Modeling causative complexity across languages with the Interclausal Relations Hierarchy

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We present a multivariate analysis of acceptability judgment data on causative constructions collected from speakers of nine languages spoken on four continents. The central research question of this study is which semantic variables determine the minimal morphosyntactic complexity necessary for acceptable descriptions of a given causal scenario (or 'chain'). To measure the morphosyntactic complexity of the stimulus descriptions, we employed the juncture-nexus-type scale inherent in the Interclausal Relations Hierarchy (IRH) of RRG.

Motivation of the study - It has long been hypothesized that the minimal morphosyntactic complexity required of a causative description iconically mirrors the conceptual complexity of the represented causal chain (Haiman 1983, McCawley 1978, *inter alia*). For example, (1) is a good description of an event in which Floyd took a hammer to the vase with the goal of breaking it, whereas (2) is more suitable in case Floyd sneezed so hard that the vase fell off a shelf.

(1) *Floyd broke the vase*
(2) *Floyd caused the vase to break*

What is less clear is which semantic factors influence the speaker's selection of syntactic complexity level (e.g., Dixon 2000 proposes 9 semantic variables), how these factors rank in importance, and the extent to which the answer to the first two questions is language-specific. These questions have so far been addressed in studies based on secondary data (Escamilla 2012, Levshina 2016a) and in corpus studies (Haspelmath 2008; Levshina 2015, 2016b, 2017). The sole attempt to date at tackling them on the basis of primary crosslinguistic data has been a small production study (Bohnemeyer et al. 2010). Here, we present (to our knowledge) the first study of the semantic typology of causatives based on acceptability ratings data. This method presents all participants with the same descriptions and described scenarios, captures inter-speaker variation, does not depend on the availability of corpora for the sample languages, and provides not only positive evidence of what speakers actually say in a given situation, but also negative evidence of what they consider unacceptable as a representation of a given causal chain.

Study design - 12+ speakers per language rated descriptions, elicited from L1 speakers of each sample language, of 43 video clips for their goodness of fit. The descriptions crossed the stimulus scenes with a language-specific set of response types featuring a range of causative constructions (cf. Table 1 below). During a training phase, the raters had learned to express through their ratings whether the descriptions were (i) ungrammatical, (ii) grammatical and interpretable but semantically inaccurate of the described scene, (iii) accurate but pragmatically misleading for the scene, or (iv) semantically and pragmatically appropriate for it. The scenes had been designed to manipulate ***causer type*** (intentional actor vs. accidental actor vs. natural force), ***causee/affectee type*** (controlled vs. psychologically impacted vs. physically impacted vs. inanimate), ***mediation*** (the presence vs. absence of an intermediate subevent/participant between cause and effect), and further variables not included in the analysis we present here.

Coding the stimulus descriptions based on the IRH - To assess the manner and level of structural integration of the expressions of causing and resulting events in the descriptions, each description was assigned a juncture-nexus type (JNT) in the Layered Structure of the Clause model (Van Valin 2005). The juncture level of the descriptions (see Table 1) was then used as the basis for the dependent variable in a series of language-specific analyses. The JNT scale is unique in projecting the relevant aspects of morphosyntactic complexity into a single scale. In phrase structure grammars, the complexity of the causing and resulting event expressions and that of the combination of the two are all independent of one another.

Analysis - For each language, we trained language-specific classification trees using the CART algorithm (Breiman 1984) to predict the juncture of the most compact construction type to receive ceiling ratings given a particular combination of independent variable levels. A Random Forest analysis (Tagliamonte & Baayen 2012) was also performed to provide a more reliable ranking of variable importance. These methods permit an assessment of the relative impact of the candidate predictors without being susceptible to overfitting due to collinearity or sparsely populated cell issues as standard regression models are.

Table 1. *Construction types by language and juncture (AC – Adjunct causer/reason ('because of x'), CC – Causal connective, CV – Converb, MC – Morphological causative, PC – Periphrastic causative, RV – Resultative construction (incl. resultative-type serial verb construction), SC - Scalar Connective construction ('So x that y'), TC – Transitive causative verb)*

Juncture level Language	Field site	Simplex or nuclear-layer	Core-layer	Clause-layer
Datooga (Nilotic)	Tanzania	MC, TC	AC, PC, SC	CC
English (Germanic)	United States	RV, TC	PC	AC, CC, SC
Japanese (Japonic)	Japan	MC, TC	AC	CC
Korean (isolate)	South Korea	MC, RV, TC	PC	CC, CV
Russian (Slavic)	Russia	TC	PC	AC, CC, SC
Sidaama (Cushitic)	Ethiopia	MC, TC	AC, PC	CC
Swedish (Germanic)	Sweden	RV, TC	PC	CC, SC
Yucatec (Mayan)	Mexico	MC, TC	PC	CC
Zauzou (Loloish)	China	RV	CC, CV, PC	CC

Preliminary findings and implications - The sample languages form a continuum in terms of the proportion of scenes for which clausal junctures are the only acceptable response type for most participants. For the Japanese and Korean participants, this was the case for more than half of the scenes tested. Conversely, for the Datooga, Sidaama, Yucatec, and Zauzou speakers, this was not the case with even a single scene. The three European groups assumed intermediate positions along this cline. The participants also differed by language in terms of the conditions under which they would accept compact descriptions (simplex-nucleus or nuclear junctures): speakers of the European languages and Yucatec (and, in first approximation, Korean) rejected such descriptions whenever an intermediate event/participant was involved in the scene. In contrast, Japanese speakers accepted compact descriptions of such scenes, but tended to reject them when the causer was accidental or a natural force. It seems plausible that Japanese speakers prefer to avoid direct causal attribution when referring to such scenes (cf. Fausey et al. 2010). (Inter-speaker variation precludes a clear picture of the Datooga, Sidaama, and Zauzou data in this regard.) Tentatively, English and Yucatec emerge as overall mediation-dominant, Sidaama as causer-type-dominant, Datooga, Japanese, and Korean as causee/affectee-

type-dominant, and Russian and Swedish as being dominantly sensitive to both mediation and causee/affectee-type. Our study also showcases the usefulness of the IRH as a tool for measuring morphosyntactic complexity, including in, but not restricted to, typological research.

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