Counting Aggregates, Groups and Kinds:
Countability from the Perspective of a
Morphologically Complex Language

Scott Grimm & Mojmír Dočekal

1 Introduction: Towards Understanding Countability

Understanding countability necessitates understanding the relation between morphosyntax and lexical semantics in nominals. What, if anything, in a noun’s meaning impinges on its ability to appear in different morphosyntactic contexts related to counting and/or measuring? Or in the other direction, how do morphosyntactic contexts impinge on the possible interpretations of a noun? An explanation of countability must show how countability distinctions arise, from morphosyntax or lexical meaning or from a combination thereof, and be predictive of grammatical number systems both generally and in particular languages.

A variety of proposals on the relation between morphosyntax, lexical meaning and countability have been put forth which occupy various positions along the spectrum of possible answers—from arguing that lexical
meaning simply does not influence countability patterns (see Borer 2005 i.a.) to arguing that lexical meaning fully determines countability patterns (Wierzbicka, 1988; Wisniewski et al., 2003). The evidence for which analysis is best come from natural language data, of course, and consequently the choice of which languages to discuss will pre-determine the range of tenable conclusions about the nature of countability.

This paper, primarily exploring data from Czech, puts the focus on languages which have a morphologically rich nominal system. Importantly, in such systems, various interpretations may be given morphological expression which in less morphologically rich languages are only contextually available and often difficult to tease apart from other interpretations. In our case, Czech disposes of complex cardinal expressions which permit explicitly counting different types of entities beyond just those at the object-level, such as aggregates, groups and kinds. The greater complexity of the system of cardinal expressions has broad implications, since it muddies one of the clearer diagnostics of countability, the combination of nouns with cardinal expressions (named the “signature property” of non-countable nouns by Chierchia 2010). For Czech, certain nouns may combine with some cardinal expressions yet not others, and accordingly be “countable” in different ways.

The data from Czech will also bear on several specific choice points facing theoreticians of countability when constructing an analysis. First, what elements serve as the ontological foundations of countability? Second, is one countability category, e.g. non-countable, more basic than another? Third, to what extent is countability lexically-specified as opposed to dependent on pragmatic context? We provide initial discussion of each of these questions
The early theory of Link (1983) took the count-mass distinction to be a lexical contrast grounded in a basic ontological distinction between atomic and non-atomic entities, from which the syntactic patterns of countability followed. From this starting point, researchers have taken more and less parsimonious positions. Chierchia (1998a, 2010), for instance, takes a more parsimonious position wherein all nouns derive from a common ontological sort: all nouns have an atomic domain, but mass nouns, due to their inherent vagueness, impede the ability to refer to the atomic parts. On the other hand, Grimm (2012) accepts an ontological contrast between atomic entities and substances, and further argues that even more ontological contrasts are needed than just the one between atomic and non-atomic (substance) reference, namely reference to aggregates, e.g. for nouns such as ‘hair’ or ‘foliage’.

Czech provides more evidence that nominal roots may be ontologically richer than the individual/substance contrast which has garnered the most attention in the literature. This is in part due to the complex cardinals mentioned, which directly target several ontological sorts (aggregates, groups and kinds), but also due to derivational morphology which observably derives aggregates, which form a sub-class of non-countable nouns in Czech with particular properties.

A related, yet slightly different question facing theories of countability is what to take as basic and what to derive. Countable and non-countable nouns could have equal status, or one class could be derived from the other. For Borer (2005), again an example of a parsimonious theory, all nouns begin
as mass or “stuff”, then are given further structure in syntax through the application of functional heads. To anticipate, the Czech system provides a complicated data point for theories where one class of nouns is derived from the other.

The final choice point that we will track is the relation between nominal interpretation and context as relevant for countability. The core question is how does the meaning of a word impinge on its ability to appear in different contexts, if at all? In English, famous shifts in meaning have been attributed to operations knowing as ‘grinding’, ‘packaging’, and ‘sorting’ (see Pelletier 1979; Bunt 1985, i.a., demonstrated with examples (1), (2) and (3) from Bach (1986). For these cases in English, erstwhile countable nouns appear as non-countable (as in (1)), and vice versa (as in (2) and (3)), given suitable context.

(1) a. There was dog splattered all over the road.
   b. Much missionary was eaten at the festival

(2) ice-creams = ‘portions of ice-cream’

(3) muds = ‘kinds of mud’

While the existence of contextual shifts is uncontroversial, their importance for theories of countability is a matter of ongoing debate. Some researchers have taken nominal flexibility to be a foundational property of countability (Borer, 2005; Chierchia, 2010; Pelletier and Schubert, 2004), which dovetails with the data in English. On the other hand, there are serious questions as to how well the flexibility data in English carries over to other languages.
A valuable set of recent studies, including Dalrymple and Mofu (2012) on Indonesian, Lima (2014) on Yudja and Deal (To appear) on Nez Perce, have reported on languages with restricted morphological means to grammatically code number distinctions which simultaneously permit a large degree of nominal flexibility. In these languages, canonical mass nouns, like mud or blood, may be counted when appearing in contexts which license such interpretations. Although the authors have not settled whether in these languages there is a lexically encoded distinction between countable and non-countable nouns or not (see discussion in Deal To appear), these studies have greatly added to our knowledge about how such languages function.

Examining Czech, which uses rich inflectional and derivational morphology coding countability, provides a counterpoint study. As will become clear, Czech presents the opposite behavior than theories that emphasize flexibility would predict: while Czech possesses rich number morphology, it manifests very limited nominal flexibility. More generally, we seek to provide evidence bearing on a larger question: as the syntax and morphology varies from language to language, how does this affect the distribution of labor between pragmatically available senses and morpho-syntactically specified senses?

This paper is organized as follows. In section 2, we introduce the core countability data from Czech, including the basic diagnostics as well as derivational morphology and complex cardinals. To the best of our knowledge, even this basic data has not received any substantial attention in the countability literature. Further, as we have foreshadowed, the data itself already provide directions towards answering some of the questions brought up here, and as we will return to in section 3. Sections 4 and 5 develop a
formal analysis of Czech’s nominal countability system data, providing an extended investigation of how the different semantic distinctions are parceled out to different parts of the morphosyntax. Altogether, this exploration of countability in a morphologically rich language advances the understanding of the interplay between morphosyntax, lexical meaning and countability.

2 Countability in Czech: The Core Data

Czech, as with the majority of Slavic languages, is an SVO language possessing rich inflectional and derivational morphology. Czech lacks overt articles and nominal phrases that appear bare can be interpreted in various ways, including definite, indefinite or generic interpretation. The interpretation of bare nouns in Czech has been investigated in connection with lexical aspect (Dayal 2004, Filip 1999, Krifka 1992 among many others), although we only mention this in passing as it falls outside of this paper’s main focus.

