Mass-to-Count Shifts and Number Morphology

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1. Introduction

It is well-known that the mass-count distinction is characterized by the property of **elasticity**: notionally count nouns like *chair* may be used as mass and vice versa: notionally mass nouns, e.g., ones denoting substance, may appear in a count-like frame (e.g. Borer 2005, Krifka 1989, Rothstein 2010). The latter point, particularly relevant for the purposes of the present paper, is illustrated for English in (1).

(1) I ordered three beers / waters.

This property is arguably universal (Chierchia 2010), and such expressions as the object in (1) are expected to be found across number marking languages. Indeed, the counterparts of *three beers* or *three waters* are often judged as acceptable in Russian under the same meaning, specifically, 'three glasses / bottles of beer / water' (2). However, as soon as a numeral above *četyre* 'four' is used, unacceptability results (3).

(2)	Dajte	nam	tri	piva	/	?vody
	Give.2nd PL.	we.DAT	three	beer.GEN SG		water.GEN SG
	'Give us three beers / waters.'					
(3)	*Dajte	nam	pjat'	piv	/	vod
	Give.2nd PL.	we.DAT	five	beer.GEN PL		water.GEN PL
	'Give us five beers / waters.'					

This contrast is related to the fact that while complements of numerals up to *četyre* (*odin* 'one' and so-called **paucal** numerals, *dva* 'two', *tri* 'three' and *četyre* 'four') are morphologically singular, those of the higher numerals are plural. Crucially, while *pivo* 'beer' entirely lacks an acceptable plural form (**piva* 'beers'), *voda* 'water' can be pluralized (*vody* 'waters'). This makes the unacceptability of (3) with *vod* 'waters' particularly puzzling. Pluralization of some mass nouns is acceptable, and so is the use of mass nouns in counting (2). However, the interaction of these two phenomena is ruled out, as revealed by the unacceptability of (3).

It is worth pointing out that the data are subject to a certain degree of variation in judgments, especially as far as the acceptability of (2)-type constructions is concerned. Not all speakers like such sentences. However, an online questionnaire distributed among 32 native speakers of Russian reveals a robust contrast revealing that (3)-type sentences are judged worse than their (2)-type counterparts. The speakers were asked to evaluate sentences on a three-point scale, where 1=unacceptable, 3=acceptable, and 2 indicates uncertainty. The results reveal that (3)-type sentences score considerably higher than the (2)-type ones. For example, the sentence *Nam prinesli dva supa* 'Two soups were brought to us' was judged as acceptable by 22 speakers (68.75%), whereas its counterpart with a high numeral and plural noun, *Nam prinesli pjat' supov* 'Five soups were brought to us', was accepted by only 11 respondents (34.38%). *My poprosili u oficiantki tri vody* 'We asked the waitress for three waters' was, in fact, disliked by many speakers (19, 59.38%), but its counterpart with *šest' vod* 'six waters' was rejected by all

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respondents except two (30, 93.75%). To sum up, the acceptability of phrases consisting of a (singular) mass noun with a paucal numeral varies depending on the noun and the individual speaker. But the combinations of plural mass nouns with non-paucal numerals are robustly rejected.

One final addition to the puzzle has to do with those instances where mass nouns are turned into count ones by the attachment of the classifier-like suffix *-in*:

(4) *gorox* 'pea' - *goroš**in**a* 'a pea', *grad* 'hail' - *grad**in**a* 'hailstone'

This suffix functions as a divider / countizer that creates count nouns denoting sets of natural units of which the original aggregate consists (cf. Musatov 2015, Khrisman 2019, Kagan, Geist and Erschler 2021). Crucially, such nouns undergo pluralization and combine with numerals (whether paucal or not) without any difficulty:

(5) pjat' gorošin
five pea.PL.GEN
'five peas'

The main focus of the present paper is the ungrammaticality of (3), in comparison with the marginal (2) and perfectly acceptable (5). More specifically, the following questions will be raised. 1. Why can originally mass nouns be "countized" and pluralized in (5) but not in (3)? 2. Why is the combination with a numeral judged much worse for plural mass nouns (3) than for singular ones (2)?

