

More than one comparative in more than one Slavic language: an experimental investigation

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1 Introduction

The focus of this paper is on cardinal-containing comparatives like *more than five sandwiches* (Barwise and Cooper 1981, Krifka 1999, Hackl 2000, Geurts and Nouwen 2007). As observed in Matushansky and Ionin 2011, these expressions are ambiguous between *many* readings (where *more than five sandwiches* means ‘six or more sandwiches’) and *much* readings (where it means ‘something more substantial than five sandwiches’). The two readings can be brought out by the continuations in (1a,b), respectively.

- (1) I ate more than five sandwiches...
- a. ‘*many* reading’: I ate six!
 - b. ‘*much* reading’: I ate five sandwiches plus a bowl of soup!

Whereas English cardinal-containing comparatives have both readings available to them, in Russian, the availability of *many* vs. *much* readings depends on the type of comparative: phrasal (*more*+Genitive-marked NP) vs. clausal (*more*+wh-expression) (cf. Heim 1985, Lechner 1998, 2001, Pancheva 2006). Only the clausal comparative has the *much* reading (2a), while the phrasal comparative has only the *many* reading (2b) (from Matushansky and Ionin 2011).

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- (2) a. Ja s'jela bol'se, čem pjat' buterbrodov.
 I ate more than five-ACC sandwiches.
 √^{many reading}, √^{much reading}
- b. Ja s'jela bol'se pjati buterbrodov.
 I ate more five-GEN sandwiches
 √^{many reading}, #^{much reading}

A further observation in Matushansky and Ionin 2011 is that in English, comparatives can combine with referential expressions, as in (3). In Russian, only the comparative type that is compatible with the *much* reading (the clausal comparative) is compatible with referential expressions, as shown in (4a-b) vs. (4c-d).

- (3) a. I invited more than (just) Peter and Mary.
 b. I read more than these five books.
- (4) a. Ja priglasila bol'se, čem Petju i Mašu.
 I invited more than Peter-ACC and Mary-ACC
 'I invited more than Peter and Mary.'
 b. Ja pročitala bol'se, čem èti pjat' knig.
 I read more than these five-ACC book-GEN.PL
 'I read more than these five books.'
 c. *Ja priglasila bol'se Peti i Maši.
 I invited more Peter-GEN and Mary-GEN
 d. *Ja pročitala bol'se ètix pjati knig.
 I read more these five-GEN book-GEN.PL

Matushansky and Ionin 2011 propose that all cardinal-containing comparatives have the bracketing in (5), where the comparative combines with a cardinal-containing NP, analyzed as having the semantic type of predicates $\langle\langle e, t \rangle\rangle$ (Landman 2003; Ionin and Matushansky 2006; Geurts and Nouwen 2007). The proposal that the cardinal forms a unit with the lexical NP, rather than with the comparative (contra the traditional approach of Generalized Quantifier theory, Barwise and Cooper 1981), is based both on the syntactic behavior of cardinal-containing comparatives cross-linguistically (Arregi 2010) and on the semantic analysis of cardinals proposed in Ionin and Matushansky 2006. See Matushansky and Ionin 2011 for discussion of the relevant evidence.

(5) [more than [five sandwiches]]

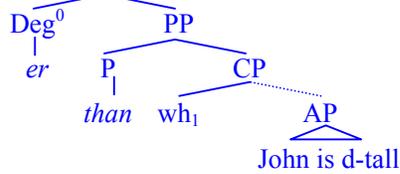
In the present paper, we propose that the bracketing in (5) can correspond to two distinct structures, small clauses and degree phrases (cf. Pancheva 2006), with systematic cross-linguistic

differences in terms of which structure(s) are available to which comparative type(s). Our goals are as follows: (i) to provide evidence for the availability of two distinct structures for cardinal-containing comparatives; (ii) using experimental methodology, to determine the availability of *many* and *much* readings to comparatives in English, Russian, Bulgarian, Polish and Czech, as well as to determine which comparative types are compatible with referential expressions; and (iii) based on the experimental data, to determine which structure(s) are available to which type(s) of cardinal-containing comparatives.

