Balancing the (Horn) scale: explaining the production-comprehension asymmetry for scalar implicatures

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A topic of intense debate in the language acquisition literature is children's difficulty with the generation of Scalar Implicatures (SIs). Until at least 4 or 5 years of age, children struggle to infer that the use of the weak term of a scale generally results in the negation of the strongest term of the scale; hence, for instance, upon hearing *some*, children struggle to infer *not all* (e.g., Foppolo, Guasti, & Chierchia, 2012; Pouscoulous, Noveck, Politzer, & Bastide, 2007). Several explanations have been proposed for these difficulties (e.g., Barner, Brooks, & Bale, 2011), but developing a comprehensive account of children's behavioral pattern has proven to be extremely challenging. Furthermore, a recent corpus study (Eiteljoerge, Pouscoulous, & Lieven, 2018) shows that children, *in production*, are able to use *some* as *not all* from 2;03 years of age. This finding suggests the existence of a production-comprehension asymmetry: the adult-like comprehension of *some* develops 2 or 3 years later than the adult-like production of the same scalar item.

Here, adopting the framework of Bidirectional Optimality Theory (Bi-OT), we propose an account of children's difficulties and of the aforementioned asymmetry. The first constraint that regulates SI generation originates from the very nature of Horn scales, i.e., lexical scales such <*some*, *all*> and <*might*, *must*>. These scales denote a certain dimension (here, *exhaustivity* and *necessity*, respectively) and are always polarized towards an *apex*, i.e., a culmination point. Based on this observation, we can formalize the following constraint, *FaithHorn*, which applies to all Horn scales in general: "The strongest element on the scale maps onto the maximization of the dimension denoted by the scale". When applied to the scale <*some*, *all* > in particular, this constraint will promote symmetry between the quantifier *all* and exhaustivity. Thus, *FaithHorn* becomes *FaithAll:* "*All* maps onto exhaustivity" (note that the term *exhaustivity* here has its pure semantic meaning, and should not be confused with *exhaustification*). Secondly, a principle that seems relevant for SI generation is Grice's Quantity-1 Maxim ("Make your contribution as informative (strong) as possible", Matsumoto, 1995). We can formalize this principle as a constraint, *Strength*, that when applied to Horn scales invites speakers to prefer the strongest term of the scale.

The interaction between these two constraints can be illustrated by means of tableaux. Tableau 1 shows that the best candidate to express the meaning "exhaustive" is the form *all*: no constraint is violated. Tableau 2 shows that *some* is the optimal output for the meaning "non-exhaustive": even though the form *some* violates the constraint *Strength* (as indicated by the asterisk), this violation is less grave than the violation of *FaithAll* (fatal violations are identified by exclamation marks). Tableaux 3 and 4 illustrate the comprehension of the forms *some* and *all*. Given that *Strength* is a constraint that regulates only the choice of forms, it cannot be violated in comprehension, and hence it is vacuously satisfied in these tableaux. Conversely, *FaithAll* rules out the "non-exhaustive" meaning when *all* is the input (Tableau 3). However, when *some* is the input (Tableau 4), *FaithAll* is vacuously satisfied, because it is a constraint that pertains only to the form *all*. Thus, in comprehension, for the form *some*, there are two equally optimal meanings.

INPUT: "exhaustive"	OUTPUT	FaithAll	Strength
	☞ *all*		
	some		!*

Tableau 1 (production): unidirectional optimization of the meaning "exhaustive"

INPUT: "non-exhaustive"	OUTPUT	FaithAll	Strength
	all	!*	
	☞ *some*		*

Tableau 2 (production): unidirectional optimization of the meaning "non-exhaustive"

INPUT: *all*	OUTPUT	FaithAll	Strength
	☞ "exhaustive"		
	"non-exhaustive"	!*	

Tableau 3 (comprehension): unidirectional optimization of the form *all*

INPUT: *some*	OUTPUT	FaithAll	Strength
	"exhaustive"		
	"non-exhaustive"		

