Singular/Plural contrasts: The case of Informational Object Nouns*

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Abstract

This paper brings together a number of different topics in semantics: the count/mass distinction, telicity, plurality, and cumulativity and distributivity. We focus on sentences containing Informational Object Nouns (IONs) such as *statement* and *belief* in constructions such as *Alex's/Alex and Billie's statement(s)/belief(s) that p/that p and q).* We observe that the interpretation of the ION in such constructions *vis-à-vis* referring to a proposition/propositions or to an eventuality/eventualities is sensitive to whether the subjective genitive and the ION are singular or plural, and to whether the complement clause is simplex (p) or complex (p and q). We derive these patterns based on a theory of the mass/count distinction for IONs developed in Sutton and Filip (2019).

1 Introduction.

This paper contributes to the small but growing literature on the countability of abstract nouns (Grimm, 2014; Nicholas, 2010; Tovena, 2001; Zamparelli, 2018, amongst others). Abstract nouns have largely been set aside in semantic theories of the mass/count distinction due to their highly puzzling nature and heterogeneity (Grimm, 2014; Zamparelli, 2018). Therefore, our modest focus is on one lexical subclass, which we label *Informational Object Nouns* (IONs) (following Sutton and Filip, 2019). IONs take propositional complements and accept *is true/false* predications. Many IONs are derived from Psych verbs (*knowledge, belief, thought, opinion*), and from verbs that denote speech act events (*statement, assertion, utterance*). The former also have another sense/use that refers to a stative *relation* to a proposition (e.g., that of believing it, knowing it etc.), which we model as denoting a set of STATES. The latter have an additional sense/use that denotes a set of dynamic EVENTS of stating/asserting etc.

We argue that count IONs can be individuated in different ways, depending on whether the eventuality type specified in their lexical entries is a STATE or an EVENT. In particular, we discuss interactions between count IONs, the grammatical number of a head NP (the ION) and of its modifier, and the complexity of its propositional complement, namely, cases in which count IONs such as *belief* and *statement* are singular or plural, have singular or plural subjective genitives, and can take simplex or complex propositional complements:

	Subj. genitive (SG or PL)	ION (SG or PL)	Prop. complement (simplex or complex)
(1)	Alex's	belief/statement	that ϕ
	Alex and Billie's	beliefs/statements	that ϕ and ψ

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These cases are of particular interest, since, as we will show, these alternations dictate whether a proposition or an eventuality is referred to, whether there is a plurality thereof or not, and how this distributes to agents/experiencers. Such alternations, we will argue, can be predicted by a theory of the mass/count distinction based upon individuation relative to a context as proposed by Sutton and Filip (2019) and Filip and Sutton (2017), amongst others.

2 Diagnostics for Informational Object Nouns (IONs)

The class of IONs, in English, include the following nouns:

> *assertion*, *belief*, *contention*, *evidence*, *fact*, *idea*, *information*, *intelligence*[1], *judgement*, *knowledge*, *opinion*, *proclamation*, *pronouncement*, *proposal*, *proposition*, *statement*, *story*, *thought*, *truth*, *utterance*.

We propose that the class of IONs consists of nouns that pass *both* the tests T1 and T2 below. No other nouns do. So, if N is an ION, then:

(T1) *N that is true/false* is felicitous (truth-evaluability);

(T2) *N that p* is felicitous (propositional complementisers)

For example, *belief* and *statement* take propositional complements: *Alex's belief/statement that it's raining*, and admit of truth/falsity predications: *Alex's belief/statement was true/false*. In contrast, nouns like *feeling* pass the complementiser test (T2): *the feeling that I have forgotten something*. However, they fail test (T1): *that feeling was true* is odd, if *true* is intended in its truth-value sense, and not in the *genuine, real* sense. Although concrete Ns like *book, article* are attested in collocations such as *this article is true* (understood as meaning that its content is true at a given world/time), they fail test (T2).

