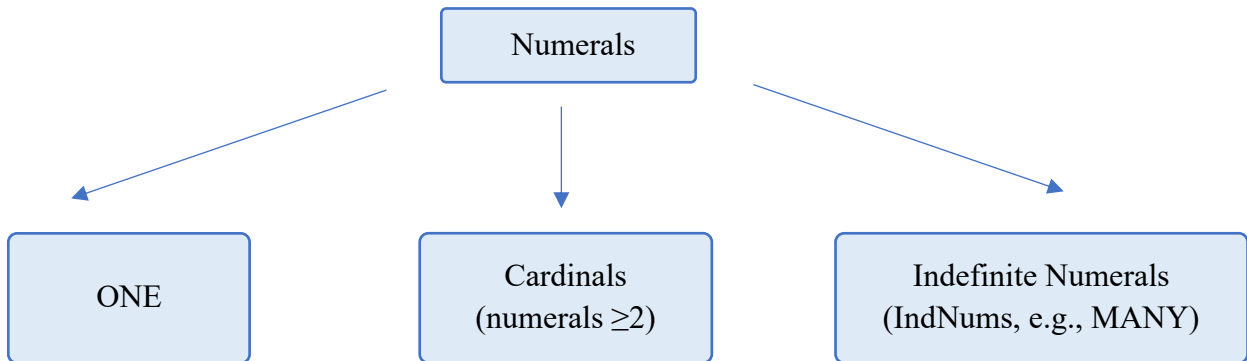


# On the Category and Morphosyntax of Numerals

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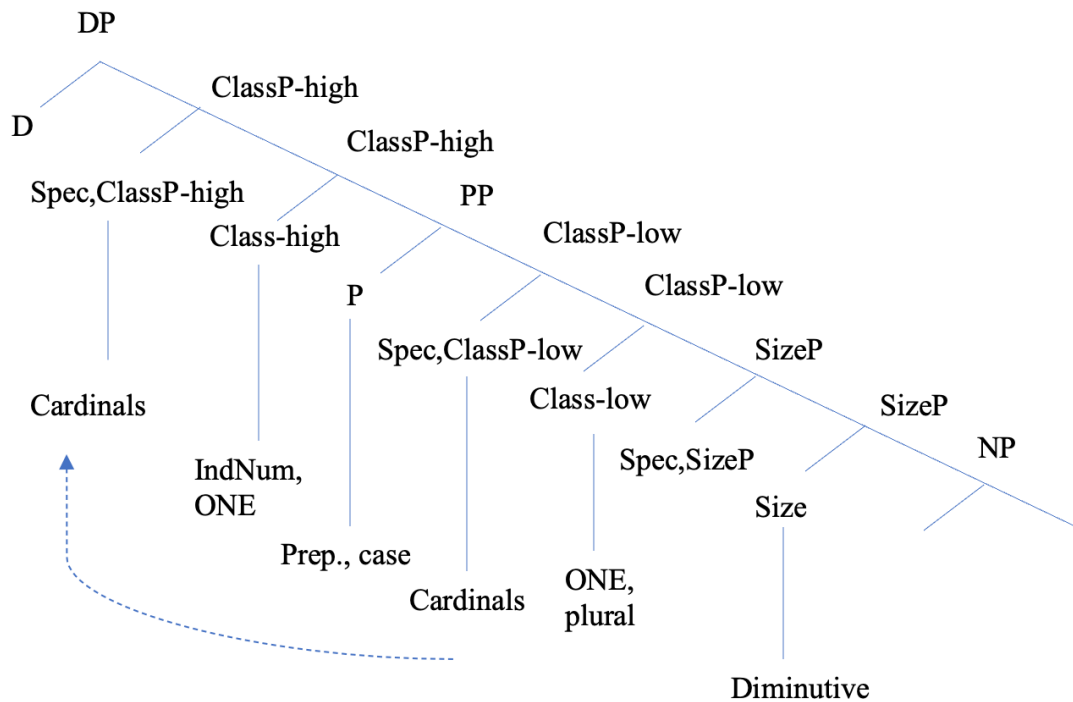
## 1. Numerals as a non-homogeneous class (cf., Barbiers 2007; Morozova & Barbiers in press)



- ⇒ What is the distribution and feature specification of the three types of Numerals?
- ⇒ Why does ONE show distinct behaviour cross-linguistically?

