for Sheila to come along...

# Harold Goodglass, 1920-2002

BU Aphasia Research Center at the VA Boston Medical Center



“Goodglass and his co-workers were the first to introduce experimental and quantitative methods into the study of the syntax of agrammatics...”

-- Goodglass & Blumstein’s intro chapter in their 1973 edited book *Psycholinguistics and Aphasia*

# Early publications

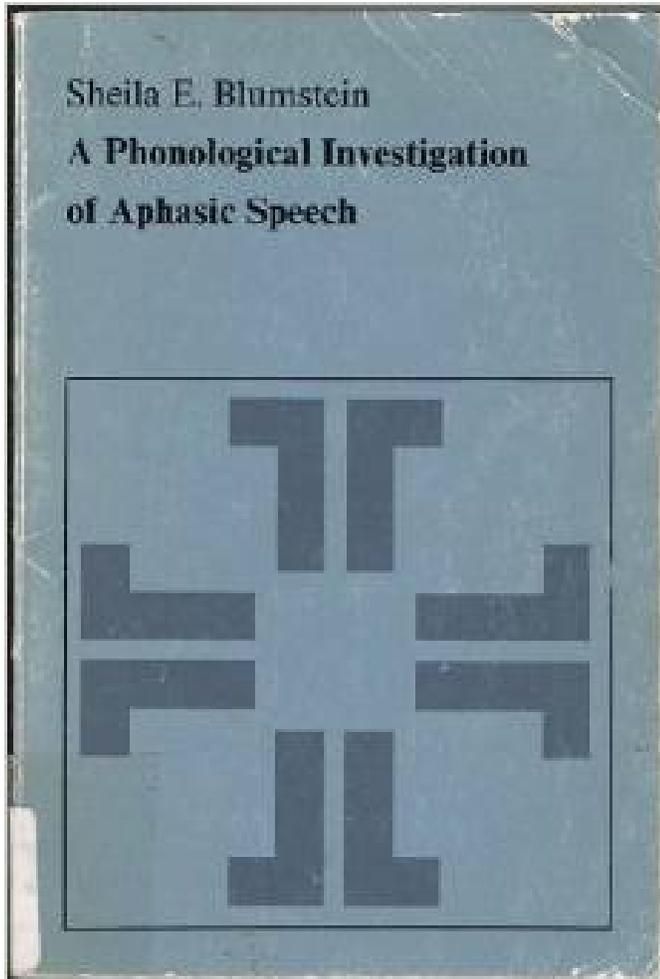
- First publication: “Phonological Aspects of Aphasic Speech” in 1968 festschrift for Jakobson
- First journal publication: 1969 *Cortex*

FREQUENCY, PICTURABILITY AND AVAILABILITY  
OF NOUNS IN APHASIA<sup>1</sup>

H. Goodglass, M. R. Hyde and S. Blumstein

(Boston Veterans Administration Hospital and  
Boston University Aphasia Research Center)

# 1970 dissertation (and 1973 book)



“In the effort to bring linguistic knowledge to bear on aphasic disorders, one of the questions at issue is whether the application of linguistic principles brings order and predictability to seemingly random phenomena. Another is whether, given clinically impressionistic differences in speech output, it may be possible to define these differences precisely in linguistic terms. **Both of these applications of linguistic methodology characterize Blumstein’s study in the area of phonology.**”

-- Goodglass’s intro to Blumstein’s chapter “Some phonological implications of aphasic speech” in *Psycholinguistics & Aphasia*

# Some results from the dissertation

Consonant-phoneme errors are most common for low-frequency consonants

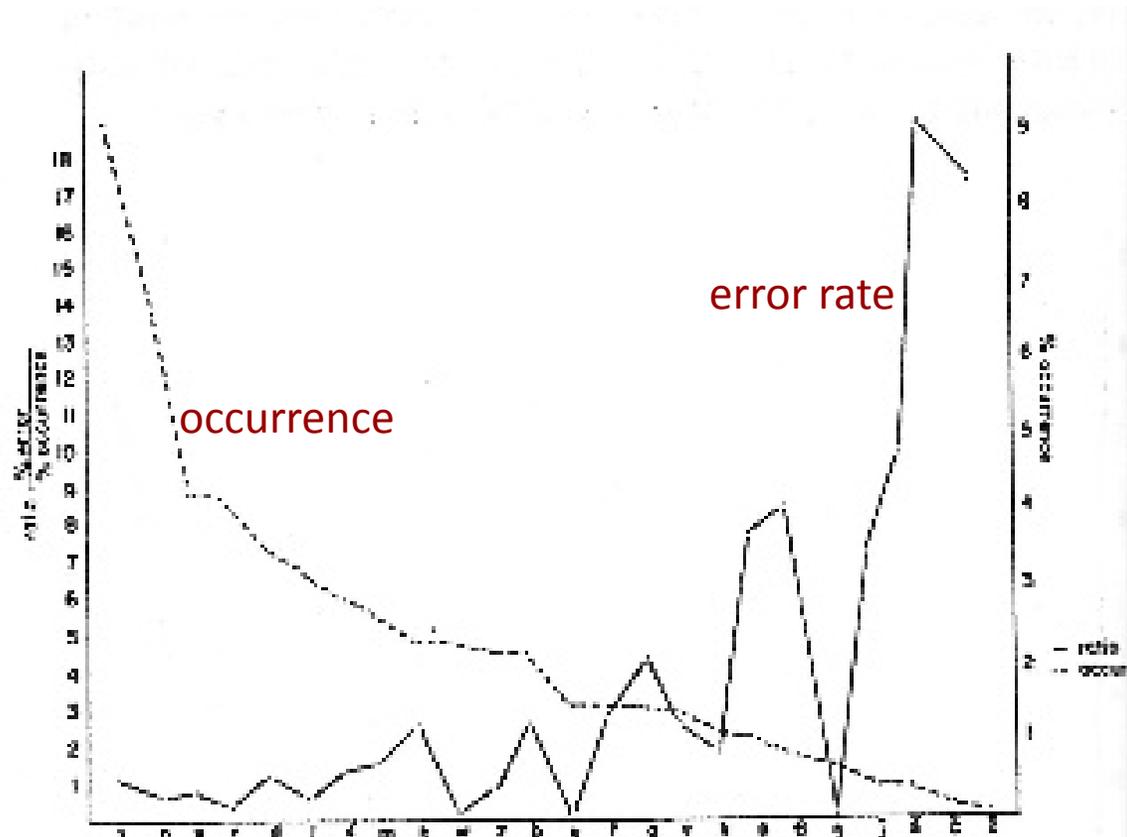


Fig. 3. (%) Errors made on phonemes in relation to their (%) frequency of occurrence

