Unifying distributivity: A cross-linguistic account

Languages mark distributivity in morphosyntactically different ways. This paper proposes a unified semantics for distributivity with two related types: quantificational restrictor and anaphoric distributives.

Introduction Distributives involves some property (the SHARE) applying to individual parts of a plurality (the KEY). For (9-c), *the men* is the key, and *carried three suitcases* is the SHARE. Morphosyntactic differences in distributivity can be characterized based on two features: (i) morphological basis, (1), and (ii) constituency of the distributive construction, indicated by circled nodes in (8), where the distributive attaches. For example, English *each* comes from a determiner but has an NP constituent functioning as an argument in (9-a), an adnominal adjunct in (9-b), and adverbial adjunct in (9-c). Reduplication of numerals/predicates marks distributivity in Georgian, (11-a)–(11-c), which function as modifiers.

(1) a. determiner/quantifier   English *each* (9-a), **(9-b)-(9-c)**; Shan *lăj* (10-a), **(10-b)-(10-c)**
     b. numeral affix   Georgian (11-a), **(11-b)**; Kaqchikel (13-a) REDUPLICATION
     c. verbal/predicate affix   Georgian **(11-c)**; Maricopa *-xper* (12-a)–(12-b); Kaqchikel **-la'** **(13-a)**
     d. prepositional   English *two by two* **(9-d)**

Proposal Despite morphosyntactic differences, I propose distributivity can be captured using two distinct but related semantics: quantificational and anaphoric distributives, shown in (2). Both start as event/individual-type-flexible (2-a), but the anaphoric type (bold in (1)) first takes an anaphoric argument with a default-singular property (or non-singular as in Shan (10-b)). This requires that distributivity quantifies over minimal situations. I will assume an event semantics following Champollion (2016), except distributives combine with verbal arguments with theta role already specified. See (8) for basic semantics.

(2) a. $[\![\text{DIST}_{\text{QUANT}}]\!] = \lambda \mathbf{Q}_{\langle \mathbf{e},\langle \mathbf{s},\mathbf{t}\rangle\rangle}.\lambda P_{\langle e,\langle s,t\rangle\rangle}.\lambda e.\lambda s.\forall s' \leq s \exists e'[e' \leq e \wedge \mathbf{Q}_{s'}(\mathbf{e}') \rightarrow P_{s'}(e')]$
     b. $[\![\text{DIST}_{\text{ANAPH}}]\!] = \lambda P_{\langle e,\langle s,t\rangle\rangle}.\lambda e.\lambda s.\forall s' \leq s \exists e'[e' \leq e \wedge \exists \mathbf{\Theta} \exists \mathbf{y}.\mathbf{\Theta}_{s'}(\mathbf{e}') = \mathbf{y} \wedge \mu_{s'}(\mathbf{y}) = \mathbf{1} \rightarrow P_{s'}(e')]$

Below are derivations for Q-restrictor-type (English/Kaqchikel) and anaphoric-type (Shan/Georgian/Kaqchikel):

(4) $[\![(9\text{-}a)]\!] = \lambda s.\exists e[\forall s' \leq s \exists e'[e' \leq e \wedge \exists x.\mathsf{ag}_{s'}(e') = x \wedge \mu_{s'}(x) = 1 \wedge \mathsf{man}_{s'}(x) \rightarrow$
                                          $\exists y.\mathsf{th}_{s'}(e') = y \wedge \mu_{s'}(y) = 3 \wedge \mathsf{suitcases}_{s'}(y)]]$

(5) $[\![(10\text{-}b)]\!] = \lambda s.\exists e.\mathsf{ag}_s(e) = \iota y.\mathsf{students}_s(y) \wedge \mathsf{got}_s(e) \wedge \forall s' \leq s \exists e'[e' \leq e \wedge$
           $\exists \Theta, z[\Theta_{s'}(e') = z \wedge \mu_{\text{HUMAN}s'}(z) = 3] \rightarrow \exists x.\mathsf{th}_{s'}(e') = x \wedge \mu_{s'}(x) = \mathsf{two} \wedge \mathsf{books}_{s'}(x)]$

(6) $[\![(11\text{-}b)]\!] = \lambda s.\exists e.\mathsf{ag}_s(e) = \iota y.\mathsf{men}_s(y) \wedge \forall s' \leq s \exists e'[e' \leq e \wedge \exists \Theta \exists z.\Theta_{s'}(e') = z \wedge \mu_{s'}(z) = 3 \rightarrow$
                                 $\mathsf{solved}_{s'}(e') \wedge \mathsf{th}_{s'}(e') = \iota x.\mathsf{problems}_{s'}(x)]$

(7) $[\![(13\text{-}a)]\!] = \lambda s.\exists e.\mathsf{ag}(e) = \mathsf{b} \wedge \forall s' \leq s \exists e'[e' \leq e \wedge \exists \Theta \exists y.\Theta_{s'}(e') = y \wedge \mu_{s'}(y) = 1 \rightarrow$
                   $\mathsf{ate}_{s'}(e')] \wedge \exists x.\mathsf{th}(e) = x \wedge \forall s' \leq s \exists z[z \leq x \wedge \mu_{s'}(z) = 3 \rightarrow \mathsf{tortillas}_{s'}(z)]$