Tableau 4 (comprehension): unidirectional optimization of the form *some*

The reason why *some* normally is not considered ambiguous and interpreted as "non-exhaustive" is *bidirectional optimization* (Tableau 5), i.e., a process by virtue of which the forms and the meaning are evaluated simultaneously on the basis of all the constraints (Hendriks & Spenader, 2006). In a nutshell, first the meaning-form pair <"exhaustive", *all*> is identified as optimal because it does not violate any constraint. The other possible pairs are evaluated

in a further round of optimization: crucially, the meaning "exhaustive" has already been included in an optimal pair, and the same happened to the form *all*. Thus, the pair <"exhaustive", *some*>, and the pair <"non-exhaustive", *all*> cannot be considered optimal. Given this, the pair <"non-exhaustive", *some*>, despite violating a constraint, represents the best solution for the interpretation of the form *some*, and the best solution to express the meaning "non-exhaustive".

	FaithAll	Strength
✌ <"exhaustive", *all*>		
<"non-exhaustive", *all*>	*	
<"exhaustive", *some*>		*
✌ <"non-exhaustive", *some*>		*

Tableau 5: bidirectional optimization over form-meaning pairs

The account of SIs presented here gives rise to the following predictions:

1. Production is easier than comprehension: speakers, simply following the constraint *Strength*, choose the form *all* whenever possible. Consequently, even young children can make a pragmatically felicitous and adult-like use of *some* (i.e., with its upper-bound reading): no complex inferential process is needed for this. Contrary to traditional accounts of SIs, this can explain Eiteljoerge et al. (2018)'s production findings. Additionally, the approach developed here allows us to draw a significant conclusion: SI generation is a process carried out entirely by listeners, and *speakers cannot be said to produce SIs*. The adequate use of *some* with its upper-bound reading simply *triggers* the generation of SIs but it is clearly more elementary than SI generation.
2. Comprehension requires additional cognitive resources: comprehension requires listeners to take into account also speakers' perspective (bidirectional optimization process). This is not problematic for adults but arguably relies on cognitive abilities such as processing speed and Theory of Mind (Hendriks & Spenader, 2006). Preliminary results from Mazzaggio, Foppolo, Job, and Surian (2018) suggests a correlation between the ability to generate SIs and ToM in children with Autism Spectrum Disorder.
3. The scale of numerals cannot give rise to implicatures: the apex is what distinguishes Horn scales from other kinds of scales. Consequently, we predict that the scale of numerals (which cannot have an upper-bound by definition), cannot trigger SI generation (*contra*, e.g. Horn, 1972). Notably, the peculiar behavior of the scale of numerals has been a puzzle for many implicatures' accounts: indeed, contrary to what happens with the <*some*, *all*> scale, cognitive load in adults does not decrease the rate of literal interpretations of numerals (Marty, Chemla, & Spector, 2013) and 5 years old children tend to reject underinformative sentences that include a numeral term (Papafragou & Musolino, 2003). These findings suggest that our characterization of scales is on the right track.

In conclusion, we propose a Bi-OT account of scalar implicatures that explains the rather puzzling finding that children's production precedes their comprehension; in addition, our perspective is able to answer crucial questions related to the properties of SIs.

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Distributivity over Situations

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Overview In this talk, I show that *-zutsu* in Japanese allows distribution over (i) individuals, (ii) salient occasions and (iii) subkinds. Previous accounts cannot incorporate (iii) under the same operator, e.g., Part or D-operator. To offer an unified account to the three readings, I propose a situation-based Part operator. As a bonus, in this account, quantifier domain restriction comes for free. I show that this offers us deeper understanding of the context sensitivity of distributivity.

Introduction *-zutsu* forces distributive readings either over individuals (1a) or salient occasions (1b).

