

# Stanford

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## Michael Frank

David and Lucile Packard Foundation Professor in Human Biology and Associate Professor, by courtesy, of Linguistics  
Psychology

### Bio

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#### BIO

How do we learn to communicate using language? I study children's language learning and how it interacts with their developing understanding of the social world. I use behavioral experiments, computational tools, and novel measurement methods like large-scale web-based studies, eye-tracking, and head-mounted cameras.

#### ACADEMIC APPOINTMENTS

- Associate Professor, Psychology
- Associate Professor (By courtesy), Linguistics
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

#### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Advisory Board, MacArthur-Bates Communicative Development Inventory (2014 - present)
- Governing board member, Cognitive Science Society (2015 - present)

#### PROGRAM AFFILIATIONS

- Symbolic Systems Program

#### LINKS

- Michael Frank - Department of Psychology: <http://web.stanford.edu/~mcfrank/>
- Language and Cognition Lab site: <http://langcog.stanford.edu>

### Research & Scholarship

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#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

How do we learn to communicate using language? I study children's language learning and how it interacts with their developing understanding of the social world. I use behavioral experiments, computational tools, and novel measurement methods like large-scale web-based studies, eye-tracking, and head-mounted cameras.

### Teaching

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#### COURSES

##### 2019-20

- Behavior, Health, and Development: HUMBIO 4B (Spr)

- Experimental Methods: PSYCH 251 (Aut)
- Psychometrics and automated experiment design: PSYCH 241 (Aut)

#### 2018-19

- Behavior, Health, and Development: HUMBIO 3B (Win)
- Experimental Methods: PSYCH 251 (Aut)

#### 2017-18

- Lab in Experimental Methods: PSYCH 251 (Aut)

#### 2016-17

- Introduction to Developmental Psychology: PSYCH 60 (Aut)
- Lab in Experimental Methods: PSYCH 254 (Win)
- Language and Thought: OSPSANTG 48 (Spr)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Mika Asaba, Erin Bennett, Sophie Bridgers, Cai Guo, Michael Hahn, Arianna Yuan

### Postdoctoral Faculty Sponsor

Alexandra Carstensen, Bria Long, Pooja Paul, Angeline Sin Mei Tsui

### Doctoral Dissertation Advisor (AC)

Rondeline Williams

### Postdoctoral Research Mentor

Alexandra Carstensen, Angeline Sin Mei Tsui

### Doctoral (Program)

Ben Peloquin

## Publications

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### PUBLICATIONS

- **Consistency and Variability in Children's Word Learning Across Languages.** *Open mind : discoveries in cognitive science*  
Braginsky, M., Yurovsky, D., Marchman, V. A., Frank, M. C.  
2019; 3: 52–67
- **Data availability, reusability, and analytic reproducibility: evaluating the impact of a mandatory open data policy at the journal Cognition** *ROYAL SOCIETY OPEN SCIENCE*  
Hardwicke, T. E., Mathur, M. B., MacDonald, K., Nilsson, G., Banks, G. C., Kidwell, M. C., Mohr, A., Clayton, E., Yoon, E. J., Tessler, M., Lenne, R. L., Altman, S., Long, et al  
2018; 5 (8)
- **A Collaborative Approach to Infant Research: Promoting Reproducibility, Best Practices, and Theory-Building**  
Frank, M. C., Bergelson, E., Bergmann, C., Cristia, A., Floccia, C., Gervain, J., Hamlin, J., Hannon, E. E., Kline, M., Levelt, C., Lew-Williams, C., Nazzi, T., Panneton, et al  
WILEY.2017: 421–35
- **Wordbank: an open repository for developmental vocabulary data** *JOURNAL OF CHILD LANGUAGE*  
Frank, M. C., Braginsky, M., Yurovsky, D., Marchman, V. A.  
2017; 44 (3): 677-694