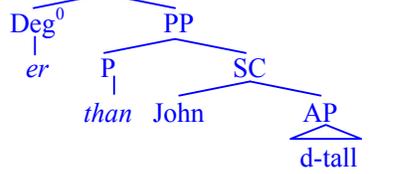
2 Analyses of comparative expressions

According to Pancheva 2006, comparative expressions allow for three distinct complements of *than*: a reduced wh-clause ((6), for (9a); in English, the complementizer is null), a small clause ((7), for (9b)), or a measure DegP ((8), for (9c)).¹

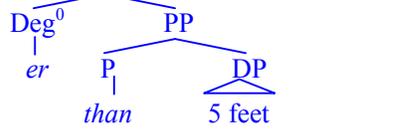
(6) DegP reduced wh-clause analysis of (9a)



(7) DegP small clause analysis of (9b)



(8) DegP degree analysis of (9c)



¹ To ensure that the complement of the preposition in (6) and (7) denotes a degree, we assume the presence of a null operator on the left periphery of that complement. Its presence is not reflected in the trees in (6) and (7), from Pancheva (2006). The same holds for the trees in (19) below.

- (9) a. Mary is taller than John is. [reduced wh-clause]
 b. Mary is taller than John. [small clause]
 c. Mary is taller than 5 feet. [DegP]

According to Pancheva 2006, to appear, Slavic languages distinguish between *clausal* comparatives that take wh-clause complements (6) and *phrasal* comparatives that take small-clause complements (7). Pancheva proposes that Russian *čem* (10a), Bulgarian *kolkoto* (11a) and Polish *niż* (12a) all take reduced clause complements (6), as evidenced by the fact that they do not assign case and allow clause-level elements such as auxiliaries and temporal verbs. (Pancheva analyzes both *čem* and *kolkoto* as wh-complements; *niż* is a preposition which can, for some speakers, co-occur with the wh-complementizer *ile*). In contrast, phrasal comparatives, including Russian Genitive (10b), Bulgarian *ot* (11b) and Polish *od* (12b) all take small clause complements (7), as evidenced by the fact that they assign Case and disallow clause-level elements.

- (10) a. Maša rabotaet segodnja lučše, čem Petja
 Mary works today better than Peter-NOM
 (rabotal) (včera).
 worked yesterday
 ‘Mary works today better than Peter (did) (yesterday).’
 b. Maša rabotaet segodnja lučše Peti
 Mary works today better Peter-GEN
 (*rabotal) (*včera).
 worked yesterday
 ‘Mary works today better than Peter.’
- (11) a. Tja e po-visoka ot-kolkoto e toj.
 she is er-tall from-how.much is he-NOM
 ‘She is taller than he is.’
 b. Tja e po-visoka ot nego.
 she is er-tall from him-ACC
 ‘She is taller than him.’ (Pancheva to appear, ex. 3)
- (12) a. Jan waży więcej niż Agnieszka (waży).
 Ian weighs more than Agnieszka-NOM weighs
 ‘Ian weighs more than Agnieszka (does).’
 b. Jan waży więcej od Agnieszki.
 Ian weighs more from Agnieszka-GEN
 ‘Ian weighs more than Agnieszka.’
 (Pancheva to appear, ex. 2)

We observe that it is not possible to rule out the possibility that

Russian *čem* and Polish *niż* can also combine with small clause complements. E.g., in (10a) or (12a), if there is no verb or adverb, *Petja/Agnieszka* could in principle be in a small clause instead of a wh-clause. This would mean that a small clause can contain a wh-complementizer (cf. Starke 1995). In contrast, Bulgarian *ot-kolkoto* clearly requires a reduced clause complement: a remnant object by itself is disallowed (13) (Roumyana Pancheva, p.c.). (Without *kolkoto*, *ot* disallows a reduced-clausal complement, except colloquially, providing evidence for a small-clause analysis.)