2. Theoretical Approach: Mass-to-Count Shifts and Pluralization

In order to account for the data described above, I first lay out a number of assumptions and proposals concerning the semantic and the syntactic properties of (certain instances of) mass-to-count and plural operators.

2.1. M→C Operator

Following Chierchia (2010), I take the mass-to-count shift in such expressions as *three beers* to result from the application of the standardized partition over sums operator Π_{ST}. This operator, type <<e,t>,<e,t>>, turns mass properties into count ones. Intuitively, it applies to the substance denoted by the mass noun and "packages" it into standardized units, typically associated with contextually salient containers, e.g., bottles, glasses, plates, etc. Thus, Π_{ST} triggers **container interpretation** in the sense of Landman (2016). Syntactically, this operator plausibly constitutes the head of Classifier, or Divider, Phrase, which is responsible for the divider, or "countizing", function (Borer 2005).

2.2. Plural Operators

I assume that two plural operators can apply to (originally) mass nouns, PL1 and PL2. PL1 is the most standard plural operator, employed, for example, when more than one member of the N-set is to be referred to. It is observed in such sentences as *John saw five / the **tables***. Intuitively, it seems to be employed when the number of N-units is higher than one. Still, I will follow Sauerland (2003), Chierchia (2010) and Kagan (2010), among others, in taking the denotation of PL1-nouns, such as *tables*, to consist not only of pluralities but also of single individuals. Under this view, the plural can be treated as a kind of default number, which does not really entail plurality. This approach allows us to predict correctly the truth conditions of such sentences as *Mary has no children*, which means that Mary does not have even a single child, and not that Mary doesn't have a plurality of children. This interpretation is rather surprising if the denotation of *children* only contains sets of two or more children. However, it is entirely expected if atomic children are contained within the set as well.

Following Chierchia (2010), I will treat PL1-marking as "an atomicity check point" (p.134): PL1 is, in essence, an identity function, but it only lets its complement through if the latter is count, i.e., if it denotes an atomic property (6). An originally mass noun thus has to undergo a mass-to-count shift in order to constitute an appropriate input for PL1.

(6) PL1 = λP.P, if for any x such that P(x) = 1, ∃n such that CARD (x,P) = n
(based on Chierchia 2010:135)

In phrases like *five tables*, the numeral (and not the plural marker) is responsible for the entailment that a plurality of entities is involved (more specifically, the number of members of the set equals 5). The fact that the plurality entailment may stem from a numeral is supported by the fact that in many languages, numerals combine with morphologically singular, rather than plural, nominals. Some examples include Finnish, high numbers in Modern Hebrew and paucal numerals in Slavic. Finally, I take numerals, similarly to PL1, to impose a requirement that their complement be atomic, but I will not include this requirement in the formal semantic representations below for the sake of simplicity.

It is important to point out, however, that the analysis proposed below is also compatible with the view that takes PL1 to entail plurality and treats it, for example, as closure under sum minus atoms (along the line of Chierchia 1998; see also Rothstein 2010 for the discussion of the two approaches.)

The second type of plural, PL2, is the plural of abundance. This operator combines with certain mass nouns and renders the meaning of abundance, as exhibited by such nominals as *waters*, *snows* or *sands*. In fact, this type of pluralization is not quite relevant when constructions with numerals are concerned. Still, I will discuss it briefly in order to relate, in Section 3.3, to the unavailability of abundance readings in sentences like (3).

