Cumulative readings of 'distributive conjunctions': Evidence from Czech and German

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Summary: We present new data showing that cross-linguistically a class of conjunction strategies that are usually considered purely distributive exhibit cumulative readings ('CRs') in object position. This is surprisingly similar to the pattern found for *every*-DPs [1 4 6] and German *jed*-DPs [3], suggesting that all these elements form a natural class. Our evidence stems from experiments on Czech *A i B* and German *sowohl A als auch B* using a picture selection task. In the crucial items, participants saw pictures of a cumulative scenario and a scenario making both the CR and the distributive reading (DR) false, and had the option of selecting one scenario or rejecting both. In both languages, cumulative scenarios were accepted more often with the conjunction in object position than with the conjunction in subject position. Further, surface subjects of passive sentences patterned with objects of active sentences and topicalized objects patterned with non-topicalized objects, suggesting that passivization and topicalization do not affect CRs. **Background**: Analyses of **conjunction particles** – markers used to form conjunctions that have other uses, e.g. as additive particles – typically link their semantic impact to distributivity [5 7]. These works focus on conjunctive subjects of active sentences. Some distributive quantifiers, such as English *every*-DPs [4], exhibit CRs in subject, but not object position, raising the question whether conjunction particles pattern analogously. [3] claim that German *sowohl A als auch B* with the additive particle *auch* shows the same asymmetry (1). Their account predicts CRs for a particle conjunction w.r.t. another plural iff the other plural c-commands it at LF. As scope should thus affect the availability of CRs, moving a particle conjunction in object position across the subject should interfere with its CR.

(1) a. *Am   Freitag haben sowohl der Karl als auch der Peter die zwei Häuser gestrichen.*
      on.the Friday have   as.well the Karl as also the Peter the two houses painted
      'On Friday, both Karl and Peter painted the two houses.'   ***cumulative**

   b. *Am   Freitag haben die zwei Maler   sowohl die Garage als auch die Villa gestrichen.*
      on.the Friday have   the two painters as.well the garage as also the villa painted
      'On Friday, the two painters painted both the garage and the villa.'   **✓cumulative**

Our **expectations** were that this subject-object asymmetry would be confirmed experimentally (**E1**), and that surface c-command would drive the asymmetry, so movement (e.g. passivization, topicalization) would block the CR of conjunctions in object position (**E2**). Before turning to *sowohl ... als auch*, we studied Czech *i*-conjunctions, which are interesting for two reasons: (i) They are more typical particle conjunctions as they don't contain morphemes besides the particle and permit the polysyndetic structure *i A i B*. (ii) In its other uses, *i* triggers *even*-type scalar inferences [2], which require a likelihood ranking of propositions. We suspected this would block a CR, which arguably requires non-propositional conjuncts. The **experiments** were picture selection tasks. Subjects saw two images at a time; their task was to indicate whether the left, the right or neither image matched a test sentence presented in a linguistic context. This targeted the acceptability of a CR or a DR: Half of the items involved a picture of a cumulative scenario; the others a picture of a distributive scenario. In all items, the second picture made the sentence false on both CR and DR. We compared the acceptance rates for a given reading against the null hypothesis that subjects choose randomly. We tested conjunctions in 4 positions, exemplified in (2) for Czech: (i) subject position (SUBJ), (ii) object position (OBJ), (iii) surface subject of a passivized sentence (PASS), (iv) topicalized object of an active sentence (TOPIC).

(2) a. *Karel   i Jakub   vyfotili   dvě   herečky.*
      Karel.NOM I Jakub.NOM photographed two.ACC actresses.ACC
      'Karel and Jakub photographed two actresses.'   SUBJ

   b. *Dva   novináři   vyfotili   Simonu   i Kamilu.*
      two.NOM journalists.NOM photographed Simona.ACC I Kamila.ACC
      'Two journalists photographed Simona and Kamila.'   OBJ

   c. *Na večírku byly   Simona   i Kamila   vyfoceny   dvěma   novináři.*
      at party   were.3PL Simona.NOM I Kamila.NOM photograph.PASS two.INSTR journalists.INSTR

