Genitives, Types and Sorts: The Russian Genitive of Measure[*]

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1. The topic

The genitive construction in Russian is used for many different relations. But for every relation some examples are possible and some strike the native speaker as anomalous (indicated here by #):

(1)   rost   Peti   but   #rost   stolba
        height Petja-GEN   height pole-GEN
        'Petja's height'   'the/a pole's height'

(2)   stakan vody   but   #bassejn   vody
        glass   water-GEN   swimming-pool   water-GEN
        'a glass of water'   # 'a swimming pool of water'

What's the reason? Our thesis can be stated in a fuzzy form as follows: Many, although not all, restrictions on felicitous and infelicitous uses of genitive constructions, and on the possible interpretations of felicitous uses, can be characterized in terms of *sortal* distinctions within the domain of entities, and corresponding sortal properties of both the head noun and the genitive NP.

We are building on related work (Pustejovsky 1993, Jensen and Vikner 1994, Dölling 1992a,b, 1997, Knorina 1979, 1985, 1988, Borschev and Knorina 1990, Borschev 1996, Apresjan 1999, Paducheva 2004, Rakhilina 2003, Borschev and Partee 1999a,b, 2001a,b). Our goal is to integrate formal and lexical semantics.

2. What are sorts?

Sorts, as we understand them, are elements of the 'naive ontology' of language, ways of semantically classifying nominal predicates. 'Naive ontology' is part of 'natural language metaphysics' (Bach 1986) or *naivnaja kartina mira* 'the naive

picture of the world' (Apresjan 1986). Languages use many sorts. Linguists and philosophers give examples such as *physical object, substance, person, animal, plant, food, clothing, literary creation, instruments, vehicle, image,* etc. So, roughly speaking, sorts are elements of a classification system existing in language which are often labeled by "abstract" words (often found as headwords in conventional lexical entries).

Sorts are more fine-grained than types, and sorts need not form a taxonomic hierarchy; the sort *food* overlaps the sort *plant*, but neither subsumes the other. In a way all common noun and verbs can be considered as sorts, with a special partial order relation "subsort" as well as an "overlap" relation. But the structure of this system and its role in forming semantically well-formed constructions is not yet well understood.

Although there are many works discussing sorts, sortal polymorphism, sort-shifting, etc., (under different names, including *types*, which we reserve for the logical type system), the systematic study of sorts within semantics is still in its early stages, and certainly so with respect to the integration of formal and lexical semantics, which is our main concern.

In our examples above *rost* 'height' has a sort we might call *human parameter*, and one of the properties that holds for this sort is that *human parameters* are defined on *persons* (and on some *animals*), but not on inanimate objects. *Petya* is normally assumed to be a *person* and *rost Peti* 'Petja's height' is a well-formed. But *stolb* 'pole' is not animate, so we have a sortal conflict (sometimes called a 'category mistake' in earlier philosophical literature) and the expression is anomalous.

Stakan 'glass' and *bassejn* 'swimming pool' belong to similar but distinct sorts. Below we will try to show that *stakan* is a *container* but *bassejn* is (normally) not (unless it is coerced to undergo sort-shifting; more below). And this construction (genitive of measure) needs a *container* as a head noun.

Our goal here is to explore the role of sorts in distinguishing possible from anomalous genitive constructions, and their role in coercion and interpretation. We will focus mainly on one use of the genitive, the "genitive of measure" with concrete head nouns, a construction we also discussed in Borschev and Partee 1999a.

3. The genitive of measure in Russian

Prototypical examples of the construction we are concerned with are given in (3) (cf. the English pseudopartitives studied by Selkirk 1977):

(3) a. stakan   moloka
        glass-NOM.SG milk-GEN.SG
        'glass of milk'
    b. jaščik   jablok
        box-NOM.SG apple-GEN.PL
        'box of apples'

c. mašina   drov
   truck-NOM.SG firewood-GEN.PL
   'truck(ful) of firewood'
d. korzina   gribov
   basket-NOM.SG mushroom-GEN.PL
   'basket of mushrooms'

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

(4) *litr moloka*   'liter of milk',
     kilogramm jablok   'kilogram of apples'
     motok provoloki   'roll of wire'
     oxapka drov   'armful of firewood'
     stado ovec   'herd of sheep'
     kuča peska   'pile of sand'

The interpretation common to the larger class is, roughly, a certain quantity of some substance or a certain set of objects, where the substance or the objects are named by the second, genitive, part of the construction. The broader class is analogous to the English measure phrases studied in Dodge and Wright (2002).

