# Internal Reading and the Comparative Meaning[1]

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**Abstract.** Recent years have seen fruitful investigations of the *internal reading* of a comparative adjective, where the comparison standard is clause-internal. This paper takes yet another look at this topic, from the angle of scalar comparatives. The internal reading of scalar comparatives is robustly attested, and their interpretation shows unique subtleties that I argue to be challenging for current theories. I will develope a new theory that explains away this empirical challenge, unifying the internal reading of scalar and identity comparatives. The core idea of this account is that comparatives makes comparison to an alternative context, and it extends to the many uses of comparatives beyond the internal reading.

**Keywords:** comparatives, internal reading, dynamic semantics, type shifting

## 1. Introduction

When comparative adjectives are used without a overt *than*-phrase/clause, the context provides a relevant comparison standard. In (1) for example, the comparative *bigger* is naturally interpreted as a comparison between John's boat and Nick's boat.

(1) Nick's boat is small. John's is bigger.

Sometimes, the context is within the clause containing the comparative adjective. Sentences like (2) has a reading where the interpretation of the comparative is not dependent on any clause-external standard: under this reading (2) is true when John buys a boat each year and the boat he buys is increasingly bigger. This has been called the *internal reading* of the comparative (Beck 2000, Brasoveanu 2011, Bumford 2015), in contrast to the *external reading* in (1).

(2) Every year John buys a bigger boat.

Having sentence-internal readings when in the scope of a lexicalized universal like *each* and *every* appears to be a common feature of all comparative adjectives; it is true for scalar comparatives just as it is true for identity comparatives such as *different* (3). This paper presents a technical explanation for this common feature. In my account, internal readings licensed by *each/every* result from interactions of some fundamental aspect in the semantics of distributivity and comparatives, namely, their shared sensitivity to a secondary information channel.

(3) Every year John buys a different boat.

We will begin with an empirical problem: the internal reading of scalar comparative appears to be different from the interpretation derived in all available compositional accounts of internal readings, which have overwhelmingly focused on identity comparatives. A simple-minded extension of these accounts would predict that the internal reading in (3) requires that the boat John buys in the first year is still bigger than something. It doesn't.

The proposed analysis following the empirical discussions builds on the core idea of Brasoveanu (2011), i.e. both the comparative and the distributive operator presuppose an enriched, two-part context. The implementation of this idea takes a non-trivial departure: in stead of generalizing to the worst case as in Brasoveanu (2011), these more complex meanings will be treated as a

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more complex type sentence meaning, and we'll use type shifters to call up and close off the additional information channel whenever the composition demands. By the end of this paper, we would have solved the problem we start off with, and have an extended, unified account for comparatives outside of the internal reading.

Note that we won't be able to discuss *same*, whose internal readings are more widespread, can show up in places where no other comparatives can have internal readings, such as in the scope of aspectual markers, e.g. *John read the same book again and again*). This is suggestive that there might be important semantic differences between *different* and the *same* construction in English (cf. Hardt and Mikkelsen 2015), an important topic for a different occassion.

## 2. The empirical challenge

Historically, the research on *every*-licensed internal readings have mainly focused on identity comparatives. Given the established observation (in Beck 2000, Bumford 2015) that the internal reading of scalar comparatives has the exact same distributional patterns as singular *different*, i.e., *different* contained in a singular noun phrase – both are licensed by, and *only* by, lexicalized universals like *every* – it is reasonable to hypothesize that the two have the same underlying mechanism. But, I argue, that's not what we find with the results in the literature.

### 2.1. The internal reading in previous theories

In all of the few compositional analyses on the market, the internal reading of singular *different* is derived to be comparing *each* entity in the universal quantification domain to something else.

In Brasoveanu (2011), the first and a prominent compositional account on singular *different*, lexicalized universals distribute over pairs in its domain. The meaning of *every boy recited a poem* is that every pair of distinct boys both read a poem; the truth conditions can be paraphrased as in (4). The meaning of the comparative, roughly speaking, relate and compare the two entities in each pair. The derived internal reading can be paraphrasesd as (5). Becasue $x \neq x'$ entails $x' \neq x$, each of the boys is the comparison target in some pair.

(4) $\forall x, x' \in \mathsf{boy}, x \neq x', \exists y, y' \in \mathsf{poem} : \langle x, y \rangle, \langle x', y' \rangle \in \mathsf{recited}$

(5) *Every boy recited a different poem* $\rightsquigarrow$
$\forall x, x' \in \mathsf{boy}, x \neq x', \exists y, y' \in \mathsf{poem} : \langle x, y \rangle, \langle x', y' \rangle \in \mathsf{recited} \wedge y \neq y'$

In Bumford (2015), the comparative relates the discourse referent introduced by its containing noun phrase to an antecedent as it supposedly always does in the external reading; the internal reading arises as lexicalized universal quantifications denote a series of dynamic updates, each becomes the prior context of the next. As paraphrased in (6) (; denotes dynamic conjunctions), we get a series of comparisons comparing the poem recited by each boy to something else.

(6) a. [Every boy recited a different poem] $\rightsquigarrow$
[John recited a different poem from some previously mentioned poems] ;
[Nick recited a different poem from some previously mentioned poems] ;
[Fred recited a different poem from some previously mentioned poems] ; ...

And the same result in choice-functional accounts. In Lahm (2016), the comparative adjectives restrict the output of a skolemized choice function (cf. Barker 2007)[2]. We get the intended internal reading when the individual argument of the skolemized function gets bound by the universal quantifier. The meaning we derive for *every boy recited a different poem* is (7), it says every boy recited a poem that could be anything *but* a poem recited by *any* of the other boys.

(7) $[\![$Every boy recited a different poem$]\!] \rightsquigarrow$
$\exists \mathsf{CF} f : \forall x \in \mathsf{boy} : \mathsf{recited}(x, \mathsf{a}(f(\lambda y.\mathsf{poem}(y) \wedge \neg \mathsf{Im}^{-} f_x \mathsf{poem}(y)))$

One thing remains constant in all these theories – each entity in the distributive domain is automatically turned into a comparison target. This won't work as well for scalar comparatives.

## 2.2. Problem of asymmetric comparisons

The correct truth conditions for the sentence *every year John buys a bigger boat* should be paraphrased along the lines of (8) (cf. Brasoveanu 2011: (210) - (211), see also Beck 2000). Notably, this interpretation differs from the internal singular *different* in two respects.

(8) $\forall x, x' \in \mathsf{year}, x \succ x', \exists y, y' \in \mathsf{boat} : \langle y, \mathsf{john}, x\rangle, \langle y', \mathsf{john}, x'\rangle \in \mathsf{buys}, y$ is bigger than $y'$
where $x \succ x'$ iff $x$ succeds $x'$ in the temporal ordering

The first is that the first year in the distributive domain is *not* a comparison target. To see this more clearly, we can consider sentences where the domain of the universal quantifiation is fixed by an overt adverbial phrase, e.g. (9). I certainly can't be more stressed in the first year than any other year in the grad school, due to the asymmetric orderings imposed by *more*. In the meantime, (9) doesn't require me to be more stressful in the first year than any year outside of grad school, it is intuitively true even if the first year was quite stress free, so long as the stress level increases as we incrementally evaluate the later years. Perhaps the judgment becomes even sharper with sentences like (10). In (10), it is clearly odd to compare the first time of me seeing John to any other times – not to the later times, and not to the times I didn't see him, as one can't use *beautiful* (a predicate of personal taste (Egan 2010, a.o.)) without the experience of seeing[3]. In view of these observations, I'll assume that in the internal reading with *any* scalar comparative, the first entity in the distributive domain is never the comparison target.

(9) When I was in grad school, I was more stressed every year.

(10) John is more beautiful every time I see him.

The second difference is that the internal reading of scalar comparatives requires the presence of a contextually salient ordering of the distributive domain. This explains why it is typically only possible when the universal is temporal (given that the domain of times is inherently ordered by the temporal precedence relation) or else when such an ordering is saliently implicated in the context, such as in (11) (Brasoveanu 2011: (204)). Such an ordering never seems to play a role in the internal reading of the singular *different*.

(11) Each job makes me more frightening to others and more passionate.