## 2. Proposed structure

(1)



- ⇒ The structure in (1) encodes two classifiers (see e.g., Her et al. 2022 and references therein on the types of classifiers):
- Class-low: type of unit or sortal classifier, correlates with count interpretation (cf., Rothstein 2017);
  - Class-high: the type of amount or mensural classifier, correlates with amount (measure) interpretation (cf., Rothstein 2017).
- ⇒ The relation between a Cardinal and a noun is established by case (genitive or partitive) or (abstract) preposition.
- ⇒ The proposal extends the analyses of indefinite pronouns by Leu (2005) and Roehrs (2008) and the analysis of partitives by Martí Girbau (2010).

### Roadmap:

- Motivation for PP
- Differences in the distribution of ONE and Cardinals in Russian
- Combinatorial possibilities of prepositions, ONE, Cardinals and IndNums in Dutch
- The human group construction and different types of numerals
- Appendix: distribution of IndNums in Russian; frequentative construction (ONE valued by [time])

## 2. Motivation for PP

- ⇒ Cardinals require genitive (partitive) case on the noun in the syntactic environment in (1a), (2a), but ONE does not (1b), (2b).

(1) Finnish [data from Brattico & Leinonen, 2009: example 7a,b, glosses adapted]

a. *Ne kolme pien-tä talo-a o-vat*  
 those.NOM three.NOM small-PRT house-PRT be-3PL  
*kauni-ita*  
 beautiful-PL.PRT  
 ‘Those three small houses are beautiful’

b. *Se yksi pieni talo o-n*  
 that.NOM one.NOM small.NOM house.NOM be-3SG  
*kaunis*  
 beautiful.SG.NOM  
 ‘That one small house is beautiful’

(2) Russian

a. *te pjat’ malen’k-ih dom-ov*  
 those.NOM five.NOM small-PL.GEN house-PL.GEN  
 ‘those five small houses’

b. *tot odin malen’k-ij dom*  
 that.NOM one.SG.M.NOM small-SG.M.NOM house.SG.NOM  
 ‘that one small house’

⇒ In some environments Dutch shows an overt preposition in quantitative expressions.

- (3) a. *Wat voor een boek-en heb je gekocht?*  
 what for a book-PL have.PRS.2SG you buy.PTCP  
 ‘What kind of books did you buy?’
- b. *Wat heb je [~~wat~~ aan boek-en] gekocht?*  
 what have.PRS.2SG you what to book-PL buy.PTCP  
 ‘How many books did you buy?’
- c. *Ze heeft tal van boek-en gelezen*  
 she have.PRS.3SG amount of book-PL read.PTCP  
 ‘She has read a large number of books’
- d. *Er zijn er tal die de moeite waard zijn*  
 there be.PRS.PL there amount that the effort  
 worth be.PRS.PL  
 ‘There are some that are worth it’
- e. *een aan-tal (\*van) boek-en*  
 a to-some to/of book-PL  
 ‘some books’

## 2. ONE and Cardinals in Russian

### 2.1 Case effects with Cardinals and ONE

- ⇒ The noun following a Cardinal bears genitive<sup>1</sup> if DP-external case is non-oblique (1a, 4a), *hence PP in the structure and obligatory movement of Cardinals from Spec,ClassP-low to Spec,ClassP-high*.
- ⇒ DP-external case is assigned to both the cardinal and the following noun in oblique (4b), *hence no structure above ClassP-low*.
- ⇒ The noun following ONE never gets genitive case (1b, 4c,d), *hence no structure above ClassP-low*.