3 Observations

First, as shown by the examples in (2) and (3) IONs do not uniquely determine what counts as one proposition across contexts. In the original corpus examples in (2-a) and (3-a), the singular ION denotes a proposition expressed by a complement clause which is a conjunction of two clauses, but nonetheless they constitute what counts as 'one' proposition in the denotation of the ION. In the minimally modified examples in (2-b) and (3-b), the use of plural IONs individuates each proposition expressed by the two separate conjuncts as *two opinions/statements*

(2) a. ... the **opinion** that these two German countries belonged together and that the German people should solve their own internal affairs and difficulties. [UKwaC]
b. ... the **opinions** that these two German countries belonged together and that the German people should solve their own internal affairs and difficulties.

(3) a. The Panel is pleased to note the company's **statement** that the product is no longer available and that it would not form part of its Christmas 2001 gift range. [UKwaC]
b. The Panel is pleased to note the company's **statements** that the product is no longer available and that it would not form part of its Christmas 2001 gift range.

[1] *Intelligence* in the sense of pieces of military intelligence

In (3-a) and (3-b), the sentences can also denote the stating events: one stating event in (3-a) and possibly multiple stating events in (3-b). However, in (2-a) and (2-b) no parallel reference to opinion-states (i.e. to multiple opinion-states by diverse 'opinion-holders') is possible.

Second, we get a meaning contrast for plural subjective genitives when the complement clause is simplex (without a conjunction). Take the minimal pair in (4). In (4-a), *belief* refers to, and is individuated in terms of, a single proposition. But, in the same context, the use of the plural *beliefs* in (4-b) forces a reading in which relations to the same proposition are individuated in terms of the Experiencers (the different cousins).

(4) a. it certainly fueled my cousins' **belief** that my family were "snobs".
b. it certainly fueled my cousins' **beliefs** that my family were "snobs". [UKWaC]

For IONs such as *statement*, we get a different alternation. In (5-a), unlike in (4), reference can be made either to the proposition or to the stating-event. In (5-b), similarly to (4-b) it is the stating events that are referred to (reference to the proposition expressed is blocked). However, in (5-a), Franks and Vershbow are joint agents in making the statement, whereas in (5-b), the only reading is that across differentiable events, Franks and Vershbow both made statements that conveyed the same contents (either individually or together).

(5) a. in the wake of US Gen Tommy Franks and US ambassador Alexander Vershbow's **statement** that the US would produce the evidence of Iraqi WMD.
b. in the wake of US Gen Tommy Franks and US ambassador Alexander Vershbow's **statements** that the US would produce the evidence of Iraqi WMD. [BNC]

Third, we find contrasts such as those in (6) and (7). In (6-b), the plural *statements* allows for different officials each to have stated both or either one of the propositions denoted by the (complex) complement clause, whereas the singular *statement* in (6-a) suggests that the officials jointly stated the same (complex) proposition.

(6) a. there was no credible evidence to support the Bush administration officials' **statement** that Iraq had stockpiles of biological and chemical weapons and was close to having a nuclear weapon.
b. there was no credible evidence to support the Bush administration officials' **statements** that Iraq had stockpiles of biological and chemical weapons and was close to having a nuclear weapon.

In (7-b), some complainants might believe that the ads were irresponsible, some that the ads could encourage emulation by children, and others both of these things. In contrast, in (7-a), where we have *belief* as a singular noun, all of the complainants believe the same thing, namely, that the ads were irresponsible and could encourage emulation by children.

(7) a. We did not agree with the complainants' **belief** that the ads were irresponsible and could encourage emulation by children
b. We did not agree with the complainants' **beliefs** that the ads were irresponsible and could encourage emulation by children [UKWaC]

The contrast between (6-a) and (6-b), on the one hand, and (7-a) and (7-b), on the other, is that, while all can refer to the proposition(s) expressed by the complement clause, (6-a) and (6-b) can also refer to a single stating-event or multiple stating events respectively. In contrast, the IONs in (7-a) and (7-b) cannot refer to the belief-states of the experiencers.

