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# *Dva stakana moloka*: Substances and Containers in Genitive of Measure Constructions in Russian*

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## 1. Container nouns and the Russian "genitive of measure": Introduction and examples

Our topic is the Russian "genitive of measure" construction(s), studied in [Апресян 1999[1]; Борщев, Парти 1999, 2011; Borschev, Partee 2001, 2004; Partee, Borschev 2012], and [Rakhilina 2004]. These are a family of closely related constructions all of which can be instantiated by a simple phrase like *stakan moloka* 'glass of milk', with a container noun like *stakan* 'glass' followed by a genitive NP like *moloka* 'milk'. The basic meaning of a container noun like *stakan* 'glass' is sortal, but in these constructions it is sometimes sortal, sometimes relational, and sometimes functional.

And when we compare 'canonical' genitive constructions with relational nouns, like (1), the "genitive with obligatory third term" construction in (2), and the constructions studied here, in (3), we find three compositionally different organizations of the semantic parts.

(1) брат Пети
(2) человек среднего роста

In (1), the relational noun is the head and the genitive phrase is its argument. In (2), the "obligatory third term" construction, the complex genitive NP forms a modifier. And in the constructions with container nouns, we will see that a container noun may be a sortal head, it may be a relational head, and may shift to a functional reading which forms the core of a measure-phrase modifier of the NP in the genitive phrase. These readings arise as the container noun goes through a progression of semantic shifts from a concrete sortal noun through several steps until it becomes an *ad hoc* unit of measure, and for some nouns, like Russian *stakan* 'glass' and English *cup*, it may undergo a further shift to become a lexicalized standard unit of measure. The focus of our previous work has been these shifts in the container noun and in the semantics of the construction; in this article we pay additional attention to the bare noun complement *moloka* 'milk-GEN' (section 5).

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[1] In his article [Апресян 1999], which appeared at the same time as our article [Борщев, Парти 1999], Apresjan discusses similar examples, but with a slightly different point of view. More information about the differences in our approaches can be found in [Борщев, Парти 2011].

Prototypical examples of the construction we are concerned with are given in (3). The construction resembles the English pseudopartitive (Selkirk [1977] and many others since).

(3) a. два стакана молока
b. ящик яблок
c. машина дров
d. полкорзины грибов

The genitive of measure examples in (3) are a distinguishable subclass of a broader class of genitive constructions which also includes examples such as those in (4).

(4) два литра молока
полкилограмма яблок
моток проволоки
охапка дров
стадо овец

The interpretation common to the larger class is, roughly, a quantity of some substance or a collection of objects, where the substance or the objects are named by the Genitive NP. The English analogue of the broader class is studied in [Dodge, Wright 2002)]. Formal semantic analyses of measure constructions like *two liters of milk* in English and other languages can be found in [Krifka 1989a, 1989b; Landman 2004; Rothstein 2009a, 2009b; Schwarzschild 2002, 2006]. We will draw particularly on Landman's and Rothstein's work in what follows.

**2. Four readings: From Container to Measure.**

Rothstein [2009a, 2009b] concentrates on a two-way ambiguity in English *three glasses of water,* which she characterizes as an *individuating* reading, in which the DP denotes plural objects consisting of three individual glasses of water, and a *measure* reading, in which the DP denotes quantities of water which equal the quantity contained in three glasses [Rothstein 2009a: 106-107, italics added]. She shows that the two Hebrew constructions for expressing *three glasses of water*, one of them unambiguously individuating and the other ambiguous, support the analysis of the English ambiguity offered by Landman [2004].

The distinctions argued for by Rothstein are close to the semantic distinctions argued for in the case of Russian container-noun constructions in some of our earlier work [Борщев, Парти 1999, 2011; Borschev, Partee 2001, 2004]. In [Борщев, Парти 1999; Borschev, Partee 2001, 2004] we distinguished a *Concrete Portion* reading from a *measure* reading, describing the *Concrete Portion* reading as close to Pustejovsky's "dotted type" reading, referring simultaneously to the container and the substance in it (see Section 2.1), although we had no way to formalize that notion, and instead represented it as a predicate true of a portion of matter (quantity of substance) filling a container of the given sort. Later, in an unpublished handout for a conference in Düsseldorf in 2007, we explicitly distinguished and gave a partial formalization of three readings: QUANT+CONTAINER, QUANT, and MEASURE, where the QUANT+CONTAINER reading is a predicate of the container together with the substance it contains; the QUANT reading applies to a particular quantity of substance that fills a container, and the MEASURE reading applies to a standard quantity of the substance, corresponding to a conventional standard size of containers of the given kind.

Our QUANT and MEASURE may be considered subtypes of Rothstein's *measure* readings. Her *individuating* reading is close to our QUANT+CONTAINER reading.

Most recently in [Борщев, Парти 2011; Partee, Borschev 2012] we have further split our "QUANT" reading, making a three-way distinction within Rothstein's measure readings, giving four readings in all.

For example (3a), we distinguish four readings of the construction, which we refer to as follows:

- the ***Container + Contents*** reading*:* Rothstein's "individuating", Pustejovsky's "dotted type", a predicate applying simultaneously to the glass(es) and the milk (Sec. 2.1);
- the ***Concrete Portion*** reading: a predicate applying to a "concrete" quantity of milk that fills some given glass(es) (Sec. 2.2);
- the ***Ad Hoc Measure*** reading: a predicate applying to a quantity of milk that would fill some given glass(es) (Sec. 2.3);
- the ***Standard Measure*** reading: (Rothstein's "measure"), where *stakan* 'glass' has developed a lexicalized sense as a standard unit of measure like *litr* (Sec. 2.4).

For the four readings of the construction, we propose four related but distinct meanings for the container-noun. The first is closest to the basic meaning of the container-noun, and the last is closest to measure-nouns like *liter*. We start by describing the four distinct readings informally in this section. Their differences are summarized in Table 1 below[2].

Table 1. Properties of the four readings of the construction *dva stakana moloka*

| | CONTAINER + CONTENTS | CONCRETE PORTION | AD HOC MEASURE | STANDARD MEASURE |
|---|---|---|---|---|
| admissibility in contexts that are usually characteristic for words such as *stakan*, but not for words such as *moloko* | + | – | – | – |
| free cooccurence with fractional numerals | * | * | OK | OK |
| if more than one container of substance, can the containers be of different sizes? | + | + | – | – |
| standard size for the container | – | – | – | + |
| lexically limited | – | – | – | + |

In Section 3 we discuss some of the main puzzles and problems we have encountered in drawing these distinctions. In Section 4 we formalize and compare the *liter-of* construction and all four of the genitive of measure constructions, improving on our earlier formalizations by drawing heavily on the Landman-Rothstein analysis. In Section 5 we discuss issues concerning the category, type, and interpretation of the genitive *moloka* 'milk' and of non-bare-noun genitives in these constructions.

[2] We are grateful to Maria Kholodilova for summarizing our diagnostics in this table, which we have copied from her referee's report.

### *2.1. The Container + Contents reading*

The *Container + Contents* reading of *dva stakana moloka* combines reference to the container(s) and reference to the concrete amount of the substance in the container(s) as in (6).

(5) **CONTAINER + CONTENTS reading: a predicate true of some container(s)** together with a substance that fills it/them.