What separates the examples in (3) from those in (4) is the nature of the head noun: in (3), the head nouns are all concrete nouns belonging to the sort *container*; they can be used outside of the genitive construction to refer to corresponding concrete entities. The head nouns in the other examples in (4) are not concrete.

The sorts of the two participants in the construction in (3), then, are on the one hand a *container* and on the other hand a *substance* (suitable for such a container; more on this issue below).

The construction is ambiguous between an interpretation denoting the container and one denoting the substance; both readings are of predicative type <e,t>. We may informally refer to them as the *concrete quantity* reading and the *measure* reading, and they are described in a preliminary way below, to be made more explicit as we proceed.

(5)   **CONCRETE QUANTITY reading: a predicate true of concrete quantities** of the substance which is/was in the given container.

The concrete quantity reading is the most natural interpretation of expressions such as those in (6).

(6) a. Prinesi/ kupi butylku   vodki.
       bring/   buy bottle-ACC.SG vodka-GEN.SG
       'Bring/buy a bottle of vodka.'

    b. Tam   stoit   jaščik   jablok.
       There stands box-NOM.SG apple-GEN.PL
       'There stands a box of apples.'

This reading is very close to one in which the reference is to the container itself
and presumably has arisen from it by a form of metonymy which has become
conventionalized for all container-words. This ambivalence between reference to
the bottle and reference to the vodka, or between reference to the box and
reference to the apples, is typical of the English constructions discussed by
Selkirk (1977) under the label "pseudopartitive construction". Pustejovsky (1993)
introduced the notion "dotted type", suggesting a 'Cartesian product of sorts', to
represent the sort of an expression that simultaneously incorporates two distinct
sorts: in a case like these, one might argue that we can refer simultaneously to the
container and the substance. Dodge and Wright (2002) discuss some of the factors
that favor reference to the container vs. reference to the contents without
suggesting that one might sometimes refer to both simultaneously. Accompanying
verbs may select for one or the other, as in the examples below.

(7) a. My vypili butylku   (pol-butylki) šampanskogo.
      we drank bottle-ACC.SG (half-bottle)   champagne-GEN.SG
      'We drank a bottle (half a bottle) of champagne.'
    b. My razbili butylku   (*pol-butylki) šampanskogo.
      we broke bottle-ACC.SG (half-bottle)   champagne-GEN.SG
      'We broke a bottle (*half a bottle) of champagne.'

    There remains considerable unclarity around this issue; we return to it in
discussing related English examples in Section 6.
    A further metonymic shift, conventionalized at least for containers of
"standard" sizes, is a shift from the *concrete quantity* reading to a *measure*
reading.

(8)   **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.

    This reading, similar to that of expressions like *litr moloka* 'liter of milk'
in (4) above, is illustrated in (9), a typical cookbook instruction.

(9)   Voz'mite dva   stakana   muki
      take   two-ACC   glass-GEN.SG flour-GEN.SG
      'take two glasses [cups[1]] of flour' (a typical cookbook instruction).

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[1] English uses 'cups' as a standard measure, Russian uses 'glasses'. But Russians
don't have 'measuring glasses' analogous to our 'measuring cups'.

But not every potential container+substance expression is well-formed, as illustrated in (10) below. Apparently not everything that might be used as a container is conceptualized as belonging to the sort *container*. This is illustrated in the examples in (a); other kinds of anomaly are shown in (b). Our goal in the discussion below is to uncover the principles behind these anomalies.

(10)a. *#bassejn vody*   'swimming pool of water'
     #vaza vody/ cvetov   'vase of water/flowers'
     #sejf/papka dokumentov   'safe/folder of documents'.
   b. *#nož moloka*   'knife of milk'
     #stakan jaščika   'glass of box'.

The border between normal and anomalous examples is not sharp and is subject to many factors. But we repeat our thesis, now in a slightly more explicit form:

In the given construction the sorts of its participants, <u>container</u> and (suitable) <u>substance,</u> distinguish normal from anomalous examples. (Names of) containers together with suitable substances (and only they) can form normal examples with the genitive of measure in the *concrete quantity* sense.

There are two further restrictions on the *measure* sense: (i) The *container* must have (or be imagined to have) a standard or sufficiently conventional size; and (ii) it must make sense to measure the *substance* in terms of such containers. This is of course partly conventional.

We will discuss the reason for the fuzzy border between normal and anomalous examples below.