All of these observations are summarised in Table 1. The general pattern is that STATE-IONs such as *belief* can only refer to the proposition(s) that are, e.g., believed, unless the ION is plural with a plural subjective genitive and a simplex complement (4-b) in which case reference is to STATES individuated relative to experiencers. In contrast, EVENT-IONs generally allow for readings that denote the relevant EVENT(S) or denote the relevant proposition(s). Again, if the

Table 1: Summary of observations

Type	Subj. Gen.	ION	Complement	Denotation of ION	Ex. No.
EVENT	SG	SG	complex	1 proposition / 1 event	(3-a)
STATE	SG	SG	complex	1 proposition (no state reading)	(2-a)
EVENT	SG	PL	complex	n propositions / n events	(3-b)
STATE	SG	PL	complex	n propositions (no state reading)	(2-b)
EVENT	PL	SG	simple	1 proposition / 1 event	(5-a)
STATE	PL	SG	simple	1 proposition (no state reading)	(4-a)
EVENT	PL	PL	simple	n events (no proposition reading)	(5-b)
STATE	PL	PL	simple	n states (no proposition reading)	(4-b)
EVENT	PL	SG	complex	1 joint agency event / 1 proposition	(6-a)
STATE	PL	SG	complex	1 proposition (no state reading)	(7-a)
EVENT	PL	PL	complex	1 joint agency event or n events / 1 or n propositions	(6-b)
STATE	PL	PL	complex	1 or n propositions (no state reading)	(7-b)

EVENT-ION is plural with a plural subjective genitive and a simplex complement, reference to propositions is blocked (5-b), in which case reference is only to EVENTS.

4 Analysis

4.1 Plural sets and individuation schemas across semantic types

We assume Schmitt's (2013; 2017) theory for a type of generalised mereological sum operation that applies to e.g., propositions and eventualities. Schmitt defines a unified mereological sum ($\sqcup$) operation over different semantic types. For each domain of type a, $\mathcal{D}_a$, we have a bijection function pl_a on the powerset of $\mathcal{D}_a$ to a plural structure, namely, the set of singularities and pluralities for that domain, $\mathbf{PL}_a$ (the inverse of pl_a is pl_a^{-1}):

$$pl_a : (\mathcal{P}(\mathcal{D}_a)\backslash\varnothing) \rightarrow \mathbf{PL}_a \tag{8}$$

Predicates with domains on $\mathbf{PL}_a$ are members of the power set of this domain: $\mathbf{S}_a = \mathcal{P}(\mathbf{PL}_a)$, namely sets of sets of singularities and pluralities for that domain.

To demonstrate why this is helpful, suppose we have three (atomic) possible worlds in our domain: w_1, w_2, w_3, and so three *atomic functions* of type $\langle s,t\rangle$ characterised by the singleton sets $\{w_1\}$, $\{w_2\}$, and $\{w_3\}$. The set of possible propositions is $\mathcal{P}(\{\{w_1\}, \{w_2\}, \text{and } \{w_3\}\})\backslash\varnothing$ which is isomorphic to $\mathbf{PL}_{\langle s,t\rangle}$. For example, for some $\mathbf{p}, \mathbf{q}, \mathbf{r}$, $pl_{\langle s,t\rangle}(\{w_1\}) = \mathbf{p}$, $pl_{\langle s,t\rangle}(\{w_2\}) = \mathbf{q}$, and $pl_{\langle s,t\rangle}(\{w_3\}) = \mathbf{r}$. Count and mass predicates can then be distinguished in terms of quantization by supposing that countable sets of propositions are quantized sets relative to the plural structure formed by $pl_{\langle s,t\rangle}$. The definition of a quantized set (Krifka, 1989) is:

$$QUA(X) \leftrightarrow \forall x, y[x \in X \wedge y \in X \rightarrow \neg x \sqsubset y] \tag{9}$$

For example, suppose that there are two predicates of propositions of type $\langle\langle s,t\rangle,t\rangle$, P and Q such that $pl_{\langle s,t\rangle}(P) = \{\mathbf{p}, \mathbf{q}, \mathbf{r}\}$ and $pl_{\langle s,t\rangle}(Q) = \{\mathbf{p}, \mathbf{q}, \mathbf{r}, \mathbf{p} \sqcup \mathbf{q}\}$. The former differs from the latter insofar as only the denotation of the former is quantized. Hence P is, by hypothesis, countable, whereas Q is not (Q is mass).