- (13) Maria včera kupi poveče knigi ot-kolkoto
 Mary yesterday bought more books from-how.much
 Petur *^{??}(kupi) / (dnes).
 Peter bought today
 ‘*Mary bought yesterday more books than Peter did today.*’

Turning to the DegP structure in (8), the test for its availability is the ability to combine with measure phrases. In Bulgarian, *ot* can combine with measure phrases, but *ot-kolkoto* cannot ((14), from Pancheva 2006, ex. 60; Pancheva 2006 defines ⊗ as “Probably grammatical – the grammar doesn’t exclude it – yet strongly unacceptable”). In Russian, the Genitive can combine with measure phrases, but *čem* cannot ((15), from Pancheva 2006, ex. 12). However, we note that in other contexts, *čem* does take a measure phrase complement (16). Finally, in Polish, *od* cannot take a measure-phrase complement; *niż* can, but without a wh-complementizer ((17), Pancheva 2006, ex. 62).

- (14) Ivan e po-visok ot-(⊗kolkoto) 2m.
 Ivan is er-tall from 2m
 ‘*Ivan is taller than two meters.*’
- (15) a. Ivan rostom bol’še dvux metrov.
 Ivan in-height more two-GEN meters-GEN
 ‘*Ivan measures in height more than two meters.*’
 b. ⊗ Ivan rostom bol’še, čem dva metra.
 Ivan in-height more than two-NOM/ACC meter-PAUC
- (16) ... diametr kupola namnogo bol’še, čem dva metra.
 ... diameter dome a-lot more than two meter
 ‘... *the diameter of the dome is a lot more than two meters.*’
vott.ru/entry/151458
- (17) a. Ania jest wyższa niż (#ile/jak) 5 stop.
 Ania is taller than wh 5 feet
 ‘*Ania is taller than five feet.*’

- b. * Ania jest wyższa od 5 stop.
Ania is taller from 5 feet

The above discussion is summed up in Table 1 (based on Pancheva 2006, with modifications). We next turn to the availability of these structures for cardinal-containing comparatives.

Table 1. Structures available to comparatives cross-linguistically

	Russian	Bulgarian	Polish
reduced wh-clause	∅ [CP čem...]	ot [CP (kolkoto)...]	niż [CP (%ile)...]
small clause	∅ [SC DP _{GEN} Δ] maybe: ∅ [SC čem DP _{NOM} Δ]	ot [SC DP _{ACC} Δ]	od [SC DP _{GEN} Δ] maybe: niż [SC DP _{NOM} Δ]
DegP	∅ [DP _{GEN}]	ot [DP _{ACC}]	niż [DP _{NOM}]

3 Analyses of cardinal-containing comparatives

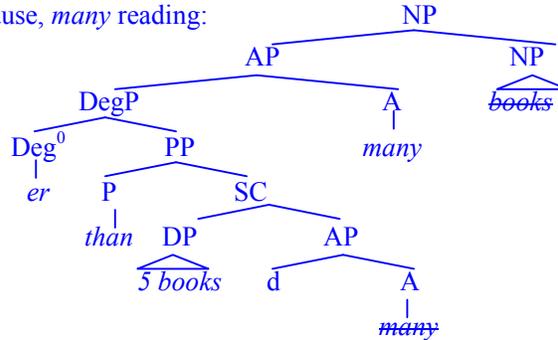
3.1. Structure of cardinal-containing comparatives in English

We first consider English cardinal-containing comparatives like *more than five books*, and note that they cannot contain material such as auxiliaries or temporal adverbs (18b), unlike other types of comparatives (18a). This provides evidence that cardinal-containing comparatives cannot have a reduced-clause structure (6), and have instead a small-clause structure (7) or a DegP structure (8).

