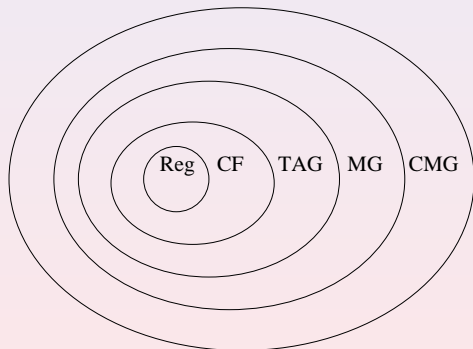


Patterns and factors in natural systems

E. Stabler, EALING, ENS Paris, 2012

1. Human languages: what they are, how we can study them
 - from the Chomsky hierarchy to linguistic theory
2. Factored grammars and models of language recognition
 - derivation, spellout, agreement
3. Beyond MCS \Leftarrow
 - HLs and birdsong as non-FS, non-CF, non-MCS

Kinds of recursive systems, areas of interest refined



Reg: $A \rightarrow aB, A \rightarrow \epsilon$

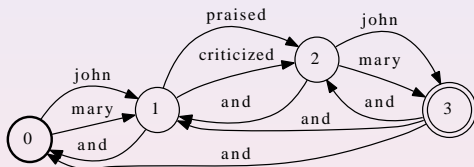
CFG: $A \rightarrow X$

CS TAG: tree adjoining grammar

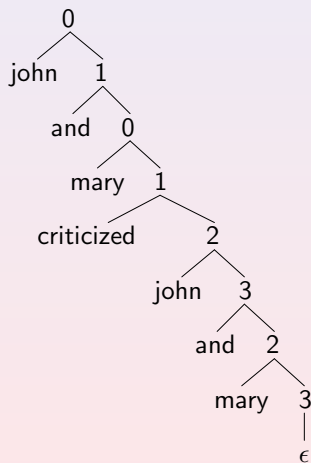
MG: ck+spellout

CMG:MG with copying

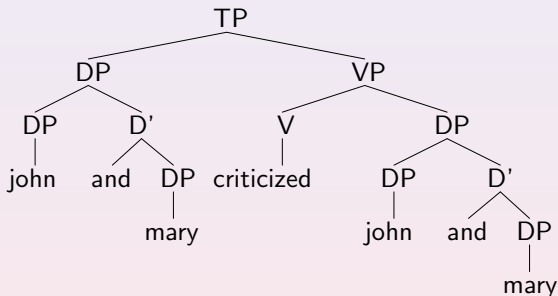
First argument:



$0 \rightarrow \text{john } 1$	$0 \rightarrow \text{mary } 1$
$1 \rightarrow \text{and } 0$	$1 \rightarrow \text{praised } 1$
$1 \rightarrow \text{criticized } 1$	$2 \rightarrow \text{and } 1$
$2 \rightarrow \text{john } 3$	$2 \rightarrow \text{mary } 3$
$3 \rightarrow \epsilon$	$3 \rightarrow \text{and } 2$
$3 \rightarrow \text{and } 1$	$3 \rightarrow \text{and } 0$



TP \rightarrow DP VP
 VP \rightarrow V DP
 V \rightarrow criticized
 DP \rightarrow DP D'
 D' \rightarrow and DP
 DP \rightarrow john
 DP \rightarrow mary

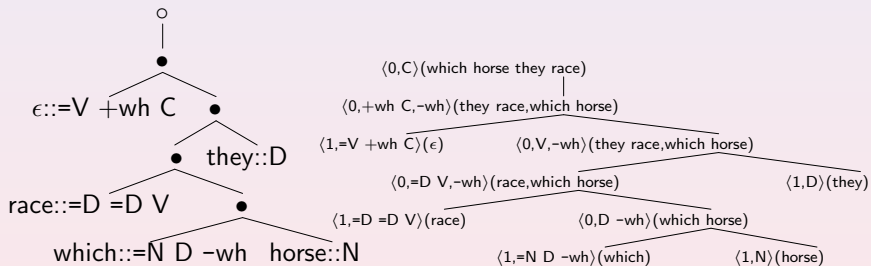


- same DPs in diff positions ('simpler')
- new name \Rightarrow both positions
- boundary effects (e.g. click)
- semantic compositionality

Why CF grammar better:

Then: L(Eng) \notin L(Reg) not shown by 'mastery of AⁿBⁿ' but by evidence that embedded TP has same structure as matrix TP, and evidence that factors relevant to acceptable depth \neq factors determining syntax.

Second argument:



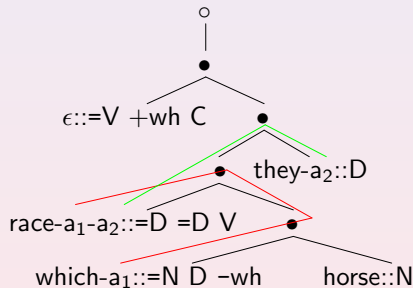
- MG treats movement configurations $[+f\alpha] \dots [-f\beta] \dots$ alike, but MCFG needs a separate rule for every instance
- MCFGs miss this important generalization about merge/move configurations, allowing us to prove that MGs can be exponentially smaller than strongly equivalent MCFGs.