The genitive of measure construction can be contrasted with two "neighboring" constructions which are rather close in sense. One is a "container *with* contents" construction which principally describes the container (11b), and the other a "contents *in* container" construction that describes the contents or substance, and describes it as being in the container without any connotation of measurement (11c).

(11)a. Genitive of measure: *stakan moloka* 'glass of milk'. – describes a quantity of milk (concrete quantity in container, or measured amount).
   b. The "with" construction: *stakan s molokom* lit. 'glass with milk' – principally describes the glass.
   c. "In" construction: *moloko v stakane* 'milk in a/the glass' – describes the milk without measuring it.

Note that English does not use the "with" construction as much, which may help explain why *vase of flowers* is fine in English but *#vaza cvetov* 'vase of flowers' is bad in Russian, where *vaza s cvetami* 'vase with flowers' would be used instead. It appears that the boundaries among these similar constructions in Russian and in English are not identical, and one of the challenges is to describe

the semantics of the constructions and of the relevant sorts to which the head nouns belong in a way that can capture such differences between languages as well as accounting for the boundaries among constructions within a language. We will take only some preliminary steps in this direction in this paper.

In the case of the "with" construction, the first, head, noun may be either a concrete entity or a mass substance (*kofe s molokom* 'coffee with milk'). If it is a concrete entity which happens to be a *container*, then the construction as a whole denotes (or more accurately denotes a property of) that entity, the contents are relegated to modifier status ('with milk').

The "in" construction in (11c) is in some ways closer to the genitive of measure construction, since in both cases the contents are what is of primary interest and not the container. But in the "in" construction the contents are denoted directly, and the "in" phrase is a modifier that provides information about their location, rather than about any measure of their volume. The noun in the "in"-phrase can be not only a container but anything that something can be "in" – this broader class, Russian *vmestilišče,* is a supersort of the subsort *container.*

If *sorts* are central to the constraints on the construction and to its interpretation, we need to try to say more about how sorts are to be described. In lexical semantics, as we understand it (Partee and Borschev 1998), the meaning of a word is (can be approximated by) a set of meaning postulates, i.e., from a logical point of view, the 'theory' of this word. The meaning of a sortal term is similarly a 'theory'. If a word belongs to some sort, the theory of this sort is a part of theory of the word. Of course, a word can belong to many sorts, even without polysemy.

Sorts help to make theories of words "modular". The theory of a word "refers" to theories of all the sorts this word belongs to and contains additional meaning postulates specific for this word. For example, *portrait* belongs simultaneously to at least three different sorts: *physical object*, *image* and *creation* (*artifact*). Corresponding properties related to these sorts are described as theories for these sorts. The theory for *portrait* itself is built from the theories of the sorts it belongs to (accessed via "pointers" to these theories, which could be represented by traditional "semantic features" or simply by the names of the sorts), plus specific meaning postulates for further properties of *portrait*.

In a way the structure of these "theories" is similar to that of a normal dictionary with its definitions. As a rule a head word in a dictionary definition is a name of a "main" sort the word belongs to:

(12)   **oat** ... **1. a.** The *grain* of a *cereal*... (here and below italic is ours)
        oath ... **1.** A solemn *appeal* to God... (Webster's Collegiate Dictionary 1944)

We note that this kind of description is similar to the notion of Abstract Data Types in computer science (Wirsing 1990), where for every type of data one specifies its properties and the operations which can be performed with it.

4.   A theory of the sort <u>*container*</u>

4.1. Relevant properties As a case study, we try to develop a semiformal theory of <u>*container*</u>.   Some relevant properties of container terms (see also Rakhilina 2004) include the following:

1) Containers have an inner part with a volume.
A <u>*container*</u> is a <u>*physical object*</u> which has an <u>*inner part*</u> (to put substances in), and this part has some <u>*volume*</u>.

2) We fill containers with suitable substances.
We fill *glasses, jars,* etc. (in Russian) with liquids or "pourable" *substances*[2], *boxes* and *baskets* with nonliquid but homogeneous substances, special *boxes* or *crates* with bottles of beer, vodka, etc. (And in the case of a crate of bottles of beer, both Russian and English allow a metonymic shift that lets us speak of a *crate of beer* (*jaščik piva*).) There are constraints relating the sorts of containers and the sorts of their contents, constraints that may reflect both reality and lexical usage.