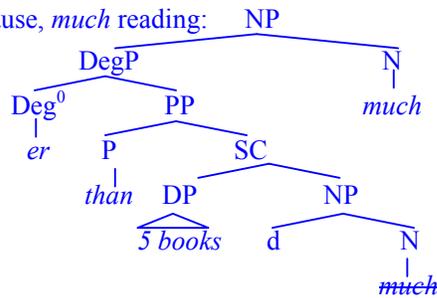
- (18) a. Today, Mary ate more than Peter (did) (yesterday).
b. Today, Mary ate more than five sandwiches (*did) (*yesterday). *cannot mean 'Mary ate something today which is more than the five sandwiches that she ate yesterday.'*

In Matushansky and Ionin 2011, building on Pancheva 2006, we propose (19) as the small-clause analysis of cardinal-containing comparatives; (19) is compatible with both *many* readings (19a) and *much* readings (19b), which, as we have seen, are both available for English (see (1)). The fact that *five books* in (19) is a regular subject and therefore can have type *e* or type $\langle\langle e, t \rangle, t \rangle$ accounts for the availability of referential expressions inside comparatives (see (3)).

(19) a. small clause, *many* reading:



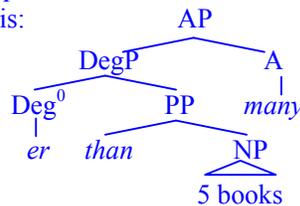
b. small clause, *much* reading:



With regard to the DegP structure, in Matushansky and Ionin 2011, we hypothesize that a cardinal-containing NP predicate can be converted into a degree (20), with the corresponding structure in (21). We further hypothesize that this degree is compatible with totally ordered scales, like *many* (as opposed to *much*, whose domain is only partially ordered), and that DegP comparatives lack *much* readings.

(20) $P_{\langle e,t \rangle} \rightarrow \iota d \text{ s.t. } \forall x [P(x) \rightarrow d = \max \{d' : Q(d',x)\}]$ where Q is contextually provided

(21) DegP analysis:



3.2. Structure of cardinal-containing comparatives in Slavic

The fact that Russian phrasal (Genitive-assigning) comparatives lack the *much* reading (2b) and cannot combine with referential expressions (4c,d) suggest that they are compatible only with the DegP analysis (21), and not the small clause analysis (19). In

contrast, the fact that clausal *čem* comparatives have *much* readings (2a) and can combine with referential expression (4a,b) indicate that they *are* compatible with the small-clause structure (19).²

In Matushansky and Ionin 2011, we assumed that *čem* comparatives containing cardinals can actually have a reduced clause structure. However, there are two problems with this. First, as in English (18), *čem* comparatives containing cardinals can never combine with clause-level elements such as temporal adverbs (22), unlike other types of *čem* comparatives (10a). Second, *čem* comparatives containing cardinals are transparent to case assignment, (23), which argues in favor of the small-clause analysis in (19).

- (22) Maša s'jela segodnja bol'se, čem pjat'
 Mary ate today more than five-NOM/ACC
 buterbrodov (*včera).
 sandwiches-GEN yesterday
 'Mary ate today more than five sandwiches.'
- (23) a. Maša pročitala bol'se, čem tysjaču knjig.
 Mary read more than thousand-ACC books-GEN
 'Mary read more than a thousand books.'
- b. Maša pol'zovala's' bol'se, čem pjat'ju mašinami.
 Mary used-REFL more than five-INSTR cars-INSTR
 'Mary made use of more than five cars.'

