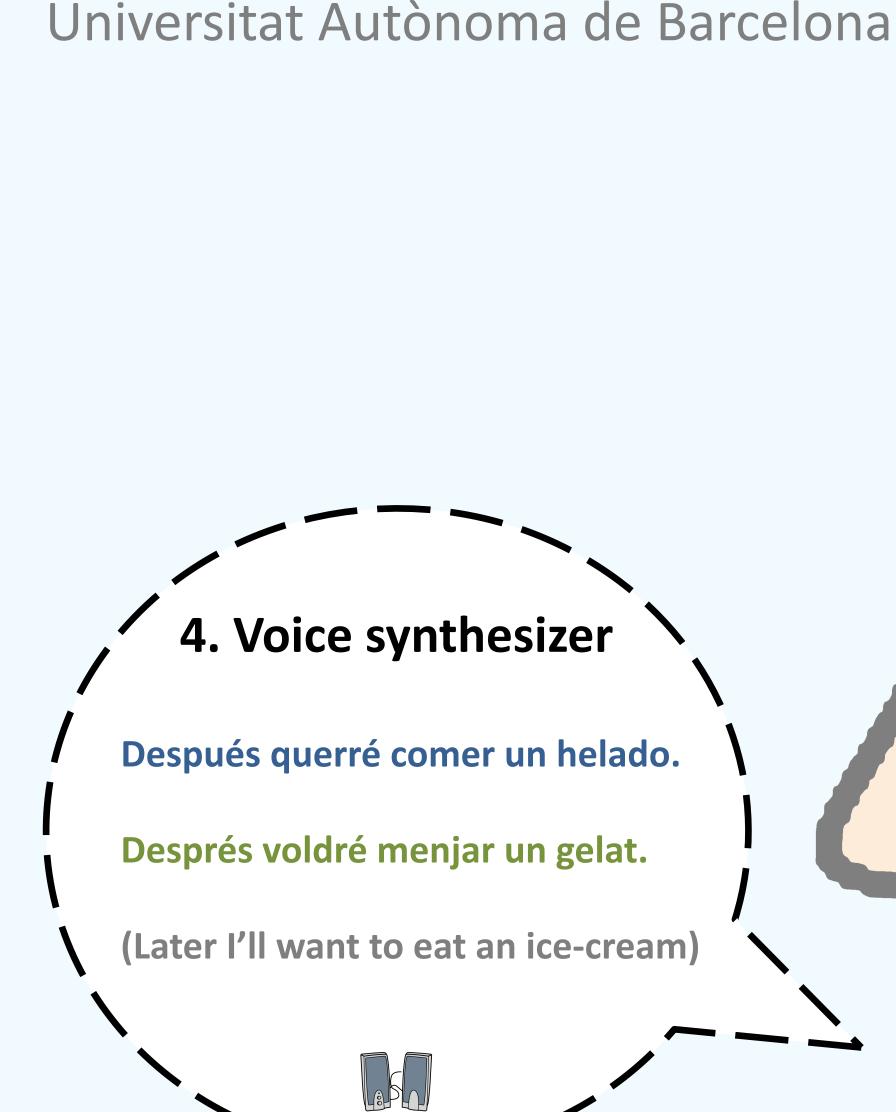
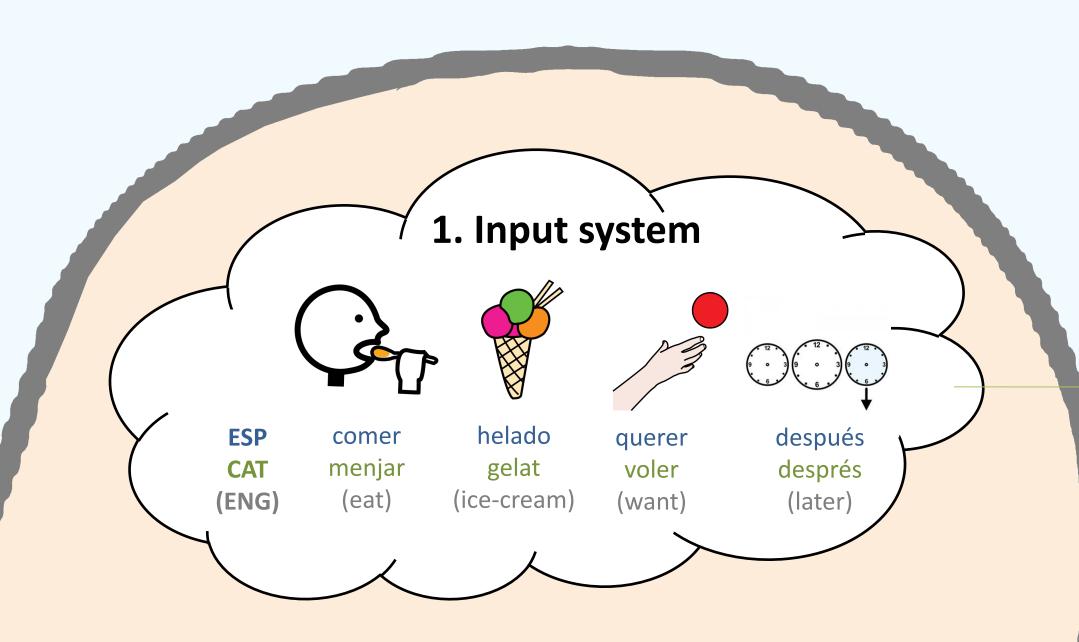
Pictogram AAC prototype software that expands telegraphic language into natural language in Catalan and Spanish



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Optional input modifiers:

- Type of sentence:
 Declarative, Wish, Permission,
 Order, Question, Answer,
 Conditional, Exclamatory.
- Negative sentence.
- Override default verb tense
 Present, Past, Immediate past,
 Future.