   For example, although we may put gloves in a pocket and glasses in a glasses case, and pockets and glasses cases are both designed to hold things, a pocket is not "filled" by gloves and a glasses case is not "filled" by glasses (Rakhilina 2004), apparently in part because gloves and glasses are not (in this collocation, at least) homogeneous substances. Russian uses a different verb, *pomeščat'* 'to place, to fit', to describe putting gloves into one's pocket or glasses into their case. And correspondingly one cannot say #*karman perčatok* 'pocket of gloves' or #*futljar' očkov* 'glasses case of glasses'.

   But we can also fill some things that we do not classify as containers for reasons to be discussed below – pools, vases, shelves, etc. – as witnessed by the impossibility (normally) of #*bassejn vody* 'pool(ful) of water', ?*polka knig* 'shelf of books'.

   Russian has another sort, *sosudy* 'vessels', overlapping with but not identical to *kontejnery* 'containers'. *Sosudy* 'vessels' can be filled mainly with liquids or pourable substances, and are prototypically made from glass, ceramic or metal. *Sosudy* include some (but not all) containers (glasses, jars) and some non-containers (vases, ...). Some containers such as crates are not considered vessels. The genitive of measure is possible only with those vessels which are also containers -- #*vaza vody*.

   The genitive of measure is discussed in Apresjan (1999), a work which is close in this respect to our article Borschev and Partee (1999) and to this work. The claims which are made there about the sort *sosudy* 'vessels' are true instead, in our opinion, for the sort *kontejnery* 'containers'.

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[2] The term *substance* is normally limited to things denoted by mass nouns, but we mean to include what masses and plurals have in common, as structured, for instance, by Link (1983).

3) Containers are functionally directed to their contents.
Classifying something as a *container* implies normally having an interest more in the contents than in the container itself. We use *glasses* and *boxes* in order to make use of what they contain: to drink, to hold, to carry their contents. But *swimming pools* we use to swim in, not simply to hold water. If in an extreme situation we use a swimming pool to hold an emergency supply of fuel, it will become a container and we can say that we have half a pool of fuel. *Vase* is also used not to hold water but flowers. So a *vase* is not a container for water. Is it a container for flowers? In Russian, apparently not, for the reason that property (2) above and property (4) below don't hold. In Russian, one doesn't fill a vase with flowers but puts flowers into a vase; and a vase could not be one-third filled by flowers. And in Russian one does not say **vaza cvetov* 'vase of flowers'. In English, on the other hand, a vase is apparently considered a container for flowers, since 'vase of flowers' is fine (though not a *a third of a vase of flowers!).

4) We can fill containers partway; 'half a basket of mushrooms'.
Glasses, jars and other containers can be filled to some degree – full, halfway, one quarter full, etc. Some transparent containers have a scale on their side to measure their content. Perhaps for all containers we have some kind of mental scale of the degree to which they are full. This is also true for some non-containers such as *pools, vases,* etc. But it is not so for other non-containers within the broader class of things that we can put things into (Russian *vmestilišča,* cognate with the verb *pomeščat'* 'to put (into)' mentioned above) such as *folders, pockets, wallets, purses, safes*. For example, many Russians don't consider folders "one-quarter full" (although we have encountered differing opinions on this score). There appears to be some correlation, although we have not investigated it systematically enough to be sure, between a speaker's willingness to speak of a folder being a quarter full of papers and a willingness to use the genitive of measure #?*papka bumag* 'folder of papers'. The possibility of judging the degree to which a container is filled is undoubtedly a factor in the shiftability of container words to measure words.

   This property is linked with two properties of substances we use to fill containers, homogeneity and 'measurability'. The non-homogeneity of flowers, which are not at all "poured" into a vase, may be another reason that *vaza cvetov* 'vase of flowers' is bad in Russian. In good cases of Russian genitive of measure, the volume of the substance corresponds to the filled part of the volume of the container, and in the case of flowers, they normally 'stand' in the vase, leaving much of its space empty, rather than conforming to its volume in the way that a liquid or a homogeneous substance would.

   But not everything that can be described as being filled halfway or half full can be described with phrases using genitive of measure like *polkorziny gribov* 'half a basket of mushrooms'. The question of why a phrase like *polkorziny gribov* 'half a basket of mushrooms' is well-formed is an interesting one; the constraints relate to the sorts of both parts of the construction, and reflect

the conventional 'measurability' of the substance as well as the subdivisibility of the (interior of) the container (the 'mental scale' mentioned above).

Although a room may be half filled with people or a shelf half filled with sweaters, we do not naturally speak of #*half a room of people* or #*half a shelf of sweaters*. Is this because we do not conceptualize rooms or shelves as containers, or because we do not measure people by the roomful or sweaters by the shelf-ful, or both? The possibility of buying *two rooms of furniture* or filing *two and a half shelves of books* suggests that both are relevant.

