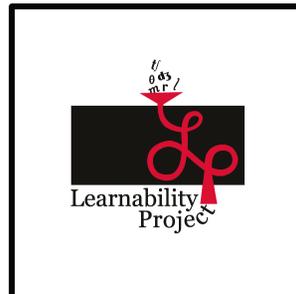




# INDIANA UNIVERSITY BLOOMINGTON

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## Gierut / Learnability Project



The Learnability Project was founded in 1985 by Judith A. Gierut, Professor Emerita of Speech and Hearing Sciences, Indiana University. Through funding from the National Institutes of Health, the project served as a test site in evaluation of the efficacy of clinical treatment for preschool children with functional (nonorganic) phonological disorders. Children who enrolled contributed longitudinal descriptive phonological samples for linguistic analysis. They also received clinical treatment, designed as single-subject experiments, to establish the optimal teaching conditions to promote phonological learning. Experimental studies were based on the triangulation of theoretical models of linguistics, psycholinguistics, and speech-language pathology, with the aim of bridging theory with application and science with best practices. The Gierut / Learnability Project collections accord with the data-sharing plan of the National Institutes of Health and are intended for broad use by scientists, clinicians, and students interested in language and learning.

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# The Learnability Project

Applied Research on Phonological Disorders

[Judith A. Gierut \(solr/searchResults.aspx?author=Judith+A.+Gierut\)](http://solr/searchResults.aspx?author=Judith+A.+Gierut)

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The Learnability Project, a clinical research program at Indiana University, was initiated in 1985, with seed support from the ASHA Foundation and extended continuous funding from the National Institute on Deafness and Other Communication Disorders. The long-term theoretical goal of our research is to determine how children acquire the sound system of the target language, with an explicit focus on preschoolers who have functional phonological disorders, but are otherwise typically developing. We adopt a multidisciplinary approach in our study of these children, drawing from linguistics, developmental and cognitive psychology, neuroscience, education, and clinical speech-language pathology. This is best reflected by the diversity of the research team, which includes scientists, professionals, and students with expertise in these disciplines.

Because we are interested specifically in phonological learning, our research crucially depends on clinical treatment as the experimental manipulation. Children who are eligible for our research receive one-on-one intervention that is tailored to meet their individual needs. Treatment itself uses conventional clinical techniques including, for example, imitative and spontaneous production practice, modeling, and corrective feedback. In this way, treatment provided through the Learnability Project resembles that of traditional clinical settings, with perhaps two exceptions: audio and video recordings are obtained at frequent intervals and treatment is administered as a longitudinal single-subject design.

Since treatment is at the heart of our research, applied goals emerge as a natural consequence and complement our long-term theoretical goals. In this regard, our applied aim is to isolate the factors that maximize children's generalization learning, such that system-wide changes in the productive sound system result from treatment.

## Bridging Theory and Practice

In our view, clinical research is the ideal way to bridge theory with practice because we are able to pursue theoretical questions about the nature and course of phonological learning hand-in-hand with clinical questions about the delivery of treatment. This creates a fluid cycle where theory feeds application and back again to form a mutually beneficial relationship between the two. Results obtained in our lab are directly transferable to the clinic because the clinical setting, in fact, defines the experimental protocol of our research.

There are a host of other benefits that result from this research that enhance the general academic

missions of service, teaching, and research. First and foremost are the advantages to the children (and their families) who receive extensive diagnostic and intensive treatment services at no cost. Through mentoring, student research assistants see the experimental process unfold, from the initial seed of an idea to the final published result. They acquire skills associated with data collection, reliability and management, and training in the ethical conduct of research. Very often, this exposure to research causes students to rethink their career goals, with new sights being set on the doctoral program.

Benefits to the discipline come in the form of scientific advances in the diagnosis of phonological disorders, implementation of treatment procedures, and monitoring of progress over time. One hallmark finding of the Learnability Project is that treatment of more complex phonological targets results in the greatest generalization. That is, when a child is taught a seemingly more difficult property of the sound system, both treated and untreated sounds show improvement, resulting in extensive learning. While this may seem counterintuitive, learning by complexity has an established applied history in first- and second-language acquisition, education and motor skill mastery, and has recently come to the theoretical forefront in cognitive science and philosophy.

Thus far, we have probed the role of complexity by evaluating the influences of a given child's sound system, method of treatment, and structural properties of language on phonological learning. All in all, the single most influential variable to affect generalization learning is the (complex) target that is selected for treatment. In our current research, we are extending this finding in new ways. For example, in one line of study, we are evaluating whether the stimulus words used in treatment have differential effects on learning as predicted by psycholinguistic models of spoken word recognition. In prior work, we found that clinical treatment of a sound in high-frequency words promotes greater generalization than in low-frequency words. Independent of this, treatment of a sound in words with few rhyming counterparts prompted greater generalization than those with many rhyming neighbors. Ongoing studies are now combining these variables to determine a potentially "best of the best" set of stimulus words.

Another set of investigations is examining the order of treatment goals. This builds on linguistic theory, which predicts that two co-occurring error patterns will be simultaneously eliminated if one of these patterns (as opposed to the other) is treated first. Children's learning data following treatment will determine if this prediction is actually borne out.

These new lines of study will thereby add to the clinical equation by defining the complexity of sounds, words, and order of teaching that lead to optimal phonological gains. This then achieves our applied mission, which is an understanding of treatment efficacy for functional phonological disorders as based on theoretically motivated clinical research.

## **The Learnability Project at Indiana University (NIDCD 001694)**

### **Core Research Team**

**Judith A. Gierut**, principal investigator **Daniel A. Dinnsen**, co-principal investigator **Michele L. Morrisette**, assistant scientist **Rachel A. Dale**, speech-language pathologist **Holly L. Storkel** (University of Kansas), consultant **Jessica A. Barlow** (San Diego State University), consultant

## Current Aims

To explore the way in which children with functional phonological disorders improve their sound systems in treatment by experimentally manipulating errors resistant to change, the lexical characteristics of treated words, and the morphosyntactic properties of the target language in clinical intervention

[Project Web site \(http://www.indiana.edu/~sndlrng\)](http://www.indiana.edu/~sndlrng)

## The Learnability Project Representative Publications

Visit the [The Learnability Project Web site \(http://www.indiana.edu/~sndlrng\)](http://www.indiana.edu/~sndlrng)

Barlow, J. A., & Gierut, J. A. (2002). Minimal pair approaches to phonological remediation. *Seminars in Speech and Language, 23*, 57–68. [Article] (<http://dx.doi.org/10.1055/s-2002-24969>) [PubMed] (<http://www.ncbi.nlm.nih.gov/pubmed/11938491>)

Dinnsen, D. A., & O'Connor, K. M. (2001). Implicationally related error patterns and the selection of treatment targets. *Language, Speech, and Hearing Services in Schools, 32*, 257–270. [Article] ([http://dx.doi.org/10.1044/0161-1461\(2001/023\)](http://dx.doi.org/10.1044/0161-1461(2001/023)))

Gierut, J. A. (2001). Complexity in phonological treatment: Clinical factors. *Language, Speech, and Hearing Services in Schools, 32*, 229–241. [Article] ([http://dx.doi.org/10.1044/0161-1461\(2001/021\)](http://dx.doi.org/10.1044/0161-1461(2001/021)))

Storkel, H. L., & Morrisette, M. L. (2002). The lexicon and phonology: Interactions in language acquisition. *Language, Speech, and Hearing Services in Schools, 33*, 24–37. [Article] ([http://dx.doi.org/10.1044/0161-1461\(2002/003\)](http://dx.doi.org/10.1044/0161-1461(2002/003)))

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