Based on the data from English and Russian, we hypothesize that cardinal-containing comparatives cross-linguistically cannot have the reduced clause structure. The only options are the small clause structure (19) and the DegP structure (21). In light of this, we predict that Bulgarian *ot-kolkoto* should be incompatible with cardinal-containing comparatives: *ot-kolkoto* comparatives require a reduced clause complement (see (13)), but per our hypothesis, the reduced clause structure is unavailable for cardinal-containing comparatives. Furthermore, *ot-kolkoto* is incompatible with measure phrases (see (14)), which rules out the DegP structure in (21). In contrast, Bulgarian *ot* comparatives – which are not restricted to reduced clause complements – should be compatible with cardinal-containing

² Given the grammaticality of (16), where *čem* appears with a measure phrase, the question arises of whether the DegP structure in (21) is available for Russian *čem* comparatives. However, given that such examples are quite marginal, we assume that in examples like (16), *čem* in fact takes a small-clause complement. An additional argument in favor of this hypothesis is the implausibility of having a wh-element combining with a DegP.

expressions, and should in principle have both the small clause structure (19) and the DegP structure (21) available to them, allowing for both *many* and *much* readings.

Turning to Polish, given that *od* comparatives cannot combine with measure phrases (see (17)), we expect the DegP structure in (21) to be unavailable for them. The small-clause structure in (19) may in principle be available to both *od* and *niż* comparatives. Finally, Czech has only one type of comparative, with *než*; it is not discussed in Pancheva 2006, but given what Pancheva 2006 says about the behavior of related elements in Polish (*niż*) and Serbo-Croatian (*nego*), we expect Czech *než* comparatives to be compatible with cardinals, and to allow for both small-clause and DegP structures.

4 Experimental study

We conducted an experimental study of the readings of cardinal-containing comparatives, in order confirm the facts discussed above for English and Russian, as well as to test the above predictions for Bulgarian, Polish and Czech. Our study examined the ability of comparatives to combine with both indefinite and referential cardinal-containing expressions. We tested availability of *many* and *much* readings, furthermore dividing *much* readings into two types, which we are terming *additive much* (where *more than five sandwiches* means ‘five sandwiches plus something else’) and *replacement much* (where it means ‘something other than five sandwiches, which is bigger than five sandwiches’).

4.1. Experimental materials

A context-based Acceptability Judgment Task (AJT) was presented via the web using the survey gizmo tool. Each test item consisted of a short context about A and B, where A asks a question, and B responds, using a cardinal-containing comparative in the response. B’s response establishes whether the comparative has the *many*, *additive much*, or *replacement much* reading. The contexts were presented in English, while the target sentence (e.g., *I read more than five books*) was presented in all five languages, and in all eight types comparatives under investigation (two types of comparatives each for Russian, Bulgarian and Polish, one each for English and Czech), as shown in the sample item in Figure 1. Participants were instructed to rate only the sentence(s) in their native language, using a scale from 1 (unacceptable in the context) to 7 (acceptable in the context).

Figure 1: sample test item, for the *many* reading

13. Context: A and B are both students; B has been studying hard for exams, and A heard from a mutual friend that B read five books last week.

A: Is it true that you read five books during last week?
 B: Actually, I read more than five books. I read ten books!

	1	2	3	4	5	6	7
English: I read more than five books.	<input type="radio"/>						
Russian: Я прочитал больше пяти книг.	<input type="radio"/>						
Russian: Я прочитал больше, чем пять книг.	<input type="radio"/>						
Bulgarian: Прочетох повече от пет книги.	<input type="radio"/>						
Bulgarian: Прочетох повече отколкото пет книги.	<input type="radio"/>						
Czech: Četl jsem víc než pět knih.	<input type="radio"/>						
Polish: Przeczytałem więcej od pięciu książek.	<input type="radio"/>						
Polish: Przeczytałem więcej niż pięć książek.	<input type="radio"/>						

The two factors varied in the task were (1) the form of the NP inside the comparative (indefinite: *five books* vs. demonstrative: *these five books* vs. conjoined proper names: *Moby Dick* and *Les Miserables*); and (2) the type of reading (*many* vs. *additive much* vs. *replacement much*, established by the continuation). Thus, there were nine test categories (3 NP types crossed with 3 types of readings), as well as one baseline category, in which the target sentence was not followed by any continuation. Sample items for each category are given in (24) through (27), for English.

