Informational Object Nouns and the mass/count distinction
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1 Introduction. This paper provides a novel contribution to the small but growing literature on the countability of abstract nouns (Ns) ([2, 6, 11, 12], i.a.). Abstract Ns have so far been largely set aside in semantic theories of the mass/count distinction, which focus on, the more tractable, concrete Ns denoting material objects or stuff. Given the heterogeneity of abstract Ns [2, 12], here we focus on one lexical subclass, which we call Informational Object Ns (IONs). What needs to be explained is why some IONs are straightforwardly countable (e.g., three statements/beliefs/facts), they are count, but others are not (#three informations/knowledges), they are mass. We draw on theories of the mass/count distinction developed for concrete Ns, especially on the semantics of Collective Artefact Ns (CANs), e.g., furniture, equipment, and jewellery, which we argue share certain grammatical properties with IONs. Moreover, we use the type-generalised mereological approach in [7, 8] which can accommodate, e.g., sums of propositions as well as the more familiar sums of entities. We also appeal to the semantic stative/episodic distinction which, perhaps surprisingly, turns out to be one factor in determining what interpretations are available for some IONs in counting constructions.

2 Diagnostics for Informational Object Ns (IONs). We provide corpus evidence that IONs pass both the following tests, while other Ns do not: If N is an ION, then (i) N that is true/false is felicitous (truth-evaluability); (ii) N that p is felicitious (propositional complementisers, e.g., Alex’s belief that it’s raining). In contrast, Ns like feeling are not IONs, because they pass the complementiser test (ii) (e.g., the feeling that I have forgotten something), but they fail test (i) (e.g., that feeling was true is odd, if true is intended in its truth-value sense, and not in the genuine, real sense). Neither are concrete Ns like book, article IONs: even if they are felicitous in collocations like this article is true (understood as meaning that its content is true at a given world/time), they fail test (ii).

3 Data. Abstract IONs share with concrete CANs considerable cross-linguistic variation in their mass/count lexicalisation patterns (Table 1). Moreover, when CANs and IONs are lexicalised as mass Ns, they resist mass-to-count coercion (1a, 2a), in contrast to other mass Ns (1b, 2b):

<table>
<thead>
<tr>
<th>Mass</th>
<th>Count (PLNOM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>furniture</td>
<td>furniture, meubilair (Dutch)</td>
</tr>
<tr>
<td>jewellery</td>
<td>jewellery, Schmuck (German)</td>
</tr>
<tr>
<td>footwear</td>
<td>footwear, Schuwerk (German)</td>
</tr>
<tr>
<td>information</td>
<td>information</td>
</tr>
<tr>
<td>evidence</td>
<td>evidence</td>
</tr>
<tr>
<td></td>
<td>meubel(s) (Dutch), huonekalu(t) (Finnish)</td>
</tr>
<tr>
<td></td>
<td>taxˇsit(im) (Hebrew), kora(t) (Finnish)</td>
</tr>
<tr>
<td></td>
<td>jalkine(et) (Finnish)</td>
</tr>
<tr>
<td></td>
<td>Beweis(e) (German), todiste(et) (Finnish)</td>
</tr>
</tbody>
</table>

Given that we assume that all IONs have a sense that denotes propositions, what we need is a notion of a unified mereological sum (⊔) operation over different semantic types (minimally, for entities of type e and propositions of type ⟨w, t⟩). For this, we use Schmitt [7, 8] who assumes,
for each Domain $D_a$ a bijection function $pl_\alpha$ on the powerset of $D_a$ to the set of singularities and pluralities for that domain, $PL_a$:

\[ pl_\alpha : (\mathcal{P}(D_a) \setminus \emptyset) \rightarrow PL_a \]

So we have a homomorphism between the set $\mathcal{P}(D_a)$ and the set $PL_a$ for any type $a$. Sums in $PL_a$ are defined in terms of set union at the level of subsets of $\mathcal{P}(D_a)$ mapped back ‘up’ to $PL_a$. The mereological part relation ($\subseteq$) is likewise specified in terms of the subset relation. For $a, b \in PL_a$:

\[ a \cup b = pl_\alpha (pl_\alpha^{-1}(a) \cup pl_\alpha^{-1}(b)) \]
\[ a \subseteq b \iff pl_\alpha^{-1}(a) \subseteq pl_\alpha^{-1}(b) \]

In effect, what this means is that we have domains for what is assumed to exist in the model, the power sets of which are isomorphic with Boolean semilattices minus the bottom element (one for each semantic type). This is, therefore, a departure from classical extensional mereology that assumes sums at the level of the domain.

Recent analyses of CANs [1, 4, 5, 9, 10] treat mass CANs as predicates which overspecify what counts as ‘one’ in their denotation, such that, if not resolved, this overspecification yields a failure of grammatical countability. For count CANs, it has been proposed that overspecification is removed, because count Ns generally encode a requirement for a contextually salient schema of individuation that quantizes the predicate [1]/makes the predicate disjoint [4, 5, 9, 10] (quantized in the sense of [3]):

\[ QUA(P) \leftrightarrow \forall x, y[(P(x) \land P(y)) \rightarrow \neg x \sqsubseteq y] \]

Importantly, across different schemas of individuation, IONs like belief overspecify what counts as ‘one’, similarly as CANs do. For example, (7) and (8) can be viewed as truth-conditionally equivalent, even if what counts as one belief in (7) overlaps with what counts as two separate beliefs in (8):

(7) Alex’s belief that Paris is in France and Madrid is in Spain is true.
(8) Alex’s beliefs that Paris is in France and Madrid is in Spain are true.

