Against Occam's razor

Rory Turnbull

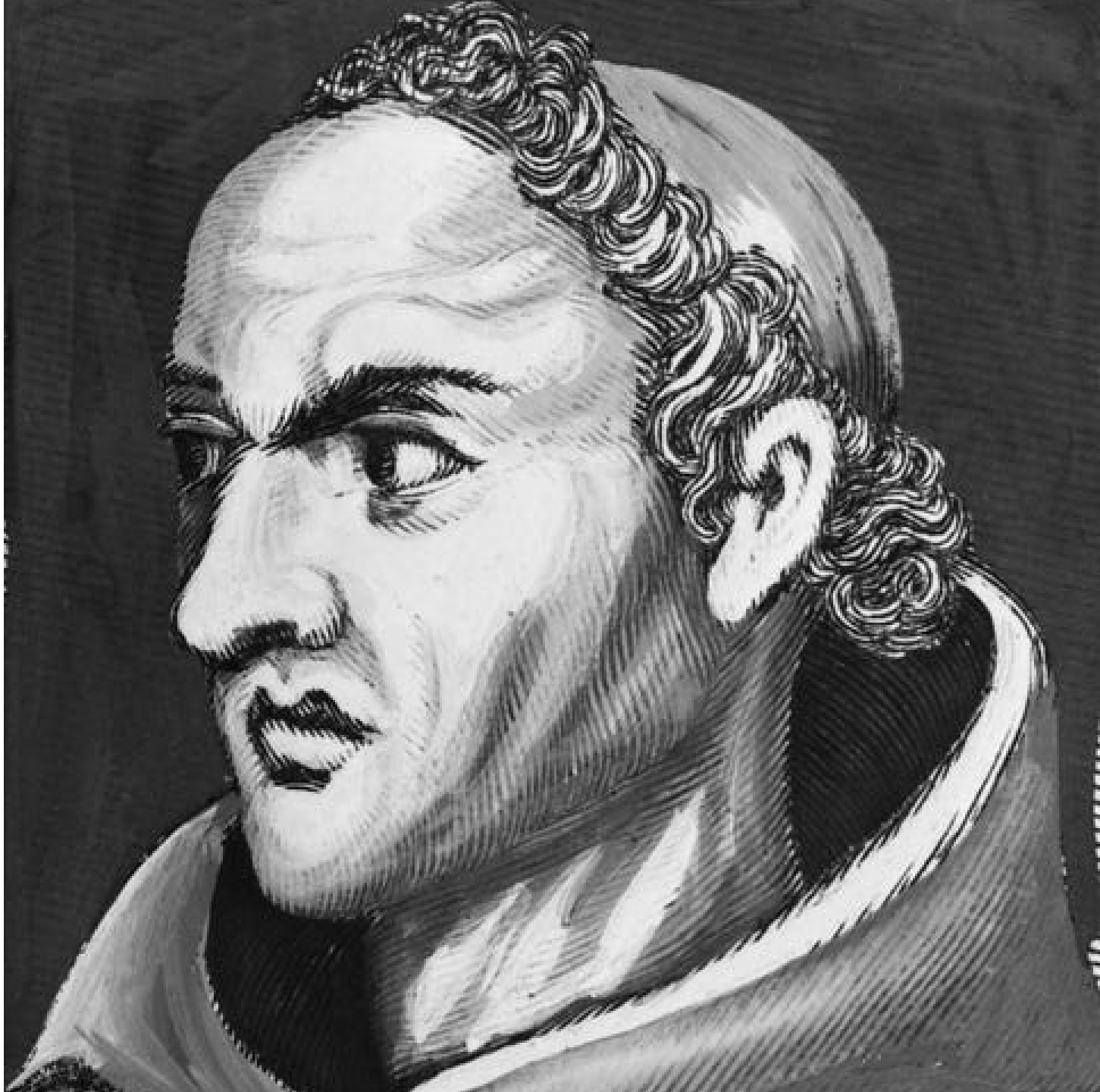
Newcastle University

It is a truth universally acknowledged

- “all things being equal, the simpler analysis is always to be preferred” (Zsiga 2013:209)
- “The usual principle adopted in phonology is that simpler rules, which use fewer features, are preferable to rules using more features.” (Odden 2013:61)
- “Sometimes, selecting underlying /X/ results in a very simple rule for deriving the surface variant [Y], whereas selecting underlying /Y/ results in very complex rules for deriving [X] from /Y/: in such a case, the choice of /X/ over /Y/ is well motivated.” (Odden 2013:33)

Occam's razor

- *Entia non sunt multiplicanda praeter necessitatem.*
- “Entities must not be multiplied beyond necessity.”



The simplest explanation: Occasionalism

- Al-Ghazali: God causes every event and interaction, through His will.
- (Malebranche and Berkeley can be read with similar views.)