- (4) a. *sem' knig*  
 seven.NOM book.PL.GEN  
 ‘seven books’
- b. *s cem'-ju knig-ami*  
 with seven-INST book-PL.INST  
 ‘with seven books’
- c. *odn-a knig-a*  
 one-FEM.NOM book-SG.NOM  
 ‘one book’
- d. *s odn-oj knig-oj*  
 with one-FEM.INST book-SG.INST

<sup>1</sup> It would be genitive singular for Cardinals up to FOUR, and genitive plural for the higher ones, see Appendix for more details.

‘with one book’

⇒ ONE agrees with the noun in gender and number (5).

(5) *Odin dom, odn-a dver’, odn-o okno*  
 One.M house, one-F door, one-N window

⇒ ONE is a classifier in Class-low

## 2.2 Classifiers in non-classifier Russian

⇒ The distribution of functional elements like *čelovek* ‘person’ with Cardinals and ONE provides evidence for the presence/absence of ClassP-high.

⇒ Russian has functional elements that in many respects resemble the behavior of sortal (Sussex 1976, Goto 2012) or mensural (Yadroff 1999, Khrizman 2016) classifiers.

⇒ We focus on functional *čelovek* ‘person’, following Yadroff (1999) and Khrizman (2016) in arguing that it is a measure expression, and suggest that it is generated in Class-high.

⇒ The elements in lexical and functional use can cooccur (note that Russian uses the suppletive form for plural *ljudi* ‘people’) (6).

(6) *pjat’ čelovek ljud-ej*  
 five.NOM person people-GEN  
 ‘five people’

⇒ As also observed in Sussex 1976, Yadroff 1999, Goto 2012, Khrizman 2016, used functionally, *čelovek* is optional and semantically bleached. It has the following distribution:

- Can cooccur with lexical nouns in Cardinal containing expressions (6,7a);
- Can not occur in quantitatives containing ONE (7b).

⇒ Adjectival modification of functional *čelovek* is not allowed (7c).

(7) a. *pjat’ (čelovek) pisatel-ej*  
 five.NOM person writer-PL.GEN  
 ‘five writers’

b. *odin (\*čelovek) pisatel’*  
 one.NOM person writer.SG.NOM

c. *\*pjat’ znamenit-yh čelovek pisatel-ej*  
 five.NOM famous-PL.GEN person writer-PL.GEN

⇒ Observations above follow if *čelovek* is generated in Class-high

⇒ Consequently, *čelovek* is not possible in oblique environments (8).

- (8) \* *s pjat'-ju čelovek muzykant-ami*  
with five-INST person musician-PL.INST

⇒ Functional *čelovek* is optional in the approximative inversion construction (9b,c).

- (9) a. *pjat' (čelovek) muzykant-ov*  
five.NOM (person) musician-PL.GEN  
'five musicians'
- b. *muzykant-ov pjat'*  
musician-PL.GEN five.NOM  
'approximately five musicians'
- c. *čelovek pjat' muzykant-ov*  
person five.NOM musician-PL.GEN  
'approximately five musicians'

⇒ Approximative inversion is not available for ONE (10a,b)<sup>2</sup> and in oblique environments (11a,b,c), hence it requires *ClassP-high layer to be present* (cf., (see Yadroff & Billings 1998 and Yadroff 1999 who argue that the fronted element ends up in D).

- (10) a. \* *pisatel' odin*  
writer.NOM one.M.NOM  
intended: 'approximately one writer' (incorrect under the intended interpretation)
- b. \* *čelovek odin pisatel'*  
person one.M.NOM writer.SG.NOM  
intended: 'approximately one writer'
- (11) a. \* *s muzykant-ami pjat'-ju*  
with musician-PL.INST five-INST
- b. \* *s pjat'-ju čelovek muzykant-ami*  
with five-INST person musician-PL.INST
- c. \* *s čelovek pjat'-ju muzykant-ami*  
with person five-INST musician-PL.INST

<sup>2</sup> In the context like (i) which requires semantic approximation, the inverted order is also prohibited.

