Czech binominal *each* and collective set predicates

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Background In this paper we address the interaction between collective numerals (CN) and determiner/binominal *each*. It was noticed in a literature (Dotlačil 2012b) that some types of collectives (collective set predicates following Winter's 2001 terminology) allow limited distributivity effects like the ability to license reciprocal anaphors (e.g. *Bill and Peter, together, carried the piano across each other's lawns*). Such data are not analyzable in the traditional approaches to pluralities and require frameworks interpreting expressions via sets of assignments (Brasoveanu 2008, Nouwen 2003, Dotlačil 2012b a.o.). We follow this trend and describe Czech data (collective interpretation of numerals and their interaction with determiner/binominal *each*) in the PCDRT framework of Dotlačil (2012a,b). Binominal *each* itself poses non-trivial questions for compositional approaches to natural language syntax and semantics and its interaction CN adds another layer of complexity. We argue that the essentially right PCDRT approach has to be enriched with syntactic analysis to deal with the puzzling Czech data.

Data Czech numerals have a distinctive subclass of the collective numerals (Dočekal 2012), which *ceteris paribus* enforce collective inferences: compare (1-a) (ordinary numeral *dva* 'two') vs. (1-b) (collective numeral *dvojice* 'twosome'), where the infelicity of the continuation in (1-b) signals the unavailability of distributive readings with CN; (1-b) has a collective inference: the two athletes worked together as a team. But even if the collective inference is a part of CN's meaning, they allow for some distributivity (in contrast to pure collectives); (2).

(1) a. **Dva** sportovci vyhráli 2 medaile, ✓první zlato a stříbro, druhý stříbro a bronz.
two athletes won 2 medals first gold & silver second silver & bronze
'Two athletes won 2 medals, the first one G & S, the second one S & B.'
b. **Dvojice** sportovců vyhrála 2 medaile, #první zlato a stříbro, druhý stříbro...

(2) **Dvojice** /#**Skupina** podezřelých zradila jeden druhého. (Intended:) 'The people within
twosome group suspects.GEN betrayed one other.
the twosome / group of suspects betrayed one another.'

The puzzling pattern we aim to address is presented in (3): (3-a) has the expected collective reading but the determiner *each* in (3-b) allows distributive reading even with CN. But as (3-c) shows such a distributive reading is unavailable with binominal *each*. The grammaticality of (3-b) is to some extent expected after (2) but then unacceptability of (3-c) is surprising. Compare the perfectly grammatical (3-d) with cardinal numeral substituting the CN.

(3) a. **Dvojice** sportovců vyhrála 3 medaile. ***distributive**
twosome athletes.GEN won.SG.FEM 3 medals.
b. **Každý z dvojice** sportovců vyhrál 3 medaile. **✓distributive**
each of twosome.GEN athletes.GEN won.SG.MASC 3 medals
c. ***Dvojice** sportovců vyhrál(a) **každý/á** 3 medaile.
twosome athletes.GEN won.SG.MASC(FEM) each.SG.MASC/FEM 3 medals
d. **Dva** sportovci vyhráli **každý** 3 medaile. **✓distributive**
two athletes won.PL.MASC each.SG.MASC 3 medals

Analysis The core assumptions of our analysis are (i) Dotlačil's PCDRT and, for the case of (3-d), (ii) the structure shown in the figure below, involving the deletion of a definite NP anaphoric to the key (under partial matching with the key, modulo number); while the key controls agreement on the verb (and case-marking on 'each'), the deleted NP controls the number on 'each'; and (iii) the lexical entries for determiner and binominal *každý* 'each' listed in (4).

(4) a. $[\![\text{DET-každý}^{u_n}]\!] = \lambda P_{rt}\lambda Q_{rt}.\delta_{u_n}(P(u_n)) \wedge Q(u_n)$
b. $[\![\text{BINOM-každý}^{u_m}]\!] = \lambda v_r\lambda P_{rt}\lambda Q_{rt}.[u_m \mid] \wedge \delta_v(P(u_m)) \wedge Q(u_m)$