This use of the plural is discussed in detail by Acquaviva (2008). The meaning of abundance plurals is vague and elusive, but intuitively, they denote **large** amounts of the corresponding substance/aggregate. Thus, neither a drop of water nor two such drops instantiate the property *waters*. Acquaviva treats this type of plural as not fully compositional, but, in fact, based on his prose, the semantics of mass nouns under the abundance plural use does appear quite predictable and systematic. (Idiosyncrasy is present in the fact that not all plural mass nouns can receive such an interpretation to begin with, but even there, some pattern seems to be available, given that nouns with more or less the same meanings receive the abundance plural in a wide range of languages.) While a deep investigation of abundance plural falls beyond the scope of the present paper, I tentatively propose for it the following half-formal representation:

(7) PL2 = λPλx. P(x) & abundant(x)

This approach has two important consequences. First, PL2 neither introduces nor requires atomicity. *Waters*, like *water*, is a mass noun. Second, (7) predicts that each entity that falls under the denotation of the plural mass noun is a large amount of N, not *any* amount of N. For instance, in a given context, a unit of *waters of an ocean* could be a stream, a unit of *snows* could be all the snow that fell during a single avalanche, etc. However, a drop of water will never be a unit of *waters*, just as a single snowflake will not form a unit of *snows*. The abundance reading results from the fact the denotation of the noun consists of exclusively large portions of the substance. Importantly, the boundaries of such portions are often undefined and instantiations of a property like *waters* may be overlapping (the base of the interpretation of such nouns is not disjoint in the sense of Landman 2016), as is expected with mass nouns. Thus, *water* and *waters* are similar in terms of their mass nature, but differ in terms of what can be conceptualized as a minimal unit instantiating the property, or as an unstable atom in the sense of Chierchia 2010. While a drop instantiates *water*, it does not instantiate *waters*. The same holds for a bottle of water. Such small units are invisible for the denotation of *waters* (unlike that of *water*).

A different analysis of abundance plural is put forward by Acquaviva (2008). He argues that nouns like *waters* and *sands* denote pluralities, but these are pluralities of **tropes**, which "cannot be identified nor counted" (p. 118). Based on the literature on philosophy, Acquaviva defines a trope as "a concrete instance of a property, as opposed both to the property and to the entity that instantiates it" (p. 117). Under this approach, the elements which form the denotation of plural mass nouns are inherently vague and not countable. We will see below that the Russian data are equally compatible with either of these two approaches to PL2.

Before we turn to some language-specific properties of Russian mass plurals, a comment on an additional submeaning is in order. As is well-known, mass plurals may also receive a subkind interpretation, e.g. *wines* may mean 'kinds/sorts of wine' (cf. e.g. Acquaviva 2008, Chierchia 2010 and references therein). Such meanings are indeed available in Russian, and they will be addressed in Section

4 below. Crucially, I believe that a separate plural operator does not have to be introduced in order to account for this phenomenon; rather, PL1 will do the job.

2.3. Pluralization of Mass Nouns in Russian

I propose that in Russian, mass nouns get pluralized low in the structure, at the root-level, namely, below nP. Here, I follow Acquaviva (2008) and Alexiadou (2011), who argue that plural morphology can attach at two levels: the root-level and the word-level, i.e. below nP and above nP, and that mass plurals are created low. I will, in fact, propose below that the latter point is not obligatory. But, crucially, there is evidence that in Russian, mass stems indeed combine with the plural suffix at the root level. This is reflected in the high degree of idiosyncrasy associated with such formation, discussed in the remainder of this section. Crucially, within the distributed morphology, such idiosyncrasy and semi-compositionality are taken to be characteristic of (some) root-level processes (Marantz 2001).

