The cognitive basis of the mass-count distinction: evidence from bare nouns[1]

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1. Introduction

The naive view of the linguistic mass-count distinction has been that it reflects a cognitive distinction between homogeneous matter which lacks units for counting, and discrete entities which form atomic units and thus can be counted. The naive view has often been questioned in the literature, most recently when Gillon 1992 and Chierchia 1998 discussed mass nouns which denote discrete entities – such as *jewelry, clothing, furniture, mail.* To consider one example, a chair is an atomic unit of furniture, since part of a chair is not furniture. Thus *furniture* is not homogeneous; nevertheless, it is a mass noun. Conversely, Rothstein 2010 discussed the fact, first pointed out by Mittwoch 1988, that there are count nouns which denote homogeneous entities – such as *fence, line, cloud, bouquet.* Two clouds which come together form a cloud, demonstrating the homogeneity of the count noun *cloud.* As a result of the discrepancy between the mass-count linguistic contrast and the homogeneous-atomic cognitive contrast, the distinction between mass and count nouns emerges in the work of these scholars as partly arbitrary and language specific.

Indeed Chierchia 1998 constructs a theory of the mass-count distinction which views it as a linguistic distinction, only partly cognitively based. In a sophisticated twist, it actually presents those mass nouns with atomic structure such as *jewelry, clothing, furniture, mail*, to be **prototypical** mass nouns. The idea is that the denotation of all mass nouns contains discrete units, for example particular quantities of water in the case of the mass noun *water*, but these units are not linguistically

accessible. Later, Chierchia 2010 abandons this view. One reason is the observation due to Roger Schwarzschild whereby units of mass nouns are linguistically accessible after all, since one can for example predicate size of them in the phrase *the big furniture*, where *big* is the size of units of furniture. Chierchia 2010 readopts the view whereby the mass-count classification reflects a cognitive distinction between types of units. Mass nouns are vague nouns with *unstable* units: within the same context (or actually within precisifications of the contex), entities in the denotation of a mass noun might at the same time be both a unit and an aggregate of units. Only mass nouns which actually have *stable* units, like *furniture*, now treated as *fake mass nouns*, reflect an arbitrary linguistic decision.

Our aim in this paper is to tighten the connection between the mass-count distinction and its cognitive basis. In section 2 we dicuss Karitiana, a language that does not have nominal pluralization and does not have any formal mass-count distinction in the structure of nouns or noun phrases, yet semantically distinguishes nouns which can be counted from nouns which cannot. In section 3, we will bring data from Hebrew, a language which has plural nominal morphology, but where, like in Karitiana, countability is not reflected by pluralization, but rather by a semantic identification of *stable units*. Following Chierchia 2010, we view mass nouns as denoting entities with *unstable units*: within the same context, an entity is at the same time both a unit and an aggregate of units. Count nouns on the other hand have stable units in a given context. We discuss a new example of mass nouns with atomic structure, found in Hebrew and hitherto undiscussed in the literature. The analysis of this new example will substantiate the 2010 model, as it demonstrates that even fake mass nouns fit unarbitrarily into the mass-count classification. Thus we believe that the claim that the mass-count distinction reflects a cognitive distinction can be extended to its limit and include fake mass nouns.[2] In the system of Chierchia 2010 there is no need to assume, as he does, that fake mass nouns reflect the arbitrary linguistic decision to ignore their existing atomic structure. Rather, we will show a principled reason for their mass nature.

(A)   We claim regarding such mass nouns as *furniture* that they are bona-fide mass terms, since what counts as a unit of furniture in a given context is not stable; it could

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[2] A different type of approach for the substantiation of the same claim is found in Grimm and Levin 2011.

be the whole sitting room set or just one of its parts. Accordingly, it may be felicitous in a given context to utter *This living room set is so much furniture!*

(B)   Conversely, count nouns have stable units in each given context. For example, *cloud* is bona-fide count, since considering parts of a cloud to be separate clouds necessitates changing the context. In order to view a cloud both as a unit and as several units at the same time, a gestalt switch is required which changes the context mid sentence in *#This cloud is so many clouds!*

Point (B) has already been argued in Nicolas 2002 and Chierchia 2010, and in this paper we therefore concentrate on substantiating point (A), the instability of the units of such mass nouns as *furniture*.

But first we argue, on the basis of Karitiana, for the general point that countability is independent of a formal linguistic mass-count distinction.

2. Karitiana

Karitiana is a Tupi-Arikém language spoken in Rondônia, in the western Brazilian Amazonic region. The language has around 400 speakers, most of them living in a demarcated reservation in Rondônia. The mass-count distinction is not formally encoded in Karitiana in any way, yet the language semantically distinguishes nouns which can be directly counted from nouns which cannot. A similar claim has been made by Wilhelm 2008 for Dëne Suliné.

The mass-count distinction is not formally encoded in Karitiana in any way. First, there is no nominal number morphology in the language that could set apart mass from count nouns (see Müller *et al.* 2006). The word *pikom* ('monkey') in sentence (1a) below is entirely undefined as for whether the number of monkeys eaten is one, more than one, or even parts of one or various monkeys. In (1b) *oho* is a bare singular referring to a kind:[3]

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[3] The data from Karitiana was collected by Müller during fieldwork. The examples are presented as follows – 1st line: orthographic transcription of the Karitiana sentence; 2nd line: morphological segmentation; 3rd line: morpheme by morpheme gloss; 4th line: translation. Abbreviations used in the glosses are as follows: abs = absolutive; abs.agr = absolutive agreement; anaph = anaphor; ass = assertive mood; caus = causative; cop = copula; cop.agr = copula agreement; decl = declarative mood; deic = deictic; fem = feminine; ft = future; impf = imperfective; inv = inverse; masc = masculine; nft = non-future tense; nmz = nominalizer; obl = oblique; pl = plural; postp =postposition; rdpl = reduplication; s = singular; sub = subordinator; tv = thematic vowel; 1, 2, 3 = 1st,2nd, 3rd person.