Telegraphic language main characteristics:

- Has only content words (words with meaning).
- Words can appear in any order.
- There can be **reduction of content words** (e.g. the subject of the sentence).

Results

- Tests done by **3 independent annotators**.
- A set of 100 basic AAC sentences.
- One of the goals was to evaluate if the system could take different inputs for the same intended sentence and generate a correct output sentence.

% Sentences rated as perfect or good* in total	98.7%
% Sentences rated as perfect or good* by all annotators	97%
% Sentences rated as perfect by all annotators	74%
% Sentences rated as perfect	86.3%

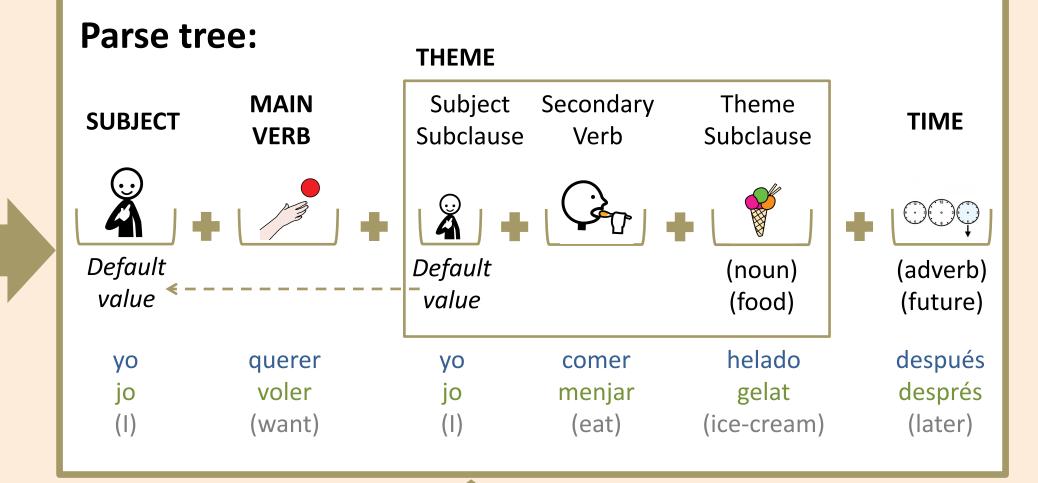
* Good sentences: sentences with minor errors that do not affect the meaning and comprehension of the sentence.

2. Parser: From the input, builds a parse tree and sends it to the generator.

- Mostly language independent, for SVO latin languages and English, as its algorithm uses semantic features.
 Syntactic word order is only used to disambiguate if semantic features are not enough.
- Rule based:

Rules encode a **controlled grammar** with restrictions on the complexity of the allowed structures.

- Verbs are the center of the sentence structures or patterns. One verb can have several patterns. There are also "verb-less" patterns.
- Patterns can have the following slots (mandatory or optional):
- Subject, Theme, Receiver, Beneficiary, Tool, Manner, Locative (To, At, From), Time and Set expressions.
- Slots can be filled with nouns, adjectives, adverbs or other verbs (sentences) alone or complemented by other nouns, adjectives, adverbs, possessives, quantifiers, etc. Basic coordination between nouns or adjectives is also permitted.



Vocabulary:

- UTAC-CACE [9]: basic AAC vocabulary designed by the University of Barcelona.
- 669 words, 41 verbs and 76 patterns annotated, both for Catalan and Spanish. It can be easily expanded.

•Semantic features: Noun (classes: animate, inanimate, human, object, food, location, abstract, etc.), Adjectives (classes of nouns that it better complements), etc.

• **Syntactic features**: Nouns (gender, number, article that usually precedes it (definite or not), feminine and plural forms, etc.), Modifiers (scope: word or sentence), etc.

3. Generator: Transforms the parse tree into natural language and sends it to the voice synthesizer.

- Language dependent.
- There are 2 generators: for **Catalan and Spanish**.
- Each has 5 concatenated modules that build the final natural language sentence step by step.
- **3.1. Slot ordering module:** Orders the slots according to the **sentence type** (declarative, interrogative, imperative, volitive, etc.)
- 3.2. Word order, prepositions and agreement module: inside each slot, puts the head and its dependents in the correct order, (including quantifiers and possessives). It also includes coordinated words, adds prepositions and makes sure that words agree in gender and in number.
- **3.3. Articles' module:** adds articles (**definite, indefinite or no article**) to the sentence and apostrophizes them if necessary.
- **3.4. Verb conjugator module:** conjugates verbs according to their subject and the verb tense of the sentence, given by the **sentence type, a time expression, a tense modifier or by the default tense** encoded in the pattern.
- **3.5. Cleaning module:** deals with pronouns and feeble **pronouns transformations**, contracts prepositions with articles, adds time and/or set expressions, **punctuation**, etc.

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