

Count and Mass Nouns in Dëne Sųłné

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1 Dëne has bare mass nouns *and* bare count nouns

Dëne Sųłné (short: Dëne), an Athapaskan language of Northern Canada, does not have any number-related grammatical categories in the nominal domain. Word order is SOV; nominals are optional (Cook 2004, Rice & Saxon 2005). The language lacks articles, case markers, etc., so that when nominal constituents occur, they are often bare nouns. (1) shows bare noun subjects, objects, and postpositional objects. There is also no nominal number inflection—except for kinship terms (cf. Wilhelm 2006), nouns have the same form in singular and plural contexts: In the (a) examples of (2)–(3), an inherently singular verb provides the singular context, in the (b) examples, the plural context is given by an inherently plural verb. The relevant nominal argument does not change in form.¹

- (1) a. K'ásba nághłnı́gh.
chicken perf-1sgS-buy O
'I bought a chicken.'
- b. Łı́ sekuı ch'azı́ tthı́héłgé.
dog child away one animal go perf
'The dog ran away from the child.'
- c. ts'ekuaze sųyúé káneta ʔú, dzól nájʔa nı.
girl toy impf-search and ball find one RO perf past
'As the girl was looking for playthings, she found a ball.'
- (2) a. yuwé ı́ nádhër
over there dog impf-one or two stay/live
'there's a dog that lives over there'
- b. yuwé ı́ nádé
over there dog impf-several stay/live impf
'there's dogs that live over there'

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¹ Data are from fieldwork at Cold Lake First Nations, Alberta. They are presented in the practical orthography, with the following conventions: dh = [ð], th = [θ], gh = [ɣ], ł = [ɬ], zh = [ʒ], sh = [ʃ], j = [tʃ], ch = [tʃʰ]; voiced obstruent symbols represent plain voiceless obstruents, voiceless obstruent symbols represent aspirated obstruents; C' = glottalized consonant; y = [j], ı = [i], ə, ɛ, ı etc. = nasal vowels, á, é etc. = high-tone vowels, ẽ = schwa. Abbreviations used: 1 = first person, 2 = second person, 3 = third person, 4 = fourth person ('the other' third person), adv = adverbial, assert = assertive, dl = dual, impf = imperfective, incept = inceptive, O = object, perf = perfective, RO = round object, S = subject, sg = singular, U = unspecified subject. Third person subject marking is zero, i.e., it is indicated by the absence of first or second person subject marking.

- (3) a. tth'áy thiŋtsɿ sɿ
 dish perf-1sgS-make one O perf assert
 'I made a (one) dish.'
- b. tth'áy ghighə sɿ
 dish perf-1sgS-make several O perf assert
 'I made several dishes.'

In the absence of number, bare nouns comprise singular and plural meaning. More precisely, they contain no number specification at all. This is demonstrated by the following test, which uses the fact that in conjunction, both conjuncts must receive the same interpretation (cf. Cruse 1986). In (4) and (5), the noun in question does not require the same number interpretation in the two conjuncts; it can denote any number of objects. I will say that Dëne nouns are **number-neutral**.

- (4) Norá chu John chu hue ghə shéheghetɿ nɿ
 Nora and John and fish of 3dIS-perf-eat past
 'Nora and John ate fish.'
true of all situations in which fish is eaten, irrespective of number of fish
e.g., some possible interpretations: Nora ate one fish and John three; Nora ate two fish and John ten; Nora ate one fish and John one
- (5) ts'ekuaze chu dëneyuaze chu dzól xél ʔelch'ázɿ senáhedhër
 girl and boy and ball with refl-away 3dIS-one or two play
 'the girl and the boy are each playing with a ball/balls in a separate place'
true of all situations in which each child plays with a ball/balls
e.g., some possible interpretations: girl has one ball, boy has one ball; girl has two balls, boy has one; girl has one ball, boy has three; girl has two balls, boy has three

Unlike more familiar bare noun languages such as Mandarin and Thai, Dëne has a clear count/mass distinction, shown by direct compatibility with a numeral. The Dëne number-neutral nouns just discussed are count: they combine directly with a numeral, (6). Dëne mass nouns, on the other hand, are not directly compatible with a numeral, (7); they require a measuring element, (8).

