Neuropsychological correlates of L1 attrition and L2 acquisition: A continuum based on proficiency

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INTRODUCTION

BACKGROUND & AIM:

Neurobiological “critical period” for language is still controversial:

- Claim that maturational constraints on brain plasticity1,2,3 impede “native-like” neuro-cognitive mechanisms of L2 processing2, whereas L1 is “privileged” in that it is hard-wired and stable.

- Opposing view: Factors such as proficiency or exposure have a greater impact than age-of-acquisition (age)/on language processing in the brain.

Immigrants immersed in new language in adulthood allow us to explore this question, as they become highly-prospective in late-L2 while experiencing changes or attrition on L1.

AIMS:

- Effect of proficiency level on patterns of L1- and L2-processing
- Does proficiency modulate processing patterns, regardless of whether the language was learned as L1 or L2?
- Does L1-attrition parallel L2 acquisition?, but in reverse?
- Neural correlates of L1-attrition (largely unexplored to date)

- Is there evidence of attrition in online L1-comprehension

PARTICIPANTS:

Four groups:

- (1) Attrition: First-generation immigrants of Italian (L1) + English (advanced, dominant, late-acquired L2).
- (2) L2 learners: English (L1) + Italian (advanced, late-acquired L2)
- (3) Italian native-speakers in Italy (Monolingual control)
- (4) English native-speakers (Multilingual control)

- Several ERP (reading) experiments assessing syntax4 (not reported here) and lexical-semantics5 in Italian and English.

- Proficiency in each language is derived as a composite measure based on written C-test1,2,3, written error-correction test, and verbal semantic fluency4; participants divided into High/Low subgroups by median split.

- Task during ERP recording: Acceptability judgment (rating 1-5).

OVERVIEW OF STUDIES:

Study 1: Difficulties with lexical-semantics within L1

- Italian sentences with confusable words (angolo/fracio vs. angolo/morto) vs. (angolo/fracio vs. angolo/morta)
- Is detection of violation mediated by proficiency level, both in L1- and L2-learners?

Study 2: Co-activation of L1 meaning when reading in L2?

- English sentences with interlingual “false friends” homographs (cane/cane or monte/monte)
- Are there co-activation6 for both bilingual groups, or just L1 to L2?
- Is there/no L1-activation with increased attrition?

STUDY 1: ITALIAN LEXICAL-SEMANTICS

RESULTS

- N400 (390-550ms): Controls (Fig. a) high proficiency Italian (Fig. b) and high proficiency Italian-L2 learners (Fig. c) show a significant N400 in both violation conditions. Low-proficiency attriters (Fig. d) (i.e., more attrition) show a large N400 with for mismatch condition, failing to automatically detect the swap.

- Mismatch is the meaningful factor (swap vs. pass, p < 0.05) rather than mismatch (word group, p > 0.5). High proficiency speakers elicit a significant N400 for swap vs. correct (p < 0.001), whereas low proficiency speakers do not (p > 0.4). High proficiency bilingual groups are not statistically different from controls (p = 0.5), contrary to low proficiency groups (p < 0.05).

- Interestingly, within each proficiency level, attritors and L2 learners do not differ significantly (p > 0.1).

DISCUSSION

- Study 1 examined Italian lexical-semantic processing during reading in L1 (for attritors) and in L2 (for L2 learners), compared to native-speakers of Italian still reading in Italy.

- Results provide the first ERP evidence of ‘non-native-like’ online lexical semantic processing in attritors, particularly in those with lower Italian (L1) proficiency scores (i.e., more attrition), and especially for confusable words (swap) conditions.

- This finding favors the view of ongoing neuroplasticity in adulthood even in one’s L1.

- Larger P600 effects in attritors may reflect more elaborated processing (“second thought”), monitoring.

- Processing patterns were mediated by proficiency level in both bilingual groups, regardless of AoA.

- We are currently investigating effects of frequency and close similarity, and correlation between ERP patterns and behavioral data.

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DISCUSSION

- Study 2 examined English lexical-semantic processing when reading in L2 (for attritors) and in L1 (for L2 learners), compared to native-speakers of English with no/minimal knowledge of other languages.

- Results showed evidence of co-activation of two lexical systems while reading sentences in one language.

- This co-activation was strongest in attritors (L1 to L2) but also present in English-Italian bilinguals (L2 to L1), who were not identical to monolingual English controls.

- Stronger attraction (i.e., less attrition proficiency) was associated with /o word cross-linguistic influence in early N400

- Taken together, these studies suggest that advancing L1-attrition and L2-acquisition have something in common – proficiency is key in determining neural correlates of language-processing, in both L1 and L2.

- Evidence in favor of L1-attrition and proficiency-mediated patterns of language processing changes the view of a neurobiological critical period.

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