Czech manifests the familiar distributional contrasts for notionally countable and non-countable nouns. For instance, pes ‘dog’, a prototypical count noun, intuitively denotes individual dogs. Such nouns can be pluralized, as shown in (4-b), and also may combine both with cardinal numerals, as shown in (4-c) and (4-d). Cardinal numerals vary in their syntactic category, being adjectives for cardinal numbers 1,2,3 and 4 as in (4-c) and nouns for cardinal numerals 5 and greater as in (4-d). Countable nouns also combine with determiners such as mnozí ‘many’, which is a vague adjectival determiner agreeing with the noun it modifies in both case and number.
Bláto ‘mud’ is a prototypical non-countable noun, denoting a substance. As shown in (5), these nouns cannot be pluralized, nor do they combine with cardinal numerals or with determiners such as ‘many’. However, these nouns do combine with certain determiners, such as všechno, roughly equivalent to English ‘all’, which requires singular agreement on the noun, shown in (6).

(4) a.  
   pes  
   dog.SG  
   ‘dog’ 

b.  
   psi  
   dog.PL  
   ‘dogs’ 

c.  
   dva psi, tři psi  
   two dog.PL, three dog.PL  
   ‘two dogs’, ‘three dogs’ 

d.  
   pět psů  
   five dogs.GEN.PL  
   ‘five dogs’ 

e.  
   mnozí psi  
   DET  dog.PL  
   ‘many dogs’ 

(5) a.  
   bláto  
   mud.SG  
   ‘mud’ 

b.  
   *bláta  
   mud.PL  
   ‘muds’ 

c.  
   *dvě bláta, tři bláta  
   two mud.PL, three mud.PL  
   ‘two mud’, ‘three mud’
For certain prototypical non-countable nouns, such as *voda ‘water’, Czech also allows packaging, as witnessed in (7-a). Yet, the ability for non-countable nouns to be used as countable nouns with a packaging interpretation is highly constrained, typically only found in idiosyncratically licensed instances. Establishing a parallel to (7-a) with *písky ‘sand’ in (7-b) fails: even when speakers are given a background scenario in which a quarry sells different packages of sand to builders, Czech native speakers reject (7-b) and deem it unnatural.

(7) a. mnohé vody už byly
many.NOM.PL waters.NOM.PL already were.PL
vyprodané
sold.PAST.PART
‘many bottles of water were already sold out’

b. #mnohé písky už byly
many.NOM.PL sands.NOM.PL already were.PL
vyprodané
sold.PAST.PART
‘many packages of sand were already sold out’

So far, the nominal classes that can be isolated through distributional
tests match up with expectations derived from English and other Western European languages. Yet, the data in Czech is far more involved. The remainder of this section explores the various types and interpretations of nouns, made visible through complex morphology on both nouns and cardinal numerals, and then turns to consider the issue of nominal flexibility. Through its derivational morphology, Czech identifies entity types critical to understanding countability, but which have garnered less discussion in the literature than the individual/substance distinction, namely derived non-countable aggregates (list-ı ‘foliage’), and complex numerals which count groups (dvoj-ice ‘a group of two’), connected clusters (dvoje hranolky ‘two collections of French fries’) and taxonomic kinds (dvojí metr ‘two kinds of measure’). We discuss each in turn.

2.1 Derived Aggregates

In addition to nouns which we consider to be lexically non-countable, Czech possesses derivational morphology, the suffix -ı³, which derives non-countable nouns. Representative examples from several semantic domains, which are restricted to be inanimate, are given in table 1. The semantic effect of -ı upon a noun $N$ may be informally stated as yielding ‘a collection of $N$’, although some of the examples illustrate that an even more specific semantics may be necessary.

Nouns derived with -ı are strongly non-countable. Unlike the root noun from which they are formed, nouns derived by -ı do not pluralize nor combine

³There are several variant forms of -ı, such as -oví, which as far as we can discern, do not differ semantically.
### Table 1: Non-Countable Nouns Derived by ľ

<table>
<thead>
<tr>
<th>Noun</th>
<th>Gloss</th>
<th>Derivational Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stromoví</td>
<td>‘clump of trees’</td>
<td>strom ‘tree’</td>
</tr>
<tr>
<td>boroví</td>
<td>‘clump of pine trees’</td>
<td>borovice ‘pine tree’</td>
</tr>
<tr>
<td>habroví</td>
<td>‘clump of hornbeam trees’</td>
<td>habr ‘hornbeam tree’</td>
</tr>
<tr>
<td>olšoví</td>
<td>‘clump of alder trees’</td>
<td>olše ‘alder tree’</td>
</tr>
<tr>
<td>vrboví</td>
<td>‘clump of willow trees’</td>
<td>vrba ‘willow tree’</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>listí</td>
<td>‘foliage’</td>
<td>list ‘leaf’</td>
</tr>
<tr>
<td>rákosí</td>
<td>‘rushes’</td>
<td>rákos ‘reed’</td>
</tr>
<tr>
<td>trní</td>
<td>‘thorns, brambles’</td>
<td>trn ‘thorn’</td>
</tr>
<tr>
<td>jahodí</td>
<td>‘clump of strawberry plants’</td>
<td>jahoda ‘strawberry’</td>
</tr>
<tr>
<td>lískoví</td>
<td>‘clump of hazel bushes’</td>
<td>líška ‘hazel tree’</td>
</tr>
<tr>
<td>maliní</td>
<td>‘clump of raspberry plants’</td>
<td>malina ‘raspberry’</td>
</tr>
<tr>
<td>ostružní</td>
<td>‘clump of blackberry plants’</td>
<td>ostružina ‘blackberry’</td>
</tr>
<tr>
<td><strong>Complex Objects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cihloví</td>
<td>‘brickwork’</td>
<td>cihla ‘brick’</td>
</tr>
<tr>
<td>krajkoví</td>
<td>‘lacework’</td>
<td>krajka ‘lace’</td>
</tr>
<tr>
<td>lažkoví</td>
<td>‘fence (made from laths)’</td>
<td>lažka ‘lath/slat’</td>
</tr>
<tr>
<td>nádobí</td>
<td>‘dishes’</td>
<td>nádoba ‘container’</td>
</tr>
<tr>
<td>síloví</td>
<td>‘netting/nets’</td>
<td>síl ‘net’</td>
</tr>
<tr>
<td><strong>Nautical Terms:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lanoví</td>
<td>‘rigging/ropes’</td>
<td>lano ‘rope’</td>
</tr>
<tr>
<td>plachtoví</td>
<td>‘sails’</td>
<td>plachta ‘sail’</td>
</tr>
<tr>
<td>ráhnoví</td>
<td>‘spars’</td>
<td>ráhno ‘spar’</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dříví</td>
<td>‘firewood’</td>
<td>dřevo ‘wood’</td>
</tr>
<tr>
<td>kamení</td>
<td>‘rocks’</td>
<td>kámen ‘rock’</td>
</tr>
</tbody>
</table>
with simple cardinal numerals or vague quantifiers, as shown in (8-a)\(^2\), nor do they permit coerced interpretations in a countable form, as shown in (11), unlike lexically non-countable nouns such as vody ‘water’.

