

# Variation in late L1 acquisition?\*

KAREN EMMOREY  
*San Diego State University*

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Mayberry and Kluender review evidence that second language (L2) proficiency declines with age of acquisition (regardless of modality), but they also review evidence for variable L2 outcomes for individuals, with factors such as motivation, language aptitude, education, and L2 experience playing a role. They argue that if L2 outcomes were fully under the control of a critical period for language (CPL), these learning variables should not predict L2 outcome, and the outcome of L2 learning would not be consistently observed to be so variable. The questions raised in this commentary are whether there is variation in late L1 proficiency and whether such variation could provide insights into the CPL.

Studies by Mayberry and her colleagues have clearly demonstrated that the language outcomes for late L1 and L2 learners (matched for age of acquisition; AoA) are not the same, with poorer outcomes for late L1 learners (e.g., Mayberry, 1993; Mayberry, Lock & Kazmi, 2002; Mayberry & Lock, 2003). This result suggests that brain maturation alone does not determine CPL and that linguistic experience in early childhood is necessary for successful L2 learning. In their conclusion, Mayberry and Kluender further assert that “this attenuated language attainment [for late L1 learners] is unrelated to overall non-verbal cognitive skills or motivation to learn ASL (Valli, Lucas, Farb & Kulick, 1992).” However, the cited work for this claim is not a research study, but rather a collection of essays by deaf students about the role of ASL in their lives. It is unknown whether cognitive skills, motivation, or “language aptitude” might influence late L1 outcomes, as found for L2 outcomes.

An examination of the standard deviation data presented in Mayberry et al. (2003) and Mayberry (1993) suggests some variation in late L1 (and L2) outcomes. For example, Table 5 from Mayberry (1993) provides the proportion of grammatical constituents preserved in a sentence recall task for late L1 and L2 ASL learners. One can calculate that one standard deviation above the mean performance of the late L1 learners (AoA = 9–13 years) falls within one standard deviation below the mean for the

L2 learners (matched for AoA). Thus, there may have been an individual late L1 learner who performed as well as an individual L2 learner. A similar calculation for data presented in Mayberry et al. (2003; Table 4) reveals overlap for the No Early Language group and both groups of L2 learners of English (AoA = 6–8 years) in grammaticality judgment accuracy for passives and relative clauses; however, such overlap was not apparent for the No Early Language group with an AoA between 9 and 13 years. In addition, variation in neural activation for late L1 learners of ASL (AoA = 8–14 years) can be seen in the study by Mayberry, Chen, Witcher, and Klein (2011). For example, for neural activity during a grammaticality judgment task, the linear regression plot of AoA (years) and neural activity (% BOLD signal change) in the left frontal operculum (vol 2; Figure 4) reveals two individuals with an AoA of 12 years exhibiting the same level of neural response in this language region as some of the native and early learners. These observations simply suggest the possibility that individual differences impact late L1 acquisition and create variability in language outcomes (particularly when L1 acquisition occurs before early adolescence).

Mayberry and Kluender recognize that the late L1 learners in the studies cited above were much less language-deprived than the case studies of Shawna, Carlos, and Martin. For example, Shawna and Carlos are not literate (Ferjan-Ramírez, Lieberman & Mayberry, 2013), unlike the other late L1 learners. With so few case studies, it is much more difficult to determine the extent of individual differences in very late L1 outcomes. For example, based on the comparison of neural activation during lexical processing for Shawna and Carlos (adolescent L1 learners) and Martin (AoA = 21), Mayberry and Kluender suggest that “left hemisphere language regions retain some capacity to process language when language is first experienced in adolescence, but this capacity is lost by young adulthood.” Loss of capacity to process language in these regions could be a general outcome for adult L1 acquisition, but this result could also be due to individual factors related to Martin’s linguistic or cognitive experiences.

Mayberry and Kluender showed that variation in linguistic experience during development impacts the

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Address for correspondence:

Karen Emmorey, Laboratory for Language and Cognitive Neuroscience, 6495 Alvarado Road, Suite 200, San Diego, CA 92120  
[kemmorey@mail.sdsu.edu](mailto:kemmorey@mail.sdsu.edu)

CPL and language outcomes. I suggest that this variability extends to individuals within both groups of late L1 and L2 learners. In light of this, the conclusion that “Unlike L2 learning, late L1 acquisition slows and then stops at the level of simple sentence structure” may be too strong or premature. For example, one or two of the late L1 learners in Mayberry et al. (2003) may have been able to comprehend complex sentences (e.g., passives; datives), and it is unknown whether either Shawna or Carlos may be able to comprehend some complex sentences with more years of ASL experience. It is also possible that with larger sample sizes (similar to those in L2 studies), a few successful late L1 learners might be identified (particularly from the less language-deprived population).

Recently, Kidd, Donnelly, and Christiansen (2018) presented detailed evidence for interactions between variation in linguistic input, in brain development (e.g., due to variation in socioeconomic factors), and in cognitive capacities (e.g., working memory, executive function). Environments that create early language deprivation are likely to exert effects on both brain development and cognitive capacities that could impact how linguistic input is processed. Variation in late L1 outcomes may provide insights into factors that impact the CPL and the role of experience in language attainment. However, this commentary should not be taken to suggest that the effects of early language deprivation can be easily overcome or that the detrimental effects of late L1 acquisition are not as severe as indicated by Mayberry’s research. Whether and how effects of early language deprivation might be mitigated by differences in cognitive

capacities, brain development, or quantity of linguistic input (among other possible variables) represents an important area for research.

## References

- Ferjan-Ramirez, N., Lieberman, A. M., & Mayberry, R. I. (2013). The initial stages of first-language acquisition begun in adolescence: When late looks early. *Journal of Child Language*, *40*(2), 391–414. DOI:10.1017/S0305000911000535
- Kidd, E., Donnelly, S., & Christiansen, M. H. (2018). Individual Differences in Language Acquisition and Processing. *Trends in cognitive sciences*, *22*(2), 154–169.
- Mayberry, R. I. (1993). First language acquisition after childhood differs from second language acquisition: The case of American Sign Language. *Journal of Speech, Language, and Hearing Research*, *36*(6), 1258–1270.
- Mayberry, R. I., Chen, J.-K., Witcher, P., & Klein, D. (2011). Age of acquisition effects on the functional organization of language in the adult brain. *Brain and Language*, *119*(1), 16–29. doi:10.1016/J.Bandl.2011.05.007.
- Mayberry, R. I., & Lock, E. (2003). Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesis. *Brain and Language*, *87*(3), 369–384. DOI:10.1016/S0093-934x(03)00137-8.
- Mayberry, R. I., Lock, E., & Kazmi, H. (2002). Development: Linguistic ability and early language exposure. *Nature*, *417*(38), 38–38. DOI:10.1038/417038a
- Valli, C., Lucas, C., Farb, E., & Kulick, P. (1992). *ASL Pah!: Deaf students’ perspectives on their language*. Silver Spring, Md: Linstok Press.