Below we discuss some contrasting pairs of good and bad examples with the same head noun:

(13)a. #*polkošel'ka deneg*   'half a purse of money'
   b.   *polkošel'ka zolota*   'half a purse of gold'

Although a *košeljëk* 'purse' is functionally intended for holding money, a purse, especially in Russian, does not normally seem to be viewed as a container. Why not, and why is (13b) nevertheless relatively OK? The answer seems to be that modern money is not measured by volume but by valuation, both because valuation is more important than volume (what kind of answer do we expect when we ask 'How much money do you have?) and because money is not homogeneous in size and shape. (There are exceptions, as in 'a suitcase(ful) of hundred dollar bills'.) The goodness of the slightly archaic (13b) reflects a past time when gold was used as money, and was indeed measured by weight or volume. And we imagine the relevant purses to be roughly uniform in size.

(14)a. **polbassejna vody*   'half a swimming pool of water'
   b.   *polbassejna mazuta*   'half a swimming pool of fuel'

Earlier we described an emergency situation in which the swimming pool was used as a container for fuel; in that case, (14b) becomes possible. Of course if we were keeping water in a swimming pool for emergency use rather than for swimming in, (14a) would also become good.

4.2. Measure-specific modifiers help coercion It is an oft-noted phenomenon that the addition of modifiers like *celyj* 'whole', *polnyj* 'full', and numerals facilitates the use of the genitive of measure with words which do not otherwise denote containers except on a shifted reading:

(15)   *polnaja komnata gostej* 'full room of guests' (Engl. 'roomful[3] of guests')
        dva vagona soldat 'two (railway) wagons of soldiers'.

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[3] Note that English has an overt suffix *–ful* whose semantics embodies the same operation that we posit for the shift from a 'space' or *vmestilišče* to a *container*, and its etymology transparently shows the importance of the notion of "filling" a container.

We noted a similar effect in Borschev and Partee (2001b) in the case of coercing *šljapa* 'hat' from apparel to container for mushrooms.

(16)a. *polnaja šljapa gribov*, 'a full hat(ful) of mushrooms'
  b. # *šljapa gribov*, 'a hat(ful) of mushrooms'

Without *polnaja*, the phrase in (16b) is not very acceptable. This example also underscores the fact that sorts are part of our way of classifying reality, and sort-shifting can occur on a prelinguistic level. A real-world "shift" occurred at the point when the wearer of the hat took off his hat and turned it upside down and started to put mushrooms into it. The big shift here is the sortal shift from *wearing apparel* to *container*.

4.3. Towards formalization We can capture some of these properties of containers in the beginnings of a **semiformal theory** of containers**:**

(17) ***Container*** (x)
  1) x is a *physical object*
  2) x has a concave *form* with *inner part* (Russian *polost'*)
  3) x can be *filled* by some *substance* to some degree (full, almost full, half-full, etc); filling x involves filling its inner part[4]
  4) x has a *volume*, which is the volume of its *inner part* and therefore the volume of the substance that x can contain
  5) x is used in order to make use of the *substance* it contains (its *contents*).

Alternatively, or perhaps additionally, we can give axioms for a relational sense of *container*:

(18) ***Container*** (x) **for** ***substance*** (y)
  1) *sort* – *physical object* x***,*** *substance* y
  2) *form* – x has an inner part and when it is used to keep a substance y, y is inside of x
  3) *usage* – x can be used to hold *substances* of the sort y; can be filled by some substance to some degree (full, almost full, half-full, almost empty, etc.)
  4) *volume of x* – it is the volume of its inner part and so the volume of the substance that x can contain.

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[4] This condition is not satisfactory as it stands. (i) There is a difference between 'being able to fill x halfway' and being able to speak of 'half a N of NP('s)', and it is the latter which is crucial for the measure use of container words. (ii) This condition is needed only for the 'second shift', to the 'measure' sense of container words.

5) *status* -- ***x*** is used in order to make use of the *substance **y*** it contains (its *contents*).

We then also need meaning postulates for the notion of **substance**. Some properties were mentioned in footnote 3; here we mention only the two further properties *homogeneity* and *measurability*.

The resulting theory should allow us to introduce the shift-operator **Quant**, generating for all words which can be considered as denoting containers (having the sort *container*) expressions which allow us to derive the semantics for the genitive of measure with 'suitable contents' in a compositional way. Examples of this shift, with *stakan* 'glass' in three senses, can be found in Borschev and Partee (2001b).

