First-language (L1) attrition in adulthood: New insights on language experience and neuroplasticity

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INTRODUCTION

It is more challenging to learn a second-language (L2) in adulthood than childhood. [1-5] This is due to maturation limits on neuroplasticity after critical/sensitive period for L2? Claim that L1 is "privileged" and hard-wired (i.e., stable) whereas L2 must rely on different neurocognitive substrates, as those for L1 are no longer plastic/available. However, factors such as proficiency and exposure are typically confounded with age-of-acquisition (AoA) and have increasingly been shown to determine native-like language processing.

First-language “attriters” shed new light on neuroplasticity – become predominantly-exposed and high-proficient in late-L2 in adulthood, while experiencing changes and attrition in L1. Is there evidence of L1-attrition in adult migrants in neural correlates underlying L1? Do ERPs reveal attrition effects before we see them in behavioral performance? Are there parallels/similarities between L1-attrition and L2-processing? Does proficiency modulate brain responses, irrespective of L1/L2 status (AoA)? Is attrition L2-to-L1 transfer, low L1-proficiency and/or something more? Behavioral tasks + ERP reading studies conducted in Italian and English Four participant groups: (1) Attriters: First-generation Italian immigrants, report L1-decline and English-use (AoA: 36 yrs; L1-L2 = 28 yrs; L2-L2 = 12 yrs; n = 24) (2) Late L2-learners: English-Iranian (advanced); AoA: ≈ 31 yrs, A4-A2-Italian = 20 yrs, n = 20 (3) Italian native-speakers in Italy (monolingual controls), Age = 30 ± 6, n = 30 (4) English native speakers (monolingual controls), Age = 30 ± 5, n = 30

STUDY 1: NUMBER AGREEMENT IN L1-ITALIAN

Manipulated number agreement between subject, verb and modifier 2 target words: verb and modifier Based on a study with Italian monolinguals which showed that when number mismatch detected between S-V, repair occurs based on V and modifier integrated accordingly (> 250 ms delay as correct, not 250 ms) Do Attriters process and “repair” number violations similarly to non-attriting native-Controls?

1) ACCEPTABILITY JUDGMENT TASK (2-5)

2) VERSUS CONTROLS

ATTITIRES

Controls

No rating differences between violations or between groups. Attriters slower in RTs than Controls (see below)

NEGATIVITY: More robust / broader in L2-Attriters than Controls. Co-factors include subjective judgment (schema in Italian), 5 targets filler V, P600: Smaller, less pronounced > attriters in controls

Attrition effects observed in online grammatical processing - Influence of English and changes in online revision/repair of sentences. - Proficiency predicts native-like processing patterns, even in L2 - But attrition not only L1 proficiency efficacy differences in group.p late P600 - Online ERP differences in absence of offline behavioral differences

STUDY 2: RELATIVE CLAUSE WORD-ORDERS IN L1-ITALIAN

Do attriters show cross-linguistic influence (transfer) from predominantly-used L2 (English) although reading in native-L1? Italian has flexible subject-verb order and Italian readers rely on semantic cues (agent-patient role) to assign subject. English readers rely on word order and would perceive R2 and R3 are grammatical (P600)

1-LVNP subject

Il gatto che caccia i topi corse nel giardino.

The cat that the mice runs in the garden.

2-LVNP object

Lo cappotto che ho perso non si trova nel gabinetto.

The coat that I lost is not in the closet.

3-LVNP subject

Il gatto che i topi cacciano nel giardino.

The mice that the cat runs in the garden.

4-LVNP object

Il gatto che caccia i topi correre nel giardino.

The cat that runs the mice in the garden.

Affix changes observed: English-L2 syntax when processing Italian-L1. Word orders are permissible in Italian but violations in English are rare and lower processed differently

STUDY 3: PROCESSING ‘CONFUSABLE WORDS’ IN ITALIAN

Correct

Attriters elicit shorter P600s for both targets: verb and modifier

Incorrect Target word: R2 is ORANGE: Do attriters show more flexible L1 processing?

Mismatch (word from a different minimal pair switched)

Attriters show less robust violation effects (L1 effects) vs. Controls. (control group performs to L2-attriters)

STUDY 4: PROCESSING HOMOGRAPHS AND COGNATES IN ENGLISH

Do L1-Attriters show less transfer (i.e., co-activation) from L1-Italian to L2-English (i.e., more “native-like” in English), with increasing proficiency? Do native-English Attriters show co-activation from L1-attrition in L1-English?

EH (homograph in English homograph context)

EH (homograph in cognate context)

CC (cognate in cognate context)

Do attriters show less transfer from a transfer-context (English-L1 to English-L2) when the context is consistent with the Italian meaning, and a cognate facilitate effect? These effects were modulated by Italian-native Italian relative proficiency level and by length of residence. The N400 for English violations were indistinguishable from English-native speakers (monolinguals and bilinguals). Both bilingual groups showed larger P600s for homograph targets than cognates (and smallest for CC) - increased conflict and “second thought” during lexical selection?

SUMMARY OF FINDINGS

Our studies provide the first ERP evidence of L1-attrition effects in online morphosyntactic and lexical-semantic processing. Individuals who lived in exclusively monolingual L1-environment until adulthood can experience changes to L1 at neurocognitive level. Changes can resemble low-proficiency conditions, cross-linguistic influence and/or less efficient and more conscious processing

Proficiency-level is a crucial factor in determining the brain’s responses to language, not only for L2 processing but also in L1. Attriters can resemble late L2-learners on some aspects of processing, regardless of L1/L2 status (on the same continuum) Overall, our studies argue in favor of ongoing neuroplasticity for language in adulthood

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