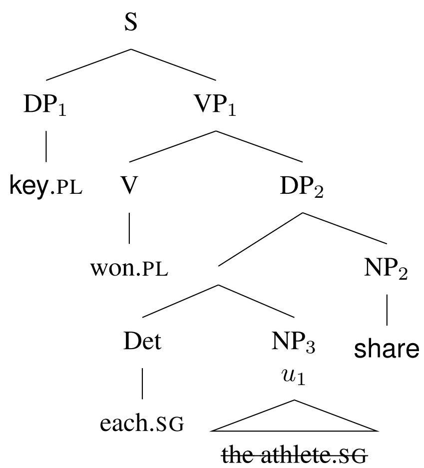
Analysis of (3-a): The subject 'twosome of athletes' ($\lambda Q_{rt}.[u_1|\#(u_1) = 2 \wedge \text{ATHLETES}\{u_1\}] \wedge Q(\bigcup u_1)$) selects the VP ($\lambda v_r[u_2|\#(u_2) = 2 \wedge \text{MEDALS}\{u_2\} \wedge \text{WIN}\{v, u_2\}]$), which results in (5). The only addition (to standard numerical conditions of PCDRT) is the collective inference stemming from the quantifier denotation of the CN, where the collective set satisfaction is required in the nuclear scope – the external argument in this case ($\text{WIN}\{\bigcup u_1, u_2\}$).

(5) $[u_1, u_2|\#(u_1) = 2 \wedge \text{ATHLETES}\{u_1\} \wedge \#(u_2) = 3 \wedge \text{MEDALS}\{u_2\} \wedge \text{WIN}\{\bigcup u_1, u_2\}]$

Analysis of (3-b): We propose that the preposition *z* 'from/of' turns predicates of groups to predicates of their parts – $\lambda P_{rt}\lambda v_r.[|v \subseteq P]$, thereby creating a property that can be selected by 'each'. The preposition operates on the predicative meaning of the CN (we follow the consensus in approaches to pluralities, where collectivity/distributivity always targets the predicates), with the collective inference targeting the CN itself ($\lambda w_r[|\#(w) = 2 \wedge \text{ATHLETES}\{\bigcup w\}]$). When the VP (as above) is selected by the quantificational subject ($\lambda Q_{rt}.[v|\delta_v([|\lambda v_r.[v \subseteq \lambda w_r[|\#(w) = 2 \wedge \text{ATHLETES}\{\bigcup w\}]]]) \wedge Q(v)$), we get (6).

(6) $[v, u_2|\text{ATHLETE}\{v\} \wedge \delta_v([|\lambda v_r.[v \subseteq \lambda w_r[|\#(w) = 2 \wedge \text{ATHLETES}\{\bigcup w\}]]]) \wedge \#(u_2) = 3 \wedge \text{MEDALS}\{u_2\} \wedge \text{WIN}\{v, u_2\}])]$

Analysis of (3-d): We argue that the syntax of Czech binominal *každý* 'each' is essentially the same as proposed by Dotlačil (2012a). That *každý* + the share form a constituent (as opposed to the floating Q *všichni* 'all' + direct object) is demonstrated in (7), where they have been fronted as a single unit. The difference to Dotlačil's analysis (to English *each*) is that the the anaphoricity of the Czech *každý* is represented in the syntax – by an NP that is anaphoric to the key and which is deleted under partial (modulo number) identity with the key. This NP (whose exact semantics will be provided in the talk) licenses the singular morphology on *každý*. The resulting meaning of the quantifier DP_2 is $\lambda Q_{rt}[u_2| \wedge \delta_{u_1}([u_2|\#(u_2) = 3 \wedge \text{MEDALS}\{u_2\}] \wedge Q(u_2)$ and the meaning of (3-d) as a whole is given in (8).



(7) [Každý /*Všichni 3 medaile] vyhráli jen čeští sportovci.
each.SG.MASC all.PL.MASC 3 medals won.PL only Czech athletes
(Intended:) 'Only the Czech athletes have (all) won (each) three medals.'

(8) $[u_1, u_2|\#(u_1) = 2 \wedge \text{ATHLETES}\{u_1\} \wedge \delta_{u_1}([\#(u_2) = 3 \wedge \text{MEDALS}\{u_2\}])] \wedge \text{WIN}\{u_1, u_2\}$

Analysis of (3-c): The reason behind the ungrammaticality of this example is that the subject and its scope impose conflicting requirements *qua* collectivity/distributivity: while the subject requires collectivity in its nuclear scope – (9-a), binominal *každý* (VP_1 node in (9-b)) dictates quantification over key's atoms.

(9) a. $[\![\text{DP}_1 \text{ of (3-c)}]\!] = \lambda Q_{rt}.[u_1|\#(u_1) = 2 \wedge \text{ATHLETES}\{u_1\}] \wedge Q(\bigcup u_1)$
b. $[\![\text{VP}_1 \text{ of (3-c)}]\!] = \lambda v_r[u_2|\delta_{u_1}([\#(u_2) = 3 \wedge \text{MEDALS}\{u_2\}]) \wedge \text{WIN}\{v, u_2\}]$

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