First, we observe idiosyncratic gaps: some mass nouns lack the plural form (e.g. **piva* 'beers', **vodki* 'vodkas', **nefti* 'petrols', **risy* 'rices', **zolota* 'golds', **ikry* 'caviars'). Moreover, certain mass nouns exist in the nominative plural but lack the plural form in other cases (*čai* - tea.NOM PL but **čajov* - tea.GEN PL). This point is relevant for our purposes, since Russian numerals require **genitive** complements. Second, if a mass plural can be successfully created, the meaning of the resulting word is not always compositional, e.g. *vody* (literally 'waters') can mean 'amniotic fluid'. And even with the more predictable interpretation, it depends on the individual noun whether it will receive an abundance or a plurality of subkinds meaning: thus, *soki* 'juices' means 'kinds of juices' and not 'a lot of juice', whereas the situation with *vody* 'waters' is reversed (putting aside for the moment the 'amniotic fluid' interpretation). Based on the idiosyncrasy associated with the formation of mass plural nouns in Russian, I conclude that it takes place below the nP projection.

3. Number and Mass-to-Count Shifts: An Analysis

I propose that pluralization of originally mass nouns is only possible under the following order of operations: first, a mass-to-count shift takes place (rendering a count property), and then pluralization applies on top of it: PL (M→C (P)). This means that PL1, which applies to count nominals, is involved. The reversed order (*M→C (PL (P))) results in unacceptability. PL1 would not let its complement through, since the latter denotes a mass property. PL2 can apply to a mass predicate, but the resulting property does not constitute an appropriate input for Π_{ST}, as will be discussed in more detail below. The following subsections address the structure and compositional semantics of the constructions that have been introduced at the beginning of the paper.

3.1. Plural Nouns with the Suffix -in

Let us begin with nouns containing the suffix *-in*, such as *gorošina* 'a pea'. As shown in (5), these nouns can be pluralized and can combine with numerals.

Following Khrisman (2019) and Kagan, Geist and Erschler (2021), I take the singulative suffix *-in* observed in such derivations to be a mass-to-count operator of the type <<e,t>,<e,t>>: it turns mass properties into count ones, similarly to Π_{ST}. Unlike Π_{ST}, however, its contribution is not context-dependent; rather, it imposes division into natural units, NU (Krifka 1989). It can thus be conceptualized as a kind of morphological classifier. Syntactically, it functions as the head of the Classifier, or Divider, Phrase, which appears immediately above nP and is responsible for the divider operation (Borer 2005, Mathieu 2012), as pointed out in Section 2.1 above. Its semantic contribution is represented in (8):

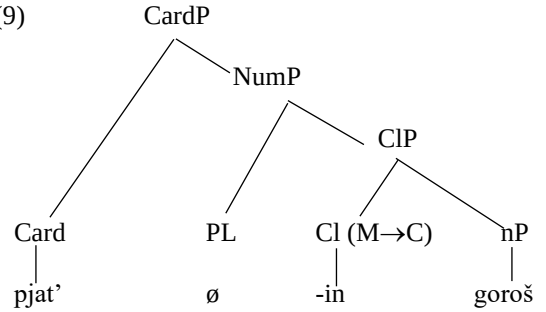
(8) $[\![\text{-in}]\!] = \lambda P \lambda x.P(x) \,\&\, \text{MEAS}(x) = \langle 1, \text{NU} \rangle$

The formalism is largely based on Rothstein (2010). Roughly, *-in* takes an argument denoting a mass property and imposes the MEASURE function, which turns this property into a count one, where a single atom constitutes a natural unit.

This way, a noun is created that is count in every possible respect, and this noun can be pluralized with PL1 and combine with a numeral, just like any count noun, e.g. *stol* 'table'. The structure of (5) is

represented in (9) and its compositional semantics, in (10). I take the plural to appear as the head of NumP and the numeral, as the head of Card(inality)P (cf. Danon 2012).