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[2]This choice function outputs a singleton set, not an entity. This is borrowed from Barker (2007); just like Barker (2007) the reason we need this is to compose *different N* with a determiner.

[3]Predicates of personal taste have been noted to give rise to what Ninan (2014) calls the *Acquaintance Inference*: in using them the speaker is committed to having a relevant firsthand perceptual experience (see also Pearson 2013, Kennedy and Willer 2016, Anand and Korotkova 2018).

With these differences, it is clear that the available theories can't easily extend to the scalar comparatives, as we can't get the correct interpretation simply by replacing the distinctness condition with the (asymmetric) ordering relation denoted by the comparative.

## 3. Sketch of the idea

### 3.1. Incremental comparisons

Despite the seeming disparity, if we take Brasoveanu's basic idea of comparison within pairs and make a little change to the pairs to compare, it is still possible to state the interpretation of the internal reading with either singular *different* or scalar comparatives uniformly.

Suppose that we fix the ordering of the distributive domain, and the *every*-licensed internal readings are interpreted as a series of *incremental comparisons* between every *later* entity in the domain and its predecessors on the given ordering. In prose, this would mean that *Every boy recited a different poem* is interpreted as (12) and, completely analogously, *Every year John buys a bigger boat* as (13); the only difference is the specific ordering relation denoted by the comparative. The observation that one entity is not the comparison target is explained, as the first entity is only a comparison standard in these meanings.

(12) Boy 2 recited a poem different from boy 1, boy 3 recited a poem different from boy 1 and 2, ...

(13) Year 2 John bought a boat bigger than in year 1, year 3 John bought a boat bigger than in year 1 and 2, ...

The truth of (13) is tied to the specific ordering we choose: if we change the ordering of the years, say, from the temporal precedence relation to its reverse, the truth value of this statement will change accordingly. On the other hand, the ordering of the (12) will invariantly be equivalent to requiring each boy to be different from the other boys. This is, I propose, why the ordering relativization goes unobserved with *different* but not with scalar comparatives. The reason seems to be similar to the contrast between (14) and (15): while every quantifier is interpreted relative to a certain domain, and so the truth of (14) might be dependent on whether the domain is the editorial board but not, evaluating (15) requires no particular domain identified, as the subset relation between $[\![\text{semanticist}]\!]$ and $[\![\text{linguist}]\!]$ makes it true with any given domain. So, even though *every*-licensed internal readings are *always* interpreted relative to a given ordering of the distributive domain, its effect just won't be visible when the comparative denotes a symmetric relation (i.e. $R(a,b) \Leftrightarrow R(b,a)$). The fact that scalar comparatives seem to impose an *additional* ordering requirement is only a side effect of its asymmetric orderings.

(14) If every linguist agrees, we will publish the paper.

(15) If every linguist agrees to publish this paper, then we know that every semanticist agrees to publish it.

### 3.2. Constructing pairs

The compositional implementation of the sketched analysis also builds on the core idea in Brasoveanu (2011), but differs from it in important ways.

Brasoveanu proposes distributive quantification is like focus interpretation in that it also introduces non-ordinary semantic values managed in an additional information channel. Like focus values, these non-ordinary semantic values are accessible to certain semantic operators (e.g. comparatives). Couched in a dynamic framework where sentence meanings are relations between information states, the additional channel is modeled as a secondary info state.

Let's imagine, in broad strokes, how this can be helpful for building our desired interpretations. Suppose a universal quantification denote the following instructions to update the context: given a certain ordering $\overrightarrow{a}$ on the restrictor set, we store pairs of entities $\langle \mathsf{a}, \mathsf{b} \rangle$ in the input state pairs, in which $\mathsf{b}$ is the sum of the predecessors of $\mathsf{a}$ on $\overrightarrow{a}$, and then pass them to the nuclear scope update; this is roughly as sketched in (16). When the nuclear scope contains a comparative marker, it naturally takes the info state pairs modified by the quantifier's pair distribution as ints input context. The meaning of a comparative marker is a comparison between the two different values in a pair with regard to its scope function. (17) illustrates this with the comparative marker *er* (a concrete definition of $\mathsf{a} >_f \mathsf{b}$ is deferred to the next section).

(16) $[\![\text{every}^u A B]\!] \rightsquigarrow$ Given $\overrightarrow{a}$ on $A$: $\begin{array}{c||c} & u \\ \hline\hline s & \mathsf{a} \\ \hline s' & \mathsf{b} \end{array} \xrightarrow[b=\oplus a' <_{\overrightarrow{a}} a]{a \in \overrightarrow{a}} Bu$

(17) $[\![\text{er}(f)]\!] \rightsquigarrow \begin{array}{c||c} & u \\ \hline\hline s & \mathsf{a} \\ \hline s' & \mathsf{b} \end{array} \xrightarrow{a >_f b} \begin{array}{c||c|c} & u & \ldots \\ \hline\hline s & \mathsf{a} & \ldots \\ \hline s' & \mathsf{b} & \ldots \end{array}$

It should already be possible to see the meaning derived from the LF (18): *er* compares whether John buys a bigger boat in a year than in the previous years, for each such year-pairs assigned by *every year*. This is exactly the incremental comparisons we want. Diifferent comparative markers can the same core meaning customarized by the ordering relation they impose, and their internal reading will be derived in the same manner.

(18) $[\text{every year}\, \lambda u\, [\text{er}\, \lambda n.[\text{a}^z\ n\text{-big boat}\, \lambda z[u\ \text{John}^v\ \text{buys}]]]]$

Unfortunately, there are some difficulties in formulating these meanings using Brasoveanu's implementation of pairs. Notice that in order for the pair-based distributivity to work as intended, it is important that, inside the distributive quantification, all the relations and properties that hold in the primary state must also hold in the secondary state. However, in the implementation of Brasoveanu (2011), information in the secondary state is simply ignored by ordinary predicates like *recited*, and therefore is not accessible to them even in the scope of a distributive quantifier (19). This is not a problem in Brasoveanu's proposal, because his *every* distributes over every pair of distinct entities in the distributive domain, which includes both $\langle x, x' \rangle$ and $\langle x', x \rangle$ for any $x \neq x'$; thus the secondary state in each pair is also the primary state in some other pair, ensuring, indirectly, the parallelism between the two states (cf. Bumford and Barker 2013: 368). However, in the new definition of *every* I have sketched above, the secondary state in the first pair is never going to be the primary state in any other pair. It is exactly this that accounts for the core observation that the first entity in the distributive domain is not a comparison target. This takes away the guarantee of the parallelism within pairs, which is why the framework in Brasoveanu (2011) is ill-suited to formulating the proposed meanings.

(19) $[\text{recited}(u, v)] := \lambda \langle S, S' \rangle . \{ \langle S, S' \rangle \mid \mathsf{recited}(S_u, S_v) \}$

We will take a different route to construct pairs that solves the above problem. Whereas Brasoveanu upgrades the semantic interpretation wholesale, in my proposal pair-based interpretation is treated as a temporary enrichment that happens under composition pressure. The enrichment will be implemented in a way that ensures parallelism whenever pairs are present.

## 4. Formalizing the account

### 4.1. The baseline plural dynamic system

The baseline dynamic system is essentially that of Plural Compositional Discourse Representation Theory (PCDRT) (cf. Brasoveanu 2007, Brasoveanu 2008, I take some liberty in presentations throughout this paper)[4]. Sentence meanings are context change potentials (CCP), which are (normally) relations between *plural* information states.

Same as in the simplest, non-plural dynamic systems, on top of the basic static types ($\mathsf{t}$ for truth values, $\mathsf{e}$ for individuals, $\mathsf{d}$ for degrees), we add one more basic type, $\mathscr{V}$, as the type of variables. With this, we can construct (partial) assignment functions, functions from variables to (any type of) objects, with the type $\mathsf{g} ::= \mathscr{V} \to \mathsf{a}$. A plural info state is a set of assignment functions, type $\mathsf{G} ::= \mathsf{g} \to \mathsf{t}$. $\mathscr{T} ::= \mathsf{G} \to \mathsf{G} \to \mathsf{t}$ is thus the type of a CCP.