- **A Collaborative Approach to Infant Research: Promoting Reproducibility, Best Practices, and Theory-Building.** *Infancy : the official journal of the International Society on Infant Studies*  
Frank, M. C., Bergelson, E., Bergmann, C., Cristia, A., Floccia, C., Gervain, J., Hamlin, J. K., Hannon, E. E., Kline, M., Levelt, C., Lew-Williams, C., Nazzi, T., Panneton, et al  
2017; 22 (4): 421–35
- **Pragmatic Language Interpretation as Probabilistic Inference.** *Trends in cognitive sciences*  
Goodman, N. D., Frank, M. C.  
2016; 20 (11): 818-829
- **Inferring word meanings by assuming that speakers are informative.** *Cognitive psychology*  
Frank, M. C., Goodman, N. D.  
2014; 75: 80-96
- **Predicting Pragmatic Reasoning in Language Games** *SCIENCE*  
Frank, M. C., Goodman, N. D.  
2012; 336 (6084): 998-998
- **Modeling human performance in statistical word segmentation** *COGNITION*  
Frank, M. C., Goldwater, S., Griffiths, T. L., Tenenbaum, J. B.  
2010; 117 (2): 107-125
- **Children Flexibly Seek Visual Information to Support Signed and Spoken Language Comprehension** *JOURNAL OF EXPERIMENTAL PSYCHOLOGY-GENERAL*  
MacDonald, K., Marchman, V. A., Fernald, A., Frank, M. C.  
2020; 149 (6): 1078–96
- **Advancing Transparency and Openness in Child Development Research: Opportunities** *CHILD DEVELOPMENT PERSPECTIVES*  
Gennetian, L. A., Tamis-LeMonda, C. S., Frank, M. C.  
2020; 14 (1): 3–8
- **Addressing Publication Bias in Meta-Analysis Empirical Findings From Community-Augmented Meta-Analyses of Infant Language Development** *ZEITSCHRIFT FUR PSYCHOLOGIE-JOURNAL OF PSYCHOLOGY*  
Tsuji, S., Cristia, A., Frank, M. C., Bergmann, C.  
2020; 228 (1): 50–61
- **What counts as an exemplar model, anyway? A commentary on Ambridge (2020)** *FIRST LANGUAGE*  
Mahowald, K., Kachergis, G., Frank, M. C.  
2020
- **The role of developmental change and linguistic experience in the mutual exclusivity effect.** *Cognition*  
Lewis, M., Cristiano, V., Lake, B. M., Kwan, T., Frank, M. C.  
2020; 198: 104191
- **The Interactions of Rational, Pragmatic Agents Lead to Efficient Language Structure and Use.** *Topics in cognitive science*  
Peloquin, B. N., Goodman, N. D., Frank, M. C.  
2020; 12 (1): 433–45
- **How optimal is word recognition under multimodal uncertainty?** *Cognition*  
Fourtassi, A., Frank, M. C.  
2020; 199: 104092
- **N-Best Evaluation for Academic Hiring and Promotion.** *Trends in cognitive sciences*  
Frank, M. C.  
2019
- **Towards a more robust and replicable science of infant development.** *Infant behavior & development*  
Frank, M. C.  
2019; 57: 101349