3

(1)a. *yn naka'yt   pikom*

      yn Ø-naka-'y-t   pikom

      1s 3-DECL-eat-NFT monkey

      'I ate (the/a/some) monkey(s).'

   b. *oho   atakam'at   Ora*

      oho   Ø-a-taka-m-'a-t   Ora

      potato   3-INV-DECL-caus-make-NFT Ora

      'Potatoes, Ora created (them)'

Nevertheless counting is attested in the language. In sentence (2a), the phrase *myhint pikom* ('one monkey') is semantically singular, whereas in sentence (2b) the phrase *sypomp pikom* ('two monkeys') is semantically plural. Yet, the noun *pikom* remains uninflected for number in both environments. In addition, Karitiana is not a classifier language, since, as the examples in (2) show numerals and common nouns combine directly.

(2)a *yn naka'yt   myhint pikom*

      yn Ø-naka-'y-t   myhin-t pikom

      1s 3-DECL-eat-NFT one-OBL monkey

      'I ate one monkey.'

   b *yn naka'yt   sypomp pikom*

      yn Ø-naka-'y-t   sypom-t pikom

      1s 3-DECL-eat-NFT   two-OBL monkey

      'I ate two monkeys.'

Not even personal pronouns are marked for number in the language. Table 1 presents the paradigm of personal pronouns. The 3rd person is clearly non-variable. On the other hand, 1st and 2nd person plural pronouns do not incorporate any morpheme with a plural meaning. They are formed by the suffixation of the 3rd person anaphora *ta* or by the suffixation of the third person pronoun *i*, as shown in second column of Table 1.

Table 1: Personal pronouns in Karitiana (Müller et al 2006)			
Pronoun	Morphology	Person	Meaning
yn	y+n	1s	I+ participant
na	a+n	2s	you + participant

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i	i	3	other (non-participant)
yjxa	y+i+ta	1pl (inclusive)	I+other(s)+anaphor
yta	y+ta	1pl (exclusive)	I+anaphor
ajxa	a+i+ta	2pl	you+other(s)+anaphor
i	i	3	other

Second, measure quantifiers and demonstratives do no distinguish between mass and count either, as they combine equally with both. The quantifiers *kandat* 'much/many' and *syyn* 'a little/few' co-occurs both with count and mass nouns. Examples with *kandat* are given below:

(3)a *kandat*   *taso*   *naponpon*   *sojxaaty kyn*

      kanda-t   taso   Ø-na-pon.pon-Ø   sojxaaty kyn

      much-OBL   man   3-DECL-shoot.RDPL-NFT   boar   at

      'Many men shot at boars.'/'Men shot at boars many times.'

  b *jonso*   *nakaot*   *kandat*   *ese*

      jonso   Ø-na-ot-Ø   kanda-t   ese

      woman   3-DECL-get-NFT   much-OBL   water

      'Women brought a lot of water.'/ 'Women brought water many times.'

Universal quantifiers, which are expressed by relative clauses, combine equally well with count and mass nouns:

(4)a *taakatyym*   *nakapyyk*   *ombaky Maria Conga*   *pip*

      ta-aka-tyym   Ø-naka-pyky-t   ombaky Maria Conga   pip

      3.ANAPH-cop-sub   3-DECL-be.over-NFT   jaguar   Maria Conga   POSTP

      'All jaguars are gone from Maria Conga.'

  b *taakatyym*   *nakapyyk*   *oro*   *Maria Conga pip*

      ta-aka-tyym   Ø-naka-pyky-t   oro   Maria Conga pip

      3.ANAPH-cop-sub   3-DECL-be.over-NFT   gold   Maria Conga   POSTP

      'All gold is gone from Maria Conga.'

Similarly, demonstratives too combine both with mass and count nouns:

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(5)a *tykat idjiera   ahop aka   a   ese   aka*

    tykat i-djera-Ø   ahop aka   a   ese   aka

    IMPF   NMZ-cost-NFT much cop   DEIC   water cop

    'How much does this water cost?'

  b *dibm   nakatari   a   õwã   aka*

    dibm   naka-tar-i   a   õwã   aka

    tomorrow   DECL-leave-FT DEIC   child cop

    'These boys will leave tomorrow.'

Nevertheless, the mass-count distinction manifests itself in what Chierchia 2010 has called "the signature property", which is the marked status of a mass noun when combined directly with a numeral expression. Count nouns are naturally modified by numerals, as illustrated in the sentences in (2), and by sentences (7) and (9) below, whereas mass nouns, if they do so, require contextual information in order to be interpreted, as illustrated by the awkwardness of sentences (6) and (8) when uttered in out-of-the blue contexts. The contrast in acceptabiliy between examples (6) and (8), and examples (7) and (9) shows that the denotation of certain nouns can only be counted if count units are introduced (explicitly or implicitly).

(6) */# *myhint ouro   naakat   i'orot*

    myhin-t oro   na-aka-t   i-'ot.'ot-t

    one-OBL gold   DECL-cop-NFT   NMZ-fall.RDP-ABS.AGR

    'One gold fell.'

(7) *myhint kilot   ouro   naakat   i'orot*

    myhin-t kilo-t   oro   na-aka-t   i-'ot.'ot-t

    one-OBL kilo-OBL gold   DECL-cop-NFT NMZ-fall.RDPL-ABS.AGR

    'One kilogram of gold fell.'

(8) # *jonso   nakaot   sypomp   ese*

    jonso   naka-ot-t   sypom-t   ese

    woman   DECL-bring-NFT two-OBL   water

    'The woman brought two waters.'

(9) *jonso   nakaot   sypomp   bytypip   ese*

    jonso   naka-ot-t   sympom-t   byty-pip   ese

    woman   DECL-bring-NFT two-OBL   bowl-POSTP water

    'The woman brought two bowls of water.'

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Counting can be encoded in Karitiana by modifiers other than numerals, as in (10) below. The distributive numerals *myhint myhint* ('one one') and *sypomp sypomp* ('two two') are sentential adjuncts that distribute individuals over events in the sentences at hand. The individuals are separated in groups which have their cardinality determined by the distributive numeral so that, in sentence (10a) boys are 'grouped' one by one, and in sentence (10b), men are grouped in twos. The distribution of groups of individuals of a given cardinality presupposes individuation in both sides of the distributive relation – in our case, one boy per event of going to the river or two men per event of arriving.