Now let's define some notions that are going to be useful in the subsequent discussions. A plural discourse referent (dref) is the mereological fusion of all the objects stored at the same variable position in a state (20). Sometimes we are also interested in the *set* containing these objects, which is defined in (21). Lexical relations are interpreted distributively within a plural info state (22). Existential quantification in non-plural systems like DPL (Groenendijk and Stokhof 1991) or CDRT (Muskens 1996) extends the input assignment function with nondeterministic assignments of a certain variable (23). Existential quantification with plural info states is defined as the cumulative-quantification style generalization of this dref introduction (24).

(20) $S_u := \bigsqcup \{s_u \mid s \in S\}$   $\mathsf{a}$

(21) $\bigcup S_u := \bigcup \{s_u \mid s \in S\}$   $\mathsf{a} \to \mathsf{t}$

(22) $[\text{walks}] := \lambda u.\textbf{walks}\ u$ where $\textbf{walks}\ u := \lambda S.\{S \mid \forall s \in S : s_u \in \mathsf{walks}\}$   $\mathscr{T}$

(23) $s[\exists u] := \{s^{u \to x} \mid x \in D\}$

(24) $S[\exists u] := \{I \mid \forall s \in S : \exists i \in I : i \in \{s^{u \to x} \mid x \in D\}, \forall i' \in I : \exists s' \in S : i \in \{s'^{u \to x} \mid x \in D\}\}$

For instance, $G$ in Figure (1a) is a plural info state. In this state, $G_u$ refers to the plural individual stored in the $u$ column $\mathsf{a} \oplus \mathsf{b} \oplus \mathsf{c}$, whereas $\bigcup G_u$ refers to the set $\{\mathsf{a}, \mathsf{b}, \mathsf{c}, \mathsf{a} \oplus \mathsf{b}\}$. $\textbf{met}(u, v)$ denotes a lexical relation test, $G$ can pass this test (i.e. $G[\textbf{met}(u, v)] \neq \emptyset$ ) so long as in *all* rows of $G$ the relation met holds between the assignment of $u$ and the assignment of $v$, i.e. $\langle \mathsf{a}, \mathsf{x} \rangle, \langle \mathsf{b}, \mathsf{y} \rangle, \langle \mathsf{c}, \mathsf{y} \oplus \mathsf{z} \rangle, \langle \mathsf{a} \oplus \mathsf{b}, \mathsf{z} \rangle \in \mathsf{met}$. Introducing a plural dref $u'$ proceeds in the way of Figure (1b): all the assignments in the output state has a predecessor in the input; in any output state, all the assignments in the input state has an successor that has a value associated with $u'$.

Finally, a feature of plural info states that we will take advantage of to define distributivity is the possibility to define substates, i.e. subsets of info states in which the assignment of $u$ sum into

[4]The main difference from Brasoveanu's original formulation of PCDRT is he makes the type of assignments, as opposed to variables, to be primitive.

| G | $u$ | $v$ |
|---|---|---|
| $g_0$ | a | x |
| $g_1$ | b | y |
| $g_2$ | c | y ⊕ z |
| $g_3$ | a ⊕ b | z |

(a) A plural info state

$G[\exists u']$ ········> 

| $J$ | $u$ | $v$ | $u'$ |
|---|---|---|---|
| $J_0$ | a | x | e |
| $J_1$ | b | y | e |
| $J_2$ | c | y ⊕ z | e ⊕ f |
| $J_3$ | a ⊕ b | f | f |

...

(b) Introducing a new plural dref

Figure 1

a particular value. This is given in (25) (I use $\sqsubseteq$ to denote the part-of relation). For $G$ in Figure (1a), $G_{u=\mathsf{a}}$ is the subset where the value of $u$ is a part of a, i.e., the first row, or $\{g_0\}$. $G_{u=\mathsf{a}\oplus\mathsf{c}}$ is the subset where the assignment of $u$, combined together, is a part of a ⊕ c, i.e. $\{g_0, g_2\}$.

(25) $I_{u=x} := \{i \in I \mid i_u \sqsubseteq x\}$

## 4.2. Type shifting to pairs

We are ready to introduce pairs. On top of the baseline system, I add one more basic type: $\mathsf{S} \times \mathsf{S}$ for pairs of (plural) info states. The meaning of a pair-based CCP is $\mathbb{T} ::= \mathsf{S} \times \mathsf{S} \to \mathsf{S} \times \mathsf{S} \to \mathsf{t}$. Consequently, we need a polymorphic definition of dynamic conjunction that is applicable to both kinds of CCPs, this is given in (26). I also define two type shifters to help resolve type mismatches resulted from having CCPs of different types, in (27) - (28).

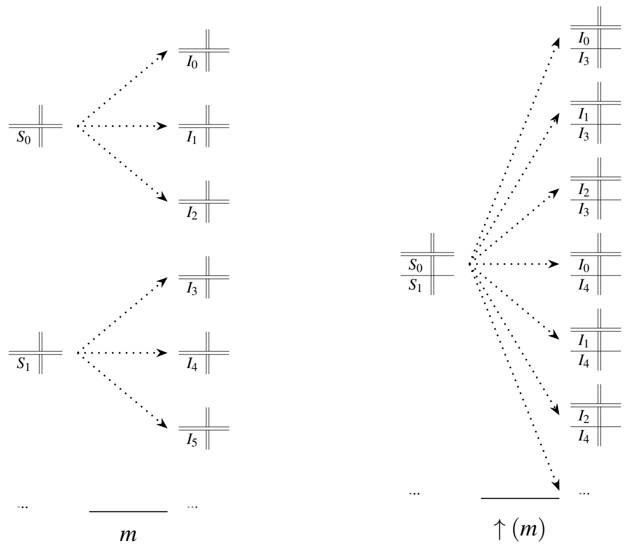
(26) $; := \lambda L \lambda R \lambda a.\{c \in Rb \mid b \in La\}$ $\quad \mathsf{a} \to \mathsf{a} \to \mathsf{a}$

(27) $\uparrow := \lambda m \lambda \langle S, S' \rangle . \{\langle I, I' \rangle \mid I \in S[m], I' \in S'[m]\}$ $\quad \mathscr{T} \to \mathbb{T}$

(28) $\downarrow := \lambda M \lambda S. \{\top \langle I, I' \rangle \mid \langle I, I' \rangle \in \langle S, S' \rangle [M]\}$
a. for any pairs $\langle S, S' \rangle$, $\top \langle S, S' \rangle = S$ $\quad \mathbb{T} \to \mathscr{T}$

The analogy between distributivity and focus interpretation originally proposed by Brasoveanu preserves: pair-based updates in my proposal resembles the enriched interpretation $[\![\ ]\!]^{\mathrm{f}}$ in Roothian focus semantics. The basic idea is this: certain lexical items evoke *alternatives* that are managed in an additional information channel. In my proposal, this is formalized as introducing *alternative variable assignments* (cf. Charlow 2019a) into the secondary info state; thus they have an inherently pair-based meaning, presupposing context updates are in this more complex form. Things that need to compose with a pair-based CCP (via dynamic conjunction) are not necessarily born with this complex type, so some coercion happens under the composition pressure: $\uparrow$ applies to shift a type $\mathscr{T}$ CCP to the more complex type $\mathbb{T}$. After the pair-based interpretation is done, its meaning is lowered back to type $\mathscr{T}$, via $\downarrow$. So, similar to $[\![\ ]\!]^{\mathrm{f}}$, processing updates with pairs is triggered by things evoking alternatives; but in lieu of always having the enriched interpretation run in parallel with operators trivializing its function from time to time (in Rooth 1992, after focus interpretation the squiggle operator $\sim$ resets $[\![\ ]\!]^{\mathrm{f}}$ to a trivial singleton set), we use type shifters to call up this additional info channel when compositionally necessary, and close it off afterwards. Semantic interpretation proceeds in the standard mode for the most part, without any reference to a secondary state.