- (24) **Baseline category:** A and B are both students; B has been studying hard for exams, reading a lot.
 A: How many books did you read during last week?
 B: I don't remember exactly, but I know this: *I read more than five books.*
- (25) **Indefinite cardinal-containing expression inside the comparative:** A and B are both students; B has been studying hard for exams, and A heard from a mutual friend that B read five books last week.
 A: Is it true that you read five books during last week?
 B: Actually, I read more than five books.
 I read ten books! [*many* reading]
 I read five books plus ten journal articles! [*additive much* reading]
 Instead of reading books, I read forty journal articles! [*replacement much* reading]
- (26) **Demonstrative cardinal-containing expression inside the comparative:** A and B are both students. A comes in and finds

that B has a stack of five books on the table, and A wants to know if B read them.

A: Is it true that you read these five books during last week?

B: Actually, I read more than these five books.

I read ten books! [*many reading*]

I read these five books plus ten journal articles! [*additive much reading*]

Instead of reading these books, I read forty journal articles! [*replacement much reading*]

(27) **Conjoined proper names insides the comparative:** A and B are both students; A heard that B read two long books, “Moby Dick” and “Les Miserables”, last week.

A: Is it true that you read “Moby Dick” and “Les Miserables” during last week?

B: Actually, I read more than “Moby Dick” and “Les Miserables”.

I read five books! [*many reading*]

I read “Moby Dick” and “Les Miserables”, and three other books besides. [*additive much reading*]

Instead of reading “Moby Dick” and “Les Miserables”, I read all sixty volumes of my encyclopedia! [*replacement much reading*]

Each of the ten categories was exemplified by four tokens (about reading books, watching plays, visiting capital cities, and photographing paintings). The items were not randomized: e.g., all items about reading books were presented one after another, followed by all items about watching plays, and so on.

4.2. *Participants*

Participants were recruited using Linguist List and the Slavic Linguistics Society list, and were provided with the url for the test. The participants resided in many different countries; all were fluent in English, and all responded only to the variants in their native language. Only results from participants who completed the test to the end were included in the analysis. (If participants missed an item, their average response was computed based on the remaining items in the corresponding category). The total number of native speakers included in the data analysis was 51 for English, 24 for Russian, 11 for Bulgarian, 5 for Polish and 6 for Czech.

4.3. Results

The mean ratings (on a scale from 1 to 7) for all categories and all comparative types, across languages, are provided in the Appendix. Here, we summarize the main findings, based on both numerical ratings and statistical analyses (ANOVA tests comparing performance across different categories within each language; for reasons of space, we do not report the statistical results here).

In English, significantly higher ratings were obtained with both *many* and *additive much* readings (ratings above 5.0) than with *replacement much* readings (ratings below 3.0). For comparatives over cardinal-containing indefinites (25), *many* readings were rated significantly higher than *additive much* readings, but both were rated quite high (6.54 vs. 5.49). Comparatives over referential expressions ((26)-(27)) also received high ratings (above 5.0), with both *many* and *additive much* readings.

In Russian, Genitive comparatives received high ratings (above 5.0) only in the baseline category (24) and for comparatives over indefinites (25) with *many* readings. Genitive comparatives over referential expressions, and/or with *much* readings, were rated much lower. In contrast, for *čem* comparatives, all readings received fairly high ratings (but higher for comparatives with indefinites and demonstratives ((25)-(26)) than with proper names (27)). For both comparatives, *replacement much* readings were rated significantly below *additive much* readings; but for Genitive comparatives, *additive much* readings also received very low ratings (3.65 with indefinites), significantly below *many* readings; for *čem* comparatives, both *much* readings were rated high (above 5.0).

In Bulgarian, *ot* comparatives received significantly higher ratings with both *many* and *additive much* readings (4.6 and above), than with *replacement much* readings (4.5 and below), for all NP types. *Ot-kolkoto* comparatives were rejected in the baseline category (mean rating 2.62), indicating ungrammaticality, and received fairly low ratings across the board – especially for indefinites with *many* readings (1.73); all other ratings were between 3.0 and 4.5.