(9)



(10) a. [[gorox]] = λx.pea(x)
b. [[gorošin(a)]] = λx. pea(x) & MEAS(x) = <1,PEA>
c. [[NumP]] = λx. pea(x) & MEAS(x) = <1,PEA>
presupposed: ∃n [CARD (x, λx. pea(x) & MEAS(x) = <1,PEA>) = n] (passes the "test")
d. [[pjat']] = λPλx. CARD (x,P) = 5
e. [[pjat' gorošin]] = λx. CARD(x, λx. pea(x) & MEAS(x) = <1,PEA>) = 5
(the presupposition represented in (c) is trivially satisfied)

3.2. Singular Mass Nouns with Paucal Numerals

Let us now turn to the combination of mass nouns with paucal numerals, illustrated in (2) and (11):

(11) tri supa
three soup.GEN.SG
'three soups'

This time, there is no morphological device to turn the mass noun into a count one, and the morphological number of the nominal is singular, even though semantically, it is interpreted as a plurality. I propose that in this case, nP, which is mass, combines with the contextually sensitive (and phonologically null) Π_{ST} operator. The operator imposes partition into soup-units, a kind of packaging into contextually salient containers, in this instance, most plausibly, plates (13b). The singular number constitutes here the morphologically default form; it does not correspond to a singular operator (whatever one takes the latter to be). The numeral applies to the ClP, which, crucially, is count and denotes a set of plates of soup. The plural interpretation is due to the semantics of the numeral, which specifies that each instantiation of the new property (the one denoted by NumP) is a plurality consisting of three plate-of-soup instantiations (13c).

(12) [CardP [$_{CARD}$ tri] [ClP [$_{CL}$ Π_{ST}] [nP sup(a)]]]

(13) a. [[sup]] = λx. soup(x)
b. [[ClP]] = Π_{ST} (λx. soup(x)) ↔ λx. soup(x) & MEAS(x) = <1,PLATE>
c. [[CardP]] = λx. CARD(x, λx. soup(x) & MEAS(x) = <1,PLATE>) = 3

At this point, a question emerges as to why the combination of paucal numerals with singular mass nouns is not always considered acceptable, even though such sentences clearly score much higher than their counterparts with non-paucal numerals and plural nouns. As pointed out in Section 1, variation in speaker judgments is observed in this respect; the acceptability of a given combination depends both on the specific mass noun and on the individual speaker. I propose that the reason has to do with strong context dependence and the phonologically null nature of the mass-to-count operator. Speakers may be more or less "willing" to accommodate the contextual details that are needed in order to license such an operator. The version with Π_{ST} competes with a phonologically overt measure phrase (e.g. *tri supa* 'three soups' versus *tri tarelki supa* 'three plates of soup'), and for some speakers the second option, which is

more explicit and less context-dependent, wins the competition. At the same time, it should be emphasized that the majority of consultants do find expressions like (11) perfectly acceptable. In the next subsection, I turn to their counterparts with mass plurals, which are judged much worse and seem to be ruled out by the grammar.

3.3. Plural Mass Nouns with (Non-Paucal) Numerals

While mass nouns are good or at least tolerable as complements of paucal numerals, with non-paucal ones, they are generally unacceptable, as revealed by native speaker judgments. This, I propose, results from the fact that the construction with non-paucals contains morphologically plural nouns, as illustrated in (3) above and in (14) below:

(14) a. *pjat' piv
five beer.GEN.PL
'five beers'

b. *pjat' vod
five water.GEN PL
'five waters'

The crucial factor in determining the unacceptability of such constructions is the low formation of Russian mass plurals, argued for in Section 2.3. The stem combines with the PL operator below nP, at root-level, before the Π_{ST} operator (or any other mass-to-count shifter) has a chance to apply. The application of PL1 is thus ruled out, because a mass stem does not constitute an appropriate input (it does not pass the count-ness requirement, formally represented in 6). We are thus left with PL2, which contributes the abundance reading (kind interpretations will be addressed separately in Section 4; further, I exclude entirely non-compositional cases from discussion).