(6) a. Он принес бутылку водки.
b. Поставь этот ящик яблок в угол.

This construction is similar to the English one discussed by Selkirk [1977] under the label "pseudopartitive construction". Pustejovsky (1993) introduced the notion "dotted type" (reminiscent of the Cartesian "dot product") to represent the sort of an expression that simultaneously incorporates two distinct sorts, where "sorts" are ontological/linguistic semantic classes that play a role in co-occurrence restrictions (*sočetaemost'*), such as *animate, inanimate, human, liquid, institution, location, building, …*, and in our case *container* and *substance* for the container and its contents. So whereas in Rothstein's analysis, one reading of *glass of milk* has the sort *container* and the other reading has the sort *substance* or *liquid*, on the *Container + Contents* reading, if one wants to argue that we can refer simultaneously to the container and the substance contained in it, it could be said to have the Pustejovskian dotted type *container* ▪ *substance*.

Dodge and Wright [2002] discuss factors that favor reference to the container vs. reference to the contents without suggesting that one can sometimes refer to both simultaneously. Accompanying verbs may select for one or the other, as in (7). But as Pustejovsky (1993) emphasized, "copredication" is possible for dotted-type objects, showing that both sorts are simultaneously accessible. The examples in (8) are from [Asher, Pustejovsky 2005: 7]; (9) is a comparable example for our construction.

(7) a. Мы выпили бутылку (полбутылки) шампанского.
b. Мы разбили бутылку (*полбутылки) шампанского.

(8) a. Mary picked up and mastered three books on mathematics.
b. Lunch was delicious but took forever.

(9) Он выпил стакан молока, который стоял на столе.

When Rothstein [2009a] discusses the reading which refers to the container together with its contents as the "individuating" reading, she does not attempt to give it a "dotted type", but takes it to refer to the complex entity consisting of the glass together with its contents. When she formalizes it (for English and for Hebrew), it turns out to actually refer to the glass, which is characterized as containing contents of a given kind.

In her referee report, Maria Kholodilova offered a useful argument in favor of something like a "dotted type" analysis of such a *Container + Contents* reading. She notes that when one looks at which verbs freely co-occur with various container nouns used in isolation, not all of those co-occurrences are possible when the container noun is used with a Genitive of Measure complement. So while (7b) is normal, (10) is not.

(10) ???сломать ящик яблок

And she makes the reasonable suggestion that the relevant difference between (7b) and (10) is that in the case of (7b), when the bottle is broken, the champagne is also affected – it will all spill out – whereas in the case of (10), it's quite possible that the apples are not affected when the box is broken. As she suggests, if this explanation for the difference holds

up under further research[3], it could serve as additional indirect evidence that the described object in (7b) is really the bottle plus the champagne, and not just a bottle that happens to be filled with champagne. See also the contrasting example (13) below.

For Russian, it would be slightly too weak to just say in an example like (9) that the glass "contains" milk; we must rather say that the glass is filled with milk[4]. There is a different construction, illustrated in (11), which clearly denotes the container and describes it as containing (and not necessarily filled by) contents of a certain sort. Likewise there is a separate construction, illustrated in (12), that picks out just the contents, described as being in a container of a certain sort.

(11) стакан с молоком
(12) молоко в стакане

The two constructions in (11) and (12) unambiguously denote the container and the contents respectively, and neither is a 'measure phrase'. The construction in (9), on the other hand, denotes both the container and the contents together. Kholodilova, who noted the contrast between example (10) and example (7b), notes that the further contrast between the nearly impossible (10) and the only slightly degraded (13) adds additional support to the claim that the construction in (11) and (13) denotes just the container, while that in (9) and (10) denotes both the container and the contents.

(13) ?сломать ящик с яблоками

But adding dotted types to a formal semantic theory is not easy (see brief discussion in Section 3), and since we do not have a formal theory of dotted types, our formalization in Section 4 approximately follows Rothstein's analysis, amending it to specify that the container is filled by, and does not merely contain, contents of a given sort. This will leave some of the puzzles concerning "dotted types" open[5]. In our prose discussion, we maintain our conclusion that the construction refers both to the container and contents.

The biggest difference between the *Container + Contents* reading and the three other readings described below is that on the *Container + Contents* reading, *a glass of milk* is *a glass*, whereas on the other three readings, *a glass of milk* is *milk*. The same distinction holds between Rothstein's two readings; it is in that sense that the three readings described below are all variants of Rothstein's measure reading.

As a corollary of this basic distinction, the use of numbers like *half* or *two and a half* is more restricted for the *Container + Contents* reading than for the measure readings. It is not impossible to use fractional numbers with the *Container + Contents* reading, but it is not usual, and it may entail implausible real-world states of affairs. Normally cardinalities are expressed by whole numbers, and many formalisms make that obligatory; but there are

[3] Our intuitions are that this explanation will hold up. We can add one supporting example: while (10) seems quite degraded, (i) below strikes the second author as fine, imagining a context where some very heavy object falls and crushes the box together the apples in it.

(i) *раздавить ящик яблок*

[4] Susan Rothstein (p.c.) counters that when we speak, for instance, of a glass of wine on this reading, the glass is rarely full; it is only when using a glass or cup as a measure that we normally require it to be full. But at the same time Russian speakers we have consulted have clear intuitions of a difference between *kastrjulja vody* 'pot of water' and *kastrjulja s vodoj* 'pot with water': the first must be relatively full, while the second just has to have some water in it. We believe, as Rothstein herself suggests (p.c.), that the answer lies in the vagueness and context-dependence of the notions of 'fill' and 'full'; a glass of wine on the *Container + Contents* reading is relevantly full when it contains a normal serving of wine, while on a measure reading it should be full to the brim.

[5] Recent work by Nicholas Asher on dotted types is beyond the scope of this paper but might in principle solve our problem; we discuss it briefly in [Partee and Borschev 2012].

approaches such as those of Hackl [2001] and Krifka [1989a], discussed by Kennedy and Stanley [2009], which treat the counting of (at least some) count nouns as analogous to the measuring of mass nouns, so as to account for the possibility of fractional numbers used with count nouns of suitable "divisible" sorts, as in (14).

(14) a. John ate two and a half sandwiches for lunch.
b. We burned two and a half logs in the fireplace last night.

If one uses fractional numbers with the *Container + Contents* reading, it would seem that there must be "fractional containers" involved; there is no such restriction when fractional numbers are used with measure readings. So while (15) is normal in either of the measure readings discussed in Sections 2.3 and 2.4 below, (16) would require the existence of some salient container that counts as a "half glass" – perhaps a cut-off glass, perhaps a half-filled glass being referred to metaphorically as a half glass[6].

(15) Он выпил два с половиной стакана молока.

(16) ??Он уронил с подноса два с половиной стакана молока

### *2.2. The Concrete Portion reading*

The *Concrete Portion* reading and the *Ad Hoc Measure* reading of *dva stakana moloka* were not distinguished in our earlier work; either could be a case of "QUANT" in [Borschev, Partee 2001, 2004]. In this section we discuss the *Concrete Portion* reading, which describes a portion of matter, and characterizes its quantity in terms of some concrete containers it actually fills. In Section 2.3 we describe the *Ad Hoc Measure* reading in which the substance need not be in any container, but its quantity is described using some actual or potential container as a measure, a container that it 'would fill'. In Section 2.4 we describe the *Standard Measure* reading, which involves a lexical shift, not a formally derivable one like the others discussed here.