Let's take a closer look at the definition of these type shifters in (27) and (28). Type lifting via



(a) Before lifting (b) After lifting

Figure 2: Lifting to a pair-based CCP

$\uparrow$ bears resemblance to point-wise functional application – the *only* effect of lifting is to apply a maximally trivial upgrade to a normal CCP, just enough to enable it to handle pairs in its context. The lifted CCP updates each member of the input pair, point-wise, with the pre-lifting normal update, and pairs up the results. This is visualized in Figure 2: before lifting, $m$ is a CCP that updates the info state $S$ to a set of outputs $K$, and the state $S'$ to a set of outputs $K'$; $\uparrow m$ returns a lifted CCP updating pairs; given $\langle S, S' \rangle$ as its input, its outputs contain nothing but an exhaustive list of pairings of members in $K$ and members in $K'$. Type-lowering via $\downarrow$ situates a complex, pair-based update into a discourse made of otherwise standard updates. $\downarrow$ first takes the pair-based CCP $M$ in its scope, an input state $S$, and feeds $M$ the pair $\langle S, S' \rangle$; after the updates of $M$ are processed, $\downarrow$ collects only the first/primary member of each output pair. Put it more vividly, we temporarily branch out the primary state to create pairs and discard the secondary states after the relevant interpretation is completed. The visualization is in Figure 3.

We'll soon see these type shiftings in action in concrete examples. I will give them colors, as an indication that they are additional processes that naturally arise when sequencing our interpretations of a discourse and are *not* rooted in lexical semantics.

### 4.3. The internal dynamics of lexicalized distributivity

(29) and (30) are the definition for *every* and the indefinite article in PCDRT, respectively. The *every* in (29) stores the maximal set of atomic individuals with the restrictor property in the $u$ column, then proceeds to distributively update this set with the nuclear scope restriction. Distributivity is achieved using the operator **dist** (29c): $\mathbf{dist}_u(m)$ takes in a plural info state $I$, guarantees the state in the output all preserve the same $u$-assignment in the input set, and crucially ensures that the $m$-update is interpreted relative to each single row of $I$ – it associates $I_{u=x}$ and $J_{u=x}$, for each value assignment of $u$ in $I$. As for an indefintie, following (30), it introduces a dref, imposes a cardinality check on its referent, and sends it to the restrictor and

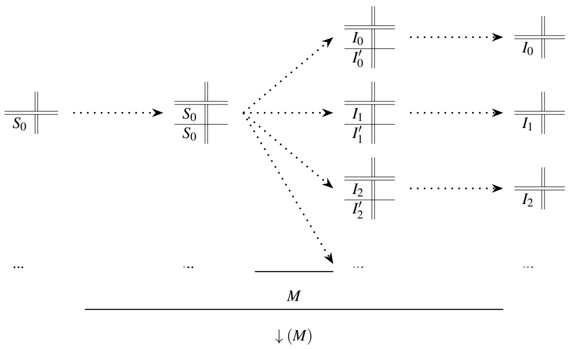



Figure 3: Lowering a pair-based CCP

the nuclear scope update. Putting together the meaning of *every year John buys a boat* using the LF in (31), the result is (32). These updates are visualized in Figure 4.

(29) $[\text{every}] := \lambda P \lambda Q.\mathbf{max}_u(\exists u; \mathbf{atoms}\ u; Pu); \mathbf{dist}_u(Qu)$

a. $\mathbf{max}_u := \lambda m \lambda S.\{i \in S[m] \mid \neg \exists H \in S[m] : I_{u'} \sqsubset H_u\}$

b. $\mathbf{atoms}\ u := \lambda S.\{S \mid \forall s \in S : s_u \in \mathsf{atom}\}$

c. $\mathbf{dist}_u := \lambda m \lambda I.\{J \mid I_u = J_u, \forall x \in \bigcup I_u : I_{u=x}[m]J_{u=x}\}$

(30) $[\text{a}] := \lambda P \lambda Q.\exists z; \mathbf{1}_z; Pz; Qz$, where $\mathbf{1}_z := \lambda S.\{S \mid |S_z| = 1\}$

(31) $[\text{every year}\, \lambda u.[\text{a}^z \text{ boat}\, \lambda z[u \text{ John}^v \text{ buys}]]]$

(32) $\mathbf{max}_u(\exists u; \mathbf{atoms}\ u; \mathbf{year}\ u); \mathbf{dist}_u(v \to \mathrm{j}; \exists z; \mathbf{1}_z; \mathbf{boat}\ z; \mathbf{buys}(z, v, u))$

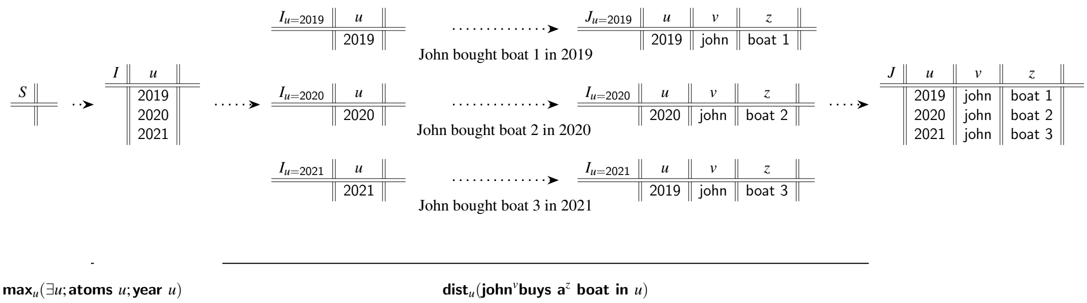



Figure 4: Distributivity in PCDRT

But our proposal is distributivity operates on pairs. Luckily, this can be achieved with some modifications of these definitions. The new definitions I'm proposing are in (33) and (34).

In the new definition of *every* in (33), we have replaced the distributivity operator with one that is based on pairs. $\mathbb{D}_u$, just like $\mathbf{dist}_u$, associates an input and output plural state with the same bookkeeping ($I_u = J_u$), making sure the $u$ assignment is unchanged from the input and the output pairs. However, the internal distributive update operates on pairs of info states. Given an ordering $\overrightarrow{x}$ on the set of $u$-values in a state $I$, $\bigcup I_u$, $I_{u=\sqcup\{x_0,\ldots x_{n-1}\}}$ is a subset of $I$ that contains the first $n$ values of $u$, and it can be regarded as the predecessor set of $I_{u=x_n}$ under the given ordering. $\mathbb{D}_u(M)$ ensures that the update $M$ is interpreted relative to each pair of a subset of $I_u$

and its predecessor set. To avoid trivial satisfaction, we add the definedness condition that the set being distributed contains at least two members.

The change in the new definition of the indefinite in (34) is in the cardinality check. $\mathbb{1}_u$ is not a trivial lift of $\mathbf{1}_v$: it checks that the cardinality in the primary state while being ignorant to the secondary state. The type mismatches between the cardinality check and the updates surrounding it can be resolved in different ways. Most innocently, $\downarrow$ can directly apply to $\mathbb{1}_u$; readers are welcomed to check that in that case (34) is effectively equivalent to (30). The other option is lifting the type of the surrounding updates. Indeed, this is what happens in the derivation of the internal reading.

(33) $[\text{every}] := \lambda P \lambda Q.\mathbf{max}_u(\exists u; \mathbf{atoms}\ u; Pu); \mathbb{D}_u(Qu)$

$$\text{where } \mathbb{D}_u := \lambda M \lambda I \left\{ J \mid \begin{array}{l} I_u = J_u \\ \exists \overrightarrow{x} \text{ on } \bigcup I_u, \forall n : 0 < n < |\bigcup I_u| \rightarrow \\ \left\langle I_{u=x_n}, I_{u=\sqcup\{x_0,\ldots x_{n-1}\}} \right\rangle [M] \left\langle J_{u=x_n}, J_{u=\sqcup\{x_0,\ldots x_{n-1}\}} \right\rangle \end{array} \right\},$$

undefined if $|\bigcup I_u| < 2$

(34) $[\text{a}] := \lambda P \lambda Q.\exists z; \mathbb{1}_z; Pz; Qz$, where $\mathbb{1}_z := \lambda \langle S, S' \rangle . \{\langle S, S' \rangle \mid |S_z| = 1\}$

With these new definitions, the interpretation of *every year John buys a boat* comes out as in (35). After the type mismatches are resolved, using $\uparrow$, the final result is (36). The visualization in (36) hopefully illustrate the pair-based distributivity update more clearly: the input and the output are exactly the same as beofore (4) and the only difference is in the distributive evaluation of the nulcer scope. $\mathbb{D}$ checks that the nuclear scope update (now a relation between pairs) associates each pair of a later year and the years before in the input and in the output. In effect, $\mathbb{D}$ looks through the distributive domain to check if the nuclear scope property *still* holds with every new entity of the domain added to the evaluation. Note that here, $\mathbb{1}_u$'s ignorance to the secondary state comes handy – the boats that John bought in previous years accumulate in the secondary state, and had the meaning of the indefinite imposed a singular cardinality check on the secondary state, the updates won't succeed unless the boats he bought are all the same one.