Unmarked consonants tend to be substituted for marked consonants

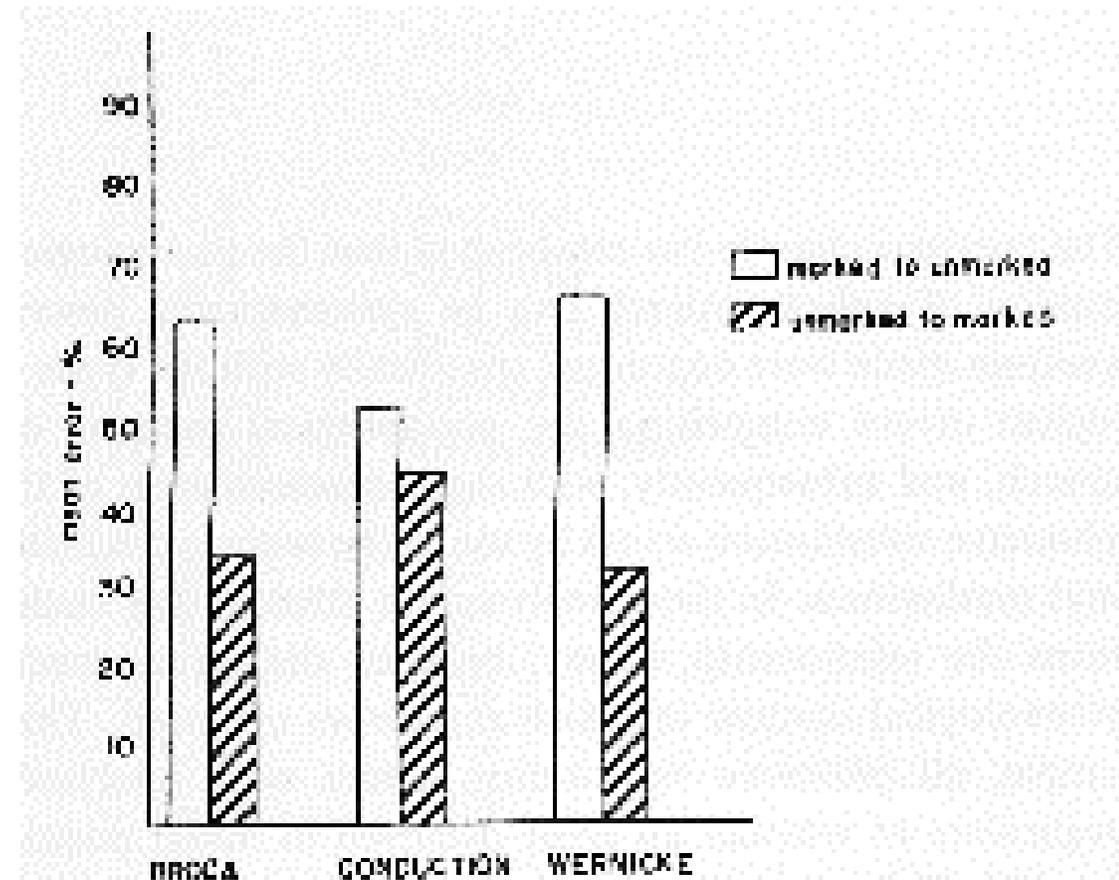
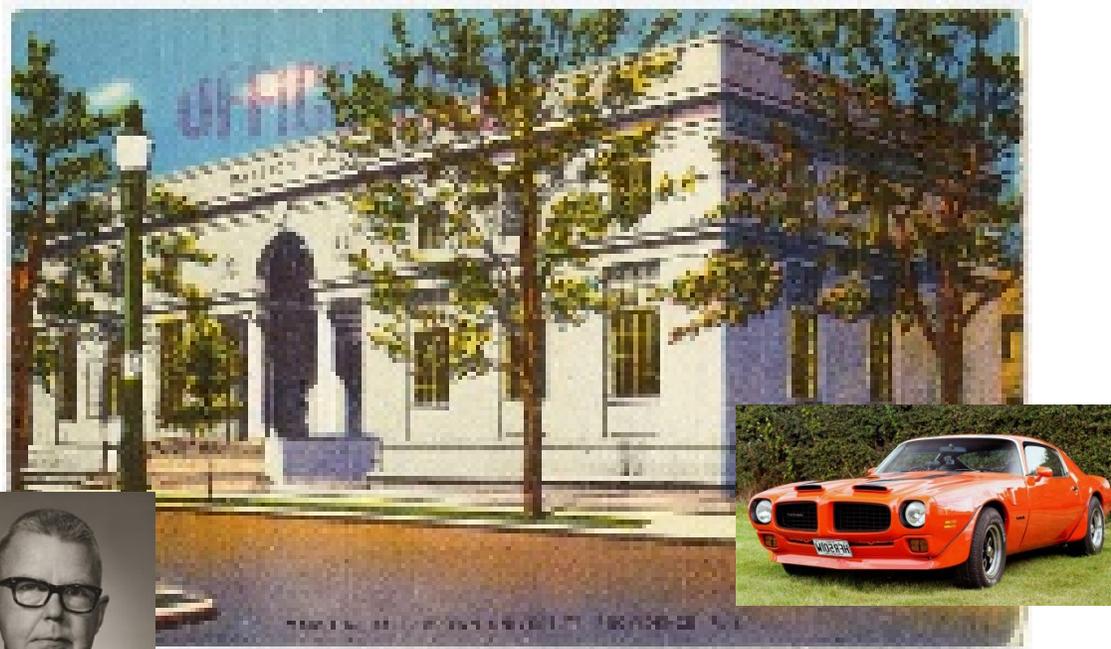


Fig. 6. Markedness analysis

# Academic job: Brown, 1970-

**Linguistics Department:**



**Sheila, Phil, lab space:**



44 years and counting!

