

Understanding Heritage Language Processing: A Neurocognitive Study

This research project examines how heritage Spanish speakers mentally process grammatical and lexical aspects of the Spanish language and how their brain patterns compare to those of native Spanish speakers and higher-level Spanish language learners. Previous studies that have investigated native language (L1) and second language (L2) mental processing have used electrophysiological data, also known as event related potentials (ERPs). For L1 and L2 speakers an N400 is elicited by lexical/semantic violations but differences lie in syntactic processing for low and high proficiency L2 speakers. At a low proficiency L2 learners elicit N400s and at high proficiency L2 learners elicit P600s and (E)LANs. No study has yet examined cognitive processing in heritage language speakers. For the purpose of this study, a "heritage speaker" is defined as a person who has been raised in a home where a non-majority language is spoken, or who speaks or merely understands the heritage language, or who is to some degree bilingual in the majority language and the heritage language (Valdes, 2000, p.1). The thesis question is whether there is a cognitive difference in processing Spanish between heritage speakers, L1 speakers and L2 learners. Following the methodology of Bowden and Ullman (submitted), both behavioral and electrophysiological data were collected for lexical/semantic and syntactic processing for heritage speakers and then compared to L1 Spanish speakers and L2 Spanish learners. For the behavioral task, heritage speakers performed more accurately than L1 speakers and L2 learners for semantic violations, but less accurately than L1 speakers and L2 advanced learners for phrase structure violations. These results seem to indicate that heritage speakers rely on semantic information. Results from ERP data showed centro-parietal negativity between the 300-500ms time windows, that suggests an N400 for semantic violations. In the same time window, results from syntactic violations showed a general anterior negativity which suggests a LAN. There is also evidence of a slightly late posterior positivity. A practical application is that, heritage speakers in their 3rd college-level semester of formal instruction in Spanish are not at the same level as L2 learners.

Neurocognitive development of L2 morphosyntactic processing:

Effects of explicit and implicit training

Of interest to SLA researchers are several related issues concerning the acquisition and processing of morphosyntactic forms by late second language (L2) learners: What computational and neural systems underlie second language acquisition and processing at both low and high proficiency levels, whether later learners can achieve native-like proficiency, and what effect explicit and implicit training has on these

issues. Informed by the fields of cognitive neuroscience and second language acquisition the current study investigated the neurocognitive underpinnings of adult acquisition and use of L2 syntactic and morphosyntactic structures by using an artificial language paradigm, following Friederici, Steinhauer and Pfeifer (2002). Adult subjects learned an artificial language to advanced levels of proficiency under two training conditions: explicit and implicit. L2 processing was examined within subjects and across groups over different proficiency levels using a grammaticality judgment task as well as event-related potentials (ERPs), which reflect the electrical brain response to a cognitive event. Results on the morphosyntactic condition (gender agreement on adjectives and determiners in nominal phrases) at two proficiency levels and on a delayed posttest (administered three to six months after the experimental sessions) will be reported. Learners receiving explicit training were more accurate making grammaticality judgments than implicitly trained learners at low proficiency but not at higher levels of proficiency or at delayed post testing. ERP measures reveal a more complex pattern of results. Both similarities and differences in neurocognitive processing are found depending on proficiency level and whether agreement is on the adjective or the determiner. These findings will contribute to a relatively new body of neurocognitive research on how L2 morphosyntax is processed (Mueller, Hahne, Fujii & Friederici, 2005; Rossi, Gugler, Friederici & Hahne, 2006; Tokowicz & MacWhinney, 2005) and will extend this research by exploring the effects of explicit and implicit training on such processing.

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