All three of these readings have a similar syntactic and semantic structure, which we make explicit in Section 4; in all of them the 'substance' phrase in the genitive is the head[7], perhaps surprisingly, and the 'measure expression' phrase (in whatever case the position of the whole NP in the sentence requires) is a modifier. While it may seem surprising that the semantic head of the phrase is in the genitive, that is not so surprising for Russian, where many numerals demand genitive case on the noun, and where genitive may be used to express partitivity even without any overt quantifier or measure expression[8].

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[6] But a sentence like *On prines polkorziny gribov* 'He brought half a basket of mushrooms', is judged intuitively to refer to a half-full basket together with the mushrooms in it. Note that neither of the constructions in (11) and (12) allow "half a glass" in Russian unless it really is a cut-off glass. The second co-author finds sentences like (16) ungrammatical; the first co-author considers them to be grammatical, but anomalous because they presuppose the existence of a very implausible kind of object, a container that is literally a half of a glass.

[7] We thank Maria Kholodilova for bringing it to our attention that a very similar conclusion about the headedness of such phrases was reached in [Гращенков 2006], partly on the basis of the same kinds of arguments, and partly with the support of other facts, and with a broader typological perspective relating the containers in Genitive of Measure constructions to container-like words used in "numerative" expressions and as classifiers in various languages.

[8] Some Russian nouns have two distinct genitive forms, a standard genitive which can be used in any genitive construction, and an unambiguously partitive genitive which may be used only with partitive interpretation. The noun *čaj* 'tea' has standard genitive form *čaja* and partitive genitive form *čaju*. A Google search on the two variants in the construction *dva stakana čaja/ čaju* 'two glasses of tea' yields results of the same order of magnitude (87100 for *čaja*, 39400 for *čaju*), which confirms that the substance noun in container constructions is indeed construed as a partitive.

(17) **CONCRETE PORTION reading: a predicate true of concrete quantities** of the substance which are/were in the given container(s).

On this reading, when we say *dva stakana moloka* 'two glasses of milk', we are talking about milk that fills two ("concrete") glasses. On this reading, like the previous one, we don't normally expect to be able to talk about fractional glasses of milk, unless the glasses themselves are somehow "fractional".

We call this reading the "concrete" quantity reading, because the modifier has a semantics which refers to some actual container(s), and characterizes the substance in terms of its occupying those containers. Because of the "concreteness" of the containers, this reading allows for examples like (18a,b), where *two pots* or *two mugs* can involve one large pot (mug) and one small one. That can also happen with the *Container + Contents* reading, but not with the measure readings we will discuss in Sections 2.3 and 2.4.

(18) a. Он сварил две кастрюли супа, большую для нас и маленькую для кошки.

b. Он нацедил из бочки две кружки пива, большую для себя и маленькую для сына.

In (18a), the two pots of soup could be of the 'same' soup or different kinds of soup in each; in (18b), since the two mugfuls come from the same barrel, it's clearly two mugs of the same kind of beer. For (18b), a measure reading would be especially plausible for the first half of the sentence, but is then blocked by the mention of two containers of different sizes. And it's clearly not a *Container + Contents* reading, since it's beer, not mugs, that's being drawn from the barrel.

An example like (19a) would probably be interpreted as involving a "concrete portion", since the definiteness and plurality suggest that the milk is in two particular glasses; it might even be interpreted as involving the *Container + Contents* reading[9]. Sentence (19b), on the other hand, would probably be more readily interpreted as the Ad Hoc Measure reading, although many examples are undoubtedly ambiguous or indeterminate between the two.

(19) a. Выпей эти два стакана молока.
b. Выпей рюмку водки.

This *Concrete Portion* reading arises from the reference to the container by a form of metonymy which has become conventionalized for all container-words, from container to contents. The container word, together with any preceding numeral phrase, is reinterpreted so as to contribute a modifier; the whole phrase denotes milk or soup contained in a glass or pots, not the glass or pots.

### *2.3. The Ad Hoc Measure reading*

We now subdivide our earlier "QUANT" reading into the *Concrete Portion* reading described above and an *Ad Hoc Measure* reading. The *Concrete Portion* reading can be thought of as primarily a "contents" reading, and only incidentally as specifying an amount. On the *Ad Hoc Measure* reading of *dva stakana moloka* 'two glasses of milk', some ordinary

[9] Given the semantics we propose below, it is easier to account for the definite determiner if the primary reference is to the glass, as in the *Container + Contents* reading. And Pustejovsky's 'dotted type' examples suggest that it is very easy to shift verb uses as well, so that *drink* might be applied to *glass* with a metonymic shift. One can even say *Drink that glass*, with no mention of the contents; see discussion in Section 3.

glass is considered as a unit of measure, and *dva stakana moloka* then holds of a quantity of milk that fills, or would fill, that glass two times. That is, we make a shift from the contents of a concrete glass to a measure of the volume of milk that glass can hold. And with the glass construed as a measure, it is perfectly natural to speak of fractional glassfuls (as with the English word *glassful*, in fact), as in the example in (15) above, and those in (21).

(20) **AD HOC MEASURE reading: a *measure* predicate true of a quantity** of the substance that would fill a given container of the given sort a given number of times.

(21) a. За ягодный сезон я собрал, наверное, два с половиной ведра черники и полведра брусники.

b. На эту поездку нам потребуется два бака бензина.

This reading is very close to the *Standard Measure* reading to be discussed next, and both are quite similar to the interpretation of *liter*. The difference is that this Ad Hoc Measure reading is available for all sorts of containers[10] whether they have any "standard" versions used for measuring or not: an *ad hoc* unit of measure is created based on a concrete container, such as a particular glass.

### *2.4. The Standard Measure reading*

The shifts we have discussed so far, yielding the first three readings of *dva stakana moloka* 'two glasses of milk', can be considered 'formal' shifts: we can define the semantics of the shifted uses of the container word in terms of its original sortal meaning. The last shift, from the *Ad Hoc Measure* reading to the *Standard Measure* reading, is on the one hand a small step, but on the other hand this one is a non-compositional lexical shift that is only undergone by some nouns, those for which there is a notion of a "standard" volume associated with that kind of container. This is the case for Russian *stakan* 'glass' and English *cup*[11]. It is not the case for Russian *kastrjulja* 'pot' or for English *glass*. Of course 'standards' may be context-relative and temporary, and some containers may be used as standard measures at a certain time and place even if not conventionally for the language as a whole. And conventional standards are a cultural as well as a linguistic matter: in the parts of the English-speaking world that use metric units, *cup* is presumably not a standard unit.

On the *Standard Measure* reading, *cup of milk* in English or *stakan moloka* 'glass of milk' in Russian has a meaning and use fully parallel[12] to *liter of milk.*

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[10] Louise McNally (p.c.) observed that in several languages, it is hard to get this reading for things that are not 'normally' used as containers. As she notes, one can equally speak of *two spoons of ice cream* or *two spoonfuls of ice cream*, and of *two forkfuls of spaghetti* but not *#two forks of spaghetti*. It is similarly difficult in Russian to use *vilka* 'fork' as an *Ad Hoc Measure* without somehow enriching the context so as to coerce a shift of *vilka* into the sort 'container'. See discussion in [Borschev, Partee 2004] of the possibility of coercing hats and rooms (in Russian) into containers by adding modifiers like 'full' and numerals.

