To: Editorial Board of *Cognition*

Dear Editors,

# We are submitting our manuscript “Learning to understand an unfamiliar talker: Testing models of adaptive speech perception”, jointly authored by Maryann Tan and Florian Jaeger, for consideration in *Cognition*. This is the first submission of our manuscript. It presents original work.

The manuscript investigates **adaptive speech perception**—specifically, the incremental unfolding of adaptation to the speech of an unfamiliar talker. Seminal research in the early 00s showed that speech perception is considerably more flexible than previously thought: after exposure to an unfamiliar talker, listeners perception of the same physical input can change substantially, sometimes within minutes. Such adaptivity is now understood to play a critical role in affording robust speech perception across talkers. Its existence has been demonstrated across many different paradigms, languages, and environmental conditions.

What has remained less clear is what mechanisms support this flexibility, and *how* they facilitate incremental adaptive changes in listeners’ perception. That is, how do listeners incrementally integrate speech inputs from a new talker with their pre-existing expectations about speech formed through lifelong experiences? This is the question we aim to address. We do so through **behavioral experimentation and computational modeling**.

We focus on one of the most developed class of models for adaptive speech perception, *distributional learning* models (which also play an important role in other domains of the cognitive sciences). We identify four predictions that these models make about the incremental integration of information during the initial moments of exposure to an unfamiliar talker. To test these predictions for the first time, we implemented a novel incremental testing paradigm. Using novel data analysis techniques (Bayesian psychometric mixed-effects models), we confirmed most predictions of distributional learning models. However, we also find unrecognized limitations of adaptive perception that existing distributional learning models—as well as any other model we are aware of—*fail* to predict. Critically, these limitations become apparent only when human behavior is compared against normative models of adaptive perception (Bayesian ideal observers and adaptors).

We are excited about this work. It is directly inspired by recent calls for stronger tests of theories of adaptive speech perception. To the best of our knowledge, it is the first attempt to evaluate state-of-the-art models of ideal information integration against richer, incremental, data across different exposure conditions. We believe that it is this type of richer data that will be required to identify deficiencies in our existing theories of adaptive behavior.

Sincerely,

Maryann Tan T. Florian Jaeger

**Suggested reviewers with relevant expertise and a variety of theoretical perspectives (and no COIs):**

* Eleanor Chodroff ([eleanor.chodroff@uzh.ch](mailto:eleanor.chodroff@uzh.ch))
* James McQueen ([j.mcqueen@donders.ru.nl](mailto:j.mcqueen@donders.ru.nl))
* Jessamyn Schertz ([jessamyn.schertz@utoronto.ca](mailto:jessamyn.schertz@utoronto.ca))
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**Currently reviewing other manuscripts of ours:**

* Arty Samuels (SUNY / BCBL)

**We respectfully would prefer that the following reviewers are *not* invited, as we are not sure they would judge this work objectively:**

* Dick Aslin, Bob McMurray, Sarah Creel