Adult Neuroplasticity in Word Processing: Evidence from First Language Attrition Research

Anastasia Sorokina[1]

[1] *World Languages and Literatures, Southern Connecticut State University, USA*

Background: Research on first language (L1) attrition, the non-pathological decline of language abilities following prolonged second language (L2) immersion, might offer an insight into adult neuroplasticity and word processing. This literature review synthesizes findings from studies examining L1 attrition to evaluate whether the adult brain retains sufficient plasticity for language reorganization and how such changes inform theoretical models of word processing.

Method: Out of the initial list of 500 studies, a search was narrowed down to 25 papers based on the following criteria: 1) investigation of L1 attrition in adults; 2) inclusion of at least one word processing measure; 3) relevance to neuroplasticity. The examined studies focused on diverse language pairs, employed various neurophysiological measures (primary event-related potentials) alongside behavioral assessments (reaction times, accuracy, fluency tasks).

Results: Findings revealed domain-specific vulnerability patterns. **Lexical-semantic processing** demonstrated the most consistent attrition effects. **Morphosyntactic processing** showed variable patterns. **Phonological attrition** was most pronounced for L1 contrasts lacking L2 support, with a critical threshold around age 12 for exposure effects. Proficiency rather than age of acquisition emerged as the key modulator: high-proficiency attriters achieved native-like processing on some measures while lower-proficiency attriters resembled L2 learners, challenging categorical native/non-native distinctions. L2-dominant attriters could perceive grammatical L1 sentences as ungrammatical when structures violated L2 grammar, demonstrating substantial reorganization of stabilized first language processing. Importantly, attrition effects were reversible through L1 re-exposure, supporting dynamic activation threshold models over permanent representational loss.

Discussion: These findings provide evidence that adult brains retain substantial neuroplasticity for language processing, challenging a strict critical period hypothesis. Neural reorganization is evident in altered ERP components, with cross-linguistic influence operating bidirectionally. The continuum of processing profiles from monolingual-like to L2-learner-like challenges categorical native/non-native distinctions, demonstrates that word processing continuously adapts to linguistic environment. The domain-specific vulnerability and reversibility through re-exposure support dynamic systems where proficiency and exposure shape processing. Lastly, high-proficiency attriters show that "nativeness" is not static but adapts to usage patterns, with linguistic knowledge remaining accessible and flexible.

References

[1] Kasparian, K., Vespignani, F., & Steinhauer, K. (2016). First Language Attrition Induces Changes in Online Morphosyntactic Processing and Re-Analysis: An ERP Study of Number Agreement in Complex Italian Sentences. *Cognitive Science*, *41*(7), 1760–1803. https://doi.org/10.1111/cogs.12450

[2] Pu, H., Medina, Y., Holcomb, P. J., & Midgley, K. J. (2019). Testing for Nonselective Bilingual Lexical Access Using L1 Attrited Bilinguals. *Brain Sciences*, *9*(6), 126. https://doi.org/10.3390/brainsci9060126

[3] Gallo, F., Bermúdez-margaretto, B., Malyshevskaya, A., Shtyrov, Y., Kreiner, H., Pokhoday, M., Petrova, A., & Myachykov, A. (2024). Lexico-Semantic Attrition of Native Language: Evidence From Russian–Hebrew Bilinguals. *Language Learning*, *75*(3), 771–800. https://doi.org/10.1111/lang.12678

[4] Ahn, S., Chang, C., Dekeyser, R., & Lee-Ellis, S. (2017). Age effects in first language attrition: Speech perception by Korean-English bilinguals. *Language Learning*, *67*(3), 694–733. https://doi.org/10.1111/lang.12252

[5] Steinhauer, K., & Kasparian, K. (2020). *Brain plasticity in adulthood-ERP evidence for L1attrition in lexicon and morphosyntax after predominant L2 use*. Oxford University Press.