[11] See [Partee, Borschev 2012] for some notes on the history of *cup* and of the measure word *gallon*.

[12] Maria Kholodilova (referee report) questions whether *stakan* is "fully parallel" to *litr*, and indeed that may be more true for English *cup* than for Russian *stakan*. As she notes, pots may be described in Russian as having a volume of two liters but not as having a volume of six glasses; but in English a container may be said to have a volume of six cups. And as we noted in [Partee, Borschev 2012: fn. 15], whereas American "measuring cups" are calibrated in fractions of a cup, their Russian analogs are calibrated in milliliters or centiliters. So there are clearly fine-grained differences within the family of what we have called the *Standard Measure* reading, and these differences are not captured in our analysis. She notes further differences in linguistic behavior of *litr* and *stakan* which merit further study, which we must leave for future work. To cite one interesting example which she found in the Russian National Corpus, a recipe can call for a less than full *stakan* of flour, something that never happens with *litr*:

(22) **STANDARD MEASURE reading: a *measure* predicate true of a standard quantity** of the substance, corresponding to a conventional standard size of containers of the given kind.

Example (23) is a typical cookbook instruction.

(23) Возьмите два стакана муки.

Landman and Rothstein, in their interpretation rules for their measure reading, which corresponds to our *Standard Measure* reading, use expressions like "GLASS-FUL" without attempting to define them in terms of "GLASS". We distinguish two measure readings, depending on whether one is appealing to the existence of some glass (the *Ad Hoc Measure* reading, definable from the sortal noun meaning) or to the existence of a standard (the *Standard Measure* reading, requiring a lexical shift).

### 3. What is clear and what is not so clear

The lines between these different interpretations of expressions like *dva stakana moloka* 'two glasses of milk' are admittedly not entirely easy to draw, and the lines as we have drawn them here have been influenced in part by issues that have arisen as we have worked out how to formalize them. Our earlier "QUANT" meaning was split into two in part because any attempt to formalize our earlier QUANT meaning for *stakan moloka* 'glass of milk'[13] in a way that made a place to add *dva* 'two' required a decision as to whether we were counting the glasses in which the milk was contained (which normally could not be a fraction), or the number was indicating how many times a certain glass could be filled by the given portion of milk – a true 'measure' reading, easily allowing fractional results. Admittedly, the distinction is easier to perceive theoretically than in examples.

One foundational problem area concerns Pustejovsky's 'dotted types'. It is not clear how to make the *Container + Contents* meaning actually denote *both* the container and the contents. We cannot take the mereological sum of the glass(es) and the milk contained in them, because then counting would make no sense; and yet we very easily count glasses of milk in those uses, and we do it by counting the glasses. We have followed Rothstein in formalizing this reading as referring to glasses that contain milk, modifying it to specify that the milk fills the glasses, which distinguishes it from the Russian construction in (11), *stakan s molokom* 'glass with milk', which better fits the interpretation Rothstein gives to 'glass of milk'. So we do have a distinction between the *Container + Contents* reading and the 'glass with milk' construction, but that still does not capture the "dotted type" reading that the *Container + Contents* construction is felt to have. Native speakers' intuitions are that unlike the constructions in (11) and (12), *stakan moloka* 'glass of milk' on its *Container + Contents* meaning denotes the glass and the milk together, but how to formalize that has long been a mystery. Asher [2008] offers a theory of dotted types that appears to avoid the difficulties encountered by previous attempts at formalization. The core of the theory involves complicating the notion of predication, so that one predicates something not of an object as a 'bare particular', but of an object 'under a certain conceptualization, or aspect' [Asher 2008:

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(i) *«Ушки»: замесить тесто из 1 яйца, 1 ч. ложки растительного масла,* ***1 неполного стакана муки*** [Фирменный рецепт (2004) // «Приазовский край», 2004.10.07] (НКРЯ).

[13] Our formula for *stakan moloka* 'glass of milk' on the QUANT (quantity) reading in (Борщев и Парти 1999, Borschev and Partee 2001) was: $\lambda x$[substance(moloko) & quantity(moloko)($x$) & $\exists z$(stakan1($z$) & fills($z$)($x$))]; this formula uses *moloko* for the e-type name of the kind 'milk', and *stakan1* as a predicate true of individual glasses.

165]. Asher's approach handles the 'copredication' evident in examples like (7), (8), and (9). We believe it would handle the cases discussed here, but because the formalism goes considerably beyond simple type theory, we did not try to implement it in [Partee, Borschev 2012]; the non-dotted-type analysis we give below should be considered a placeholder for a more adequate formalization.

A related puzzle concerns the selectional restrictions of verbs and their shiftability. Some of the main tests for different readings that are frequently appealed to in the literature concern selectional restrictions: you cannot drink a container, and you cannot break liquid. But actual usage seems to be rather flexible in such matters; even when there is only a word for a container or a word for a substance present, one often finds perfectly natural uses of *prima facie* violations of selectional restrictions, as in the English examples in (24).

(24) a. Stir the pot every 10 minutes or so. [What is stirred is the soup, not the pot.]
b. Please put a lid on the soup. [The lid goes on the pot, not the soup.]
c. Set the juice on my desk, please. It shouldn't be sitting on the windowsill. [Setting and sitting are applicable to solids, not liquids.]
d. He drank the whole glass in one gulp. [Maybe, but more likely the contents.]
e. Keep the wine on its side, not vertical. [Only makes sense for the bottle.]

These all seem to involve metonymy that can go in either direction between a container and its contents, meaning that even if we can clearly distinguish meanings for *stakan moloka* that pick out the glass or the milk, it won't be easy to find simple tests for identifying which meaning we have in a given example, because such metonymic shifts could reverse the results. It's not even completely clear where to localize the shifts in (24); are they all shifts in the noun phrase, or might some of them be shifts in the verb or other predicate? These metonymy phenomena make it harder to give criteria for distinguishing among the different meanings we have claimed to distinguish, and they may also be at the root of the phenomena underlying Pustejovsky's theory of "dotted types", although that is only a conjecture at this point. We believe that Asher's recent work [Asher 2008] supports the idea that on a dotted type reading, one can apply predicates that hold of the given 'complex entity' under any of its 'aspects'. But his work does not settle the question of how to tell when there is further metonymy at work in a given example.

But some things are relatively clear, we believe. The *Container + Contents* reading is different from all the others in that it most clearly refers to the container (as well as the contents); and on that reading the container-word has shifted to a normal relational noun meaning which takes the complement substance term as its argument. On that reading, as the tree in (27) below represents, the container word is the head noun, and any number preceding it is counting entities, just as with a sortal. Hence that construction most clearly resists fractional numbers and most straightforwardly combines with verbs that apply to concrete objects. This is Rothstein's *individuating* reading. The only big puzzle remaining about it is the puzzle of dotted types.