(19)   **Quant (P) = $\lambda y \lambda x$[substance(y) & quantity(y)(x) & $\exists z$(P(z) & fills(z)(x))]**
        domain restriction: P belongs to the sort *container*
        output specification: Quant(P) belongs to the sort *quantity*

Then, if the word belongs by its dictionary meaning to the sort *container* (like *stakan* 'glass') or can be understood as a *container* in a specific context (like *šljapa* 'hat'), we can apply this operator to it and get an expression which corresponds to the result of metonymic shift of this word to the sort *quantity*. For example, if ***P*** is *stakan*, we will get the expression for *stakan* shifted from the sort *container* to the sort *quantity*:

(18) $\lambda y \lambda x$[substance(y) & quantity(y)(x) & $\exists z$(stakan(z) & fills(z)(x))].

5. Loose ends

We consider the properties we described above and the "theory" as a very rough approximation of the sort *container*. But we presuppose that such a kind of theory exists (in our heads) and it discriminates between normal and anomalous examples of the genitive of measure construction.

Why is the line between normal and anomalous examples rather fuzzy? We believe that there are several possible reasons, probably all of them relevant.

One factor is the fuzziness of the theory itself, since some of its important terms (like "suitable") are vague.

Another factor is the fuzziness of the evaluation of properties, which by themselves can be "strict". For instance in the case of the controversial (at least in Russian) question of whether a folder can be one-third or one-quarter filled with papers, the degree term is not vague; what is not so easy to evaluate is whether putting papers into a folder is a case of filling a container with a substance. It is similarly difficult in borderline cases to answer the question of whether "some vessel is functionally directed to its contents."

A third factor is undoubtedly diversity of idiolects. And a fourth factor seems to be competition among distinct available constructions. The 'blocking

effect' in these cases does not always seem to be all-or-none. While a language may choose whether to speak of a *vase with flowers* or a *vase of flowers*, it also possible to use different constructions with slightly different senses, as in the case of *glass of milk, glass with milk,* and *milk in a glass.*

So far we have discussed "prototypical containers". But of course metaphors and other shifts are also used. In both Russian and English we find for example two-dimensional 'containers' such as 'a page and a half of writing' or 'three walls of murals'.

For some of the other properties discussed above more needs to be said about the relation between the container and its contents so that we can capture the mutual constraints on the two sides of the relation.

We have checked Russian dictionaries for words of the sort *container* (by our definition.) Almost all of them have one of the words *vmestilišče* 'container' or *sosud* 'vessel' as the main word of the definitions.

In works on lexical semantics, a number of authors make use of the notion of semantic primitives (primes) and advocate analysis of lexical semantics in terms of lexical decomposition into primitives (Mel'čuk 1988, Apresjan 1994, Wierzbicka 1996). The notion of sorts is in a way opposite to the notion of semantic primitives, although, like all pairs of opposites, the two notions have much in common. Probably the most important difference is that by making use of meaning postulates as axioms and developing theories for sorts, we can exploit linguistically significant and recurrent notions without making any claims about the possibility of completely exhausting the meaning of any given word in our semantic 'analyses' ('theories') of its important semantic properties. Meaning postulates, expressing what the Russian lexical semanticists (Paducheva, Apresjan, and others) call 'components of meaning', also help to provide ways to express the relation between lexical and compositional aspects of meaning, as we have tried to indicate in this paper and have discussed further in some of our other work (Borschev and Partee 1999a,b, 2001b, Partee and Borschev 1998, 2003.)

6. Addendum: A note about English 'quantity' phrases

In this paper, we have mainly discussed the first shift from *stakan* 'glass' as a concrete object to the relational *stakan* which combines with a substance term such as *moloka* 'milk.GEN' to form quantity expressions. On the 'second shift' (see Borschev and Partee 1999a), the container term becomes a measure term similar to *liter*. English expressions such as *two pounds of sugar, a liter of wine*, *10 feet of rope* are the type that *stakan* 'glass' can shift INTO on this 'second' shift.

So there are, we think, three different possible sorts, on a scale from concrete container to abstract measure.

(i) <u>Bottle, concrete object (container)</u>. *Bottle of wine* can still denote a concrete object, filled with wine.

(20)   He broke a bottle of champagne over the bow of the ship (to christen it).

(ii) <u>Bottle of wine: 'quant'</u>   -- the 'middle' case, denoting a certain concrete quantity of wine, forming the contents of the container.