(10)a   *myhint.myhint*   *nakahori*   *õwã*   *se*   *pip*

         myhin-t.myhin-t   naka-hot-i   õwã   se   pip

         one-OBL.one-OBL   DECL-go.PL-FT   child   river   POSTP

         'Boys will go to the river one at a time.'

    b   *sypomp.sypomp*   *naotãm*   *taso*

         sypom-t.sypom-t   na-otãm-Ø   taso

         two-OBL.two-OBL   DECL-arrive-NFT   man

         'Men arrived two at a time.'

Distribution then can only operate on count arguments. As expected, distributive quantifiers applied to mass nouns do not yield grammatical sentences, as illustrated by the sentences (11) and (12), unless particular contexts are given so that they introduce feasible measure phrases for the nouns at hand.

(11) */# *ese*   *naakaj*   *i'orot*   *myhint.myhint*

        water   na-aka-j   i-'ot.'ot-t   myhin-t.myhin-t

        water   DECL-cop-FT   NMZ-fall.RDPL-ABS.AGR   one-OBL.one-OBL

        'Water will fall one at a time.'

 (12) */# *sypomp.sypomp*   *naotãm*   *ouro*

        sypom-t.sypom-t   na-otãm-Ø   oro

        two-OBL.two-OBL   DECL-arrive-NFT   gold

        'Gold arrived two at a time.'

    Thus in Karitiana the individuability of units is directly reflected for some nouns, without the mediation of morphology, since the difference between

individuated vs. non-individuated nouns is expressed in their ability to be interpreted in certain grammatical constructions and their corresponding semantic operations. This is not contradicted by examples of what Chierchia 2010 calls the property of "elasticity". One finds mass to count and count to mass coercion in the language. Count nouns may be coerced into mass by the so-called "universal grinder", as illustrated below by the word *'ep* that is count in (13a) and (14a) (meaning 'tree'), but turns mass in (13b) and (14b) (meaning 'wood'). According to Chierchia, grinding count nouns into mass nouns seems to involve the notion of material part of, which is also illustrated by sentence (15) in the context of a rat being smashed against a wall.[4]

(13)a   *'ep*   *itipasagngãt*   *João*

        'ep   i-ti-pasag.pasag-t   João

        tree   3-INV-count.RDPL-NFT   João

        'The trees, João is counting (them).'

   b   *'ep*   *naakat*   *jepyryt*

        'ep   Ø-na-aka-t   jepyry-t

        wood   3- DECL-cop-NFT   club-ABS

        'The club is of wood.'

(14)a   *myhint.myhint*   *namangat*   *'ep*   *João*

        myhin-t.myhin-t   Ø-na-mangat-Ø   'ep   João

        one-OBL.one-OBL   3-DECL-carry-NFT   tree   João

        'João carried trees one by one.'

   b   *myhint*   *namangat*   *kandat*   *'ep*   *João*

        myhin-t   Ø-na-mangat-Ø   kandat   'ep   João

        one-OBL   3-DECL-carry-NFT   much-OBL   wood   João

        'João carried a lot of wood at once.'

(15)   *pyryhopiyn*   *mejahygng*   *amby*   *parede*   *sok*

        pyry-hop-iyn   mejahygng   house   parede   sok

        ASS-exist-NFT   rat   house   wall   over

        'There was rat all over the wall.'

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[4] though Cheng, Doetjes and Sybesma 2008, on the basis of data from Mandarin, argue that the grinder reading is not similarly available in all languages.

The reverse coercion, of mass nouns into count nouns, is also attested in Karitiana, by what Lewis called the "universal packager", which inserts context dependent units as in (16):

(16)a ony   sypomp   ge   aka   naakat   ipositivot

        ony   sypom-t   ge   cop   na-aka-t   i-positivo-t

        deic   two-OBL   blood cop   DECL-cop-NFT   NMZ-positive-ABS

        'Those two bloods (blood containers) are positive.'

   b myjymp   him   pysyp iorot

      myjym-t   him   pysyp i-ot-ot-Ø

      three-OBL   game   meat   NMZ-fall.RDPL-ABS

      'Three (pieces of game) meat fell'/ 'Three steaks fell'

In Karitiana, it appears that all nouns with atomic structure are countable, i.e. we do not find fake mass nouns in this language. For example, *clothes/ clothing,* which is a fake mass noun in some languages, and could have been considered a mass term in Karitiana as well, since it appears with *much* in e.g. (17a), can actually be counted, as shown in (17b):

(17)a Milena   naakat   iamyt   kandat   pykyppyty

            Ø-na-aka-t   i-amy-t   kanda-t   pykypp-y-ty

       Milena   3-DECL-cop-nft   NMZ-buy-NFT   much-OBL   clothes-TV-OBL

       'Milena bought a lot of clothes.'

   b Milena   naakat   iamyt   sypomp   pykyppyty

           Ø-na-aka-t   i-amy-t   sypom-t   pykypp-y-ty

      Milena   3-DECL-cop-nft   NMZ-buy-NFT   two-OBL   clothes-TV-OBL

      'Milena bought 2 pieces/units of clothes.'

In this section, we have shown that the conceptual distinction of countability is directly expressed in Karitiana without the mediation of morphological marking of count nouns.[5]

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[5] A reviewer rightly points out that a full understanding of the basis of the mass/count distinction in Karitiana would require an extensive investigation of all nouns which exhibit variable-behavior in different languages, e.g. *furniture, hair,* as well as abstract nouns. We leave this investigation to future research.

3. Hebrew

Unlike Karitiana, Hebrew has plural nominal morphology. Yet as in Karitiana, it is not plural morphology which distinguishes count from mass nouns in Hebrew.