- (6) *sɿlághe ts'ére* 'five blankets', *sɿlághe ʔerihŋtschënë* 'five pencils', *sɿlághe dzól* 'five balls', *sɿlághe kón* 'five pieces of firewood (sticks, logs)', *sɿlághe bek'eshich'elyɿ* 'five tables', *sɿlám dëne* 'five people (individuals)', *sɿlághe ts'uzi* 'five flies', *sɿlághe ʔejëre* 'five cows', *sɿlághe ʔ* 'five dogs', etc.
- (7) *#sɿlághe ʔejëretth'úe* (five milk), *#sɿlághe bër* (five meat), *#náke/hunénóna thay* (two/one hundred sand), *#sɿlághe dedhay* (five salt), *#sɿlághe suga* (five sugar), *#sɿlághe dzə* (five mud), *#náke tlës* (two grease/fuel), *#ʔlághe yú* (one cloth/clothing), *#sɿlághe/hunénóna yath* (five/one hundred snow), etc.
- (8) a. *sɿlághe ʔejëretth'úe tɿl* 'five milk cartons, five cartons of milk'
 five milk container
- b. *sɿlághe nedádhi bër* 'five pounds of meat'
 five pound meat
- c. *ʔlághe yú delch'ëli* 'one yard of cloth'
 one cloth yard

These facts challenge the widespread view that count nouns cannot be bare. It is often thought that bare nouns are "non-individuated", and hence not countable, without the aid of something like a classifier, determiner, plural marker, or other grammatical element (cf. Greenberg 1990[1972], Hundius & Kölver 1983, Seiler 1986, Wiese 1997, to appear, Chierchia 1998a,b, 2005, Cheng & Sybesma 1999, Grinevald 2000, Krifka 2003, Borer 2005). This view cannot explain the existence of bare count nouns in Dëne.

I propose a different, essentially lexicosemantic view. On it, the count/mass distinction has a semantic basis in the meaning of noun roots, and is not dependent on functional elements. Dëne count nouns are count because the roots name discrete objects. In the semantics, this conceptual information yields an atomic denotation (cf. section 2). Mass nouns cannot be counted because the roots name (aggregates of) matter, which yields a nonatomic semantics. As a shorthand, I will call the former roots atomic, the latter nonatomic. On this view, there *are* “individuated” bare nouns—those with atomic roots. After formalizing my proposal (section 2), I will show that neither atomic nor nonatomic roots can be dispensed with (sections 3–4). I conclude with arguments for an independent semantic basis of mass/count distinctions across languages (section 5).

2 Dëne: a semantic count/mass distinction

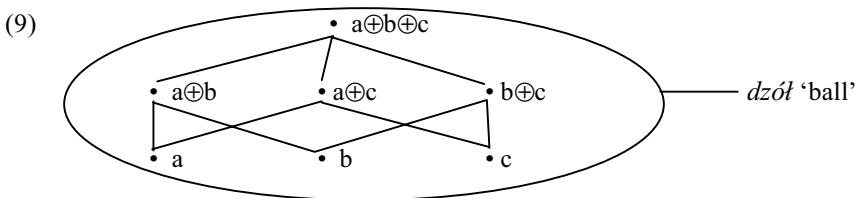
2.1 Semantics of count and mass nouns

If we look back at the nouns in (6) and (7) above, we see that whether a noun acts count or mass depends on its inherent (or lexical) meaning. Since the root is what contributes the inherent (or lexical) meaning, I propose that the count/mass behaviour follows from the meaning of the roots. Count nouns have roots denoting entities that are easily distinguished with the naked eye, and usually interacted with individually (e.g., table, dog). We can say that these roots denote individuals or discrete objects. Mass nouns have roots that denote things whose components are so small (e.g., grains of sand, milk molecules) that they are difficult or impossible to distinguish with the naked eye. Even if they are distinguishable, they are not usually interacted with individually, but as a group. We can say that these roots denote “stuff”, i.e., quantities or aggregates of matter.²

I use the classic account of Link (1983) to formalize this intuitive characterization. Link models count and mass denotations with two separate but homomorphic domains, and atomic domain E and a nonatomic domain D .³ Each domain has its own sum operation (\oplus) and (proper) part relation (\sqsubset), and thus is a set closed under sum formation, or a complete semi-lattice. We can formalize the Dëne facts as follows: The lexical information associated with stuff-denoting roots does not provide any clear criteria for atoms, hence these roots are associated with nonatomic denotations. They denote sets of (sums of) quantities, i.e., nonatomic sublattices of D . Individual-denoting roots, on the other hand, provide clear atoms, and thus are associated with atomic denotations. They denote sets of atoms and their sums, i.e., atomic sublattices of E .

