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Burning facts

A. Lexical causatives (e.g. *burn*) have been argued to be more restricted in their use than periphrastic *cause*-causatives (*cause to burn*) in several respects. Recently, Rose et al. (2021) experimentally established that *cause*, but not lexical causatives, can take an absence-denoting subject, see (1). We observe that Rose et al.'s contrasts are not restricted to absences and extend to a broader range of subjects referring to abstract entities, see e.g. (2)-(4). All subject DPs in (2)-(4) are incompatible with Vendler's 1967 narrow containers (e.g., *happen*), but enter loose containers (e.g., *inform of*), a behaviour which is expected if they denote abstract objects such as facts.

(1) a. The lack of sunscreen caused Jane's skin to burn.   (Rose et al. 2021)
     b. #The lack of sunscreen burned Jane's skin.   (*ibid.*)

(2) a. The low quality of the potting soil caused the plants to dry.
     b. #The low quality of the potting soil dried out the plants.

(3) a. The intensity of the storm caused the city's sewer system to flood.
     b. #The intensity of the storm flooded the city's sewer system.

(4) a. Andy's leaving the phone on the table caused it to burn.
     b. #Andy's leaving his phone on the table burned it.

Rose et al. take contrasts in (1) to support the view that natural languages operate with two notions of cause (distinguished e.g. in Kistler 2005 or Copley and Wolff 2014): the production-based P-CAUSE relation takes events as relata and is expressible with lexical causatives, while the dependence-based D-CAUSE relation can take abstract entities (such as absences) as relata and cannot be conveyed by lexical causatives. We take the directness constraint often associated with lexical causatives (Shibatani 1976, Wolff 2003) to be distinct from Rose et al.'s PRODUCTION-BASED CAUSATION CONSTRAINT, as the former can only come into force once the latter is respected: causal (in)directness is only defined for relations between events; for instance, facts can neither be nor *not* be spatio-temporally adjacent.

One issue with Rose et al.'s (2021) production-based causation constraint is that it seems mostly at play with a specific subset of lexical causatives, which remain to be defined. For us, the problem of (1b)-(3b) disappears with some non-alternating (e.g., *destroy/damage/ruin/overwhelm*) or alternating (e.g., *change/alter*) verbs, see (1b)-(3b) vs. (5a-c), and disappears as well when the very same verbs as in (1b)-(3b) are taken in an *abstract* sense, see e.g. (1b)-(2b) vs. (5d).

(5) a. The lack of sunscreen destroyed/damaged/changed Jane's skin.
     b. The low quality of the potting soil ruined/destroyed/altered the plants.
     c. The intensity of the storm overwhelmed the city's sewer system.
     d. The lack of love in Jane's life burned/dried out her heart.

Examples (5a/c) indicate that *some* lexical causatives taken in a concrete sense *can* have a subject denoting an abstract entity after all. We propose that what these verbs have in common is that in their concrete sense, they do *not* lexically specify canonical properties of the cause. We call these verbs THIN causatives. Verbs like *burn* taken in their concrete sense as in (1b)/(2b) *do* specify such canonical properties (*burn* and *heat* tell us that the cause of the VP-event typically is a source of heat or light; *flood* tells us it is a liquid/fluid, etc.). We call *burn*-verbs THICK causatives. The difference between the two verb types can be seen in the way transitive sentences with two pronominal arguments marked for inanimacy as in (6) specify properties of the subject: (6a) tells us more about this argument than (6b). (Corpus studies on the level of semantic homogeneity among highly frequent inanimate nouns in the subject position of thick vs. thin causatives confirm the same point.)

(6) a. This burned/dried/flooded it.
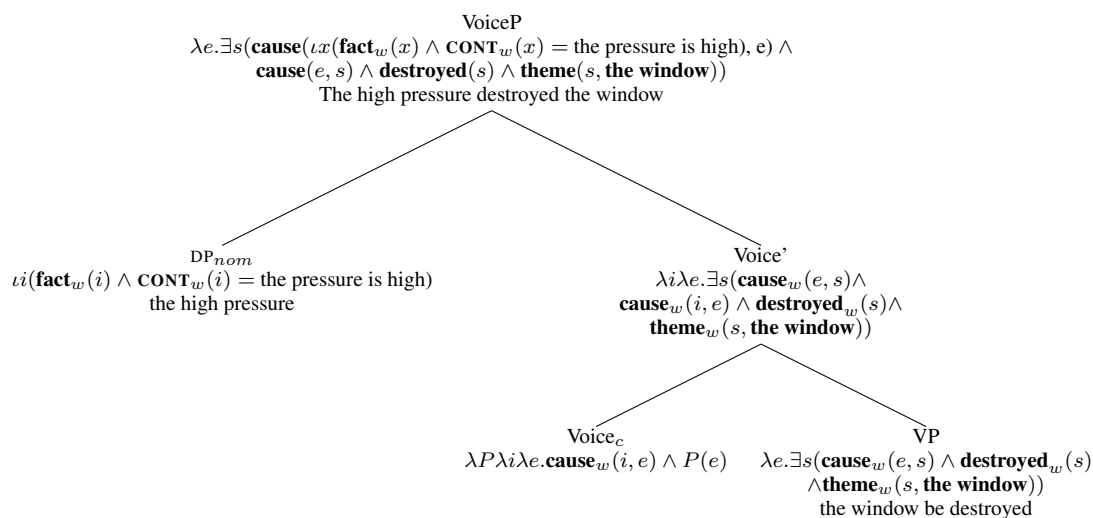   b. This destroyed/changed/overwhelmed it.

B. We assume that like *cause*, lexical causatives can in principle express both P-CAUSE and D-CAUSE. We derive Rose's et al. production-based causation constraint ('lexical causatives are

restricted to the expression of P-CAUSE') as a by-product of the verb's 'thickness'. Thick lexical causatives (*burn, flood, dry*) used in their concrete sense are conventionally associated with canonical properties of the cause (e.g., extreme temperature, fluidity). These only characterize physical entities (e.g., water, fire, etc.). Entities that can satisfy these properties are 'transference' causes. This triggers the selection of P-CAUSE over D-CAUSE, at least when the theme is a concrete object itself and the VP-event understood as a physical event. Facts and other abstract entities cannot be p-causes to begin with, and *a fortiori* cannot satisfy these canonical properties. In contrast, thin lexical causatives (*destroy, change*) remain completely silent about the nature of the cause. Therefore, they do not favour P-CAUSE over D-CAUSE even when used to describe a concrete event, and accept fact-denoting subjects.

Remember furthermore that when taken in an abstract, non-literal sense, even thick causatives (*burn, flood*) welcome fact-denoting subjects (see (5d)). This is because in their non-concrete sense, thick verbs (i) do not convey P-CAUSE anymore (e.g., the burning of one's heart is not understood as energy transference) and (ii) lose weight: used abstractly, they are bleached and lose the lexical specification of the canonical properties of the cause (e.g., (6d) does not present the absence of love as having an extreme temperature, even non-literally).

C. We aim to capture the observations above in the semantics without multiplying lexical entries. We assume that the very same CAUSE head is 'compressed' in the lexical causative and exponed in a one-to-one fashion in the verb *cause*, and introduces an event causing a situation v which can be an event, a state or a more abstract entity such as a state-of-affairs or a fact (see *The lack of sunscreen caused the fact that her skin is completely destroyed*). Thus, CAUSE conveys both production-based or dependence-based causation. With Kratzer (1996) and others, we take external arguments to be introduced by a Voice head. To avoid multiplying flavours of Voice, we assume a Voice$_{resp}$ head (of type $\langle\langle s,t\rangle, \langle i, \langle s,t\rangle\rangle\rangle$) introducing the entity i responsible for the VP-event, be it an animate, an eventuality or a fact (see (7)). We take the DPs in subject position in (5) to be concealed fact descriptions. We translate them with the function CONT that maps a contentful entity x and a world w to the propositional content of x in w (Kratzer 2006, Uegaki 2015, Elliott 2020 a.o.). For instance *the high pressure* is translated as the fact whose content is that the pressure is high in w. The meaning we attribute to *The high pressure destroyed the window* can thus be paraphrased as 'the fact whose propositional content in w is that the pressure is high is the entity responsible for the event causing the window to be destroyed' (and the concept of CAUSE compressed by *destroy* is the dependence-based concept).

(7)

VoiceP
$\lambda e.\exists s(\mathbf{cause}(\iota x(\mathbf{fact}_w(x) \wedge \mathrm{CONT}_w(x) = \text{the pressure is high}), e) \wedge$
$\mathbf{cause}(e,s) \wedge \mathbf{destroyed}(s) \wedge \mathbf{theme}(s, \mathbf{the\ window}))$
The high pressure destroyed the window

DP$_{nom}$
$\iota i(\mathbf{fact}_w(i) \wedge \mathrm{CONT}_w(i) = \text{the pressure is high})$
the high pressure

Voice'
$\lambda i \lambda e.\exists s(\mathbf{cause}_w(e,s) \wedge$
$\mathbf{cause}_w(i,e) \wedge \mathbf{destroyed}_w(s) \wedge$
$\mathbf{theme}_w(s, \mathbf{the\ window}))$

Voice$_c$
$\lambda P \lambda i \lambda e.\mathbf{cause}_w(i,e) \wedge P(e)$

VP
$\lambda e.\exists s(\mathbf{cause}_w(e,s) \wedge \mathbf{destroyed}_w(s)$
$\wedge \mathbf{theme}_w(s, \mathbf{the\ window}))$
the window be destroyed

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The ontological basis of grammatical categories

PROPOSAL: In this talk, we argue that basic ontological distinctions rooted on perception, such as *extension*, *boundary*, and *agency* are responsible to generate parallel grammatical hierarchies of ontological denotations across linguistic domains (nominal, verbal, clausal). Prior to the generation of this hierarchy, pre-linguistic roots stored in the *semantic memory* component of the human mind/brain are lexicalised to become usable by the linguistic system. This lexicalisation is accomplished by means of a categoriser, whose function is to generate (i) *argument-taking functions* in the form of either verbal *eventualities*, or adpositional *predicates*, and (ii) *arguments* in the form of nominals. Recursively applied to the lexicalised categories, the basic ontological distinctions yield correlative grammatical categories in both domains, through which linguistic objects of progressive structural complexity are generated that are parallel to progressive ontological complexity organised in the form of yielding Aristotelian ontologies across domains.