- This account explains everything – it happened because God willed it to happen.
- This account has very few entities involved.
- There are no (independent) laws of thermodynamics or gravity or evolution
- There is only the divine will.

English nasals [m, n, ŋ]

- can occur alone in syllable codas (*dam, Dan, dang*)
- can occur in syllable codas followed by a homorganic voiceless stop (*ramp, rant, rank*)
- only [m, n] permissible in onsets (*map, nap*, *[ŋæp], *smack, snack*, *[sŋæk])
- [ŋ] is always* followed by [k], [g], or a morpheme boundary (*thing, anchor, mango, banger, singing*).

* With some exceptions...

The simple solution

- All instances of [ŋ] are actually /n/, transformed to the velar place by place assimilation to the following velar sound.
- Morpheme-final [ŋ] is underlying /ng/: the final /g/ is deleted later in the derivation.
- There is no underlying /ŋ/ in English.

- *thank* /θænk/ [θæŋk]
- *anchor* /ænkə/ [æŋkə]
- *mango* /mængoʊ/ [mæŋgoʊ]
- *bang-er* /bæng-ə/ [bæŋə]
- *sing-ing* /sɪng-ɪng/ [sɪŋɪŋ]

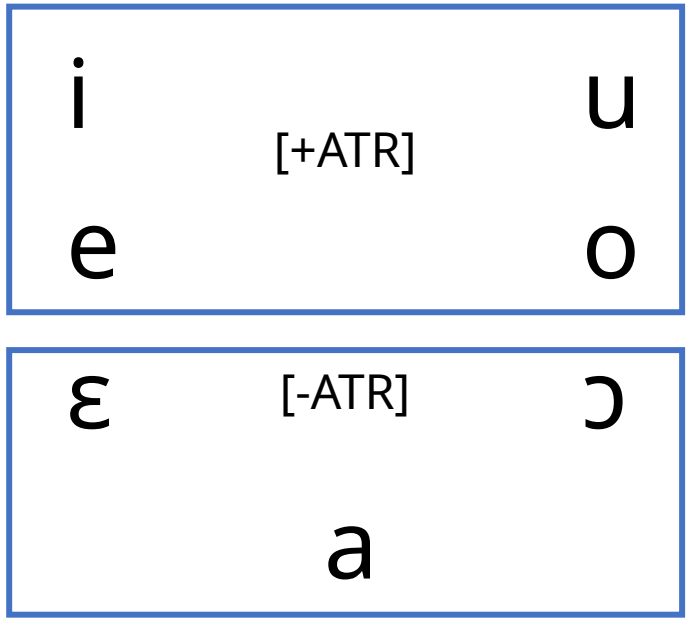
Exceptions and problems

- *Shanghai*
- *Singapore*
- *orangutan*
- *Birmingham*
- *gingham*
- *dinghy*
- *...*

- If we ignore these words, we have a really neat set of generalizations!
- We have simplified the phoneme inventory of English.
- But at what cost?

Vowels in Urhobo

- Urhobo is a southwest Edoid language spoken by around 7 million people in southern Nigeria.
- This language has seven distinct vowels.
- All data here are from Aziza (2008).



[ATR] harmony in Urhobo

1. o-si “they pull”
2. o-se “they call”
3. o-ku “they pour”
4. o-kʲo “they steal”
5. ɔ-ʃɛ “they sell”
6. ɔ-ɣɔ “they worship”
7. ɔ-sa “they shoot”
8. mi-si “I pull”
9. mi-se “I call”
10. mi-ku “I pour”
11. mi-kʲo “I steal”
12. me-ʃɛ “I sell”
13. me-ɣɔ “I worship”
14. me-sa “I shoot”

There are ten vowels in Urhobo

- Urhobo has ten underlying vowels:
  /i, ɪ, u, ʊ, e, ɛ, o, ɔ, ə, a/
- The vowels /ɪ, ʊ, ə/ never surface faithfully.
- ʊ → o
- ɪ → e
- ə → ɛ