# 1976: Joke prelim exam for the faculty

DEPARTMENT OF LINGUISTICS, BROWN UNIVERSITY

Annual Check-up Exam for Faculty

"Tis more blessed to give than to receive."

## IV. MISCELLANEOUS

1. You are part of a scientific expedition to the Planet of the Yapes. Your mission is to carry out dichotic listening experiments and study aphasics to determine the neural organization of language in the Yapes. Answer the following:
  - (a) You discover that the Yapes have three ears, not two. How could you modify the dichotic paradigm to take this into account? Would it matter where the third ear was located?
  - (b) You find that part of the aphasic syndrome in Yapes is that their toenails fall out and they develop cancer sores. How might these symptoms affect a localization hypothesis?

# Three early papers on aphasia

Four of Sheila's top 10 cited works are on aphasia  
– the book plus three journal papers.

Blumstein et al. 1977(a), *Neuropsychologia*

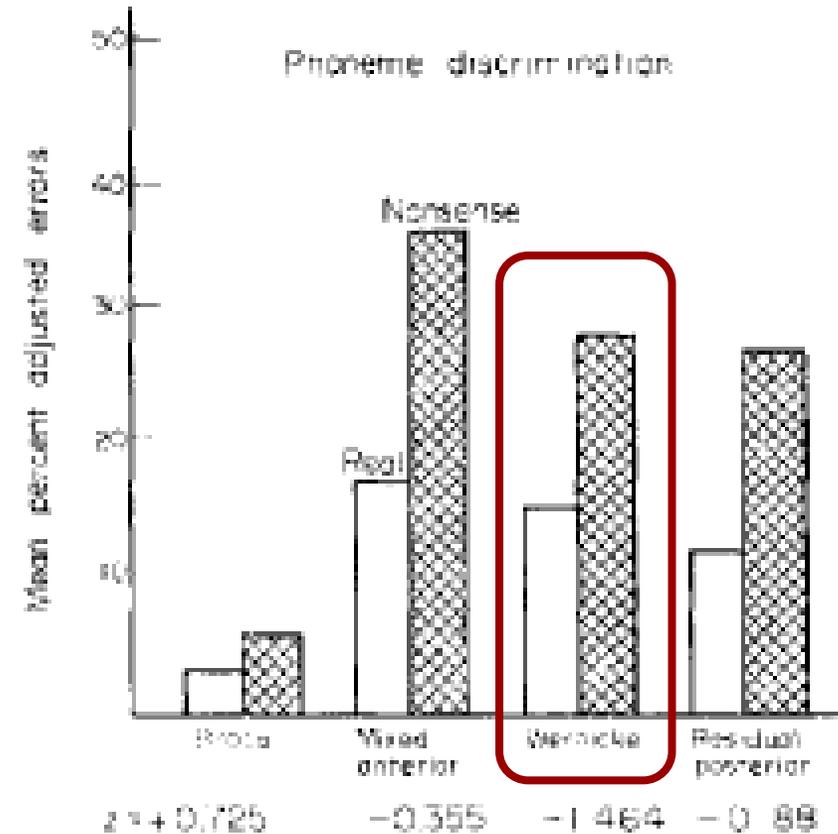
PHONOLOGICAL FACTORS IN AUDITORY  
COMPREHENSION IN APHASIA\*

SHEILA E. BLUMSTEIN, ERROL BAKER and HAROLD GOODGLASS

Aphasia Research Center, Department of Neurology, Boston University School of Medicine,  
and Boston Veterans Administration Hospital, 150 So. Huntington Avenue,  
Boston, MA 02130, U.S.A.

# Are Wernicke's aphasics impaired in phonemic perception?

NOT the most-impaired aphasic group on any of three speech tasks, e.g. discrimination:



