

MultiMap: Multilingual visual naming test for the mapping of eloquent areas during awake surgeries

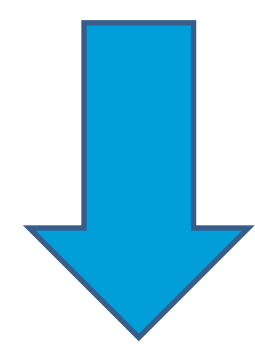
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Introduction

In **awake brain surgery**, object naming is the gold standard task for identifying language-related areas.



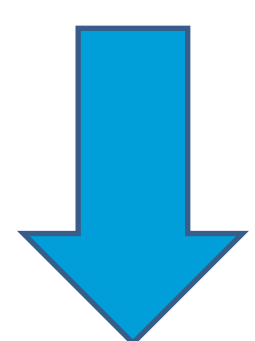
Improve surgical language mapping

VERB MAPPING

Behavioral, electrophysiological, and neuroanatomical evidences show that **verbs** and **nouns** differ at the lexical, semantic, morphological, and syntactic levels.

MULTILINGUAL MAPPING

Evidence of common and specific brain areas underpinning different **languages** and bilingual aphasia reports, where a bilingual patient gets selectively impaired in one language.



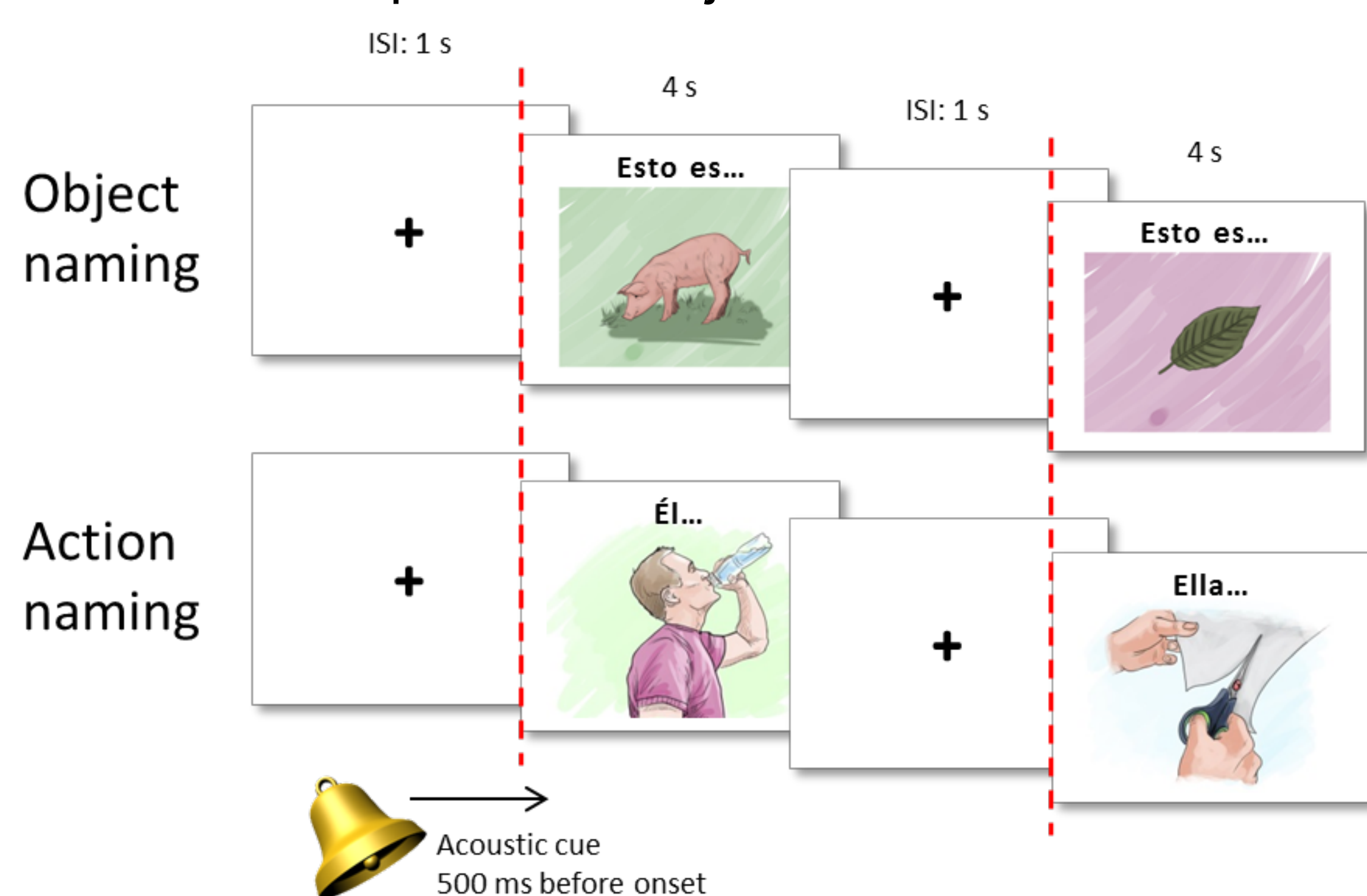
Development of **MultiMap**

Database of standardized color pictures depicting common objects and actions, normed for **name agreement** in Spanish, Basque, Catalan, English, French, Chinese, and Arabic and equated for a number of **linguistic variables** between Spanish and the other languages to facilitate testing bilingual patients.

Method

MATERIAL SELECTION

- Creation of an initial set of pictures depicting 109 nouns and 109 action verbs.
- **Name agreement** data for each picture collected on 100 participants for each of the languages on an online platform.
- Picture selection for **each language** so that word frequency, number of letters, number of substitution neighbors, and name agreement were equated for objects and actions.



CROSS-LANGUAGE COMBINATIONS

- The psycholinguistic variables were controlled between languages to create cross-language combination lists.

VALIDATION

- With the Spanish version, we tested the images as they would get used in a surgery setting in a group of 20 participants (13 female; mean age = 35,55; SD = 13,64).