DEVELOPMENT: Our claim is that those ontologies are governed by a distinction between *denotation* and *reference*. In a nutshell, the former is about the internal structure of ontological sorts (objects for nominals, eventualities for verbals, propositions for clauses), whereas the latter is about how ontological sorts link to the wider context. We assume an association of denotation and reference to the topology of grammatical phases, interior and edge respectively, and on that assumption we propose that the nominal and verbal domains yield their parallel ontologies by means of incremental grammatical complexity associated to identical cognitive categories (see Longobardi 2005 on relating phrase topology and interpretation, and Hinzen & Sheehan 2015 on phases as units of referential meaning). A clear prediction of our proposal is then that there is such a thing as verbal reference, and that such reference is established on the basis of grammatical categories associated to the edge of the verbal *v* phase (not the C phase), which are ultimately ontological.

We further propose that the transitions between types of denotations have to do with general cognitive categories (extension, boundary, agency), expressed by means of parallel nominal and verbal inflections. In the case of nominals (1), we add *n* (or gender) to provide extension to an abstract-denoting noun (*fox-hunting*), thus yielding a mass (*we ate fox*). We then add # (number), related to singular/plural distinctions, not to quantification (Borer 2002: 93), to provide a boundary, thus yielding a countable object (*we saw a house*). Finally, we add *person* to yield an animate being (*he ran away*). As for verbal denotation (2), which is about the internal specification of eventualities (ie. *Aktionsart*), the very same cognitive categories and similar grammatical specifications implement transitions between types. Thus adding extension (=temporal change) to an atemporal *state* (by means of categorizer *v*), we get an *activity*, which is compatible with progressive morphology (unlike states), but lacks a boundary (activities are necessarily atelic), and does not need an agent (*The balloon flew away*). By adding a boundary (telicity) we get an *achievement*, which crucially is at odds with agency (i.e. achievements happen, rather than being done, and hence tend to lack an external argument: *John arrived*), and it's generally perfective (*John found the key* vs. **John was finding the key*). Finally, agency (rather than duration) yields an *accomplishment*, which necessarily involves an external argument, and hence Voice, as in Kratzer 1995:

(1) **Nominal denotation**
    <u>abstract</u> (+extension, *n*) > <u>mass</u> (+boundary, #) > <u>object</u> (+agency, *p*) > (animate) <u>being</u>
(2) **Verbal denotation**
    <u>state</u> (+extension, *v*) > <u>activity</u> (+boundary, *Asp*) > <u>Achievement</u> (+agency, *Voice*) > <u>Accomplishm.</u>

We then analyse the hierarchies of nominal and verbal reference along similar lines, although here we follow a slightly different strategy. We start by acknowledging that reference in the nominal domain (3), by assumption determined at the phase edge (Sheehan & Hinzen 2011), is organized along well-known types like *predicative* (zero reference), indefinite, kind, definite, or deictic (Martin & Hinzen 2014). It is quite uncontroversial that those referential types are structurally, rather than lexically motivated (Borer 2005: 3-4), and hence that differences between generic *I like <u>cats</u>* vs indefinite *I like*

three cats vs definite *I like the cats* vs deictic *I like these cats* have more to do with types of determination than with noun denotation. As a result, the transitions between referential types are brought about by general cognitive principles (weak/strong operator, and context) associated to specific grammatical categories, such as (weak) Quantifiers, (strong) Determiners, and DX (deixis):

(3) **Nominal reference**
predicate (+weak operator, Q) > indefinite (+strong op, D) > definite (+context, DX) > deictic

We further enrich this view by claiming that reference in the nominal domain requires connecting nominals to higher phases, and that driving such connections is precisely the role of the relational categories hosted in phase edges. For the nominal domain, the phase edge, we claim, is occupied by (i) *Case*, which inserts the nominal within the predicate structure of the immediately higher *v* (eventive) or P (adpositional) phases, and/or (ii) *Person* (≠ *person*, small case), which puts the nominal in relation to the speech participants in the higher C phase. On this basis, a nominal can function as a (caseless) bare predicate in instances of predicate modification such as '*fox*-hunting' above. To become an argument of an event, however, the nominal needs Case (KASE, as in Bittner & Hale 1996), and semantically this can take the form of weak case (indefinite reference) or strong case (definite reference) as in 'John saw {*a/the*} *man*', both of which are grammatically defined by an operator structure: weak vs strong case, respectively (de Hoop 1996). Finally, grammatical Person establishes a deictic link between the animacy (*person*) features of the nominals that identify the participants in the event/predication downstairs, and the participants (1P/2P) in the speech act upstairs (Sigurðsson 2004). This form of reference is the strongest possible a nominal can have (*John saw me*), and it's said to constitute *essential indexicality* irreducible to nondeictic forms of reference (Perry 1993, Martin & Hinzen 2014).

We then predict that the same rationale must apply to verbal reference. If reference in the nominal domain is a function of the grammatical categories that appear in the phase edge (Case, Person), then reference in the verbal domain, which is about locating events (modally or temporally) with respect to the speech context (Reichenbach 1947), must likewise be dependent on grammatical categories that appear at the edge of the verbal phase, categories that connect the eventuality to higher propositional phases (Ramchand & Svenonius 2014). That is to say, we have at work the same exact cognitive principles (operatorhood and deixis), implemented by relational verbal categories such as *Mood*, based on operators (weak for subjunctive: I suggest *that*_{OP} [*you be careful*], and strong for imperative: *OP[(you) don't be careless]*), as well as Tense (= indicative mood), based on deictically linking the event/predicate to the temporality of the speech act (i.e. Tense is a deictic category) (*You were careless*):

(4) **Hierarchy of verbal reference**
nonfinite(+weak operator) > subjunctive (+strong operator), imperative(+context) > indicative

(Non-indicative) Mood is thus parallel to Case in allowing the event/predicate to become an argument of a non-assertive operator (subjunctive, imperative) without appealing to the context, whereas Tense is parallel to Person in that it is a deictic category relating features of an eventuality (*v* phase) or non-eventive predicate (P phase), to features of the speech act (C phase) (Sigurðsson 2004).

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Social Meaning has Multiple Sources: Form vs. Meaning Driven Variation in Language Use

Speakers vary their use of language depending on the social context of a speech act even in cases where two variants are functionally equivalent (Lavandera 1978). Situationally-conditioned variation is inextricably linked with the signaling of social identity — what is known as *social meaning* (Eckert 2008). While not all situational variation can be subsumed under social meaning, all social meaning is situationally conditioned. This is because social meaning is constructed interactionally by means of indexical associations (Ochs 1992; Silverstein 2003). Silverstein (2003) describes these succesive layers of indexicality, where each layer builds upon the preceding one: first-order indexical relationships include macro-level correlations between social or situational dimensions and linguistic forms (Labov's 1994 *indicators*), second-order indexicals are salient within a particular speech community and can vary intra-individually (Labov's 1994 *markers*), while third-order indexicals (Labov's 1994 *stereotypes*) are legible across speech communities and become *enregistered* as part of "a socially recognized register of forms" (Agha 2003: 231).

We argue that at least two distinct classes of such variation need to be distinguished: *Form-Driven Variation* and *Meaning-Driven Variation*. Meaning-driven variation differs from form-driven variation in that, in the former, semantic and/or pragmatic differences between alternatives are themselves exploited in interaction. We introduce diagnostics that distinguish the two classes and argue that the mechanisms underlying the two classes cannot be the same. Paradigmatic examples of the two classes are, on the one hand, the *–ing*-variable of English in (1) and, on the other hand, the use of round numbers in (2). We first motivate two initial distinctions. We then argue that both types of variation can furthermore interact with implicature, which predicts a third class of variation.

(1) *-ing*-variable (form-driven): English gerund forms are realized in speech with either a dental nasal /n/ (e.g. *dunkin'*) or with a back nasal /ŋ/. Competent English speakers adjust their use from between 90% use of the n-variant in informal circumstances to 90% use of the /ŋ/ variant in formal circumstances (Labov 2012, Burnett 2023).

(2) Roundness (meaning-driven): Round numbers (both with and without markers of approximation such as '50', 'around 50', and 'about 50') are more frequent in casual conversation than in formal, on-the-record situations, and can convey solidarity-related social meaning (Beltrama 2018, Beltrama et al. 2022, Mühlenbernd & Solt 2022).

Distinction 1 - Presence of a Trigger: In form-driven variation, there is always a linguistic unit (usually a morpheme or phoneme) that is present in at least one of two variants. With the –ing-variable: /n/ or /ŋ/ in the gerund affix position.

