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Object mass nouns and subkind countability

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We argue for a novel cross-linguistic definition of object mass nouns—e.g. *furniture, equipment*—which accommodates the observation that some can combine with numerals to count subkinds. The primary observation comes from Hungarian, where counting subkinds with object mass nouns was not found to be more marked than with count nouns or substance mass nouns—e.g. *három készlet* ('three stock) can refer to three kinds of products to the same extent as *három termék* ('three products'), and it was not found to be more marked than *három sör* ('three beers') referring to three kinds of beer. This differs from English and Dutch, where object mass nouns are uncountable altogether, i.e. they cannot count objects or subkinds (Cowper & Hall 2012; De Belder 2013; Grimm & Levin 2017; Rothstein 2017; Sutton & Filip 2018). We argue for a definition that distinguishes object mass nouns from count nouns in the ability to refer to objects in count morphosyntax, thus leaving open the possibility of counting subkinds. Lastly, we suggest that general number (Corbett 2000; Paul 2012) is a necessary (but insufficient) condition for a language to have object mass nouns that can count subkinds.

1. Introduction

To get to the heart of a linguistic category, its stable properties must be teased apart from its unstable ones. This paper is about the category of object mass nouns—e.g. *equipment, furniture*—which Erbach (2020) identifies across languages via the properties that (i) they are mass nouns that (ii) range over to objects. That these nouns are mass is seen via a number of combinatorial properties, such as (1) not combining directly with numericals[1] to count discrete objects, and (2) not combining directly with *every* and *several* (Rothstein 2010).

(1)   *three furniture(s)   [Intended: 'three pieces of furniture']

(2)   *{several, every} furniture(s)

That object mass nouns range over objects despite the infelicity in (1)–(2) was empirically demonstrated by Barner & Snedeker (2005), who showed that they are judged according to the cardinality of discrete objects in quantity comparison tasks, while other mass nouns—e.g. *mustard, toothpaste*—are judged according to volume. While this identification of "objects" has been compared to the ability of pre-linguistic infants to distinguish solid objects from non-solid substances as in Soja et al. (1991), we take a theory-neutral stance to the characteristics of objecthood, though we assume that it can be distinguished via semantic tests like those of Barner & Snedeker (2005).

Studies like Erbach (2020) have used the aforementioned properties to identify object mass nouns in typologically distinct languages: Greek, Hungarian, and Japanese. However, a crucial omission of Erbach (2020) is that object mass nouns in English cannot combine directly with numericals to count subkinds (henceforth 'can(not) count subkinds'), but substance mass nouns can—e.g. *three juices: apple, orange, and grape*—(references in Section 2.3).[2] A pertinent question is whether this property is stable. We give a negative answer with novel data from Hungarian, where nascent evidence suggests that, on average, object mass nouns can count subkinds to the same extent as count nouns and substance mass nouns. Thus, it seems that the inability to count subkinds is not a stable property of object mass nouns, and it can be maintained that their sole stable properties are (i) the inability to count objects which (ii) are nevertheless semantically accessible (e.g. in cardinality comparison).[3]

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[1] We follow Filip and Sutton (2017, p. 351) in distinguishing *numericals* as linguistic expressions (*one, two,* etc.) from *numerals* as mathematical objects (1, 2, etc.).

[2] Additional nouns with a mass interpretation that can receive a subkind interpretation are *virtue* (Carlson 1980, §7.6.1), *emotion* (Gillon 1999) and *crime* (Grimm 2016).

[3] See Section 4.4 for the suggestion that (i) should specify simplex (as opposed to composite) objects.

This paper is organized as follows. Section 2 reviews object mass nouns in English and Hungarian, Section 3 presents novel data regarding the ability of object mass nouns in Hungarian to count subkinds, and Section 4 discusses the implications of these data on previous analyses of countability in Hungarian and subkind-countability of object mass nouns. Section 4 also suggests that the difference between Hungarian and English is correlated with the former having general number (Corbett 2000; Paul 2012), and a novel definition of object mass nouns is offered.

2. Background

This section presents background regarding object mass nouns in English and Hungarian, the former being the language where this category has been most widely studied, and the latter being the source of novel data of subkind-countability. What will be seen in Section 2.1 is that the primary properties of these nouns are (i) grammatically mass behavior, and (ii) reference to discrete individuals (i.e. 'objects') in certain semantic tests. In Section 2.2, we will review the state of the art of research on object mass nouns in Hungarian. In Section 2.3, another property of object mass nouns in English will be discussed, namely lack of subkind-countability, thereby suggesting an additional way of distinguishing them from count nouns and substance mass nouns which we reject in the next sections, thus contributing to the consolidation of the category of object mass nouns.

2.1 The primary properties of object mass nouns

The class of object mass nouns is one of several notional classes that make the count–mass distinction challenging to capture formally (Chierchia 1998; 2010; Rothstein 2010; Landman 2011; 2020; Sutton & Filip 2016). Substance mass nouns like *mud, juice,* and *water* refer to substances, and these nouns are identified as mass because certain instances of the substances cannot be counted without a specified quantity (3).

(3)   a.   There were a few #(spots of) mud(#s) on my jeans.
         b.   I cleaned many #(drops of) juice(#s) off of the table.
         c.   I stepped in two #(puddles of) water(#s).

Alongside (3), substance mass nouns can count subkinds and certain quantities (4)—e.g. *water* can count servings, bodies, samples or kinds of water.

(4)   a.   We ordered two waters, a juice and a Corona light.
         b.   The club's committee have secured access to The Lake of Tranquility at Leeswood, which comprises of two waters.
         c.   The two waters that showed greatest divergence between chemical and biological recovery both lay in close proximity within the strongly acidified region of Galloway. (Bray 2013)

    d.   The USP monograph lists two waters that are prepared in bulk form: Purified Water (PW) […] and Water for Injection (WFI).
        [servings, bodies of water, samples or kinds][4]

Object mass nouns—e.g. *equipment, furniture, clothing*—require a classifier to count objects (5), although these objects can be counted with unmodified count nouns—e.g. *tools, chairs, shirts* (6).

(5)   a.   There were a few #(bits of) equipment(#s) in the truck.
        b.   I cleaned many #(items of) furniture(#s) after the flood.
        c.   I washed two #(pieces of) clothing(#s).

(6)   a.   There were a few tools in the truck.
        b.   I cleaned many chairs after the flood.
        c.   I washed two shirts.

What makes object mass nouns challenging to capture formally is that despite behaving like mass nouns grammatically, they refer to discrete objects rather than substances. The categories *object* and *substance* are loosely based on the notions of *solid object* and *non-solid substance* of Soja et al. (1991), where two-year-old children learned novel names for novel objects and non-solid substances, and were found to extend the names for objects to entities of the same shape and number, while names for non-solid substances were extended to entities of the same material.

    While Soja et al. (1991) established solid objects and non-solid substances as distinct pre-linguistic concepts, Barner & Snedeker (2005) established that object mass nouns are semantically distinct from substance mass nouns. They showed participants two quantities, one larger in volume and the other larger in cardinality of discrete objects, and participants were asked "Who has more X," where X was the noun referring to the entities being shown. What was found is that certain mass nouns—e.g. *mustard, toothpaste, chocolate, stone*—were judged in terms of volume rather than cardinality of discrete objects, while other mass nouns—e.g. *furniture, silverware*—were judged in terms of cardinality of objects rather than volume. Note that stones and chocolate bars are solid objects in the sense of Soja et al. (1991), but the corresponding mass nouns are assumed to be interpreted as substance mass nouns rather than object mass nouns. Under Barner & Snedeker (2005), object mass nouns are lexically encoded with an individuation operation that individuates countable objects, while substance mass nouns are not. Crucially, however, it is assumed that lexical individuation is not sufficient for being a count noun. Rather, count

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[4] (4a), and (4d) were retrieved on September 24 2020 from

https://www.yelp.com/menu/la-tapatia-martinez-5/item/chimichanga
http://www.processandwater.com/water-faqs/

(4b) was retrieved on July 13 2021 from

https://www.warringtonguardian.co.uk/sport/11065211.new-waters-for-lymm-angling-club/

nouns like *shoe* are syntactically individuated by elements like the indefinite article or plural morphology (Barner & Snedeker 2005).

In addition to cardinality comparison, it has been observed that object mass nouns are modifiable by "stubbornly distributive predicates"—i.e. size and shape adjectives like *round, long,* and *large*—while substance mass nouns are not (McCawley 1975; Rothstein 2010; Schwarzschild 2011; Landman 2020). Thus, it has been implicit in the literature that the defining properties of object mass nouns are (i) they are genuine mass nouns, meaning that they cannot occur in count morphosyntax (e.g. they cannot combine directly with numericals), and (ii) they refer to objects that are accessible to cardinality comparison and stubbornly distributive predicates. As mentioned above, Erbach (2020) takes these as the means for identifying object mass nouns across languages, including Greek (Alexiadou 2015), Japanese (Erbach et al. 2017; 2019), and Hungarian (Erbach 2021), the latter of which will be discussed in Section 2.2. Thus, the state of the art of characterizing object mass nouns is in (7), which is implemented on Hungarian in Section 2.2. Section 2.3 suggests a modification to (7b) (pertaining to subkinds) which is dismissed in Section 3, thus necessitating the modification to (7a) in Section 4.4.

(7)   Object mass nouns are distinct from
     a.   count nouns in that only the latter can occur in count morphosyntax.
     b.   substance mass nouns in the ability to
         i.   compare via cardinality of objects.
         ii.   combine with stubbornly distributive predicates.