- **childes-db: A flexible and reproducible interface to the child language data exchange system** *BEHAVIOR RESEARCH METHODS*  
Sanchez, A., Meylan, S. C., Braginsky, M., MacDonald, K. E., Yurovsky, D., Frank, M. C.  
2019; 51 (4): 1928–41
- **childes-db: A flexible and reproducible interface to the child language data exchange system.** *Behavior research methods*  
Sanchez, A., Meylan, S. C., Braginsky, M., MacDonald, K. E., Yurovsky, D., Frank, M. C.  
2019
- **The role of salience in young children's processing of ad hoc implicatures.** *Journal of experimental child psychology*  
Yoon, E. J., Frank, M. C.  
2019; 186: 99–116
- **Promoting Replicability in Developmental Research Through Meta-analyses: Insights From Language Acquisition Research** *CHILD DEVELOPMENT*  
Bergmann, C., Tsuji, S., Piccinini, P. E., Lewis, M. L., Braginsky, M., Frank, M. C., Cristia, A.  
2018; 89 (6): 1996–2009
- **Still Suspicious: The Suspicious-Coincidence Effect Revisited.** *Psychological science*  
Lewis, M. L., Frank, M. C.  
2018: 956797618794931
- **A Practical Guide for Transparency in Psychological Science** *COLLABRA-PSYCHOLOGY*  
Klein, O., Hardwicke, T. E., Aust, F., Breuer, J., Danielsson, H., Mohr, A., IJzerman, H., Nilsson, G., Vanpaemel, W., Frank, M. C.  
2018; 4 (1)
- **With Great Data Comes Great (Theoretical) Opportunity.** *Trends in cognitive sciences*  
Frank, M. C.  
2018
- **The Role of Design and Training in Artifact Expertise: The Case of the Abacus and Visual Attention** *COGNITIVE SCIENCE*  
Srinivasan, M., Wagner, K., Frank, M. C., Barner, D.  
2018; 42: 757–82
- **The Role of Gesture in Supporting Mental Representations: The Case of Mental Abacus Arithmetic** *COGNITIVE SCIENCE*  
Brooks, N. B., Barner, D., Frank, M., Goldin-Meadow, S.  
2018; 42 (2): 554–75
- **Pre-linguistic segmentation of speech into syllable-like units** *COGNITION*  
Rasanen, O., Doyle, G., Frank, M. C.  
2018; 171: 130–50
- **Early Understanding of Pragmatic Principles in Children's Judgments of Negative Sentences** *LANGUAGE LEARNING AND DEVELOPMENT*  
Nordmeyer, A. E., Frank, M. C.  
2018; 14 (4): 262–78
- **A Bayesian decision-making framework for replication** *BEHAVIORAL AND BRAIN SCIENCES*  
Hardwicke, T. E., Tessler, M., Peloquin, B. N., Frank, M. C.  
2018; 41
- **Data availability, reusability, and analytic reproducibility: evaluating the impact of a mandatory open data policy at the journal Cognition.** *Royal Society open science*  
Hardwicke, T. E., Mathur, M. B., MacDonald, K., Nilsson, G., Banks, G. C., Kidwell, M. C., Hofelich Mohr, A., Clayton, E., Yoon, E. J., Henry Tessler, M., Lenne, R. L., Altman, S., Long, et al  
2018; 5 (8): 180448
- **A Bayesian decision-making framework for replication.** *The Behavioral and brain sciences*  
Hardwicke, T. E., Tessler, M. H., Peloquin, B. N., Frank, M. C.  
2018; 41: e132
- **The Trouble With Quantifiers: Exploring Children's Deficits in Scalar Implicature.** *Child development*  
Horowitz, A. C., Schneider, R. M., Frank, M. C.

