

A Naïve View on Language

Philip Schulz

A Naïve View on Language

Just some statements...

- We are born with language
- Any given language can be exhaustively described by a set of rules
- Language is as economic as possible
- The purpose of language is to exchange information
- Language is what makes us special

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Goals of this talk

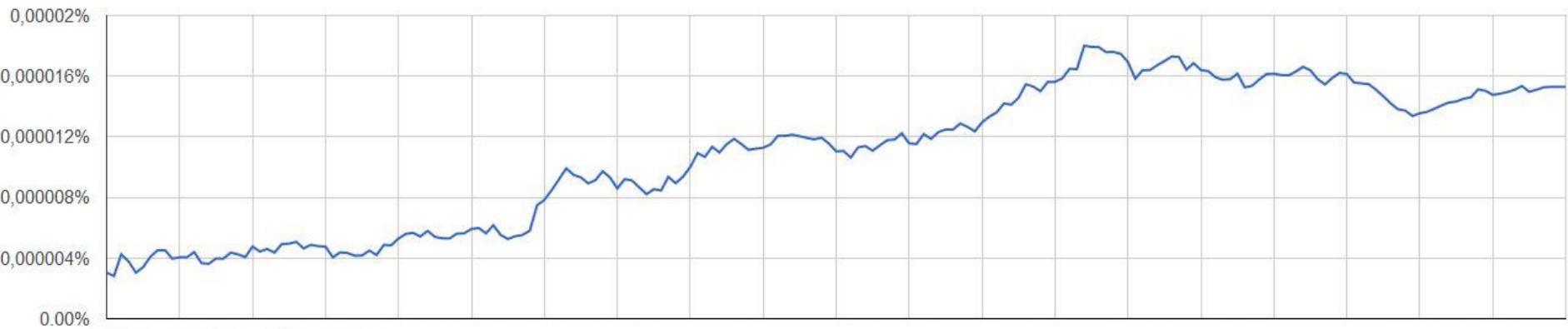
- Present language research as an empirical endeavour
- Share some interesting facts about language
- Get you opinionated about research in “cognition”
- All of this will be done leaving out the engineering perspective (which is important in its own right)

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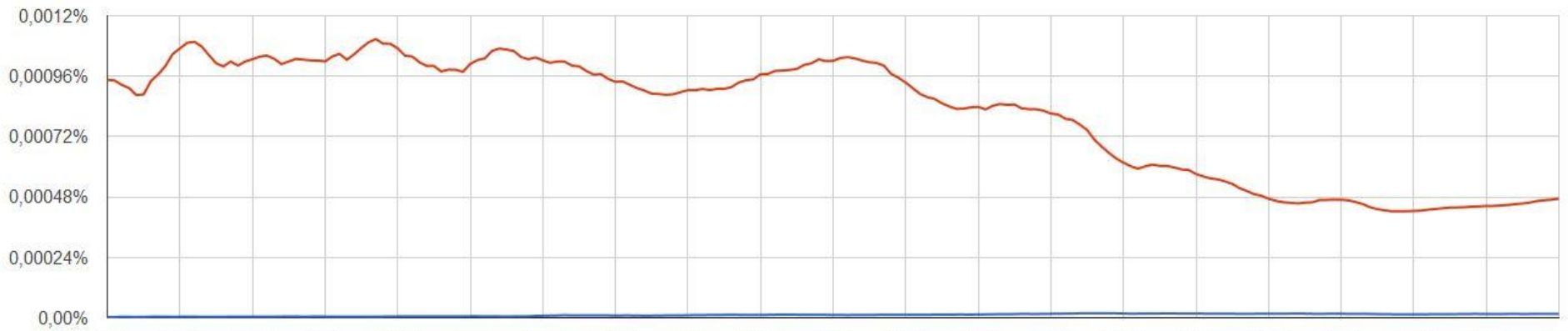
A little game to warm up

- There...
- By the...
- be or not...