(8) a. list-í-m
    leaf-í-INST.SG
    ‘foliage’

    b. *list-í-mi
    leaf-í-INST.PL
    ‘foliages’

(9) a. dva list-í
    CARD.Masc leaf.Masc.PL
    ‘two leaves’

    b. *dvě list-í
    CARD.Neut leaf-í.Neut
    ‘two foliages’

(10) *mnohé list-í už spadly
    many leaf-í already fell.PL
    ‘many foliage already fell’

(11) *břízy a smrky shodily mnohé listí
    birches and spruces shed.PL many leaf-í
    ‘birches and spruces shed many foliage’

As the examples in table 1 indicate, the derived nouns implicates multiple elements designated by the root noun, i.e. a clump of pine trees implicates multiple pine trees. Further, the properties of nouns by derived by -í pattern with plural nouns, as they are cumulative \((list-í + list-í = list-í)\) and non-divisive, since their are atomic parts for which divisiveness does not hold,

\(^2\)Since case syncretism often obscure the morphological patterns in Czech, we often present nouns in the instrumental case which is morphologically more transparent.
i.e., parts of list-ı are list-ı but not parts of list ‘leaf’.³

Yet, the meanings derived by -ı contrast strongly with ordinary plural meanings. As the glosses given in table 1 express, the resultant meaning of nouns derived by -ı is not simply a set of, e.g., pine trees, but a set in which the members are coherently related, most often by spatial proximity, in the case of clumps of trees or plants, or functional interdependence, as in the case of lanovı where it is not the individual ropes at issue, but their coherent organization as part of a ship’s rigging. Similarly, cihlovı, derived from cihla ‘brick’, does not signify a random collection of bricks, rather they must be related in some manner, for instance, used together in an architectural motif.⁴

Additionally -ı is not nearly as productive as one would expect if it were only to signal plurality. As the examples in (13) demonstrate, the ability to derive new nouns with -ı is limited.

(13)  a. *stol-ı

    table.ı

    ‘collection of tables’

³For reference, we present definitions of predicates which are cumulative, divisive and atomic (relative to a property) in (12).

(12)  a. Cumulative(P) = [P(x) ∧ P(y) → P(x ⊔ y)]

    b. Divisive(P) = ∀x[P(x) → ∀y[y < x → P(y)]]

    c. Atomic(x,P) ↔ P(x) ∧ ¬∃y[y < x ∧ P(y)]

⁴We confirmed these intuitions by examining uses of -ı nouns along with their related images on the internet. For instance, in one illustrative example, the noun cihlovı designates various clusters of bricks used in an architectural pattern, differentiated by colors. (https://www.novinky.cz/bydleni/tipy-a-trendy/240130-karnevalove-vile-rekonstrukce-vratila-puvodni-rozverny-styl.html)
b. *kabát-í
   jacket.í
   ‘collection of jackets’

c. *planet-í
   planet.í
   ‘collection of planets’

Given these observations, the non-countability, at least in terms of object-
level countability, of derived aggregates is expected, since these nouns do not
simply designate entities, but coherently related groupings of entities. As
will be seen in detail in section 2.2.2, Czech provides morphological mecha-
nisms for counting precisely these more complex composite entities.

2.2 Complex Numerals

Czech, like other Slavic languages, possesses simple cardinal numerals, such
as those shown in (14), but also morphologically derived complex numerals.

(14) a. tři psi
    three dogs
    ‘3 dogs’

b. tři hrnky
   three cups
   ‘3 cups’

This section lays out the basic data from complex numerals in Czech, through
which speakers make reference to groups, aggregates, and taxonomic kinds.
2.2.1 Derived group numerals

We first examine the complex numeral derived with the suffix -ice, which we term group numerals. In contrast with simple numerals, complex numerals derived with -ice obtain an interpretation of “group of n Xs”, such as “group of three sailors” given in (16-b). Complex numerals formed with -ice are semantically restricted to combining with animate nouns.5

(16) a. tři námořníci
   three sailors
   ‘3 sailors’

   b. troj-ice námořníků
      three.ICE sailors.GEN
      ‘a group of 3 sailors’

The complex numeral formed with -ice may occur in both singular and

5Khrizman (2015) discusses a similar type of complex cardinal number in Russian, the collective numeral. Some properties are shared by the Russian collective numeral and by the Czech group numeral. First, both types of numerals favor a “collective” interpretation, and second, Russian collective numerals are also restricted to combine with animate nouns (more specifically, the nouns must denote humans or young animals). Yet, there are many important distinctions between the Russian collective and Czech group numerals. Most critically, Russian collective numerals allow distributive and cumulative readings, while such readings are simply unacceptable for Czech group numerals. The Czech examples in (15-a) and (15-b) witness this fact. In (15-a), the obligatory distributive marker po clashes with the collectivity of the numeral, resulting in the sentence being unacceptable. In (15-b), the sentence has only collective-distributive interpretation: the group of three sailors has been lost twice (in different harbors). The cumulative interpretation, e.g. Sailor A has been lost in a harbor 1 and Sailors B and C have been lost in a harbor 2 is unacceptable. Consequently Czech group numerals seem to be a clear case of group interpretation unlike Russian collective numerals. This is formalized in section 5.2 accordingly.