Distinction 2 - Crosslinguistic prevalence: Meaning-driven variation should be found in all languages that have the means to express similar meaning differences. Form driven variation, on the other hand, can vary across languages. The following **further cases** show how the distinctions apply beyond (1) and (2):

Analytic vs. synthetic comparatives (form-driven): Modern Greek exhibits an alternation between synthetic and analytic forms of comparatives, including two analytic types (*pjo* + adjective and *perisotero* + adjective), the first of which can only be interpreted evaluatively (Makri 2018; Alexiadou et al. 2021). Alexiadou et al. (2022) show that this alternation is correlated with register: fictional texts are more strongly analytic than expository ones.

Perspectival temporal comparatives (meaning-driven): The German temporal comparative *eher* 'sooner' — in contrast with its simpler alternative *früher* 'earlier' — is appropriate in casual situations but less acceptable in formal ones, where its expression of speaker perspective yields an inappropriate impression of 'chumminess' (Umbach & Solt 2022).

Necessity modals (meaning-driven): Glass (2015) explains differences in corpus distribution between the English deontic modals *need to*, *have to* and *got to*. She argues that *need to*

presupposes that the speaker is able to dictate the priorities of the interlocutor, which may result in different social effects depending on the relationship between interlocutors.

Perspectival demonstratives (meaning-driven): Acton & Potts (2014) argue that use of the demonstrative in phrases such as *'that left front tire'* (Lakoff 1974) and *'that warning bell'* (Liberman 2010) invokes a shared perspective of speaker and listener.

Cyclical grammaticalization in TMA systems (meaning-driven): The emergence of novel Tense-Mood-Aspect markers proceeds cyclically (Deo 2015). The direction of these cycles is due to the semantic relationship between stages: each prior stage entails a successive stage asymmetrically (ibid.). The more specific of these two alternatives is typically associated with more pragmatically enriched meanings as well as with more familiar registers. Detges (2021) shows that periphrastic futures in Romance are associated with greater assertive force and more informal registers. A similar generalization holds for HAVE-perfects, competing with the simple past: van der Klis et al. (2022) observe that in Germanic and Romance, perfects are part of the grammar of spoken discourse. This is meaning-driven: perfects require their deictic centre be co-extensive with the utterance situation (de Swart 2007).

Distinction 3 – Implicature and Indirect Variation: In both cases, implicatures are liable to arise in contexts of competition. Then, the default variant acquires via this pragmatic mechanism a social meaning complementary to that of the marked variant — we call this *indirect variation.* Two examples on either side of the dividing line between indirect form-driven and meaning driven-variation are T/V pronouns vs. distancing by definite:

T/V pronouns (indirect form-driven): A borderline case are T/V distinctions in pronouns such as the French *tu* vs. *vous* used for second person singular address. Wang (2023) recently argued that T/V distinctions across languages always involve a superset-subset relationship. We therefore argue that after conventionalization, this is a form-driven case.

Distancing by definite (indirect meaning-driven): Acton (2019) discusses the distancing effect definite plurals in examples like *'The Americans drive cars'.* The effect derives via implicature from the alternative variant *'We Americans drive cars'.* As inclusion of the speaker is part of the meaning expressed by *we*, this is meaning-driven variation.

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Belief-in is belief-that from a participant stance

Belief-that reports such as 1 have been the subject of a lot of semantic theorizing. By contrast, belief-in reports such as 2 and 3 are hardly ever discussed (one exception is Szabó, 2003).

1. Ayesha believes that she's early.
2. Boris believes in his friends.
3. Carol believes in sets.

This piece will present the first general semantics for belief-in reports. The rough idea is that a belief-in report asserts that one has a belief-that and presupposes that it's held from a participant stance. I'll motivate and explain this idea by showing that it accounts for three features of belief-in reports: i) their context-dependence, ii) their lack of equivalence with belief-that reports, and iii) using an excluded middle presupposition, their neg-raising property.

Context-dependence Belief-in reports have been claimed to have at least two different uses (Price, 1969, pp.426-455). For instance, 3 is naturally used to claim that Carol believes that sets exist. That's an *ontological* use. By contrast, 2 is naturally used to claim that Boris believes that his friends will do some contextually salient things. That's a *fiduciary* use.

2 and 3 have distinct prepositional objects (*his friends* versus *sets*). However, a single type of belief-in report can be used either way, depending on the context. In a context where it's relevant whether sets exists, for instance, one would use 3 ontologically. But if it's relevant whether sets will act as foundations for mathematics, one would use 3 fiducially to claim that Carol believes that sets will act as the foundation for mathematics.

More generally, what belief-in reports are used to claim is highly context-dependent. Context may rule out an existence interpretation in favour of a weaker one, as in 4: the property Alexius believes non-existent objects to have is that they should be part of our ontology, not, on pain of contradiction, that they exist. Context may also rule out an existence interpretation in favour of a stronger (existence-entailing) interpretation. In 5, adapted from Price (1969, p.434), the property S believes David's hair to have is that it is David's own (rather than a wig).

4. Alexius believes in non-existent objects.
5. Context: We know David's hair exists, but wonder whether it is his own.
   S: I believe in his hair.

To explain the context-dependence of belief-in reports, I suggest that, to a first approximation, $[\![\text{S believes in O}]\!]^c = 1$ iff for some property F salient in c, S believes that O has F.

Lack of equivalence Given F as a contextually salient property, this predicts an equivalence between *S believes in O* and *S believes that O has F*. However, I argue that this equivalence fails. The reason it fails is that belief-in reports require that one's belief-that is held from what Marušić (2017) calls a participant stance, a stance that requires one to be prepared to exhibit various affective attitudes (e.g., a sense of betrayal, disappointment, or gratitude) should the things one believes in have or fail to have the property they're believed to have.

The participant stance requirement explains why belief-in reports are odd if the context rules out or makes highly unlikely that the believer is prepared to feel betrayed or disappointed if the things they believe in don't have the property they believe them to have.

6. Context: We wonder whether John's enemies will overwhelm his defences.
   S: # John believes in his enemies.

S's statement is odd even if we know that John believes that his enemies will overwhelm his defences. This is because we naturally assume that he isn't prepared to feel betrayed or disappointed if they don't overwhelm his defences. Of course, context could rescue S's statement. If we know that John wants his enemies to overwhelm his defences so he can finally surrender, S's statement is no longer odd. For we now know that John is prepared to feel betrayed or disappointed if his enemies don't overwhelm his defences.

The participant stance requirement also explains a datum Szabó (2003, p.591) uses to argue against the equivalence of ontological uses of *S believes in O* and *S believes that O exists*. Even

in a context where it's relevant whether O exists, *S believes in O* and *S believes that O exists* need not be equivalent. In Szabó's example, Horatio reasonably believes that things he doesn't believe in exist. But, it's not the case that he believes in things he doesn't believe in: this belief-in would be *un*reasonable. Thus, since Horatio is being reasonable, rather than unreasonable, *Horatio believes that things he doesn't believe in exist* is true, but *Horatio believes in things he doesn't believe in* is not. The participant stance requirement allows us to explain this difference in truth-value. In Szabó's example, Horatio lacks the participant stance: he wouldn't be grateful if things he doesn't believe in exist after all or disappointed if they don't.

To take into account the participant stance requirement of belief-in reports, I now suggest, as a second approximation, that $[\![S \text{ believes in O}]\!]^c = 1$ iff for some property F salient in c, S believes that O has F and S holds this belief from a participant stance.

Neg-raising *Believe* is widely known to be a neg-raising verb (e.g. Crowley, 2019): a wide-scope negation of a belief-that report, e.g. 7a, invites an inference to a narrow-scope negation, e.g. 7b. (In this sense, the negation is 'raised'.) But what hasn't been noted yet is that belief-in reports behave similarly. For instance, the wide-scope negation 8a invites an inference not only to the narrow-scope negation in 8b, but also to Eylem being prepared to exhibit a sense of disappointment if Santa Claus does exist. Thus, 8a invites an inference to 8c.

7. (a) David doesn't believe that Ann left.
   (b) David believes that Ann didn't leave.
8. (a) Context: We wonder whether Santa Claus exists.
       S: Eylem doesn't believe in Santa Claus.
   (b) Eylem believes that Santa Claus doesn't exist.
   (c) Eylem believes in Santa Claus not existing.

One explanation of neg-raising for belief-that reports uses an excluded middle presupposition (Gajewski, 2007). On this view, *S believes that P* presupposes that S believes that P or believes that not-P. The presupposed and asserted content of *S doesn't believe that P* now jointly entail that S believes that not-P. However, even given the excluded middle presupposition, the semantics of belief-in reports presented up to this point doesn't explain their neg-raising. On the view so far, a belief-in report asserts two conjuncts. Negating the report then leaves open that one of the conjuncts, for instance that S believes that O has F, is true. So, presupposed and asserted content don't jointly entail that S believes that O doesn't have F.

To explain neg-raising for belief-in reports, I push the participant stance from asserted into presupposed content. Thus, *S believes in O* asserts that S believes that O has a contextually salient property F and presupposes that S i) believes that O has F or believes that O doesn't have F and ii) holds whichever belief makes i) true from a participant stance. Now, the presupposed and asserted content of *S doesn't believe in O* jointly entail that S believes, from a participant stance, that O doesn't have F. Thus, we predict 8a to invite an inference to 8b and 8c.