(35) $\mathbf{max}_u(\exists u; \mathbf{atoms}\ u; \mathbf{year}\ u); \mathbb{D}_u(\underbrace{v \rightarrow \mathrm{j}; \exists z}_{\text{type:}\mathscr{T}}; \mathbb{1}_z; \underbrace{\mathbf{boat}\ z; v\ \mathbf{buys}\ z\ \mathbf{in}\ u}_{\text{type:}\mathscr{T}})$

(36) $\mathbf{max}_u(\exists u; \mathbf{atoms}\ u; \mathbf{year}\ u); \mathbb{D}_u(\uparrow(v \rightarrow \mathrm{j}; \exists z); \mathbb{1}_z; \uparrow(\mathbf{boat}\ z; v\ \mathbf{buys}\ z\ \mathbf{in}\ u))$

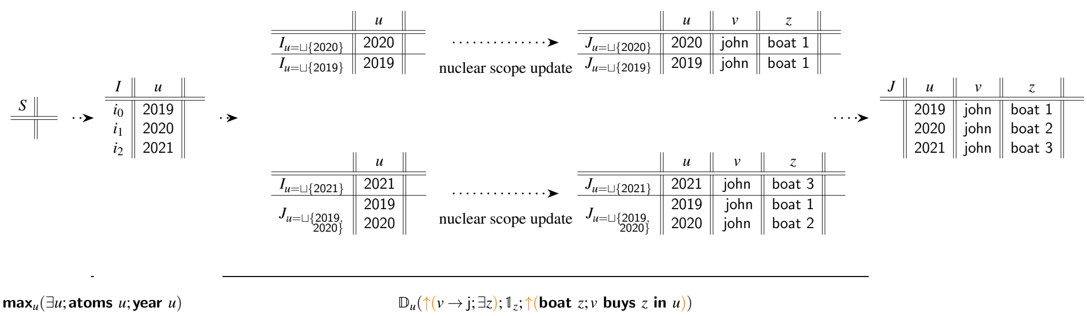



Figure 5: Distributing over pairs of info states

4.4. Incremental comparison in a distributive domain

The final step is giving the comparative a meaning that lets it exploit the pairs $\mathbb{D}$ has constructed. Following standard practice, I take comparative adjectives in English to be the morphological fusion of a gradable adjective (e.g. *big*) and the comparative marker *er*. I propose the meaning of a compararive marker is a comparison between the primary and the secondary info state. A most straightforward definition that achieves this is given in (37).

(37) $[\text{er}] := \lambda f.\mathbb{max}_n(\exists n; fn); >_n$

a. $\mathbb{max}_n := \lambda M.\lambda \langle S, S'\rangle . \left\{ \langle I, I'\rangle \in \langle S, S'\rangle [M] \mid \begin{array}{l} \neg\exists \langle H, H'\rangle \in \langle S, S'\rangle [M] : \\ H_n > I_n \text{ or } H'_n > I'_n \end{array} \right\}$

b. $>_n := \lambda \langle S, S'\rangle . \{\langle S, S'\rangle \mid S_n > S'_n\}$

Figure 6 presents the step-by-step composition of *every year John buys a bigger boat*. We can see the contribution of the comparative by comparing the interpretation we get at the top node to the comparative-free universal quantification meaning in (36). It adds two more steps into the nuclear scope update:

(i) Introducing the maximal bigness degrees of the boat that John buys in the primary and the secondary state, respectively;

(ii) Testing if the degree in the primary state is larger than the secondary state.

The effects can be seen more clearly in the illustration of Figure 7. Piggybacking on the pairs constructed by $\mathbb{D}$, [er] applies its degree introduction and maximization as well as the ordering relation test to each of these pairs. The evaluation returns true if the (plural) degree dref of the primary state is larger than that of the secondary state[5]. So the sentence is true if the boat John bought in 2021 is bigger than the maximal boat he bought in 2019-2020, the boat he bought in 2020 is bigger than the maximal boat in 2019. This is exactly the internal reading we are after.

To briefly summarize the result: the targeted internal reading is derived by giving several lexical items a pair-sensitive meaning – the comparative, the distributive quantifier, and the indefinite.

4.5. Two internal readings of *different*

I will give *different* a meaning parallel to scalar comparatives (cf. Heim 1985, Beck 2000). In the current setting, the simplest treatment of this kind is decomposing *different* into a predicate of identity and a scope-taking comparative marker (cf. Sun 2021 for a similar analysis of *same*):

(38) different $\rightsquigarrow$ DIFF - IDENT

a. IDENT $:= \lambda z \lambda v.v = z$

b. DIFF $:= \lambda f.\mathbb{max}_z(\exists z; fz); \neq_z$ where $\neq_z := \lambda \langle S, S'\rangle . \{\langle S, S'\rangle \mid S_u \not\sqsubseteq S'_u\}$

With this meaning, the *every*-licensed internal reading of *different* is entirely expected. In this reading, DIFF scopes under the universal quantifier (39), and the LF translates to the interpretation in (40), true iff the poem recited by each *later* boy that $\mathbb{D}$ plows through is not a part of the previous ones, i.e. the poem recited by every boy is different from the others.

[5] I adopt the framework for degree pluralities in Dotlačil and Nouwen (2016), in which the ordering relation $>$ is only applicable to atomic degrees unless pluralized, and after pluralization it is cummulatively closed, so $d'' > d \oplus d'$ iff $d'' > d'$ and $d'' > d'$.

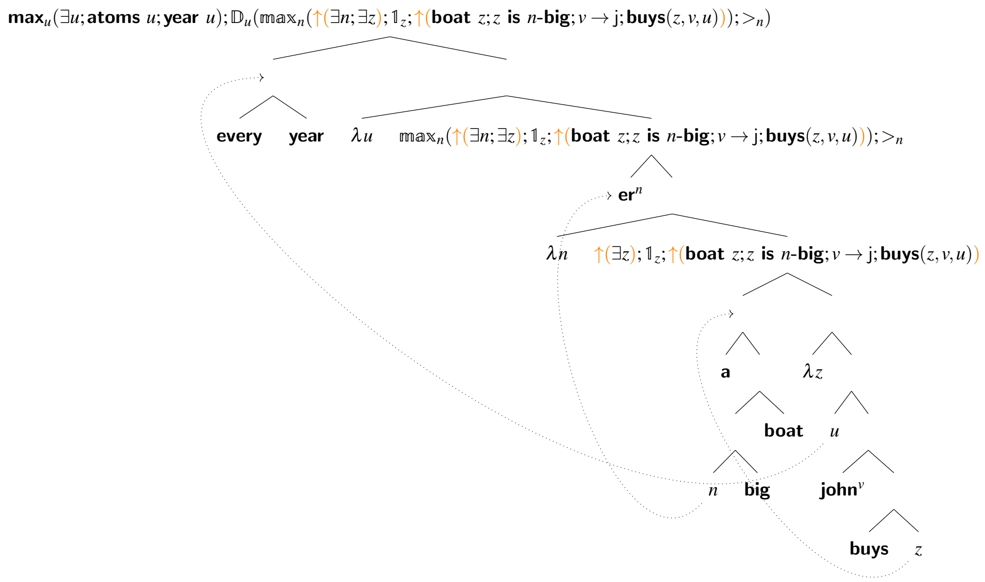



Figure 6: Composing the internal reading of *every year John buys a bigger boat*

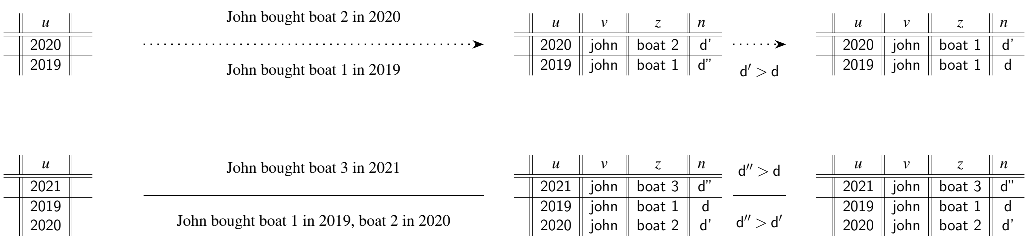



Figure 7: Incremental comparisons in the internal reading

(39) $[\text{Every boy } \lambda u[\text{DIFF}_u\, \lambda n[\text{a } z\text{-IDENT poem } \lambda v[u \text{ recited } v]]]$