# Blumstein et al. 1977 (b), *Neuropsychologia*

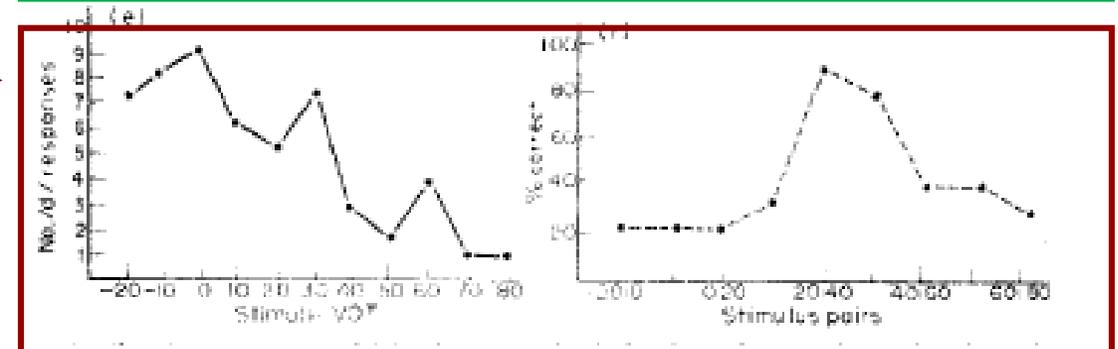
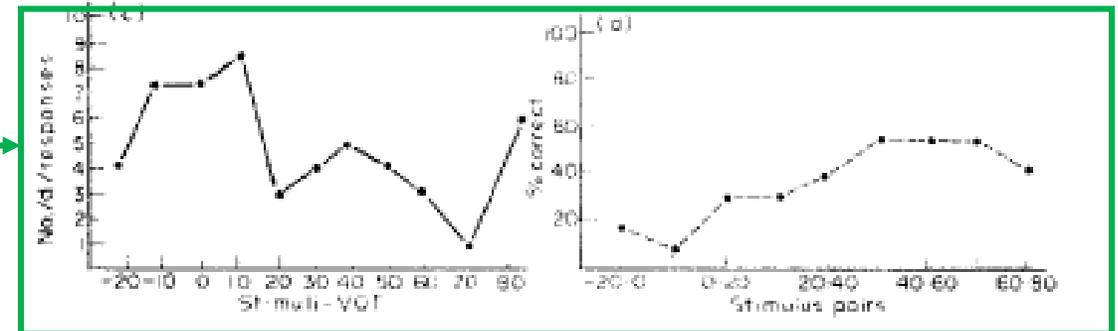
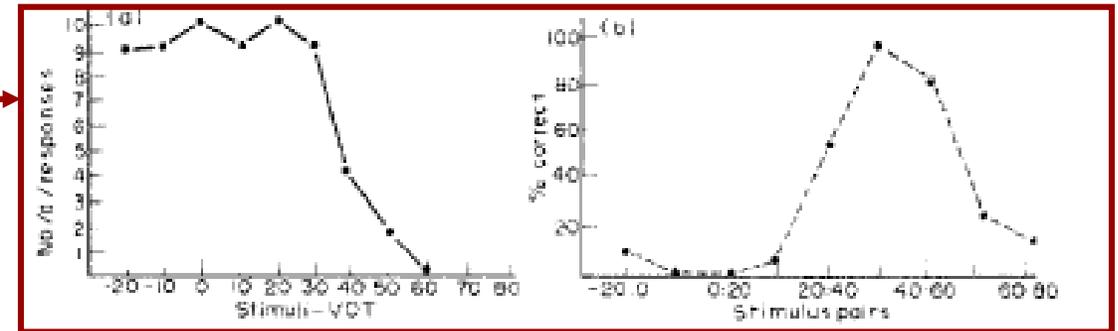
## THE PERCEPTION AND PRODUCTION OF VOICE-ONSET TIME IN APHASIA

SHEILA E. BLUMSTEIN\*, WILLIAM E. COOPER†, EDGAR B. ZURIF‡  
and ALFONSO CARAMAZZA§



# Do aphasics perceive speech categorically?

- Some do
- Some don't
- Some don't categorize well but do discriminate
- These patterns are not related to individual aphasics' language **comprehension**, or to their **production** of VOT



# Milberg and Blumstein 1981, *Brain and Language*

Lexical Decision and Aphasia:  
Evidence for Semantic Processing

WILLIAM MILBERG\* AND SHEILA E. BLUMSTEIN\*†

*\*Boston Veterans Administration Medical Center and †Brown University*



# What's impaired? Lexical organization, or access to semantic properties of words?

Even Wernicke's aphasics, though overall slower, show semantic priming effects, so the lexical information is still there:

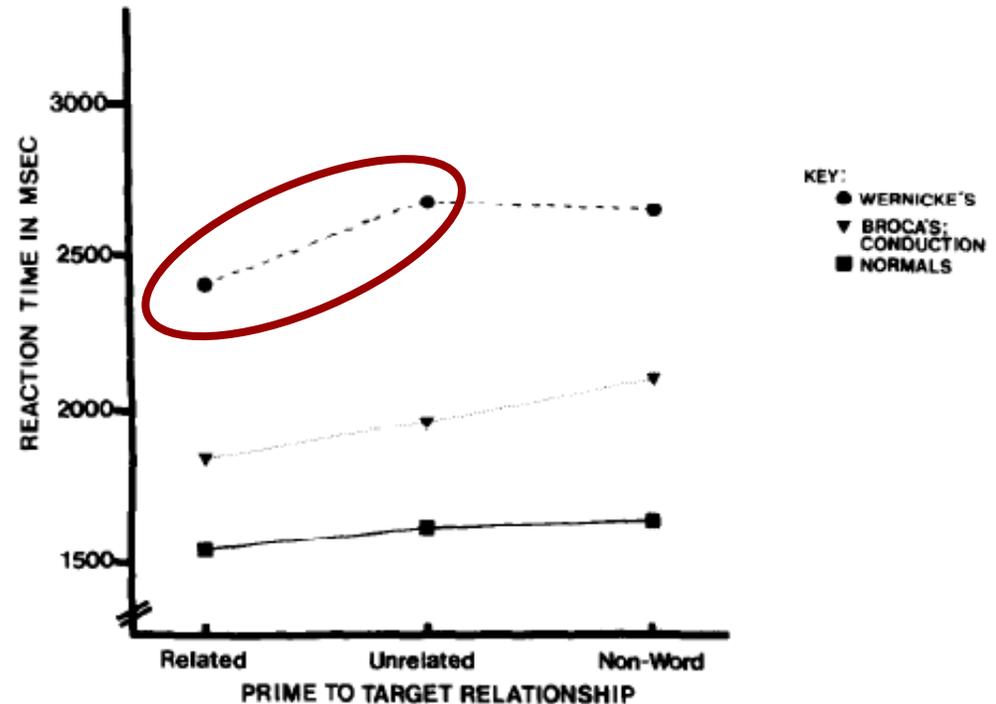


FIG. 1. Mean reaction time latencies of correct YES responses as a function of subject group and prime type.

