

## The predictive function of Baniwa classifiers

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Listeners use a multitude of linguistic cues to predict upcoming language features and structures. One such cue is *classifiers*, i.e., morphemes that impose a classification on nouns based on semantic features [1, 2]. Although classifiers are found in a fourth of the world's languages [3], their predictive potential has only been investigated in major East Asian languages. Specifically, there is evidence for predictive use of classifiers in Japanese [4] and Mandarin Chinese listeners [5-8].

We investigated the predictive function of classifiers in Baniwa [bwi], an Arawakan language of Northwest Amazonia with 3000-4000 speakers. Baniwa has 53 classifier suffixes [9] obligatorily marked in several morphosyntactic contexts, one of the most common being numerals. Numerals precede nouns in the noun phrase (example 1), thus qualifying classifiers marked on numerals as possible predictive cues of upcoming nominal referents. The classifiers mainly encode physical shape. A generic classifier, *-da*, contrasts with other classifiers in being compatible with a much larger and more diverse set of nouns.

- (1)    *apá-da*            *ienipétti*  
         one-CLF.GENERIC child  
         'one child'

We investigated whether speakers of Baniwa use classifiers marked on numerals as cues to following nouns. Twenty native speakers took part in a lexical choice response time study (8 female, mean age 43). The experiment was designed in Psychopy and run with over-ear headphones in São Gabriel da Cachoeira (Brazil). Instructions were given in Portuguese and/or Baniwa. The participants listened to numeral-classifier-noun phrases while seeing a 'target' and a 'competitor' image on the screen (example in appendix). The target image depicted the spoken noun while the competitor image depicted either 1) a noun taking a different classifier (*classifier-informative condition*) or 2) a noun taking the same classifier as the target noun (*classifier-uninformative condition*) [4, 7]. Participants were asked to select which image the phrase referred to by pressing different keys.

We hypothesized that 1) response times would be faster in the classifier-informative condition because listeners could use the classifier to pre-activate semantic features of the following referent [4, 7] and 2) classifiers that are more constraining regarding which nouns can follow result in faster response times [6]. Classifiers were divided into two groups based on their hypothesized usefulness as predictors of upcoming nouns: *shape* (more constraining) and *generic* (less constraining). In a separate model, the degree of constraint was operationalized as *entropy*, a measure of uncertainty.

The results were in line with our hypotheses. Listeners responded faster when classifiers were informative about noun identity than when they were uninformative. Further, more constraining classifiers resulted in faster response times.

The findings indicate that Baniwa classifiers can help listeners keep up with a rapidly unfolding speech signal by hinting at semantic features of upcoming referents. Together with similar observations in Japanese and Mandarin Chinese, this adds a new time-dependent dimension to the function of classifiers cross-linguistically. Not only are they used to organize nouns in the lexicon, but they also have a predictive function in the sense that they facilitate the identification of referents in the dynamic process of speech perception.

**Classifier competitor**  
apáda hiipáda 'I stone'



**Mismatch competitor**  
apáda hiipáda 'I stone'



## References

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