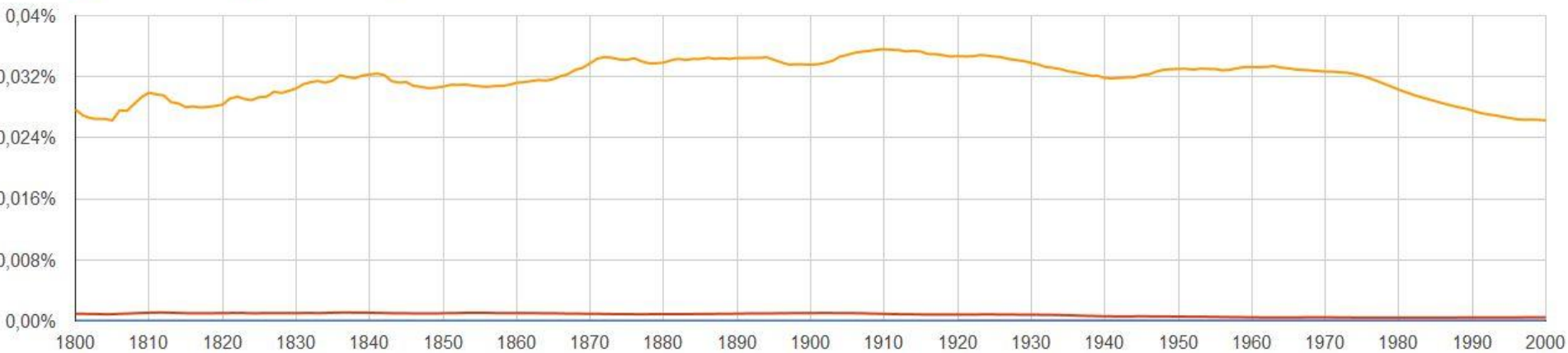
■ be or not to be



■ be or not to be ■ by the way



■ be or not to be ■ by the way ■ there is



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- Google ngram viewer available at <http://books.google.com/ngrams/>
- Clearly, our prediction ability for language is highly influenced by our cultural environment

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Fact 1: Language is linear

- So is it an inherent property of language that it is linear?

Fact 2: Speech is subject to inertia

- In fact, to change their tonal level, speakers of Mandarin take about 100 ms (Xu&Sun,2002)

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Before we move on with linearity, let's take a look at some more speech trivia

- Humans, just as other animals, are able to judge a persons size by their voice
- Emotions are conveyed by body size projection (big = aggressive/upset)
(Chuenwattanapranithi et al, 2008)

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- This carries over to sexual appeal
- Breathy voices are perceived as more attractive (probably because they are pure-tone-like)
- Women's vocal folds never close fully after adolescence
(Xu et al, 2013)

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Fact 3: Language conveys Instinctive and social information

- “These results [...] indicate that humans still employ a vocal interaction strategy used in animal calls despite the development of complex language.” (Xu et. al, 2013)

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But back to linearity...

- Do we make use of linearity?
- Children learn difficult concepts like colours much easier when in the right order:
“There is a red apple on the table.”
vs.
“The apple on the table is red.”
(Ramscar et al, 2010)