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Perspective-Shifting in Relativist Semantics

Many natural language expressions, including predicates of taste ("tasty", "disgusting"), aesthetic adjectives ("beautiful", "ugly"), moral terms ("good", "bad", "ought to"), epistemic modals ("must", "might") etc. are *perspectival*, in the sense that they require a perspective to be supplied for their semantic interpretation. Relativism, one of the major views on the market (Kölbel 2004, 2009; Lasersohn 2005, 2016; Recanati 2007; MacFarlane 2014 etc.), captures their perspectivality by introducing *parameters for perspectives* in the "circumstances of evaluation" (Kaplan (1989)) with respect to which utterances of sentences containing such terms are evaluated for truth.

In this talk, I want to tackle the issue of what is the best way to handle *perspective-shifting* in a relativist framework. Shifting is illustrated by several linguistic/interpretative phenomena. Thus, although most of the time perspectival expressions are used with the speaker's perspective as the default, sentences like

(1) Licorice is tasty,

can be interpreted from someone else's point of view (this is what Lasersohn (2005) calls "exocentric uses", as opposed to "autocentric" ones). Perspectives can also be shifted via explicit "for"-phases, quantifiers or attitude and speech verbs, as the following sentences illustrate:

(2) Licorice is tasty for Anne.
(3) Everyone got something tasty. (Schaffer 2011: 193)
(4) Alicia believes/thinks/etc. that licorice is tasty.
(5) Helen finds licorice tasty.
(6) Mary said that licorice is tasty.

Moreover, the combination of autocentric and exocentric uses of perspectival expressions in a sentence gives rise to a less-discussed phenomenon: *perspectival plurality* (Kneer 2015, [author a]) – basically, the existence of readings of such sentences in which appeal to two different perspectives is needed. Thus,

(7) At Halloween, Johnny played a silly prank and had a lot of tasty licorice

has a reading according to which, while the licorice was tasty for Johnny, the prank was silly for the speaker or a third party. Perspectival plurality is also possible with "for"-phrases, quantifiers and attitude verbs – as the following sentences illustrate:

(8) Licorice is tasty for Anne, but not for Bob.
(9) At Halloween, every kid played a silly prank and had a lot of tasty licorice.
(10) The mother snipe thinks the ugliest baby birds are beautiful. Sæbø (2013: 337)

I aim to provide a unified relativistic account of all shifting phenomena. To this end, I explore two possibilities: i) an *intensional* approach, according to which all shifters are treated as intensional operators (à la Lasersohn 2008); ii) an *extensional* approach according to which all shifters are treated as variadic operators (as in [author b]).

The first approach treats shifting by taking the relevant expressions – "for"-phrases, quantifiers, attitude verbs, etc. – to shift the perspective parameter in the circumstances of evaluation. "For"-phrases from examples like (2) are treated as intentional operators modelled on the more familiar modal or temporal ones (construed either sentential, as in Kölbel 2009 or predicational, as in Lasersohn 2008). Regarding bound uses such as those on (3), Lasersohn 2008) proposes "index-binding", which is "to quantify directly on the individual index, setting and resetting its value in tandem with the variable introduced by a quantifier" (324). Attitude/speech verbs are also treated as shifting the perspective parameter to the subject of the verb. Both the autocentric and the exocentric readings of (1) are treated by setting the value of the perspective parameter to the relevant subjects. I discuss several objections and potentially problematic cases for this approach.

The second approach is based on the idea of treating the relevant expressions as "variadic operators" (Recanati 2002, 2004; Collins 2020). A variadic operator takes a predicate as an input and yields a different one with a modified adicity. The general form of the *expansive* variadic operator (outputting a predicate with increased adicity) is

$$\mathbf{V}(\lambda x_1 \ldots \lambda x_n. \, P(x_1 \ldots x_n)) \equiv \lambda x_1 \ldots \lambda x_n.\lambda y. \, P(x_1 \ldots x_n, y),$$

where $\mathbf{V}$ is the operator, $\lambda x_1 \ldots \lambda x_n. \, P(x_1 \ldots x_n)$ the input predicate P with its n arguments, $\lambda x_1 \ldots \lambda x_n. \, \lambda y. \, P^*(x_1 \ldots x_n, y)$ the output predicate P* with its n+1 arguments, while y the (here, unspecific) variable that occupies the additional argument place created by the operator. Specific versions of such operators (i.e., corresponding to the expressions at stake) are arrived at by fixing the type of predicate and additional argument (for predicates of taste, y is a perspective; etc.). Under this approach, "for"-phrases, quantifiers and attitude verbs are construed as contributing expansive variadic operators, while both the autocentric and the exocentric readings of (1) (and of all sentences in which no expressions like these appear) are treated as in the previous approach, thus assuring that the view remains relativist in essence. Here, too, I discuss several objections and potentially problematic cases.

However, neither of these two accounts has taken perspectival plurality into consideration. Relying on previous work ([author c]), I argue that the best way to account for this phenomenon is by introducing a *sequence* of parameters for perspectives (leading to an interestingly different version of relativism which I dub "Multiple Indexing Relativism"). Accordingly, both the intentional and the extensional approach highlighted above have to be tailored to accommodate perspectival plurality within this framework. I discuss what these changes amount to and nod to various philosophical issues that arise in this connection.

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Objectual Quantifier Theory

In this talk, we argue that quantificational noun phrases such as *every philosopher* or *no musician* denote certain kinds of generic individuals, rather than sets of properties. We develop this view in a rigorous way, building upon Kit Fine's (1985a; 1985b) work on arbitrary objects, and we defend it against objections.

In philosophy and linguistics, quantificational determiners, such as *every* and *some*, are standardly analysed as denoting relations between sets of individuals, and quantifier phrases, such as *every chair* and *some person*, as denoting properties of sets of individuals. For example, the expression *every chair* denotes the set of properties that every (possibly, contextually salient) chair has, while *every* denotes a relation between a pair of sets of individuals, namely, the subset relation. Call an expression that denotes a set of properties a *generalised quantifier* and call the study of generalised quantifiers *Generalised Quantifier Theory*. The development of Generalised Quantifier Theory marked a significant step in the philosophical and linguistic theorising about quantification, saving us from 'the dark days of logic', when 'quantifier phrases were assimilated to names to give an undivided category of noun phrases' (Lewis 1970: 52). The general success of Generalised Quantifier Theory to explain the linguistic behaviour and logical properties of quantifiers has cemented its place as an essential component of contemporary semantic theory.[1]

In this talk, we develop and critically assess an alternative to Generalised Quantifier Theory, which we call *Objectual Quantifier Theory*. According to this view, quantificational noun phrases denote certain kinds of generic objects, rather than properties of sets of individuals. For example, the expression *every woman* denotes the arbitrary (or 'universally generic') woman, an object who exists in addition to all of the individual women and who has just those properties that every woman has. Similarly, the expression *some dog* denotes the indefinite (or 'existentially generic') dog, an entity who exists in addition to all of the individual dogs and who has just those properties that some dog or other has. Each generic object is associated with an appropriate range of individuals: each arbitrary woman is associated with the range of individual women; each indefinite dog is associated with the range of individual dogs; and so on. And each generic object has those properties whose distribution amongst its associated range of individuals matches its 'ontological status': the arbitrary woman has all those properties common to all women, and so it is mortal, since each individual women is; the indefinite dog has those properties that some individual dog or other has, and so it barks, since some individual dog does.

There has been little systematic discussion of this approach to quantification. We aim to explore its potential for a treatment of quantification in natural language, one that deals with a wide range of linguistic constructions and avoids arguments against more naive variants of the view that quantifiers denote objects. Specifically, we show in our talk how the objectual approach sketched above can be extended to cover the full range

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[1] Generalized Quantifier Theory goes back to the work of Frege (1879); important later developments include Barwise and Cooper (1981) and Keenan and Stavi (1986). For an excellent assessment of Lewis's 'dark days of logic', see Oliver (1999).

of quantifiers to which Generalized Quantifier Theory applies. We argue that, for any generalised quantifier, there is a generic objectual quantifier to which it is, in a certain sense, equivalent. Thus, any quantifier phrase that can be interpreted as a generalised quantifier can also be interpreted as an objectual quantifier, without loss of generality. We develop our theory within a compositional setting and argue that the logical properties of generalised quantifier theory are captured equally well within our framework.

Finally, we assess some reasons why one might be sceptical about the prospects for an objectual approach to quantification. In particular, we discuss whether the fact that quantifier phrases have domains they range over, have scope, and can bind pronouns speaks against an objectual approach to quantification. One might think that such features are unique to quantifier phrases, as opposed to expressions that are more commonly taken to denote objects, such as proper names. And one might take that as a reason to prefer a generalized quantifier-approach to an objectual approach to quantification.[2] Against this, we point out that the contrast between quantifier phrases and standard referential terms is not as pronounced as it might at first seem. Standard referential terms, too, can bind pronouns, for example. We also show how scope phenomena and the binding of pronouns can be accounted for on an objectual approach, by assuming that the mechanisms responsible for binding and scope are separate from the quantifiers in a narrow sense—an idea that can for example be implemented by assuming that there are separate variable binders in the logical form, and that scope ambiguities arise via the raising of quantifiers in the syntax. The comparison of quantifier phrases and standard referential terms, rather than undermining the case for an objectual treatment of quantifiers, in fact speaks for a more unified approach to both kinds of expressions.

The upshot of our talk is that going back to the dark days of logic would not nearly be as horrifying as one might have thought. An objectual approach to quantification can be developed in a rigorous, compositional way, it can be defended against Generalised Quantifier Theory and important objections, and it provides a unifying perspective on quantifier phrases and (as we argue) other referential terms.