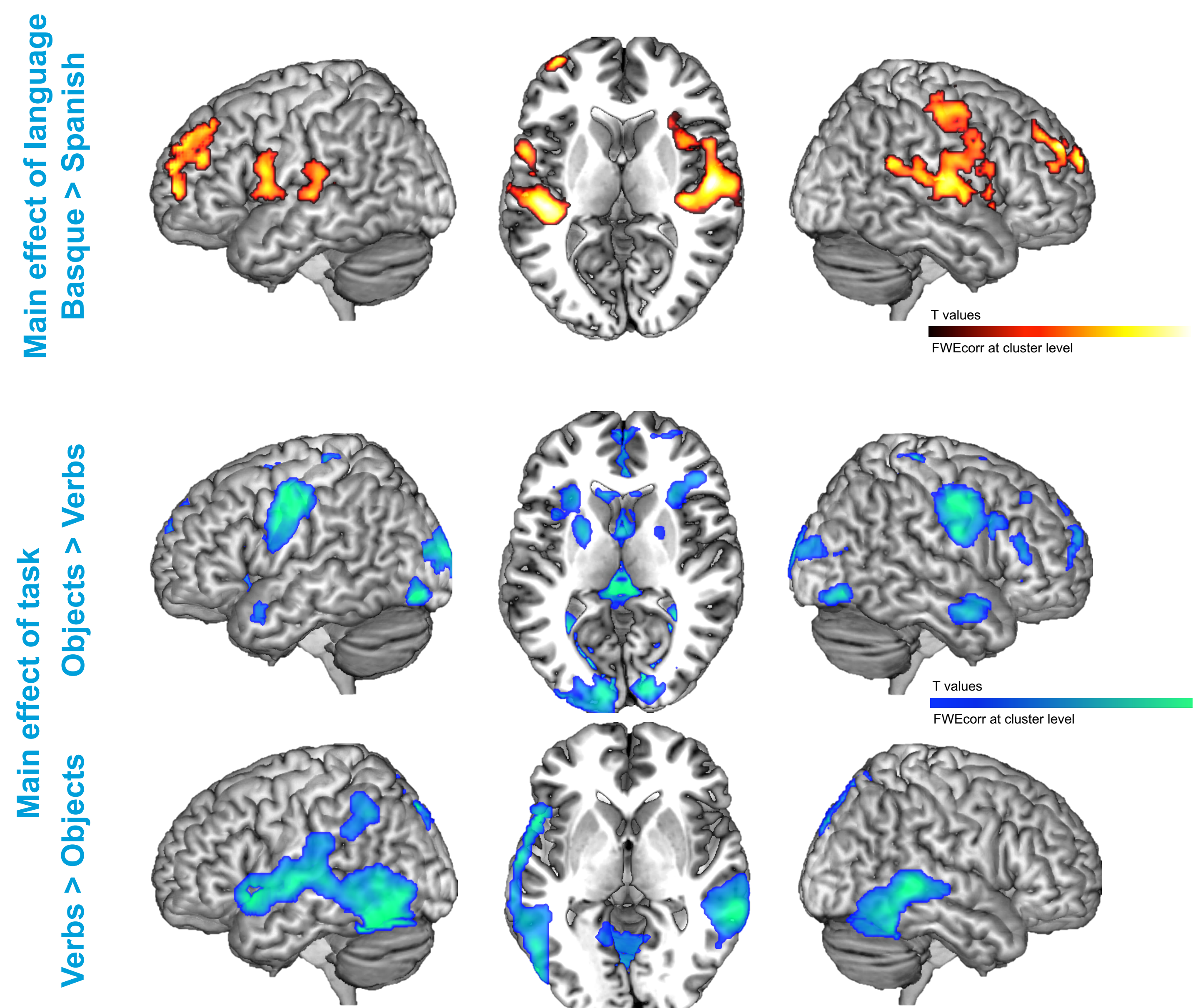
Results

MULTIMAP

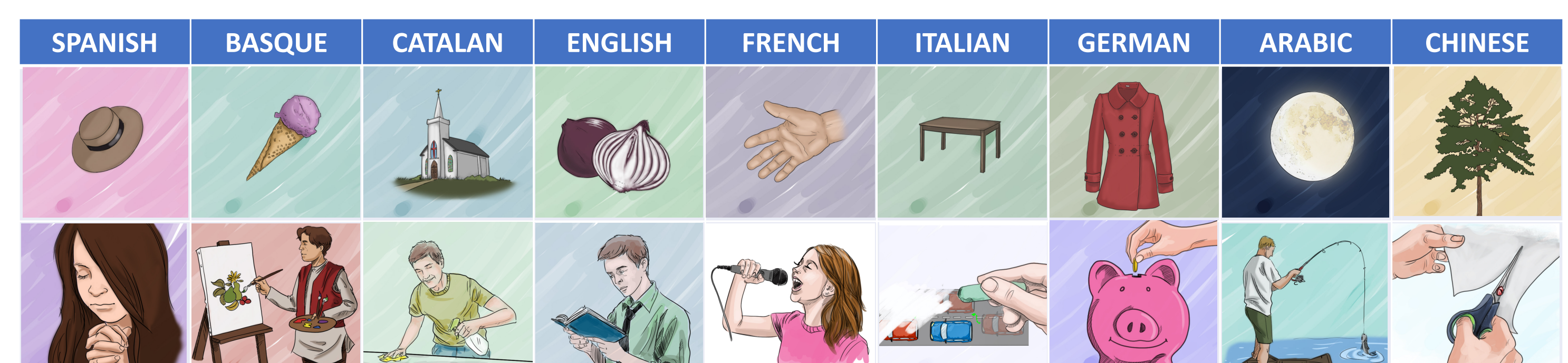
- Cross-language combinations generated for Spanish - Basque, English, and French.
 - Name agree > 80%
 - Psycholinguistic variables for objects and verbs equated both **within and between languages**.
- Single-language lists equated for objects and verbs.

fMRI TESTING OF THE PARADIGM (Spanish-Basque)

- 20 Spanish-Basque balanced bilinguals (13 female; mean age = 23,72; SD = 4,16).
- Picture presented for 1s, followed by 2-8s fixation cross.
- Overt answers.



MultiMap



MultiMap is the first tool designed specifically for multilingual language mapping in awake surgery.

REFERENCES

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