(8) Situation-anchored event-semantics skeleton

$S_{\langle s,t\rangle} : \lambda s.\exists e.\mathsf{ag}_s(e) = \iota x(\mathsf{noun1}_s(x)) \wedge \mathsf{verb}_s(e) \wedge \exists y.\mathsf{th}_s(e) = y \wedge \mu_s(y) = \mathsf{num} \wedge \mathsf{noun2}_s(y)$
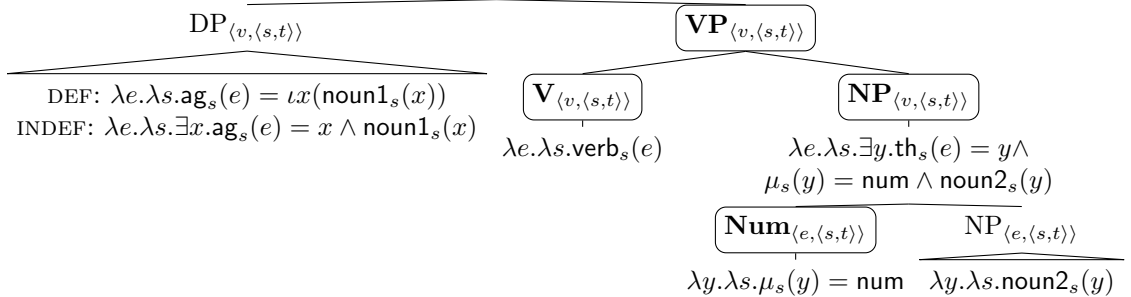
Summary This brings morphologically distinct distributivity into a unified phenomenon using quantification over situations and type flexibility (event/individual). The property of events tied to the anaphoric component could be a thematic-role or property of places/times. It addresses differences between dependent numerals and pluractionals in Kaqchikel and can capture restrictions on determiner-derived distributives noted by Zimmermann (2002) and ambiguities noted by Gil (1982).

(9) **English** (Indo-European)

    a.   **Each** man carried three suitcases.   DET/QUANT, ARGUMENT

    b.   The men carried three suitcases **each**.   DET/QUANT, ADNOMINAL

    c.   The men **each** carried three suitcases.   DET/QUANT, ADVERBIAL

    d.   The men carried the suitcases, **three by three**/**in threes**.   PREPOSITION, ADVERBIAL

(10) **Shan** (Kra-Dai)   (Moroney, To appear)

    a.   lukhén [sǎam kɔ̂]   **lǎj**   laj pâplik sɔ̌ŋ pâp

          student three CLF.H DIST get book two CLF.BOOK

          'Each three students get two books.'   DET/QUANT, ARGUMENT

    b.   lukhén laj pâplik [sǎam kɔ̂]   **lǎj** sɔ̌ŋ pâp

          student get book three CLF.H LAJ two CLF.BOOK

          'Each three students get two books.'   DET/QUANT, ADNOMINAL

    c.   lukhén kaw kɔ̂   tsɤ́ nân [sǎam kɔ̂]   **lǎj** laj pâplik sɔ̌ŋ pâp

          student nine CLF.HUM PL that three CLF.HUM LAJ get book two CLF.BOOK

          'Those nine students, each three get two books.'   DET/QUANT, ADVERBIAL

(11) **Georgian** (South Caucasian)   (Gil, 1982, 14-16,219)

    a.   Orma   k'acma **sam-sami**   čanta   c'aiɣo

          two-ERG man-ERG three-DIST-NOM suitcase-NOM carried-3SG

          Two men carried three suitcases each.   NUMERAL AFFIX, NP-MOD

    b.   K'acebma amocanebi   gamoicnes **sam-samat**

          men-ERG   problems-NOM solved-3PL three-DIST-ADV

          (i) 'The men, in threes, solved the problems.'[1] or

          (ii)'The men solved the problems in sets of three problems.'[1]   NUMERAL AFFIX, VP-MOD

    c.   K'acebma amocanebi   gamoicnes **prtxil-prtxilat**

          men-ERG   problems-NOM solved-3PL care-DIST-ADV

          'Each man carefully solved the problems.'[1] or

          'The men carefully solved each problem.'[1]   PREDICATE AFFIX, VP-MOD

(12) **Maricopa** (Yuman, Hokan)   (Gil, 1982, 14-16)

    a.   ʔIpač   xvikk   ʔii xmok**xper**m   paayšík

          men-NOM 3-two-SG-SS stick 3-three-SG-DIST-DS 3-carried-DUAL-REAL

    b.   ʔIpač   xvikk   ʔii xmokm   paay**xper**šík

          men-NOM 3-two-SG-SS stick 3-three-SG-DS 3-carried-DIST-DUAL-REAL

          'Two men carried three suitcases each.'   PREDICATE AFFIX, PRED.

(13) **Kaqchikel** (Mayan)   (Henderson, 2014, (105))

    a.   X-e'-in-tij-**la'**   **ox-ox**   wäy.

          CP-A3p-E1s-eat-la' three-RED tortilla

          'I kept eating the tortillas in groups of three.' PRED/NUM AFFIXES, PRED./NP-MOD

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[1]My paraphrases