A communicative framework for early word learning

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Abstract

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Introduction

Word learning as a statistical inference problem.

From Quine on. (Quine, 1960)

three kinds of uncertainty – over statistical time and in the moment

constraints, pragmatics, etc deal with uncertainty in the moment

uncertainty over consistent meanings – priors of some kind to deal with this tenenbaum & xu (J. B. Tenenbaum, 1999,Xu and Tenenbaum (2007))

statistical co-occurrence structure deals with uncerainty reduction over time (Siskind, 1996,C. Yu (2008),Richard A. Blythe, Smith, and Smith (2010),Richard A Blythe, Smith, and Smith (2016))

these two scales are linked (Frank, Goodman, & Tenenbaum, 2009)

linking priors and in the moment scales (Frank & Goodman, 2012,Frank and Goodman (2014))

All of the arguments in these domains are about the relative difficulty of these different kinds of problems (Trueswell, Medina, Hafri, & Gleitman, 2013,L. B. Smith, Suanda, and Yu (2014),D. Yurovsky, Fricker, Yu, and Smith (2014),Daniel Yurovsky and Frank (2015))

but all of this stuff is still about speakers talking to no one! (Tomasello, 2000, Tomasello (2001))

Indeed, it looks like it matters whether speech is to children - structural reasons (Aslin, Woodward, LaMendola, & Bever, 1996,) - evidence from weisleder, hoff, etc. (Weisleder & Fernald, 2013) - argument from ruthee about structure of contra evidence from Akhtar (Akhtar, Jipson, & Callanan, 2001,Akhtar (2005),foushee2016)

In contrast, pedagogical inference – shafto, bonawitz, etc. (Bonawitz et al., 2011,Shafto, Goodman, and Frank (2012)) - evidence for some of this kind of stuff from follow-in labeling. tomasello, baldwin, yu - but this is probably not what parents are doing

most of the time (although c.f. tamis-lemonda) (Tamis-LeMonda, Kuchirko, Luo, Escobar, & Bornstein, 2017) - old arguments from newport, etc. (Newport, Gleitman, & Gleitman, 1977)

An intermediate position: Speakers goal is to communicate - Grice (1969)

reference games and transmission of language - Kirby, Tamariz, Cornish, and Smith (2015) - E. Gibson et al. (2017) - Baddeley and Attewell (2009)

Critically, reference games and information theory (in general) assume that speaker and receiver share the same code

But what if only one person knows the code? In this case, in order to communicate successfully, speakers need to take into account the listener's knowledge of the language - evidence for some speaker design - brown-schmidt and tanenhaus (Brown-Schmidt, Gunlogson, & Tanenhaus, 2008)

In this case, ambiguity will be controlled in part by the speaker's communicative goals, and scale with the listener.

We show that without any explicit pedagogical goal, can get speaker design in reference games that leads to better learning

A spectrum of models from pedagogical to adversarial. Figure?

A model of learning and production

Brief explanation of the general reference game framework

Experiments 1 and 2

speakers adapt to beliefs about points and also speaker knowledge

Methods

Participants.

Material.

Procedure.

Data analysis.

Results

Discussion

Experiments 3 and 4

this leads to better learning, but not as good as ostension (obviously)

A model of teaching

Experiment 5

teaching!

Experiment 6?

partner game–maybe this waits until next paper?

General Discussion

Conclusion

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