Because Dëne does not have number inflection, the denotation of the roots is not “split” up into singular and plural as we go from roots to nouns. This is why Dëne count nouns are number-neutral, as shown above. Just like their roots, they denote not only singularities (atoms), but also pluralities (the sums formed from the atoms).⁴

To illustrate with *dzól* ‘ball’, imagine a world with just three balls, a , b , c . *Dzól* then can denote a single ball, a sum of two balls, or the sum of all three balls, (9). In other words, count nouns denote an atomic set closed under sum formation, (10).



(10) *dzól* ‘ball’: $[[dzól]] = \lambda x[*ball'](x)$ where $*X = \{\oplus_E Y \mid Y \subseteq X\}$

(11) *thay* ‘sand’: $[[thay]] = \lambda x[sand'](x)$

² Psycholinguistic studies suggest that distinguishability and type of interaction with the denotatum are major factors in determining whether a noun is count or mass (Wisniewski et al. 2003, Middleton et al. 2004).

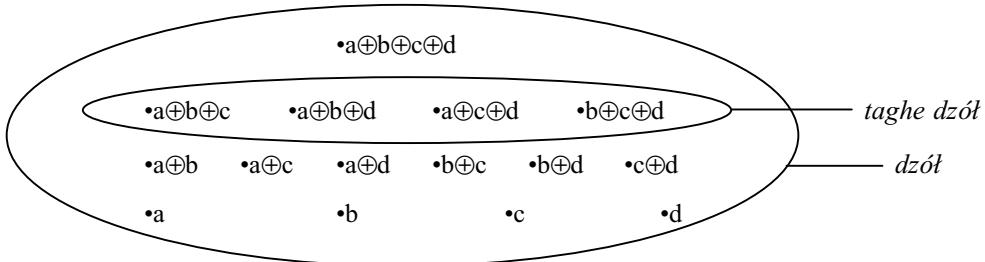
³ For a definition of atomicity, see Krifka (1992). Also see Wilhelm (to appear) for discussion.

⁴ In languages with number inflection, the uninflected, bare form of the noun is usually singular, and thus denotes only a set of atoms. Compare the “bare” English *ball* to Dëne *dzól*.

2.2 Semantics of Dëne numerals

I now give a semantics of Dëne numerals that explains their differential behaviour with count and mass nouns. Assuming that counting requires access to atoms (cf. Chierchia 1998a), I propose that numerals like Dëne *taghe* ‘three’ do not simply denote a whole number, but also an atom-accessing function. I formalize this in (12), loosely following Krifka (1995), cf. also Kang (1994). Here *OU* is an atom-accessing function. It gives the number of “object units”, i.e., atoms, in a plurality. For example, imagine a world with four balls a, b, c, d. Then the denotation of *dzól* ‘ball’ contains each of the four single balls and all sums formed from them, as in (14). The denotation of *taghe dzól* ‘three balls’ contains only those instances of *dzól* that consist of three “object units” or atoms. In other words, the denotation contains only sums of three balls, (13)/(14). (In (14), lines are omitted for legibility.)

- (12) *taghe* ‘three’: $\lambda P\lambda x[P(x) \ \& \ OU(x) = 3]$
 “a function from a set *P* (of atoms and sums) onto that subset of *P* containing the sums of three object units/atoms “
- (13) *taghe dzól*: $\lambda x[*ball'(x) \ \& \ OU(x) = 3]$
- (14)



If a numeral is combined with a mass noun, i.e., a nonatomic noun, semantic ill-formedness results, because it is not clear what the atoms are, and so *OU* has nothing to apply to. In this way the atom-accessing function *OU* of numerals accounts for their differential behaviour with count/atomic and mass/nonatomic nouns.

In sum, my semantic account of the count/mass distinction in Dëne hinges on the existence of both roots with nonatomic and roots with with atomic denotations. I now show that neither type of root can be dispensed with.

3 The need for roots with atomic denotations

In an attempt to streamline the connection between syntax and semantics, and in particular, to reduce the amount of information required to be lexically listed, there have been proposals to derive count denotations in the syntax, thus eliminating atom-denoting roots. For example, Borer (2005), perhaps the strongest proponent of this approach, claims that lexical noun roots are unmarked for mass or count. The syntax provides “partitioning” functional elements, specifically number inflection, certain determiners, and numeral classifiers. Nouns are countable if they are embedded in such partitioning syntax, otherwise they have a default mass interpretation. The prediction is that count nouns occur only in certain morphosyntactic environments; they are never bare. And since no information as to what constitutes an atom is given lexically, this view also must rely on general, transparent semantic processes in order to create count/atomic interpretations.