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Important implications

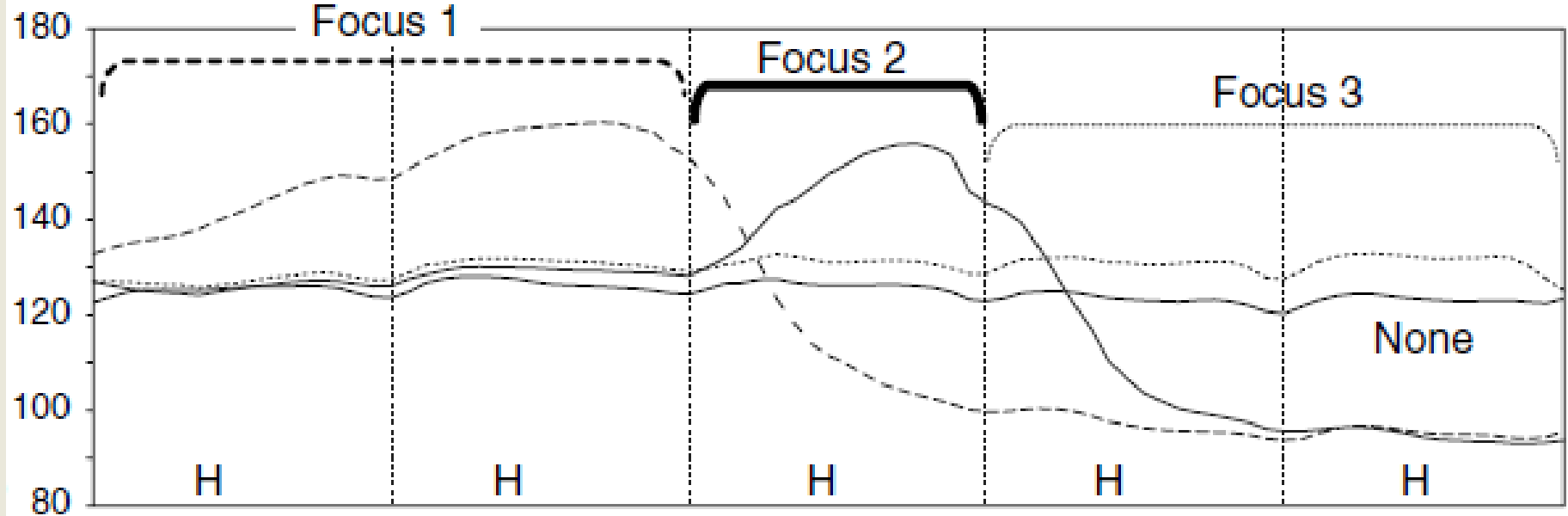
- Children do not just learn words, they learn word-concept pairs
- This indicates that words do not have any meaning per se (a point we will return to later)

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More on linearity

- So does linearity mean that we concatenate minimal meaningful elements in an economic (parsimonious) fashion?
- At least Danny Fox (MIT) made a career by claiming this

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(from Xu, 2005)

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Fact 4: Language (just as most other communicative systems) is redundant

- Up to now we have seen that a common-sense view on language already reveals a lot about it
- So what about “meaning”? What role does logic play?

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Some opinions

- “[rule-driven NLP] has become notorious for the production of countless non-monotonic logics and almost as many logics of knowledge and belief and none of the works shows any obvious application to actual knowledge representation.”
(Charniak, 1993)

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Some opinions

- “[...] sciences that involve human beings rather than elementary particles have proven more resistant to elegant mathematics. [...] we should stop acting as if our goal is to author extremely elegant theories, and instead embrace complexity [...]”

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Some opinions

- “For those how were hoping that a small number of general rules could explain language, it is worth noting that language is inherently complex [...] Every day, new words are coined and old usages are modified.”
(Halevy et al, 2009) => Google research staff

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Some opinions

- “Translation essentially means to transfer a meaning from one language to another. If we knew how to do this machine translation would be easy. However, up to now nobody has given an adequate representation of meaning.”

Khalil Sima'an, ILLC

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Some traditional arguments

- Our theory cannot explain this because it is idiomatic (and not compositional)
- However, this really just means putting a stamp on everything you can't explain (in more data-oriented approaches this would count as cheating)
- See Bolinger (1972) for further arguments against calling something an “idiom”

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Some traditional arguments

- What does “head” mean?
- “Candy came from out on the island in the backroom she was everybody's darling but she never lost her head even when she was giving head”.
(Lou Reed, Walk on the wild side)

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Some traditional arguments

- Well, meanings are conventional (an idea that goes back to Lewis, 1969)
- However, Wagner (2009) and Muehlenbernd & Franke (2010) have shown that acquisition of a convention depends mainly on the learner's surrounding

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Some traditional arguments

- “Although messages are initially meaningless in this game, meaningfulness arises from regularities in behaviour.”
(Muehlenbernd & Franke, 2010)
- Learners observe their surroundings, detect frequent events and try to comply with those

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Summary

- From a very simple observation, namely that language is linear, we have explored an enormous space of language phenomena
- We have seen that, based on real data, we can at least try to come up with reasonable explanations (something that is impossible if one looks only at a hand-picked data set)

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Sooooo,...

- Given that many language phenomena seem to operate on a fairly low level and have to be learned, do we need any fixed notion of meaning at all?
- Plus, of course, all points that you want to discuss

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References

- Just ask me, if interested