



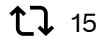
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@ev_fedorenko

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New position paper on expressive agrammatism in aphasia (w/@raryskin, @LanguageMIT). Given growing evidence that humans approximate a Bayesian ideal observer, we revive the “economy of effort” idea where agrammatic output is a rational adaptation to increased production costs. 🧵

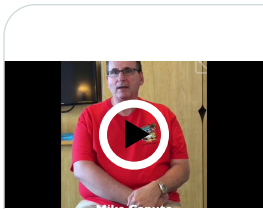
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Paper link: psyarxiv.com/46vdu

Speech (and written output) of many patients with non-fluent aphasia consists of short, simple utterances, with omitted/incorrect function words and morphology (e.g., number agreement). A video of a sample patient:



youtube.com

Broca's Aphasia (Non-Fluent Aphasia)

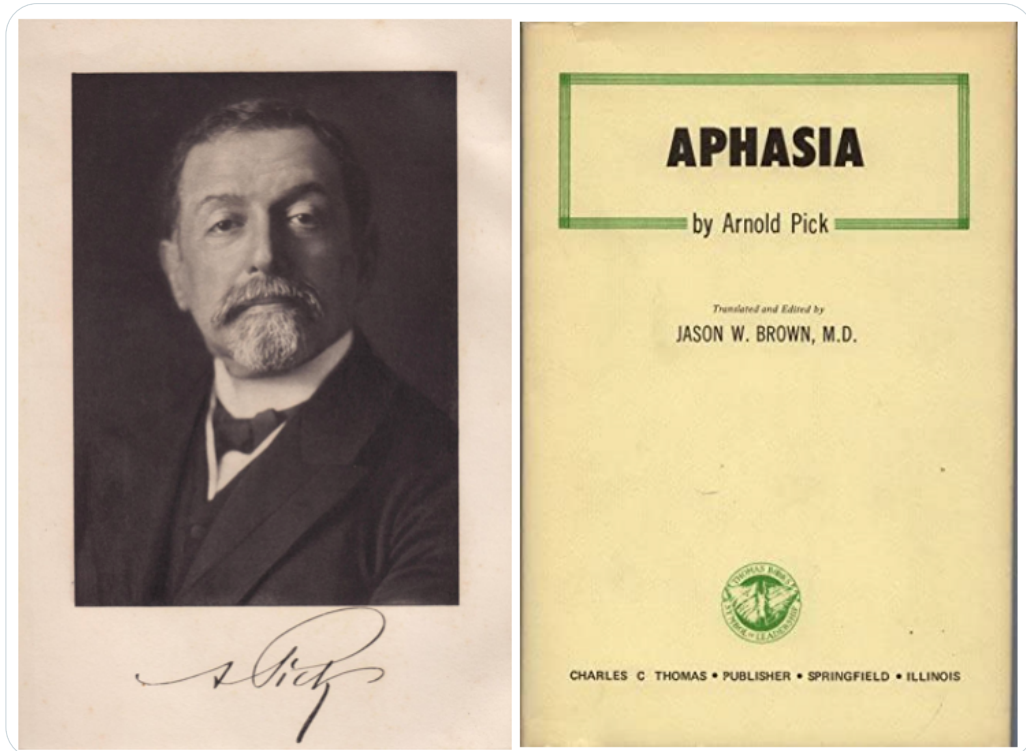
Stroke survivor Mike Caputo has Broca's aphasia. He shares what it feels like and talks about his ...





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This kind of output has long been described as “agrammatic” (lacking grammar; Steinthal, 1871; Kussmaul, 1876). One early explanation of agrammatic output is the “economy of effort” hypothesis (Pick, 1913) where shortening messages by omitting uninformative elements saves effort.





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The economy of effort idea has largely fallen out of favor (cf. Kolk's work in 80s-90s). Why? Zurif et al. (1972; also, Caramazza & Zurif, 1976) showed that individuals with expressive agrammatism have difficulty understanding sentences whose meaning depends on syntactic cues.

The kinds of sentences some individuals with expressive agrammatism have difficulty understanding:

Big Bird is being tickled by Cookie Monster.



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So, given that non-fluent aphasia is characterized by both a) a reduction of syntactic cues in production and b) a deficit in interpreting sentences whose meaning hinges on syntax, many researchers in the 80s-90s argued for a core deficit in syntactic representation.