(1) a. karera-ga kaban-o san-ko-**zutsu** hakon-da.
they-NOM suitcase-ACC 3-CL_{Things}-DIST carry-PAST
"They each carried three suitcases."
b. Shun-ga kaban-o san-ko-**zutsu** hakon-da.
Shun-NOM suitcase-ACC 3-CL_{Things}-DIST carry-PAST
"Shun carried three suitcases at each salient occasion."

In (1b), the subject is a proper noun and blocks distribution over individuals. However, the sentence is true with distributing over salient occasions, e.g., Shun brought three suitcases per once and repeated it until he finishes carrying every suitcase. I call this a *occasion reading*.

zutsu can also occur prenominally with a distributive reading within the argument nominal.

(2) Kinoo, Wataru-ga ni-satsu-**zutsu**-no hon-o ka-tta.
Yesterday Wataru-NOM 2-$CL_{Volumes}$-DIST-GEN book-ACC buy-PAST
"Yesterday, Wataru bought a two-volume book."

I call this reading a *kind partition reading*. It differs from cardinal modification. Compare (2) and (3): (3) is false in (4a), but true in (4b). However, (2) is true in (4a), but false in (4b).

(3) Kinoo, Wataru-ga ni-satsu-no hon-o ka-tta.
Yesterday Wataru-NOM 2-$CL_{Volumes}$-GEN book-ACC buy-PAST
"Yesterday, Wataru bought two books."

(4) At a book store Wataru is looking for textbooks for his semantics class. He found volume 1 and volume 2 of *Logic, Language and Meaning* and *Semantics in Generative Grammar*.
a. Scenario 1: Wataru bought a copy of *Logic, Language and Meaning* volume 1.
b. Scenario 2: Wataru bought two copies of *Semantics in Generative Grammar*.

Previous accounts Champollion (2017) proposes two types of distributivity operators as follows.[1]

(5) a. Event-based D-operator: $[\![D_\theta]\!] = \lambda V \lambda e.\, e \in {}^*\lambda e' [V(e') \,\&\, \mathrm{Atom}(\theta(e'))]$
b. Event-based Part operator: $[\![Part_{\theta,C}]\!] = \lambda V \lambda e.\, e \in {}^*\lambda e' [V(e') \,\&\, C(\theta(e'))]$

The contextually supplied predicate C makes occasion readings available. He proposes that lexicalisation of these operators allow cross-linguistic variation and English *each* does the former while German *jeweils* does the latter, for example.

On the other hand, Zimmermann (2002) analyses *each* as involving two indices for a plural individual and a relation. A simplified version of his entry for *each* is as follows. x_i and R_j are bound via λ-abstraction rule (Zimmermann, 2002). For example, (7a) has the logical form (7b).

[1] '*' signifies that a set with it is closed under sum-formation.

(6) $[\![each]\!]^{i,j} = \lambda P \forall x' \sqsubseteq x_i[\mathrm{Atom}(x') \rightarrow \exists y[P(y) \& R_j(x', y)]$

(7) a. Boys bought two sausages each.
b. $\exists x[\mathrm{boys}(x) \& \forall x' \sqsubseteq x[\mathrm{Atom}(x') \rightarrow \exists y[\text{two-sausages}(y) \& \mathrm{buy}(x', y)]]$

However, none of these can account for kind partition readings: partitioning events to smaller pieces nor linking individuals and relations via indices are irrelevant to kind reference.

Proposal I propose that distributivity operators offer partition of a situation. Adopting the possibilistic situation semantic framework, I propose a situation-based Part operator, which resolves contextual information via *matching function* (Rothstein, 1995), which maps an event to its corresponding counterpart. Extending it to situation semantic term, Kratzer (2004); Schwarz (2009) treats it as an assignment of different individuals/events to situations.

(8) a. Everyone finished every job.
b. $\lambda s \forall x[\mathrm{person}(x)(s) \rightarrow \exists s'[s \sqsubseteq s \& \mathbf{M(s') = x} \& \forall y[\mathrm{job}(y)(s') \rightarrow \mathrm{finished}(y)(x)(s')]]]$

Based on this, I propose the following entry.

