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1.Most Downloaded

Neural changes underlying successful second language word learning: An fMRI study

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Abstract

A great deal of research has examined behavioral performance changes associated with second language learning. But what changes are taking place in the brain as learning progresses? How can we identify differences in brain changes that reflect successes of learning? To answer these questions, we conducted a (fMRI) study to examine the neural activities associated with second language word learning. Participants were 39 native English speakers who had no prior knowledge of Chinese or other tonal language, and were trained to learn a novel tonal vocabulary in a six-week training session. Functional MRI scans as well as behavioral performances were obtained from these learners at two different times (pre- and post-training). We performed region of interest (ROI) and connectivity analyses to identify effective connectivity changes associated with success in second language word learning. We compared a learner group with a control group, and also examined the differences between successful learners and less successful learners within the learner group across the two time points. Our results indicated that (1) after training, learners and non-learners rely on different patterns of brain networks to process tonal and lexical information of target L2 words; (2) within the learner group, successful learners compared to less successful learners showed significant differences in language-related regions; and (3) successful learners compared to less successful learners showed a more coherent and integrated multi-path brain network. These results suggest that second language experience shapes neural changes in short-term training,

and that analyses of these neural changes also reflect individual differences in learning success.

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2.Recent Article

The electrophysiological mechanism of joint language switching: Evidence from simultaneous production and comprehension

Abstract

Successful communicative language switching requires the finely orchestrated interaction between a speaker's production-based processes and a listener's comprehension-based processes. It is necessary to explore language switching mechanisms during simultaneous production and comprehension tasks. Pairs of bilinguals were asked to cooperatively complete a picture-naming task in two languages according to cues, leading to simultaneous production and comprehension. Results showed that switching to L2 elicited a larger LPC than switching to L1 during within-person switching in stimulus production processing, suggesting that inhibition may mainly play a role in suppressing the non-target lemma. This LPC pattern was also found at right hemisphere electrodes during within-person switching in stimulus comprehension processing, and occurred after the listener heard the speaker's utterance. Altogether, simultaneous language production and comprehension might both involve inhibitory control mechanism, and listeners compare the actual utterance of speaker with his/her own previous prediction after hearing what the speaker said.

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3. Most Cited

A neural theory of speech acquisition and production

Abstract

This article describes a computational model, called DIVA, that provides a quantitative framework for understanding the roles of various brain regions involved in speech acquisition and production. An overview of the DIVA model is first provided, along with descriptions of the computations performed in the different brain regions represented in the model. Particular focus is given to the model's speech sound map, which provides a link between the sensory representation of a speech sound and the motor program for that sound. Neurons in this map share with "mirror neurons" described in monkey ventral premotor cortex the key property of

being active during both production and perception of specific motor actions. As the DIVA model is defined both computationally and anatomically, it is ideal for generating precise predictions concerning speech-related brain activation patterns observed during functional imaging experiments. The DIVA model thus provides a well-defined framework for guiding the interpretation of experimental results related to the putative human speech mirror system.

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4. Open Access Article

چکیده مقاله زیر در صورت تمایل قابل ترجمه می باشد

Brain responses to syntax constrained by time-driven implicit prosodic phrases

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Abstract

Previous research suggests that time-based working memory limits of 2–3 s constrain the integration of verbal information, and that speakers tend to parse sentences into prosodic phrases that do not extend beyond this time window. The present study used Event-Related Potentials (ERPs) to investigate how time-driven implicit prosodic phrasing influences the syntactic processing of embedded clauses. Participants read Swedish sentences in which the first embedded clause had a subordinate, main or neutral clause structure cued by the position of the sentence adverb. The presentation rate was manipulated so that either one or two clauses were read within 2.7 s. When the 2.7 s time limit was reached before the onset of the embedded clause, the sentence adverb indicating subordinate clause structure elicited a posterior negativity and a late positivity. These effects were interpreted to reflect the detection of unexpected word order, followed by the revision of the anticipated main clause structure. A positive shift that correlated with individual working memory span was also seen at the clause-final word after 2.7 s, possibly indicating closure of an implicit prosodic phrase. These results suggest that prosodic phrasing was influenced by time-based working memory limits, which in turn affected syntactic analysis: readers were more likely to interpret an embedded clause as a main clause if it could be associated with the beginning of a new prosodic phrase.

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