3.1. Plural Morphology in Hebrew

Among nouns which pluralize, we can distinguish broadly between three noun classes in Hebrew, according to their plural morphology. These classes only partly overlap with gender distinctions (cf. Bat-El 1989, Faust 2011, Ritter 1995, Schwarzwald 1991). Class I nouns, which are mostly masculine, have the suffix *–im* in the plural. Class II nouns are often feminine, and are inflected in the plural by the the suffix *–ot*. Class III nouns mostly denote members of natural pairs, and are inflected in the plural by the suffix *–áyim*.[6] These are shown in (18a-c) respectively:

(18) a. Class I nouns (plural suffix –im)
     ħatul / ħatul-im   *dbor-a / dbor-im*
     cat.masc cats   bee-fem bees

  b. Class II nouns (plural suffix –ot)
     tmun-a / tmun-ot   *ħalon   / ħalon-ot*
     picture-fem pictures   window.masc windows

  c. Class III nouns (plural suffix –áyim)
     magap / magap-áyim   *géreb / garb-áyim*
     boot.masc boots   sock.fem socks

The nouns illustrated in (18) above are all count nouns. Most mass nouns in Hebrew do not pluralize:[7]

(19)   *órez * oraz-im*   *ħacac * ħacac-im*
     rice.masc rice-pl   gravel.masc gravel-pl

     *avir *avir-im*   *boc   *boc-im*
     air.masc air-pl   mud.masc mud-pl

     *méši * meši-im*   *ħem'-a * ħem'-ot*
     silk.masc silk-pl   butter-fem butter-pl

     *kutn-a * kutn-ot*   *ħalud-a * ħalud-ot*
     cotton-fem cotton-pl   rust-fem   rust-pl

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[6] If attached to nouns which do not denote members of natural pairs, the suffix *–áyim* may be interpreted as dual rather than plural, but we will not be interested here in the dual.

[7] Some plural forms in (19) are found when these mass nouns are coerced to count readings, by e.g. the "universal packager" or "subkind coercion". These are always the default forms, i.e. Class I for masculine nouns and Class II for feminine nouns.

But there are also quite a few mass nouns in Hebrew which are plural, where plural morphology does not mark a count reading but retains the mass interpretation. First, there are mass nouns which are *pluralia-tantum*. These nouns are obligatorily inflected with a plural suffix from one of the three classes I – III:[8]

(20) *haris-ot * haris-a*   *'atiq-ot * 'atiq-a*   *šimur-im *šimur*
      ruins   antiquities   canned goods

      *šmar-im   * šémer*   *m-áyim   *ma*   *šam-áyim *šama*
      yeast-pl   water-pl   sky-pl

      qur-ey [9]*/ *qur aka<u>b</u>iš*   *kl-ey / *kli mita*   *maca'-im   maca'*
      web-pl   spider   linen-pl   bed   bed-linen-pl bed
      'spider webs'   'bed linen'

Second, there are also mass nouns which have a morphological contrast between singular and plural forms:

(21)   *géšem   / gšam-im*   *šéleg   / šlag-im*
            rain.masc   rain-pl   snow.masc   snow-pl

            déše   / dša'-im   *ed   / ed-im*
            grass.masc grass-pl   steam.masc   steam-pl

            kése<u>p</u>   / ksa<u>p</u>-im   *dam   /   dam-im*
            money.masc   money-pl   blood.masc   blood-pl

            adam-a /   adam-ot   *ašp-a   / ašp(-at)-ot*
            land-fem   land-pl   rubbish-fem rubbish-pl

            ħol   / ħol-ot   *ruaħ   /   ruħ-ot*
            sand.masc   sand-pl   wind.fem   wind-pl

            merħa<u>b</u>   / merħa<u>b</u>-im
            space.masc   space-pl

Semantically, the plural form of mass terms, when it contrasts with the singular, denotes *abundance plural*, similarly to what has been reported for other languages (Corbett 2000, Ojeda 2005, Tsoulas 2006, Acquaviva 2008, Alexiadou 2011).

We conclude that overt plural morphology does not distinguish count from mass nouns. Rather, as in Karitiana, the distinction between count and mass nouns depends on the availability of counting, i.e. cooccurrence with cardinality modifiers.

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[8] Some of these singular forms exist as deverbal nominalizations, e.g. *haris-a* 'destruction', *šimur* 'preservation'.
[9] *-ey* is the construct-state form of the plural suffixes *–im* and *–áyim.*

3.2. The Cardinality Modifier Criterion

Count nouns combine with cardinality modifiers such as one, two, several.

(22)a. *yéled   eħad*   *yelad-im aħad-im*   *šney   yelad-im*
     child.masc one.masc   child-pl one-pl   two.masc child-pl
     'one boy'   'several boys'   'two boys'

   b. *yald-a   aħat*   *yelad-ot aħad-ot*   *štey   yelad-ot*
     child-fem one.fem   child-pl one-pl   two.fem child-pl
     'one girl'   'several girls'   'two girls'

Cardinality modifiers do not combine with mass nouns, irrespective of whether these mass nouns are *singularia tantum*, *pluralia tantum*, or alternate in plurality. In particular, this indicateds that the plural mass terms illustrated in (20) and (21) above are indeed mass terms: similarly to singular mass terms, they do not co-occur with cardinality modifiers.

(23) **órez eħad*   * *dam-im aħad-im*
     rice   one   bood-pl one-pl
     *'one rice'   *'several bloods'

   * *ħalud-a   aħat*   * *štey   ruħ-ot*
     rust-fem one.fem   two.fem wind-pl
     *'one rust'   *'two winds'

   * *ħol-ot aħad-im*   * *šney   šmar-im*
     sand-pl one-pl   two.masc yeast-pl
     *several sands'   *'two yeasts'

3.3. The Measure Quantifier Criterion

Like in Karitiana, there are measure quantifiers in Hebrew such as *a lot, a little,* which basically measure quantities, and they co-occur both with mass nouns and with count nouns. Count nouns combined with these quantifiers are interpreted as pluralities, both in Karitiana and in Hebrew, but in a languages such as Hebrew, their plurality must be morphologically marked. This gives rise, in languages with plural morphology, to an additional distributional criterion for the mass-count distinction: plurality is imposed on count nouns but not mass nouns for the purpose of measure quantification. This criterion has been emphasized in the semantic literature at least since Pelletier 1975 and Link 1983, as it demonstrates the semantic affinity of plural count nouns to mass nouns.