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BUT: core syntactic deficit accounts have problems. 1) Some patients with expressive agrammatism have no comprehension difficulties (even for synt. complex sentences). So expressive agrammatism can be observed in the presence of intact syntactic knowledge (Miceli et al, 1983).





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And 2) In many patients with comprehension problems, syntactic knowledge loss is unlikely: they can make grammaticality judgments, even subtle ones (eg, Linebarger, 1983) and comprehension performance is affected by the paradigm and task demands (eg, Caplan & Hildebrandt, 1988).



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Plus, similar comprehension problems can be induced in healthy neurotypical adults under cognitive load (Miyake et al., 1994). So: given the growing evidence for noisy-channel accounts of language processing, we revisit the idea of expressive agrammatism as a rational behavior.



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The CRUX: There is a cost per unit of output. This cost is greater for pts with nonfluent aphasia. For a rational agent, this increase should lead to shorter messages. Critically, the informative parts of the msg should be kept and the redundant ones (eg, function words) omitted.



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So, agram. output can be construed as a rational+communicatively optimal behavior under the conditions of greater production cost.(These processes need not require explicit reasoning about maximizing utility. Human minds+🧠 implement unconscious Bayesian inference across domains.)



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Note that individuals without aphasia can and do use the agram. 'register' when their production cost is increased (e.g., having a sore throat, exercising, or having to pay for each letter in texts) or for the benefit of the comprehender (e.g., if talking to kids or foreigners).



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2 more points: **1** Pts with expressive agram. are a highly heterogeneous population (eg, Badecker & Caramazza, 1985; Goodglass & Menn, 1985). Single-factor explanations are therefore unlikely.



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2 Some pts with aphasia certainly suffer from synt. knowledge loss. BUT: to argue for a core synt. deficit, one needs to show that the deficit a) is present in both prod. and compreh., b) generalizes across modalities, materials, and paradigms, and c) is not due to confounds.



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This is a high bar, which is not met in the vast majority of published studies that argue for core syntactic impairments in patients with expressive agrammatism.



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The account of expressive agrammatism as a rational behavior may advance basic research and inform aphasia therapies. On the basic research side, pursuing this hypothesis may reveal how the human mind+ 🧠 maximize communicative efficiency in the presence of production difficulties.



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On the applied side, this construal of expressive agrammatism emphasizes the strengths of some pts to flexibly adapt utterances in order to communicate in spite of grammatical difficulties. Focusing on these strengths may be more effective than trying to “fix” their grammar.



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This point about the importance of focusing on improving the ability of pts with aphasia to interact with others has been made by many over the years, including Holand (1980), van Lancker (2001), Armstrong & Ferguson (2010), Beeke et al. (2012), Doedens & @abcdlabReading (2022).



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Epilogue: Related to this last point, I recently came across a 2001 Aphasiology piece by Diana Van Lancker (tinyurl.com/4dkndp65) called “Is your syntactic component really necessary?” (tinyurl.com/2wy3e89t). It’s a BBS-style piece with responses from other researchers.





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The responses include some somewhat uncollegial replies from the proponents of generative grammar, and a thoughtful response from one of my favorite scientists—Liz Bates. I'll leave you with a couple of quotes from it. End of 📖.



Liz Bates
(1947-2003)

A few quotes from a response to Diana van Lancker's 2001 piece in *Aphasiology*:

"...the hegemony of grammar persists not only for historical reasons, and not only because of the prestige that it confers on linguists who embrace it, but because the "grammar organ" and "grammar gene" metaphors serve current social, economic, and political purposes"

"...the intelligent layperson understands enough about the word "semantics" to suspect that meaning itself is a very broad property of the mind, the brain, and the genome. Meaning isn't a thing in a box. Grammar could be a thing in a box. So we have hope of finding genes and centres for grammar, but far less hope of finding such easy and transparent solutions for semantics."

"...our own hubris as a species dictates the establishment of hard lines to separate us from other beasts. We have been told that it is grammar that makes our language unlike the grunts and squeals and grimaces that characterise communication in other species, because other species do have a primitive semantics ... If "all" that separates us from other animals is semantics, then "all" that separates us from other animals is more and better semantics. In other words, if Van Lancker is right, the difference between humans and other species is... only a matter of degree. We don't seem to like that answer. It is a slippery slope, and it doesn't feel safe."



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p.s. For comments on the earlier versions, thank you to [@smwilsonau](#) as well as Brian MacWhinney, Lise Menn, and Rosemary Varley (all twitter-less, I think)! ❤️



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