(9) Situation-based Part operator: $[\![Part_M]\!] = \lambda P \lambda s.\, s \in {}^*\lambda s' \exists e/x \sqsubseteq s'[P(e/x) \& M(s') = e/x]$

Based on this operator, I propose the following denotation for *-zutsu*.

(10) $[\![zutsu]\!] = \lambda Q \lambda P \lambda s.\, s \in {}^*\lambda s' \exists e/x \sqsubseteq s'[Q(e/x) \& P(e/x) \& M(s') = e/x]$

Occasion readings are represented as follows. The situation pronoun *s* can be bound by the Austinian topic situation or contextually salient situation via assignment function.[2] Note that this directly plays a role to resolve the question of which occasion matters for distributivity.[3]

(11) ni-satsu-zutsu kau (buying two volumes each) =
$\lambda s.\, s \in {}^*\lambda s' \exists e \sqsubseteq s'[\textsc{volume}(\mathrm{Th}(e)) = 2 \& \mathrm{buy}(e) \& M(s') = e]$
(where *s* is, for example, situations in which Shun walks to where suitcases are piled.)

On the other hand, following Miyamoto (2009), I assume that prenominal *-zutsu* underlyingly forms a relative clause. Extending it, I further assume this underlying relative clause is an appositive.

(12) hon-ga ni-satsu-**zutsu** da.
book-NOM 2-CL_{volume}-DIST COPULA
(lit)"The book comes in two volumes." (Miyamoto, 2009)

I assume that individual-level predicates are inherently generic (Chierchia, 1995) and kinds are the plural individual that comprises all of the atomic members of the kind in any world/situation (Chierchia, 1998). Then, I analyse that the predicate "Num-CL-zutsu-Copula" is an individual-level predicate and takes the maximal situation.

(13) hon-ga ni-satsu-zutsu-da (the book comes in two volumes) =
$\lambda s.\, s \in {}^*\lambda s' \exists x \sqsubseteq s'[\textsc{volume}(x) = 2 \& \mathrm{book}(x) \& M(s') = x]$
(where *s* is the totality of situations which contains this type of books.)

The matrix clause is independent of it and get a normal existential reading. For example, the matrix clause of (2) is given as (14) and (13) is a presupposition/conventional implicature with it.

(14) $\lambda s.\, \exists e \exists x[\mathrm{book}(x) \& \mathrm{read}(e) \& \mathrm{Ag}(e) = \mathrm{Wataru} \& \mathrm{Th}(e) = x]$ (where *s* can be anything.)

This explains why kind partition readings are truth-conditionally different from cardinal modification and only observed in the prenominal position. In this way, this situation-based account offers a unified account for occasional readings and kind partition readings. In addition, situation variable set a restriction for which occasions matter for distribution.

[2]The details of the mechanism will be described in the talk, but I follow basic assumptions made in Schwarz (2009).

[3]Technically speaking, each *s* has to be *minimal* to avoid redundant counting, but I omit that part as that is a general issues for situation semantics.

Commitment issue? A unified analysis of Mandarin discourse particle *ba*

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This paper provides new data and a unified account for the discourse particle *ba* in Mandarin. Previously, people have argued for two *ba*s: *ba*1 in declaratives, which weakens the assertion; *ba*2 in questions, which strengthens the question by urging the addressee to answer it (Zhu 1999). I propose that there is only one *ba*, whose function is to cancel any commitment that the prejacent would make, similar to rising intonation in English (Gunlogson 2008). I bring in new data on *ba* in declaratives and argue that the "strengthening" of *ba* in interrogatives has been overstated; the urgency intuition results simply from the fact *ba* is re-asking a question.

I. Epistemic uncertainty? Previously, the effect of *ba* as in (1) has been described as expressing the speakers epistemic uncertainty (Li 2006, Ettinger and Malamud 2014 a.o.). Similar to epistemic modals, judging a *ba*-assertion as wrong seems unfair. Additionally, *ba* can be used to express doubt without outright denial (2).