In order to model how what counts as one proposition can vary across contexts, we use Sutton and Filip's (2019) notion of a context indexed individuation schema, $\mathcal{Q}_c$ that applies to sets and returns maximally quantized subsets of entities that count as 'one' in that context and so can be arguments of cardinality functions. (See Krifka (1989) for *quantized*. See, Landman

(2011; 2016) for a related idea in terms of disjointness (maximally disjoint subsets). Cf. Filip's (2008) use of maximalization.) *Maximally quantized subsets* are defined as follows:

$$Y \subseteq_{max.QUA} X \leftrightarrow Y \subseteq X \wedge QUA(Y) \wedge \forall Z[Z \supseteq Y \wedge Z \subseteq X \wedge QUA(Z) \rightarrow Z = Y] \quad (10)$$

Whereas quantized sets have no two members such that one is the proper part of the other, maximally quantized subsets of a set X are the largest subsets if X that are quantized.

Generalising Sutton and Filip's (2019) definition of $\mathcal{Q}_c$, $\mathcal{Q}_c$ applies to an expression of any type and returns a maximally quantized subset thereof (a possibly different set depending on the value of the context, c).

> For all c, for all $\tau \in \mathbf{type}$, $\mathcal{Q}_c$ is a polymorphic function of type $\langle \tau, \tau \rangle$
>
> If X is a set, the members of which are of type a, then $\mathcal{Q}_c(\mathrm{X}) = \mathrm{Y}$, such that $\{\mathbf{y} : \mathbf{y} = pl_a(y), y \in Y\} \subseteq_{max.QUA} \{\mathbf{x} : \mathbf{x} = pl_a(x), x \in X\}$

To build upon the example from above, for the set $X = \{\{w_1\}, \{w_2\}, \{w_1, w_2\}\}$, applying pl_s to the members of this set yields $\{\mathbf{p}, \mathbf{q}, \mathbf{p} \sqcup \mathbf{q}\}$. Since there are two maximally quantized subsets of this set, $\{\mathbf{p}, \mathbf{q}\}$ and $\{\mathbf{p} \sqcup \mathbf{q}\}$, there are two distinguishable contexts c and c' such that:

$$\mathcal{Q}_c(X) \quad = \quad \{\{w_1\}, \{w_2\}\}; \qquad \mathcal{Q}_{c'}(Y) \quad = \quad \{\{w_1, w_2\}\}$$

4.2 Lexical entries

Here we take our two main examples of the two types of count IONs, *belief* and *statement*. In parallel to proposals for the verbal predicates they are derived from, we assume that the lexical entries for these nouns includes a predicate of eventualities: $\lambda s.belief(s)$ and $\lambda e.statement(e)$, respectively. (Where s is a variable over STATES and e is a variable over EVENTS). Nouns like *belief* also have an Experiencer thematic role ($\lambda x.\lambda s.exp(s)(x)$), and nouns like *statement* have an Agent thematic role ($\lambda x.\lambda s.agent(e)(x)$). Both *belief*-like and *statement*-like nouns have a Contents thematic role, ($\lambda s.\lambda p.contents(s)(p)$ and $\lambda e.\lambda p.contents(e)(p)$, respectively). Following Sutton and Filip's (2019) proposal for concrete count nouns, we assume that the lexical entries of count IONs include a context indexed individuation schema. For IONs, this applies to the Contents-specifying conjunct in the lexical entry such that it ensures the set of propositions denoted by the ION is quantized. So if σ is a constant that denotes either an EVENT, a sum of EVENTS, a STATE, or a sum of STATES, $\lambda p.\mathcal{Q}_c(contents)(\sigma)(p)$ is a quantized set of propositions (or, more correctly, the set of members of $\mathbf{PL}_{\langle s,t \rangle}$ that are related to members of that set via $pl_{\langle s,t \rangle}$ is quantized).