2017

- **Social cues modulate the representations underlying cross situational learning** *COGNITIVE PSYCHOLOGY*  
MacDonald, K., Yurovsky, D., Frank, M. C.  
2017; 94: 67-84
- **Semantic Coherence Facilitates Distributional Learning** *COGNITIVE SCIENCE*  
Ouyang, L., Boroditsky, L., Frank, M. C.  
2017; 41: 855-884
- **Beyond naïve cue combination: salience and social cues in early word learning** *DEVELOPMENTAL SCIENCE*  
Yurovsky, D., Frank, M. C.  
2017; 20 (2)
- **The Emergence of an Abstract Grammatical Category in Children's Early Speech** *PSYCHOLOGICAL SCIENCE*  
Meylan, S. C., Frank, M. C., Roy, B. C., Levy, R.  
2017; 28 (2): 181-192
- **The development of children's ability to track and predict turn structure in conversation** *JOURNAL OF MEMORY AND LANGUAGE*  
Casillas, M., Frank, M. C.  
2017; 92: 234-253
- **Adaptive Engagement of Cognitive Control in Context-Dependent Decision Making** *CEREBRAL CORTEX*  
Waskom, M. L., Frank, M. C., Wagner, A. D.  
2017; 27 (2): 1270-1284
- **Avoiding frostbite: It helps to learn from others** *BEHAVIORAL AND BRAIN SCIENCES*  
Tessler, M., Goodman, N. D., Frank, M. C.  
2017; 40: e279
- **MetaLab: A repository for meta-analyses on language development, and more**  
Tsuji, S., Bergmann, C., Lewis, M., Braginsky, M., Piccinini, P., Frank, M. C., Cristia, A., Int Speech Commun Assoc  
ISCA-INT SPEECH COMMUNICATION ASSOC.2017: 2038–39
- **Beyond naïve cue combination: salience and social cues in early word learning.** *Developmental science*  
Yurovsky, D., Frank, M. C.  
2017; 20 (2)
- **Semantic Coherence Facilitates Distributional Learning.** *Cognitive science*  
Ouyang, L., Boroditsky, L., Frank, M. C.  
2017; 41 Suppl 4: 855–84
- **Preschoolers Flexibly Adapt to Linguistic Input in a Noisy Channel** *PSYCHOLOGICAL SCIENCE*  
Yurovsky, D., Case, S., Frank, M. C.  
2017; 28 (1): 132-140
- **Embedded Implicatures as Pragmatic Inferences under Compositional Lexical Uncertainty** *JOURNAL OF SEMANTICS*  
Potts, C., Lassiter, D., Levy, R., Frank, M. C.  
2016; 33 (4): 755-802
- **Understanding the effect of social context on learning: A replication of Xu and Tenenbaum (2007b).** *Journal of experimental psychology. General*  
Lewis, M. L., Frank, M. C.  
2016; 145 (9): e72-80
- **The length of words reflects their conceptual complexity** *COGNITION*  
Lewis, M. L., Frank, M. C.  
2016; 153: 182-195
- **Learning Mathematics in a Visuospatial Format: A Randomized, Controlled Trial of Mental Abacus Instruction** *CHILD DEVELOPMENT*  
Barner, D., Alvarez, G., Sullivan, J., Brooks, N., Srinivasan, M., Frank, M. C.