2.2 Object mass nouns in Hungarian

Recently, the nominal system of Hungarian has garnered much attention because it has unit specifying "classifiers" that are optional for a large number of nouns (Csirmaz & Dékány 2014; Schvarcz & Rothstein 2017; Erbach et al. 2019). In counting constructions, count nouns that are not plural-marked can combine directly with numericals or a classifier can be used (8).

(8)   (Csirmaz & Dékány 2014, p. 150)
     a.   hét   (fej)   saláta
         seven CL_{head} lettuce
         'seven lettuces'

     b.   hét   (szem) cukor
         seven CL_{eye} candy
         'seven pieces of candy'

     c.   hét   (szál)   gyertya
         seven CL_{thread} candle
         'seven candles'

Two competing analyses of (8) have different implications for object mass nouns in Hungarian. One analysis is that the nouns in (8) are "flexible" in having both a strictly singular, countable denotation which combines with numerals, and an object mass denotation which is made countable via combination with classifiers (Rothstein 2017; Schvarcz & Rothstein 2017). Under this analysis, every object-denoting noun that can be counted with classifiers (which is the vast majority object-denoting nouns) has an object mass denotation in addition to a count denotation. The alternative analysis is that these nouns are unambiguously number-neutral, referring to singular, countable individuals and sums thereof (Farkas & de Swart 2010; Erbach et al. 2019), thereby explaining the lack of plural marking in counting constructions. To account for the optional classifiers, Erbach et al. (2019) propose that their function is to restrict counting to a particular sort—e.g. combining *fej* ('head') with *saláta* ('lettuce') restricts the counting to heads of lettuce, but combining *féle* ('kind') restricts the counting to kinds of lettuce. If Erbach et al. (2019) is accepted, then fewer nouns in Hungarian have object mass denotations.

Whichever aforementioned analysis is accepted, some Hungarian nouns have been found to unambiguously have object mass denotations. Three such nouns were elicited by Erbach (2021): *lőszer* ('ammunition'), *felszerelés* ('equipment'), and *csomagolás* ('packaging'). They cannot count objects in count morphosyntax such as direct composition with numerals, the WH-quantifier *hány* ('how many'), and plural morphology (9), thereby showing that they are mass nouns.

(9)   (Erbach 2021, p. 130–131)
    a. Három #(darab) lőszert   számoltam.
         three   piece   ammunition.ACC count.PST.1SG
         'I counted three pieces of ammunition.'

    b. #Hány   felszerelés van   a   táskádban?
         how.many equipment be.there DEF bag.POSS.2SG
        #'How many equipment are in your bag?'

    c. #csomagolás-ok
         packaging-PL
        #'packagings'

Erbach (2021) used contexts as in (10), which license comparison in terms of cardinality, to show that the nouns in (9) refer to objects despite their infelicity in (9). As in Barner & Snedeker (2005), where participants compared two sets of entities (one with a larger cardinality of objects but a smaller volume), the context in (10) does the same verbally, where a 9mm bullet is roughly 1/9th the volume of a 12-gauge shotgun shell.

(10)   (Erbach 2021, p. 131)
    a. Alex has three 9mm bullets for his pistol and Charlie has two 12-gauge shotgun shells.

b. Ki   rendelkez-ik több lőszerrel?
who have-3SG   more ammunition
'Who has more ammunition?'

Because *lőszer* ('ammunition'), *felszerelés* ('equipment'), and *csomagolás* ('packaging') are mass nouns that receive cardinality based judgments in quantity comparison tasks, Erbach (2021) concludes that they unambiguously have object mass denotations. This prompts the questions (i) whether additional such nouns exist, and (ii) whether they share all of the properties of object mass nouns in English. The next subsection presents a property in addition to those in Section 2.1.

2.3 Object mass nouns and subkind-countability in English

This section presents a property of object mass nouns in English that pertains to the subkind reading of nouns (Carlson 1980, §6.1, §7.6.1), also known as the taxonomic reading (Krifka et al. 1995, §1.3.3). This reading is part of the instance-subkind ambiguity, which is exhibited by *emotion* (Gillon 1999, §3.1), *crime* (Grimm 2016), *bird, weapon, game* and *wine* (11).

(11) a. i. <u>Moses the raven</u> is a **bird**.   *instance*
    ii. <u>Ravens</u> are a (widespread) **bird**.   *subkind*

    b. i. <u>Napoleon's sword</u> is a **weapon**.   *instance*
    ii. <u>Swords</u> are a (widespread) **weapon**. *subkind*

    c. i. <u>Greco–NN, London 1623</u> is a (chess) **game**. *instance*
    ii. <u>Chess</u> is a (widespread) **game**.   *subkind*

    d. i. <u>The liquid in this glass</u> is **wine**.   *instance*
    ii. <u>Merlot</u> is a (widespread) **wine**.   *subkind*

    e. i. <u>My love of semantics</u> is an **emotion**. *instance*
    ii. <u>Love</u> is a (widespread) **emotion**.   *subkind*

    f. i. <u>Cain's murder of Abel</u> is a **crime**.   *instance*
    ii. <u>Murder</u> is a (widespread) **crime**.   *subkind*

As early as Jespersen (1954, §5.211), it is noted in the countability literature that nouns with limited countability can, in fact, count subkinds (Baker 1978, §10, fn.1; Pelletier & Schubert 2002; Chierchia 1998, ex. 10; 2010, ex. 10; Doetjes 2012, §4.1). Put differently, nouns with the subkind reading can occur in (perhaps) any count morphosyntax, as (12) shows with *wine*. Because of such evidence, some have questioned whether countability is truly a property of nouns as opposed to DPs (see, e.g., Pelletier & Schubert 2002). For present purposes, it suffices to think of count morphosyntax as a set of contexts that affect the interpretation of the noun in a certain, countable way. Put differently, by "*wine* with count morphosyntax", we mean what Koslicki (1999) means by "count-occurrence of *wine*."

(12) a. Merlot is a wine.   *(a)n N_{SG}*
      b. Merlot is one wine that I like.   *one N_{SG}*
      c. Merlot and cabernet are two wines.   *two N_{PL}*
      d. Both wines are widespread.   *both N_{PL}*
      e. Several wines are widespread.   *several N_{PL}*
      f. A number of wines are widespread   *a number of N_{PL}*
      g. Each wine is widespread.   *each N_{SG}*
      h. Every wine is widespread.   *every N_{SG}*

While the subkind reading is available to *wine, emotion* and *crime,* it is not available to object mass nouns in English (13). Thus, these are counterexamples to Pelletier & Schubert (2002) writing that "there seems to always be a count sense (or use) for every (alleged) mass expression *M* which means *kind of M*" (p. 20), as is echoed in Chierchia (2010, ex. 10) and Doetjes (2012, §4.1). Indeed, this hypothesized universality belies Bunt's (1985, p. 11) term of the universal sorter. However, it is noted as early as Cowper & Hall (2012) that the object mass nouns *furniture, footwear* and *equipment* are counterexamples; (13) is based on their example 8, and similar contrasts are reported in Rothstein (2017, §4, ex. 45) and analyzed by Sutton & Filip (2018, §4.1).

(13) a. If there's one *(kind of) furniture I can't stand, it's bunk beds.
      b. Of all the {* furnitures, kinds of furniture} in the world, it's bunk beds.

In (13), *furniture* is compared to *kind of furniture*. One can also compare object mass nouns to count counterparts (if they exist), as Sutton & Filip (2018: ex. 5) do with *vehicle-transport* (14).

(14) The brief […] is to produce four {vehicles, * transports} ranging in size from the Ford Fiesta to the Vauxhall Cavalier.

Given (13)–(14), an additional property of object mass nouns in English is that they lack subkind-countability. This is puzzling, given that this ability is afforded to count nouns like *vehicle* and mass nouns like *wine, emotion* and *crime*. Thus, perhaps the characterization of object mass nouns in (7b) should be refined to accommodate this property (15b.iii).

(15) Object mass nouns are distinct from
      a. count nouns in that only the latter can occur in count morphosyntax.
      b. substance mass nouns in
          i.   the ability to compare via cardinality or objects.
          ii. the ability to combine with stubbornly distributive predicates.
          iii. the inability to count subkinds.

Before adopting (15b.iii), one should check whether it has the same putative stable status as (i)–(ii). For one, this property distinguishes between object and substance mass nouns in Dutch (16) (De Belder 2013, ex. 22, 25).

(16)   a. *een ondergoed/zilverwaar/huiswerk
        a   underwear/silverware/homework
        Intended: 'a (kind of) underwear, silverware, homework'

     b. een helder bier/water/vernis
        a   clear   beer/water/varnish
        'a clear (kind of) beer/water/varnish'

Although (15b.iii) holds in English and Dutch, we argue that it is not universal with novel data from Hungarian in Section 3. Thus, we contribute to the consolidation of the category of object mass nouns by arguing that (15b) should not replace (7b), rather that (15a) should be modified as detailed in Section 4.4 (object mass nouns are distinct from count nouns in that only the latter can refer to objects in count morphosyntax). Beforehand, the next section presents the critical data.

3. Data

The data for this project was gathered in two parts, one consisting of fieldwork and the second a questionnaire. The fieldwork resulted in finding object mass nouns in Hungarian in addition to *lőszer* ('ammunition'), *felszerelés* ('equipment'), and *csomagolás* ('packaging'). Consultant and reviewer judgments of sentences where object mass nouns count subkinds were mixed, so the conduction of a questionnaire was prompted. Section 3.1 details how nouns were found and determined to be object mass, and Section 3.2 details how it was determined that this class of nouns is not uniformly characterized as lacking subkind-countability.

