Input beyond the threshold:
Explaining AUX-initial declaratives


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BACKGROUND:
Corpus and diary data is from one cognitively typical monolingual 2yo (Paddy) acquiring British English. He takes AuxS to be canonical word order.

Paddy's syntactic development is largely typical:
- ✓ Head directionality[2]
- ✓ Distinction between AUX and V[3]
- ✓ Auxiliaries/copula BE often omitted[4]
- ✓ Inflected auxiliaries with overt Nom.Subj[5]

Atypical features we observed with Paddy:
- × Default Subj-initial word order[6]
- × Medial auxiliaries before SAI[3]
- × Inversion of any AUX > copula BE[7]

HYPOTHESIS: AuxS 'wins out' as the canonical order for Paddy due to a high proportion of AuxS in his input.

DETAILS:
- **Variational Learning** predicts acquisition of competing grammars until input frequency helps determine which grammar is correct.
- **Tolerance Principle** predicts that a non-canonical variant prevails as lexicalized if its proportional input frequency is not higher.

→ For Paddy, **AuxS is the rule supported by the input; $SAux_{DECL}$ is treated as an exception.**

References:
[1] = Yang (2016).:The price of linguistic productivity.
[2] = Hirsh-Pasek & Golinkoff (1996): The intermodal preferential looking paradigm.
[3] = Stromswold (1990): Learnability and the acquisition of auxiliaries
[4] = Brown, R. (1973): A first language: The early stages.
[5] = Schütze & Wexler (1996.): Subject case licensing and English root infinitives
[6] = Brown & Bellugi (1964): Three processes in the child's acquisition of syntax.
[7] = Cazden (1972): Child Language and Education.
[8] = Heycock & Wallenberg (2013): How variational acquisition drives syntactic change

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When children learn to map speech acts onto clause types, they treat *input variation* like any other regularization problem:

There is a TOLERANCE level for exceptions to a postulated position for auxiliaries.

$$e \leq \theta_N = \frac{N}{lnN}$$

Let a rule R be defined over a set of N items. R is productive if and only if e, the number of items not supporting R, does not exceed θ_N.[1]

Input	Eve (Brown)	Paddy (Diary)	Naima (Providence)
Age & MLUw	*1;11-2;3 & 3.23*	*2;3-2;7 & 2.9*	*1;3-2;7 & 2.87*
AuxS	1164 (8.0 %)	137 (12.6%)	5416 (8.8%)
SAux	953 (6.7%)	31 (3.36%)	6330 (10.7%)
Overall	14509	922	61695

OUTPUT
(1) *You can have lobster salad [...]* 2;2
(2) *Can I have apples too ?* *1;11*

OUTPUT
(3) *MOT: Where is your pen ?*
Oh there it is !
CHI: Can Paddy get it . *2;3*
(4) *Can I read that?* *2;6*

OUTPUT
(5) *I can have lunch before your ice cream .* *2;4*
(6) *Can I have my wallet ?* 2;9

Eve and Naima: SAux is canonical and used for statements, AuxS marks (polar) questions
Paddy: AuxS is canonical and is used for statements (3) and polar questions (4)

VARIATIONAL LEARNING :
- 11 of the 13 auxiliaries in **Naima and Eve's** input occur in both AuxS and SAux orders.
- N & E cannot and do not associate different word orders with different auxiliaries.
- N & E must instead associate different word orders with different semantics.

- Only 2 out of the 8 auxiliaries in **Paddy's input** occur in both AuxS and SAux (with >3 cases of SAux).
- Paddy posits a ***AuxS rule with a few lexicalized exceptions***.

	INPUT		OUTPUT	
	AuxS	SAux	AuxS	SAux
aux-BE	15	6	4	1
can	27	20	2	
cop-BE	25		18	
could	1			
DO	28	3	6	
HAVE	12		2	
might		1		
shall	8		2	
will		1		
Total	116	31	34	1

TOLERANCE PRINCIPLE:
- Paddy **hears** 8 auxiliaries so would permit 4 exceptions (TP: $e \leq \theta_8 = 8/\ln(8) = 3.85$). Only *will* and *might* are used in SAux only.
- *Aux-BE* and *can* could constitute exceptions of a different type; Paddy must determine the import of the difference here.
- Paddy **produces** only 1 lexical exception to a general AuxS rule given an inventory of 6 auxiliaries (TP: $e \leq \theta_6 = 6/\ln(6) = 3.35$).

INDEPENDENT MOTIVATION:
Variation in T-to-C movement reported for Paddy vs. Naima and Eve resembles variation in V-to-T in V2 languages.[8]

MORE DATA?
COMING SOON!


My can I pour it.