(1) (i)A: Ting, shenme shengr? *What is that sound?*
(ii)B: Xiayu le **ba**. *It's raining **ba**.*

(2) (i)A: Xiayu le. *It's raining.*
(ii)B: Mei xia **ba**. *It's not **ba**.*

However, *ba* is subtly different from epistemic modals.

No out-of-blue contexts Unlike epistemic modals (3a), *ba* requires a pre-existing Question under Discussion (QUD, (4b)) and cannot be used in out-of-blue contexts (3b):

(3) *Anna (A) walks in the room and says:*
a. A: Louxia **keneng** zai fa dangao. *They might be giving out cakes downstairs.*
b. A': #Louxia zai fa dangao **ba**. *They are giving out cakes downstairs* **ba**.

(4) *Ben (B) asks Anna (A) who just walks in the room*
B: Weishenme louxia zheme chao? *Why is it so noisy downstairs?*
a. A: Louxia **keneng** zai fa dangao. *They might be giving out cakes downstairs.*
b. A': Louxia zai fa dangao **ba**. *They are giving out cakes downstairs* **ba**.

Responding to assertions While with some special intonation, *keneng p* can be used to respond to an assertion of p, *p-ba* is infelicitous in response to an assertion of p (5iia).

(5)
(i)A: Xiayu le. *It's raining.*
(iia)#B: Xia le **ba**. *It is **ba**.*
(iib)?B': **keneng** xia le. *Maybe it is.*

Felicity without uncertainty There are contexts where *ba* is felicitous although there is no uncertainty on the speaker's part. In (6), prior to the *ba*-utterance in (iii), *it's raining* is debated but then established. So A cannot possibly be uncertain about this propsition, and yet the *ba*-assertion in (6iii) is felicitous.

(6) *Context: C wants to know if it's raining outside.*
(i) A: Xia le. *It is.*
(ii) B: Mei xia. *It's not.*
They walk outside, and both see that it is raining.
(iii)A: (Nikan,) xiayu le **ba**! *See, it's raining **ba**!*

II. Cornering effect? In questions like (7iiia), *ba* appears to strengthen the force of the question into "you must directly answer this question", similar to the cornering effect described for English *or-not* questions (e.g. *Do you want icecream or not?* see Biezma 2011). Previous work tried to code this meaning in the semantics of *ba*, claiming that *ba* means "I insist" when appending after interrogatives (Zhu 1999, Han 1995, Ettinger and Malamud 2014, a.o.). However, the cornering effect results from bringing up again a previous issue, ignoring intervening discourse. For example, the question in (7iiib) does not have *ba*, but sounds equally urgent and impolite in this conversation.

(7) (i)A: Jiyutang zenme zuo? *How to make fish soup?*
(ii)B: Ni geishui zuo ya? *Who are you cooking for?*
(iiia)A: Ni hui haishi buhui **ba**? *Do you know **ba**?*
(iiib)A': Ni hui haishi buhui? *Do you know?*
(iiic)C: Ni hui haishi buhui **ba**? *Do you know **ba**?*

As mentioned before, *ba* requires a pre-existing related question, so in interrogatives it always occurs as re-raising a previous issue. Moreover, *ba* interrogatives are only felicitous if their addressee was not the one to raise this previous issue. As shown by the contrast between (7iiic) and (8, A can raise the issue first and C utters a *ba*-question, but it is infelicitous for B to use a *ba*-question. Thus, *ba* can only be used in such "impolite" questions, but is not itself responsible for the intuited urgency/impoliteness.