3.1 Testing for object mass nouns in Hungarian

Elicitation sessions with one native speaking Hungarian adult consultant (born and raised in Hungary in a Hungarian speaking household in Budapest) were used to aggregate data on object mass nouns in Hungarian. Following the methodology for semantic fieldwork of Matthewson (2004), English was used as the meta-language for elicitation, including providing contexts for the target sentences which were constructed in Hungarian by the co-author conducting the fieldwork. Consultants were asked to judge sentences, including those in (18)–(20), containing the target nouns in count morphosyntax as either natural or unnatural.

To add to *lőszer* ('ammunition'), *felszerelés* ('equipment'), and *csomagolás* ('packaging') elicited by Erbach (2021), we elicited the 14 nouns in (17) by asking a consultant for Hungarian nouns that refer to the same objects as the English glosses. These nouns were targeted due to notionaly

referring to collections or groups of artifacts that share a common function or purpose. When cases were unclear (e.g. *tackle*), example referents were provided (e.g. fishing poles, lures, line, etc.). Attempts were made to elicit nouns for 11 additional sets of objects,[5] but no fitting nouns could be recalled by the consultant for the referents in question.

(17) a. ágynemű   ('bedding')   műanyagáru   ('plasticware')
          aprópénz   ('change')   porcelán   ('china')
          áru   ('merchandise')   ruházat   ('apparel')
          horgászfelszerelés ('fishing tackle')[6] sportruházat ('sportswear')
          készlet   ('stock')   üvegáru   ('glassware')

      b. papírmunka   ('paperwork')

      c. cserépedény   ('crockery')   leltár   ('inventory')
          műalkotás   ('artwork')

The 11 nouns in (17a-b) were found to be mass nouns according to data gathered in elicitation with the consultant using the following morphosyntactic tests: direct (no classifier) counting (18), composition with the plural morpheme (19), and composition with the count WH-quantifier *hány* ('how many') (20). Because these nouns were found to not felicitously refer to objects in these constructions, we conclude that they are mass. The three nouns in (17c), on the other hand, were not found to be mass in these tests.

(18) a. #Három papírmunká-t   számoltam.
          three   paperwork-ACC count.PST.1SG
          Intended: 'I counted three pieces of paperwork.'

      b. #Három (sport)ruházat-ot   számoltam.
          three   sport.apparel-ACC count.PST.1SG
          Intended: 'I counted three pieces of apparel/sportswear.'

      c. #Három horgászfelszerelés-t számoltam.
          three   tackle-ACC   count.PST.1SG
          Intended: 'I counted three pieces of tackle.'

(19) a. #Hány   készlet van?
          how.many stock   be
          Intended: 'How many pieces of stock do you have?'

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[5] The full list objects discussed: artwork, bakeware, beachwear, bedding, change, china, clutter, crockery, glassware, hardware, housewares, inventory, loot, merchandise, outerwear, paperwork, plasticware, rigging, seating, silver (referring to housewares made of silver), sportswear, stock, tackle, and teaware.

[6] An anonymous reviewer reports that *három horgászfelszerelést* ('three tackle.ACC') can refer to three sets consisting of a fishing rod, a few baits and a net. We return to this in Section 4.4.

b. #Hány   ágynemű van?
   how.many bedding be
   Intended: 'How many pieces of bedding do you have?'

c. #Hány   aprópénz van?
   how.many change   be
   Intended: 'How many pieces of change do you have?'

(20) a. #A   porcelán-ok drágá-k.
         the porcelain-PL expensive-PL
         Intended: 'The pieces of porcelain are expensive.'

      b. #Az   üvegáru-k   drágá-k.
         the glassware-PL expensive-PL
         Intended: 'The pieces of glassware are expensive.'

      c. #Az áru-k   drágá-k.[7]
         the merchandise-PL expensive-PL
         Intended: 'The pieces of merchandise are expensive.'

To test whether the 11 nouns in (17a-b) refer to individuated objects despite the infelicity in (18)–(20), we provided the consultant with contexts where they were asked to compare two sets of objects that can be referred to by the same noun. One set in each pair contained a larger cardinality of objects, and the other contained a larger volume (21).

(21) a. [Context: The shipment to H&M contains 50 sweaters and 50 pairs of jeans, while the shipment to Desigual contains 60 t-shirts and 50 pairs of jeans]
          Kinek   van több ruházat-a?
          who.DAT be   more apparel-POSS
          'Who has more apparel?'

      b. [Context: Max has three 200-mL containers, and Shannon has one two-liter container.]
          Kinek   van több műanyagáru-ja?
          who.DAT be   more plasticware-POSS
          'Who has more plasticware?'

The consultant made several observations about the available dimensions of comparison. First, it made the most sense to the consultant to compare *papírmunka* ('paperwork') in terms of the amount of work required rather than the number or volume of documents or sheets of paper. Second, in addition to comparisons in terms of cardinality, *aprópénz* ('change'), *áru*

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[7] An anonymous reviewer accepts *Ez-ek az áru-k nagyon drágá-k* as 'These pieces of merchandise are very expensive' while rejecting *három áru* 'three pieces of merchandise'. We return to this in Section 4.4.

('merchandise'), and *készlet* ('stock') could just as naturally be compared in terms of monetary value. For the other nouns, no dimension of comparison was volunteered other than cardinality.

In conclusion, the 10 nouns in (17a) were used in various examples of count morphosyntax, and these sentences were judged to be infelicitous in terms of reference to concrete objects (as opposed to subkinds), which can be taken as indication that they are mass nouns. All are comparable in terms of cardinality, so they can be classified as object mass nouns along with *lőszer* ('ammunition'), *felszerelés* ('equipment'), and *csomagolás* ('packaging'). The next subsection discusses the subkind-countability of this class of nouns.

3.2 Subkind-countability of object mass nouns in Hungarian

To test the subkind-countability of object mass nouns in Hungarian, we constructed a questionnaire to aggregate naturalness judgments from 30 Hungarian native speakers (born in Hungary and speaking only Hungarian at home at least until age 18). The questionnaire tested two conditions: counting objects and counting subkinds. Three classes of nouns were tested: count nouns, object mass nouns and substance mass nouns. The latter consisted of the 10 nouns in (22), and the first two consisted of the 10 pairs in (23), which differ in object-countability but have overlapping extensions (Wisniewski et al. 1996; Casey 1997).[8] The classification of the nouns in (23) with regards to object-countability was done in cooperation with the consultant who helped compose the materials for the questionnaire (different than that in Section 3.1). The two factors (noun class and counted entities) were not fully crossed for reasons we discuss below.

(22) acél ('steel') fa ('wood') sör ('beer') viz ('water')
　　 arany ('gold') homok ('sand') talaj ('soil')
　　 bor ('wine') kávé ('coffee') vér ('blood')

		object-uncountable		*object-countable*	
(23)	a.	ágynemű	('bedding')	takaró	('blanket')
	b.	áru	('merchandise')	árucikk	('good')
	c.	horgászfelszerelés	('fishing tackle')	horgász kiegészítő	('fishing accessory')
	d.	készlet	('stock')	termék	('product')
	e.	lőszer	('ammunition')	golyó	('bullet')
	f.	műanyagáru	('plasticware')	tárolónak	('container')
	g.	porcelán	('porcelán')	edény	('dish')
	h.	ruházat	('apparel')	ruha	('garment')
	i.	sportruházat	('sportswear')	sport ruha	('sport garment')
	j.	üvegáru	('glassware')	pohár	('glass vessel')

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[8] (23) differs from (17) in *lőszer* ('ammunition') instead of *aprópénz* ('change'). (23) has the 10 object mass nouns that we perceived as easiest to write stimuli for.

The object-countable nouns in (23) were tested in the object-counting condition in order to obtain a baseline for naturalness, e.g. (24a), and those lacking object-countability were tested in the same condition for a baseline of unnaturalness, e.g. (24b).

(24) a. A   barátom   vett   két ruhát: egy pólót   és   egy nadrágot.
DEF friend.POSS buy.PST two garment.ACC one shirt.ACC and one trousers.ACC.
'My friend bought two garments: a shirt and trousers.'

b. #A   barátom   vett   két ruházatot: egy pólót   és   egy nadrágot.
DEF friend.POSS buy.PST two apparel.ACC one shirt.ACC and one trousers.ACC.
#'My friend bought two apparel: a shirt and trousers.'

Count nouns, object mass nouns, and substance mass nouns were tested in the subkind-counting condition, e.g. (25) and (26), to determine the subkind-countability of these noun classes in Hungarian.

(25) a. Ez   a   bolt csak két ruhát   árul: nadrágot   és   pólót.
This DEF shop only two garment.ACC sell trousers.ACC and shirt.ACC
'This shop only sells two (kinds of) garments: trousers and shirts.'

b. Ez   a   bolt csak két ruházatot árul: nadrágot   és   pólót.
This DEF shop only two garment.ACC sell trousers.ACC and shirt.ACC
'This men's store only sells two (kinds of) apparel: trousers and shirts.'

(26) Ebben a   bárban csak egy sört   adnak: Sopronit.
this.IN DEF bar.IN only one beer.ACC serve Soproni.ACC
'This bar only serves one (kind of) beer: Soproni.'