(21)a. He poured the bottle of wine into a crystal decanter.
   b. We drank the whole bottle of wine.

        In (21a,b) it is the definite article that makes it a particular quantity in a particular bottle. With an indefinite article, it would be ambiguous between this 'quant' reading and the measure reading in (iii) below.

(iii) <u>Liter of wine</u>: 'measure' – denotes only wine, 'liter' has no autonomy, no sortal part of its own.

(22)   There's half a liter of wine in this beef stew.

        As in Russian, English container nouns can almost always shift into the "quant" construction, but only sometimes into the "pure measure" construction. English allows shifts in the opposite direction as well.

(23)   a. I opened a liter of wine.
        b. I don't want to open a whole liter and a half of wine.

Russian doesn't seem to make this shift as easily, although certain measure terms have become lexically concretized, as *pol-litra* 'half of a liter' for the standard bottle of vodka. (Colloquially *pollitra,* with accusative *pollitru,* reanalyzing the genitive masculine *-a* as nominative feminine *-a*.)

References

Apresjan, Jurij D. 1986. Dejksis v leksike i grammatike i naivnaja model' mira [Deixis in lexicon and grammar and the naive model of the world]. *Semiotika i informatika* 28: 5-33.

Apresjan, Jurij D. 1994. O jazyke tolkovanij i semanticheskix primitivax [On the language of lexical explications and semantic primitives]. *Izvestija Rossiskoj Akademii Nauk, Serija literatury i jazyka* 53 (4): 27-41.

Apresjan, Jurij D. 1999 Semanticheskaja motivacija nesemanticheskixkh svoistv lexem [Semantic motivation of nonsemantic properties of lexemes]. In *Die Grammatischen Korrelationen*, ed. Branco Tošović, 96-116. Graz: Institut für Slavistik.

Bach, Emmon. 1986. Natural language metaphysics. In *Logic, Methodology, and Philosophy of Science VII*, ed. Ruth Barcan Marcus, Georg J.W. Dorn and Paul Weingartner, 573-595. Amsterdam: North-Holland.

Borschev, V.B. 1996. Estestvennyi jazyk - naivnaja matematika dlja opisanija naivnoj kartiny mira [Natural language as naïve mathematics]. *Moscow Linguistic Almanac* 1:203-225.

Borschev, V.B. and L.V.Knorina. 1990. Tipy realij i ix jazykovoe vosprijatie [Types of entities and their perception in language]. In *Jazyk logiki i logika jazyka*, ed. Vjač. Vs. Ivanov, 106-134. Moscow: NSK.

Borschev, V.B. and B.H. Partee. 1999a. Semantika genitivnoj konstrukcii: raznye podxody k formalizacii. [Semantics of genitive construction: different approaches to formalization]. In *Tipologija i teorija jazyka: Ot opisanija k ob"jasneniju. K 60-letiju Aleksandra Evgen'eviča Kibrika. (Typology and Linguistic Theory: from Description to Explanation. For the 60th birthday of Aleksandr E. Kibrik.),* ed. Ekaterina V. Rakhilina and Yakov G. Testelets, 159-172. Moscow: Jazyki Russkoj Kul'tury.

Borschev, Vladimir and Barbara H. Partee. 1999b. Semantic types and the Russian genitive modifier construction. In *Formal Approaches to Slavic Linguistics: The Seattle Meeting* 1998, ed. Katarzyna Dziwirek et al. Ann Arbor: Michigan Slavic Publications.

Borschev, Vladimir and Barbara H. Partee. 2001a. Ontology and metonymy. In *Ontology-Based Interpretation of Noun Phrases. Proceedings of the First International OntoQuery Workshop*, ed. Per Anker Jensen and Peter Skadhauge, 121-138. Kolding: Department of Business Communication and information Science, University of Southern Denmark.

Borschev, Vladimir and Barbara H. Partee. 2001b. Genitive modifiers, sorts, and metonymy. *Nordic Journal of Linguistics* 24: 140-160.

Dodge, Ellen, and Abby Wright. 2002. Herds of wildebeest, flasks of vodka, heaps of trouble: An Embodied Construction Grammar approach to English measure phrases. In *Proceedings of the 28th Annual Meeting of the Berkeley Linguistics Society*, ed. Julie Larson and Mary Paster, 75-86. Berkeley: Berkeley Linguistics Society.

Dölling, Johannes. 1992a. Flexible Interpretation durch Sortenverschiebung. In *Fügungspotenzen*, ed. Ilse Zimmermann and Anatoli Strigin, 23-62. Berlin: Akademie Verlag.