The lexical entry for *belief* is given in (11). It is a function from experiencers to a function from propositions to a set of states. The plural *beliefs* is formed via upward closure under sum (encoded by the * operator). Assuming that semantic plural formation applies only to quantized predicates, and given that the set of belief states is not quantized (see section 4.3 for justification), the only place for the * operator to apply is on $\lambda p.\mathcal{Q}_c(contents_c(s))(p)$ (i.e. allowing reference to pluralities of propositions).

$$[\![\text{belief}]\!]^c = \lambda x\, \lambda p\, \lambda s\, [belief(s) \wedge exp(s)(x) \wedge \mathcal{Q}_c(contents_c(s))(p)] \quad (11)$$

$$[\![\text{beliefs}]\!]^c = \lambda x\, \lambda p\, \lambda s\, [belief(s) \wedge exp(s)(x) \wedge {}^*\mathcal{Q}_c(contents_c(s))(p)] \quad (12)$$

Given that the interpretations of *belief(s)* and *belief(s) that S* are the same type (both can denote propositions, both can combine with determiners), we assume the following semantics

for *that S* complements. $\mathfrak{f}$ is of type $\langle e, \langle \langle s,t\rangle, \langle v,t\rangle\rangle\rangle$, where v is the type of eventualities and σ is a variable over eventualities (e.g., STATES or EVENTS).

$$[\![\text{that S}]\!]^c = \lambda \mathfrak{f}\, \lambda x\, \lambda p\, \lambda \sigma\, [\mathfrak{f}(x)(p)(\sigma) \wedge p = [\![\text{S}]\!]^c] \tag{13}$$

$$[\![\text{belief that S}]\!]^c = \lambda x\, \lambda p\, \lambda s\, [belief(s) \wedge exp(s)(x) \wedge \mathcal{Q}_c(contents_c(s))(p) \wedge p = [\![\text{S}]\!]^c] \tag{14}$$

In subjective genitive constructions, assuming an ι-closure licensed by the genitive and $\exists$-closure of the remaining argument, this yields an ambiguity between a DP denoting a proposition or a belief-state:

$$[\![\text{Jo's belief that S}]\!]^c = \begin{cases} \iota p\, \exists s[belief(s) \wedge exp(s)(j) \wedge \mathcal{Q}_c(contents_c(s))(p) \wedge p = [\![\text{S}]\!]^c] \\ \iota s\, \exists p[belief(s) \wedge exp(s)(j) \wedge \mathcal{Q}_c(contents_c(s))(p) \wedge p = [\![\text{S}]\!]^c] \end{cases} \tag{15}$$

EVENT-IONs such as *statement* have similar lexical entries, but there is a key differences between the lexical entries of EVENT-IONs and STATE-IONs on top of those detailed above: plural formation for EVENT-IONs can apply with respect to propositions *or* EVENTS:

$$[\![\text{statement}]\!]^c = \lambda x\, \lambda p\, \lambda e\, [statement(e) \wedge agent(e)(x) \wedge \mathcal{Q}_c(contents_c(e))(p)] \tag{16}$$

$$[\![\text{statements}]\!]^c = \lambda x\, \lambda p\, \lambda e\, [^*statement(e) \wedge agent(e)(x) \wedge {}^*\mathcal{Q}_c(contents_c(e))(p)] \tag{17}$$

Expressions such as *Jo's statement/statements that S* are derived as above *mutatis mutandis*.

4.3 Further assumptions

We require eight further assumptions in order to derive the distributional patterns in Table 1. These are divided into three common knowledge assumptions (i)-(iii), two theoretical quantization assumptions (iv)-(v), two theoretical assumptions relating to individuation of propositions (vi)-(vii), and, finally, one theoretical assumption relating to cumulation (viii).

(i) experience of a token mental state cannot be shared. Aside from SciFi scenarios wherein alien beings have collective hive-mind consciousness, for the actual world as we know it, we assume that for any single mental state, such as a belief, there can be only one experiencer (not, for example, a sum of experiencers that have 'co-experienceship').

(ii) agency of an event can be shared. Agency of events such as making-a-statement events can be genuinely shared (e.g., via co-authorship of a written statement).

(iii) contents of mental states can be shared. Although there is some philosophical debate as to the extent to which the contents of the beliefs of any two experiencers can be identical, at the level of granularity of beliefs we assume here, we take it for granted that there is a genuine sense in which two experiencers can hold the same belief *qua* contents.