Since the merge takes place below nP, idiosyncratic gaps are possible. If the combination of a given stem with the plural suffix results in such a gap, the derivation crashes already at this stage. This is what we observe in (14a) above. If the combination is, in contrast, possible, we get a plural mass noun denoting a large quantity of the substance in question (14b). The semantics of *vody* 'waters' (under the abundance reading) is represented in (15b). The resulting noun is still mass, and the nature of what may count as its unit is vague. However, what we do know is that such units can only comprise of a large amount of water. A drop of water, or even a bottle of water, does not instantiate *waters*.

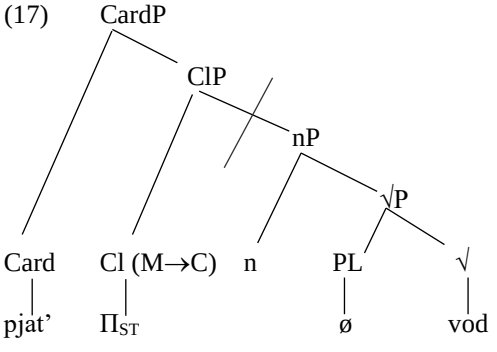
(15) a. [[voda]] = λx.water(x)
b. [[vody]] = λx. water(x) & abundant(x)

With this in mind, let us move to the next step. The nP cannot combine with a numeral directly, since the former is a mass nominal and as such lacks an atomic structure (or **stable** atomic structure in the sense of Chierchia 2010). Its denotation is not divided into units that can be counted. A structure of the kind represented in (16) is thus ruled out.

(16) *[CardP [$_{CARD}$ pjat'] [nP vod]]

However, we can ask ourselves why it is impossible to apply the Π_{ST} operator on top of the plural, before a merge with the numeral takes place. That would render the structure in (17).

(17)



The partition operator would impose atomic structure and we would get a nominal meaning, roughly, 'portions of N' (e.g. 'bottles of water'), which would, in turn, constitute an appropriate argument of a numeral. The problem with (17) is, I propose, largely of pragmatic nature. The null Π_{ST} is context-dependent and generally accepted only as long as there is a well-defined and very salient notion of container in accordance to which partition into units can be achieved. But such container interpretation is not generally available with large, even huge, amounts of substance that form (even the smallest) potential unites of nouns like *waters*. Recall that each such unit must not only carry the property like *water* but also that of abundance. This could be, for example, a stream of an ocean or maybe all the water that falls during a particular rain. Such items are not easily conceptually packageable into any salient container type; moreover, they strongly tend to lack clearly defined boundaries (even in a given context). Hence the typical unacceptability of expressions like **pjat' vod* 'five waters'. They cannot be interpreted as five glasses or bottles of water (as these do not instantiate *waters*), and it is unclear what they *can* mean.

Tropes, too, lack clearly defined spatiotemporal boundaries: here, we do not even deal with physical water; rather, these are abstract entities that cannot be packaged into a container. Thus, Acquaviva's (2008) approach, too, predicts the incompatibility of an abundance plural noun with Π_{ST}.

To summarize, combinations like (14b) are unacceptable because the plural form is created too low, before the mass-to-count operator has a chance to apply. As a result, the application of PL1 is ruled out. In turn, PL2 creates an output that does not constitute an appropriate argument for either Π_{ST} or a numeral.

The fact that the analogous English construction is acceptable (*five beers*) suggests that the English plural may appear above nP even with mass nouns. Two possibilities are then available: either, as proposed by Borer 2005, it occupies the Cl position and functions as the mass-to-count operator (and the plurality meaning is then supplied by the numeral), or it functions as a higher Num head. In the latter case, first, Π_{ST} turns the mass property into a count one, second, PL1 applies at Num, and, finally, the numeral applies to the resulting count plural property.

4. Kind-Denoting Mass Plurals

As mentioned above, mass plurals can, cross-linguistically, also receive a sub-kind interpretation, a fact that also holds for Russian: *vina* (wine.PL) 'kinds of wine'. Such plurals may also merge with numerals (18). How do such readings arise and why are they acceptable in Russian?