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[2] See King (1991: 254) for an argument along such lines.

Semantics and the Metaphysics of Words

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There has been quite a bit of recent interest in the metaphysics of words taken to be the domain of inquiry which considers what words are. That is, it asks metaphysical questions about what makes some entity a word, when is it the case that two entities are instances of the same word, and what sort of entity words are (e.g., are they abstract objects or mere collections of concrete tokens). With only a couple of notable exceptions, work on the metaphysics of words has not, though, been connected with various debates and puzzles within semantics. This is surprising given that, at least to some degree, debates about semantics are directly concerned with words or the properties that words possess.

In this talk, I will make a case for the value and importance of the metaphysics of words for theories and positions within semantics. My aim is not to solve any debates in semantics, nor even to propose a solution to them. Rather, I aim to make explicit certain metaphysical assumptions that can be found within arguments for certain prominent positions in the philosophy of language. I contend that only by making these assumptions explicit, and considering whether we are willing to accept those assumptions, can we begin to assess the full implications of the proposed arguments.

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Exoskeletal Iceberg Semantics - Grammar and Perception in the mass/count distinction
For consideration for the general session

One aspect of the mass/count distinction that has caused significant debate both in linguistics an cognitive science more generally is the degree of influence of the perceptual reality (*object* versus *stuff*) on the linguistic coding (mass vs count etc.), if at all. There have been many influential proposals in this area. Chierchia [2010] argues the distinction between *vague* and *non-vague* individuals is key. For Chierchia, *rice* individuals are vague, as any proper part of a grain of *rice* still counts as *rice*. This contrasts with *cat* individuals which cannot be described in the same way (a part of a cat is not a cat), and are thus *non-vague*. In Chierchia's theory, vague individuals are linguistically coded as mass, and non-vague as count. Following this, non-vague individuals may be coded as mass due to a *copycat* effect (e.g FURNITURE). Other accounts, such as Landman [2020], take *overlap* rather than vagueness to be paramount to the mass/count distinction. Specifically, overlap of individuals lead to mass coding. For example, KITCHENWARE is mass, as the individuals are overlapping with regard to what counts as 'one' - Is a *pestle and mortar* one individual, or two?

Sutton and Filip [2016] argue that vagueness alone or overlap alone are insufficient to account for the entire story. They argue that *lentil, pea, bean* individuals are no less vague than *rice* individuals, yet LENTIL PEA BEAN are count. Additionally, it is not immediately clear that *rice* is overlapping. Further, the crosslinguistic coding of such nouns varies (LEŠTA/LENTIL is mass in Bulgarian). Sutton and Filip's remedy consists in proposing a dual-source approach that synthesises the intuitions of vagueness and overlap. In this account, a language can be 'sensitive' to vagueness and/or overlap, and vagueness/overlap can trigger mass coding on a case-by-case basis.

Sutton and Filip's account, while fundamentally correct regarding the importance of both vagueness and overlap as sources of mass encoding, it is overall incomplete. This is because it cannot account for (un)countability/mass encoding in languages which have a singulative count system. In such a system, the singular term (singulative) is morphologically derived from a number neutral term (often called a collective). Singulative count systems are a minor number system (in the sense of Corbett [2000]), appearing alongside the dominant singular-plural system. While a minor number system, the distribution often spans entire semantic classes, including granulars, insects, flowers, trees, fruits, vegetables and small animals. We follow the majority consensus in analysing collectives as uncountable (object) mass nouns, and the singulative morpheme as a type of classifier. In this sense, collectives are akin to predicates in generalised classifier languages [Grimm, 2012, Mathieu, 2013], and languages with singulative morphemes constitute 'hybrid' languages with both number marking and generalised classifier features.

(1)   Collective → Singulative

    a.   Welsh: pysgod → pysgodyn   (fish, a fish)
    b.   Arabic: samak → samakah[1]   (fish, a fish)

(2)   Singular → Plural

    a.   Welsh: brechdan → brechdanau   (sandwich, sandwiches)
    b.   Arabic: sanduwiish → sanduwiishaat   (sound plural - sandwich, sandwiches)
    c.   Arabic: 'asad → 'aswaad   (broken plural - lion, lions)

Taking collective nouns to be object mass is incompatible with Chierchia's, Landman's, and Sutton and Filip's accounts. That is, a *fish* is no less vague or more overlapping than a *cat*, so there is no obvious reasoning why PYSGOD, SAMAK are mass. Further, this mass coding cannot be a *copycat* effect, as singulative count systems have a regular distribution across natural classes.

The solution we offer to this problem is inspired by the exoskeletal iceberg semantics of de Vries and Tsoulas [2021, 2023]. The proposed analysis builds on Sutton and Filip's 2016 proposal that both vagueness and overlap are relevant to mass-coding as well as on a Rothstein [2010] style context-dependent view of semantic atomicity. Our account differs as we do not take vagueness and overlap to be the only triggers for mass coding - rather, we incorporate Grimm [2012]'s scale of individuation, allowing for richer typological predictions for mass encoding. The proposed analysis has theoretical advantages in that while the notions of 'object'

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[1]The Arabic singulative can pluralise again, using the morphemes found in the singular/plural domain

and 'substance' are pre-theoretical, the mass/count distinction is derived in the syntax. Variation is analysed as an intrinsically linguistic phenomenon, with no inherent appeal to real-world metaphysical descriptions - essentially, the system describes the interaction between UG and perception. Finally, our account is powerful enough to predict countability of predicates intra and crosslinguistically.

To illustrate, we assume with de Vries and Tsoulas [2021] that roots denote root concepts, modelled formally as sets of mereologies associated with the entire range of possible ontological constructs (individuals, events, kinds and so on, depending on the level of ontological detail, individuals will be subdivided to different types and sorts, see a.o Moltmann [2019, 2021] and references therein for discussion). The root concept undergoes a filtering process whereby the relevant entities are pulled out. The IND(ividual) filter for example isolates individuals (See de Vries and Tsoulas [2021] for definitinos of filters for substances and more). The filter is syntactic head. For roots $\sqrt{cat}$ $\sqrt{fish}$, $\sqrt{furniture}$, $\sqrt{rice}$, IND will pull out contextually salient individual cats, fish, items of furniture, and grains of rice. After filtering, Link [1983]'s plural operator, *, may apply. If it does apply, the semantic atoms form a semi-lattice structure of singular atoms and their sums. If * does not apply, then the set will denote atoms only. This set will serve as the counting BASE. An overlapping BASE (due to *), will lead to uncountability, as individuals are not linguistically fronted (though still perceptually available). A disjoint base (no *) will lead to countability, as individuals are fronted. The BODY is then built from the BASE. This results in different predicate types built from the same perceptual units, one countable, denoting an i-set $< BODY, BASE >$, and the other uncountable, denoting an i-set $<^* BODY,^* BASE >$. These are exemplified below, (f:set = Filter set, X= some root).

Example of derivation of object/fake/neat mass and collectives
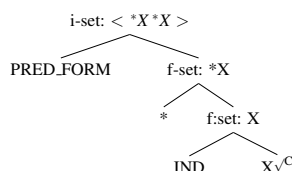
Example of derivation of singular count nouns
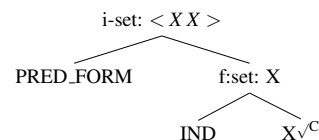
The application of * is the locus of linguistic variation. Languages with uncountable number neutral reference (Mandarin, Japanese) will apply * in the derivation of every object-denoting noun. Languages which lack object mass nouns (Greek) do not apply *. Languages with productive object mass (English) and singulative languages (Welsh, Arabic) are sensitive to certain semantic features which may trigger * such as:

(3) a. Superordinate concepts, which includes overlap (KITCHENWEAR, FOOTWEAR)
     b. Sensitivity scale of individuation [Grimm, 2012] (i.e. collective nouns PYSGOD, SAMAK)
     c. Aggregation/Clusters (CHANGE, CATTLE)
     d. Vagueness of atoms (RICE, CORN, LEŠTA)

Importantly, as * is applied during the syntactic derivation, this predicts intra and crosslinguistic variation, exceptions, and lexical doublets (e.g. COIN/CHANGE, the latter has *). In the final section of the paper we show that this proposal fares well emprically in accounting for interpretations of further pluralisation, including pluralisation of singulatives and pluralisation in general classifier languages; applications to lexically restricted items and categories, including stubbornly distributive predicates (STUBs Schwarzchild [2007]); and interpretations of grinding/packaging.

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Predicates of amount and the ontology of degree

Introduction. In formal semantics, the notion of "degree" has proven useful to analyze the meanings of natural language expressions of measurement and comparison. There is however no consensus as to what degrees actually are, nor how to best represent them in our logical meta-language. Under the more common view, degrees are simplex entities, abstract albeit primitive objects that can be ordered in order to build ordered scales (Seuren 1973, von Stechow 1984, Heim 1985, Kennedy 1999). The most prominent alternative view proposes instead that degrees constitute complex objects derived from primitive individuals, such as entities or events, analyzing them either as equivalence classes (e.g. Cresswell 1976), tropes (Moltmann 2009) or kinds (Anderson & Morzycki 2015, Scontras 2017). Given their close resemblance to properties, such complex degrees potentially contain both more information and more structure than their simplex alternatives. The current situation thus leaves the question of which of the two notions of degree is preferable, or whether they exist side-by-side. We show that the comprehensive compositional analysis of certain degree constructions in English supports the latter view.

