

9.57, Fall 2001, PROBLEM SET #1

Please note: These are not meant to be “tricky” but to help you learn, to let you test your understanding. Answers should be given in a fairly brief manner; no extra points for extra words. Clarity and correctness is most important. Good luck.

**PROBLEM (1)**

Consider the set of “languages”, all of which have sentences that are made up from the word “zot.”

L1 is { zot, zot zot, zot zot zot, ... }

L2 is { zot zot, zot zot zot, zot(4), ... }

L<sub>i</sub> is { zot(i), zot (i+1), zot (i+2), ... }

...

The notation zot(3) means 3 occurrences of zot, i.e. zot (4) means zot zot zot zot. And so on for the notation. This is an infinite class of languages. L2 simply omits the sentence “zot” and has all the other sentences made from zot. L3 omits “zot zot”, but has all the other sentences. In general L<sub>i</sub> has all sentences on the word “zot”, starting from zot (i) and increasing in length. The languages in the class are defined for all I, that is, there is an infinite class of languages.

Question: Is this class of languages learnable, by the definition given in class, that is, is there a learning procedure which, hearing sentences one after the other from the language (no negative information), will eventually guess the language and never change after that? That is, this learning procedure has to work for all languages in this class. If there is such a learning procedure, describe it. On the other hand, if the class of languages is *not* learnable, say why that is.

Answer: This class of languages is learnable. The learning procedure is as follows: guess the language whose shortest "zot" sequence corresponds to the shortest sequence that you've heard so far. So if you hear zot(12), guess L12; if you then hear zot(8), change your guess to L8; if you then hear zot(15), continue to guess L8; and so on. Since the number of sequences in the input is infinite, this learning procedure will eventually converge on the right language: at some point, the shortest sequence in the input will correspond to the shortest sequence of the correct language. Your guess will never change after that.

Note that, unless the language is L1, you as the learner will never be 100% certain that your guess is correct. Thus, if the shortest sequence you've heard so far is zot(3), you've guessed L3, but you can't be sure that it's right - maybe zot(2) and zot(1) just haven't occurred in the input yet. However, learnability as defined in the question does not take certainty into account. A frequent error was stating that the class of languages is unlearnable because learners will never be certain of their guess. If you gave this answer but also defined the correct learning procedure, you got partial credit.

## **PROBLEM (2)**

Consider the following interchange.

Child: Nobody don't like me

Mother: No, say "nobody likes me."

Child: Nobody don't like me.

(eight repetitions of this dialogue).

Mother: No, now listen carefully; say "Nobody likes me."

Child: "Oh, nobody don't likes me."

Does this interchange argue for or against the usefulness of negative evidence in language learning? Be brief. Two or three sentences are enough to explain.

Answer: This interchange argues against the usefulness of negative evidence. First, it suggests that children do not pay attention to their parents' correction: the child in the example hears the correction eight times before even attempting to follow it. Second, the example suggests that children do not understand what their parents are correcting them for: the child here does not correct the appropriate part of the sentence, and the child's final sentence is in fact less correct than the original.

In order to get full credit, you needed to state both points: that children ignore corrections, and that they don't understand what the correction is for. Both points are arguments against the effectiveness of corrections for language acquisition.