Building on [1], we assume: (i) while mass CANs (jewellery) specify non-quantized sets of objects for counting, mass IONs (information) specify non-quantized sets of propositions for counting; (ii) while count CANs (koru ‘items of jewellery’, Finnish) specify quantized sets of objects for counting relative to each context, count IONs (Informationen ‘pieces of information’, German) specify quantized sets of propositions relative to each context.

Formally, for a context $i$, count ION lexical entries contain a function $Q_i$ such that $Q_i(X)$ is a maximally quantized subset of $X$.

\[ X \subseteq_{\text{max, QUA}} Y \iff X \subseteq Y, QUA(X), \forall Z \subseteq Y[Z \supseteq X \land QUA(Z) \rightarrow Z = X] \]

For belief(s), for instance, the sets are sets of sets of possible worlds mapped via $pl_w$ (i.e., $pl_w(\mathcal{P}(D_w))$, so $Q_i$ ensures the relevant set is quantized, and so suitable as the input for a grammatical counting operation (see (10-11) below).

When it comes to individuation presupposed by grammatical counting, for propositions, which we take is the denotation of all IONs, what seems to matter is whether we view them as contents of mental states or as what is (also) conveyed by speech acts. We give simplified lexical entries for belief, statement, and knowledge in (10)-(12). Consider first our (simplified) lexical entry for the singular count ION belief (10). The predicate of mental states belief is stative (individual-level). Given that generally such stative predicates are odd with modifiers referring to specific locations in time and space, they cannot be individuated relative to space and/or time, and neither, as we argue, relative to particular belief-holders, i.e., Experiencer participants. The criterion of individuation which is needed for grammatical counting derives from the set of propositions themselves ($pl_w(\mathcal{P}(D_w))$) which form a quantized set due to the function $Q_i$. Contrast this with the entry for statement in (11) which is polysemous between two count concepts. In its speech act-related meaning (11a), it is episodic (stage-level), as it sanctions modifiers referring to specific
locations in time and space, and it denotes a set of eventualities, each of which is the extension of a speech act performed by an agent. Consequently, we can count these eventualities via anchoring them (cf. [2]) to their corresponding, different, speech acts even if the contents of these speech acts is the same. Alternatively, given that statement can refer to contents, i.e., to propositions (11b), one can count distinct propositions conveyed by statements (speech acts), even if they are the product of some larger speech act-related event (e.g. The President made several statements in one long, meandering tirade.). In effect, our treatment of belief in (10) and statement in (11) amounts to the claim that some IONs have more than one sense or use, each associated with a different criterion of individuation in counting constructions, depending on whether the criterion of individuation comes from their episodic or stative sense.

The lexical difference between count IONs (belief, statement (10,11)) and mass IONs (knowledge (12)) is captured by the presence (count) or absence (mass) of the Qi function in their lexical entries. The lexical entry for knowledge (12) resembles that of belief minus the Qi, but plus (minimally) a veridicality constraint that the proposition is true at every world in the common ground. (12) exemplifies a lexical entry for a mass ION, it lexically specifies no criterion of individuation. (For clarity of presentation, we suppress the applications of pl and pλ−1 in the formulas below.)

\[
\text{[belief]}' = \lambda x. \lambda p. \exists s [\text{belief}(s) \land (exp(s))(x) \land Q_i(\text{contents}(s))(p)]
\]

\[
\text{[statement]}' = \begin{cases} 
(a) \lambda x. \lambda e. [\text{statement}(e) \land (agent(e))(x) \land (\text{contents}(e))(p)] \\
(b) \lambda x. \lambda p. \exists e [\text{statement}(e) \land (agent(e))(x) \land Q_i(\text{contents}(e))(p)]
\end{cases}
\]

\[
\text{[knowledge]}' = \lambda x. \lambda p. \exists s \forall w \in CG [\text{knowledge}(s) \land (exp(s))(x) \land (\text{contents}(s))(p) \land p = 1]
\]

Although the entry in (10) is satisfactory if experiencers are drawn only from the domain of single individuals, in our full paper, we also discuss complications arising from pluralities of experiencers. Beliefs are sharable, so just as one can say Alex and Billie’s mother with the inference that the individual referred to is the mother of both Alex and Billie, one can also say Alex and Billie’s belief that p with the inference that the belief referred to is the belief of both Alex and Billie. The same is not true for mass nouns, both concrete and abstract. Neither Alex and Billie’s flour nor Alex and Billie’s knowledge implies that there is one amount of flour/knowledge possessed by Alex and Billie (even though this possibility is not excluded). The entry in (10) does not yield this result, hence we need the entry in (13), mutatis mutandis for other count IONs.

\[
\text{[belief]}' = \lambda x. \lambda p. \exists s [\text{belief}(s) \land (\ast (exp(s)))(x) \land \forall s' \forall y (\text{belief}(s') \land (exp(s')))(y) \land s' \subseteq s \land y \subseteq x) \land Q_i(\text{contents}(s'))(p)]
\]

The entry in (13) requires that, given a plurality of experiences and an i closing of the p λ-bound variable, each of the belief states of each of the experiencers must have the same content, p.

In summary, a major methodological and theoretical consequence of our approach is that we can make inroads into the analysis of abstract Ns by extending models developed for concrete Ns (pace common pretheoretic claims that concrete and abstract Ns require entirely different semantic models), and do so parsimoniously via applying concepts anyway needed to characterise countability for concrete Ns and the distinctions between stative/episodic predicates of eventualities.