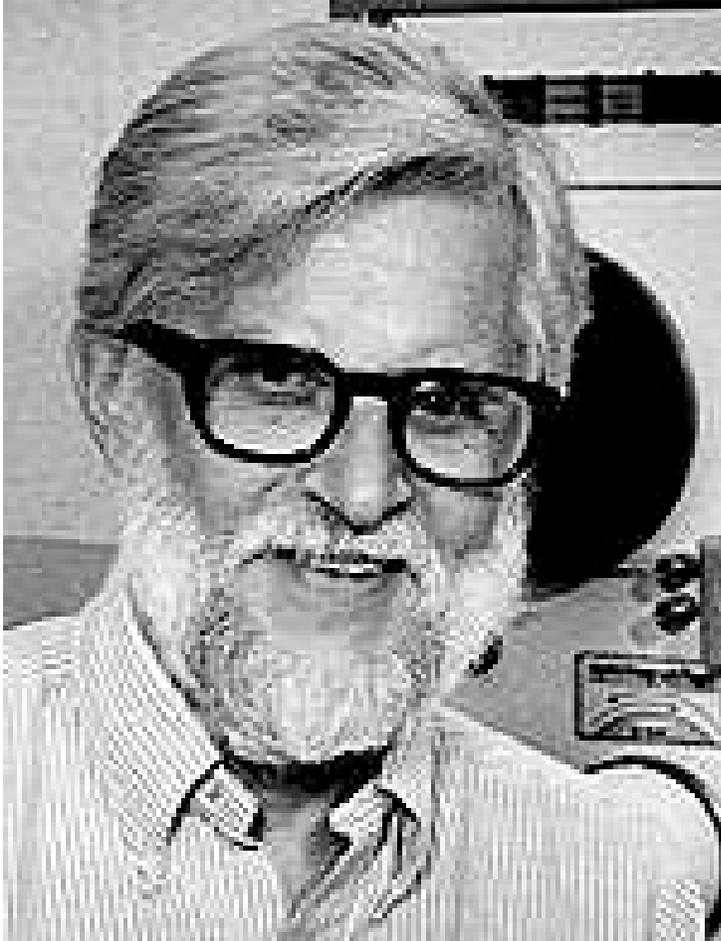
# Another Jakobson influence: Phonetic correlates of distinctive features

From Jakobson, Fant & Halle 1951:

- “a distinctive feature cannot be identified without recourse to its specific property”
- “the invariance of the minimal distinctions can be separated from the redundant features that are conditioned by the adjacent phonemes in the sequence”

# Ken Stevens, 1924-2013

MIT 1948-2007



“invariant acoustic properties for the phonetic categories of language reside at various sampling points or regions in the acoustic waveform”

--Stevens & Blumstein 1981

# Most-cited papers: 1978, 1979 *JASAs*

**perception:** **Invariant cues for place of articulation in stop consonants**

K. N. Stevens

*Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139*

S. E. Blumstein

*Department of Linguistics, Brown University, Providence, Rhode Island 02912*  
(Received 1 February 1978; revised 18 July 1978)

**production:** **Acoustic invariance in speech production: Evidence from measurements of the spectral characteristics of stop consonants**

Sheila E. Blumstein

*Department of Linguistics, Brown University, Providence, Rhode Island 02912*

Kenneth N. Stevens

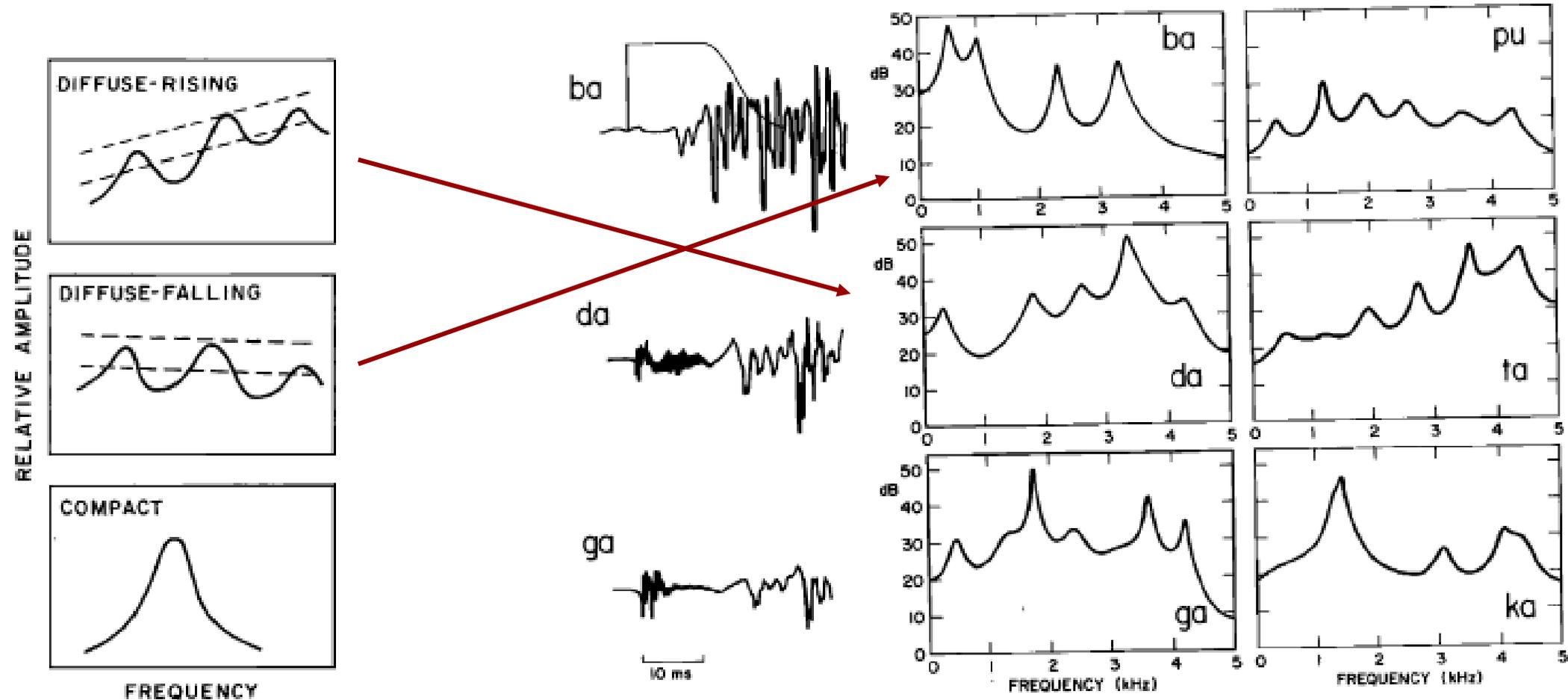
*Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139*