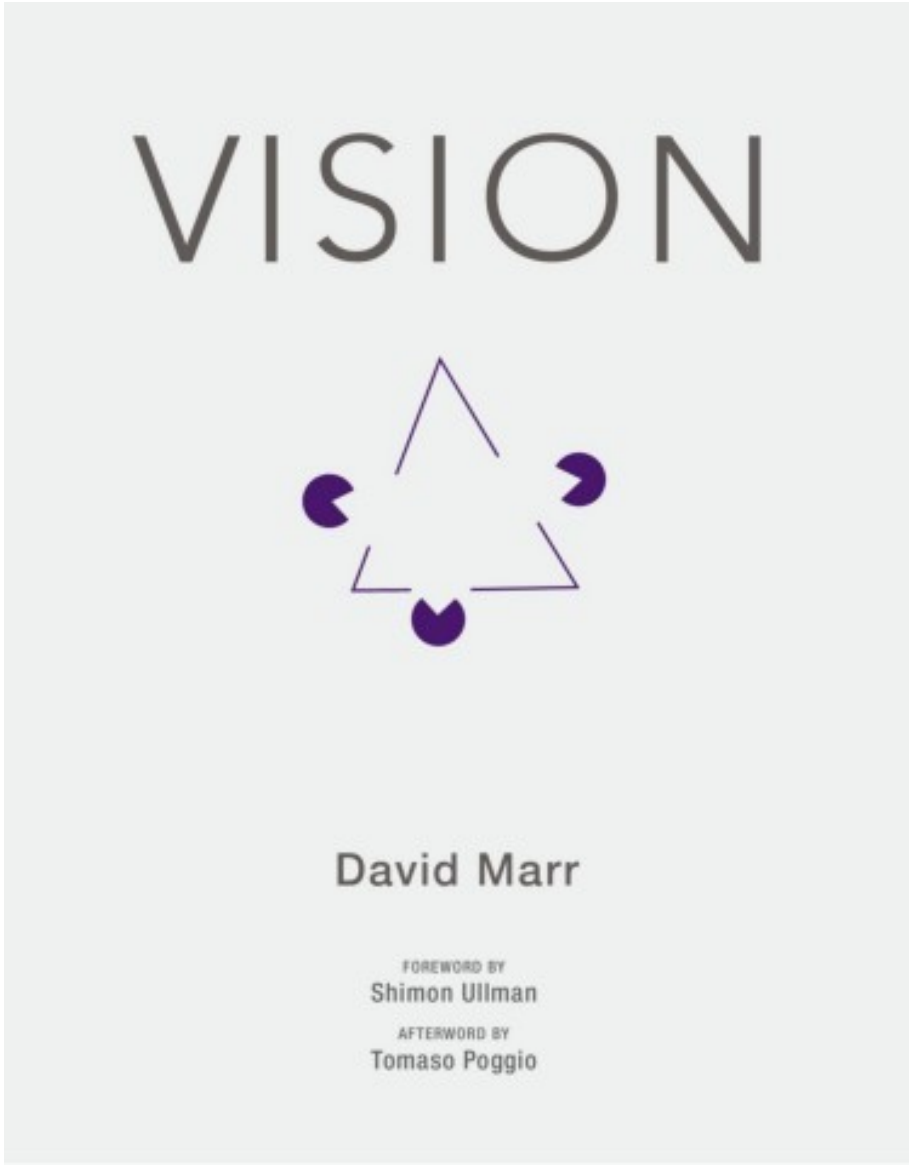
- Harmony happens first, then vowel neutralisation.
- There are counterexamples (Rolle 2013, Umukoro 1999):
- [ɔfigbo] “oil”
- [ɔneki] “customer”

Simpler for whom?

- Occam's razor has been applied to greater and lesser extent in French phonology in the last ~50 years (Klausenburger 2014).
- Simplicity has been used to motivate
  - using monovalent features rather than binary features (Backley 2011), and
  - using ternary features rather than binary features (Contreras 1969).
- The "simplicity" of a hypothesis is relative to the question it answers (Sober 1975).

Marr's (1982) levels of analysis

- Computational: What does the system do?
- Algorithmic: How does the system achieve this?
- Physical: How are the computations performed?



Competing goals of phonological theory

Describe universal grammar

- Promotes a *syntactic* simplicity where economy of expression is valuable.
- Does not necessarily lead to a cognitive or behavioural prediction.

Describe knowledge of a language

- Simplicity may be useful but depends on the Marrian level at which we want to describe it!
- Could lead to a behavioural prediction.

Shorter representations are not necessarily more efficient

- What is more efficient?
  - Non-redundant phonolexical representations and an allophonic rule that must be applied every time the morphemes are uttered or perceived.
  - Storing 500 morphemes with detailed phonetic representations, with rules only used to generalize to novel forms.
- There is no answer to this question (yet!)

Linguistics as a formal science

- The desire for simplicity is perhaps inherited from origins as a formal science.
- Generative grammar is a type of programming, developing a machine that will generate grammatical forms.

- "The real problem is that programmers have spent far too much time worrying about efficiency in the wrong places and at the wrong times; **premature optimization** is the root of all evil (or at least most of it) in programming."

  (Knuth, 1974: 671, emphasis added)

Concluding questions

- Occam's razor considered harmful?
- Simplicity either has empirical, testable predictions, or it is just notational abbreviations.
- "All models are wrong, but some are useful" (George Box)
- How useful is it for our theories to be simple? For whom?

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