

## Questions to address for the Saffran and Newport 1996 paper in *Science*

Saffran et al. 1996 is a very short, but highly cited paper in *Science* (the accompanying pdf is posted), and your goal is to do a thorough critique and analysis of what these researchers did in their experiment and what they accomplished. You will have to pay special attention to the footnotes. As the main topic selection page indicates, while you need to address the points below, you also need to do some thinking on your own and go beyond just answering these point blank to get full marks.

1. In a single short sentence, please state clearly what hypothesis Saffran et al. were trying to establish.
2. What knowledge do Saffran et al. assume that 8-month babies already have, that they bring to the task they were given (both the training and test situations)? What knowledge do Saffran et al. say that is acquired by the infants? What was the specific experimental method they used to determine whether the infants had acquired this knowledge? Please be as complete as possible (i.e., list *all* the prior knowledge that is assumed).
3. Saffran et al. ran two main experiments with the infants. Why did they run two experiments, and not just one? (What was the purpose of each experiment?)
4. For each of the two experiments, they constructed two distinct sets of “training stimuli” for the infants, “Condition A” and “Condition B” nonsense syllable sound streams. (So they constructed four sets of nonsense sound streams in all.) In each condition, a ‘word’ was made up of 3 Consonant-Vowel (CV) ‘syllables,’ so each word looked like this: CVCVCV, e.g., ‘pabiku’; see, e.g., footnotes 16 and 19 in their paper for details. Then all the ‘words’ were run together to create a two minute training data sequence, which is what the infants were exposed to. Question: Why did they construct two *different* sets of stimuli, A and B, for each experiment? Please provide your own examples of each of the four sound streams, at least 40 characters long, following *their* rules for constructing the sequences. What were the statistical properties of these sequences? Why? What other constraints did the artificially constructed sequences have to follow and why? For instance, below is one example corresponding to one of the four syllable sound streams—your job is to give examples like this for all four (including your own version of the one below):

**pabikutibudogolatudaropitibudogolatupabiku**

5. To test the infants after exposing them to the training data, Saffran et al. constructed four “test words” in each of the two experiments. What were they? Why were they constructed the way they were? For each of these words, what did they expect the behaviors of the infants to be?
6. Can you think of any problems with this test stimuli design?
7. The training and test stimuli that Saffran *et al.* used were, of course, ‘nonsense’

syllables. Human languages, on the other hand, can vary quite a bit from this norm. Hawai'ian has a very small phoneme inventory and allows only CV (consonant+vowel) or plain V syllables. An unsegmented Hawai'ian text is thus going to have a lot of alternating CV pairs, with occasional vowel+vowel sequences as well. Polish has a slightly larger consonant inventory than English, and many of its consonant phonemes are written with digraphs (e.g., *sz*). Further, Polish syllables can contain long strings of consonants, as in *grzbiet* ('back') and so on. To an English speaker, Polish texts appear to have huge long strings of consonants. We have provided some test data for you to examine the differences between Polish and Hawai'ian in the files *HawaiianStory.txt* and *PolishStory.txt*. Given this, what would you predict in advance about the success of the infants' newly discovered statistical abilities on Hawai'ian vs. Polish? Explain your answers.

8. Can you think of any other issues with the design and results of this experiment? If you were a reviewer for *Science* would you accept it without changes; accept it with minor revisions; accept it with major revisions, or reject it? In each case, you must justify your answer clearly and succinctly (e.g., what are the revisions and why?).