(Received 24 November 1978; accepted for publication 6 July 1979)

# 1978 paper: “integrated acoustic properties that define each place of articulation”

“We shall suggest that the auditory system samples the short-term spectrum at stimulus onset for a stop consonant, and that identification of place of articulation for the consonants is based on attributes of the gross shape of this spectrum. This onset spectrum is determined both by the burst spectrum and by the formant frequencies at the onset of voicing. (...) the spectrum sampled at onset is more likely to provide a context-independent indication of the consonantal place of articulation than are the trajectories of the formants.”

# 1979 paper: criteria for sorting release spectra into the three place categories of English



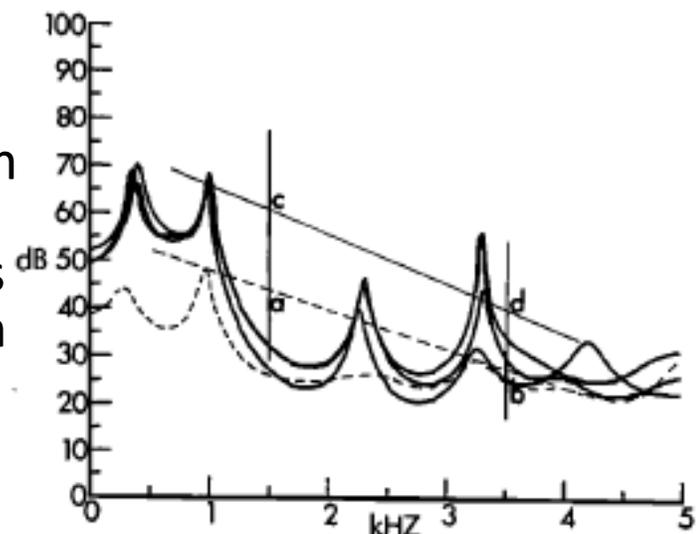
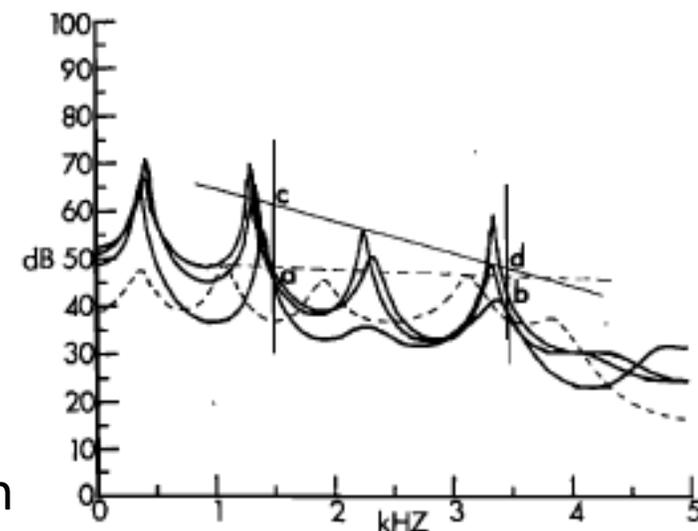
# Lahiri et al. 1984, *JASA*: “dynamic relative invariance”

## A reconsideration of acoustic invariance for place of articulation in diffuse stop consonants: Evidence from a cross-language study

Aditi Lahiri,<sup>a)</sup> Letitia Gewirth,<sup>b)</sup> and Sheila E. Blumstein  
*Brown University, Department of Linguistics, Providence, Rhode Island 02912*

“In this study, we have explored two claims of a theory of acoustic invariance in speech. The first claim is that there is acoustic invariance in the speech signal corresponding to the phonetic features of language. (...) Results indicated that indeed such invariance could be derived for diffuse stop consonants in Malayalam, French, and English, and could account for over 91% of the stop consonants analyzed. The second claim of a theory of acoustic invariance is that the perceptual system is sensitive to these invariant properties. (...) Results showed that listeners were sensitive to the invariant properties in making place of articulation categorizations, even in the presence of formant frequency and transition cues for the alternative place of articulation category.”

## Labial vs. dental in French:



Sheila with  
John Mertus,  
~ 1989



# Blumstein & Cooper 1974, *Cortex*

## HEMISPHERIC PROCESSING OF INTONATION CONTOURS'

Sheila Blumstein and William E. Cooper

(Brown University, Boston Veteran Administration Hospital Aphasia Research Center,  
Boston University School of Medicine, and Massachusetts Institute of Technology)



# Is intonation perceived by the left hemisphere, like lexical tone?

No, there's a left-ear (right-hemisphere) advantage, for both filtered and non-filtered speech:

	Adjusted ear scores		Index of laterality
	Left	Right	$\frac{R-L}{R+L} \times 100$
Filtered test	13.15	11.95	-4.4
Non-filtered test	11.75	10.7	-4.7

