

# Basque grammar in the brain

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At the Psycholinguistic Laboratory of the University of the Basque Country (EHU-UPV), Basque-Spanish bilingualism and the relation between language and the brain have been under study. It is a fact that the human brain is organized specifically for us to master languages. Also taking part in this research into bilingualism are researchers from Catalonia and the Canary Islands. Within this context they analysed how word order and grammar, amongst other things, are structured in the brain.

The EHU-UPV researchers investigated the processing of Euskera -the Basque language - in adults. In using Basque there may be more ways than one of sequencing words. The majority of linguists hold that the basic word order in Euskera is the following: subject, object and verb (SOV). For example, "emakumeak gizona ikusi du" (the woman has seen the man). Other word sequences, such as, "gizona emakumeak ikusi du" (OSV), are structures derived from the first (SOV) type and are syntactically somewhat more complex than the basic structure and thus give rise to a greater processing task for the brain.

## Word order

In order to investigate the order of words in Basque the researchers carried out two types of experiments. On the one hand, they measured reaction times, i.e. the times needed for Basques to read both SOV and OSV sentences. The results of these measurements show that SOV-type sentences take less time than OSV sentences. So, it can be concluded that the SOV sentences are easier to process.

In the second group of experiments undertaken, electroencephalograms were taken with a number of Basque speakers. A cap with a number of electrodes was placed on the head in order to measure the electrical activity of the brain. On the electrodes receiving an stimulus from the brain, this activity is instantaneously (in less than 100 milliseconds) registered on a screen. In this way, the brain's activity expressed by Basques reading

both SOV and OSV-type statements could be seen on the screen immediately and it was thus possible to study how the brain reacted as a function of the linguistic structure being used. Differences were observed. In the case of Basque speakers, electrophysiological indications of the syntactic complexity involved using the OSV structure involving the change of the position of the object in the word order were observed.

This research further strengthens the main hypotheses currently held in linguistic circles. In fact, as has been possible to demonstrate, the SOV structure is the sequence involving the least effort that arises, in practice, in Basque grammar.

At the same time, how Basque speakers process ambiguous SOV and OSV-type word chains have been studied— for example, "emakumeak gizonak ikusi ditu" — (the woman has seen the men or the man has seen the women. The brain sees the two structures alternatively, i.e. they cannot be processed simultaneously. Given this ambiguity, Basques preferentially opt for the SOV structure. The OSV alternative is only opted for if there are other factors involved, such as, for example, in the case of "srdiak otsoak jan ditu" (sheep[p]-wolf[s]-has eaten), we would always choose the OSV word order, given that, from experience, it makes more sense. Thus, according to the results obtained by the EHU-UPV researchers, the Basque language has a basic word order and all other orders are syntactic operations derived from this.

## Erroneous sentences

Besides investigating word order, a study was made of language cognition in both those whose mother tongue was Basque since birth and those who started to learn Basque at 3-4 years. To this end, erroneous sentences or grammatical mistakes were used as working tools.

Comparing the processing of correct and incorrect sentences, we would in principle expect different results arising at the point of error. In this study they used sentences where either the structure, the

concordance of the verb, the ergative case or the semantics had not been used appropriately. A comparative study was carried out between those persons whose mother tongue was Basque since birth and those who started to learn Basque at 3-4 years - using the erroneous and the correct sentences. The brain did not function in the same way with Basque-Spanish bilingual speakers in the two cases. In any case, currently there is no a priori way to distinguish the two groups without a previous study of the brain.

All this research has been undertaken at the Psycholinguistic Laboratory with adults. However, normally it is said that there is a period when we become masters of the language and this is in childhood. Children learn languages with greater ease. This is why the research team at the EHU-UPV does not discard the possibility of working with children in the future.

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