Testing substance mass nouns for subkind-countability as in (26) was motivated by the desire to have a more complete picture of subkind-countability in Hungarian, to situate the results of the condition in which object mass nouns count subkinds. At the same time, substance mass nouns were not tested for object-countability because (i) their lack of object-countability is not in question and such judgments would have been redundant alongside those of object-countability of object mass nouns, and (ii) we wanted to keep the total number of questionnaire items at a maximum of 100, which we assume is the upper limit for quality participation. We were therefore limited to 50 test items in order to achieve balance with an equal number of filler items (25 natural and 25 unnatural according to the judgments of the Hungarian consultant). While substance mass nouns were not tested in the 'counting objects' condition, the occurrence of noun classes across the questionnaire was balanced by ensuring even distribution with the filler tasks; each noun class comprised about ⅓ of the questionnaire.

Participants were presented with one sentence and Likert scale per screen, ranging from 1 "nagyon természetellenes" ('very unnatural') to 7 "nagyon természetes" ('very natural'). Sentences were presented in a random order by using the shuffle function in PHP implemented in a questionnaire on SoSciSurvey.de. We ensured that minimal pairs did not occur one after the other by splitting the pair-mates across two lists and drawing randomly from one list before the other. To ensure that the two blocks of the questionnaire were fully counterbalanced, we evenly distributed the noun classes and (in)felicitous sentences across the two blocks. A copy of the study is archived at https://github.com/kerbach2/subkindcountability022022.

Because acceptability judgment tasks have been shown to largely converge with speaker judgments (Sprouse et al. 2013), we predicted the results for the two conditions in (24) to converge with the consultant judgements in (24). Specifically, because count nouns can combine directly with numericals to count objects, we expected sentences of condition (24a) to receive a high acceptability judgment. Conversely, because object mass nouns cannot combine directly with numericals to count objects, we expected sentences of condition (24b) to receive a low acceptability judgment. Next, because Erbach et al. (2019) argue that nouns like *sütemény* ('cookie') count kinds and objects via the same semantic operation, we expected the count nouns in (23) to have subkind-countability, though judgments may be lower because counting kinds with *féle* ('kind of') is less ambiguous. Lastly, assuming the universal sorter (Bunt, 1985) is available to count kinds of substances in Hungarian, we expected sentences of condition of (26) to receive a high acceptability judgment.

To gauge the subkind-countability of the object mass nouns in (23), we planned to compare conditions (25b) and (26) with a non-paired *t*-test, and we planned to run an ANOVA test on a mixed-effects model with the four conditions in (24) and (25). The first test is meant to check whether object and substance mass nouns differ in subkind-countability, and the second is meant to check for an interaction between object-countability and counted entities (objects versus subkinds), i.e. whether the sort of counted entity has a different effect on the two classes of nouns in (23). We follow the practice of using *t*-tests and mixed-effects models for Likert items in acceptability judgements (Bross 2019 and references therein).

The average judgements per condition are summarized in **Table 1** and **Figure 1**. All participant responses were kept as their answers were acceptably high and low respectively to the expected felicitous ($\bar{x} = 5.86$, $s = 0.64$) and infelicitous ($\bar{x} = 1.78$, $s = 0.63$) fillers. The average judgments of count nouns counting objects ($\bar{x} = 5.04$) and substance mass nouns counting subkinds ($\bar{x} = 4.48$) are not as high as expected, and the average judgment of object mass nouns counting objects ($\bar{x} = 3.84$) is higher than expected, though the mid-scale judgements of counting subkinds by count nouns ($\bar{x} = 4.79$) and object mass nouns ($\bar{x} = 4.46$) is in line with

the assumption that counting subkinds is acceptable but marked compared to overtly specifying *féle* ('kind of'). The results and the code used to analyze them are archived at https://github.com/kerbach2/subkindcountability022022/.

Noun class	Counted entities	Avg	SD
Object-countable	Objects	5.04	.84
Object mass	Objects	3.84	1.02
Object-countable	Subkinds	4.79	.94
Object mass	Subkinds	4.46	.93
Substance mass	Subkinds	4.48	1.31

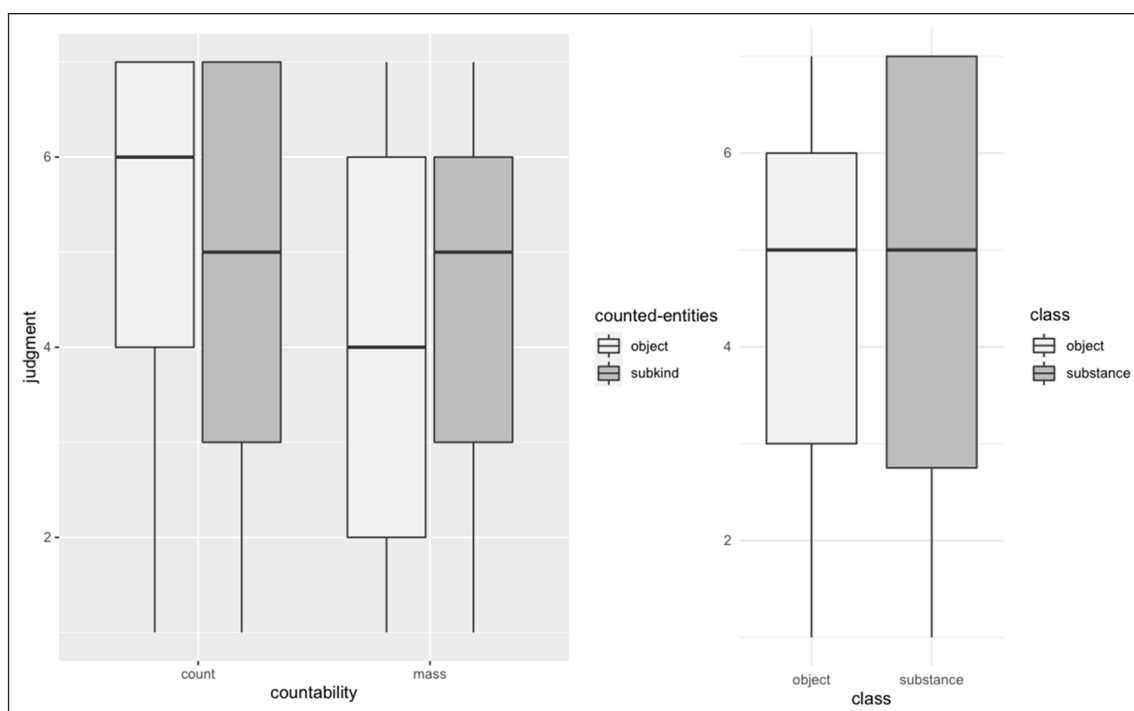**Table 1:** Average judgments per condition.

Figure 1: Left: Boxplot of judgments of object denoting nouns in object and subkind conditions per noun class. Right: Boxplot of judgments of mass nouns in subkind condition per noun class.

Beginning with the comparison between object and substance mass nouns counting subkinds, the averages per noun are in **Table 2**, which shows that the two noun classes exhibited around the same range of subkind-countability. A non-paired *t*-test found no difference between the

classes ($t = 0.12$, $p = 0.91$), thus maintaining the null hypothesis that the classes do not differ in subkind-countability. In English and Dutch, subkind-countability is a property of substance mass nouns but not of object mass nouns (Section 2.3), but we did not find this difference in Hungarian.

The informativeness of the aforementioned test is limited by the questionnaire not including a condition of substance mass nouns (infelicitously) counting objects, e.g. (the Hungarian translation of) *After my beer splashed on the wall, there were 10 beers on the wall*. With this condition, one could test for an interaction between the sort of mass noun (object vs. substance) and counted entities (objects vs. subkinds), but we leave this to future research.

Object mass		$\bar{x}$	Substance mass		$\bar{x}$
üvegáru	('glassware')	2.4	bor	('wine')	2.7
műanyagáru	('plasticware')	3.3	acél	('steel')	3.2
porcelán	('china')	3.9	vér	('blood')	4.5
lőszer	('ammunition')	4.3	viz	('water')	4.5
ruházat	('apparel')	4.8	arany	('gold')	4.6
horgászfelszerelés	('fishing tackle)	4.9	talaj	('soil')	4.7
készlet	('stock')	5.0	fa	('wood')	5.0
sportruházat	('sportswear')	5.2	homok	('sand')	5.1
áru	('merchandise')	5.3	sör	('beer')	5.2
ágynemű	('bedding')	5.6	kávé	('coffee')	5.3
		4.5			4.5

Table 2: Subkind-countability of object and substance mass nouns.

To analyze the results regarding the pairs of nouns with overlapping extensions, a mixed-effects model was constructed in R (R Core Team 2015) using the lmerTest package (Kuznetsova et al. 2019). The maximal random effects structure justified by our experimental design should include by-subject random intercepts and slopes and by-pair random intercepts and slopes, but this model did not converge, so we simplified the random effects structure by not allowing correlation between the random slope and random intercept for subjects (Barr et al. 2013). The full model translates to: lmer(rating ~ (`object-countability` * `counted-entities`) + (1|subject) + (0 + `object-countability` * `counted-entities`|subject) + (1 + `object-countability` * `counted entities`|pair), data = data). The summary of the model is in **Table 3**; the main effect of object-countability is statistically significant ($p = .0421$), and its interaction with counted entities is nearly-significant ($p = .0731$).

Fixed effects		b	SE	t	p
Intercept		5.0400	.4257	11.839	1.54e–07
Object-countability		–1.1933	.5053	–2.362	.0421
Counted entities		–.2467	.4111	–.600	.5629
Object countability * Counted entities		.8633	.4291	2.012	.0731
Random effects		Variance			
Subject		6.630e–06			
Object-countability | Subject		7.856e–01			
Counted entities | Subject		6.014e–02			
Object-countability * Counted entities | Subject		1.166e–01			
Pair		1.553e+00			
Object-countability | Pair		2.350e+00			
Counted entities | Pair		1.485e+00			
Object countability * Counted entities | Pair		1.434e+00			

Table 3: Effect sizes (*b*), standard errors (*SE*), *t*-values and *p*-values for lmer model.