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2016; 87 (4): 1146-1158

- **Children's Pragmatic Inferences as a Route for Learning About the World** *CHILD DEVELOPMENT*  
Horowitz, A. C., Frank, M. C.  
2016; 87 (3): 807-819
- **Comment on "Math at home adds up to achievement in school".** *Science*  
Frank, M. C.  
2016; 351 (6278): 1161-?
- **Response to Comment on "Estimating the reproducibility of psychological science"** *SCIENCE*  
Anderson, C. J., Bahnik, S., Barnett-Cowan, M., Bosco, F. A., Chandler, J., Chartier, C. R., Cheung, F., Christopherson, C. D., Cordes, A., Cremata, E. J., Della Penna, N., Estel, V., Fedor, et al  
2016; 351 (6277): 1037
- **Chaser: Unlocking the Genius of the Dog Who Knows a Thousand Words (Book Review)** *AMERICAN JOURNAL OF PSYCHOLOGY*  
Book Review Authored by: Frank, M. C.  
2016; 129 (1): 99-104
- **Adaptive Engagement of Cognitive Control in Context-Dependent Decision Making.** *Cerebral cortex*  
Waskom, M. L., Frank, M. C., Wagner, A. D.  
2016
- **Using Tablets to Collect Data From Young Children** *JOURNAL OF COGNITION AND DEVELOPMENT*  
Frank, M. C., Sugarman, E., Horowitz, A. C., Lewis, M. L., Yurovsky, D.  
2016; 17 (1): 1-17
- **Linguistic structure emerges through the interaction of memory constraints and communicative pressures** *BEHAVIORAL AND BRAIN SCIENCES*  
Lewis, M. L., Frank, M. C.  
2016; 39: e82
- **An integrative account of constraints on cross-situational learning** *COGNITION*  
Yurovsky, D., Frank, M. C.  
2015; 145: 53-62
- **Predicting the birth of a spoken word** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Roy, B. C., Frank, M. C., DeCamp, P., Miller, M., Roy, D.  
2015; 112 (41): 12663-12668
- **Quantifying naturalistic social gaze in fragile X syndrome using a novel eye tracking paradigm.** *American journal of medical genetics. Part B, Neuropsychiatric genetics : the official publication of the International Society of Psychiatric Genetics*  
Hall, S. S., Frank, M. C., Pusiol, G. T., Farzin, F., Lightbody, A. A., Reiss, A. L.  
2015; 168 (7): 564-572
- **A Second Look at Automatic Theory of Mind: Reconsidering Kovács, Téglás, and Endress (2010).** *Psychological science*  
Phillips, J., Ong, D. C., Surtees, A. D., Xin, Y., Williams, S., Saxe, R., Frank, M. C.  
2015; 26 (9): 1353-1367
- **PSYCHOLOGY Estimating the reproducibility of psychological science** *SCIENCE*  
Aarts, A. A., Anderson, J. E., Anderson, C. J., Attridge, P. R., Attwood, A., Axt, J., Babel, M., Bahnik, S., Baranski, E., Barnett-Cowan, M., Bartmess, E., Beer, J., Bell, et al  
2015; 349 (6251)
- **Relevant and robust: a response to Marcus and Davis (2013).** *Psychological science*  
Goodman, N. D., Frank, M. C., Griffiths, T. L., Tenenbaum, J. B., Battaglia, P. W., Hamrick, J. B.  
2015; 26 (4): 539-541
- **Young children's developing sensitivity to discourse continuity as a cue for inferring reference.** *Journal of experimental child psychology*  
Horowitz, A. C., Frank, M. C.  
2015; 129: 84-97

- **Ad-hoc Implicature in Preschool Children** *LANGUAGE LEARNING AND DEVELOPMENT*  
Stiller, A. J., Goodman, N. D., Frank, M. C.  
2015; 11 (2): 176–90
- **Unsupervised word discovery from speech using automatic segmentation into syllable-like units**  
Rasanen, O., Doyle, G., Frank, M. C., ISCA-INT SPEECH COMMUN ASSOC  
ISCA-INT SPEECH COMMUNICATION ASSOC.2015: 3204–8
- **Cultural Differences in Perceptual Reorganization in US and Piraha Adults** *PLOS ONE*  
Yoon, J. M., Witthoft, N., Winawer, J., Frank, M. C., Everett, D. L., Gibson, E.  
2014; 9 (11)
- **The role of context in young children's comprehension of negation** *JOURNAL OF MEMORY AND LANGUAGE*  
Nordmeyer, A. E., Frank, M. C.  
2014; 77: 25-39
- **Markers of Topical Discourse in Child-Directed Speech** *COGNITIVE SCIENCE*  
Rohde, H., Frank, M. C.  
2014; 38 (8): 1634-1661
- **Three ideal observer models for rule learning in simple languages (vol 120, pg 360, 2011)** *COGNITION*  
Frank, M. C., Tenenbaum, J. B.  
2014; 132 (3): 501
- **Visual search and attention to faces during early infancy.** *Journal of experimental child psychology*  
Frank, M. C., Amso, D., Johnson, S. P.  
2014; 118: 13-26
- **Cultural differences in perceptual reorganization in US and Pirahã adults.** *PloS one*  
Yoon, J. M., Witthoft, N., Winawer, J., Frank, M. C., Everett, D. L., Gibson, E.  
2014; 9 (11)
- **SPEAKER-INDEPENDENT DETECTION OF CHILD-DIRECTED SPEECH**  
Schuster, S., Pancoast, S., Ganjoo, M., Frank, M. C., Jurafsky, D., IEEE  
IEEE.2014: 366–71
- **Throwing out the Bayesian baby with the optimal bathwater: Response to Endress (2013)** *COGNITION*  
Frank, M. C.  
2013; 128 (3): 417-423
- **Zipfian frequency distributions facilitate word segmentation in context.** *Cognition*  
Kurumada, C., Meylan, S. C., Frank, M. C.  
2013; 127 (3): 439-453
- **Learning and Long-Term Retention of Large-Scale Artificial Languages** *PLOS ONE*  
Frank, M. C., Tenenbaum, J. B., Gibson, E.  
2013; 8 (1)
- **Throwing out the Bayesian baby with the optimal bathwater: Response to.** *Cognition*  
Frank, M. C.  
2013; 128 (3): 417–23
- **Social and Discourse Contributions to the Determination of Reference in Cross-Situational Word Learning** *LANGUAGE LEARNING AND DEVELOPMENT*  
Frank, M. C., Tenenbaum, J. B., Fernald, A.  
2013; 9 (1): 1–24
- **An Open, Large-Scale, Collaborative Effort to Estimate the Reproducibility of Psychological Science** *PERSPECTIVES ON PSYCHOLOGICAL SCIENCE*  
Alexander, A., Barnett-Cowan, M., Bartmess, E., Bosco, F. A., Brandt, M., Carp, J., Chandler, J. J., Clay, R., Cleary, H., Cohn, M., Costantini, G., DeCoster, J.,  
Dunn, et al  
2012; 7 (6): 657-660

