

This letter is a comment on ``Computational Constraints on Syntactic Processing in a Nonhuman Primate,`` which appeared in *Science* on 16 January 2003 (volume 303), pages 377--380.

To the Editor,  
Science

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Dear Sir,

Fitch and Hauser [1] have shown that undergraduate students could learn patterns of syllable sequences of the form  $A^n B^n$  for  $n \leq 3$ , whereas tamarin monkeys could not. The authors and Premack [2] interpret this to mean that humans can learn recursive Phrase Structure Grammars (PSG), whereas the monkeys cannot; such grammars are claimed to be crucial to human language [3]. Their interpretation suffers from a flaw: although the the patterns used (AB, AABB, and AAABBB) were generated by a PSG, the induction of a PSG is not *required* to learn them. One cannot assume that the human or monkey who is solving the problem will use the same technique as the experimenters who constructed the sequences.

The experimental conditions do not force a recursive interpretation of the patterns: nothing links the first A to the last B, *etc.* One can force a recursive interpretation by constructing a sentence like "The cats the dog the men walk chases run away." (A="the [noun]", B=[verb].) One then finds that the recursive parsing of such centre-embedded sentences is a non-trivial task [4-7], near or beyond the limits of human performance.

We can think of two other explanations for the observed difference between human and tamarin performance. One is that human subjects determine the "grammaticality" of the stimuli by counting the number of syllables of type A and type B and checking that the numbers match. A second explanation is that the subjects simply learned that there were three allowable patterns and that any pattern that didn't match one of those templates was ungrammatical. Either way, humans can judge the grammaticality of these recursively generated stimuli without the need for recursive mental structures. The existence of these other interpretations of Fitch and Hauser's experiment shows that the case for recursive Phrase Structure Grammars in humans *vs.* tamarin monkeys has not yet been made.

Sincerely,

John Coleman, Greg Kochanski,  
Burton Rosner, Esther Grabe

## References

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- [2] David Premack "Is Language the Key to Human Intelligence," *Science* **v.303**, 16 January 2004, pp. 318-320.
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