Burton, Small & Blumstein 2000,  
*Journal of Cognitive Neuroscience*

**The Role of Segmentation in Phonological  
Processing: An fMRI Investigation**

**Martha W. Burton and Steven L. Small**

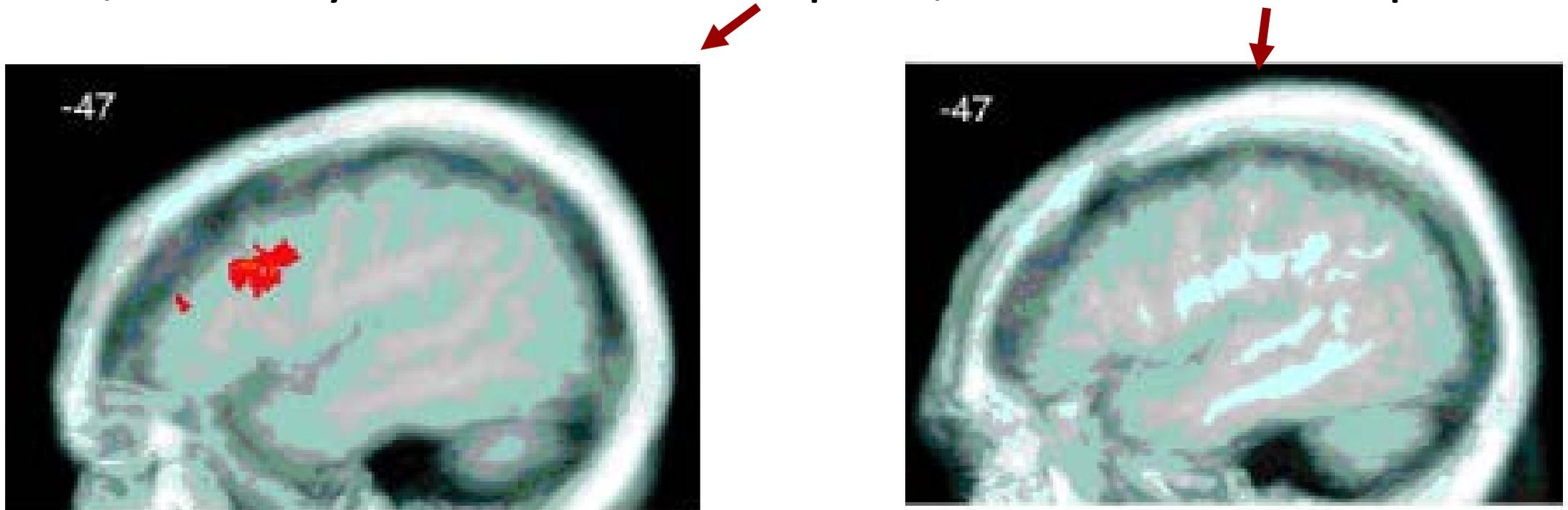
University of Maryland School of Medicine

**Sheila E. Blumstein**

Brown University

# Is Broca's area involved in judgments about phonetic segments?

Yes, but only for non-minimal pairs, not for minimal pairs:



Rissman et al. 2003,  
*Journal of Cognitive  
Neuroscience*



## An Event-Related fMRI Investigation of Implicit Semantic Priming

Jesse Rissman<sup>1</sup>, James C. Eliassen, and Sheila E. Blumstein

“Despite her incredibly busy life as President, Sheila (...) even found time to come to the local hospital where we were conducting our first fMRI study together, since she wanted to be there when we ran our first few subjects. She also wanted to understand everything about the data analysis process, so she would meet with me and we would click through the buttons together and she would ask endless questions to make sure she knew everything that was happening to the data at every stage. It was really important to her to be an informed user of this technology rather than just a supervisor of students and staff members who carry out the studies and analyses on her behalf. She was a wonderfully kind and patient mentor to me, and I still look back fondly on the formative years I spent in her lab. She was also an incredible teacher, and her Aphasia and the Brain course was one of the very best I took while a student at Brown.”

# Most of the current work involves fMRI

- Righi, Blumstein, Mertus & Worden 2010 “Neural systems underlying lexical competition: An eye tracking and fMRI study”
- Peramunage, Blumstein, Myers, Goldrick & Baese-Berk 2011 “Phonological neighborhood effects in spoken word production: An fMRI study”
- Blumstein & Myers 2012 “Speaker invariance for phonetic information: an fMRI investigation”
- Blumstein & Amso 2013 “Neural plasticity and dynamic functional organization: Insights from Functional Neuroimaging”
- Minicucci, Guediche & Blumstein 2013 “An fMRI examination of the effects of acoustic-phonetic and lexical competition on access to the lexical-semantic network”

# Some papers on traditional phonetic topics

- Behrens & Blumstein 1988 “Acoustic characteristics of English voiceless fricatives: A descriptive analysis”
- Burton, Blumstein & Stevens 1992 “A phonetic analysis of prenasalized stops in Moru”
- Magen & Blumstein 1993 “Effects of speaking rate on the vowel length distinction in Korean”
- Utman & Blumstein 1994 “The influence of language on the acoustic properties of phonetic features: A study of the feature [strident] in Ewe and English”
- Kessinger & Blumstein 1997 “Rate of speech effects on voice-onset time in Thai, French, and English”
- Pickett, Blumstein & Burton 1999 “Effects of speaking rate on the singleton/geminate consonant contrast in Italian”