An ANOVA test on the model in **Table 3** found a main effect of object-countability: $F(1, 9.0448)$ 5.9680, $p < .05$. By contrast, a main effect of counted entities was not found: $F(1, 9.7178) = .3055$, $p = .59295$. Lastly, a near-significant interaction was found between the two fixed effects: $F(1, 9.6199) = 4.0476$, $p = .07307$. **Table 4** shows the average judgments per pair of nouns with overlapping extensions, which we discuss next in relation to cleaning up the data.

Object-countable		Obj	Subk	Object-uncountable		Obj	Subk
tárolónak	('container')	2.5	3.6	műanyagáru	('plasticware')	3.2	3.3
árucikk	('good')	3.7	5.4	áru	('merchandise')	3.2	5.3
golyó	('bullet')	3.8	3.8	lőszer	('ammunition')	4.0	4.3
sport ruha	('sport garment')	5.2	5.3	sportruházat	('sportswear')	4.7	5.2
horgász kiegészítő	('fishing accessory')	5.4	5.7	horgászfelszerelés	('fishing tackle)	4.8	4.9
termék	('product')	5.6	5.8	készlet	('stock')	2.3	5.0
ruha	('garment')	5.7	5.1	ruházat	('apparel')	3.3	4.8
edény	('dish')	5.9	4.3	porcelán	('china')	5.4	3.9
pohár	('glass vessel')	6.3	3.6	üvegáru	('glassware')	2.0	2.4
takaró	('blanket')	6.4	5.4	ágynemű	('bedding')	5.5	5.6
		5.0	4.8			3.8	4.5

Table 4: Average judgment per pair with overlapping extensions.

There are a few inconsistencies between noun class and naturalness judgment in **Table 4**. Specifically, counting objects via *golyó* ('bullet'), *tárolónak* ('container'), and *árucikk* ('good') was rated relatively low, and counting objects with *ágynemű* ('bedding') and *porcelán* ('china') was rated relatively high. These results are contrary to the classification of these nouns in (23). Future work is needed to determine what caused these judgments and the extent to which they hold across further examples, though we will offer a few speculations.

First, it could be that the sentences with the count nouns were judged as unnatural for reasons other than their ability to count objects. For *golyó* ('bullet') in (28), the goal was for participants to conceive of the bullets as stacked on top of each other as in an ammunition clip in the handle of a pistol like a Luger. However, given the low judgements ($\bar{x}$ = 3.8), the participants may have thought of a revolver in which the bullets are arranged in a circular fashion rather than on top of each other. A post-hoc discussion with the consultant who helped with the questionnaire has confirmed this to likely be the case.

(28) #A   pisztolyban hat golyó volt   egymás   tetején.
      DEF pistol.IN   six bullet COP.PST one.other on.top
      'The pistol held six bullets, one on top of the other.'

For *tárolónak* ('container') in (29), the low judgments ($\bar{x}$ = 2.5) were likely due to an unnoticed typo, namely the lack of the inessive morpheme *ban* ('in') on *tárolónak* ('container').

(29) #Az ebéd két műanyag tárolónak   volt: az   egyik egy szendvicset
      DEF lunch two plastic   container.DAT COP.PST DEF one.of one sandwich.ACC
      tartalmazott,   a   másik gyümölcsöt.
      contained.PST DEF other fruit.ACC
      'The lunch was in two plastic containers: one containing a sandwich and one
      containing fruit.'

Unlike (28) and (29), the low judgments ($\bar{x}$ = 3.7) of *árucikk* ('good') in (30) are less clear, though the aforementioned consultant suggests it is because it does not sound very colloquial, and that the sentence would have sounded more natural if *dolog* ('thing') were used.

(30) #Vettem három árucikket: két szivacsot   és   egy üveg szappant.
      buy.PST three   good.ACC: two sponge.ACC and one bottle soap.ACC
      'I bought three goods: two sponges and a bottle of soap.'

Next, the high judgements ($\bar{x}$ = 5.5) of *ágynemű* ('bedding') in (31) can be explained by the independent observation that *ágynemű* ('bedding') can count sets but not individual objects (Anna Brody, p.c.). The consultant has agreed that it is straightforward to interpret *egy ágyneműje* ('one bedding') in (31) as 'one set of bedding items'. The ability of such nouns to count sets is discussed further in Section 4.4.

(31) A   barátomnak   egy ágyneműje   van, amit   minden héten kimosnak.
      DEF friend.POSS.DAT one bedding.POSS COP which every   week wash
      'My friend has one item of bedding, which is washed each week.'

Next, the reason why the sentence with *porcelán* ('china') in (32) received relatively high judgments ($\bar{x}$ = 5.4) is likely due to a difference in lexical encoding between the participants and the consultant. This is supported by the distribution in judgments for (32): while the vast majority were high ("7" n = 13, "6" n = 6), and some were mid-scale ("5" n = 4, "4" n = 2, "3" n = 1), those that were low were at the bottom of the scale ("2" n = 0, "1" n = 4). The four "1" judgments in opposition to the thirteen "7" judgments could be indicative of a minority of speakers who encode *porcelán* ("china") as only object mass, while the majority encode it as count, similar to how some English speakers think of *data* as a count noun and others only as a mass noun. A consultant has confirmed that this is possibly the case.

(32) A   gyerek összetört három porcelánt: egy tányért   és   két tálat.
      DEF child   break.PST three   china.ACC one plate.ACC and two bowl.ACC
      'The child broke three pieces of china: a plate and two bowls.'

Altogether, the aforementioned judgements show several inconsistencies between expected and actual judgments, which requires further investigation. In the meantime, removing the five pairs that contribute a noun to (28–32) yields the average judgements per condition in **Table 5**.

Noun class	Counted entities	Avg	SD
Object-countable	Objects	5.62	1.01
Object mass	Objects	3.42	1.29
Object-countable	Subkinds	5.08	1.26
Object mass	Subkinds	4.45	1.13

Table 5: Average judgments per condition, cleaner data.

The differences between the averages in **Table 5** are larger than those in **Table 1**. For example, the difference in **Table 1** between the object-counting conditions is 1.2 (5.04–3.84), while that in **Table 5** is 2.22 (5.64–3.42). To check whether this affected the statistical analysis, we constructed a mixed-effects model for this cleaned-up data, but it turned out to not have an effect. The second model is summarized in **Table 6**, and it is like the first one in that the main effect of object-countability is statistically significant (p = .042) and its interaction with counted entities is nearly-significant (p = .074).

Fixed effects	b	SE	t	p
Intercept	5.6200	.2661	21.120	7.11e–09
Object countability	–2.200	.7560	–2.910	.042
Counted entities	–.5400	.5852	–.923	.407
Object countability * Counted entities	1.5667	.6618	2.367	.074
Random effects	Variance			
Subject	7.231e–06			
Object countability | Subject	6.853e–01			
Counted entities | Subject	8.150e–02			
Object countability * Counted entities | Subject	2.288e–01			
Pair	1.676e–01			
Object countability | Pair	2.671e+00			
Counted entities | Pair	1.554e+00			
Object countability * Counted entities | Pair	1.863e+00			

Table 6: Effect sizes (*b*), standard errors (*SE*), *t*-values and *p*-values for lmer model.

As with the first model, an ANOVA test on the model in **Table 6** found a main effect of object-countability: $F(1,4.1356)$ 10.0361, $p < .05$. By contrast, a main effect of counted entities was not found: $F(1,4.0700) = .3435$, $p = .58880$. Lastly, a near-significant interaction was found between the two fixed effects: $F(1,4.2011) = 5.6037$, $p = .07396$.

There are two perspectives to the nearly-significant interaction. First, in the two object-counting conditions, object-countable nouns were rated higher than object-uncountable ones by 2.20 (5.62–3.42), but in the counting-subkinds conditions the rating was higher only by 0.63 (5.08–4.45). Second, object-countable nouns were rated higher for counting objects than subkinds by 0.54 (5.62–5.08), but object-uncountable nouns were rated higher for counting subkinds than objects by 1.03 (4.45–3.42). Although this interaction is only nearly-significant, it stands in contrast to English and Dutch where object mass nouns are reportedly uncountable altogether, i.e. they are equally bad at counting objects and subkinds. We take these results to cast doubt on the hypothesis that object-uncountability is a stable property of object mass nouns. Put differently, object-uncountability does not imply subkind-uncountability, as is best exemplified by *áru* ('merchandise'), *készlet* ('stock') and *ruházat* ('apparel') being better at counting subkinds than objects by at least 1.5 points. We now turn to discussing the implications of this data for theories of countability in Hungarian, of subkinds in general, and the characterization of object mass nouns.

4. Implications

The questionnaire findings indicate that Hungarian differs from English and Dutch in two ways. First, while subkind-countability distinguishes between count and object mass nouns in English (Sutton & Filip 2018), the questionnaire has not found such a difference in Hungarian. Second, while subkind-countability distinguishes between object and substance mass nouns in English and Dutch (Cowper & Hall 2012; De Belder 2013), the questionnaire has not found such a difference in Hungarian. This section discusses the implications of the aforementioned findings. Sections 4.1 and 4.2 discuss these findings in relation to analyses of countability in Hungarian and countability of subkinds respectively. Section 4.3 suggests that the difference between English and Hungarian is correlated with the latter having general number, and Section 4.4 provides the needed modification to the characterization of object mass nouns.