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In Hebrew, examples of measure quantifiers are *harbe* 'a lot of', *me'at* 'a little', *ódep/ yoter miday* 'too much', *kílo* 'a kilo of' etc. They co-occur both with count nouns and mass nouns, but in the case of count nouns, they only co-occur with plural forms of the noun. This is illustrated by the contrast between (24a), where the count nouns are plural, and the ungrammatical (24b), with singular count nouns:

(24)a. *harbe yelad-ot*   *me'at ħatul-im*   *kílo tapuħ-im*   *ódep   botn-im*
        a lot   child-pl   a little cat-pl   kilo apple-pl   too much peanut-pl

        'many girls'   'few cats'   'a kilo apples'   'too many peanuts'

    b. **harbe yald-a*   **me'at ħatul*   **kílo tapúaħ*   **ódep   bóten*
        a lot child-fem   a little cat   kilo apple   too much peanut

When combining with mass nouns, measure quantifiers allow singular morphology (though plural morphology is also an option for mass nouns which have plural forms, preserving the *abundance plural* reading):

(25)   *harbe ħol/ ħol-ot*   *me'at órez*   *kílo šum*   *ódep géšem / gšam-im*
        a lot   sand/sand-pl   a little rice   kilo garlic   too much rain/ rain-pl

        'much sand'   'a little rice'   'a kilo garlic' 'too much rain'

3.4.   The paradox of flexible nouns

The two distributional criteria described in sections 3.2 and 3.3 above mostly yield consistent results separating between mass nouns (*ħol* 'sand', *órez* 'rice', *šum* 'garlic', *géšem* 'rain' etc.) and count nouns (*yald-a* 'girl', *ħatul* 'cat', *tapúaħ* 'apple', *bóten* 'peanut' etc.). But as already mentioned above for Karitiana, there is elasticity in the system, and as a result there are nouns which these two criteria fail to classify. Some are of the types which are familiar crosslinguistically. First, nouns which are usually taken to basically be counts nouns and are coerced to mass readings by the "universal grinder", e.g. *kébes* 'lamb' also interpreted as meat, *op* 'bird' also interpreted as chicken meat, *ec* 'tree', also interpreted as wood:

(26)a *šloša kbas-im*   *ħamiša   op-ot*   *šney   ec-im*
       three.masc lamb.masc-pl   five.masc bird.masc-pl   two.masc tree.masc-pl
       'three lambs'   'five birds'   'two trees'

    b *ódep   kébes*   *kílo op*   *harbe ec*
       too much   lamb   kilo chicken   a lot   wood
       'too much lamb'   'a kilo of chicken'   'a lot of wood'

Second, nouns which are usually considered to be basically mass nouns and are coerced to count readings by the "universal packager", e.g. *stone*, *rope*, *beer*, *soap*,

(27)a   *tona ében*   *harbe ħébel*   *yoter miday bir-a*
      ton   stone   a lot   rope   too much   beer-fem
      'a ton of stone'   'a lot of rope'   'too much beer'

   b   *ħameš   aban-im*   *šney ħabal-im*   *šaloš   bir-ot*
      five.fem   stone.fem-pl   two.masc rope.masc-pl   three.fem beer.fem-pl
      'five stones'   'two ropes'   'three beers'

or by the "subkind coercion" whereby *šaloš birot* 'three beers' means 'three kinds of beer'.[10,11]

     But there is an additional class in Hebrew which we will call *flexible nouns*, which the two criteria fail to classify. According to the first criterion, co-occurrence with cardinality modifiers, these are count nouns. The examples in (28a) below show that flexible nouns co-occur with cardinality modifiers. Yet these nouns are found in the singular with measure quantifiers, as in (28b), and are thus classified as mass nouns by the second criterion.[12]

(28)a   *ħamiša gzar-im / šib'a   bcal-im/ štey   ħás-ot / dla'-ot*
      five   carrots/   seven onions/   two lettuces/ pumpkins

      šmona   cnon-im/ tíras-im /krub-im / tut-im
      eight   radishes / corncobs/ cabbages/ mulberries

   b   *kílo gézer / bacal/ tut   / ħás-a/   lépet*
      kilo carrot/ onion/ mulberry/   lettuce/   turnip

      ódep   cnon / tíras / krub   / dlá'at / šumar
      too many   radish/ corn / cabbage /   pumpkin / fennel

     The mass interpretation in (28b) is not the result of coercion by the "universal grinder", since it is not necessarily e.g. mashed carrot substance but individuated carrots which are measured.[13] Similarly, though it is possible to interpret *tíras* 'corn' as corn grains in (28b), it is also interpretable as individuated corn cobs. Also, whereas

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[10] Some authors (e.g. Barner and Snedeker 2005) do not consider *stone* and *rope* to be basically mass terms.
[11] Subkind coercion has been shown to be at work even in languages that do not have a plural morphology (Chung 2000), but we were not able to find such examples in Karitiana.
[12] Flexibility cannot be attributed to the absence of grammatical number (Kwon and Zribi-Hertz 2004), which is present in Hebrew.
[13] Other fruits/vegetables, typically large ones, only have a coerced mass reading, where the mass term denotes substance of the fruit denoted by the count noun: *milon* 'melon', *abatíaħ* 'watermelon'.

ódep kébes 'too much lamb' cannot be interpreted as 'too many lambs' (for which the plural would have to be used in Hebrew as well as in English), *ódep gézer* 'too much carrot' can be interpreted as 'too many carrots' despite of the singular form of *gézer* 'carrot'. Moreover, if the mass interpretation of flexible nouns were the effect of the "universal grinder", we would expect the same interpretation for the count nouns in (29) below such as *apple* and *peanut*, but this is not the case. (29) includes *bona fide* count nouns which are not flexible, i.e. they usually appear in the plural with measure phrases:[14]

(29)a   *kílo tapux-im/ agas-im/ xacil-im   / qišu-im   / eškoliy-ot*
      kilo apples/   pears / aubergines/ courgettes / grapefruits

      harbe   adaš-im/ anab-im/ zeyt-im/ botn-im/ dubdeban-im
      many   lentils/ grapes/ olives/ peanuts/ cherries

      ódep   agbaniy-ot/ šezip-im/ tapuz-im / pitriy-ot
      too many   tomatoes/   plums / oranges / mushrooms

   b **kílo tapúax / agas / xacil   / qišu   / agbaniy-a*
       kilo apple/ pear / aubergine/ courgette / tomato

      *harbe   adaš-a/ anab/   záyit / bóten   / dubdeban
       many   lentil/ grape/ olive/ peanuts/ cherry

      * ódep   eškolit   / šezip / tapuz / pitriy-a
       too many   grapefruit/ plum/ orange / mushroom

Neither is the count interpretation in (28a) the result of coercion by the "universal packager". Unlike *stone*, *rope*, *beer* in (27) which we consider to be mass nouns that may give rise to standardized units, the flexible nouns *carrot*, *onion*, *mulberry* etc in (28) have very salient natural units just like *bona fide* count nouns such as *apple*, *pear*, *olive* in (29).

