

BIOGRAPHICAL SKETCH

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NAME: Lutfi, Robert A.

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POSITION TITLE: Professor, Department of Communication Sciences and Disorders

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of South Florida, Tampa, FL	BA	1975	Experimental Psychol.
University of South Florida, Tampa, FL	MA	1977	Experimental Psychol.
Loyola University of Chicago, Chicago, IL	Ph.D.	1980	Experimental Psychol.
MRC Applied Psychology Unit, Cambridge, ENG	Post Doc	1980	Psychoacoustics
Northwestern University, Evanston, IL	Post Doc	1981-1983	Psychoacoustics

A. Personal Statement

My area of expertise is auditory psychophysics. I completed my dissertation under the supervision of Dr. William A. Yost, and received postdoctoral training in the laboratories of Drs. Fred L. Wightman, Roy Patterson and David M. Green. Since receiving my Ph.D., I have been fascinated by the question of how our ability to detect and identify complex sounds in noise is influenced by both lawful and random variation in sound as occurs in nature, and how this ability is affected by hearing loss. A goal of my research has been to develop computational models for predicting detection and identification performance under noisy conditions that approximate those we encounter in everyday listening. I have published over 70 papers in peer-reviewed scientific journals and several book chapters directly or indirectly related to this topic. My research programs have been supported by grants from the National Science Foundation, the Deafness Research Foundation, the Air Force Office of Scientific Research, the Office of Naval Research, the National Institute of Deafness and Communicative Disorders, and the National Institute for Child Health and Human Development. My current NIDCD-funded research program builds on 38 years of my work on problems of auditory detection and identification in noise in normal-hearing adults, children and the hard-of-hearing.

B. Positions and Honors**Positions and Employment**

1977-1979	Lecturer, Psychology Department, Loyola University of Chicago
1979-1980	Visiting Assistant Professor of Psychology, Psychology Department, Indiana University, Bloomington
1983-1984	Research Scientist, Central Institute for the Deaf, Washington University, Saint Louis, MO
1984-1989	Associate Scientist, Waisman Center, University of Wisconsin–Madison
1986	Lecturer, Department of Communicative Disorders, University of Wisconsin–Madison
1987-1989	Adjunct Professor of Psychology, Department of Psychology, University of Florida, Gainesville
1989-1992	Assistant Professor of Audiology, Department of Communicative Disorders, University of Wisconsin–Madison
1992-1996	Associate Professor of Audiology, Department of Communicative Disorders, University of Wisconsin–Madison
1993-1996	Associate Professor of Psychology, Department of Psychology, Univ. of Wisconsin–Madison

- 1996-2017 Professor of Audiology, Department of Communication Sciences and Disorders, University of Wisconsin–Madison
- 1996-2017 Professor of Psychology, Department of Psychology, University of Wisconsin–Madison
2006 Chair, Department of Communicative Disorders, University of Wisconsin–Madison
- 2017-present Professor of Audiology, Department of Communication Sciences and Disorders, University of South Florida, Tampa

Other Professional Activities and Honors

- Ad hoc reviewer for the National Science Foundation
- Ad hoc reviewer for the National Institutes of Deafness and Communicative Disorders
- Ad hoc reviewer for Israel Science Foundation
- Ad hoc reviewer for National Energy Systems, Air Force Office of Scientific Research
- Ad hoc reviewer for United States Civilian Research and Development Foundation
- Consultant on various NSF and NIH Grants
- Editorial Consultant for the *Journal of the Acoustical Society of America*, *Journal of Experimental Psychology*, *Perception and Psychophysics*, and *IEEE Transactions on Audio, Speech and Language Processing*
- Fellow, Acoustical Society of America
- Former Member of Committee on Psychological and PhysP7 (ydy)3.7 (s)_0sP7 ()Tj 11 (o,)]TJ 0 Tc ()T stical 3vie

- c. Gilbertson, L., and Lutfi, R.A. (2015). Estimates of decision weights and internal noise for the masked discrimination of vowels by young and elderly adults. *J. Acoust. Soc. Am.*, 137:EL403-407. PMID: PMC4441709.
- d. Gilbertson, L. and Lutfi, R.A. (2014). Correlations of decision weights and cognitive function for the masked discrimination of vowels by young and old adults. *Hear. Research*, 317:9-14. PMID: PMC4253306