      'At the party Simona and Kamila were photographed by two journalists.'   PASS

   d.*Simonu   i Kamilu   dva   novináři   vyfotili   až   po   půlnoci.*

   Simona.ACC I Kamila.ACC two.NOM journalists.NOM photographed only after midnight

   'Simona and Kamila, two journalists photographed only after midnight.'   TOPIC

The experiments were run online, with 38 Cz(ech) and 48 Ger(man) speakers participating. Each subject saw 4 items per condition (2 with cumulative and 2 with distributive pictures), plus 16 control items with binominal *each* or universal quantifiers. 4 Cz and 1 Ger subject were excluded as they got less than 75% of the controls right. **Results**: Fig. 1 shows the acceptance rates (relative frequencies) from the Cz exp (left: items with cumulative pictures; right: distributive pictures). 1 means the respective distributive/cumulative picture was selected, 0 that the 'false' picture or neither one was selected. Using this binary coding, the data were analyzed via mixed-effects logistic regression in the R package LME4; there was one fixed factor, Condition (with reference level SUBJ), and intercept subject and item random effects. In the **distributive** part, acceptance of the DR in the condition SUBJ was significantly above chance in both the Cz ($\beta = 1.98, z = 3.04, p < 0.01$) and Ger ($\beta = 1.76, z = 2.82, p < 0.01$) experiments. In the Cz exp, acceptance rates for the DR in the conditions OBJ, PASS, TOPIC didn't significantly differ from chance level: (i) OBJ ($\beta = 0.44, z = 0.72, p = 0.47$), (ii) PASS ($\beta = -0.53, z = -0.87, p = 0.38$), (iii) TOPIC ($\beta = -0.59, z = -0.99, p = 0.32$). In German, acceptance for OBJ was also at chance level ($\beta = 0.08, z = 0.13, p = 0.89$); in the Ger conditions PASS, TOPIC there was a slight, but non-significant tendency to reject the DR ($\beta = -0.78, z = -1.28, p = 0.20$, $\beta = -0.54, z = -0.89, p = 0.38$, respectively), as in Czech. In both experiments, only SUBJ differed significantly from the other conditions (diffs of OBJ, PASS, TOPIC vs SUBJ: $\beta = -1.54_{Cz}/-1.68_{Ger}, z = -2.89_{Cz}/-4.26_{Ger}, p < 0.01_{Cz}/0.001_{Ger}; \beta = -2.51_{Cz}/-2.55_{Ger}, z = -4.47_{Cz}/-5.67_{Ger}, p < 0.001_{Cz}/0.001_{Ger}; \beta = -2.57_{Cz}/-2.30_{Ger}, z = -4.80_{Cz}/-5.39_{Ger}, p < 0.001_{Cz}/0.001_{Ger}$ respectively). We take this contrast as evidence that the DR was easily accessed in SUBJ, but less easily in OBJ, PASS and TOPIC. In the **cumulative** part, the only condition where subjects in both exps behaved at chance level was SUBJ (Cz exp: $\beta = 0.32, z = 0.79, p = 0.43$, Ger exp: $\beta = 0.49, z = 1.10, p = 0.27$). The other three conditions show a statistically significant preference for accepting the CR: (i) OBJ (Cz: $\beta = 1.34, z = 2.94, p < 0.01$, Ger: $\beta = 1.31, z = 2.85, p < 0.01$), (ii) PASS (Cz: $\beta = 1.57, z = 3.47, p < 0.001$, Ger: $\beta = 2.09, z = 4.16, p < 0.001$), (iii) TOPIC (Cz: $\beta = 1.13, z = 2.70, p < 0.01$, Ger: $\beta = 1.57, z = 3.28, p < 0.01$). In both languages, these three conditions didn't significantly differ from each other, but all three differed significantly from the reference condition, SUBJ (the diffs of OBJ, PASS, TOPIC against SUBJ: $\beta = 1.02_{Cz}/0.82_{Ger}, z = 2.27_{Cz}/2.39_{Ger}, p < 0.05_{Cz}/0.05_{Ger}; \beta = 1.24_{Cz}/1.60_{Ger}, z = 2.81_{Cz}/3.97_{Ger}, p < 0.01_{Cz}/0.001_{Ger}; \beta = 0.807_{Cz}/1.08_{Ger}, z = 1.99_{Cz}/2.96_{Ger}, p = 0.046_{Cz}/< 0.01_{Ger}$ respectively). **Discussion**: The high acceptance rates for the CR of *A i B* and *sowohl A als auch B* conjunctions in object position, as compared to subject position, confirm **E1** for both languages. This is unexpected for purely distributive analyses of particle conjunctions [5 7], but expected under the plural-based account in [3]. The different morphological makeup of the conjunctions and the scalarity of Czech *i* did not have an impact. The surface c-command generalization (**E2**) was not confirmed, as movement did not affect the CR. This is a puzzle for existing theories of cumulativity asymmetries [1 3 4]. Further, although our task targeted acceptability rather than relative preferences, such preferences unexpectedly seemed to influence the results. In object position, acceptance of a DR was at chance level, suggesting that it was blocked by the preferred CR. The data thus provide new insights on the semantics and processing of particle conjunctions.
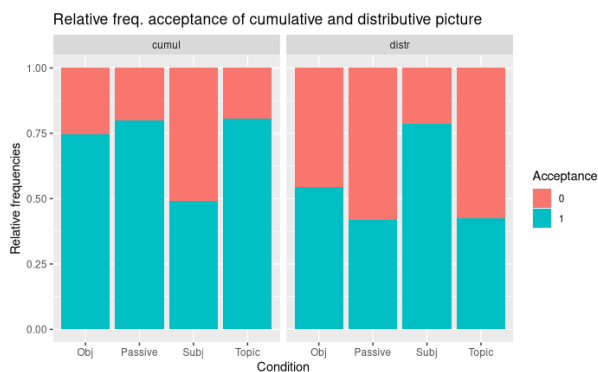

Fig. 1: Barplots of Cz exp

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