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Is there a critical period for L1 but not L2?

ELISSA L. NEWPORT

Center for Brain Plasticity and Recovery, Georgetown University

I am very pleased to comment on this important and thought-provoking keynote article. The evidence reviewed by Mayberry and Kluender (Mayberry & Kluender, 2017) is extremely significant for our understanding of a critical or sensitive period for the acquisition of language, and the hypothesis they suggest regarding a critical period for first but not second language is challenging. The studies of late L1 learning from the Mayberry lab provide very strong evidence for a critical or sensitive period. However, I am less persuaded of their interpretation of L2 learning and the contrast they hypothesize between L1 and L2 learning during adulthood. I will suggest another hypothesis regarding the differences in age effects for first versus second languages, one that is equally compatible with their important data. My focus here is therefore on their interpretation of the L2 literature. I will not comment further on their review of Mayberry's remarkable studies of late L1 acquisition, except to congratulate them on this very important work.

L2 acquisition: the shape of the AoA function and the effects of non-age variables.

The L2 literature contains several types of evidence regarding whether there is a critical/sensitive period for L2 acquisition. The main evidence, of course, is that there is a decline in average L2 proficiency as a function of the age of first exposure to the language. Here there is virtually no controversy: countless studies find that L2 proficiency does, generally and on average, decline after early childhood. But is this due to a critical or sensitive period, or is it rather due to other variables? I will comment on some of the other types of findings Mayberry and Kluender review.

First, as originally suggested by Johnson and Newport (1989), one can ask about the shape of the AoA function. We argued that if age effects were due to biological maturation, they should change at times and in ways that accord with biological brain maturation. However, our understanding of brain maturation has changed quite a bit in the last 30 years. In 1989 most of us thought that maturational changes in the brain occurred during childhood, but that adulthood was a time of stability (until old age began). Johnson and I therefore hypothesized that age effects in L2 acquisition should also change during childhood but remain stable through the adult years. That is what we found in our data on Chinese or Korean speakers acquiring English. Since that time other investigators have challenged our claim about the shape of this function, using analyses of Spanish speakers or other language groups

Address for correspondence: Elissa L. Newport, Center for Brain Plasticity and Recovery, Georgetown University, 4000 Reservoir Rd. NW, Building D, Suite 145, Washington DC 20057, USA, eln10@georgetown.edu.

acquiring English. But two points are important: First, various L1 groups may have an easier or harder time acquiring English as a function of the similarities and differences between their L1 and English. These differences may result in moving the age function up or down, sometimes producing ceiling effects on simple measures that give the appearance of decline in scores only at later ages. Some language groups may also have substantial exposure to English before their arrival in the US or lack of exposure to native English after their arrival in the US, complicating AoA as a measure of age of exposure.

Second and perhaps most important, in the 30 years since our paper was published, much has been learned about changes in the brain during adulthood. It is now more accurate to hypothesize that L2 proficiency SHOULD decline during adulthood, since we now know that declines in many aspects of brain function begin in early adulthood and continue thereafter throughout the lifespan. Clearly, like many critical periods in other systems and other species, a critical or sensitive period for language acquisition in humans is not absolute or sudden. As we now know better than previously, neither is the plasticity of the brain at the cellular-molecular level. The lack of flattening of the age function at adulthood in many studies does not mean that learning is not constrained by biologically based maturational changes.

There are also many non-age variables that affect proficiency in L2. Mayberry and Kluender take this as evidence against a critical period effect for L2; they suggest that if there were a critical period for L2 acquisition, other variables should not be important. Here I would simply argue that this doesn't follow – why can't other variables interact with age effects? Moreover, there is no evidence that such variables (e.g., the amount of experience or frequency of use of the language) have no effect on delayed L1 acquisition; there simply aren't relevant studies.

The Mayberry and Kluender hypothesis: L1 is affected by a critical or sensitive period, but L2 is not.

Is Mayberry and Kluender's main conclusion – that there is a critical period for L1 but not L2 – the only one that we can arrive at?

Mayberry and Kluender provide clear evidence that delayed L1 acquisition shows much more substantial effects of age of acquisition, both on attained proficiency in the late acquired language and on the neural representation of that language, than we see anywhere in the L2 literature. Mayberry and Kluender argue that there is a critical period for the acquisition of a first language, but there is not a critical period for the acquisition of a second language; and that age effects on L2 arise from other variables.

Another hypothesis is that there is a critical or sensitive period for both first and second language acquisition, but the effects of age on L2 acquisition are REDUCED by the fact that another language has been acquired early in life. Striking differences between late L2 and late L1 learning tell us only that having an early L1 helps; it does not demonstrate that there is no age effect in L2. The striking differences in neural representation may also be the result of a reduced age effect. Greater language proficiency often shows stronger left hemisphere

lateralization. This is true not only for individuals who vary in L2 proficiency but also for L2 learners at different phases of learning and for aphasics after left hemisphere strokes of varying severity.

We have conducted a number of miniature language studies with adult and child learners, who receive carefully controlled and exactly the same input and acquire these languages in the same learning circumstances. However, young children in these studies acquire linguistic patterns quite differently from adults (Culbertson & Newport, 2015, 2017; Hudson Kam & Newport, 2005, 2009; Newport, 2016; Schuler, Yang & Newport, 2016). All of our participants are native speakers of English, so one might view these as studies of L2 learning. There are clear age effects in how they learn. Adults do learn quite a bit, but they also exhibit substantial differences from children in their complex pattern learning.

In sum, I think Mayberry and Kluender's paper is a wonderful contribution to the literature, and their hypothesis that only L1 is subject to critical period effects is challenging and interesting. But I would argue that another hypothesis – that there are critical period effects on both L1 and L2, but that age effects are milder and tempered by other variables when there is a first language already acquired early in life – is equally compatible with the data they review.

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