(40) $\exists u; \textbf{atoms}\, u; \textbf{boy}\ u; \mathbb{D}_u(\mathrm{max}_n(\uparrow(\exists z; \exists v); \mathbb{1}_v; \uparrow(v = z; \textbf{poem}\ v; \textbf{recited}(v,u))); \neq_z)$

Researchers have noted that plural *different*, i.e. *different* contained in a plural noun phrase, may also receive an *internal reading* in sentences like *three boys recited different poems*, the licensor of which is a semantically plural noun phrase (e.g. *three boys*). I take the spirit of Brasoveanu's analysis on this reading to be essentially right; that is, plural *different* is licensed by a covert distributivity operator distributing inside the noun phrase. I assume the determiner of these plural phrases, either an overt article/numeral or the silent existential closure EC, takes scope; DIFF scopes below, under the covert presence of $\mathbb{D}$ (41). The interpretation is in (42).

(41) $[\text{Three boys } \lambda u[\text{EC } \lambda v[\mathbb{D}_v[\text{DIFF}\, \lambda z[v[z\text{-IDENT poem }]]]\lambda v[u \text{ recited } v]]]$
where $\text{EC} := \lambda P \lambda Q. \exists v; Pv; Qv$

(42) $\exists u; \downarrow(\mathfrak{Z}_u); \textbf{boys}\, u; \exists v; \mathbb{D}_v(\mathrm{max}_n(\uparrow(\exists z; v = z; \textbf{poem}\, v)); \neq_z); \textbf{recited}\,(v,u)$

As the illustration in Figure 8 shows, DIFF inside the noun phrase compares the indentity of the three poems to each other. We see in this kind of use in sentences like *There are three* *different poems*. What gives rise to the flavor of an internal reading is the plural predication on the sentence level. The output of the distributive update, e.g. $J$ in Figure 8, will pass the test of **recited** $(v,u)$ iff in each row the referent of $u$ recited the poem stored at $v$ holds; at this point, the poems being different is equivalent to that the poems read by some of the boys are different from the poems read by some other boys. In other words, we get the internal reading when the plural lexical relation is cumulatively satisified in a matrix. And finally, this kind of internal reading is not possible with the singular *different*, simply because it isn't possible to distribute the referent of a singular noun phrase.

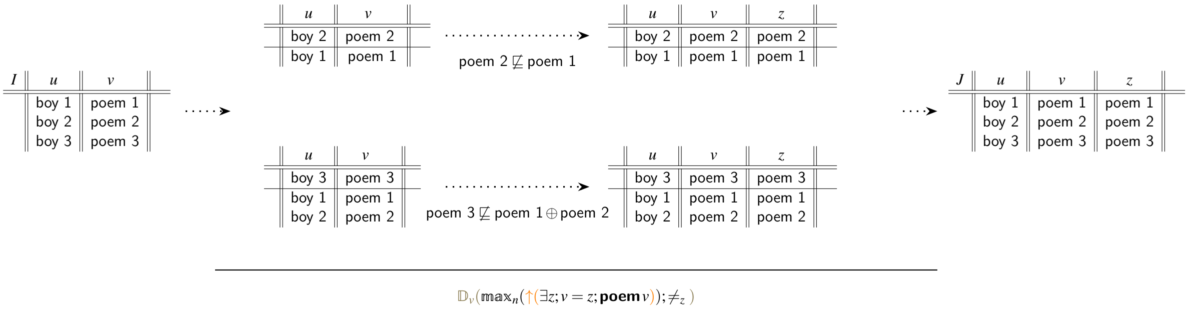



Figure 8: Plural *different* licensed by noun phrase internal distributivity

Beck (2000) noted that the singular and the plural *different* are two morphologically distinct items in German. With my account, this can be explained as an optional lexical incorporation of the covert distributivity operator that may happen in some languages but not in the others. For example, we can say that the German plural *different* (*verschieden*) is exactly like English *different* (or German *anders*) except that it uses a slightly different comparative marker, DIFF':

(43) $\text{DIFF'}_v := \lambda f.\mathbb{D}_v(\mathbb{max}_z(\exists z; fz); \neq_z)$

## 5. Extension to the external reading

### 5.1. Generalized parasitic scope

So far in the current proposal, the use of comparatives is parasitic on the scope-taking of distributivity operator. *er* defined in (37) compares the maximal degree assignment in the primary state to that in the secondary state. The reason that the two degrees are possibly different, in the internal reading, is because a variable ($u$) in the scope of *er*, whose value the value of the degree dref is dependent on, is assigned two values in a pair by $\mathbb{D}$. The maximal degree of the boats can be different in a pair because maximization in each state is relative to different years.

An obvious question is whether we can extend this treatment to the so-called *external reading* of the comparative, exemplified in (44). Here the relevant comparison standard is provided, not by anything internal to the comparative sentence, but the first sentence. More importantly, there is no distributity operator whose pair assignments *er* can exploit.

(44) Nick's boat is small. John's boat is bigger.

I believe it can, with a little modification. At the core of the internal reading we've derived is a comparison between a pair of correlates on a measurement function provided by the sentence containing the comparative. We can paraphrase the external reading in (44) analogously: it is a comparison between John's boat and Nick's boat on their measurement of bigness. Seen in this way, the only obstacle to a unified meaning is a technical one: in the internal reading, the standard correlate is introduced by $\mathbb{D}$; how is it introduced in the external reading? The solution: let *er* help itself to introducing an alternative $u$-value in the secondary state:

(45) $[\text{er}_u] := \lambda f. {}^{\perp}u \rightarrow x; \mathbb{max}_n(\exists n; fn); >_n$
where ${}^{\perp}u \rightarrow x := \lambda \langle S, S' \rangle . \{\langle I, I' \rangle \mid I = S, I' \in S'[\exists u]\}$

This modified lexical entry can derive an underspecified comparison for (44). Suppose the subject *John's boat* moves for EPP, and *er*, being co-indexed with the subject, takes scope under it (46). This will give us the meaning in (47a) at first, which then shifts to be (47b) after $\downarrow$ applies to resolve the type mismatch. These updates are illustrated in Figure 9: we branch out the info state where $u$ is already assigned to John's boat into a pair, re-assign $u$ in the secondary state to some other entity a[6]; degree introduction and maximization follows point-wise in a pair, and we end up with comparing John's boat to a in size.