The *Standard Measure* reading is also clearly distinguishable from the others, in that on that reading, the container word has shifted to a unit of measure similar to *liter*, and there is no requirement that any actual container be involved at all – *dva stakana moloka* 'two glasses of milk' on that reading is just milk in a certain amount. This is Rothstein's *measure* reading, unless perhaps her *measure* reading is indeterminate between this one and what we are calling the *Ad Hoc Measure* reading.

The *Ad Hoc Measure* reading is indeed close to the *Standard Measure* reading; both describe milk of a certain quantity, and neither requires the milk to be in a container of the mentioned sort. The difference is in whether some particular glass is being used as a measure – perhaps only on a single occasion – something that could in principle be done with any container any time; or whether a standard has become conventionalized, perhaps so far as to become lexicalized. These two measure readings have a vague boundary, since there is no sharp line between the *ad hoc* or occasional use of some container as a unit of measure and a conventionalized appeal to a container of a certain size as a standard unit of measure.

The *Concrete Portion* reading is not easy to discriminate from all the others; it shares properties with the *Container + Contents* reading on the one hand and with the *Ad Hoc Measure* reading on the other. Like the *Container + Contents* reading, it requires that the substance be in the container, but as on the *Ad Hoc Measure* reading, the whole phrase *dva stakana moloka* 'two glasses of milk' is a predicate that applies to milk, not to glasses, a fact that is reflected in its syntax, which is like that of both of the measure readings, and unlike that of the *Container + Contents* reading[14].

## 4. Formalizing the semantics of *liter* and the four container constructions

In this section we formalize the semantics corresponding to the different meanings of the container constructions described in the previous section. We begin with the semantics of pure measure phrases like *two liters of milk*, which have been well studied. The structure given for *two liters* of *milk* also fits for all three measure-like readings of *dva stakana moloka* 'two glasses of milk'; for the *Container + Contents* reading, we also need a different syntactic structure, which we will provide. As we formalize the readings, we will note open problems that remain.

Measure phrases like *two liters of milk* involving *Standard Measure* words like *liter* are not ambiguous, since pure measure units like *liter* have no alternative interpretation as sortal nouns: they are unambiguously functional nouns of a special sort. There are several approaches to formalizing their syntax and semantics; see [Brasoveanu 2008; Champollion 2009; Ionin, Matushansky, Ruys 2006; Krifka 1989a, 1989b; Landman 2004; Rothstein , 2009a , 2009b; Schwarzschild 2002, 2006]. Here we build on [Landman 2004; Rothstein 2009a, 2009b], and our work in [Борщев, Парти 2011].

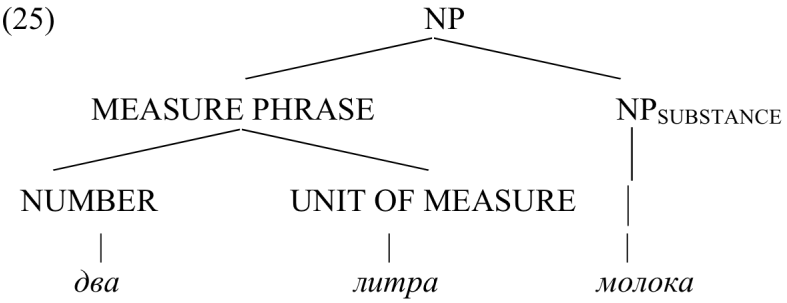
### *4.1. Formalizing liter*

The tree in (25), from Борщев и Парти (2011), is a slight simplification of the structure proposed by Landman (2004) and used by Rothstein (2009a, 2009b).

NP is to be understood as "common noun phrase"; the NP below can also be the sole constituent of a DP (which would be understood as indefinite), or can be made into a DP by the addition of a determiner such as *tvoi* 'your-FAM.PL' or *èti* 'these'.

[14] It is possible that on the analysis of Asher (2008), there might not be any need to have a separate *Concrete Portion* reading; it could be just one of the "aspects" of the dotted type *Container + Contents* reading.

(25)




Numerals are given their own type *n* by Landman; they could also be treated as a distinguished subsort among the entities. *Moloka* 'milk' is a sortal (mass) common noun, type <e,t>, a predicate[15] of portions of milk, which we represent as $MILK_{<e,t>}$.

The measure unit *litr* 'liter' is assigned a basic lexical meaning as a measure function, a function of type <e,n> which applies to a measurable entity (some quantity of substance whose volume can be measured in liters), and whose value is the number of liters of the volume of that entity. We write this basic meaning as $LITER_1$. In order for the measure phrases that occur in NPs to be interpreted as modifiers, *litr* is shifted to a derived meaning, *litr2*, of type <n, <e,t>>, which takes a number as argument and returns a predicate of portions of matter. (Schwarzschild [2005] discusses further shifts undergone by unit-of-measure terms as they occur in other constructions.)

Because not everything can be measured in liters, there are presuppositions corresponding to definedness conditions for the function, but we will not try to represent those explicitly[16].

The semantic derivation for *dva litra moloka* then proceeds as shown in (26).

(26) (i) *litr: litr2:* Type <n, <e,t>>. Meaning: $LITER_2$, defined as follows:
$LITER_2 = \lambda n [ \lambda x [LITER_1(x) = n] ]$
(ii) *dva*: Type n. Meaning: 2.
(iii) *dva litra*: Type <e,t>. Meaning: $\lambda x [LITER_1(x) = 2]$
(iv) *moloka*: Type <e,t>. Meaning $MILK_{<e,t>}$
(v) *dva litra moloka*: Type <e,t>. Meaning: $\lambda y[LITER_1(y) = 2 \ \& \ MILK_{<e,t>}(y)]$

Note that measure functions like the $LITER_1$ function can return rational numbers, not just cardinal numbers. This is one of the formal distinctions between those readings which involve a standard or *ad hoc* unit of measure, and those that involve counting concrete containers.

Also note that although *moloka* is genitive, and *litr* is a functional noun, in the semantics we don't have *moloka* as an argument of *litr.* Rather *moloka* is a common noun (phrase) (NP), type <e,t>, and *dva litra* is also of type <e,t>, and they combine by the Predicate Modification rule of Heim and Kratzer [1998]. As mentioned above, the fact that

[15] Like Rothstein, we assume that $MILK_{<e,t>}$ and $MILK_e$ are related by Chierchia's 'up' and 'down' operators.
[16] There is explicit discussion of the definedness conditions for various measure expressions in (Krifka 1989a; 1989b) and more recently Schwarzschild (2002; 2006) makes a case for including measure dimensions like *volume* and *length* more explicitly as well.

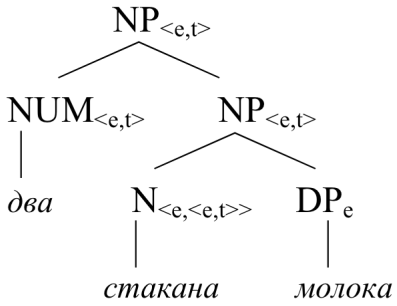
the noun occurs in the genitive case is evidently related to the use of genitive with numbers and for expressing partitivity.

With this analysis of the pure measure constructions as background, we now go through the four readings of the container construction; as before, we start with the one closest to the basic sortal meaning of the container, and end with the one most similar to the *litr* construction.

### *4.2. Formalizing the Container + Contents reading*

The syntactic tree for *dva stakana moloka* on this reading is shown in (27), annotated with semantic types. Again we draw the tree only up to NP, although this could be a non-branching DP as well.

