Event participant relations in language and cognition: a cross-linguistic study

Before infants learn their first words, they represent events in terms of relations between event participants (Woodward, 1998). At the level of language, verbs highlight these participant relations: *love*, for example, relates someone who loves to something that is loved, a linkage often thought to be encoded in the verb's argument structure. In this study, we investigated the relationship between conceptual participant relations and verbal argument structure, focusing on the case of instruments, e.g. *Sam sliced the bread with a knife*. English instruments pattern like arguments given some argument diagnostics but pattern like modifiers given others. We asked whether this noncanonical argument status is reflected commonly across languages. Comparing the judgments of speakers of English, Spanish and Mandarin, we found strikingly similar results, supporting the theory that the interface between event concepts and verbal meaning is similarly constrained across languages, even for noncanonical participants such as instruments.

English instrumental verbs Instrumental phrases (e.g. *slice with a knife*) do not clearly pattern as either arguments or adjuncts (see Schutze, 1995). Koenig, Mauner & Bienvenue (2003), for example, propose that verbs such as *slice, beat* and *write* semantically "require" an instrument, in contrast with *eat, open* and *break*, which only "allow" an instrument. This require/allow-instrument contrast is not, however, reflected in syntactic argument behavior: the *with*-phrase patterns as an adjunct regardless of verb type (see Rissman, 2010).

Rissman, Rawlins & Landau (2015) investigated the semantic status of require-instrument verbs, testing the hypothesis that these verbs encode three arguments, parallel to dative verbs such as *lend* and *teach*. In a set of experiments, English speakers were instructed to report judgments about the number of "arguments" of a verb, e.g. that because *want* involves a person who wants and a thing wanted, *want* has two arguments. Subjects were directed towards a semantic rather than syntactic interpretation of this concept, e.g. they were told that "arguments" are crucial to the verb's meaning but are not necessarily mentioned in a sentence. Rissman et al. found that instruments were judged to be arguments more often for require- than allow-verbs, and that recipients were almost always judged as arguments of dative verbs. Nonetheless, there was a considerable gap in the argument judgment rates for require-instrument verbs vs. dative verbs: 35% vs. 87%. Given this contrast, Rissman et al. argue that instruments are not arguments, but are encoded gradiently as relatively salient extensions of the agentive force component of an event.

Spanish and Mandarin studies: method and results This proposal raises the question of whether gradient encoding of instruments is cross-linguistically common. That is, are there languages in which instruments are encoded as prototypical arguments, or where instruments are not argument-like at all? As a first step towards addressing this question, we adapted the materials from Rissman et al. (2015) into Spanish and Mandarin. We selected verbs in the same semantic space as the English instrumental and recipient verbs, and adapted the instruction about the nature of "arguments." Native speakers of Spanish and Mandarin (N = 28; 32) then read sentences such as in (1-4) and had to choose one of the bracketed phrases as an argument of the verb, or that neither phrase was an argument.

(1) Rachel REBANÓ algo [con una hoja de afeitar] [en el puerto].
Rachel slice-3PST something with a razor blade in the port

(2) 【在去年復活節那天】小琴 用【一把短柄小斧】⁞砍了⁞一些東西。
in last Easter Sunday Xiaoqin use one hatchet chop-PFV something

(3) [A las 6 am] Ruby le PRESTÓ algo [al nadador].
At 6 AM Ruby 3SG lend-3PST something to the swimmer.

(4) 克洛伊【在街上】⁞賣了⁞一樣東西【給演員】。
Chloe in street send-PFV something to actors

We asked two questions: 1) will all three languages show a strong asymmetry between recipients and instruments, and 2) will all three languages show gradient patterns across individual verbs? Given that the require- and allow-instrument categories were proposed on the basis of individual English verbs, we did not test whether comparable categories emerge in Spanish and Mandarin.

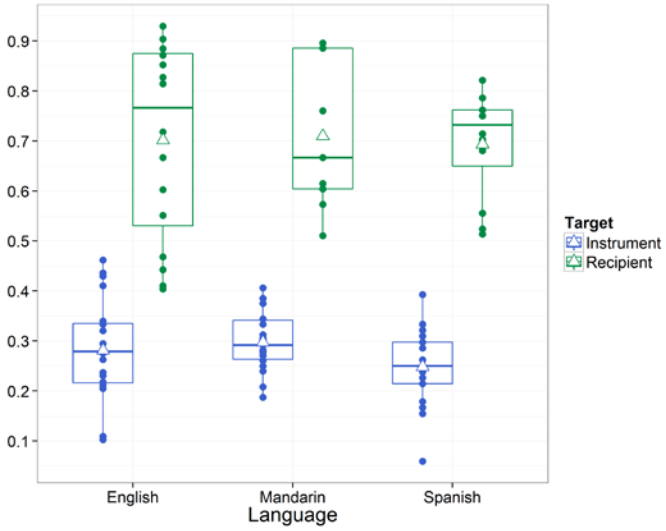

Figure 1. Rates of choosing the instrument or recipient as an argument in each language. Box plots show median and 2nd-3rd quartiles; triangles show means; dots represent single verbs

Figure 1 shows the rate of choosing the instrument or recipient as an argument for each verb and verb category, including the English data from Rissman et al. In a logistic regression model, we found that participants selected recipients more often than instruments as arguments ($\beta = 2.86$, SE = .10, $p < .001$), with no main effect of Language ($\chi^2(2) = .39$, $p > .1$). Thus neither Mandarin nor Spanish appears to encode the instrument as a prototypical argument. We also found significant variability within the verb categories in each language, suggesting instruments are generally encoded as more or less salient. Finally, we found significant correlations between the individual verb means across languages, suggesting that the semantic features of these verbs have comparable effects on event representation in each language (Recipients: English-Spanish = .84, English-Mandarin = .72; Instruments: English-Spanish =.81, English-Mandarin =.59; all p's < .01). Although our study only covers three languages, these findings support the theory that the relationship between conceptual event representation and verbal meaning is subject to cross-linguistically general biases. Encoding an instrument in an argument role may be dispreferred, raising questions about the conceptual foundations of such a dispreference.

References Koenig, Mauner, & Bienvenue (2003). Arguments for adjuncts. *Cognition.* | Rissman (2010). Instrumental *with*, locatum *with* and the argument/adjunct distinction. *LSA Meeting Extended Abstracts* 2010 | Rissman, Rawlins & Landau (2015). Using instruments to understand argument structure: evidence for gradient representation. *Cognition.* | Schutze (1995). PP Attachment and argumenthood. *MITWPL.* | Woodward (1998). Infants selectively encode the goal object of an actor's reach. *Cognition.*