- (i) \* *Dl'ja perezd-a nužn-a mašin-a odn-a*  
for moving.GEN need.F car.SG.NOM one.F.NOM  
Intended: 'There is approximately one car needed for moving (out)'

⇒ When *čelovek* is present, the amount rather than count interpretation is induced which is reflected in singular neuter agreement (12a).<sup>3</sup> The same holds for approximative inversion (12b).

- (12) a. *Pjat'*            *čelovek*            *pisatel-ej*            *priš-l-o*  
 five.NOM            person            writer-PL.GEN            come-PAST-SG.NEUT  
 'Five writers came'
- b. *Čelovek*            *pjat'*            *muzykant-ov*            *priš-l-o*  
 person            five.NOM            musician-PL.GEN            come-PST-SG.NEUT  
 'Approximately five musicians came'

⇒ Cardinal containing nominal expressions in Russian can result in either singular neuter or plural agreement on the verb (see also Bošković 2006 on two distinct structures).

- Neuter agreement: the noun is expected to move to Class-high (unless it is occupied by other elements) (13a). This tends to correlate with the amount interpretations.
- Plural agreement: the noun stays in situ (13b). This tends to correlate with the count interpretation.<sup>4,5</sup>

- (13) a. *Pjat'*            *pisatel-ej*            *priš-l-o*  
 Five.NOM            writer-PL.GEN            come-PAST-SG.NEUT  
 'Five writers came' (amount)
- b. *Pjat'*            *pisatel-ej*            *priš-l-i*  
 Five.NOM            writer-PL.GEN            come-PAST-PL  
 'Five writers came' (count)

⇒ The absence of ClassP-high in oblique environments implies that the amount interpretation is not available syntactically. The evidence comes from the construction with distributive preposition *po* (cf. e.g., Franks 1994), which is expected to assign dative case to the numeral and the noun.

- In (14a) the amount reading is the only possible one and the noun in the environment of the Cardinal still bears genitive, *hence the full structure including Class-high is present*.
- In (14b), *no Class-high is available*, therefore dative case appears on both the Cardinal and the noun, leading to count interpretation.
- (14c,d) support the presence of ClassP-high since approximative inversion is possible.

<sup>3</sup> Preference for singular agreement in amount reading is also noted for Dutch measure expressions, English group constructions, Western Armenian Cardinal containing constructions – see Ionin & Matushansky (2018) for discussion.

<sup>4</sup> Variation in agreement and lack of strict one-to-one mapping can be attributed to semantic agreement rather than syntactic one and the influence of normative use.

<sup>5</sup> See Nessel & Janda (2023) for extensive discussion of factors that influence plural and singular agreement in Russian Num+N constructions.

- (14) a. *Oni polučil-i po pjat' knjig*  
 They get-PST-PL DISTR five.NOM book.PL.GEN  
 'They got five books each'
- b. *Oni rasse-l-i-s' po pjat-i mašin-am*  
 They sit-PST-PL-RECP DISTR five-DAT car-PL.DAT  
 'They got distributed in five cars'
- c. *muzykant-ov po pjat'*  
 musician-PL.GEN po five.NOM  
 'by around five musicians'
- d. *čelovek po pjat' muzykant-ov*  
 person po five.NOM musician-PL.GEN  
 'by around five musicians' ('five musicians each')

Summary of the analysis of ONE:

### ONE in Class-low

- ⇒ Class-low classifier:
  - 1) [Unit: \_] needs to be valued by gender
- ⇒ No structure above ClassP-low, hence:
  - 1) no genitive on the noun;
  - 2) impossible with functional *čelovek*;
  - 3) impossible in approximative inversion.

Summary of the analysis of Cardinals:

### Cardinals in Spec,ClassP-low, moving to Spec,ClassP-high if possible

- ⇒ In non-oblique environments Cardinals move to Spec,ClassP-high:
  - 1) the noun in the syntactic environment of the Cardinal has genitive: evidence for ClassP-high;
  - 2) functional *čelovek* is allowed;
  - 3) approximative inversion is allowed.
- ⇒ Plural agreement if noun stays in situ and singular neuter agreement if Class-high is filled (either by functional elements like *čelovek* or by attracting the lexical noun to Class-high).
- ⇒ No ClassP-high in oblique hence Cardinals stay in Spec,ClassP-low:
  - 1) both nouns and Cardinals get DP-external case;
  - 2) no functional *čelovek* possible;
  - 3) approximative inversion is impossible.
- ⇒ Have feature specification [Unit: \_; Partitioning].