Then: L(Eng) $\not\in$ L(MCF) not shown by 'mastery' of 'X or no X' constructions, for example (Pullum and Rawlins, 2007; Kobele, 2007a), but by considering best factored (eg. MG + memory restrictions) account.

ck+spellout: simplest perspective on merge/move grammar
 (Kobele, Retoré, and Salvati, 2007)

0. form derivation (trivial!)
1. check derivation (at interfaces?) (FS dbutt)
2. map to PF/LF (FS dmbutt)

Third argument (in notes): adding ϕ -agr to MGs

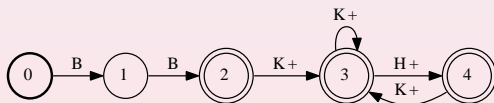


Not multiplying out all possibilities,
separate probes for each feature
(again avoids potentially exp blowup)

Simplest perspective: ck + spellout + agr

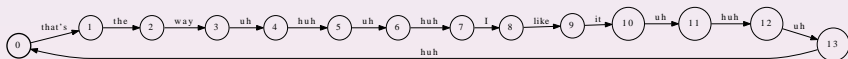
Copying and repetition

(Ouattara et al., 2009): "In nonpredation contexts, we recorded three distinct call sequence types, (i) a pair of 'boom' calls (B) given alone, (ii) a pair of boom calls followed by a series of krak-oo (K_+), and (iii) a pair of boom calls, followed by a series of K_+ calls, with one to several hok-oo (H_+) calls interspersed." p.22027



Apparently repetition of fixed material, not productive copying? (not clear, given reported geographical variation!)

(Knuth, 1984) on 'Alouette', . . . , 'That's the way I like it'



S \rightarrow that's the way U I like it U S

U \rightarrow A A

A \rightarrow uh huh

obviously we want to do still better, but for present purposes: apparently repetition of fixed material, not productive copying (?)

'Verbal clefts' in Vata (Koopman '83)

ngōnū ò wà òā ò ká ngónú á
sleep you want NA you FUT-A sleep Q
'Do you want to sleep?' (p154)

- * tākā ò wà fòtò mómú ò táká bó àbà
show you like picture ITIT you showed REL Aba
'It's show that you like the picture you showed Aba' (p159)

Many questions: why copying in these sorts of constructions and not others?

Cf. (Lefebvre, 1992; Koopman, 1997; Kobele, 2007b; Johnson, 2010, ...)

Case/concord:

(one-one) T[~~u~~Case:N][_{VP}he[Case:N] v[~~u~~Case:A] sees her[Case:A]]

(concord)

- der mutmaßliche Täter (German)
the.N presumed.N perpetrator.N
- des mutmaßlichen Täters
the.G presumed.G perpetrator.G

(stacking)

- thabuju-karra-nguni mijil-nguni (Kayardild, Round'10)
brother-G-I net-I
'with brother's net'

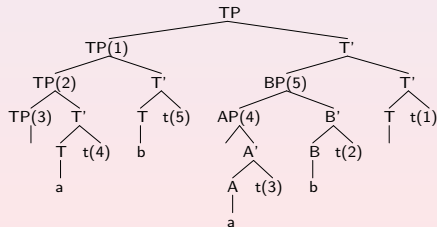
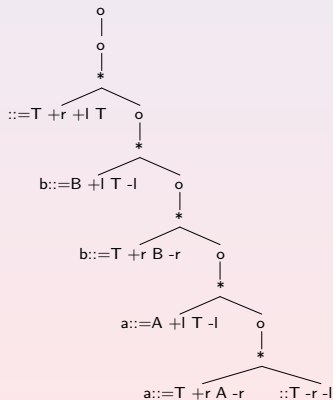
Cf Old Georgian (Michaelis&Kracht'10), and perhaps 'hidden stacking' explains default case effects, etc
(Moravcsik'95;Svenonius'05;Richards'07;Matushansky'11;Brattico'11)

What copying is not:

- use of a queue instead of a stack: **too strong**
(see comp.sci. text, or Li&al'93 "The power of the queue")
- Effect of MG movements: **too weak** . . .

MGs can copy, missing generalizations

(Stabler'04;Kobele'06,'07)

 $\epsilon::T -r -l$ $a::=T +r A -r$ $b::=T +r B -r$ $\epsilon::=T +r +l T$ $a::=A +l T -l$ $b::=B +l T -l$ 

MG copying need a distinct category for every copiable word, not automatically available for new words

Birdsong:

- Finch, formal models
- California Thrasher, formal models

(cf Stabler, Taylor, Cody, forthcoming...)

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