(iv) sets of states such as $\lambda s.\, belief(s)$ are not quantized relative to one experiencer. States, such as belief-states hold true for experiencers at relatively long and vague time intervals. If an experiencer has a mental state (e.g. belief), with some propositional contents for some time interval, then they will be in that mental state at any subinterval and moment within that interval. For example, if Ann believes that it's raining during time interval i, then this belief persists at any subinterval and moment of i. Therefore the set of mental attitude states is not quantized, even if the experiencer and the content of these states is the same.

(v) sets of events such as $\lambda e.\, statement(e)$ are quantized relative to an agent, and a propositional contents. Suppose that a states that p and that this eventuality, e has a run time t. There is no sub-eventuality in which a also states that p. (Of course, if there are sub-propositions of p, such as q and r, then there may be $e', e'' \sqsubseteq e$ such that e' is a stating q event

and e'' is a stating r event, mutatis mutandis for plural agents). In other words, predicates of accomplishments, restricted in this way are quantized.

(vi) simplex complement clauses fix the context to one in which the proposition denoted counts as 'one'. If a states/believes that S, where S is a simplex sentence, then there is, in terms of logical possibility, no guarantee that what is expressed by S will count as one proposition. By assumption (§4.1), plural structures based on the domain of propositions are generated from atomic propositions (those that are equivalent to singleton sets of possible worlds), hence all but those sentences that express atomic propositions will express sums of elements of $\mathbf{PL}_{\langle s,t\rangle}$ (which could count as one or as many propositions). However, the use of words to express a proposition intuitively *frames* that thought in some way, and simplex sentences such as 'Alex is coming to the party' seem to militate against individuating the propositions they express from counting as more than one: our choices to use certain words impose particular individuation schemas on that which we refer to. Formally, if S is a simplex sentence in a complement clause, we assume that the context of evaluation, c is such that:

$$\mu_{\#}([\![\mathrm{S}]\!]^{c}, \mathcal{Q}_{c}(\mathcal{P}(\mathcal{D}_{\langle s,t\rangle})\backslash\varnothing)) = 1 \tag{18}$$

In words, the cardinality of the proposition(s) expressed by a simplex sentence S in context c is 1 relative to the domain of propositions under the individuation schema $\mathcal{Q}_c$ (where $\mathcal{Q}_c(\mathcal{P}(\mathcal{D}_{\langle s,t\rangle})\backslash\varnothing)$ is a maximally quantized subset of the domain of (pluralities of) propositions).

(vii) complex complement clauses are compatible with the proposition denoted counting as more than one. The same restriction does not seem to apply to complex sentences. To take the sentence conjunction case, if a states/believes that S and S$'$, then the use of the conjunction seems to license a certain kind of conceptual freedom in whether we individuate what is expressed by 'S and S$''$' as one proposition, or as two. Formally, then, if S is a complex sentence in a complement clause, then we assume that there is a licensed context of evaluation, c', such that:

$$\mu_{\#}([\![\mathrm{S}]\!]^{c'}, \mathcal{Q}_{c'}(\mathcal{P}(\mathcal{D}_{\langle s,t\rangle})\backslash\varnothing)) \geq 1 \tag{19}$$

(viii) Propositions denoted by singular IONs do not cumulate with Agents/Experiencers. Whether the *contents* conjunct is closed under sum as in (12) and (17) or is not as in (11) and (16) makes an important difference when a definite DP involving an ION refers to propositions. Just as singular definites like *the cat* denote single entities (atoms), when an ION is realised as a singular definite argument, the ION can only refer to a proposition that counts as 'one ION' (i.e. a single member of the set of propositions under $\mathcal{Q}_c$). Thus, if the proposition that counts as 'one ION' is a sum of propositions in a given context, none of its proper parts can count as 'one ION' in that same context. Consequently, if the ION is in the definite singular, and the agent/experiencer is realised as a plural argument, individual agents/experiencers cannot be distributed over proper parts of the proposition. When the ION is plural, this is not the case, provided that the individual agents/experiencers are related, via believing/stating, to a proposition that is in the set of propositions that count as one or sums thereof in that context (i.e. cumulative readings are available).