(15) a. *Trojice námořníků vyhrála po litru rumu.
   three.ICE sailors won.3SG.F DIS liter rumu.GEN
   ‘A group of three sailors won a liter of rum.’

   b. Trojice námořníků se ztratila ve dvou přístavech
      three.ICE sailors REFLEX lost.3SG.F in two harbors
      ‘A group of three sailors has been lost in two harbors.’
plural, as shown in (17).

\[(17)\]  
a. \(s\) troj-icí<\textit{INST.SG} námořníků  
with three.<\textit{ICE.INST} sailors.<\textit{GEN}  
‘with group of three sailors’  
b. \(s\) troj-ice-mi<\textit{INST.PL} námořníků  
with three.<\textit{ICE.INST} sailors.<\textit{GEN}  
‘with groups of three sailors’

Complex numeral phrases formed through the application of \(-ice\) can be further quantified over with cardinal numerals, as shown in (18). Further, they are compatible with the vague adjectival determiners \textit{mnozí} ‘many’, as shown in (19). At the same time, unlike simple cardinal numerals, the use of \(-ice\) derived numerals is incompatible with the singular universal quantifier \textit{všechno} ‘all’, as shown in (20).

\[(18)\] dvě troj-ice námořníků  
two three.<\textit{ICE} sailors.<\textit{GEN}  
‘two groups of three sailors’  

\[(19)\] mnohé troj-ice námořníků  
many three.<\textit{ICE} sailors.<\textit{GEN}  
‘many groups of three sailors’  

\[(20)\] *všechna troj-ice námořníků  
all three.<\textit{ICE} sailors.<\textit{GEN}  
‘all group of three sailors’

Accordingly, counting groups through complex numerals only shows a partial match on the diagnostics of countability present for simple cardinal numeral, or countable nouns for that matter. The other complex cardinals,
to which we now turn, also show only partial matching, but in different fashion than the group numerals.

2.2.2 Complex Numerals for Aggregates

The suffix -oje combines with cardinal numeral roots to designate a number of collections of an entity. For instance, applied to the cardinal numeral root dv- ‘two’ yields dv-oje, which roughly translates to ‘two collections’. Examples are given in (21).

(21) a. dv-oje karty
    two.OJE card.PL
    ‘two sets of cards’

   b. dv-oje klíče
    two.OJE key.PL
    ‘two rings/sets of keys’

   c. dv-oje boty
    two.OJE shoe.PL
    ‘two pairs of shoes’

   d. dvoje schody
    two.OJE stair.PL
    ‘two staircases’

This complex numeral is quite restricted in the sorts of nouns it may combine with, primarily pluralia tantum, entities that typically come together in multiples, and nouns derived by -í. Examples of each type are shown in (22)-(24), respectively. There is clearly a lexical semantic theme concerning which nouns may combine with -oje numerals, namely the nouns must designate entities which are sets of individuals that typically come together or are “connected” to one another in some manner.
(22) | PLURALIA TANTUM: dveře ‘doors’, housle ‘violins’, brýle ‘glasses’

(23) | ENTITIES THAT TYPICALLY COME TOGETHER IN MULTIPLES: sirky ‘matches’, hranolky ‘french fries’, schody ‘stairs’

(24) | NOUNS DERIVED BY -í: nádobí ‘dishes’, dříví ‘firewood’, kamení ‘rocks’

Attempts to apply -oje to nouns outside of these restricted class result in infelicities, as given (25).

(25) a. ??dvoje stoly
two.OJE table.PL
‘two sets of tables’
b. ??dvoje kabáty
two.OJE jacket.PL
‘two sets of jackets’

Unacceptability further results from combining -oje numerals with všechny ‘all’ as in (26) or with simple cardinals as in (27).

(26) a. ??všechny dvoje housle
DET two.OJE violin.PL
‘all two sets of violins’
b. ??všechny dvoje klíče
DET two.OJE key.PL
‘all two sets of keys’

(27) a. *tři dvoje klíče
three two.OJE key.PL
‘three two sets of keys’

b. *tři dvoje dveře
   three two.OJE key.PL
   ‘three two sets of doors’

Thus, the sort of object delivered by combination with an aggregate numeral is not one that can be further counted, at least in a standard manner.

2.2.3 Taxonomic numerals

The final type of complex numeral is derived with the suffix -ojí and yields taxonomic plurals, i.e. a “different kinds” reading. This complex numeral is syntactically parallel to -oje. Applying -ojí to the cardinal numeral root dv- ‘two’ yields dv-ojí, which roughly translates as ‘two kinds’. Examples of nouns are given in (28). Note that sýry ‘cheese’ in example (28-b) does not combine with ordinary cardinals, and by that diagnostic is uncountable.

(28) a. dv-ojí život
two.OJI life
   ‘two kinds of life’ (as in a Jekyll and Hyde scenario)

b. dv-ojí sýry
two.OJI cheese
   ‘two kinds of cheese’

c. dv-ojí tvář
two.OJI face
   ‘two faces’ (as in a Janus face)

Unlike the previous two complex numerals, the nouns with which -ojí combines are not as restricted. Still, there are some noun types for which usage is more usual than for others, namely liquid and substance nouns, pluralia
tantum and abstract nouns. Examples of each type are shown in (29)-(31), respectively.

(29) **LIQUID AND SUBSTANCE NOUNS:** krev ‘blood’, víno ‘wine’, sýr ‘cheese’

(30) **PLURALIA TANTUM:** housle ‘violin’, šaty ‘dress’

(31) **ABSTRACT NOUNS:** život ‘life’, metr ‘measure’, občanství ‘citizenship’

Similarly to what was found with complex aggregate numerals derived by -oje, further combination with všechny ‘all’ or simple cardinals is disallowed, as shown in (32) and (33), respectively.

(32) a. *všechny dvojí sýry* 
   DET two.OJI cheese
   ‘all two kinds of cheese’

   b. *všechen dvojí život* 
   DET two.OJI life
   ‘All two kinds of life’

(33) a. *tři dvojí sýry* 
   three two.OJI cheese
   ‘three two kinds of cheese’

   b. *deset dvojích životů* 
   ten two.OJI lives
   ‘ten two kinds of life’

Having set out the data for complex numerals in Czech, we now turn to examining the ability of nouns in Czech to shift their interpretation as a
function of the context.

2.3 Nominal flexibility

In comparison with a language such as English, the grammatical elements impacting countability and nominal interpretation in Czech are far more elaborate. At the same time, the interpretative possibilities of nouns appears to be more impoverished than in English. At issue is the reduced number of interpretations a noun licenses.

As discussed at the beginning of this section, packaging is permitted in Czech, if there is sufficient conventional use associated with the object at issue. Yet, two other operations frequently claimed to be “universal”, namely the Universal Grinder (Pelletier, 1979) and the Universal Sorter (Bunt, 1985), do not operate in Czech.

“Grinding” appears to be broadly rejected by Czech native speakers. The examples in (34) and (35) provide standard grinding contexts in Czech, the first providing a “splattered animal” context and the second providing an “animal-as-food-product” context. Both are anomalous in Czech. 6

(34) #Po celé silnici byla kráva.
    on whole road was cow
    ‘There was cow all over the road.’

(35) #V salátu bylo prase.
    in salad was pig
    ‘There was (a) pig in the salad.’