Flexible nouns are found in the singular in additional contexts where the plural is normally required with counts nouns, such as in (30a) below, where a plurality of units is intended, yet the singular can be used with flexible nouns. A relevant context would be the planning of a shopping expedition to the market, where one does not normally buy single fruits and vegetables. With *bona fide* count nouns, as in (30b), singularity gives rise to an anomalous interpretation in this context, since the only

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[14] We leave out borrowed nouns such as *míšmiš* (Arabic) 'apricot', *ánanas* (French) 'pineapple', *anóna* (Latin) 'sweetsop', *aboqádo* 'avocado', *batáta* 'sweet potato', *fijóya* 'feijoa', and also *singularia tantum* nouns, which resists plural morphology, both in the context of counting and in the context of measuring, yet are nevertheless clearly count nouns, as they appears with the same number morphology in both environments, e.g. *šney šeseq* 'two loquats', *kilo šeseq* 'a kilo loquats'.

possible interpretation would be one where the addressee is asked to buy a single exemplar at the market. Yet apples, just like carrots, are typically not purchased by the unit at the market but by the kilo:

(30)   (In the context of shopping)
    a   *tiqni gézer / tut   /   šumar* / bacal
         buy carrot / mulberry/ fennel / onion
         'Buy carrots/ mulberries/ fennels/onions.'

    b   # *tiqni tapúaħ/ agas/ tapuz/   agbaniya/ šezip*
         buy apple/   pear/ orange/ tomato / plum
         # 'Buy an apple/a pear/ an orange/ a tomato/ a plum.'

In the same shopping context, it is possible to form the comparative on the singular of *carrot* but not *apple*:

(31)   (In the context of shopping)
    a   *hi qanta yoter gézer /cnon/ bacal mi   ma   še- biqašnu*
         she bought more carrot/radish/ onion than what that we-asked
         'She bought more carrots/ radishes/ onions than we asked.'

    b   * *hi qanta yoter tapúaħ/ agbaniya/ šezip mi   ma   še- biqašnu*
         she bought more apple/ tomato / plum   than what that we-asked

In partitive and existential examples where there isn't a contextual preference for plural readings and both singular and plural interpretations are on principle felicitous, the singular form of a count noun in (32b-33b) below only gives rise to a single unit interpretation, whereas the singular form of the flexible noun in (32a-33a) also refers to a plurality in addition to singular reference.

(32)a. *rob   ha-gézer raquv*   b. *rob   ha-tapúaħ raquv*
       most (of) the carrot   is rotten   most (of) the apple   is rotten
       'Most of the carrot is rotten.'   'Most of the apple is rotten.'
       'Most of the carrots are rotten.'

(33)a. *yeš   gézer b-a-tiq*   b. *yeš   tapúaħ b-a-tiq*
       there (is) carrot   in-the-bag   there (is) apple   in-the-bag
       'There is a carrot in the bag.'   'There is an apple in the bag.'
       'There are carrots in the bag.'

The examples below in (34) – (35) below demonstrate that flexible nouns give rise to amount relatives in the singular, unlike ordinary count nouns (Carlson 1977):

(34)   *b-a-ħayim lo nacliaħ   le-gadel et ha-gézer*
        in-the-life not we-succeed to-grow acc the-carrot
        še   hem crikim bišbil mif'al-ha-šimurim   šel-ahem

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that they need   for   the-canning-factory of-theirs
'Not even in a life-time will we succeed to grow the carrots that they need for their canning factory.'

(35)   *b-a-ħayim lo   nacliaħ   le-gadel et ha-tapuħ-im/*tapúaħ*
in-the-life not we-succeed to-grow acc the-apples/*apple
še hem crikim bišbil mif'al-ha-šimurim   šel-ahem
that they need for   the-canning-factory of-theirs
'Not even in a life-time will we succeed to grow the apples that they need for their canning factory.'

The examples in (36) – (37) below demonstrate that reference to kinds also distinguishes between count nouns and flexible nouns, which can have the distribution of mass nouns. Singular reference to kinds is impossible in the environments in (36) – (37) for count nouns, but is possible for mass nouns (Doron 2003). Flexible nouns appear in the singular in these environments, like mass nouns and unlike count nouns. For example, a bare singular noun in the object position of *love* can denote a kind, which is possible for singular flexible nouns, similarly to mass nouns, but not for count nouns, as shown in (36). Additionally, count nouns such as *apple* and *tomato* must be pluralized in the compounds *apple-juice* and *tomato-soup* in Hebrew, whereas the flexible noun *carrot* and *onion* are singular in the same compounds, as shown in (37).

(36)   *ani ohebet gézer   / *tapúaħ / tapuħ-im*
I   love   carrot /   apple / apples
'I love carrots/apples.'

(37)a *mic   gézer / *tapúaħ   / tapuħ-im*
juice carrot /   apple   / apples
'carrot/apple juice'

   b *maraq   bacal / *agbaniy-a / agbaniy-ot*
soup   onion / tomato   / tomatoes
'onion/tomato soup'

To summarize this section, we have seen that flexible nouns are distinguishable from count nouns. Flexible nouns appear in the singular in environments where count nouns are typically plural:

A. In the environment of measure quantifiers such as *harbe* 'a lot of', *me'at* 'a little', *ódep/ yoter miday* 'too much', *kílo* 'a kilo of'

B. In the context of shopping

C. In partitive and existential constructions

D. With amount relatives

E. In reference to kinds

On the other hand, flexible nouns are similar to mass nouns such as *petruzílya* 'parsley', *šamir* 'dill', *téred* 'spinach', *šu'iyt* 'bean', *šum* 'garlic'. Mass nouns, like flexible nouns, are singular when combined with measure quantifiers, as shown in (38a). But unlike flexible nouns, mass terms are not countable, as shown in (38b):