(27)




On the *Container + Contents* reading, the types and meanings of the basic constituents and the compositional derivation are shown in (28). We call this derived meaning of *stakan* 'glass' *stakan+*, where + is mnemonic for *Container + Contents*. We defer to Section 5 discussion of the decision to use (like Rothstein) the kind-denoting e-type $MILK_e$ here, and the interpretation of formulas where it is an argument of a relation like *fill*.

(28) (i) *stakan+:* Type <e, <e,t>>. Meaning: λy[λx[glass(es)(x) & y fills x]]
(ii) *moloka*: Type e. meaning $MILK_e$ (a kind-denoting term)
(iii) *stakan+ moloka*: Type <e,t>. Meaning: λx[glass(es)(x) & $MILK_e$ fills x]
(iv) *dva*: Type <e,t>. Meaning: λx[ |x| = 2]
(v) *dva stakana+ moloka*: Type <e,t>. Meaning: λx[glass(es)(x) & $MILK_e$ fills x & |x| = 2]

The meaning for *stakan+* is a shift from the sortal meaning of the container word to a relational meaning expressing the relation between the container and its contents. But this clearly does not give a "dotted type" reading. Like Rothstein's individuating reading, we have the literal interpretation of the expression apply to a plurality of glasses that are two in number and that are filled with milk. On the issue of the dotted types, we would try in further research to incorporate something like the analysis of Asher [2008].

Even without a formalization of dotted types, we do have an account for the difference in meaning between *dva stakana moloka* 'two glasses of milk' and *dva stakana s molokom*, 'two glasses with milk': the former requires glasses filled with milk, while the latter requires only that the glasses contain some milk.

### *4.3. Formalizing the Concrete Portion reading*

The syntactic tree and the semantic types for the *Concrete Portion* reading and two measure readings that follow will all be like tree (25) for *litr*, so we will not draw them. We call the shifted *stakan* in this reading $stakan_{CQ}$. The semantic derivation is shown in (29).

(29) (i) $stakan_{CQ}$: Type <n, <e,t>>. Meaning: λn[λx[∃y. glasses(y) & x fills y & |y| = n]]

(ii) *dva*: Type n. Meaning: 2.

(iii) *dva* $stakana_{CQ}$: Type <e,t>. Meaning: λx[∃y. glasses(y) & x fills y & |y| = 2]

(iv) *moloka*: Type <e,t>. Meaning $MILK_{<e,t>}$

(v) *dva* $stakana_{CQ}$ *moloka*: Type <e,t>. Meaning: λx [$MILK_{<e,t>}$(x) & [∃y. glasses(y) & x fills y & |y| = 2 ]]

So on the *Concrete Portion* reading, *dva stakana moloka* 'two glasses of milk' is a predicate true of milk that fills two glasses; unlike the two measure readings that follow, on this reading there could be a big glass and a small glass. Thus this 'quantity' reading is not exactly a "measure" reading.

One could make this subtler by allowing 'glass-stages', so that the milk could fill the same glass at different times OR different glasses. We ignore such subtleties concerning counting and individuation.

### *4.4. Formalizing the Ad Hoc Measure reading*

We call the shifted *stakan* in the *Ad Hoc Measure* reading $stakan_{AHM}$. The semantic derivation is shown in (30).

(30) (i) $stakan_{AHM}$: Type <n, <e,t>>. Meaning: λn.λx.∃y[glass(y) & x fills[17] y n times]

(ii) *dva*: Type n. Meaning: 2.

(iii) *dva* $stakana_{AHM}$: Type <e,t>. Meaning: λx.∃y[glass(y) & x fills y 2 times]

(iv) *moloka*: Type <e,t>. Meaning $MILK_{<e,t>}$

(v) *dva* $stakana_{AHM}$ *moloka*: Type <e,t>. Meaning: λx [$MILK_{<e,t>}$(x) & ∃y[glass(y) & x fills y 2 times]]

This meaning is probably the same meaning that applies to the productive English –*ful* suffix, as in *truckful, spoonful, bowlful,* which is also not restricted to standard measures.

### *4.5. Formalizing the Standard Measure reading*

We have finally reached the *Standard Measure* reading, Rothstein's *measure* reading, which is exactly parallel to the measure construction with *litr* 'liter', which involves a lexical shift that occurs with Russian *stakan* 'glass' and English *cup*. For this meaning of *stakan* we write $stakan_{SM}$. The meaning of $stakan_{SM}$ is not formally derived from the meaning of sortal *stakan*, but is a basic measure of volume like *liter*. Like *liter*, its basic type is <e,n>, a function from entities to numbers that gives the volume of that entity in number of glasses. We denote that function by ***stakan-units***. The type for $stakan_{SM}$ as used in this construction is <n,<e,t>>, defined in terms of ***stakan-units***, combining with a number to make an amount modifier.

[17] We intend for this use of "fills" to have a modal component – e.g. "would fill" under suitable conditions.

The derivation is in (31).

(31) (i) *stakan$_{SM}$:* Type <n, <e,t>>. Meaning: λn.λx[***stakan-units***(x) = n]
(ii) *dva*: Type n. Meaning: 2.
(iii) *dva stakana$_{SM}$*: Type <e,t>. Meaning: λx[***stakan-units***(x) = 2]
(iv) *moloka*: Type <e,t>. Meaning MILK$_{<e,t>}$
(v) *dva stakana$_{SM}$ moloka*: Type <e,t>. Meaning: λx[MILK$_{<e,t>}$(x) & ***stakan-units***(x) = 2]]

This completes the formalization of the four readings; we compare them in Section 4.6.

### *4.6. Comparing the four shifted meanings of container-words*

If we compare the four different shifted meanings of *stakan* presented above, we can see that they form a sort of scale: the most concrete is the *Container + Contents* reading, *stakan+,* denoting a glass together with its contents; then comes the *Concrete Portion* reading *stakan$_{CQ}$*; then the *Ad Hoc Measure* reading reading *stakan$_{AHM}$*; and finally, the most abstract measure-like reading, *stakan$_{SM}$*, the *Standard Measure* reading (which does not exist for all container nouns).

We repeat the four definitions below in (32) for ease of comparison.

(32) a. *stakan+:* Type <e, <e,t>>.
Meaning: λy[λx[glass(es)(x) & y fills x]
b. *stakan$_{CQ}$:* Type <n, <e,t>>.
Meaning: λn[λx[∃y. glasses(y) & x fills y & |y| = n]]
c. *stakan$_{AHM}$:* Type <n, <e,t>>.
Meaning: λn.λx.∃y[glass(y) & x fills (can/would fill) y n times]
d. *stakan$_{SM}$:* Type <n, <e,t>>.
Meaning: λn.λx[***stakan-units***(x) = n]

In this comparison, it is easy to see that numbers like the *dva* in *dva stakana moloka* 'two glasses of milk' play a very different role with *stakan+* than with the other three constructions. With *stakan+*, it is simply counting concrete glasses. In the *Ad Hoc Measure* construction and the *Standard Measure* construction, the number is related to a unit of measurement. In the *Concrete Portion* reading, it enters the construction in the same way as with the two measure readings, but there is quantification over glasses internal to the construction, and the milk is measured by counting those glasses.