Dölling, Johannes. 1992b. Polysemy and sort coercion in semantic representations. In *Discourse and Lexical Meaning: Proceedings of a Workshop of the DFG Sonderforschungsbereich 340*, ed. Peter Bosch and Peter Gerstl, 61-78. Stuttgart: Arbeitspapiere des Sonderforschungsbereich 340: Sprachtheoretische Grundlagen für die Computerlinguistik.

Dölling, Johannes. 1997. Semantic form and abductive fixation of parameters. In *From Underspecification to Interpretation*, ed. Rob van der Sandt, Reinhard Blutner and Manfred Bierwisch, 113-138. Heidelberg: IBM Deutschland.

Jensen, Per Anker, and Carl Vikner. 1994. Lexical knowledge and the semantic analysis of Danish genitive constructions. In *Topics in Knowledge-based NLP systems*, ed. Steffen Leo Hansen and Helle Wegener, 37-55. Copenhagen: Samfundslitteratur.

Knorina, L.V. 1979. Obobščennye tolkovanija i ix ispol'zovanie dlja formalizovannoj zapisi teksta. [Generalized definitions and their use for formal representation of text]. In *Semantika estestvennyx jazykov v specializirovannyx sistemax. Tezisy dokladov konferencii* [*Semantics of natural languages in specialized systems. Theses of conference lectures*]. Leningrad: Leningrad State University.

Knorina, L.V. 1985. Ob interpretacii genitivnyx konstrukcij [On the interpretation of genitive constructions]. In *Semiotičeskie aspekty formalizacii intellektual'noj dejatel'nosti* [*Theses of the workshop "Semiotic foundations of intellectual activity"*]. Moscow: VINITI.

Knorina, L.V. 1988. Klassifikacija leksiki i slovarnye definicii [Lexical classification and dictionary definitions]. In *Nacional'naja specifika jazyka i ee otraženie v normativnom slovare*, ed. Ju.N. Karaulov, 60-63. Moscow: Nauka.

Link, Godehard. 1983. The logical analysis of plurals and mass terms: a lattice-theoretical approach. In *Meaning, Use, and Interpretation of Language*, ed. Rainer Bauerle, Ch. Schwarze, and Arnim von Stechow, 302-323. Berlin: Walter de Gruyter.

Mel'čuk, Igor A. 1988. Semantic description of lexical units in an explanatory combinatorial dictionary: basic principles and heuristic criteria. *International Journal of Lexicography* 1: 165-188.

Paducheva E.V. 2004. *Dinamičeskie modeli v semantike leksiki* [*Dynamic models in lexical semantics*]. Moscow: Jazyki slavjanskoj kultury.

Partee, Barbara H., and Vladimir Borschev. 1998. Integrating lexical and formal semantics: Genitives, relational nouns, and type-shifting. In *Proceedings of the 2nd Tbilisi Symposium on Language, Logic, and Computation*, ed. Robin Cooper and Thomas Gamkrelidze, 229-241. Tbilisi: Center on Language, Logic, Speech, Tbilisi State University.

Partee, Barbara H., and Vladimir Borschev. 2003. Genitives, relational nouns, and argument-modifier ambiguity. In *Modifying Adjuncts*, ed. Ewald Lang, Claudia Maienborn and Cathrine Fabricius-Hansen, 67-112. Berlin: Mouton de Gruyter.

Pustejovsky, James. 1993. Type coercion and lexical selection. In *Semantics and the Lexicon*, ed. James Pustejovsky, 73-94. Dordrecht: Kluwer.

Rakhilina, Ekaterina V. 2003. The case for Russian genitive case reopened. In *Annual Workshop on Formal Approaches to Slavic Linguistics: The Amherst Meeting 2002*, eds. Wayles Browne, Ji-Yung Kim, Barbara H. Partee and Robert A. Rothstein, 433-450. Ann Arbor: Michigan Slavic Publications.

Selkirk, Elisabeth. 1977. Some Remarks on Noun Phrase Structure. In *Formal Syntax*, ed. Peter Culicover, Thomas Wasow and Adrian Akmajian, 285-316. New York: Academic Press.

Wierzbicka, Anna. 1996. *Semantics: Primes and Universals*. Oxford [England]; New York: Oxford University Press.

Wirsing, Martin. 1990. Algebraic Specification. In *Handbook of Theoretical Computer Science*, ed. Jan Van Leeuwen, 675-788. Amsterdam: Elsevier.