6We tested these sentences with 32 native speakers of Czech recruited from Masaryk University. The first sentence was only accepted as a mass interpretation by 2 of the 32 and only 8 out 32 consented to a mass interpretation.
The interpretation of plural nouns as referring to “different kinds” of the relevant noun is similarly rejected. As shown in (36), although packaging interpretations may be derived when erstwhile non-countable nouns are pluralized, taxonomic plural interpretations are not licensed. Nor are more complicated interpretations involving kinds available, i.e. *vypili jsme pět piv* in (37) cannot mean we drank a total of 10 beers, 2 bottles each of 5 kinds.

(36) Vypili jsme dvě vín.
drank-we AUX two wines
‘We drank two (bottles of/*kinds of) wines.’

(37) Vypili jsme pět piv.
drank-we AUX five beers
‘We drank five (bottles of/*kinds of) beers.’

We now take stock of the implications of Czech’s nominal system for theories of countability.

3 Interim Discussion

All theories of countability have at their core a claim of what countability is about. By measuring the claims of different theories against the Czech data, we can work towards narrowing down the space of theoretical possibilities. We focus on three issues: (i) whether nouns are ontologically uniform or multi-sorted, (ii) the nature of aggregates, and (iii) the trade-off between a language’s potential for nominal flexibility and its capacity for expression through morphology.

To gain insight into the first issue, we consider what it means within
different theories to be non-countable and then compare that conjecture with the non-countable nouns derived by -í. In brief, we will show that the Czech data poses challenges for theories in which there is one overarching explanation of how (non-)countability arises. In particular, these explanations falter when extended to account for the second form of non-countable nouns in Czech derived by -í.

First we consider the theory of Borer (2005) for which all nouns begin as non-countable, and then through combination with a functional head, e.g. Div0, may become countable. Two facets of the Czech system in conjunction undermine this claim: the lack of grinding and the nouns in Czech derived by -í. Instead, the opposite trajectory is observed. Non-countable aggregate nouns such as listí ‘foliage’ begin as nominal roots for which there is only evidence that they are fully countable nouns, i.e. list only has a countable interpretation and no effects from ‘grinding’ may be observed. Through combination with morphology, these nouns become then non-countable, which is exactly opposite of the prediction in Borer (2005). This is not to say that the system in Borer (2005) could not altered to account for the immediate data under consideration, in the way that others have expanded her system to account for different countability phenomena (De Belder, to appear; Mathieu, 2012). Rather, the phenomenon of -í nouns in Czech stands in contradistinction to the conceptual predictions of Borer (2005).

Similar unmet expectations are found when considering how the data aligns with the theory of Chierchia (1998b, 2010), for which non-countable nouns differ from countable ones in that non-countable nouns designate enti-
ties for which the atomic parts are vague. Applying this line of reasoning to
-ı nouns would also be counterintuitive, since the parts, designated by the
derivational source, e.g. list- ‘leaves’, are non-vaguely atomic and fully count-
able. One would have to argue either that the semantic contribution of -ı
brings about vagueness into the derived forms, or that there is a secondary
cause for non-countability. In either case, this subclass of non-countable
nouns would go against the grain of the explanation of non-countability in
Chierchia (1998b, 2010).

More generally, the subclass of non-countable nouns derived by -ı pro-
vides a strong argument that non-countability may arise from more than one
source. Accordingly, theories for which there is a single path of explanation
that gives rise to (non-)countable interpretations are simply not expressive
enough. In other words, the domain of nominal meaning is not of a single
ontological sort, but many-sorted, containing at least substances and what
we have termed aggregate nouns, those derived by -ı, the nature of which
we turn to now.

Granting the existence of aggregates nouns as separate from substance
nouns, many questions remain about their nature. Again, measuring the
theoretical possibilities by the Czech data proves illuminating.

The grammatical number system Czech forces the recognition of (i) ag-
gregate nouns as a distinct class, both through devoted derivational mor-
phology (-ı) and through a devoted complex numeral, and (ii) a stronger
notion of aggregate than is often employed. The first point dovetails with
increasing acceptance in the literature of at least three types of nouns,
substance non-countable, aggregate non-countable and individuals. For in-
stance, Bale and Barner (2009) and Deal (To appear) both explicitly set out to model those three noun types. Despite increasing recognition of two sorts of non-countable nouns, the data from Czech implicates a more specific semantics than is usually given in the analysis of nouns such as *furniture* or *footwear* in English. First, in those models, aggregate nouns are essentially treated as akin to plural nouns but for the inclusion of atoms, technically speaking as atomic join semi-lattices. Second, even though theories such as Barner and Snedeker (2005) or Bale and Barner (2009) do recognize aggregate nouns as a distinct class, they analyze them through lexical fiat, i.e. the non-countable status of such nouns is idiosyncratic. For these accounts, extending such a treatment to -ı nouns leaves their regularity and lexical semantic cohesion unexplained. Why should these particular nouns, and not others, receive such distinguished morphological treatment?

As shown in 2.2.2, Aggregate Numerals, complex numerals derived with -oje, apply to nouns derived by -ı, pluralia tantum nouns, and also certain morphologically regular plural nouns which designate entities that typically come together in multiples. Assuming that there is some form of semantic selection, then there should be a common denominator among these noun types. Analyzing aggregates as akin to plurals however does not provide enough discriminatory power to bring this to the fore. Since morphologically regular plurals and aggregates are selected for by Aggregate Numerals, the common denominator would be individuated lattices, but this would over-generate since then any plural noun should be able to combine with Aggregate Numerals, contrary to fact. Instead, our semantics must distinguish entity types for whom its members canonically co-occur, as is the case

24
Finally, we turn to considering the nature of nominal flexibility, which we argue requires a more nuanced view. The countability literature has often put forth that the possible interpretation of nouns is unrestrained, in that every countable noun can find a non-countable use, and vice versa, as is most clearly articulated in Pelletier and Schubert (2004) or Borer (2005). What then should be made of Czech’s limited flexibility? Under such a view, an interpretation as a taxonomic plural should be licensed when conceptually possible, yet, the taxonomic plural is systematically absent as an interpretation of ordinary plural nouns. The cause for this discrepancy is obvious: Czech has morphology devoted to expressing precisely this interpretation. Similarly, grinding with bare singular nouns is absent in Czech. Again, there is a plausible reason for this: unlike in English, Czech does not have articles, so bare singular nouns already serve a role in Czech.

The broader implication is that the potential for nominal flexibility in a given language is likely to correspond to distinctions not already expressed within the morphosyntax of nominals in that language. That is, the lexical semantics of nouns manifest structure that is coordinated with what is expressed in the grammatical structure.