Dëne poses a serious challenge to the syntactic view because in this language, countability is *not* predictable from the syntactic environment. As we saw above, a certain class of nouns combines bare with numerals, e.g., *sólághē dzól* ‘five balls’, while another class of nouns does not, e.g., # *sólághē thay* (five sand). The count nouns have no special partitioning syntax such as number inflection,

determiners, or classifiers.⁵ According to the syntactic view, in this bare environment all nouns should be mass by default. How is it, then, that some nouns are count here while others are mass? The only possible explanation is that count or mass is part of the nouns' inherent meaning, part of the semantic representation of noun roots. This also gives the correct result that the wellformedness of numeral plus noun is a matter of semantic compatibility, not of grammaticality.

Further support for the semantic "origin" of Dëne count nouns comes from the fact that an additional count environment is also semantic, namely verb roots. Dëne has verb roots which are inherently singular, plural (or, in some cases, dual). Verbs derived from these roots are compatible with count nouns. For example, the "classificatory" verbs of handling and existence in (15)–(18) are derived from roots that specify the shape and number of objects involved. Other types of classificatory verbs/roots are used for mass nouns, as shown in (19)–(22).⁶ They are derived from roots that specify the container in which the matter is located/handled, or simply the consistency of the material.

- (15) Norá ts'éré seghā nínłchúdh *count*
 Nora blanket 1sg-for adv-handle one flat/flexible object perf
 'Nora brought me a blanket'
- (16) dlánélt'e ʔerihł'íschéné thełə? *count*
 how many/much pencil impf-plural objects exist impf
 'How many pencils are there?'
- (17) dzól híʔā *count*
 ball incept-1sgS-handle one round/compact object perf
 'I found a ball'
- (18) ʔłághe kón ʔeyër thełə *count*
 one firewood there impf-one sticklike object exists impf
 'there's one piece of wood laying over there'
- (19) ʔejeretth'úé yeghā nínłkā *mass*
 milk 4O-for adv-handle object in shallow container perf
 'he brought her some milk (in a saucer/plate/small bowl/...)'
- (20) thay nínłdzáy *mass*
 sand adv-1sgS-handle loose matter perf
 'I brought some sand'
 (I put it in a pile or spread it out, i.e., not in a container)
- (21) dedhay yeghā nínłłta *mass*
 salt 4O-for adv-handle object in nonshallow container perf
 'he brought her a bag/container/shaker/... of salt'
- (22) suga łā tághłdzáy *mass*
 sugar lots into-perf-1sgS-handle loose matter perf
 'I put lots of sugar into something'

It is important to note that in (15)–(22), *roots* rather than functional elements reveal whether a noun is count or mass. These patterns are a matter of semantic compatibility, not of syntactic derivation. If so, the countability of some roots must be an inherent, lexical property.

⁵ If the numerals were the partitioning syntactic elements, a possibility suggested in Borer (2005), nouns like *thay* 'sand' should combine directly with numerals as well. The same, unsupported prediction is made if lower functional elements (such as "little-n") that presumably occur above all noun roots had a partitioning function. Thus, I discard these possibilities for Dëne. A final way to save the syntactic view is to assume an unpronounced functional projection above only those noun roots with a count interpretation. We can discard this possibility as well, since there is no independent evidence for it.

⁶ Some mass nouns can combine with inherently number-specified verbs. This involves coercion to a count meaning, e.g., 'bring plural *glasses of milk*', one of the regular semantic mechanisms alluded to above. However, this type of coercion is not very productive in Dëne; it is restricted to items frequently used in standard portions, such as coffee and beer (see Wilhelm 2006, to appear for examples and more discussion).

The existence of atom-denoting roots is also supported by cases of lexical count/mass polysemy. Some Dëne nouns have both a mass and a count meaning, but one cannot be predicted from the other by the regular semantic mechanisms that a syntactic view must rely on. Thus, a lake is not a standard portion of water, (23), a standard portion of flour is not a loaf of bread or bannock, (24), and a standard portion of hunger/starvation is not a shrew, (25). Rather, the roots of these nouns have two separate (albeit related) semantic specifications, one of which yields suitable atoms while the other one does not.