- **Teaching Replication** *PERSPECTIVES ON PSYCHOLOGICAL SCIENCE*  
Frank, M. C., Saxe, R.  
2012; 7 (6): 600-604
- **Learning From Others: The Consequences of Psychological Reasoning for Human Learning** *PERSPECTIVES ON PSYCHOLOGICAL SCIENCE*  
Shafto, P., Goodman, N. D., Frank, M. C.  
2012; 7 (4): 341-351
- **Representing Exact Number Visually Using Mental Abacus** *JOURNAL OF EXPERIMENTAL PSYCHOLOGY-GENERAL*  
Frank, M. C., Barner, D.  
2012; 141 (1): 134-149
- **Verbal interference suppresses exact numerical representation** *COGNITIVE PSYCHOLOGY*  
Frank, M. C., Fedorenko, E., Lai, P., Saxe, R., Gibson, E.  
2012; 64 (1-2): 74-92
- **Measuring the Development of Social Attention Using Free-Viewing** *INFANCY*  
Frank, M. C., Vul, E., Saxe, R.  
2012; 17 (4): 355-375
- **Learning From Others: The Consequences of Psychological Reasoning for Human Learning.** *Perspectives on psychological science : a journal of the Association for Psychological Science*  
Shafto, P., Goodman, N. D., Frank, M. C.  
2012; 7 (4): 341-51
- **Teaching Replication.** *Perspectives on psychological science : a journal of the Association for Psychological Science*  
Frank, M. C., Saxe, R.  
2012; 7 (6): 600-604
- **Three ideal observer models for rule learning in simple languages** *COGNITION*  
Frank, M. C., Tenenbaum, J. B.  
2011; 120 (3): 360-371
- **Overcoming Memory Limitations in Rule Learning** *LANGUAGE LEARNING AND DEVELOPMENT*  
Frank, M. C., Gibson, E.  
2011; 7 (2): 130-48
- **Beyond Transitional Probabilities: Human Learners Impose a Parsimony Bias in Statistical Word Segmentation**  
Frank, M. C., Arnon, I., Tily, H., Goldwater, S., Ohlsson, S., Catrambone, R.  
COGNITIVE SCIENCE SOCIETY, INC.2010: 760-65
- **Russian blues reveal effects of language on color discrimination** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Winawer, J., Witthoft, N., Frank, M. C., Wu, L., Wade, A. R., Boroditsky, L.  
2007; 104 (19): 7780-7785