In Czech, *než* comparatives received significantly higher ratings with both *many* and *additive much* readings (4.5 and above) than with *replacement much* readings (3.0 and below), for all NP types. And in Polish, *od* comparatives were rejected in the baseline category (mean rating 1.05), indicating ungrammaticality, and received low ratings across the board (below 4.0); for *niż* comparatives, all readings, with all comparative types, were relatively acceptable (mean ratings above 4.0), with no clear patterns and no significant effects.

4.4. Discussion

Overall, two distinct patterns obtained in the data. The first pattern, exhibited only by Russian Genitive comparatives, involved high ratings for indefinites with *many* readings, compared to everything else. This pattern is expected if Russian Genitive comparatives are compatible only with the DegP structure (21) and not the small-clause structure (19): the DegP structure does not support *much* readings, and cannot contain a referential expression. It can only generate *many* readings for cardinal-containing indefinites.

The second pattern involved high ratings of *many* and *additive much* readings, compared to *replacement much* readings, with all NP types (indefinite and referential) behaving similarly. This pattern was exhibited by comparatives in English and Czech (strong contrasts between the two types of *much* readings), as well as by Bulgarian *ot* and Russian *čem* comparatives (weak contrasts between the two types of *much* readings). The compatibility with both *many* and *much* readings, as well as the ability to combine with referential expressions, indicates that these four types of comparatives have the small-clause structure in (19): this structure supports *much* readings and also allows referential expressions. We note that no comparative type was found which allowed *additive much* readings but disallowed referential expressions, or vice-versa; the fact that *much* readings and compatibility with referential expressions went hand-in-hand supports our proposal that both are available on the small-clause structure in (19) and not available on the DegP structure in (21).

We now consider the rather unexpected finding that *replacement much* readings received significantly lower ratings than *additive much* readings. We suggest that *replacement much* readings are less acceptable not for any syntactic reason, but because they are harder to construct: these readings require the speaker to first determine whether two distinct entities (e.g., five books and forty journal articles) are comparable, and then to compare them. In contrast, the *additive much* reading requires only a comparison of two clearly comparable entities (e.g., five books vs. five books + something else). It is possible that the low ratings of *replacement much* readings are due essentially to speakers' difficulty with comparing apples and oranges. However, the question remains open as to why the ratings of *replacement much* readings were particularly low for English and Czech, compared to Russian and Bulgarian. We leave this issue for further research.

Finally, we note that Polish comparatives and Bulgarian *ot-kolkoto* comparatives did not fit into either pattern. Bulgarian clausal

comparatives were largely rejected, which is expected if *ot-kolkoto* requires a reduced wh-clause complement, as discussed above. Polish *od* comparatives were also found ungrammatical, which was not expected; it seems that neither the DegP nor the small-clause structure is available for this comparative type. Polish *niż* comparatives, while largely acceptable, exhibited rather unclear results, with much individual variability (possibly due to the rather low number of Polish-speaking participants).

4.5. Structures of comparatives, revisited

Our findings suggest the distribution of structures for cardinal-containing comparatives given in Table 2: comparatives with the small clause structure have both *many* and *much* readings, while comparatives with the DegP structure have only *many* readings. (Any comparative which allows both *many* and *much* readings is in principle compatible with the DegP structure as well as the small clause structure: there is no way to tease the two apart in such cases.)