(18) pjat' izyskannyx vin
five refined.GEN.PL wine.GEN.PL
'five fine wines'

The first point to make is that kind interpretation becomes available for Russian nouns (or maybe even stems) very low in the structure. Empirically, this is reflected in the fact that kind readings are available to nominal stems that get incorporated in compounds. For example, consider the compound *ženonenavistnik* 'misogynist', 'women-hater', where the bound stem *žen-* translates as 'woman/women' (it lacks grammatical number) and *nenavistnik* means 'hater'. Crucially, the resulting compound denotes a set of people who hate **women as a kind**, not those who hate specific women or at least one woman. In other words, the stem *žen-* receives kind interpretation. The state of affairs is similar with *knigoljub* 'book-lover', which is used to refer to individuals who enjoy books in general. Again, the stem *knig-* 'book(s)' seem to be interpreted as a kind. Crucially, such incorporated stems in compounds cannot contain considerable functional structure: for example, these cannot be NumPs, QPs or DPs. This is why such stems cannot receive quantificational, specific or definite meanings; further, they cannot contain overt morphemes that are associated with the higher functional layers in the nominal structure, such as the plural suffix: **knig**i**ljub* (book-PL-lover) or the singularizer *-in*: **armjan**in**onenavistnik* (Armenian-SING-hater; cf. Kagan, Geist and Erschler 2021). Thus, these stems must be very "small" in terms of their functional structure (typically, either nPs or even roots that have not yet combined with a category head). This, in turn, means that kind readings are available very low in the structure, at least in Russian. This view is in line with Chierchia's (1998) analysis, according to which nouns in a language like Russian can be "born" as either property or kind-denoting, and type-shifting in each direction is allowed.

Turning back to mass nouns, I propose that the mass property meaning is shifted to the subkind meaning due to the application of the K operator, defined below:

(19) $K(P) = \lambda x\ [\text{subkind}\ (x, {}^{\cap}P)]$ (Chierchia 2010:132)

After the application of K, the mass noun comes to denote a property of being a subkind of N. Crucially, this is a **count** property. Kinds, and, similarly, subkinds, are individuals of type e (although sortally special). Each subkind consists of all the instantiations of this subkind; the maximal set of such instantiations will constitute an atom for a predicate like *vin* in (18). The semantics of (sub-)kind-denoting nominals is, of course, vague (especially if we enrich the picture under an intensional approach), but still count. This, in turn, means that such nouns constitute an appropriate input to the PL1 operator. In other words, I propose that the plural operator exhibited in *five wines* under the subkind meaning is exactly the same "standard" plural as the one we observe in expressions with count nouns like *five tables*. The subkind meaning is not due to the application of PL, but rather to that of K, which, crucially, applies lower than PL does.

We thus get the correct order of application which, as predicted at the beginning of this section, renders an acceptable combination of a numeral and a plural mass noun. First, the mass-to-count shift takes place due to the application of K. Then PL1 applies to the resulting count noun. Then, finally, the result is merged with a numeral. The compositional semantics of (18) is represented in (20); I exclude the adjective for the sake of simplicity.

(20) a. $[[\text{vin(o)}]] = \lambda P \lambda x.\ \text{wine}(x)$

b. $K([[\text{vin(o)}]]) = \lambda x\ [\text{subkind}\ (x, {}^{\cap}\text{wine})]$

c. $[[\text{vina}]] = PL1(K([[\text{vin(o)}]])) = \lambda x\ [\text{subkind}\ (x, {}^{\cap}\text{wine})]$
presupposed: $\exists n$ such that $\text{CARD}\ (x, \lambda x\ [\text{subkind}\ (x, {}^{\cap}\text{wine})]) = n$

d. $[[\text{pjat' vin}]] = \lambda x.\ \text{CARD}\ (x, \lambda x\ [\text{subkind}\ (x, {}^{\cap}\text{wine})]) = 5$
(the presupposition represented in (c) is trivially satisfied)

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