4.4 Deriving the available readings

(A) SG IONs with PL genitives and simplex complement clauses (4-a, 5-a). The fact that these constructions have simplex complement clauses ensures that the proposition

denoted by the complement clause counts as 'one' in the context, so on a definite interpretation, there is only a single proposition referred to (assumption vi). For STATE-IONs, and based on our common world knowledge that any single token mental state is experienced by only one experiencer (i.e., there is no 'co-experience' of a single token mental state by a sum of experiencers, assumption (i)), if the Experiencer argument is plural, we know that at least two belief states must be involved. However, the use of the singular *belief* (as opposed to the plural *beliefs*) in the subjective genitive construction in (4-a) militates against individuating propositions in terms of multiple belief states each tied to a different experiencer. This leaves only one interpretation: a definite DP denoting a single proposition, hence *my cousins' belief that my family were snobs* denotes a single proposition that is the contents of some belief state that each of the cousins have. For EVENT-IONs, the plural Agent *can* be interpreted as multiple individuals with joint agency (assumption ii), and so there may be only a single event involved. Indeed, since the set of events that is denoted by the singular *statement* is quantized (assumption v), the definite DP *Franks and Vershbow's statement*, if it refers to an EVENT, can only refer to a single event with joint agency. On its proposition denoting reading, *Franks and Vershbow's statement that the US would produce the evidence* can only be drawn from a quantized set of propositions that each count as 'one' in the context (assumption vi), and so, if it refers to a proposition, it refers only to one proposition.

(B) PL IONs with PL genitives and simplex complement clauses (4-b, 5-b). Excluding downwards entailing contexts, these constructions cannot refer to pluralities of propositions, because the simplex complement specifies a proposition that counts as 'one' in the context (assumption vi). Hence, it would be pragmatically infelicitous to refer to multiple propositions (just as it is to say *There are cats are on the mat* when only one cat is). For STATE-IONs, *beliefs* should be able to denote pluralities of propositions (12), but the simplex complement clause rules this out (assumption vi). We, furthermore, have a plurality of experiencers, and we know that they cannot share a belief state (assumption i), although they can all share the contents of a belief (assumption iii). The pragmatic effect of the use of the plural is to try to identify some kind of plurality of things in the context. The only option left, therefore, is to try to individuate belief states. Problematically, however, this set is not quantized for STATE-IONs (assumption iv), and so no clear individuation criteria is provided by the meaning of *beliefs*. The solution, we propose, is to derive a quantized set of, e.g., belief states via anchoring each state to an experiencer (see Davidson (1969/1980) and Krifka (1989) for individuating eventualities with respect to participants, see Grimm (2014) for anchoring to experiencers). In other words, one infers that the speaker is referring to a plurality of mental states, each possessed by a different experiencer. Hence *my cousins' beliefs that my family were snobs* has only one reading: reference to multiple belief states that are individuated with respect to individual cousins, all of whom share the content of a belief. EVENT-IONs also cannot refer to pluralities of propositions in these constructions for the same reasons just given for STATE-IONs. However, they can, straightforwardly, refer to pluralities of EVENTS as licensed by the fact that singular EVENT-IONs denote quantized sets of eventualities (assumption v) and plural EVENT-IONs denote pluralities of eventualities that are generated from quantized sets e.g., **statement* in (17). Hence *Franks and Vershbow's statements that the US would produce the evidence* can only denote a plurality of stating-events, the propositional content of each is the same.

(C) SG IONs with PL genitives and complex complement clauses (6-a, 7-a). Even though these constructions have complex complements, because the ION is singular, the propositions that can be referred to count as 'one' and it is not possible for single Agents/Experiencers to believe/state only proper parts of the relevant proposition (assumption viii). The use of the singular form also implicates that what is being referred to is not a plurality of either proposi-

tions or eventualities. For STATE-IONs, a STATE referring reading is out, since the set of states is not generated from a quantized set (assumption iv). This just leaves one reading: reference to a single proposition (albeit one expressed by a complex complement clause), that is the contents of each of the mental states of the experiencers. Hence, *the complainants' belief that the ads were irresponsible and could encourage emulation by children* refers to the proposition expressed by the complement and frames it as counting as one. For EVENT-IONs, since the set of EVENTS is quantized (assumption v), there is a single EVENT-referring reading available, albeit one with joint agency (assumption ii). The single (albeit complex) proposition-referring reading is also available. Unlike the *belief*-case, this must be linked to a single stating-event. Hence, *the officials' statement that Iraq had weapon stockpiles and was close to having a nuclear weapon* refers either to the proposition expressed by the complement and frames it as counting as one, or refers to a single joint-agency event of stating this complex proposition.