4.1 Analyses of countability in Hungarian

Hungarian having object mass nouns that can count subkinds is neither predicted by nor excluded from the analyses of countability in Hungarian of Schvarcz & Rothstein (2017) and Erbach et al. (2019), though the former potentially provides a means for accounting for nouns with object mass denotations having subkind-countability. Recall that Schvarcz & Rothstein (2017) claim that Hungarian has an extremely large class of flexible nouns—i.e. nouns with both a count denotation and a mass denotation—the latter of which is object mass. Under this analysis, the count denotation of the nouns that they discuss—e.g. *rózsa* ('rose')—could be the input to the (derived) denotation that can count subkinds. In other words, they could say the object mass noun *rózsa* ('rose') cannot count subkinds, but the count homophone can. However, **Table 4** suggests that *áru* ('merchandise'), *készlet* ('stock'), and *ruházat* ('apparel') do not have a denotation that can count discrete objects, so their subkind-countability cannot be attributed to such a denotation.

Next, Erbach et al. (2019) base their analysis of countability in Hungarian on Sutton & Filip's (2017) analysis of countability, which assumes that nouns must have quantized reference to be countable. A quantized predicate, following Krifka (1989), is one that does not apply to two entities where one is a proper part of the other. Thus, for a noun to count objects in Hungarian, as *gyertya* ('candle') does in (8c), it must be that no two things called *gyertya* ('candle') in that context are part of one another. Sutton & Filip (2018) have a similar analysis of subkind-countability, so a straightforward way to extend Erbach et al. (2019) would be to assume that subkind-countability is licensed by quantized (or disjoint) reference. However, the next subsection argues that this does not provide a straightforward means of accounting for the subkind-countability of *áru* ('merchandise'), *készlet* ('stock') and *ruházat* ('apparel').

4.2 Analyses of subkind countability

The central idea of Sutton & Filip (2018) is that English object mass nouns, unlike count nouns and substance mass nouns, cannot count subkinds because of unresolvable overlap between subkinds in a given level of categorization. They assume that when mass nouns like *rice* combine with numericals, the enumeration is of disjoint subkinds in a given level of categorization: basmati, jasmine, arborio, etc., where no instance of one subkind is also an instance of another. By contrast, kinds of furniture in the same level of categorization overlap, e.g. office furniture, bedroom furniture and living room furniture overlap in chairs that belong to all three categories. Likewise, it is proposed that kinds of transport cannot be enumerated with direct numerical modification of *transport* due to overlap in a given level of categorization. Conversely, the (near-) synonym *vehicle* can count subkinds since, as a count noun, it is assumed to be encoded with a counting schema, which forces entities that realize more than one subkind to only realize one in the context of use.

The analysis of Sutton & Filip (2018) is geared towards English, and it can extend to the subkind-countability of *áru* ('merchandise'), *készlet* ('stock') and *ruházat* ('apparel') in one of two ways. First, Hungarian but not English has a null modifier synonymous with expressions like *típus* ('type') or *fajta* ('kind'), which, following Sutton & Filip's (2018) analysis of *kind of*, resolves overlap by forcing entities that realize more than one subkind to only realize one in the context of use.[9] However, such a difference in the existence of a null modifier should be corroborated with independent evidence. Alternatively, Sutton & Filip (2018) can be extended by assuming that the denotations of object mass nouns in Hungarian are encoded with counting schemas that enforce a disjoint interpretation in the interpretation domain of kinds, as Sutton & Filip assume for count nouns like *vehicle*. However, this counting shema cannot apply to the interpretation domain of objects, otherwise Hungarian object mass nouns would not exist. Again, a reason for why this encoding should occur in Hungarian is not immediately clear. In sum, extending Sutton & Filip (2018) requires a yet-to-be explained difference between Hungarian and English, meaning that they would not predict which languages should have object mass nouns with subkind-countability. Since neither analysis in Section 4.1 of countability in Hungarian predicts subkind-countability for at least some object mass nouns, we question whether this sort of countability should be tied to object-countability, contra Sutton & Filip (2016; 2018) attributing both sorts to disjointedness.

Another approach to the difference between English and Hungarian would be within the work on reference to subkinds of Carlson (1980, §6.1, §7.6.1) or Krifka et al. (1995, §1.3.3), although the latter do not make claims as specific as whether object mass nouns should be able

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[9] Sutton & Filip's analysis of *kind of* is at odds with the felicity of *Fred is every kind of Doctor* (cf. McNally 1997:ex. 122), where *kind* does not force overlap resolution and thus the kinds of doctors overlap in Fred.

to count subkinds. The former interprets the contrasts in (33) as indicating that the following nouns lack the subkind reading: *gas-well, airport, ball-bearing* and *courage.*

(33)   (Carlson 1980, §6–7)
   a.   Every {mineral, ?gas-well} is in short supply.
   b.   Which {plant, ?airport} is the most widespread?
   c.   Three {cars, ?ball-bearings} are made in five different countries.
   d.   many {virtues, *courages}

Carlson proposes that the bad nouns in (33) lack the subkind reading for him because he does not know nouns that name subkinds, and he hypothesizes that (33c) should be acceptable to speakers who know nouns for kinds of ball-bearings, e.g. car manufacturers (p. 206). However, this does not explain why *furniture* cannot count subkinds for speakers who know nouns like *chair* and *table,* which presumably name kinds of furniture.

Another analysis of subkind-countability is that of Grimm & Levin (2017), whose central idea is that object mass nouns in English do not head taxonomies in the sense of Murphy (2002). For example, *mail* does not head a taxonomy because the extensions of nouns that name kinds of mail (e.g. *letter*) are not necessarily subsets of the extension of *mail.* Put differently, not every letter is mail, as is the case for letters in museums (which are not mail due to not being candidates for being delivered). Similarly, not every bullet is ammunition, as is the case for bullets in museums (which are not candidates for being loaded into weapons). To maintain the idea that counting subkinds is licensed by heading a taxonomy, one should demonstrate that *lőszer* ('ammunition') heads a taxonomy but *ammunition* does not. This would be the case if the extensions of nouns in Hungarian that name kinds of ammunition were subsets of the extension of *lőszer* ('ammunition'), e.g. there is a counterpart of *bullet* that is only applicable to bullets that are candidates to being loaded into weapons. However, we observe that bullets in museums are called *golyó* ('bullet')[10] and *lövedék* ('projectile').[11] Thus, a different strategy is needed to extend Grimm & Levin (2017), e.g. that in the end of the next subsection.

4.3 General number and subkind countability

The background to this subsection is that Chierchia (2015) argues that certain properties of nominal systems across languages are correlated. For example, he argues that whether a language has object mass nouns is correlated with whether singular nouns in the language are required to range over stable atoms. Similarly, one might hypothesize that a difference between

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[10] Retrieved on February 24 2021 from https://mult-kor.hu/20111020_amputalt_labak_es_a_lincoln_eletet_kiolto_golyo_az_uj_marylandi_muzeumban.
[11] Retrieved on February 24 2021 from https://militaria.hu/hadtorteneti-intezet-es-muzeum/hadtorteneti-muzeum/targyi-gyujtemenyi-osztaly/loszergyujtemeny.

the English and Hungarian nominal systems allows some object mass nouns to count subkinds only in the latter. It would be difficult to identify this difference based on two languages alone, but the upcoming discussion of Japanese and Brazilian Portuguese points in the direction of general number (Corbett 2000). Thus, we propose that general number is a necessary (but insufficient) condition for a language having object mass nouns with subkind-countability. We write *insufficient* because we do not expect general number to imply the count-mass distinction, let alone object mass nouns.

As background, the questionnaire of Erbach et al. (2021) tested the acceptability of enumerating objects in Japanese with artifact nouns modified with *nan-byaku to iu* ('hundreds of'), and found that certain aggregate artifact nouns were markedly more acceptable than substance nouns enumerating instances with the same modifier (e.g. 'hundreds of (beads of) sweat'), but also markedly worse than discrete object nouns (e.g. 'hundreds of chairs'). This result was taken to indicate that Japanese may indeed have object mass nouns, though more empirical work is necessary to support this claim. Taken together, the Hungarian and Japanese data show that the semantics of (potentially) object mass nouns in languages with general number is ripe for further empirical work.

Regarding the specifics of the results in Erbach et al. (2021), Erbach (2021) writes that there is some question as to whether *chōri-ki* ('kitchenware') is an object mass noun. First, while the general results of the questionnaire suggest that several aggregate artifact nouns in Japanese are object mass given their marked judgments with the count quantifier *nin-byaku to iu* ('hundreds of'), the accuracy of this conclusion is called into question on account of there being pragmatic issues with certain sentences. With respect to *chōri-ki* ('kitchenware') in particular, on the one hand, participants in the study rejected a sentence where *chōri-ki* ('kitchenware') refers to objects and occurs in count morphosyntax, suggesting that it is a mass noun. On the other hand, this categorization is challenged by a consultant's note that *chōri-ki* can count objects if their number equals the number of kinds (34).

(34)   *Japanese* (Erbach 2021: ex. 7.37)
        mi-tsu   no   chōri-ki
        three-CL GEN kitchenware
    #'three kitchenwares'
    #(chopping board, two knives)
    ✓(chopping board, knife, mixing bowl)

The preceding discussion of Hungarian sheds new light on (34) in suggesting that it is not objects that are counted, but subkinds. Assuming that certain object mass nouns in Japanese can count subkinds as in Hungarian, the felicitous interpretation of (34) does not prevent *chōri-ki* from being categorized as an object mass noun under the definition in Section 4.4.