(8) (i)A: Jiyutang zenme zuo? *How to make fish soup?*
(ii)#B: Ni hui haishi buhui **ba**? *Do you know **ba**?*

In Sum, a unified account need to explain why (1) *ba* can be used to express epistemic uncertainty in some contexts, but (2) it cannot occur out of the blue, but requires a previous issue, (3) cannot be used to accept the addressee's proposal, (4) can be used in certain contexts without uncertainty, and (5) in interrogatives requires that the issue in (2) was not raised by the addresee.

III. Proposal I propose to explain the generalisations (1)-(5) as follows. (i) *ba* presupposes that its prejacent is relevant to an issue raised in the prior discourse; (ii) its prejacent is not part of the addressee's commitments (assuming that the inquisitive content can also be part of one's commitment); (iii) the speaker of the *ba*-utterance does not undertake a new commitment.

This accounts for the data as follows. As *ba*-utterance does not undertake new commitments, a *ba*-assertion appears to be weaker than its counterpart without *ba*. Since the particle requires a pre-existing question (i), *ba*-utterances cannot appear in out-of-blue contexts. In (5), the prejacent of *ba it's raining* is part of A's commitment; per the requirement (ii), (5) is infelicitous. Since a lack of commitment is not equal to uncertainty, *ba* is felicitous in (6). For interrogatives, the requirement in (i) and (ii) leads to the cornering effect: first, *ba* requires a pre-existing issue, and (ii) requires that the question raised by the prejacent of *ba* cannot be a question that the addressee has raised.

IV. Discourse model I assume the commitment-based discourse model of Farkas and Bruce (2010), further developed by Farkas and Roelofsen (2017), following recent work on *ba* (Ettinger and Malamud 2014). A model M contains discourse commitments (DC), the Table (T), common ground (cg), projected set (ps). The discourse effect of *ba* can be formalized as:

(9) If an untterance *UTT* would update a context $C_0 = \langle DC_0{}^s, DC_0{}^h, T_0, cg_0, ps_0, QUD_0\rangle$ to $C_1 = \langle DC_1{}^s, DC_1{}^h, T_1, cg_1, ps_1, QUD_1\rangle$, then *UTT-ba*:
   a. presupposes that *Top*(T_0) = q_0 , such that *UTT-ba* is *relevant* (Roberts 1996) to q_0;
   b. presupposes that $[\![UTT]\!] \notin DC_0{}^h$;
   c. modifies C_1 to $C_{ba} = \langle DC_0{}^s, DC_1{}^h, T_1, cg_0, ps_1, QUD_1\rangle$, i.e. besides canceling the discourse commitment of *UTT* and keeping the common ground from being updated by *UTT*, *UTT-ba* updates the discourse context in the exact same way as *UTT*.

In conclusion, this paper provides a unified account for *ba*: the particle requires a pre-existing issue and presupposes that the prejacent of *ba* is not part of the addressee's commitments, while signals that the speaker does not make new commitment with the current utterance.

References: **Biezma 2011** Alternative vs polar questions: the cornering effect; **Ettinger & Malamud 2014** Mandarin utterance-final particle *ba*in the conversational scoreboard; **Farkas & Bruce 2010** On reacting to assertions and polar questions; **Gunlogson 2004** True to form; **Han 1995** A pragmatic analysis of the *ba* particle in Mandarin Chinese. **Li 2006** Chinese final particles and the syntax of the periphery. **Zhu 1999** *Yufa jiangyi* Lectures on Mandarin Grammar.

Partitive case in Finnish numeral-noun constructions

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Introduction. Many Uralic and Slavic languages show interesting case patterns in their numeral-noun constructions (NNCs). This contribution focuses on the case pattern of Finnish NNCs, where in structural case contexts, *yksi* 'one' and the noun get matching structural case (1a), while *kaksi* 'two' and higher cardinal numerals require the noun to take partitive case (PAR) (1b).