### 3. Place ONE in Dutch

⇒ ONE in Dutch can combine with some prepositions (15), but not others (16). The construction in (15) is impossible with Cardinals and IndNums.

- (15) a. *Zij kwam-en bij een/\*twee/\*veel*  
 they come.PST-PL by one/two/many  
 ‘They came together’
- b. *Dit zak-mes is drie gereedschapp-en in*  
 this pocket-knife be.PRS.3SG three tool-PL in  
*een/\*twee/\*veel*  
 one/two/many  
 ‘This pocket-knife is a three-in-one tool’
- c. *Dit gebeur-t nu al drie dag-en achter*  
 this happen.PRS.3SG now already three day-PL after  
*een/\*twee/\*veel*  
 one/two/many  
 ‘This has been happening three days after another now’
- d. *Zij kwam-en dit over een/\*twee/\*veel*  
 they come.PST-PL this over one/two/many  
 ‘They agreed upon this’
- e. *De toeschouwer-s zat-en dicht op een/\*twee/\*veel*  
 the spectator-PL sit.PST-PL tight on one/two/many  
 ‘The spectators sat close together’
- f. *Toen ging-en ze uit een/\*twee/\*veel*  
 then go.PST-PL they out one/two/many  
 ‘Then they separated’
- g. *Zij sloeg-en de hand-en in een/\*twee/\*veel*  
 they put.PST-PL the hand-PL in one/two/many  
 ‘They joined hands’

- (16) *\*binnen-één; \*buiten-één; \*boven-één; \*onder-één; \*beneden-één;*  
 inside-one outside-one above-one under-one beneath-one  
*\*tegen-één; \*tussen-één; \*naast-één; \*voor-één*  
 against-one between-one next-one for-one

⇒ Ungrammaticality of (16) is not due to semantics: *elkaar* instead of *één* is possible (17a,b).

- (17) a. *Zij kwam-en bij elkaar/één*  
 they came.PST-PL by each other/one  
 ‘They got together’
- b. *De twee schilderij-en hang-en boven elkaar/\*één*  
 the two painting-PL hang.PRS-PL above each other/one  
 ‘One painting is above the other one’



- ⇒ (Almost all) prepositions in (15) are morphologically simplex and, thus, can be combined with ONE.
- ⇒ Prepositions in (16) are morphologically complex and are formed with a low classifier *-en* merging with a locative root (Corver, 2021).
- ⇒ *Eén* and *-en* are both classifiers in Class-low and are in complementary distribution when combined with Dutch prepositions.
- ⇒ Cardinals can not cooccur with ONE because of the incompatibility of features, instead they can sometimes occur with *-en* in P+Cardinal +*-en* (18). The type of unit is provided by silent STUK (18) in the spirit of Kayne (2019) and Corver (2021).<sup>6</sup>

(18) *Ze sloeg de steen in twee-en*  
 she smash.PST.SG the stone in two-PL  
 ‘She smashed the stone in half’ (i.e., in two pieces)

Summary of the analysis is provided below:

#### Dutch Place ONE constructions

bij één/\*twee/\*veel

by one/two/many

- ⇒ [PP *bij* [ClassP-low [Class-low *één* [N ]]];
- ⇒ Feature specification ONE: [Unit: \_];
- ⇒ The unit feature is valued by P which gives a locative (or temporal) interpretation;
- ⇒ Cardinals are possible in principle if there is *-en*;
- ⇒ IndNums are impossible because Class-high is absent.

#### 4. ONE in the human group construction

- ⇒ Cardinals up to EIGHT (Postma 2015) (but not the IndNums) can be combined with the diminutive suffix in the human group construction (19) in Dutch.