As demonstrated with the Hungarian and Japanese data, a major implication of this research is that the countability of objects and subkinds should be considered independently. To illustrate, Pires de Oliveira & Rothstein (2020) characterize *mobília* ('furniture') as a mass noun that can be compared in terms of cardinality (35) (or other dimensions depending on the context).

(35) *Brazilian Portuguese* (Pires de Oliveira & Rothstein 2020)
    João tem   mais mobília que a   Maria.
    João have.3SG.PRS more furniture than the Maria
    ✓'João has more pieces of furniture than Maria.'

While it is implied that Pires de Oliveira & Rothstein (2020) strictly consider object-countability, which presumably underlies the infelicity in (36) (Braga et al. 2010), they do not report whether *mobília* ('furniture') can count subkinds.

(36) *Brazilian Portuguese* (Braga et al. 2010)
    ??Comprei   duas   mobílias   hoje.
    buy.PST.1SG two.FEM furniture.PL today
    'I bought two furnitures today.'

To illustrate the importance of distinguishing objects from subkinds, we have indication from Roberta Pires de Oliveira (p.c.) that *mobília* ('furniture') can count subkinds. Specifically, most of her consultants did not judge a contrast in acceptability in (37), although she and two others slightly prefer (37b) with *tipo* ('kind'). This parallels how the Hungarian sentences in (25)–(26) were judged to be improved with *féle* ('kind of') by the consultant helping with the questionnaire materials.

(37) *Brazilian Portuguese* (Pires de Oliveira p.c.)
    a. As   duas   mobílias   que mais vendem   são cadeiras e   mesas.
        the.FEM.PL two.FEM furniture.PL that most sell.3PL.PRS are chair.PL and table.PL
        'The two best-selling furnitures are chairs and tables.'
    b. Os   dois   tipos   de mobília que mais   vendem são cadeiras
        the.MSC.PL two.MSC kind.PL of furniture that sell.3PL.PRS most   are chair.PL
        e   mesas.
        and table.PL
        'The two best-selling kinds of furniture are chairs and tables.'

As with Japanese, this brief look at Brazilian Portuguese demonstrates that the two sorts of countability may be independent despite the uniform analysis of Sutton & Filip (2016; 2018). Subkind-countability does not imply object-countability, given that Hungarian object mass nouns can count subkinds but cannot count objects, parallel to the count nouns *species* and *halogen* (Krifka et al. 1995). There is no implication in the other direction either, given that *student* can count objects but not subkinds (Kwak 2012).

Since there is nascent evidence of object mass nouns counting subkinds in Japanese (Erbach 2021) and Brazilian Portuguese (Pires de Oliveira p.c.), perhaps it is due to their nominal systems (along with that of Hungarian) having a property that differs from that of English and Dutch.

One common property of Hungarian, Japanese, and Brazilian Portuguese is general number (Corbett 2000; Rullman & You 2006; Paul 2012), where bare singular (notionally) count nouns range over singularities and pluralities without implying whether the proposition is verified by a singular or plural object. General number is a feature of Hungarian (Farkas & de Swart 2003), Japanese (Nemoto 2005) and arguably Brazilian Portuguese (Pires de Oliveira & Rothstein 2011, ex. 2), but not English or Dutch. Thus, we conclude this subsection with an outline of an analysis which correlates general number with subkind-countability of object mass nouns.

Recall that Carlson (1980) proposes that a noun can get the subkind reading for a speaker (and hence count subkinds) only if the speaker knows nouns that name subkinds (p. 206). Now, what if subkind-countability depended not only on the existence of subkind-naming nouns, but also on their denotation? Consider *shirt* and *póló* ('shirt'); although they are translational counterparts, the difference in general number between English and Hungarian can be analyzed as only the latter having cumulative reference (Rullmann & You 2006). Although Farkas & de Swart (2003) treat count nouns in both languages as having atomic (i.e. non-cumulative) reference, the contrast in (38a-b) indicates that *póló* ('shirt') differs from *shirt* in ranging over non-atomic shirts. Note that the felicity of a bare predicative noun does not imply cumulative reference, given that the bare Hebrew *xultsá* ('shirt') is felicitous in (38c) while lacking cumulative reference.

(38) a. Ez a két ruhadarab   póló.   *true referring to* 👕👕
          this the two piece.of.clothing shirt
          'These two pieces of clothing are shirts.'[12]

      b. These two garments are #(a) shirt.   *false referring to* 👕👕

      c. ʃn-éy   ha-bgad-ím   ha-ele   hem   xultsá.   *false referring to* 👕👕
          two.MSC-CS the-garment-PL the-those are-PL-MSC shirt
          'These two garments are a shirt.'

An analysis of (38a-b) following Rullmann & You (2006) is that in a world with three shirts, the English and Hungarian nouns have the extensions in (39), only the latter of which is cumulative; ⊔ is join as is standard in lattice-theoretic semantics, see e.g. (Rothstein 2010).

(39) The shirts in w_1 are 👕$_1$, 👕$_2$, and 👕$_3$.
      a. ⟦shirt⟧$_{w1}$ = {👕$_1$, 👕$_2$, 👕$_3$}
      b. ⟦póló⟧$_{w1}$ = {👕$_1$, 👕$_2$, 👕$_3$, 👕$_1$⊔👕$_2$, 👕$_2$⊔👕$_3$, 👕$_1$⊔👕$_3$, 👕$_1$⊔👕$_2$⊔👕$_3$}

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[12] A consultant has offered the gloss 'These two pieces of clothing are each a shirt.' This still indicates a cross-linguistic difference, because this paraphrase is unavailable in English and Hebrew.

Next, recall that under Grimm & Levin (2017), a noun can count subkinds only if it heads a taxonomy (in the sense of Murphy 2002). Abstracting away, we derive the hypothesis that a noun can count subkinds only if it heads a certain hierarchical structure of kinds. Now, what might cause *ruházat* ('apparel') to head this structure but not *apparel*? As discussed previously, one can extend Sutton & Filip (2018) to posit that only the former is encoded with a counting schema that resolves overlap between subkinds in a given level of categorization, but this would be disconnected from the difference in general number between English and Hungarian.

We suggest the following analysis. First, we build on Carlson's (1980) proposal that subkind-countability is licensed by the existence of subkind-naming nouns, which in the present examples are the Hungarian *póló* ('shirt') and the English singular *shirt*, but not the plural *shirts* (see upcoming discussion). Next, we propose that *ruházat* ('apparel') can count subkinds because it has cumulative reference and there are enough subkinds named by lexically-entered nouns in Hungarian, e.g. *póló* ('shirt'), which also have cumulative reference. By contrast, *apparel* cannot count subkinds because it has cumulative reference but there are not enough subkinds named by lexically-entered nouns in English with cumulative reference. While the singular *shirt* can be said to name a kind of garment, we propose that it cannot co-occur with *apparel* in the relevant hierarchical structure because *apparel* ranges over pluralities of shirts while *shirt* does not. The latter is indicated by (38b) for *shirt,* and the former follows from the standard analysis of mass nouns having cumulative reference (Quine 1960, §19; Link 1983; Krifka 1989; 2007). Conversely, (38a) shows that *póló* ('shirt') ranges over pluralities, so it *can* co-occur in the relevant structure with *ruházat* ('apparel'). Put differently, object mass nouns in English have cumulative reference, but they cannot combine with numericals to count subkinds because many subkind-naming nouns lack cumulative reference, meaning that they do not range over plural sums in the extensions of the object mass nouns. Conversely, Hungarian object mass nouns and subkind-naming nouns both have cumulative reference, meaning that the latter range over the plural sums in the extensions of the object mass nouns.

Under Carlson (1980), subkind-countability is licensed by subkinds being named by lexically-entered nouns, but not by syntactically-derived noun phrases. However, it is not consensus that singular and plural nouns differ in being lexically-entered, since both are (morpho-)syntactically-derived under Borer (2005) and Cowper & Hall (2012). Abstracting away, we assume that subkind-countability is licensed by subkinds being named by expressions which are sufficiently simple in the relevant way, which is met by singular nouns but not by plural ones. Under Carlson (1980), "sufficiently simple" means lexically-entered, while under Cowper & Hall (2012) it would mean an inflectional projection #P (encoding individuation) whose head does not realize >1 (spelled out as the plural morpheme). While bare countable plurals can refer to kinds (e.g. *owls* in *Owls are widespread*), we propose that they are irrelevant to the hierarchical structure of kinds which licenses subkind-countability on the basis that their singular counterparts are morphologically simpler. If subkind-countability is indeed licensed by the existence of expressions naming

subkinds, then there must be a limit on which expressions license the countability, otherwise the contrasts in (33) would not exist.

Another issue is that if one assumes that *shirt* has a sub-constituent with cumulative reference, e.g. the category-neutral root, then one might expect it to license the subkind-countability of *apparel*. However, we assume that roots are irrelevant to the hierarchical structure of kinds due to their meaning being too general to stand in the subkind relation. To illustrate, the nouns *hammer* and *tool* stand in the subkind relation (*Hammers are a kind of tool* is true), but the corresponding verbs do not (*Hammering is a way of tooling* is false, cf. Cruse 1986:§6.2 on *Strangling is a way of killing*). We therefore assume that the hierarchical structure of kinds which licenses subkind-countability consists of noun-denotations, not root-denotations.

Regardless of whether general number turns out to license subkind-countability of (some) object mass nouns, the data in Section 3.2 points towards a modification to the definition of object mass nouns in Section 2.1. This is the topic of the next subsection.