4 A Formal Treatment of Czech’s Grammatical Number System

We now turn to examining how to integrate Czech’s nominal system within a formal analysis of countability. We develop an analysis in an extended
version of the theory of Krifka (1995). The system in Krifka (1995) provides a useful starting point since it develops explicit representations of several ingredients to the semantics of countability, such as taxonomic reference and a notion of “natural units”. This stands in contrast to several other theories, mentioned in passing, committed to a parsimonious view on the semantics underpinning countability. As such, it provides an expressive framework for accounting for the set of distinctions present in Czech. Even so, after presenting the basic components of the theory of Krifka (1995), we still must further develop a variety of extensions to the system in section 5 in order to fully account for the data.

4.1 Nominal Semantics in Krifka (1995)

Krifka (1995) integrates two lines of research on nominal semantics. On the one hand, building on Link (1983) and Krifka (1989), the domain of objects is structured according to the basic principles of mereology, and as such models nominal meaning as complete semilattice structures lacking the null element. On the other hand, it builds on the work on generics, in which nominal meaning includes both reference to objects and reference to kinds (Carlson, 1980; Krifka et al., 1995; Zamparelli, 1999; Müller-Reichau, 2006). Krifka (1995) proposes a revision to kind-based nominal semantics that we will adopt: instead of kinds, the broader category of concepts is used, of which kinds are special subset. The two levels of nominal meaning are related by a realization relation R between concepts and the instances of the concept at the level of objects. That is, the referential use of dog is tied to the realizations of the concept dog, i.e. the instances of a concept.
A second relation, discussed in Krifka (1995), is a taxonomic relation \( T \) holding between kinds/concepts and their subkinds or subconcepts, where the subkind reading of dogs would correspond to “different types of dogs”, such as beagle or chihuahua. The basic meaning of a noun in this system is given in (38), which gives “the property of being a specimen or subspecies, or an individual sum of specimens or subspecies” (Krifka 1995, p. 399). In (38), \( i \) is a variable of type \( s \) ranging over possible worlds—in what follows, we will simplify by extensionalizing the representations.

\[
(38) \quad \lambda y_k \lambda i \lambda x_o \left[ R_i(x_o, y_k) \lor T(x_o, y_k) \right]
\]

Given (38), an entity may satisfy the predicate dog in two ways. First, if it is an individual dog, or a plural individual composed of dogs, which are objects related to the kind dog by the realization relation \( R \). (In (38), variables ranging over object-level entities are subscripted with \( o \), while variables ranging over kind-level entities are subscripted with \( k \).) Second, the predicate may be satisfied on the taxonomic reading, where the entity must be an individual subkind of dog (chihuahua) or sum of subkinds, which are related to the kind dog by the taxonomic relation \( T \).

Krifka’s account further includes measure functions to model expressions such as two liters or five ounces. More pertinent for us, partly based on an analogy with classifier languages, Krifka considers countable nouns, e.g. in English, to have a built-in measure function that counts “natural units” relative to the kind that the noun names. Countable nouns under this account are two-place relations between numbers and entities, while non-
countable nouns are one-place entities, as exemplified by contrasting the
lexical entries for *dog* and *gold* in (39-a) and (39-b), respectively. Krifka then
explains that there are two criteria of applicability at work: one which is
“qualitative” and represented by the nominal predicate, viz. *gold* or *dog*, and
a second which is “quantitative”, represented by a “natural unit” measure
function. Thus, the OU (“object unit”) operator provides a measure, \( n \), of
the number elements of which qualify as instances of the kind.

\[
\begin{align*}
(39) \quad \text{a.} & \quad \ interpretations := \lambda x[R(x, \text{Dog}) \land \text{OU(Dog, } x \text{) } = \ n] \\
\text{b.} & \quad \ [\text{gold}] := \lambda x[R(x, \text{Gold})]
\end{align*}
\]

Returning to issues of countability, the difference between countable and
non-countable entities in Krifka’s theory is not due to any intrinsic sortal
distinction present in the entities themselves, i.e. objects vs. substances,
but is relative to particular predicates in a given language. Higher-order
properties such as cumulativity are then specified for particular natural lan-
guage predicates rather than as properties of the model. For instance, the
predicate *gold* is translated as a cumulative predicate \( \text{CUM}_o(\text{gold}) \) and per-
haps as a divisive predicate too, \( \text{DIV}_o(\text{gold}) \). One outcome of this view
is that the same entity may be described by different predicates, which in
turn have different countability statuses, without contradiction. That is, the
same element of the semi-lattice may, for instance, be described both by a
predicate designating atomic individuals (*table*) and a predicate designating
substances (*wood*).

This system then asserts two differences between countable and non-
countable nouns at the lexical level: (i) the satisfaction of the properties such as cumulativity or quantization and (ii) whether there is a built-in natural unit measure function, the OU operator. Clearly the second property hinges on the first to some extent, and we will simply focus on the occurrence of the OU operator.

The general theory of nominal reference outlined so far is able to account for the basics of nominal reference in Czech as well. The statements in (40) represent singular countable nouns, plural countable nouns, the use of a simple cardinal numeral, and a non-countable noun, respectively.

\[(40)\]

\[\begin{align*}
    \text{a. } & \text{ } [\text{pes}] = \lambda x [R(x, \text{Dog}) \land \text{OU}(x) = 1] \\
    \text{b. } & \text{ } [\text{psi}] = \lambda x [R(x, \text{Dog}) \land \text{OU}(x) \geq 2] \\
    \text{c. } & \text{ } [\text{2 psi}] = \lambda x [R(x, \text{Dog}) \land \text{OU}(x) = 2] \\
    \text{d. } & \text{ } [\text{prach}] = \lambda x [R(x, \text{Dust})]
\end{align*}\]

As we now show, this account also extends straightforwardly to the taxonomic interpretations of nominals in Czech as well.