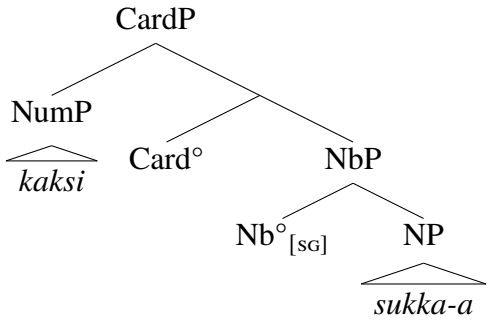
(1) a. ***yksi*** ***sukka/*****sukka-a***
one.SG.**NOM** sock.SG.**NOM**/SG.PAR
'one sock'

b. ***kaksi*** **sukka/**sukka-a***
two.SG.**NOM** sock.SG.NOM/SG.**PAR**
'two socks'

In previous work, it has been proposed that the contrast in (1) is due to syntax: *kaksi* and higher numerals are partitive-assigners, while *yksi* is not (Brattico, 2011). In this contribution, I propose an alternative semantic account where the case pattern is connected to unboundedness. This analysis does not rely on a syntactic distinction between two types of cardinal numerals within Finnish NNCs, and unifies the analysis of case in Finnish NNCs with the standard unboundedness-based analysis of object NP case in the language (Heinämäki, 1984; Kiparsky, 1998).

Syntactic background. I assume Norris's (2018) syntax of Estonian NNCs with a small modification: I replace Div° with Number°$_{[SG]}$ (for short, Nb°$_{[SG]}$), as shown below in (2). There are two reasons for using Nb°$_{[SG]}$. First, in Finnish, plural NNCs (Nb°$_{[PL]}$) exhibit a different case pattern than singular NNCs. Second, in Russian, numerals that are diachronically related to the dual (Nb°$_{[DU]}$) exhibit a different case pattern than higher numerals (Babby 1987, cited from Brattico 2011). This suggests that Nb° is relevant for determining case in NNCs. The proposal does not hinge on this choice, however.

(2)



Semantic background. I assume a strata-theoretic approach to unboundedness (Champollion, 2010, 2017): unboundedness corresponds to the higher-order property of stratified reference (SR), which is verified in distributive constructions (DCs). DCs consist of a Share S, a Map M, and a Key K, and can be used to describe an entity x only if x can be exhaustively divided into one or more parts that are in S and that are mapped by M to something that has granularity g. This SR-requirement is introduced as a presupposition by an expression that also composes S, M, and K with each other. To illustrate, take the DC *run for two hours*, where $g = \lambda t[t < M(e)]$ (e is the event described by the DC). In this DC, *for* (3) combines with a predicate of intervals (K: *two hours*), the runtime function (M: τ), and a predicate of events (S: $*run$) ($*$ indicates closure under mereological sum), and yields a predicate P of running events lasting two hours. Within this DC, SR is satisfied, as the described e can be divided into events e' in S such that $\tau(e') < \tau(e)$.

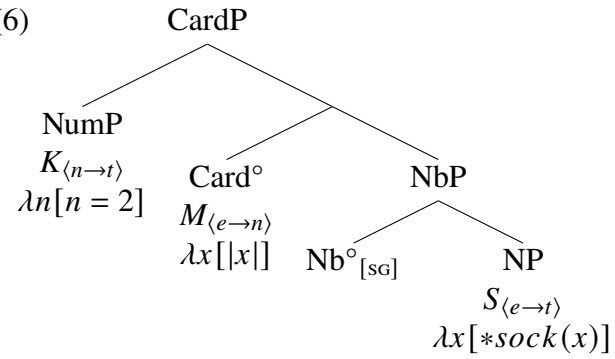
(3) $[\![for]\!] = \lambda K_{\langle i \to t \rangle} \lambda M_{\langle v \to i \rangle} \lambda S_{\langle v \to t \rangle} \lambda e : e \in *\lambda e'[S(e') \wedge \tau(e') < \tau(e)] \,.\, S(e) \wedge K(M(e))$

Proposal. I propose that Finnish NNCs are DCs, and that Nb°$_{[SG]}$ is responsible for the introduction of the SR-requirement, the composition of the DC, and the appearance of PAR. Within the DC, NP is the Share (note again the presence of $*$), NumP is the Key, and Card° hosts the cardinality function Map. g is set to $\lambda n[n < M(x)]$ (x is the entity described by the DC). The denotation of Nb°$_{[SG]}$ is shown in (4), the DC-meaning of (1b/2) in (5), and the DC-structure of (1b/2) in (6).