- (23) a. tu 1. ‘water’, 2. ‘lake’
 b. tu yeghā nínłtā *mass*
 water 4O-for adv-handle object in nonshallow container perf
 ‘he brought her some water (e.g., in a pail)’
 c. náke tu ghesʔı̄ *count*
 two lake perf-1sgS-see perf
 ‘I saw two different lakes’ (e.g., from hilltop)
- (24) a. łés 1. ‘flour’, 2. ‘loaf of bread (i.e., bannock)’
 b. łés łą tághı̄dhi *mass*
 flour lots into-perf-1sgS-handle smooth/fine substance
 ‘I put a lot of flour into it’
 c. sɔ́łághe łés thı̄łt’e *count*
 five bread loaf perf-1sgS-roast/fry perf
 ‘I cooked five bannocks’
- (25) a. dǎ 1. ‘hunger/starvation’, 2. ‘shrew’
 b. dǎ k’é łeghátı̄dǎ *mass (abstract)*
 starvation P U-perf-two or more die perf
 ‘people died of starvation’
 c. sɔ́łághe dǎ *count*
 five shrew
 √‘five shrews’; # ‘five starvations’

A comparable English example are the two readings of *marble* ‘type of natural stone’ (mass) and ‘small glass ball’ (count). In all these cases, the semantic relations between the count and the mass meaning are as unpredictable as other polysemies, e.g., (26).

- (26) a. tılı 1. pail, 2. tractor, 3. motor (all count)
 b. ʔerı̄htı̄’ıs 1. (piece of) paper, 2. book (all count)

In sum, there is no evidence in Dëne that count or atomic denotations are syntactically derived by functional elements. Rather, there is plenty of evidence that lexicosemantic properties of the roots are responsible for count/atomic denotations. I conclude that atom-denoting, or inherently partitioned, roots cannot be dispensed with.

4 The need for roots with nonatomic denotations

Having established that a successful analysis of Dëne requires roots with atomic denotations, I will now show that nonatomic denotations cannot be dispensed with either. Specifically, it is not possible in Dëne to subsume mass denotations under the atomic domain, as has been proposed by Chierchia (1998a,b). For Chierchia, count nouns are those that denote either atoms only (when singular) or sums only (when plural-marked); mass nouns are defined as denoting both atoms *and* their sums (in the bare form), i.e., they are what I have called number-neutral. The properties typical of mass nouns—incompatibility with numerals, no plural inflection—are argued to follow from this semantics: Since the bare nouns are already plural, they cannot be plural-marked, and since the atoms are not singled out in any way, there is no semantic basis for counting/numerals.

However, Dëne number-neutral nouns have precisely this semantics, and yet they are count and not mass, as shown by their compatibility with numerals. This means that mass cannot be equated with number-neutrality. Rather, as I proposed above, number-neutral nouns are in principle countable, by virtue of having atoms in their denotation. The atoms may be accessed or “singled out” by the *OU* function of numerals. In contrast, true mass nouns have no clear atoms in their denotation and hence nothing for *OU* to access; this and not number-neutrality is the reason they are not countable. I conclude that nonatomic denotations are indispensable for an account of Dëne mass nouns.⁷

Other languages also provide evidence that number-neutral nouns are not mass. First, bare number-neutral nouns also combine directly with a numeral in Korean (Kang 1994), Hungarian (Ortmann 2000), Turkish (Bliss 2003) and Armenian (Borer 2005). Second, counter to Chierchia’s prediction, bare number-neutral nouns are pluralizable in Indonesian (Chung 2000), Hungarian (Ortmann 2000), Turkish (Ortmann 2000), Korean (Kang 1994), and to some extent Mandarin (Rullmann & You, to appear).

5 Conclusion: The semantic count/mass distinction is universal

In this paper, I have shown that Dëne has bare mass and bare count nouns; only the latter are directly compatible with a numeral. I have argued that this pattern can only be explained if we assume a semantic count/mass distinction in Dëne. By this I mean that the behaviour of the nouns is based in the semantic properties of the roots. Roots that refer to discrete (distinguishable, individually handled) objects yield semantic representations in terms of atomic semi-lattices. Roots that refer to (aggregates of) matter yield nonatomic semi-lattices. Since there is no number inflection, the nouns derived from atomic roots are number-neutral, denoting both atoms and their sums. I have further argued that in Dëne, it is not possible to eliminate atomic roots by syntactically deriving count/atomic representations through certain functional material. Nor can one eliminate nonatomic semantic representations for mass nouns altogether. The Dëne facts warn us that a closer and leaner connection between syntax and semantics cannot be achieved at the expense of semantics, and that semantic information associated with a noun root cannot always be minimized.