4.2 Taxonomic Interpretations and Numerals

Krifka (1995) analyzes nouns in English as able to refer equally to objects, which are realizations of a kind via the realization operator \(R(x,k)\) or to taxonomic subkinds, which are specimens of a kind via the taxonomic operator \(T(x,k)\). Yet, as was shown in section 2, non-countable nouns in Czech do not manifest a taxonomic plural reading, as was seen in (36), repeated here as (41).
We analyze nominals in Czech as only disposing of the realization operator $R$, but not of the taxonomic operator $T$. Accordingly, the base template for nominal meaning in Czech is (42) (cf. English common nouns given in (38)).

\begin{equation}
\lambda y \lambda x_o[R(x_o, y)]
\end{equation}

The taxonomic operator $T$ is instead found in the meaning of the complex taxonomic numerals derived by -oji. The lexical entry for the derivational suffix -oji is given in (43), designating “different kinds”.

\begin{equation}
[-oji] = \lambda n \lambda k \lambda x[\exists Y[\forall z(z < x \land T(z, k) \rightarrow z \in Y) \land |Y| = n]]
\end{equation}

This ensures, for example in (44), that when combining with a numeral, here dv- ‘two’, and a noun, here víno ‘wine’, which happens to be non-countable at the object-level, the resulting cardinal phrase designates a set of subkinds of wine whose cardinality is 2.

\begin{equation}
[dvojí víno] = \lambda x[\exists Y[\forall z(z < x \land T(z, Wine) \rightarrow z \in Y) \land |Y| = 2]]
\end{equation}

A further welcome result is an explanation of the oddity when combining taxonomic numerals with uniquely denoting noun phrases, as in (45-a), and with proper names, as shown in (45-b).
(45)  a. #dvojí noha tohoto stolu  
    two.OJI leg this table  
    ‘two kinds of this table’s leg’

b. #dvojí Petr Novák  
    two.OJI Petr Novák  
    ‘two kinds of Petr Novák’

We now turn to aspects of Czech’s nominal system which require an extension to this basic framework.

5 Extending the Framework: Groups and Aggregates

The last section demonstrated that, with some minor modifications, Krifka (1995) can be successfully used to treat the basic cases of nominal semantics as well as taxonomic numerals. Yet, in order to cope with the data arising from group numerals and from aggregates in Czech, more substantial extensions are required. We first enrich the system with groups in the sense of Landman (1989) to account for group numerals, and then with mereotopology in the sense of Grimm (2012) to account for aggregates.

5.1 Group numerals

The system of Krifka (1995) does provide a method to analyze certain types of group nouns, such as herd, making uses of measure functions. As shown in (46), the measure function counts groups in the same way it counts atomic objects.
While this analysis is adequate for the data discussed in Krifka (1995),
the derived collective numerals in Czech require a different analysis. In
particular, counting with the aid of group numerals involves counting both
at the level of the number of groups and the number of individuals inside the
groups. As was shown in (18), repeated here as (47), -ice assigns a cardinal
value to the members of the groups (troj-ice námořníků ‘a group of three
sailors’), which themselves can be counted.

(47) dvě troj-ice námořníků
two three-ice sailors.GEN
‘two groups of three sailors’

Accordingly, an analysis of these complex numerals will both need to
contribute a generalized way to deliver a semantics which groups objects
and counts the number of objects in the group. A straightforward solution
is to augment the schema of Krifka (1995) with the group shifting operator
↑ from Landman (1989). Unlike the other complex numerals, -ice is the
head of the noun phrase and takes a genitive argument describing the group
members, i.e. as sailors.

We analyze -ice, shown in (48), as first combining with a number, which
feeds the OU operator, and then the property provided by the genitive
argument. A minimal example is given in (49), where the application of dv-
‘two’ and then mužů to -ice results in the meaning ‘a group of two men’.

(46) \[[\text{three herds of cows}] = \lambda x [R(x, \text{Cow}) \land \text{Herd(Cow,x)} = 3]\]

(47) dvě troj-ice námořníků

two three-ice sailors.GEN

‘two groups of three sailors’

(48) \[-ice = \lambda n \lambda P \lambda x [\uparrow (P(x)) \land OU(P,x) = n]\]
This meaning is again fully countable, designating a singular individual or atom, but in the domain of groups. In particular, the meaning given in (49) can be itself be pluralized, as well as counted by means of standard cardinal numbers, where, for instance, the meaning of $2$ dvojice mužů consists of the set of two groups of two men.

5.2 Aggregate numerals and derived mass nouns

The derived aggregate nouns and complex numerals which count aggregates require further extensions to Krifka (1995) and the adoption of theory of aggregate nouns. First, the derived aggregate nouns and complex numerals for aggregates discussed in section 2, unlike the other phenomena discussed here, showed severe restrictions. The derivational suffix -í only applied to restricted set of nouns, while the complex numerals for aggregates only applied to connected entities, which in turn could be morphologically encoded in the noun, as with -í derived nouns or pluralia tantum, or due to nouns meaning, they proffer such a connectedness relation, as in the case of schody ‘stairs’, which typically come in multiples.

We build on the account of Grimm (2012) to provide a semantics for aggregate nouns in Czech. Grimm (2012) provides a topological extension of mereology in part to treat non-countable aggregate terms in English such as (sand or foliage) as well as to treat morphologically recognized collective/singulative classes in languages such as Welsh. The principle tool is to add connectedness relations to the standard mereological framework. While
topological extension of mereology in Grimm (2012) relates to such core
topics in countability such as how to define atoms and substances, we only
discuss the portion of the account relevant for the Czech aggregate data.

Central to extending mereology with topological relations is including a
relationship of connectedness. The intuitive definition of being connected
is that two entities are connected if they share a common boundary. Including
a definition of connectedness then interacts with the different definitions
and axioms of standard mereology, as discussed in detail in Casati and Varzi
(1999).

We consider first the basic relation $C$, connected, which is required to
be reflexive and symmetrical, given as axioms in (50) and (51). There are
some further intuitive interactions with the mereological relations $\text{part}$, $\leq$, and $\text{overlap}$, $O$, that Casati and Varzi (1999) note. First, the axiom in (52)
ensures that parthood implies connectedness. From (52) the relation in (53)
follows, whereby overlap implies connectedness.

\begin{align*}
(50) & \quad C(x,x) \text{ (Reflexivity)} \\
(51) & \quad C(x,y) \to C(y,x) \text{ (Symmetry)} \\
(52) & \quad x \leq y \to \forall z(C(x,z) \to C(z,y)) \\
(53) & \quad O(x,y) \to C(x,y)
\end{align*}

Connectedness can come in a variety of strengths. Two more specific
varieties of connectedness relevant for aggregate noun semantics are external connectedness, when two entities touch on their boundaries, notated
as $C_{ext}(x, y)$ and PROXIMATE CONNECTEDNESS, when two entities are sufficiently near relative to some distance $d$, $C_{prox}(x, y)$. We now turn to apply this extended system to aggregates in Czech.

5.2.1 Derived mass nouns

We now give a semantics to the morpheme -i, whereby it applies to a root noun and returns a connected set of individuals, which we will term a “cluster individual”, described by a root noun. We first define a transitive connection relation in (54). In prose, $x$ and $y$ are transitively connected relative to a property $P$, a connection relation $C$, and a set of entities $Z$, when all members of $Z$ satisfy $P$ and $x$ and $y$ are connected through the sequence of $z_i$s in $Z$.