Table 2: Structures for cardinal-containing comparatives

	English	Russian	Bulgarian	Polish	Czech
reduced wh-clause	* <i>than</i>	* <i>čem</i>	* <i>ot-kolkoto</i>	* <i>niż</i>	* <i>než</i>
small clause (19)	√ <i>than</i>	√ <i>čem</i> *Genitive	√ <i>ot</i>	√ <i>niż</i> * <i>od</i>	√ <i>než</i>
DegP (21)	? <i>than</i>	? <i>čem</i> √Genitive	? <i>ot</i>	? <i>niż</i> * <i>od</i>	? <i>než</i>

√ = structure available

* = structure unavailable

? = cannot tell whether structure is available

The incompatibility between *ot-kolkoto* and cardinal-containing comparatives is expected, given that *ot-kolkoto* requires a reduced clause complement. The incompatibility between *od* and the DegP structure is also expected, given that *od* cannot combine with measure phrases: however, the reason for this incompatibility is not clear. A puzzle remains as to what rules out the small clause structure in (19) for both Genitive comparatives in Russian and *od* comparatives in Polish, given that these comparative types can take small-clause complements in other environments ((10b), (12b)). We do not have an answer to this in present, but we note a relationship between case assignment and availability of the small clause structure in (19): both Genitive comparatives in Russian and *od*

comparatives in Polish assign Genitive case, unlike *čem*, *niz* and Czech *než* comparatives. Serbo-Croatian also has *od* comparatives which assign Genitive case; like Russian Genitive, and unlike Polish *od*, Serbo-Croatian *od* is fully compatible with cardinal-containing comparatives. Our prediction is that like Russian Genitive comparatives, Serbo-Croatian *od*-comparatives should have the DegP structure only, and hence allow only for *many* readings, and be incompatible with referential expressions.

5 Conclusion

We have shown that comparatives differ systematically in terms of whether they allow *many* vs. *much* readings, and that the availability of *much* readings correlates with ability to combine with referential expressions. We have also provided novel evidence in favor of treating ‘clausal’ comparatives over cardinal-containing expressions as having a small clause rather than a reduced clause structure.

A number of questions remain open. First, there is the question of why Genitive comparatives in Russian have only the DegP structure available to them, and whether this is related to the fact that these are the only comparatives in our study with no overt preposition. Second, it is still unclear what rules out Polish *od* comparatives with cardinals and measure phrases. Third, as noted above, it is fruitful to explore the behavior of cardinal-containing comparatives in other Slavic languages, e.g., Serbo-Croatian. And finally, there is the more general question of why the reduced clause structure is unavailable to cardinal-containing comparatives.

6 Appendix: mean ratings across categories

Table A1. Ratings for indefinites containing cardinals

language & comparative	baseline category	<i>many</i>	additive <i>much</i>	replacement <i>much</i>
English	6.39	6.54	5.49	2.13
Russian, phrasal	6.42	5.36	3.65	2.89
Russian, clausal	5.17	6.24	6.32	5.53
Bulgarian, phrasal	6.45	5.27	5.57	3.73
Bulgarian, clausal	2.62	1.73	3.52	3.48
Polish, phrasal	1.05	3.45	1.60	3.65
Polish, clausal	4.45	6.85	4.70	6.40
Czech, clausal	6.54	6.29	4.58	2.17

Table A2. Ratings for demonstrative expressions containing cardinals

language & comparative	<i>many</i>	additive <i>much</i>	replacement <i>much</i>
English	6.03	5.87	1.85
Russian, phrasal	4.17	4.05	2.86
Russian, clausal	5.76	6.42	5.06
Bulgarian, phrasal	5.93	4.69	4.50
Bulgarian, clausal	3.57	3.39	4.30
Polish, phrasal	1.60	3.95	1.55
Polish, clausal	4.35	6.75	4.15
Czech, clausal	5.96	5.11	2.54

Table A3. Ratings for conjoined proper names

language & comparative	<i>many</i>	additive <i>much</i>	replacement <i>much</i>
English	5.26	6.18	1.78
Russian, phrasal	3.03	2.89	2.75
Russian, clausal	4.99	5.07	4.58
Bulgarian, phrasal	4.84	5.55	3.89
Bulgarian, clausal	3.05	3.80	3.84
Polish, phrasal	3.40	1.35	3.30
Polish, clausal	6.55	4.45	6.30
Czech, clausal	5.83	5.46	2.42

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