2. Research on hearing has long been challenged with understanding our exceptional ability to 'hear out' individual sounds in a mixture. Two general approaches to the problem have been taken using sequences of tones as stimuli. The first has focused on our tendency to hear sequences, sufficiently separated in frequency, split into separate cohesive streams (auditory streaming). The second has focused on our ability to detect a change in one sequence, ignoring all others (auditory masking). The two phenomena are clearly related, but that relation has never been evaluated analytically. We have used detection theory to develop a theoretical analytic relation between multitone streaming and masking that underscores the expected similarities and differences between these phenomena and the predicted outcome of experiments in each of toneso p (tr)63e, iuDK.4 (Cl)L153 T/TT0 2 Of 1.721 0 Td (945j 0.001 Tc 0.279 0 Td [(to dev)3.8di)-1 (to)-1.7 (ke

4. We rely critically on our ability to identify simple objects and events from sound to function normally in the world. Yet, despite its importance, little is known regarding this ability. Perturbation analysis is a psychophysical method that has enjoyed success as a means of revealing decision processes underlying object identification in vision [Murray, R.F. 2011. *J. of Vision* 11, 1-25]. We have adapted this approach to the problem of sound source identification in audition. Three new findings have been made using this approach. They include (1) an unexpected constraint on identification imposed by limited auditory sensitivity, (2) an overriding influence of the highest level spectral prominences on identification, and (3) reliable individual differences in target enhancement and noise cancellation in the identification of targets in noise.

- a. Lutfi, R.A., Liu, C.J., and Stoelinga, C.N.J. (2013). A new approach to sound source identification. In *Basic Aspects of Hearing: Physiology and Perception* (vol. 787, pp. 203-213). Edited by B.C.J. Moore, R.D. Patterson, I.M. Winter, R.P. Carlyon, and H.E. Gockel. (Springer: New York). ISBN: 978-1-4614-1589-3
- b. Lutfi, R.A., and Stoelinga, C.N. (2010). Sensory constraints on the auditory identification of the material and geometric properties of struck bars. *J. Acoust. Soc. Am.*, 127(1):350-360. doi: 10.1121/1.3263606. PMID: PMC2821150.
- c. Lutfi, R.A., Liu, C.J., and Stoelinga, C. (2008). Level dominance in sound source identification. *J. Acoust. Soc. Am.*, 124(6):3784-3792. doi: 10.1121/1.2998767. PMID: PMC2737249
- d. Lutfi, R.A. (2008). Human sound source identification. In *Springer Handbook of Auditory Research: Auditory Perception of Sound Sources* (pp. 13-42). Edited by W.A. Yost, A.N. Popper, and R.R. Fay (Springer-Verlag, New York). ISBN: 978-0-262-01341-3.

5. An unexpected finding of our previous work is that listeners show highly replicable, individualistic patterns of decision weights on frequencies in spectral discrimination tasks – what we refer to as *individual listening styles*. Importantly, these listening styles have been replicated over a period of months and are only manifest in the measurement of the decision weights as performance levels are found to be remarkably similar across listeners. We, like many researchers, have attributed these listening styles to peculiarities in how listeners attend to different frequencies, but our more recent work suggests they may also be influenced by how irregularities in cochlear micromechanics affect the relative level of frequencies transduced in individual cochleae (Lee et al., 2016).

- a. Lee, J., Heo, I., Chang, A-C., Bond, K., Stoelinga, C., Lutfi, R., and Long, G. (2016). Individual differences in behavioural decision weights related to irregularities in cochlear mechanics. *Adv. Exp. Med. Biol.*, 894:457-65. doi: 10.1007/978-3-319-25474-6_48. PMID: PMC5079619.
- b. Lutfi, R.A., and Liu, C.J. (2007). Individual differences in source identification from synthesized impact sounds. *J. Acoust. Soc. Am.*, 122(2d37 (enc).9[(and Li)-1 (u, f110.32 2e-13 Td [(d375w (-)Tj 0.5Lted thes)3.8