(4) $[\![\text{Nb}^{\circ}_{[\text{SG}]}]\!] = \lambda S_{\langle e\to t\rangle}\lambda M_{\langle e\to n\rangle}\lambda K_{\langle n\to t\rangle}\lambda x$
$: x \in *\lambda x'[S(x') \wedge |x'| < |x|]$
$. S(x) \wedge K(M(x))$

(5) Meaning of CardP in (6):
$\lambda x : x \in *\lambda x'[*sock(x) \wedge |x'| < |x|]$
$. *sock(x) \wedge |x| = 2$

(6)



I propose that PAR appears on the Share (NP) when SR is satisfied within the DC. Crucially, SR satisfaction depends on K (NumP). With *kaksi* as K (1b/2/6), SR is satisfied: the described x can be divided into one or more x' in S such that $|x'| < |x|$, given that $|x| = 2$. Thus, NNC nouns carry PAR with *kaksi* (and higher numerals) because of unboundedness (modeled as SR). In contrast, with *yksi* as K (1a), SR is not satisfied: the described x cannot be divided into one or more x' in S such that $|x'| < |x|$, given that $|x| = 1$. Thus, due to boundedness (modeled as SR), NNCs nouns do not get PAR with *yksi*, and their case must be determined otherwise. (Note that SR failure does not prevent $\text{Nb}^{\circ}_{[\text{SG}]}$ from fulfilling its compositional role within the CardP, i.e. SR only affects case.)

Open issues. As mentioned above, I assume that the Share NP denotation is closed under mereological sum, as has been claimed for e.g. Turkish singular Ns (Bale et al., 2011). However, unlike in Turkish (7), such bare NPs cannot appear in predicative position with plural subjects in Finnish (8). Moreover, while such bare NPs have cumulative reference, they cannot appear in measure constructions in Finnish (Sutton and Little, 2019) (**kaksi kiloa sukka-a* int. 'two kilos of socks').

(7) a. *John çocuk*
John boy.SG
'John is a boy'

b. *John ve Brad çocuk*
John and Brad boy.SG
'John and Brad are boys'

(8) a. *John on poika*
John is boy.SG.NOM
'John is a boy'

b.**John ja Brad ovat poika*
John and Brad are boy.SG.NOM
Int. 'John and Brad are boys'

Under the present analysis, one way to account for these data is to assume that the bare NPs in (8) are in fact accompanied by a covert equivalent of *yksi* in Finnish, and they therefore do not contain plural individuals (or have cumulative reference). The same covert *yksi* would also be present in conjunctions like *kaksi sukkaa ja kenkä* 'two socks and one shoe'. I leave this issue open for now.

Conclusion. In this contribution, I argue that the case pattern of Finnish NNCs is determined by unboundedness. By doing so, I eliminate the need to assume that *yksi* 'one' is syntactically different from other numerals inside NNCs, and unify the analysis of case in NNCs with the standard analysis of object NP case in Finnish. As it stands, the analysis should be straightforwardly applicable to Estonian (Norris, 2018), where partitive object NPs are also correlated with unboundedness.

Selected ref. Brattico (2011) Case assignment, case concord, and the quantificational case construction. *Lingua*. ♣ Champollion (2017) *Parts of a whole: Distributivity as a bridge between aspect and measurement*. OUP. ♣ Norris (2018) The morphosyntax of number in Estonian numeral-noun constructions. *Proceedings of the LSA*. ♣ Sutton and Little (2019) The Finnish partitive in counting and measure constructions. *SuB 24*.