As a final point, I want to propose that not only Dëne has a semantic count/mass distinction, but that the semantic count/mass distinction is indeed universal. I claim that a distinction between roots whose conceptual information yields atoms in the semantics, and roots which do not, is present in all languages, and informs any morphosyntactic count/mass distinction a language may have. For example, a survey of psycholinguistic and developmental studies suggests a broad “conceptual” basis of the syntactic count/mass distinction in English: count nouns are used for more “individuated concepts”, mass nouns for less “individuated” ones (Wisniewski et al. 2003).

However, if a language has a morphosyntactic count/mass distinction, it can “mask” the underlying semantic one, due to mismatches between the two. Well-known examples of mismatches are *singularia tantum* and *pluralia tantum*. For instance, *scissors* is plural-only although it refers to a single object (contrast German: *Schere_{SG}* – *Scheren_{PL}*); *brains* is plural-only although it refers to ‘grey matter’, and *jewelry* is singular-only although it refers to plural objects. Thus, the syntactic categories do not divide up a language’s nouns in precisely the same way as the semantic categories they are based on (see Wiltschko 2005, Barner & Snedeker 2005 for more on mismatches).

Such mismatches, and their purported arbitrariness, are often cited as evidence that the count/mass distinction is a purely morphosyntactic phenomenon (e.g., Chierchia 1998a, Borer 2005). However, it appears that broadly speaking, the mismatches are not that arbitrary, but in many cases have a conceptual/semantic basis, and in that sense are not mismatches at all. For example, mismatches often involve nouns denoting things that are small and numerous enough to be classed as either count or mass, based on distinguishability and type of interaction (cf. Wierzbicka 1988). But to the extent that morphosyntactic categories do not allow for such intermediate cases, the same noun may end up as

⁷ Chierchia cites numeral classifier languages as key evidence for his proposal. If all nouns in classifier languages are “mass”, the need for a classifier is explained. However, several classifier languages have been shown to distinguish between count and mass nouns: Thai (Hundius & Kölver 1983), Korean (Kang 1994), Chinese (Cheng & Sybesma 1999). Moreover, there is an alternative explanation for the obligatoriness of classifiers: In Wilhelm (2006, to appear), I argue that classifiers are required because the numerals in these languages lack *OU*, not because the nouns are number-neutral or mass.

count in one language and mass in another (compare South German *Haar*_{SG}/*Haare*_{PL} and English *hair*). Dëne does not impose such morphosyntactic categorization, and interestingly, these types of nouns can be mass or count in Dëne, depending on pragmatic factors. For example, *tthígha* ‘(human) head hair’ is usually mass, but in a context that makes individual hairs salient, such as a crime scene investigation, the noun is count:

- (25) a. ??*náke* tthígha mass
 two (head) hair
 can only be said in a context like forensics, cf.:
- √ samáganís *náke* tthígha húlʔa count
 cop *two* (head) hair find O perf
 ‘the cop found two hairs’
- b. ??*náke* tthígha yeghā nínʔla mass
 two (head) hair 4O-P adv-handle pl O perf
 (intended: ‘s/he brought him/her two hairs’)
- √ can be said in a context like forensics count

Interestingly, the same appears to be true for novel nouns in English: In a psycholinguistic study (Middleton et al. 2004), participants consistently referred to an aggregate of unfamiliar small things with a plural-marked, i.e. count, novel noun (e.g., *blickets*) if they had handled the small things individually; without this interaction they used a bare, i.e. mass, novel noun (e.g., *blicket*).

Other nouns, however, may be instances of true mismatches. For example, it is difficult to imagine a semantic/conceptual basis for so-called object-mass nouns (*furniture, jewelry*), which are syntactically mass but semantically atomic. It seems that here the connection between syntax and semantics is indeed arbitrary (cf. Barner & Snedeker 2005). An interesting implication of my proposal is that languages without morphosyntactic count/mass distinction, such as Dëne, should not have any true mismatches (see also Chierchia 2005). For example, to the extent that object-mass nouns have a normal atomic semantics,⁸ they should be countable in Dëne. In this as in other aspects of count and mass nouns, Dëne should offer us an unobstructed view of the semantic basis of the phenomenon.

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⁸ But see Markman (1985), Bloom (1990), Wisniewski et al. (1996) for a different view.

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