(19) a. *Hij is in \*(zijn) een-tje*  
 He be.PRS.3SG in his one-DIM  
 ‘He is alone’

b. *We zijn met %(z’n/ons) drie-tje-s/-en*  
 we be.PRS.PL with his/our three-DIM-PL/-PL  
 ‘It is just the three of us’

<sup>6</sup> It may seem that in the example below (i) *-en* and ONE are not in complementary distribution. However, we take *-en* here as the realisation of HOUR or TIME, because, as shown below, plural inflection is not allowed in this case even if the Cardinal is followed by an overt N.

(i) *Het bericht komt na een-en / twee-en / twee uur(\*-en)*  
 the message come-PRS.3SG after one-en / two-en / two hour-PL  
 ‘The message will arrive after one/two o'clock’

- c. \* *We zijn met (ons) veel-tje-s/-en*  
 we be.PRS.PL with (us) many-DIM-PL/-PL  
 Intended meaning: ‘We are with many people’

⇒ SizeP is an additional projection below ClassP-low that hosts a diminutive morpheme in Dutch, more precisely, its features (cf. De Belder 2011, Corver 2021, Borer 2005 for discussion of the diminutive).

- ⇒ [PP [P *in/met* [PossP [Poss *zijn* [ClassP-low Cardinal [Class-low *een/-s* [SizeP [Size *-tje* [N]]]]]]]]]]]  
 ⇒ Unit is valued by [person] due to possessive.  
 ⇒ Bound morphemes in Class-low and Size can only be realized on (silent) N, hence the inverse order surfaces.  
 ⇒ IndNums are not possible because there is no ClassP-high.

⇒ Russian provides evidence for a similar derivation (20a), where the Cardinal can combine with the suffix *-er* in Class-low and the suffix *-om* in Size.  
 ⇒ While the construction in principle is allowed with ONE (20b) and IndNums (20c), these two classes are in complementary distribution with the suffix *-er* supporting the fact that all those elements are found in Class-low.

- (20) a. *Oni priš-l-i v-pjat'-er-om*  
 they come-PAST-PL in-five-er-om  
 ‘They came in fivesome’  
 b. *šampun' i gel' dl'a duš-a v odn-om*  
 shampoo.NOM and gel.NOM for shower-GEN in one-om  
 ‘shampoo and shower gel in one’  
 c. *Oni vo mnog-om pohož-i*  
 they in many-om similar-PL  
 ‘They are similar in many respects’

- ⇒ [PP [P *v* [ClassP-low Cardinal [Class-low *-er* [SizeP [Size *om* ]]]]]]  
 ⇒ [PP [P *v* [ClassP-low [Class-low *odn* [SizeP [SizeP *om* ]]]]]]  
 ⇒ [PP [P *vo* [ClassP-low [Class-low *mnog* [SizeP [SizeP *om* ]]]]]]

## 6. Conclusions

- **Numerals consist of at least three distinct categories:**
  - **ONE is a classifier** generated in a low classifier position and has feature specification [Unit: \_];
  - **Cardinals are phrases** generated in the specifier of this classifier; they have the feature specification [Partitioning: Value], where the Value of Partitioning is 2 in the case of Cardinal TWO, 3 in the case of THREE, etc.
  - **Indefinite Numerals** such as *veel* 'many' are generated in a **high classifier position**, i.e., above PP, and have the feature specification [Unit: \_; Partitioning].
- The [Unit: \_] on ONE can be valued by at least [person], [gender], [space] or [time], which makes it similar to the underspecified anchoring head at the clausal level (cf., Ritter & Wiltschko 2009, 2014)

## 7. Appendix

### 7.1. IndNums in Russian as classifiers base-generated in ClassP-low

⇒ Two forms of IndNums: amount *mnogo* 'many' and plural *mnogie* 'many-PL'.