Data. Our main empirical focus is on copular sentences with numerical noun phrases in subject position. These may occur with predicates that select for individuals, as in (1)).

(1) a. Ten pounds of broccoli are in the refrigerator.
 b. Five dogs are in the garden.

Such numerical NPs may nevertheless also occur in examples such as (2)/(3), which show crucial differences from the cases in (1): (i) they allow a singular form of the copula, even with the count plural *dogs*; (ii) there is lack of existential commitment to any one particular individual, that is, there is no particular 10lb broccoli portion or plurality of five dogs to which the predicate applies in (2a)/(3a). Instead, (2a)/(3a) are not so much about broccoli or dogs as they are about 10lb of broccoli as an *amount* of food and 5 dogs as a *number* of pets (Rett 2014). The (b) and (c) examples are similar but with the added complication that instead of predicates over individuals we find the dimensional abstract noun *weight*, and event-denoting nominals such as *work* and *grooming*.

(2) a. Ten pounds of broccoli is too much food.
 b. Ten pounds of broccoli is too much weight.
 c. Ten pounds of broccoli is too much {work / chopping}.
(3) a. Five dogs is too many pets.
 b. Five dogs is too much weight.
 c. Five dogs is too much {work / grooming}.

There are two further important empirical observations to be made. **First**, the critical *amount/number* reading is only available in the presence of a form of *much/many* or a related item in the sentential predicate; see for example (4). **Second**, in statements such as (2)/(3) there is a previously overlooked requirement: subjects must be able to be sensibly predicated of the nominal following *much*, regardless of the form of the subject and the polarity of the sentence, as shown in (5)/(6).

(4) a. Ten pounds of broccoli is {as much weight as I can carry / *weight}.
 b. Five dogs is not { many pets / more pets than we need / *pets}.
(5) a. #These rocks are (not) too much food.
 b. #These ideas are (not) too much weight.
(6) a. #10lb of rocks are (not) too much food.
 b. #Five ideas are (not) too much weight.

We show that these facts follow from a novel proposed semantics for *much* together with a conception of degrees as nominalized quantity-uniform properties (Scontras 2017).

Individual-selecting predicates. Consider first the cases (1a) / (1b) with individual-selecting predicates. Adopting a predicative view of numerical indefinites, we take the subject DPs to denote predicates of individuals (portions of broccoli (1a) or dog-pluralities (1b)), with the quantity provided by a measure function (μ_{WEIGHT}, $\mu_{\#}$) that maps individuals to simple degrees; see (7). Following intersection with the sentential predicate (8) and existential closure we obtain (9) as the truth conditions of (1a) (similarly for (1b)).

(7) a. $[\![10lb\ of\ broccoli]\!] = \lambda x.broccoli(x) \wedge \mu_{WEIGHT}(x) = 10lb$
  b. $[\![5\ dogs]\!] = \lambda x.dogs(x) \wedge \mu_{\#}(x) = 5$
(8) $[\![in\ the\ refrigerator]\!] = \lambda x.in\text{-}the\text{-}refrigerator(x)$
(9) $\exists x[broccoli(x) \wedge \mu_{WEIGHT}(x) = 10lb \wedge in\text{-}the\text{-}refrigerator(x)]$

Degree-selecting predicates. The analysis in (9) does not generalize to the examples in (2) / (3), which do not make existential statements about particular entities (such as broccoli or dogs), but rather predicate a property of an amount or quantity. To get this reading – only available in the presence of *much* – we propose a novel semantics for *much* and its modified forms, on which it combines with an ordinary predicate to deliver a set of *complex* degrees, conceived as nominalized quantity uniform properties, type d_e.

(10) $[\![too\ much]\!] = \lambda P_{\langle e,t\rangle}.\lambda d_e : \exists X \subseteq P[U_{DIM}(X) \wedge d_e = {}^{\cap}X].\ d > \theta_P$,
    where $U_{DIM}(X)$ iff $\forall x, y \in X[x \sim_{DIM} y]$
(11) $[\![too\ much\ food]\!] = \lambda d_e : \exists X \subseteq [\![food]\!][U_{DIM}(X) \wedge d_e = {}^{\cap}X].\ d > \theta_{food}$

At the time of taking its last argument, the resulting predicate checks that the subject meets two criteria: that the to-be-nominalized property is quantity uniform and a subset of the nominal predicate. We represent this as a presupposition introduced via a partial function in; thus, (11) effectively enforces the requirement that the degrees in question are amounts of food (cf. (5a)). In examples such as (2a), an argument of the appropriate type is obtained by nominalizing the predicative interpretation of the subject, yielding the following as truth conditions (omitting the presupposition):

(12) $[\![2a]\!] = {}^{\cap}(\lambda x.broccoli(x) \wedge \mu_{WEIGHT}(x) = 10lb) > \theta_{food}$

Importantly, *much* predicates can also occur in contexts that require a predicate over individuals, as in *I bought too much food*. We derive the necessary interpretation via a type shift that maps a set of complex degrees to the set of entities realizing those degrees:

(13) $[\![SHIFT]\!] = \lambda D_{\langle d,t\rangle}\lambda x_e.\exists d \in D[x \in {}^{\cup}d]$

Extensions. Consider now (2b) / (3b), which feature the dimensional noun *weight*. Nouns of this kind pattern with (concrete) mass nouns such as *food* in that they combines with *much*, and thus we take it to have a mass denotation, specifically denoting abstract "dimension-stuff" associated with individuals (cf. Moltmann's tropes). The truth conditions can be derived in parallel to (12); a consequence is that a numerical noun phrase such as *10 pounds of broccoli* must have interpretations as nominalization of both a set of portions of broccoli and the set of their weights. The eventive subjects in (2c) / (3c) are argued to involve complex structures, with an elliptical DP describing a full event description – which may be overt, as in *Chopping 10lb of broccoli is too much work*.

Conclusions. Assuming complex degrees as well as simple ones allows a compositional analysis of a range of puzzling copular constructions. In the talk, we discuss consequences for the ontology of degree, including the structure of the domain of complex degrees (whose ordering is transitive but not antisymmetric), and the nature of dimensional abstract nouns such as *weight* and their "dimensional-stuff" denotations. We also discuss the correct type of nominalizing operation that must apply to quantity uniform properties to form complex degrees, since different nominalizing operations make different assumptions about their domain and how it is structured.

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Vendler's Imperfect Nominals in Spanish

Ever since the work of Vendler (1967), it has been usually assumed that Imperfect Nominals (IN), in italics in (1) and (2), refer to facts (see Bennet, 1988, Asher 1993, among others). This has also been the case in the Hispanic tradition (see De Miguel 1996, Kornfeld 2004, among others) for Vendler's translated examples in (3) and (4).

(1) I deny ever *having seen her* (Vendler, 1967, 125)

(2) *John's being able to walk* is the result of an operation (Vendler, 1967, 125)

(3) Niego *haberla visto* alguna vez.

(4) *El ser capaz de caminar Juan* es el resultado de una operación.

In a recent work, Grimm and McNally (2022) have brought back the attention to Vendler's IN, and have defended that, post-Vendler, most agree in that (a) we need events and propositions, (b) that Vendler's Perfect Nominals denote events, and (c) that *that*-clauses designate propositions. There is, however, no agreement on what verbal gerunds (Vendler's IN) denote (for different approaches, see Grimm & McNally 2022).

In this presentation, we want to pursue a semantic explanation of the role Vendler's IN in Spanish play when they appear in argument positions. Specifically, we will focus on the role of the Spanish infinitive as an IN, which may always appear with the definite article (though it is optional, see Kornfeld 2004), as in (5) and (6).

(5) El haber puesto el Illich en mi user cambió mi vida.

The have.INF put the Illich in my user changed my life.

(https://twitter.com/FeticheSoy/status/1657833559023841280)

(6) a Dembele le afectó el llegar a ese Barça.

Demble was affected by the arrive.INF to that Barça.

(https://twitter.com/Messidelentes10/status/1656274312607694849)

Grimm and McNally (2016) defend that *the-VPing* denote event kinds –also defended by Schirakowsky (2020) for Spanish with the use of experimental methods, in (8)–, in sentences such as (7).

(7) Ann doesn't like the getting up at 6AM. (Grimm & McNally 2016, p. 169)

(8) El observar (los) pájaros es una actividad popular.(Schirakowsky, 2020, p.277)

the observe.INF (the) birds is a popular activity

We will argue, somewhat inspired by Portner (1992), that the Spanish infinitive IN denotes a function that temporally relates the event properties denoted by the IN with the event properties denoted by the verb in the main clause. The temporal relation establishes that, once the entire clause is existentially closed, the event denoted by the IN will be anterior to the event denoted by the main clause (reading that arises even when the temporal periphrasis with *haber*, which involves a past tense, is not there, as in (9)).

(9) Dolió el romper esos vínculos

(It) hurt the break.INF those bonds

(https://twitter.com/xime_yeager/status/1657625132448317440)

We follow Iordăchioaia (2020) and defend that Vendler's IN can be treated as defective nominals which involve the nominalization of a vP via DP, as in (10). Since the IN lacks an nP the DP cannot assign gender and number to it. Thus, it receives the default value in (11), where vExtP are further verbal extended projections, and the definite article is defective.