(38)a *kílo téred*　　*harbe petruzíly-a*　*me'at šamir*　*ódep̱*　　*šu'iy-t*
　　　kilo spinach　　much parsley　　a little dill　　too much　bean

　b *téred eħad*　* *štey petruzíly-ot*　* *šamir eħad*　* *šaloš šu'iy-ot*
　　　one spinach　　two　parsley-pl　　one dill　　　three bean-pl

3.5　Fake mass nouns

The flexible nouns introduced in the last section have a lot in common with what Chierchia 2010 called *fake mass nouns*, a term which he coined for nouns like English *furniture*, *jewelry, mail*, mass nouns which have recognizable atomic units. The flexible Hebrew nouns *carrot, fennel, onion, mulberry, cabbage* etc have the characteristics of fake mass nouns: on the one hand they have the distribution of mass nouns, and on the other hand they have recognizable atomic units. There is one difference between flexible nouns and fake mass noun, and it is that the former, unlike the latter, also have the distribution of counts nouns. We will return to this difference below, but, based on the similarities, we will henceforth consider flexible nouns in Hebrew to be fake mass nouns.

We propose that what semantically characterizes fake mass nouns is that they have units which can be individuated in many contexts, yet speakers are actually not normally interested in these units. The reason is that the typical context for the use of these terms normally involves other units, which, in the case of the English fake mass nouns, are typically aggregates of the atomic units. These aggregates are unstable, in that modifiying them in the process of context precisification changes their status as units. Consider the English fake mass nouns *furniture, clothing, bed-linen, mail, silverware*. These predicates have perceptible atomic units like a chair, a knife, a letter, a shirt, a sheet. Yet in most everyday contexts we are not interested in these

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units, but in other units which are aggregates of these units: a set of tableware, a living-room set, a combination of clothes, a set of bed linen, the contents of a mailbox. These aggregates are not themselves stable units, since we could include poorer or richer aggregates in more precise contexts, which may result in the original aggregates loosing their status as units. Accordingly, these concepts lack stable units, and the type of predicate which denotes them is indeed a mass term.[15] A similar point is independently made by Landman 2010 regarding the nature of fake mass nouns. According to him, fake mass nouns, which he calls *neat mass nouns*, have possibly overlapping generators, that is, both atomic individuals and their groupings may count as 'one'.

Turning to Hebrew fake mass nouns, the examples we have considered so far all name fruits and vegetables. Examples parallel to the English fake mass nouns exist as well; we will return to them in the next section. The fruit and vegetable fake mass nouns, like the English-type fake mass nouns, have natural atomic units. Yet in the context of preparation of food, we are not normally interested in the natural units of these particular fruits and vegetables, but typically in edible serving-size units. What characterizes these particular fruits and vegetables seems to be their texture, which determines the ease with which serving size units can be constructed. Fruits and vegetables with uniform texture easily lend themselves to have parts or aggregates considered to be food portions. On the other hand, one cannot indiscriminately carve food portions out of apples, plums and oranges, because their texture is not uniform and contains corks, pits, sections, etc. The same consideration extends to courgettes, cucumbers and aubergines, which are not uniform in texture since some of their parts are packed with seeds and others are free of seeds. These are therefore *bona fide* count nouns. Carrots, turnips and radishes, on the other hand, have uniform texture, and thus avail themselves to be carved into portions, or have portions constructed from parts of different natural units. Similarly for onions, cabbage, lettuce, fennel, which also carve out naturally out into indiscriminate parts. All these are fake mass nouns in Hebrew. It is predicted that though minuscule fruit never form serving-size portions by themselves, they are not all categorized in the same way. Fruits with pits,

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[15] In the case of the fake mass noun *change*, each coin is a unit, yet at the same time its monetary value has different units, e.g. a two-Euro coin is counted just like two one-Euro units for the purpose of paying. Thus *change* inseparably involves both coins and their values, and though both types of units are stable, the existence of two sets of equally salient units in the same context prevents using either for counting.

such as olives and cherries do not have uniform texture and do not allow indiscriminate formation of serving-size portions. They are therefore classified as count nouns. Strawberries and mulberries are uniform in texture, and are thus fake mass terms.

We thus propose that fake mass nouns are nouns which naturally allow for an additional mode of individuation in parallel to their natural atomic structure, within the same context. This additional mode of individuation is the one typically relevant to speakers, and it determines the distribution of these nouns. The units of this mode of individuation are unstable, which is a property that characterizes mass nouns in Chierchia's 2010 system.[16]

3.6.   The collective-singulative alternation

We now return to the difference between English and Hebrew fake mass nouns, i.e. Hebrew fake nouns also have the distribution of count nouns. We attribute this difference to the fact that Hebrew does, and English doesn't, have singulative morphology which marks the selection of natural units, and the shift of the type of these nouns from mass to count. Singulative morphology differs from the "universal packager" in that it does not derive standardized units of mass nouns in general, but it only applies to fake mass nouns which have natural units to begin with.

Singulative morphology (*nomen unitatis)* in Hebrew, and in Semitic languages in general, e.g. Arabic (Wright 1859: 147) and Neo Aramaic (Khan 2008: 343), is homonymous to **collective morphology**, both expressed by the feminine suffix, cf. Moscati et al. 1964: 86. This type of polar morphology is an example of the phenomenon of *morphological reversal*, whereby two opposite processes make use of the same exponent (Baerman 2007). In Modern Hebrew, the actual use of the feminine exponent for these processes is relatively rare, but crucially it is found in

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[16] There are language specific factors that determine which units are linguistically encoded beyond the atomic units of nouns which denote discrete entities. Languages may choose to disregard aggregates as units for some nouns which have natural atomic units. At the limit, as pointed out to us by a reviewer, there are languages such as Greek, which disregard aggregates as units in the case of all nouns that have natural units; such languages thus have no fake mass nouns at all.

both directions. (39) illustrates the direction in which the singulative is marked as feminine, and (40) – the direction in which the collective is marked as feminine.[17]