(D) PL IONs with PL genitives and complex complement clauses (6-b, 7-b). The use of the plural noun in these cases implicates that some plurality of things is being referred to. The difference between the interpretations of plural STATE-IONs and plural EVENT-IONs plays a role: the former licence the application of the *-operator only on $\lambda s.\mathcal{Q}_c(contents(s))$, the latter on both $\lambda e.\mathcal{Q}_c(contents(e))$ and e.g., $\lambda e.statement(e)$. For STATE-IONs, there is a plurality of experiencers, and a plurality of propositions generated from a quantized set of propositions (by assumption (vii) the proposition expressed by the complex complement can count as more than one for the purposes of counting). As before, the set of STATES is not quantized (assumption iv). Given this, such DPs can refer to pluralities of propositions, but there is no impetus to try to derive a quantized set of states via anchoring states to experiencers. Hence, *the complainants' beliefs that the ads were irresponsible and could encourage emulation by children* denotes a plurality of propositions, e.g., $pl_{\langle s,t\rangle}(\llbracket$the ads were irresponsible$\rrbracket) \sqcup pl_{\langle s,t\rangle}(\llbracket$the ads could encourage emulation by children$\rrbracket)$, and it suffices for each of these propositions to be believed by at least one of the complainants and for each of the complainants to believe at least one of those propositions (a cumulative reading). For EVENT-IONs, we have not only pluralities of propositions generated from a quantized set, but also pluralities of EVENTS generated from a quantized set (see 17). This allows for either of two different cumulative readings: individuation in terms of the propositions or individuation in terms of the events. Hence *the officials' statements that Iraq had weapon stockpiles and was close to having a nuclear weapon* can refer to either a plurality of propositions, each of which is the contents of at least one statement made by at least one official (such that each of the officials made a statement, individually or jointly, the contents of which was one of the propositions), *or* to a plurality of EVENTS, each of which was made by at least one of the officials and expressed a least one of the propositions (such that each of the propositions was stated by at least one of the officials).

Although, due to lack of space, we do not explicitly derive such cumulative truth conditions, we suspect an approach that closely tracks that of Schmitt and Haslinger (Haslinger and Schmitt, 2019; Schmitt, 2019) for sentences involving propositional attitude verbs such as *Alex, Billie and Charlie believe that p, q, and r* would be fruitful.

5 Concluding remarks

This paper brings together a number of different major topics in semantics: the count/mass distinction, telicity, plurality, and cumulativity and distributivity. Interestingly, the understudied class of abstract nouns seems to be a rich vein in which to explore the interactions of these topics. In order to try to make sense of the data, we have argued that a couple of theoretical

ingredients are crucial. First, that individuation, grounded in an extensional property such as quantization, must be sensitive to context such that what counts as one proposition or eventuality in some contexts may count as many in others. Second, that the aspectual class of verbs from which abstract nouns are derived impacts individuation. Put roughly, for STATE-IONs, if a proposition denoting reading is available, it will be the default reading. Individuating states (done indirectly via, e.g., Experiencer anchoring) will be a strategy of last resort. In contrast, for EVENT-IONs, if the combination of the number marking on the ION and the complexity of the complement allows it, we can as happily individuate the events as we can the propositions involved. Third, indeed the complexity of propositional complements seems to play a huge role in how we individuate propositions and eventualities denoted by IONs. This is surprising, from a semantic point of view, since the distinction cast here between simplex and complex complements is fundamentally one of form: a simplex complement can express the same proposition *qua* set of possible worlds as a complex one, and yet whether we view this proposition as one or many in the context of use turns on the words that we use, not merely on what they mean.

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