(10) [$_{DP}$ [$_{vExtP}$ [$_{vP}$ [√ROOT]]]] defective nominals

(11) [$_{DP}$ D [$_{vExtP}$ vExt [$_{vP}$ v [√ROOT]]]]
      G[defG]

Num[defNum]

We want to see, now, how we may adapt Iordăchioaia's (2020) idea to a semantic analysis of Spanish INs. Our analysis involves an anterior temporal relation between the event denoted by the IN and the main event denoted by the main clause. The IN infinitive in (14) establishes an anterior temporal relationship between the event properties denoted by the vP of the IN and the event properties denoted by the main clause (this analysis only intends to provide the interpretation of the infinitive that forms the IN). The event properties denoted by the vP are combined with the defective D in (16) to allow it to function as an argument of *soprend-* in (17). Since tenses are not the focus of our paper, we will close existentially the sentence in (12) using Kratzer's (1996) **past** to have (18) [note that this is an oversimplified analysis]:

(12)   (El) llegar tarde Juan me sorprendió.

       (The) arrive.INF late Juan me surprised.

(13) $[[_{vP}$ lleg- tarde Juan$]]=\lambda e.$**[lleg** (e) & **Agent** (Juan, e) & **late** (e)]

(14) $[[-r^{IN}]]=\lambda P<s,t>.\lambda Q<s,t>.\lambda e1.\lambda e2.P(e1)<Q(e2)$

(15) $[[_{vExtP}$ llegar tarde Juan$]]=\lambda Q<s,t>.\lambda e1.\lambda e2[[$**lleg** (e1) & **Agent** (Juan, e1) & **late** (e1)] $<$ Q(e2)]

(16) $[[_{DP}$ El llegar tarde Juan$]]=\lambda Q<s,t>.\lambda e1.\lambda e2[[$**lleg** (e1) & **Agent** (Juan, e1) & **late** (e1)] $<$ Q(e2)]

(17)   [[el llegar tarde Juan me sorprend-]]$=\lambda e1.\lambda e2[[$**sorprend** (e2) & **Agent** (I, e2) & **Theme([lleg** (e1) & **Experiencer** (Juan, e1) & **late** (e1)] **,** e2)] & e1 < e2]

(18)   [[**past**]]([[el llegar tarde Juan me sorprend-]])$=\exists e2.\exists e1[[$**sorprend** (e2) & **Agent** (I, e2) & **Theme([lleg** (e1) & **Experiencer** (Juan, e1) & **late** (e)], e2) & past (e2)] & e1 < e2]

Our analysis has the advantage of explaining why IN can combine with verbs which involve causation (the arriving late causes surprise), why IN cannot combine with truly propositional verbs (IN do not denote propositions), why IN cannot combine with perception verbs (IN denote a relationship between events, and not existentially quantified events), among others. Overall, we defend that INs in Spanish in argument positions denote a relationship between the event properties denoted by the IN and the event properties denoted by the main clause. Once the main clause is existentially closed, we get an anterior temporal relationship between both events.

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Session: Complement Clauses

Is Believing a Relation?

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The nonrelational theory (NRT) proposed by Friederike Moltmann and Robert Matthews offers a plausible, syntactically-informed treatment of attitude reports, one in which the that-clause's role is not, as standardly thought, to specify the object of the relation indicated by the attitude verb but to predicate a property of an associated "attitudinal object" (Moltmann). In this presentation, I raise questions as to whether NRT offers a genuinely nonrelational analysis. In addition, I argue that the standard treatment of that-clauses as specifying propositional contents is fully compatible with NRT. If so, it's unclear to what extent the theory provides a genuine alternative to the standard view.

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Sufferability as a grammatically relevant notion: the German derivational suffix *-bar*

Introduction. The topic of this paper is the notion of modality inherent to the German derivational suffix *-bar* as used in (1).

(1) Die Schrift ist les-**bar**.   'The handwriting is read-**able**.'

German adjectives formed with *-bar* can generally be translated as English adjectives with the suffix *-able*. Both can be paraphrased with a short passive in the scope of *können / can* (cf. e.g., Keyser & Roeper 1984, Erben 2000):

(2) Die Schrift **kann ge**-les-**en werden**.   'The handwriting **can be** read.'

Both *-able* and *-bar* can only combine with verbal roots that describe events with two event participants, one of which is affected by the event (usually the object in a regular assertion: 'The boy reads the handwriting'); neither suffix can combine with single-participant verbs, like *cough / husten* (see: **coughable / *hustbar*) or *sleep / schlafen* (see **sleepable / *schlafbar*).

Kratzer-semantics. The paraphrasability with *können* ('can') suggests that the modality expressed by *-bar* (and *-able*) has an existential quantificational force. Kratzer (1991: 647) further proposes that the "modality expressed by the suffixes *-ible* or *-able* will likewise have a circumstantial modal base". We assume that this is also a plausible assumption for *-bar*. Based on the paraphrase and against the background of these assumptions, a plausible working hypothesis is therefore that *-bar* and *-able lexicalize* the combination of the passivization of the verbal root in the scope of *können / can*.

(3) a. ⟦**-bar**⟧ = ⟦[λ_1 [[**ge**-t$_1$-**t werden**] **könn**$_{\text{CIRC}}$-]]⟧ b. ⟦**-able**⟧ = ⟦[λ_1 [**can**$_{\text{CIRC}}$ [**be** t$_1$-**ed**]]]⟧

The corresponding Kratzerian truth conditions are as follows:

(4) 'α ist V-bar' / 'α is V-able' is true in w iff there is a world w' that is R^{CIRC}-accessible from w such that 'α is V-ed' is true in w'.

where the circumstantially accessible worlds $w' \in R^{\text{CIRC}}$ are identical to the world of evaluation w wrt. the relevant circumstances. We believe that this grouping together of all "relevant circumstances" hides a complex interplay of properties and facts.

Sufferability. Circumstantial modality in connection with *können* 'can' is a modal notion for which we can distinguish subtypes. This can be illustrated with (5).

(5) Die Forscherinnen **können** die Schrift lesen ...
    'The scientists **can** read the handwriting ...'

    a. ... because the scientists know the language.   ability
    b. ... because the quality of the paper is well preserved.   sufferability
    c. ... because the room is well lit.   circumstantial possibility

Relative to all three continuations, (5-a)–(5-c), *können* 'can' has a circumstantial reading in the Kratzerian sense, yet the continuations focus on different circumstances. In (5-a) the focus is on the properties enabling a successful reading event inherent to the agent; in (5-b) it is on the properties inherent to the patient; in (5-c) it is on the outer circumstances (= neither inherent to the agent or the patient). While the first subtype of circumstantial possibility is typically called **ability** and the third subtype could be called **circumstantial possibility** (in a narrow sense), there is no specific name yet for the second subtype of circumstantial possibility that focuses on the properties inherent to the patient. We propose to call this notion **sufferability**.

Under the working hypothesis in (3), we predict that all three readings are also readily available for *-bar*; this is not the case, compare (5) to (6).

(6) Die Schrift ist les-**bar** . . . ('The handwriting is read-able . . .')

    a. ??. . . because the scientists know the language. ability

    b. . . . because the quality of the paper is well preserved. sufferability

    c. . . . because the room is well lit. circumstantial possibility

At first glance, the contrast between (5-a) and (6-a) suggests that German *-bar* might lexically encode sufferability as a special case of a circumstantial modality. We argue, however, that something weaker is the case. For the initial sentence in (6) to be true, the properties of the agent, the patient, and the circumstances conspire to enable a successful reading event: if the properties of the patient change, the properties of the agent and circumstances that enable a successful reading event (may) need to change accordingly. The continuations, we propose, only highlight one of these three, crucially interdependent aspects. Hence, the contrast between (5) and (6) tells us that due to their syntax and argument structure (i.e., the potential agent is left implicit in (6)), *bar*-adjectives focus on the properties of the patient and thus sufferability.

<u>Difference to -*able*</u>. If we take sufferability to mean any circumstantial possibility that focuses on the properties of an event participant in so far it is affected by that event, then *-bar* and *-able* both express sufferability. However, *-bar* and *-able* differ with respect to the type of verbal roots with which they can combine. *-bar* is restricted to transitive verbal roots that may combine with the modal *können* ('can') on an ability reading; *-able* doesn't share this restriction, see (7).

(7) a. He is like-able. (transparently: 'He can be liked.')

    b. Er ist *mög-bar.

    c. *Ich kann$_{\text{ABIL}}$ ihn mögen. / *I can$_{\text{ABIL}}$ like him.

Therefore, our second claim wrt. *-bar* is that the notion of sufferability relevant for the semantics of *-bar* is connected to the notion of ability via its selection restrictions.

(8) The class of transitive verbal roots that the use of *bar* is restricted to is the class of transitive verbal roots that can be used with *können*$_{\text{ABIL}}$.

<u>Towards a semantics for -*bar*</u>. Two clear aspects of the semantics of *-bar*: (i) it places a selection restriction on the transitive verbal root, which must be compatible with ability-ascriptions; (ii) the resulting *bar*-adjective is a property of individuals understood to be affected by the event described by the verbal root (i.e., they fill the patient role). We take the main challenge wrt. the semantic contribution of *-bar* to be to capture the complex interplay between the three subtypes of circumstantial modality, as well as the focus on the concrete properties of the affected individuals. Our current hypothesis is that in a sentence like (6), where the agent is left implicit, the properties of the agent and the general circumstances for which the event is said to be possible are abstracted over through generic quantification (e.g., Krifka et al. 1995): handwriting is readable iff for all relevantly normal circumstances and all relevantly normal individuals there is a world with a combination of properties of the handwriting, properties of the individual, and circumstances such that the individual reads the handwriting in those circumstances. The viability of this proposal will be further discussed in the talk.