4.4 The category of object mass nouns

Section 2.3 hypothesizes that object mass nouns are distinct from substance mass nouns in being unable to count subkinds, but Section 3.2 calls into question the stability of this property because it was not found to distinguish between these noun classes in Hungarian. Likewise, Section 2.3 hypothesizes that object mass nouns differ from count nouns in the inability to occur in count morphosyntax, but Section 3.2 found no difference in this regard when the enumeration is of subkinds. This necessitates a modification to the difference between count and object mass nouns in (7a).

(7)   Object mass nouns are distinct from
        a.   count nouns in that only the latter can occur in count morphosyntax.

(7a) does not distinguish between count and object mass nouns in Hungarian, since there is nascent evidence that some of the latter can occur in count morphosyntax to count subkinds. The difference is that only the former can refer to objects in this morphosyntax (to be qualified shortly). The revised (40a) makes this distinction.

(40)   Object mass nouns are distinct from
        a.   count nouns in that only the latter can refer to objects in count morphosyntax.
        b.   substance mass nouns in the ability to
             i.   compare via cardinality of objects.
             ii. combine with stubbornly distributive predicates.

(40) is this paper's contribution to the consolidation of the category of object mass nouns across languages; subkind-uncountability is not a stable property of object mass nouns, therefore complete preclusion from count morphosyntax is not a defining property.

Crucially, (40a) might still be in need of further revision, given the observation in Footnote 5 from an anonymous reviewer that *három horgászfelszerelést* ('three tackle.ACC') can refer to three sets consisting of a fishing rod, a few baits and a net. It is also reported by Anna Brody (p.c.) that *(sport)ruházat* '(sports) apparel' and *ágynemű* 'bedding' can count sets but not individual objects. Additionally, Roberta Pires de Oliveira (p.c.) judges that *duas mobílias* ('two furnitures', Brazilian Portuguese) can refer to two sets of a chair and sofa but not to two chairs or two sofas, and Sutton & Filip (2016) report that *ein besteck* ('one cutlery', German) can refer to a set of cutlery. Assuming that these are object mass nouns, it seems that while they cannot count simplex objects, they can count what might be called composite objects.

Motivation for distinguishing the countability of composites from that of simplex objects comes from Czech having derived numericals for counting the former. Perhaps not coincidentally, Czech also has derived numericals for counting subkinds (41) (Dočekal 2012; 2013). This suggests that the countability of simplex objects is less marked than the two other sorts.

(41) *Czech* (Dočekal 2012; 2013)
    a. dv-a   klíč-e   *simplex*
        two-INFL key-PL
        'two keys'

    b. dv-oj-e   klíč-e   *composites*
        two-STEM-SFX key-PL
        'two bunches of keys'

    c. dv-oj-í   housle   *subkinds*
        two-STEM-SFX violin
        'two kinds of of violin'

It seems that Hungarian, Brazilian Portuguese, and German have object mass nouns that can count certain (composite) objects. However, (40a) disqualifies object mass nouns from counting objects altogether. This is remedied by (42).

(42) Object mass nouns are distinct from count nouns in that only the latter can refer to simplex (as opposed to composite) objects in count morphosyntax.

(42) reflects the conclusion that preclusion from count morphosyntax is not a defining property of object mass nouns. The proposed defining property is that these nouns cannot refer to simplex objects in count morphosyntax, which accommodates the observation that some can refer to subkinds or composites in this morphosyntax.

While the idea that object mass nouns can refer to composites and even count them is not unprecedented, what remains to be investigated about object mass nouns that can count composites is the nature of this countability. In other words, to better understand these

nouns and countability systems in general, what remains to be investigated is whether the aforementioned cases of counting composites are cases of lexical ambiguity, systematic polysemy, a phonologically null operation creating a complex numeral, or something else. For example, while English mass nouns like *water* are known to count kinds (4d), they are also known to count portions (4a,c), and a similar sort of semantic shift might be responsible for the ability of certain object mass nouns to count composites. Alternatively, these object mass nouns might be homophonous with what have been called collective nouns (e.g. *committee, deck*), which can count collections of individuals (see, e.g. Wągiel 2021 i.a.). Another possibility is that, instead of having an overt morpheme like *-oje* which creates complex numerals for counting composites, some languages have a phonologically null morpheme for the same purpose. The restrictions on counting composites described above is in line with those on the Czech morpheme *-oje,* which Grimm & Dočekal (2021) show is restricted to objects that come in groups (e.g. bunches of keys). However, the primary investigation of this paper has focused on the inability of certain Hungarian nouns to count simplex objects but possibly count subkinds, so the ability to count composites was overlooked. Thus, it could be that some of the nouns in (17a) range over countable complex objects as *committee* does, rather than only ranging over uncountable objects as *furniture* does.

A final loose end of (40a) and (41) is what counts as count morphosyntax. Plural morphology is regarded as such by Erbach (2021) (cf. Section 2.2), Rothstein (2010), Chierchia (1998) and many others, but recall from Footnote 4 that an anonymous reviewer accepts *Ez-ek az áru-k nagyon drágá-k* as 'These pieces of merchandise are very expensive' while rejecting *három áru* ('three [pieces of] merchandise'). This parallels the cases in Rothstein (2021) where pluralization does not imply countability, and another such case is (43) with the Hebrew *kvudá* ('luggage').

(43) a. ha- kvud-ót   ha-ele   yekar-ót.
          the luggage-PL the-those expensive-PL
          'These (pieces of) luggage are expensive.'

      b. #ʃloʃ-á   kvud-ót
          three-FEM luggage-PL
          'three pieces of luggage'

Given that pluralization does not entail (full) countability,[13] plural morphology should not be considered as count morphosyntax in (40a) in (41), and it is recommended to test for countability via direct combination with numericals when possible.

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[13] We write *full* because under Allan's (1980) test of inducing plural agreement, *kvudót* ('luggage-PL') and *áru-k* ('merchandise-PL') have a medial degree of countability.

5. Conclusion

On the assumptions made based on the novel empirical evidence presented in this paper that Hungarian has object mass nouns that can count subkinds, we conclude that subkind-uncountability is not a stable property of object mass nouns. Therefore, unlike (15), subkind-uncountability should not be considered a defining property of object mass nouns. Likewise, the characterization of object mass nouns put forth in Erbach (2020) and summarized in (7) requires modification since some object mass nouns with subkind-reference can occur in count morphosyntax. Thus, we propose the characterization of object mass nouns in (40).

By specifying that object mass nouns cannot count objects in count morphosyntax, we leave room for them being able count subkinds, as demonstrated by the Hungarian data. As discussed in Section 4, this has implications for formal models of subkind-countability such as Sutton & Filip (2018), which accounts for object mass nouns not being able to count subkinds in English, but extending to Hungarian needs modification. As an alternative to appealing to quantization or disjointedness, we build on Carlson (1980) and Grimm & Levin (2017) by suggesting that a noun can count subkinds only if it heads a certain hierarchical structure along with other nouns which name subkinds. As a result, the non-cumulative reference of count nouns in English prevents *shirt* from co-occurring in the structure with *apparel*, but the cumulative reference of *póló* ('shirt') allows it to co-occur in the structure with *ruházat* ('apparel'). This appeal to general number could be on the right track, given the data from Japanese and Brazilian Portuguese.

Next, the present empirical study and the refined characterization of object mass nouns has increased the known number of object mass nouns in Hungarian (and potentially Japanese). This has implications for the theory of Erbach (2020), according to which the number of object mass nouns is correlated with the amount of mass/count morphosyntax in the language. In particular, Erbach (2020) observes that English has both a large number of object mass nouns (upwards of 50) and a large amount of mass/count morphosyntax, while Hungarian, Greek, and Japanese have fewer object mass nouns (2–3 each in Erbach 2021) and less mass/count morphosyntax. While the number of known object mass nouns in Hungarian is now at least three times higher compared to Erbach (2021), it is still considerably small compared to English (roughly one-fifth), and thus it might still be compatible with Erbach (2020). However, as no quantitative lexicological study on the number of object mass nouns has been carried out on any of the aforementioned languages, we agree with an anonymous reviewer about this conclusion being premature.

The final conclusion is that identifying object mass nouns across languages presents a more difficult challenge than previously thought. (40) entails that it is not enough to consider countability as a whole, but rather one should consider object-countability specifically, since subkind-countability is orthogonal to the identification of object mass nouns. (42) also entails

that the countability of composite objects might also be orthogonal (though this requires further work). Therefore, when testing for object mass nouns, one should test for the countability of both simplex and complex objects as well as subkinds. There is indication from Czech that counting subkinds and composites is marked compared to counting simplex objects, and it follows from (40) that object mass nouns consistently lack the basic sort of countability while the derive sorts are less stable. In closing, there is a great deal more empirical work to be done to further clarify the nature of the data presented here, and regarding object mass nouns across languages.

Abbreviations

1 = first person, 2 = second person, 3 = third person, ACC = accusative, CL = classifier, CS = construct state, DEF = definite, FEM = feminine, GEN = genitive, IN = inessive, INFL = inflectional marker, MSC = masculine, PL = plural, POSS = possessive, PRS = present, PST = past, SFX = derivational suffix, SG = singular, STEM = non-cardinal stem

Ethics and consent

Following the national guidelines of the first author's home country (Germany), the questionnaire was exempt from an ethics vote, as specified by the rules of the German Research Foundation (DFG): psycholinguistic experiments that sample healthy adults and that use behavioral non-invasive methods for data collection do not require a special ethics vote as long as they pose no risk or physical/emotional burden to participants and as long as participants are debriefed after participation (https://www.dfg.de/foerderung/faq/geistes_sozialwissenschaften/).

Competing Interests

The authors have no competing interests to declare.

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