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OPEN ACCESS JOURNALS

Archives of Neurology & Neurological Disorders

Research Proposal | Vol 1 Iss 1

Better Speech Processing of Albanian Language would Mean Less Activity in fMRI

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Received: October 13, 2018; **Accepted:** November 10, 2018; **Published:** November 15, 2018

1. Introduction

Studying Albanian language has a particular importance since it represents one of the oldest surviving members of the "Balkan" and Paleo-Balkan languages, proposed as the ancestor of modern Albanian as proto-Indo-European model which is widely accepted [1].

Certain characteristics of Albanian language, such as particular words that represent a correlation of phenomena of action and sound are particularly old and believed to be ancestors of proto-Albanian. Other characteristics of Albanian language are relatively short words with the capability to form compound words or new lexemes [2].

Human speech is a well-learned, sensorimotor, and ecological behaviour ideal for the study of neural processes and brain-behaviour relations. Using modern neuroimaging as functional magnetic resonance imaging (fMRI), Computational Neuroscience model and DES (Direct electrical stimulation) in awake patients undergoing brain surgery, the potential for investigating neural mechanisms of speech has increased [3]. Using axonal DES (Direct electrical stimulation) in awake patients undergoing brain surgery led to a hodotopical (delocalized) and dynamic model in processing the language; this model contradicts the traditional modular and serial view [4]. In this networking model brain processing is not conceived as the sum of several sub functions, but results from the integration and potentiation of parallel-though partially overlapping-sub networks. This hodotopical account improves our understanding of neuroplasticity [5].

According to the hodotopical model, following the visual input, the language network is organized in parallel, segregated (even if interconnected) large-scale cortico-subcortical sub-networks underlying semantic, phonological and syntactic processing [6]. A similarity occurs when instead of a picture, a sound and a meaning is correlated as input. In the case of meaningful short words, making other compound words are compatible with this dynamic model.

Citation: Struga G. Better Speech Processing of Albanian Language would Mean Less Activity in fMRI. Arch Neurol Neurol Disord. 2018;1(1):103.

Following an input that correlates sound and meaning or a lexeme composed of small, meaningful words the most important neurofunctional principal the Hebbian learning, i.e. a synaptic link between two model neurons is strengthened if both neurons are activated during the same time interval is fulfilled [7].

Special characteristics in Albanian language such as phonosymbolism or phono semantics where sound and meaning correlate, also short words compound word forming capabilities, richness in sound, make this language more suitable for brain speech processing and affecting positively the speaker abilities for learning and overall cognitive development [8].

The richness of the Albanian language is also expressed in its written form, with the large alphabet existing of 36 to 53 letters in different periods. The Albanian language has a strong ethnic tradition of singing, considered by UNESCO as a word heritage. This iso-polyphony is a form of ancient singing where voices assemble the orchestra found mainly in the south but traditionally also in north and Macedonia. It is still vividly present in modern Albania [9].

A critical view is made of the Indo-European model of languages which did not take sufficient account of Albanian, the only living testimony of Pelasgic and the view of Albanians and Albanian language as the descendant of the most ancient population of Europe, the Pelasgians. This view is contested as myth by opposite the others [10].

Musicians and people who are bilingual utilized fewer brain resources when completing a working memory task. These findings show that musicians and bilinguals require less effort to perform the same task, which could also protect them against cognitive decline and delay the onset of dementia [11].

Bilinguals performed at about the same level as participants who spoke only one language and didn't play a musical instrument on remembering the sound, but they still showed less brain activity when completing the task. Musical training and bilingualism benefit executive functioning and working memory (WM) but bilinguals performed at about the same level as participants who spoke only one language and didn't play a musical instrument on remembering the sound, but they still showed less brain activity when completing the task [11].

In Albania, language characteristics and ethnography enhance the native neuroplasticity, making it easier for Albanian speaker to learn another language and to pronounce such new language with a more accurate accent. This factor is independent of CPH (critical period hypothesis) influencing L2 (second language) acquisition better pronunciation or accent. Other than influence of CPH on L2 speech pronunciation or foreign accent is the fact whether the L1 is native language and how close is this native language to L2 language etymological formation. This process is similar process seen in the musicians having a greater ability to learn and pronounce languages with a more accurate accent [12].

We propose examine special word resembling phonosymbolisem and classified especially old from the most genuine Albanian Geg dialect, these would be compare with similar word in other languages using fMRI. A possible better speech processing of Albanian language would mean less activity in fMRI particularly in the word resembling phonosymbolisem and less effort in performing the same task and better executive function, in long term this may be protective against cognitive decline.

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