(46) $[\text{John's boat}\ \lambda u[\text{er}_u\ \lambda n\,[u \text{ is } n\text{-big}]]]$

(47) a. $\underbrace{u \rightarrow \text{j's boat};}_{\text{type:}\mathscr{T}} \underbrace{{}^{\perp}u \rightarrow x; \mathbb{max}_n(\uparrow(\exists n; \mathbb{u} \textbf{ is } n\textbf{-big}); >_n}_{\text{type:}\mathbb{T}}$

b. $u \rightarrow \text{j's boat}; \downarrow({}^{\perp}u \rightarrow x; \mathbb{max}_n(\uparrow(\exists n; u \textbf{ is } n\textbf{-big}); >_n)$

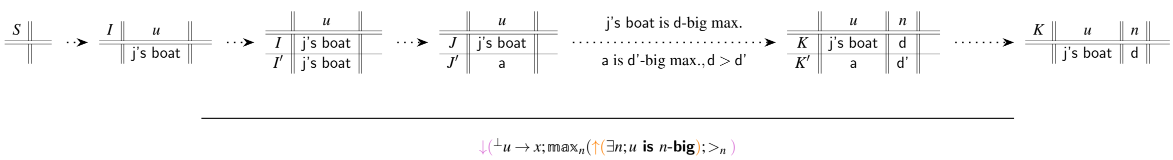



Figure 9: Comparative updates in the external reading

But of course, this comparison is not informative unless we specify the identity of a. To do that, I define an anaphoric operator $\mathbb{R}$ in (48)[7]: it takes a pair based-CCP and adds a definedness constraint on its output, requiring the to-be-specified secondary values in its scope $(u, n)$ to be identical to some discourse antecedents $(u', n')$. Note that $\mathbb{R}$ must apply in the scope of $\downarrow$ since that's the only place where reference to the secondary state is possible. The final interpretation is thus in (49); when we let the antecedents of $\mathbb{D}$ be Nick's boat and the boat's size[8], a *has to* be Nick's boat and this is exactly the external reading of (44) that we are after.

(48) $\mathbb{R}_{u,n,u',n'} := \lambda M.M; \underline{{}^{\perp}u = u', {}^{\perp}n = n'}$
a. $\underline{{}^{\perp}u = u', {}^{\perp}n = n'} := \lambda \langle S, S' \rangle . \underline{S'_u = S_u, S'_n = S_n} . \{\langle S, S' \rangle\}$

[6] This is the *destructive update* of assignment functions, which was taken to be a problem for dynamic theories by some (Vermeulen 1993, Groenendijk et al. 1995), see Charlow (2019b) for a response to these criticisms.
[7] If we only consider the external and the internal reading, it's possible to save the trouble of defining an additional operator and simply take *er* to be anaphoric, i.e. let the secondary $u$-values are free variables that must be bound by a discourse antecedent. However, this free variable treatment becomes problematic when we take into account explicit comparative constructions. See Li (2022) for more discussions.
[8] The boat's size isn't overtly mentioned, but it could still be introduced as a dref, perhaps by a silent POS operator that is present in positive consructions (cf. Cresswell 1976, Kennedy 1997 a.o.).

(49) $u \to \text{j's boat}; \downarrow(\mathbb{R}_{u,n,u',n'}(^{\perp}u \to x; \mathbb{max}_n(\uparrow(\exists n; u \textbf{ is } n\textbf{-big}); >_n))$
$\rightsquigarrow u \to \text{j's boat}; \downarrow(^{\perp}u \to x; \mathbb{max}_n(\uparrow(\exists n; u \textbf{ is } n\textbf{-big}); >_n; \underline{^{\perp}u = u', ^{\perp}n = n'})$

Importantly, the same modified lexical entry can still derive the internal reading – the effect of *er*'s correlate introduction ($^{\perp}u \to x$) is vacuous in the derivation of the internal reading. On the one hand, it is true that (45) allows *er* to randomly assign values to $u$ in the secondary state, and these new assignments will override the secondary $u$-values $\mathbb{D}$ assigns to the input pairs of the nuclear scope update. On the other hand, because the definition of $\mathbb{D}$ (in (33)) also guarantees the output pairs of the nuclear scope update has the same $u$-values as the input, *er*'s $u$-assignments is pre-conditioned to be the same as the input – it is as if it never happened.

This technique is quite powerful. *er* may take scope to intervene between *any* scope taker and the variable it binds, and thereby introduce and make comparison to the secondary alternative value of that variable. An attributive *er* can be licensed by the scope-taking determiner (Heim 1982, Barker 1995, Charlow 2020). The amount comparative *er* can be licensed by the subject (51), a scope-taking predicate in the sentence (52) (I'll assume the scope taking is triggered by focus-marking on the predicate[9]), a quantificational operator such as the indicative operator in (53)[10], or even the combination of several such scope-takers (54)[11]. Any (combinations of) expressions in the sentence containing the comparative can turn into parameters of the comparison, by taking scope.

(50) I thought Mary is quite tall. Today I finally met a taller woman.
$\rightsquigarrow$ $[\text{a } \lambda u[\text{er}_u \lambda n[u[n\text{-tall woman}]]]$

(51) John read five books. Mary read more (books).
$\rightsquigarrow$ $[\text{Mary } \lambda u[\text{er}_u \lambda n[n\text{-many books } \lambda z[u \text{ read } z]]]$

(52) John criticized five books. He PRAISED more (books).
$\rightsquigarrow$ $[\text{PRAISED } \lambda u[\text{er}_u \lambda n[n\text{-many books } \lambda z[\text{He } u\, z]]]$

(53) John was required to donate five books. He ended up donating more (books).
$\rightsquigarrow$ $[\text{IND}_{@}\ \lambda w[\text{er}_w \lambda n[n\text{-many books } \lambda z[\text{He ended up donating}_w\ z]]]$

(54) John criticized five books. Mary PRAISED more (books).
$\rightsquigarrow$ $[\text{Mary } \lambda v[\text{PRAISED } \lambda u[\text{er}_{u,v} \lambda n[n\text{-many books } \lambda z[v\, u\, z]]]]$

There are still some restrictions. The account predicts the external reading of a comparative requires, in addition to a degree antecedent, *some* comparison correlate associated with that degree. This prediction is born out: in (55), when the intended antecedent *ten* is in a negated clause, the use of the comparative in (55a) is infelicitous (under the reading of *more than ten*). The infelicity is unexpected if *er* is only anaphoric to an antecedent degree, given the fact that a co-construal reading of the degree demonstrative in (55a) is perfectly acceptable, suggesting the degree is still an accessible dref. It is expected in our account, because the negation has

[9]A scope-taking approach to focus marking has an (apparent) disadvantage in explaining the island-insensitivity of focus association. See Charlow (2014) for a way to make them compatible.

[10]Following Von Fintel and Heim (2011), I assume intensional operators like modals and attitude verbs force the intensional interpretation of their sentence argument, e.g. $[\text{thought}_w \text{ John left}] := [\text{thought}_w]\ (\lambda w'.[\text{John left}_{w'}])$.

[11]To deal with this kind of comparison over multiple correlates, we need to adjust the definition of *er* in (45) to the following: $[\text{er}_{u_0,\ldots,u_n}] := \lambda f.^{\perp}u_0 \to x_0, \ldots ^{\perp}u_n \to x_n; \mathbb{max}_n(\exists n; fn); >_n$ . where $^{\perp}u_0 \to x_0, \ldots ^{\perp}u_n \to x_n := \lambda \langle S, S'\rangle . \{\langle I, I'\rangle \mid I = S, I' \in S'[\exists u_0]; \ldots; [\exists u_n]\}$.

effectively made *ten* a bare degree: it is no longer associated with *John*, or any other possible correlates in this context. (See Li 2022 for more detailed discussions and an extension to explicit comparative constructions like *John is taller than Mary*).

(55) John didn't read ten$^d$ books.
 a. ✓ He has never seen that$_d$ many books in his entire life.
 b. # Mary read more$_d$.

Similarly, to derive the external reading of *different*, we can give DIFF a modified entry in (57). In the context of (57), DIFF takes scope under the determiner, deriving a comparison between the book John read and some book; then $\mathbb{R}$ resolves this book to the antecedent *War and Peace*.

(56) $[\text{DIFF}_u] := \lambda f.{}^{\perp}u \to x; \mathbb{max}_n(\exists z; fz); \neq_z$

(57) Mary read *War and Peace*. John read a different book.
 $\rightsquigarrow$ $[\text{a } \lambda u[\text{diff}_u\, \lambda n\, [u[n\text{-IDENT}\,\text{book}]]]$

In sum, we can have a unified comparative meaning where the use of the comparative marker is licensed by some other scope-taking operator in the sentence. The internal reading is a special case when the licensor is the distributive operator.

### 5.2. Quantification subordination

Not all external readings are deitic. (58) has a reading that says for each boy, the poem they recited today is longer than the poem the same person recited yesterday. This is a case of quantificational subordination (which has come to the interests of semanticists through sentences like *every farmer owns a donkey$^x$, every farmer feeds it$_x$ with soybeans*): the comparison correlates are the temporal adverbs and the comparison co-varies with the universal quantifier.