## 5 The genitive *moloka* in the four constructions

In [Partee and Borschev 2012], as in Rothstein's work, the genitive *moloka* is an NP of type <e,t> in the *Concrete Portion* and both *Measure* constructions: *dva stakana* 'two glasses' in each case is a modifier which combines intersectively with *moloka*, and the whole expression is an <e,t> predicate true of portions of milk. In the *Container + Contents* reading, *moloka* is an e-type DP denoting a kind; the resulting construction is a predicate true of glasses that are filled with milk. On a 'dotted type' analysis, we would want the whole expression to be able to be predicated both of glasses and of portions of milk, so at least the 'resulting' expression should have a component similar to <e,t>-type *milk*.

Of course, technically, the 'milk' inputs to any of these constructions could be either e-type or <e,t>, since we could use Chierchia's 'up' and 'down' operators to shift them to the

other type. But we should have linguistic motivation for the choices we make. Before examining the properties of *moloka* in these constructions, let us pause to note an important difference in the status of *stakan* and that of *moloka*.

### *5.1. Lexical constraints on stakan, non-lexical constraints on moloka*

At various points above we have noted constraints on the 'container' nouns that can participate in the four constructions. For the *Standard Measure* reading, only specific measure-nouns are possible; and some of those have arisen more or less recently from names of containers. For the other readings, virtually any noun denoting a kind of container is possible, and sometimes a non-container noun can be coerced into a container reading (see discussion of *polnaja šljapa gribov* 'full hat of mushrooms' in [Borschev, Partee 2004]). We have also noted that some languages can productively derive measure nouns like *forkful, truckload,* etc. In the trees for all three *QUANT* or *measure* constructions, we see that the N in the position of *stakan* 'glass' must be a measure noun; this explains why there are lexical constraints on that position. In the case of the *Container + Contents* reading, we have a relational noun of a particular sort and its DP complement; here it is not that the 'construction' is 'constrained', but that it is just for container nouns that we get a conventionalized shift to this particular relational reading.

The genitive *moloka*, on the other hand, is in a position that is not lexically constrained, and we don't know of any languages that have productive morphological derivation of special forms for the nouns in the 'substance' position in these constructions. This is not surprising, because *moloka* is in a DP or an NP position; it is not in an N position. In the *Container + Contents* reading, the genitive complement is presumably a DP, and is so analyzed both in Rothstein's work and in our papers. In the other three readings, it is an NP. What is worth noting is that in the *Concrete Portion* and the two *measure* readings, while the genitive NP must be a predicate of measurable stuff or things, that is an 'ontological' requirement that a function places on its argument, not a lexical one, as seen from the examples in (33).

(33) a. ложка какого-то лекарства
b. стакан какой-то гадости
c. бутылочка «*Эль де Пердри*»

### *5.2. NP and DP moloka*

When *moloka* occurs as a bare noun in these different constructions, what is its type and its interpretation?

**For measure readings: type <e,t>**

We can see from the semantics given in Section 4 that in all three of the "measure" constructions (*Concrete Portion, Ad Hoc Measure, Standard Measure*), *moloka* should be of type <e,t>; it serves as a predicate of portions of stuff (or 'things') whose quantity is being measured. But we do find expressions in that position whose basic meanings are e-type, and which refer to definite ('maximal') quantities of stuff or things, just as in the English examples in (34) and in (35a); (35b-c) are similar but probably refer to kinds rather than to a definite quantity.

(34) a. Two kilos of the flour that I bought … (Rothstein handout Oct 6, 2010, p.15)
b. On the table were two glasses of what used to be in the porcelain pitcher.

(35) a. Туда же выливаем примерно стакан того, что осталось в кастрюле
(from http://www.drive2.ru/users/vovchique/blog/48999163945791164 40/)
b. Налей стакан того, что пил вчера
(from *akak.ru/recipes/248-kak-izbavitsya-ot-pohmelya*)
c. Они просили принести вам стакан того, что вы пьете, и включить его стоимость в счет их родителей
(from http://lib.rus.ec/b/117424/read)

In these cases we assume that the semantics of the construction coerces a very common "partitive" shift from a maximal sum of stuff or things (type e) to a predicate of the stuff or things making it up (type <e,t>). So it would also be possible to start with $MILK_e$ and coerce it to shift to the predicate $MILK_{<e,t>}$.

**For *Container* + *Contents* reading: type e, but maybe additional types too**

Many kinds of complements apparently occur in the *Container* + *Contents* reading; what are the constraints on them and how are they interpreted? Let's check with English; Russian seems relevantly like English in this construction, apart from the absence of articles and the controversies concerning DP vs. NP, etc.

(36) On the table were two glasses of …
a. wine
b. a rare liquid
c. #rare liquid
d. something I made today
e. what had been in the porcelain pitcher

*A rare liquid* in (36b) is an indefinite NP or DP kind term, and one can shift down to a predicate of stuff which instantiates a rare kind, much as one can shift down from the kind $MILK_e$ to a predicate of stuff which instantiates that kind, $MILK_{<e,t>}$.

Why is (36c) anomalous? Why should it be impossible to shift from the predicate of kinds *rare liquid* to a predicate of the stuff that instantiates some rare kind, when something so similar seems to happen in (33b)? The answer seems to be that kind-predicates are all count nouns, even when the kinds they describe are massy kinds; this accounts for the indefinite article in (36b) as well as the familiar pluralization found in *those wines were too expensive for us.* Hence *#rare liquid* as an NP is always anomalous, not only in this construction.

To analyze example (36d), *two glasses of something I made today,* we need to figure out the interpretation of *something I made today*. As with other indefinites, there are various possible theories. If we consider all indefinites to be born in type <e,t>, we might arrive at a meaning as in (37i); as a generalized quantifier, it could be as in (37ii); or we could treat it as a specific indefinite using a choice function as in (37iii).

(37) i. $<e,t>: \lambda x_e.$ made (I, x)
ii. $<<e,t>,t>: \lambda P_{et}.\exists x_e$ [made(I,x) & P(x)]
iii. e: $f_c (\lambda x_e.$ made (I, x))

When we work out the interpretation given earlier for *dva stakana moloka* on its *Container + Contents* reading, if we use the formula (28v) arrived at there and just substitute in the e-type interpretation (37iii) above, the result will not be quite what it should be.

(38) ||*two glasses of something I made today*||, according to (28v) and (37iii):

$\lambda x_e$[glass(es)(x) & |x| = 2 & fills($f_c$ ($\lambda y_e$. made (I, y)), x)]

The only thing seriously wrong with this result is that it says that what I made today fills the two glasses; that is not right. In the original example formula (28v), we had the statement that $MILK_e$ fills two glasses, and we assumed that automatic coercion would interpret that as saying that something that instantiates the kind MILK fills the two glasses (cf. Chierchia's derived kind predication). But in (37iii) we have an e-type interpretation for *something I made today* which denotes an entity (possibly a plurality of things, or a sum of massy stuff), which should not need any coercion. Similarly if I speak of *two glasses of the sumac juice I made today*, I don't imply that *the sumac juice I made today fills two glasses*; I may have made a gallon or more.