Selected references: Keyser & Roeper. 1984. On the middle and ergative constructions in English. *LI* 13 ● Kratzer. 1991. Modality. In: von Stechow & Wunderlich (eds.) Handbook Semantics. ● Krifka et al. 1995. Genericity: An Introduction. In: The Generic Book.

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Homogeneity effects are motivated by communicative efficiency

Background. One of the most intriguing properties of negation in natural language is that certain types of sentences do not have complementary truth conditions with their negated counterparts. For instance, neither of the sentences in (1) is true in a scenario where half of the kids laughed, and the other half burst in tears. This kind of truth-value gap is termed homogeneity. Homogeneity effects have been observed in various semantic domains such as sentences with definite plurals (1), generics (2), habituals, and conditionals (see [7] for a recent review). In such sentence pairs, the affirmative is typically similar in meaning to a corresponding sentence with universal quantification, whereas the negative is roughly equivalent to a corresponding sentence with a negated existential. However, sentences without overt quantification, as in (1)-(2), often allow for exceptions, which is known as non-maximality.

(1) a. The kids laughed.   ($\approx$ All of the kids laughed.)
     b. The kids didn't laugh.   ($\approx$ None of the kids laughed.)

(2) a. Men are mortal.   ($\approx$ All men are mortal.)
     b. Men aren't mortal.   ($\approx$ No men are mortal.)

Existing theories analyze homogeneity as a presupposition [12; 9], an implicature [10; 1], a product of underspecification [5; 11], or a phenomenon sui generis [6]. Yet a fundamental question remains: why is homogeneity such a pervasive property of negation in natural language? That is, why are there no attested languages (to the best of our knowledge) which do not exhibit homogeneity or where homogeneity effects are observed in some of the constructions in (1)-(2) but not others? **The goal of this study is to answer this question**, and the proposal is compatible in principle with various formal approaches to deriving homogeneity effects.

Homogeneity and the "missing O puzzle". I argue that homogeneity effects are tightly related to a semantic universal proposed in [3]. The traditional square of opposition (see Figure 1) represents the logical relations between four logical forms. According to Horn, many languages have morphologically simple lexemes for three corners of the square (**A**, **I**, **E**), but no attested language has a simple lexeme for the remaining corner (**O**). This universal is stated in (3).

(3) *Horn's universal* [3]:
     No attested language has a simple lexeme with the meaning of 'not all' (the **O** form).

I suggest that Horn's universal may be extended to sentences with zero marking of quantificational force. The proposed generalization is stated in (4). I assume that $\mathbf{A}_{zero}$ is true iff **A** is true, false iff **E** is true, and undefined otherwise. $\mathbf{E}_{zero}$ is, of course, a mirror image. I further take non-maximal interpretations of $\mathbf{A}_{zero}$ and $\mathbf{E}_{zero}$ to be a pragmatic phenomenon [8; 6]. Notice that zero-marked negative sentences, e.g., (1b) and (2b), are uniformly interpreted as $\mathbf{E}_{zero}$. The **O** form may only be expressed with an overt quantifier, as in (5). Hence, the **O** form is expressed by more complex constructions than $\mathbf{A}_{zero}$ and $\mathbf{E}_{zero}$, which is compatible with Horn's original universal.

(4) *Extension of Horn's universal* (novel):
     No attested language expresses the **O** form with zero marking of quantificational force.

(5) a. Not **all** of the kids laughed.
     b. Not **all** men are mortal.

The extended universal in (4) provides a novel insight into homogeneity. Generic sentences (2), for instance, exhibit a homogeneity effect because a positive generic sentence is typically interpreted as $\mathbf{A}_{zero}$, and its negation is interpreted as $\mathbf{E}_{zero}$ rather than **O**, which is the logical negation of $\mathbf{A}_{zero}$. As a consequence, the truth conditions of the sentences in (2) are non-complementary.

Communicative efficiency. Recent studies have argued that certain semantic universals arise from general principles of efficiency in communication [see e.g., 4; 13]. I propose that communicative efficiency also explains the fact that zero-marked negative sentences express the meaning of $\mathbf{E}_{zero}$ rather than $\mathbf{O}$, which in turn gives rise to homogeneity effects. A language is considered efficient if the speaker and listener can successfully communicate with minimal effort on average, e.g., by minimizing the message length [2]. Consider a hypothetical language that does not exhibit homogeneity—i.e., the affirmative and negative sentences in (1)-(2) have complementary truth conditions. Further suppose that the (a) examples are interpreted as $\mathbf{A}_{zero}$, like in English. In a language without homogeneity, the (b) examples are interpreted as $\mathbf{O}$ because the (a) and (b) examples are to have complementary truth conditions. If one wishes to avoid a systematic ambiguity between $\mathbf{O}$ and $\mathbf{E}$, it follows that the $\mathbf{E}$ form must be expressed with overt quantification, as in (6).

(6)   a.   **None** of the kids laughed.
        b.   **No** men are mortal.

I suggest that such a language would be inefficient relative to attested languages. The $\mathbf{E}$ form is considerably more frequent in usage than the $\mathbf{O}$ form (see corpus evidence below). Therefore, in a language where zero-marked negative sentences are interpreted as $\mathbf{O}$, frequent messages ($\mathbf{E}$) would be longer than infrequent messages ($\mathbf{O}$). As a result, communication would be less efficient overall. Given that language systems are shaped by a pressure for communicative efficiency [4; 2], such a language is unlikely to arise.

More formally, consider a fragment of a language that contains six types of sentences: the four overtly-marked forms and two zero-marked forms—positive and negative. Assuming that the zero-marked forms are unambiguous, the only relevant measure of communicative cost distinguishing between different hypothetical systems is the average message length. The set of messages M is the union of sets corresponding to these six forms: $M = \bigcup_{n=1}^{N} M_n$. The relative frequency of M_n is the cardinality of M_n divided by the cardinality of M. The length of a message m is $l(m)$, as measured by the number of words in m, and $\bar{l}(M_n)$ is the average message length in M_n. Hence, the average message length in M equals the sum of the average message length in each set weighted by its frequency, i.e., $\bar{l}(M) = \sum_{n=1}^{N} \frac{|M_n|}{|M|} \cdot \bar{l}(M_n)$. Communication is more efficient when $\bar{l}(M)$ is smaller. Therefore, it follows from the above equation that it is more efficient to dedicate zero marking to more frequent types of messages, e.g., $\mathbf{E}$ compared to $\mathbf{O}$.

Corpus study. To substantiate the assumption that the $\mathbf{O}$ form is much less frequent than the other three overtly-marked forms, I examined the frequency of each form in a balanced corpus. Methods: Several lexemes were identified as expressing each form, e.g., the $\mathbf{A}$ form can be expressed by *all*, *every*, *everyone*, *everybody*, and *everything*. For each query, a random sample of 30-90 sentences from the Corpus of Contemporary American English (COCA) was manually analyzed. Results: A total of 700 sentences were examined. The estimated frequencies are presented in Table 1. The results show that the $\mathbf{E}$ form is almost 15 times more frequent than the $\mathbf{O}$ form even if examples of $\mathbf{E}_{zero}$, which are similar in meaning to the former, are not included in the count.

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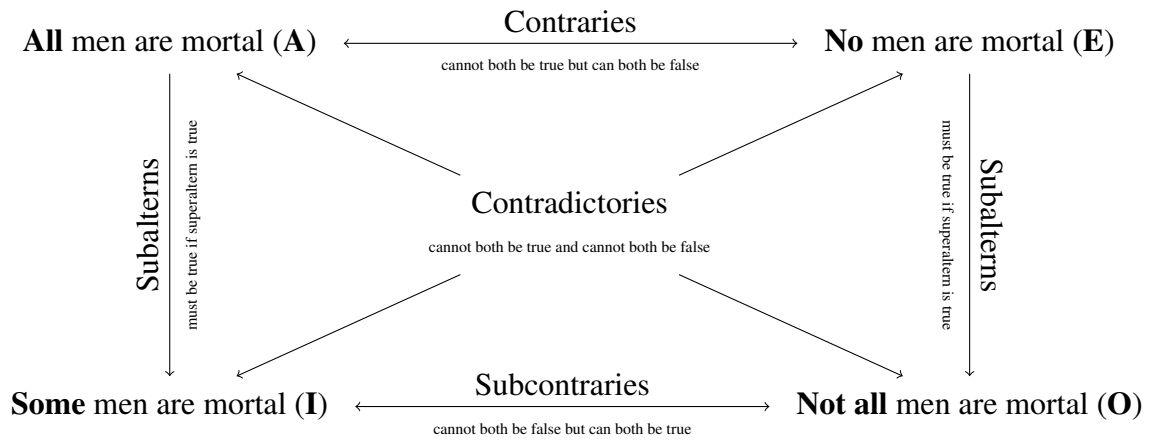
Figures and tables

All men are mortal (**A**) ←――――― Contraries ―――――→ No men are mortal (**E**)

cannot both be true but can both be false

Subalterns

must be true if superaltern is true

Contradictories

cannot both be true and cannot both be false

Subalterns

must be true if superaltern is true

Some men are mortal (**I**) ←――――― Subcontraries ―――――→ **Not all** men are mortal (**O**)

cannot both be false but can both be true

Figure 1: The traditional square of opposition

	A	I	E	O
Frequency per million words	715	656	441	30
Relative frequency	38.8%	35.7%	23.9%	1.6%

Table 1: Estimated frequencies of the four overtly-marked forms of the traditional square of opposition in COCA