(39)   The singulative alternation (singulative is derived by fem suffix)

basic mass noun	singulative count noun	plural
se'ar hair.masc	*sa'ar-a* a-hair-fem	*sa'ar-ot* hairs
sá'ar turbulence.masc	*se'ar-a* storm-fem	*se'ar-ot* storms
ómer speech.masc	*imr-a* saying-fem	*imr-ot* sayings
síaħ discourse.masc	*siħ-a* conversation-fem	*siħ-ot* conversations
mávet death.masc	*mit-a* a-death-fem	*mit-ot* deaths

(40)   The collective alternation (collective is derived by fem suffix)

	basic count noun	plural	collective mass noun[18]
a	*dag* fish.mas	*dag-im* fish-pl	*dag-a* fish-fem
b	*ale* leaf.masc	*al-im* leaves	*alv-a* foliage-fem
c	*gole* expatriate.masc	*gol-im* expatriates	*gol-a* exile-fem
d	*apun*	*apun-im*	*apun-a*

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[17] The fact that both directions are marked may present a problem for unidirectional views such as Borer 2005 whereby roots are interpreted as mass, and count nouns are derived from roots by additional structure, hence it is count nouns which should be marked relative to mass nouns.

[18] The pattern in (40) may account for the fact that though Hebrew Class I nouns (nouns pluralizing with the suffix –im) are normally masculine, they also include a limited subclass of feminine nouns with the suffix –a. Such feminine nouns, e.g. *dbor-a* 'bee' in (18a) can be considered a backformation from an original collective mass noun *dbor-a*, which historically belonged in the third column of (40). This would have been a collecitve mass noun related to the plural masc count noun *dbor-im*, similarly to the situation in rows (40e-f) where the singular count noun is mising. Eventually, the collective mass noun *dbor-a* was reinterpreted as the missing singular count noun, which was facilitated by the fact that singulative morphology is identical to collective morphology. Evidence is provided by the collective nature of many of the feminine nouns which pluralize in Class I: *nemal-a / nemal-im* 'ants', *kin-a / kin-im* 'lice', *yon-a / yon-im* 'pigeons', *adaš-a/ adaš-im* 'lentils', *te'en-a/ te'en-im* 'figs' etc. There are other languages in which nouns of this sort have singulative morphology (cf. Schwarzwald 1991).

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	a-pea.masc	peas	pea-fem
e	--	*ħit-im*	*ħit-a*
		wheat plants	wheat-fem
f	--	*se'or-im*	*se'or-a*
		barley plants	barley-fem

In the derivation of collective mass nouns in Modern Hebrew, the fem suffix is often replaced by Argument Structure Nominal morphology (ASN). As was shown by Grimshaw 1990, ASNs have the distributional properties of mass nouns:

(41)   Allomorphy in the collective alternation

	basic count noun	plural	collective mass noun
a.	*béged*	*bgad-im*	*bigud*
	garment	garments	clothing-ASN
b.	*ná'al*	*na'al-áyim*	*han'ala*
	shoe	shoes	footwear-ASN
c.	*rehit*	*rehit-im*	*rihut*
	piece of furniture[19]	pieces of furniture	furniture-ASN
d.	*péraħ*	*praħ-im*	*priħa*
	flower	flowers	bloom-ASN
e.	*mircépet*	*mircap-ot*	*ricup*
	tile	tiles	tiling-ASN

Both mass nouns with collective morphology and mass nouns related to count nouns with singulative morphology are fake mass nouns – mass nouns which nevertheless have natural units. What is special about the flexible nouns discussed in the previous sections is that there is no morphological distinction between the mass noun and the

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[19] The difference between the Hebrew count noun *rehit* and the corresponding English count term which does not include any sortal has semantics repercussions. Wereas the following Hebrew sentence is true, its English translation is normally taken to be false, since a sofa-bed is one piece of furniture, not two:

(i)   *sapa nip̱táħat mehava šney rehit-im   be- rehit   eħad*
        sofa-bed   constitutes two furniture.count-pl in furniture.count one

        'A sofa-bed consists of two pieces of furniture in one.'

In examples where both languages have count nouns, both are judged equally for truth:

(ii)   *ele   šney maxšir-im be- maxšir eħad*
        these (are) two   gadgets   in gadget one

        'These are two gadgets in one.'

corresponding count noun. Thus it is not clear whether they belong to the collective or to the singulative alternation, if there is alternation in their case at all. We will sidestep this issue in the present work by saying that they belong to a collective-singulative alternation:

(42)   The collective - singulative alternation (flexible nouns)

collective mass noun	singulative count noun	plural	
gézer carrot	*gézer* carrot	*gzar-im* carrots	
bacal onion	*bacal* onion	*bcal-im* onions	
tut mulberry	*tut* mulberry	*tut-im* mulberries[20]	etc

4.   Conclusion

We have argued that fake mass nouns do not distort after all the correspondence between a clear cognitive distinction and the mass-count linguistic distinction. Though fake mass terms, e.g. *furniture, clothing, mail, jewelry*, denote entities with natural atomic units, these units are nevertheless irrelevant since in many given contexts, it is natural to rather view parts or aggregates of these units as units. The instability of these latter units is what makes these nouns mass. We have given examples of fake mass terms in Hebrew which have not so far been brought up in the literature: *carrot, onion, strawberry, mulberry,* etc. We have shown that these nouns denote units that are found in nature, but, due to their homogeneous texture, also denote at the same time serving-size units in the context of food preparation. With these units in mind, such nouns emerge as vague, since the size of edible portions changes in the process of context precisification in a way which changes their status as units. Accordingly, they too exhibit unit instability and are treated as mass nouns. The view developed in this paper explains the different properties of these nouns in comparison to what might otherwise look like an indistinguishable class, e.g. *apple, tomato, orange, cherry,* but which actually belongs with count nouns. These nouns do

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[20] A couple of examples of this sort exist in English as well, *hair*, *grain*, *seed*; we are indebted to Malka Rappaport Hovav for this observation.

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not lend themselves, due to their texture, to a level of vague food portions, and thus remain countable even in the context of food preparation. Chierchia's 2010 analysis of mass nouns as vague nouns with unstable units has shaped the present approach, which in turns extends the limits of his analysis to include fake mass nouns as well.

We have not found examples of fake mass nouns in Karitiana, a language where nouns are number-neutral. It appears that the role of plural morphology is crucial for constructing different types of mass nouns, and for distinguishing different types of units, stable and unstable, of which only the former are available for counting.

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