So let us reconsider the interpretation given for *stakan+* in (28i), repeated below

(28i) *stakan+:* Type <e, <e,t>>. Meaning: λy[λx[glass(es)(x) & y fills x]].

Evidently, if we take the complement of *stakan+* to be of type e, we need to build partitivity into the interpretation. Let us revise (28i) as follows, using ⊑ for the mereological 'part of':

(39) *stakan+:* Type <e, <e,t>>. Meaning: λy[λx[glass(es)(x) & ∃z[z ⊑ y & z fills x]]]

Then the interpretation of (36d) will come out correctly:

(40) ||*two glasses of something I made today*||, according to (39) and (37iii):

$\lambda x_e$[glass(es)(x) & |x| = 2 & ∃z[z ⊑ $f_c$ ($\lambda w_e$. made (I, w)) & fills(z, x)]]

This correctly says that part of something I made fills two glasses. (It needn't be a proper part, but that is a likely implicature.)

Example (36e) will also come out right with the change proposed in (39) and wrong with the original formula, which would predict that it asserted that what had been in the porcelain pitcher would fill two glasses.

Another interesting property of (36e) is that like (36d), by itself it could refer to a single entity as well as to a plurality or a mass sum; but the sortal preconditions imposed by the <e,<e,t>>-type *container* function (discussed in [Borschev, Partee 2004] require that what is in the container be a substance, by which we meant something massy or plural.

Returning to (37i-iii): Above we worked out the interpretation of *two glasses of something I made today* on the e-type interpretation of *something I made today*, but ignored the <e,t> and <<e,t>,t> type interpretations. We will not work through them here; we believe that the same amendment to make partitivity explicit is needed in the <<e,t>,t> case, and probably even for the <e,t> case, since the property we have there is not a property that holds of parts of things I made today, but only of things I made today. The type-shifts will undoubtedly all be familiar ones; the moral of this exploration is that we had to look at an example that shouldn't have needed to shift at all to see that the meaning we originally assigned to *stakan+* was not quite right.

### *5.3. Contrasting genitive construction(s) with stakan s molokom 'glass with milk'*

We mentioned earlier that the Russian genitive constructions with container nouns contrast with two other 'neighboring' constructions, one of which is worth discussing in connection with the role of *moloka* in these constructions, namely the construction *stakan s molokom* 'glass with milk'. In some of our earlier work, and also in [Rakhilina 2004], there is discussion of how the availability of that construction apparently blocks some possibilities for the genitive construction: in Russian one does not say **vaza cvetov* 'vase of flowers', but *vaza s cvetami* 'vase with flowers'. The *s* 'with' construction does not translate perfectly simply into English; it seems to have some properties of *N with x* and some properties of *N containing x*.

Let us constrast *glass of ...* and *glass containing ...* in English and the *stakan moloka* and *stakan s molokom* constructions in Russian. What we find is that there is one clear contrast shared by the two languages, and another contrast that is almost as strong in English but apparently much weaker in Russian.

**First contrast: *is filled by* vs. *contains***

When we say 'There are two glasses of wine on the tray', we implicate that the glasses are full to a relevant degree. (See footnote 3 above concerning our discussion with Susan Rothstein. Our mutual conclusion was that in the case of *Standard Measure* readings, the container normally has to be really full, whereas in Rothstein's individuating reading, our *Container + Contents* reading, what counts as full is vague and context-dependent. Restaurants, for instance, have their own conventions about how much wine is to be put into a glass when wine is ordered by the glass; it's never actually full. But a customer familiar with that restaurant can complain that he didn't receive a full glass if he got less than the conventional glass of wine served by that restaurant.) But when we say 'There are two glasses containing wine on the tray', then there is no claim at all about how much wine is in them. That's probably clearer in a pair like the following:

(41) a. There are two glasses of wine still on the table.
b. There are two glasses containing wine still on the table.

The second would be appropriate if one finds two glasses that are not empty; the first implies that they are full (to the conventional degree).

This distinction also applies to the Russian genitive construction vs. the Russian *s* construction; recall the example in footnote 3 above about a pot of water vs. a pot with water. A confirming example from the internet is (42).

(42) Китайские археологи сделали сенсационную находку: они раскопали кастрюлю с супом, приготовленным… 2 400 лет назад. Закупоренную бронзовую чашу на трех ножках выкопали неподалеку <от> древнего города Сиань, что в провинции Шэньси. В ней нашли останки жидкости и костей животных, сообщает телеканал News One. (http://mignews.com.ua/ru/articles/54819.html)

We take this contrast as an added reason to have "fills" rather than "contains" in the meaning of the genitive construction; otherwise we would not capture this distinction between the two constructions.

**Second contrast: absence or presence of a maximality implicature with respect to an e-type complement**

We discovered in Section 5.2 that the genitive construction on its *Container + Contents* reading has 'partitivity' as part of its meaning: it may take an e-type genitive

complement, but then it does not entail that all of the denotation of that complement is filling the container(s), and in fact it often implicates that what is filling the container(s) is only a proper part of the whole.

The English expressions with *containing* seem to have a reverse implicature; compare

(43) a. I found a bag of your mother's jewels.
b. I found a bag containing your mother's jewels.

(44) a. I found two bags of the missing money.
b. I found two bags containing the missing money.

It may not be a strict entailment in either case, but the (a) examples seem to the first author to implicate that the bagful of jewels does not exhaust your mother's jewels, and the two bags of the missing money do not constitute all of the missing money. The (b) examples do seem to implicate maximality. Note also that the 'containing' idiom works fine with single entities as well: *a bottle containing a ship; a porcelain pitcher containing a small key.*

Russian data give partly similar results.

(45) a. Я нашел мешочек (шкатулку) драгоценностей твоей мамы.
b. Я нашел мешочек (шкатулку) с драгоценностями твоей мамы.

(46) a. Я нашел два мешка пропавших денег.
b. Я нашел два мешка с пропавшими деньгами.

(47) a. При разборке старого сарая у моей бабушки, был найден пакет моих старых игрушек. (*chibisl.pp.ua/)*
b. При разборке старого сарая у моей бабушки, был найден пакет с моими старыми игрушками.

The second author's intuitions for Russian agree with the first author's for English in the case of the genitive in (45a-47a), although the implicature seems weaker. But in the case of the Russian construction in (45b-47b), when the complement is something that potentially has a maximum, like 'your mother's jewels', '(the) missing money', 'my old toys', the second author does not perceive a maximality implicature; the context might independently suggest it, but on its own the construction definitely does not.

This may very well reflect a difference between the English verb *contains* and the Russian preposition *s* 'with'. (We can't test *containing* in Russian, because the corresponding participle is much more awkward to use.)

### *5.4. Open problems*

There are many open questions for further research, including the issue of how best to formalize 'dotted types', and how to best understand and capture the apparent ease with which intuitively clear selectional restrictions relating to containers and their contents seem to be violated. Progress on those difficult, and probably closely related, topics could have an impact on the question of how many readings of container constructions should be described as distinct. And it is far from settled whether two different syntactic structures are needed for the four readings, or even whether four is the right number of readings to treat as linguistically distinct. The role of sorts and of metonymy deserves further study. And progress on all of these matters may help clarify the mechanisms and constraints on type-shifting and other meaning-shifts, and with them the bigger question of the interplay of compositionality and context-dependence.

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