	<i>Mnogo</i> 'many'	<i>Mnogie</i> 'many-PL'
<i>Structure</i>	[ClassP-high [Class-high <i>mnog o</i> [PP [P gen [ClassP-low [Class-low <i>mnog [N]]]]]]]</i>	[ClassP-low [Class-low <i>mnog ie</i> [N]]]]]]]
<i>Assign genitive to A/N</i>	Yes	No
<i>Allowed in oblique</i>	No	Yes
<i>Approximative inversion</i>	No	No
<i>Functional čelovek 'person'</i>	No	No
<i>Interpretation</i>	Amount	Individuated
<i>Agreement</i>	Plural agreement if with lexical N (individuated), singular agreement if with Class-high	Plural

- (21) a. *mnog-o knig*  
many-o book.PL.GEN  
'many books' (amount)
- b. *mnog-ie knig-i*  
many-PL.NOM book-PL.NOM  
'many books' (individuated books)
- c. *s mnog-imi/\*mnog-o knig-ami*  
with many-PL.INST/many-o book-PL.INST  
'With many books'
- d. *\*pisat'el-i/pisat'el'-ej mnog-ie*

- e. writer-PL.NOM/writer-PL.GEN many-PL.NOM  
\* *pisat'el'-ej mnog-o*  
writer-PL.GEN many-o
- f. \* *mnog-ie čelovek pisat'el-i/pisat'el'-ej*  
many-PL.NOM person writer-PL.NOM/writer-PL.GEN
- g. \* *mnog-o čelovek pisat'el'-ej*  
many-o person writer-PL.GEN
- h. *Mnog-o knjig leža-l-o na stol'-e*  
many-o book.PL.GEN lie-PST-N.SG on table-INST  
'There were many books on the table' (amount)
- i. *Mnog-ie knjig-i leža-l-i na stol'-e*  
many-PL.NOM book-PL.NOM lie-PST-PL on table-INST  
'Many books were on the table' (individuated)

## 7.2. Frequentative construction

⇒ In the Russian frequentative construction of the type *once* ONE, IndNums and lower Cardinals (TWO, THREE, FOUR) pattern together (22) ⇒ [Unit: \_] is valued by [time] (cf. Kayne 2015).

- (22) *odna-ždy, dva-ždy, tri-ždy, četyre-ždy, ?mnoga-ždy*  
*one-ždy, two-ždy, three-ždy, four-ždy, many-ždy*  
'once, twice, three times, four times, many times'

⇒ Lower cardinals assign morphologically different case: genitive singular (e.g. Bailyn 2011) (4), which is argued by Yadroff (1999) to be an overt realisation of dual number (also referred to as paucal (cf. Bailyn & Nevins 2008, Madariaga & Igartua 2017 among others).

⇒ According to Yadroff (1999): lower numerals (like ONE) do not assign case, hence possibility of nominative morphology on adjectives (due to Subset Principle, Halle & Marantz 1993).

- (23) a. *tri interesn-yh knjig-i*  
three.NOM interesting-PL.GEN book-SG.GEN  
'three interesting books'
- b. *tri interesn-yje knjig-i*  
three.NOM interesting-PL.NOM book-SG.GEN  
'Three interesting books'

Cardinals from 2 to 4 can be either in Spec,ClassP-high like other Cardinals or in Class-low

Consequently,

- ⇒ ordinal suppletion for TWO (24a);
- ⇒ gender inflection on TWO (24b);

- ⇒ complementary distribution of TWO/THREE and the suffix *-er* when forming Collectives (24c);
- ⇒ TWO, THREE and FOUR are less tolerated in approximative inversion and with functional *čelovek* and result more likely in plural rather than singular neuter agreement.

- (24) a. *vtor-oj den'*  
second-M.NOM day.NOM  
'the second day'
- b. *dv-a dom-a, dv-e knig-i, dv-a oblak-a*  
two-M house-SG.GEN, two-F book-SG.GEN, two-N cloud-SG.GEN  
'two houses, two books, two clouds'
- c. [ClassP-high [Class-high *dvo/tro-je* [PP [P [ClassP-low [Class-low ~~*dv-#r-*~~ [NP ]]]]]]]

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