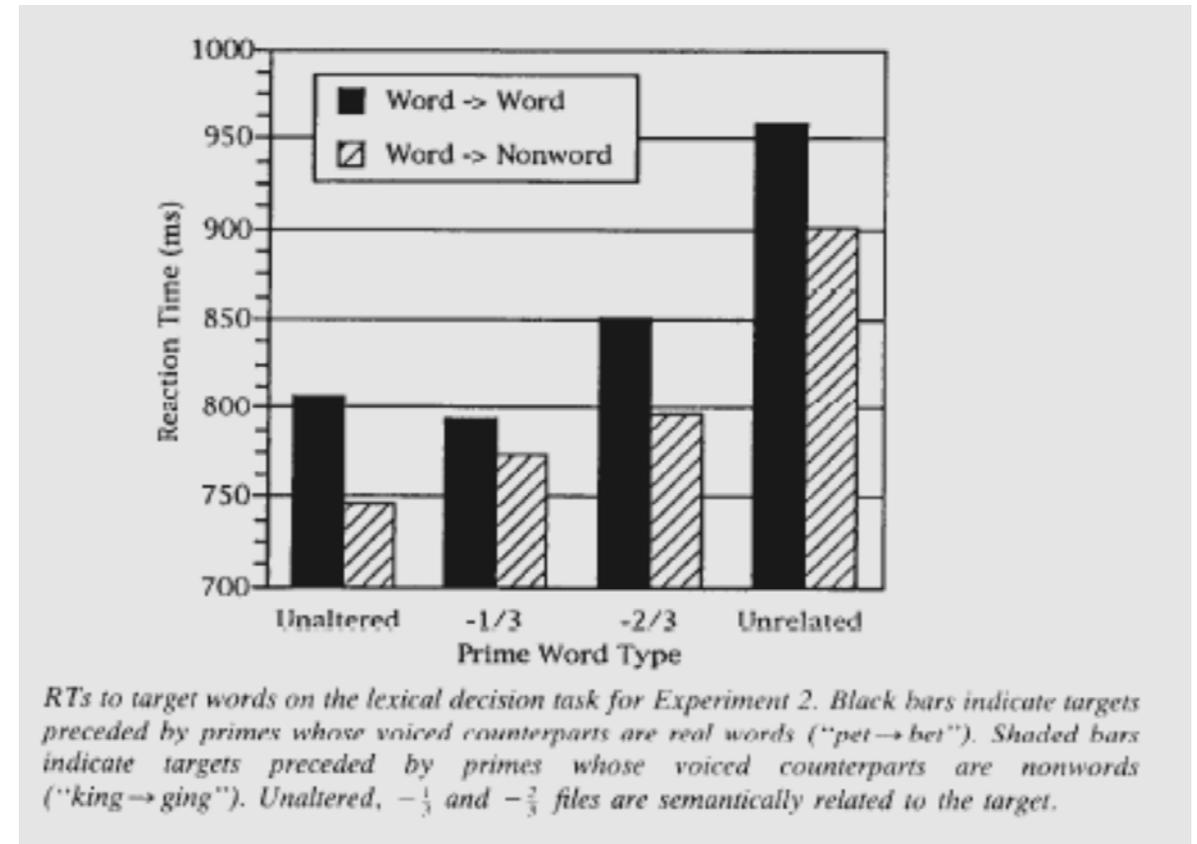
# Some papers on the role of phonetic detail in lexical processing

- Burton, Baum & Blumstein 1989 “Lexical effects on the phonetic categorization of speech: The role of acoustic structure”
- Andruski, Blumstein & Burton 1994 “The effect of subphonetic differences on lexical access”
- Utman, Blumstein & Sullivan 2000 “Effects of unsystematic and rule-governed acoustic variation on word recognition”
- Misiurski, Blumstein, Rissman & Berman 2005 “The role of lexical competition and acoustic-phonetic structure in lexical processing: Evidence from normal subjects and aphasic patients”
- White, Yee, Blumstein & Morgan 2013 “Adults show less sensitivity to phonetic detail in unfamiliar words, too”

# Andruski et al. 1994: Does the magnitude of priming depend on acoustic detail?



- Yes, priming is gradient with VOT, at least at short ISI
- When a prime is not confusable with another word, priming decreases with decreasing goodness – the better the VOT, the more priming (shaded bars)



Dean  
of the College,  
1987-1995



Interim Provost,  
1998

Interim President,  
February 2000 to July 2001



Portrait by Fritz Drury, RISD

# New department, new lab in Metcalf

cognitive, linguistic &  
psychological sciences

## The Metcalf Renovation

Creating a new home for Cognitive, Linguistic, and Psychological Sciences at Brown University



# A happy lab group



# ~29 PhD students so far

- Sandra Jeanne Pierce (Brenkle), 1977
- Robert Drake Buhr, 1978
- Patricia Ann Keating, 1980
- Molly Mack, 1983
- John H. Ryalls, 1984
- Carol Chapin Ringo, 1985
- Philip Charles Shinn, 1985
- Shari R. Baum, 1986
- Susan J. Behrens, 1986
- Allard Jongman, 1986
- Lori J. Van Houten, 1986
- William Franklin Katz, 1987
- Martha Whipple Burton, 1989
- Amy B. Rakowsky (Neeman), 1989
- Robin S. Waldstein, 1989
- Kathleen Mary Kurowski, 1990
- Jean Evelyn Andruski, 1995
- Gary Frederick Byma, 1995
- Jennifer Aydelott Utman, 1997
- Rachel Hornberger Kessinger, 1998
- Chao-Yang Lee, 2000
- Hiroko Nakano, 2001
- Emily Myers, 2006
- Jong-Yoon Myung, 2006
- (Katherine White, 2006)
- (Giulia Righi, 2010)
- Andrew Wallace, 2011
- Megan Reilly (expected)
- Neal Fox (expected)

# Recent/current grants

- Language and Speech Processing in Aphasia, 1985-2011
- Neural Basis of Lexical and Speech Processing, 2004-2014
- A Pilot Therapy Program to Improve Phonetic Production in Aphasia, Feb 2013-14
- Deputy Director of COBRE (Centers of Biomedical Research Excellence) Center for Central Nervous System Function, 2013-2018

# Selected honors and awards

- 1965-70: Title IV Fellowship, NIH Predoctoral Fellowship
- 1977-78: Guggenheim Fellow, Radcliffe Institute Fellow
- 1982: Fellow, Acoustical Society of America
- 1985-92: Claude Pepper (Javits Neuroscience) Investigator Award
- 1993: Fellow, American Academy of Arts and Sciences
- 1998: Fellow, American Philosophical Society
- 2001: Doctor of Science, Honoris Causa, Brown University
- 2001: Susan Colver Rosenberger Medal, Brown University
- 2002: Hazeltine Senior Citation, Brown University
- 2005: Fellow, American Association for the Advancement of Science
- 2009: Fellow, Linguistic Society of America
- **2014: Silver Medal in Speech Communication, ASA**

# Thanks to

- Joyce McDonough and Erica Dayton, U Rochester
- Michele Barchi and Patricia Squadrito, Brown U
- Tim Smith, Guy Carden, Bob Underhill
- John Mertus
- Jesse Rissman

Questions? Ask Sheila!