(58) Yesterday, every boy recited a poem. Today, every boy recited a longer poem.

To derive this reading, all we need to do is to use $\mathbb{R}$ to resolve the underspecified comparison and apply the lowering before $\mathbb{D}$ does. The LF and the appropriate translations are shown in (59). As the visualization in 10 shows, nesting these type shifters results in further branching of the context in the scope of $\mathbb{D}$. That is, for each state in a pair generated by the distributive operator, the $\downarrow$ downstream slices it into a pair, whose secondary state will store the antecedent alternative. The comparison is applied internal to this pair; we get the comparison between today and yesterday for each boy, as desired.

(59) $[\text{every boy } \lambda v[\text{today } \lambda u[\text{er}_u\, \lambda n\, [[\text{a } n\text{-long poem } \lambda z]\, u\, v \text{ recited } z]]]$
 $\rightsquigarrow$ $\mathbf{max}_v(\exists v; \mathbf{atoms}\, v; \mathbf{boy}\, v); \mathbb{D}_v(\uparrow(u \to \mathsf{today};$
 $\downarrow(\mathbb{R}_{u,n,u',n'}({}^{\perp}u \to x; \uparrow(\mathbf{max}_n(\exists n; \exists z; z \textbf{ is } n\textbf{-long poem}; \mathbf{recited}(z,v,u)); >_n))))$

## 6. Conclusions

Starting from the internal reading, we have gone through a lengthy technical discussion. The goal of these discussions is to demonstrate, collectively, that it is possible to talk about *the* meaning of a comparative that encompasses its various uses. That is, comparatives compare to the alternative, secondary context that is available on demand.

The idea of having a secondary context, or even that it is involved in the internal reading is not

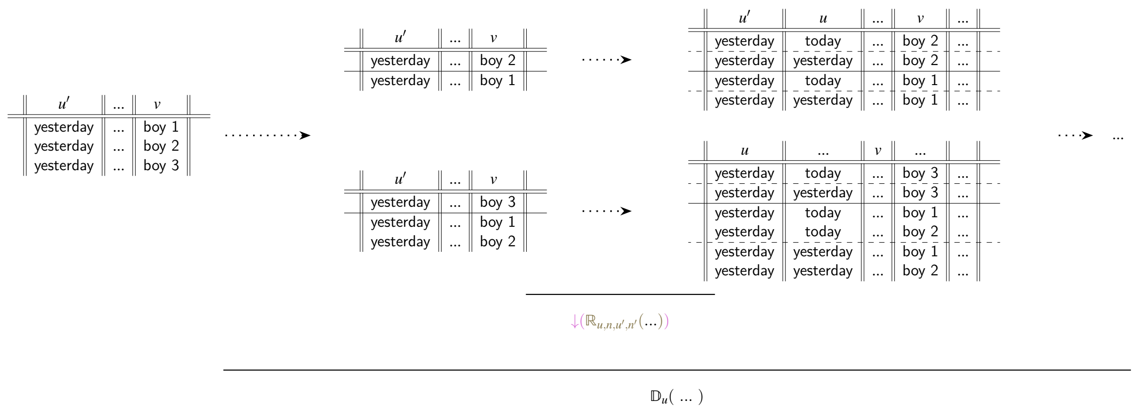



Figure 10: External reading and quantification subordination

a new one; the key innovation in my proposal is that the secondary context is created through coerced type shifting. This is what facilitates the unification. In the internal reading, whereas in Brasoveanu (2011) the required parallelism between the primary and the secondary context is tied to the specific way the distributive operator arranges its pairs, in my proposal it is directly encoded in the type shifting from a standard CCP to a pair-based one, which is defined in an analogy to point-wise functional application. This allows us to define distributivity over pairs incrementally constructed, leading to an explanation of the motivating observation[12]. Furthermore, with the help of these type shifters, *every* scope-taking operators can have its own secondary context, which makes the extension to the external reading possible.

## References


Anand, P. and N. Korotkova (2018). Acquaintance content and obviation. In *Proceedings of Sinn und Bedeutung*, Volume 22, pp. 55–72.

Barker, C. (1995). Possessive descriptions.

Barker, C. (2007). Parasitic scope. *Linguistics and Philosophy 30*(4), 407–444.

Beck, S. (2000). The semantics of different: Comparison operator and relational adjective. *Linguistics and Philosophy 23*(2), 101–139.

Brasoveanu, A. (2007). *Structured nominal and modal reference*. Ph. D. thesis, Rutgers University New Brunswick, NJ.

Brasoveanu, A. (2008). Donkey pluralities: plural information states versus non-atomic individuals. *Linguistics and philosophy 31*(2), 129–209.

Brasoveanu, A. (2011). Sentence-internal different as quantifier-internal anaphora. *Linguistics and philosophy 34*(2), 93–168.

Bumford, D. (2015). Incremental quantification and the dynamics of pair-list phenomena. *Semantics and Pragmatics 8*, 9–1.

Bumford, D. and C. Barker (2013). Association with distributivity and the problem of multiple antecedents for singular different. *Linguistics and Philosophy 36*(5), 355–369.

Charlow, S. (2014). On the semantics of exceptional scope. *PhD diss,. New York University*.

Charlow, S. (2019a). Static and dynamic exceptional scope. *Unpublished ms*.


[12]Due to space limitations, I wasn't able to include a comparison to Bumford and Barker (2013), which also directly guarantees parallelism in pairs.

Charlow, S. (2019b). Where is the destructive update problem? *Semantics and Pragmatics 12*, 10.

Charlow, S. (2020). The scope of alternatives: Indefiniteness and islands. *Linguistics and Philosophy 43*(4), 427–472.

Cresswell, M. J. (1976). The semantics of degree. In *Montague grammar*, pp. 261–292. Elsevier.

Dotlačil, J. and R. Nouwen (2016). The comparative and degree pluralities. *Natural Language Semantics 24*(1), 45–78.

Egan, A. (2010). Disputing about taste. In *Disagreement*. Oxford University Press.

Groenendijk, J. and M. Stokhof (1991). Dynamic predicate logic. *Linguistics and philosophy*, 39–100.

Groenendijk, J., M. Stokhof, and F. Veltman (1995). Coreference and modality. In S. Lappin (Ed.), *The Handbook of Contemporary Semantic Theory*, pp. 179–216. Oxford: Blackwell.

Hardt, D. and L. Mikkelsen (2015). Same but different. *Linguistics and Philosophy 38*(4), 289–314.

Heim, I. (1982). The semantics of definite and indefinite noun phrases.

Heim, I. (1985). Notes on comparatives and related matters. *Ms., University of Texas, Austin*.

Kennedy, C. (1997). Projecting the adjective. *PhD diss,. University of California, Santa Cruz*.

Kennedy, C. and M. Willer (2016). Subjective attitudes and counterstance contingency. In *Semantics and Linguistic Theory*, Volume 26, pp. 913–933.

Lahm, D. (2016). " different" as a restriction on skolem functions. In *Semantics and Linguistic Theory*, Volume 26, pp. 546–565.

Li, A. (2022). Comparative anaphora: comparing alternatives. In *Semantics and Linguistic Theory*, Volume 31, pp. 484–505.

Muskens, R. (1996). Combining montague semantics and discourse representation. *Linguistics and philosophy 19*(2), 143–186.

Ninan, D. (2014). Taste predicates and the acquaintance inference. In *Semantics and Linguistic Theory*, Volume 24, pp. 290–309.

Pearson, H. (2013). A judge-free semantics for predicates of personal taste. *Journal of Semantics 30*(1), 103–154.

Rooth, M. (1992). A theory of focus interpretation. *Natural language semantics 1*(1), 75–116.

Rooth, M. E. (1985). *Association with Focus (Montague Grammar, Semantics, Only, Even)*. Ph. D. thesis, University of Massachusetts Amherst.

Sun, Y. (2021). Decomposing same. *Natural Language & Linguistic Theory*.

Vermeulen, C. F. M. (1993). Sequence semantics for dynamic predicate logic. *Journal of Logic, Language and Information 2*(3), 217–254.

Von Fintel, K. and I. Heim (2011). Intensional semantics.