(54) $\text{TransitiveC}(x, y, P, C, Z) = \forall z \in Z[\text{TransitiveC}(z_1, z_2, P, C, Y)]$

“Cluster individuals”, relative to a property and connection type, are defined in (55) as a set of entities of the same type connected to one another by virtue of each being transitively connected to the others (through a set $Y$ relative to the same property and connection relation).

(55) $\text{Cluster}(x, P, C) = \exists Z[x = \bigoplus Z \forall z, z' \in Z \exists Y[\text{TransitiveC}(z, z', P, C, Y)]]$

With the additional topological machinery, we are now able to give a semantics to -i. We analyze -i nouns as aggregate nouns which refer to
cluster individuals, that is listí ‘foliage’ refers to connected clusters of leaves and combinations thereof. For -í-derived nouns, the relevant connectedness relation is proximate connectedness, i.e. all the individual leaves, or alder trees and other examples from table 1, must be spatially close to one another (to a degree relevant for the noun at hand). Importantly, this is a stronger condition than just being a plural individual, and distinguishes the meaning of -í-derived nouns from simple plural meanings. As given in (56), the morpheme -í applies to the root (designating the kind) and returns the connected clusters. As no individual objects are at issue, the OU operator is existentially bound.

\[ [-í] = \lambda k \lambda x \exists n[R(x, k) \land x \in CLUSTER \land OU(k, x) = n] \]

The semantics given here delivers on the nouns’ properties as discussed in section 2. Since the OU operator is existentially bound, it follows that these nouns resist pluralization and counting with basic cardinal numerals, since composition with such elements would fail. Unlike typical non-countable nouns such as water which allow contextual shifts to countable uses by adding a contextually specified measure function which counts units, -í-derived nouns resist contextual shifts to countable uses since the OU operator is already part of the denotation, it cannot be supplied from context. Finally, the application of -í was seen to have severe lexical restrictions. The given analysis, which results in cluster individuals, is constrained to apply just to those nouns which describe entities which do come in connected sets, which is a much more restricted class of entities than those to which, e.g.,
plural morphology would legitimately apply.

Although the analysis just given is, we argue, sufficient to account for the core facts concerning -í nouns, we note that there is clearly more to be said to give a full account of the special semantics of terms such as lanoví ‘rigging/ropes’ (< lano ‘rope’) or krajkoví ‘lacework’ (< krajka ‘lace’). Mere spatial connectedness of a set of ropes is not sufficient for them to constitute a ship’s rigging, since, e.g., the ropes must of the appropriate types and organized in the fashion required as specified with respect to the function of rigging on a ship. We, however, leave such intriguing details to the side on this occasion.

5.2.2 Complex Numerals for Aggregates

Armed with a semantics for -í-derived nouns, we now return specifying the semantics for the complex numerals for aggregates -oje. As the complex numerals count -í-derived nouns, they clearly count cluster individuals; however, complex numerals for aggregates cannot count arbitrary cluster individuals, as there may be many such clusters in a given connected set: cluster individual of \(n\) alder trees will of course contain many smaller cluster individuals of alder trees, \(n - 1\) and so on.

Instead, the complex cardinals for aggregates count maximal clusters, defined in (57), which are then disjoint. We then employ maximal clusters, notated MaxCluster, in our semantics for oje given in (58).

\[
(57) \quad \text{MaxCluster}(x,P) = \exists C[\text{Cluster}(x,P,C) \land \forall y(\text{Cluster}(y,P,C) \land O(y,x) \leftrightarrow y \leq x)]
\]
\[
[-oje] = \lambda n \lambda P \lambda x [P(x) \land \exists Y \forall z (z < x \land MaxCluster(z, P) \rightarrow z \in Y) \land |Y| = n]
\]

-\textit{oje} first combines with a numeral, similarly to the other complex numerals, and then with noun, whose denotation is filtered to just the maximal clusters of the specified cardinality. As such, the semantics arrives at a representation of -\textit{oje} numerals already given in traditional grammatical descriptions of Czech, that they count just objects which are somehow connected. Further, this explains the contrast given in (59), where -\textit{oje} is infelicitously used with a noun which does not designate connected entities.

(59) #Petr viděl na dvorku dvůje psy.
    Petr saw on yard two.OJE dogs
    ‘Peter saw two sets of dogs in the yard.’

The complex cardinals for aggregates can count derived nouns like \textit{listí} ‘foliage’ which directly supply maximal clusters, as well as nouns such as \textit{hranolky} ‘french fries’, \textit{karty} ‘cards’ or \textit{klíče} ‘keys’ which regularly occur in connected sets, and thus also supply clusters, although we leave it open here whether this is lexically specified. The semantics is exemplified for \textit{hranolky} ‘french fries’ in (60).

(60) \[\langle dv-oje hranolky \rangle = \lambda x [\text{Fry}(x) \land \exists Y \forall z (z < x \land MaxCluster(z, \text{FRY}) \rightarrow z \in Y) \land |Y| = 2]\]

Other uses of -\textit{oje} numerals indicate that it can be used even when a noun’s semantics does not include (maximal) clusters in its denotation. The
example in (61) shows an instance where -oje counts entities described by a non-countable noun which has been coerced into a packaging reading, where the packages are themselves complex objects for which the number of objects is further specified.

(61) dvoje vody po šesti
    two-OJE water DIST six
    ‘two packages of water, each consisting of six bottles’

Thus, -oje numerals are at once compatible with nouns which provide the appropriate semantic type, cluster individuals, but may also impose such an interpretation on nouns which do not standardly designate it.

6 Outlook

This paper has shown that much work remains in order to gain a fuller understanding of the relation between morphosyntax and lexical semantics in nominals. Ultimately, this should aid us in understanding the causal foundations of countability: why do languages make the countability distinctions that they do? Simply understanding which countability distinctions are made across languages is an undertaking in itself. Czech has demonstrated that aggregates, groups and taxonomic kinds can be counted in their own right, and in turn, this has implications for theories of countability as many more noun types need to be accounted for than parsimonious theories of noun meaning would predict. Further investigations will undoubtedly discover more distinctions, and even within Slavic languages there is much more variation than needs to be investigated and understood.
More broadly, we have made the case that increased attention to languages with complex nominal morphology are valuable for gaining insight into countability. In this paper, we have argued that the restricted interpretative possibilities of bare nouns in Czech with respect to countability are a function of the richer interpretative possibilities that are overtly expressed in morphology. It remains to be seen how well this generalizes typologically.

References


