

## The Syntactic Structure of the Construction: NUMERAL ‘out of’ NUMERAL in Polish<sup>1</sup>

### 1. Introduction

The aim of this paper is to analyse the syntax of the Polish construction NUMERAL *na* ‘out of’ NUMERAL + NP, which is illustrated in examples (1–3), all meaning ‘two out of five actresses could swim’:

- (1) *Dwie aktorki na pięć umiały pływać.*  
two<sub>NOM</sub> actresses<sub>NOM</sub> on five<sub>ACC</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>
- (2) *Dwie na pięć aktorek umiały pływać.*  
two<sub>NOM</sub> on five<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>
- (3) *Na pięć aktorek dwie umiały pływać.*  
on five<sub>ACC</sub> actresses<sub>GEN</sub> two<sub>NOM</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>
- (4) *Na pięć – dwie aktorki umiały pływać.*<sup>2</sup>  
on five<sub>ACC</sub> two<sub>NOM</sub> actresses<sub>NOM</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

The English equivalents of the above sentences would be as follows:

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<sup>2</sup> This sentence is definitely grammatical, although, to some native speakers, it seems slightly awkward (similarly to its English counterpart in (8), as the anonymous reviewer of this paper has rightly pointed out).

- (5) *Two actresses out of five could swim.*
- (6) *Two out of five actresses could swim.*
- (7) *Out of five actresses, two could swim.*
- (8) *Out of five, two actresses could swim.*

Structures such as *two out of five* in English could possibly be analysed as complex numerals, syntactically parallel to regular quantifiers or other numerical expressions:

- (9)
- |               |   |   |   |         |
|---------------|---|---|---|---------|
| I have bought | { | two<br>many<br>three and a half<br>two thousand three hundred thirty-two<br>two out of five | } | apples. |
|---------------|---|---|---|---------|

However, we will demonstrate in this paper that, in most cases, constructions such as *dwie na pięć* ‘two out of five’ in Polish cannot be interpreted as forming one syntactic constituent. In other words, they do not usually occupy a slot that is otherwise occupied by a single numeral. Instead, we interpret them as consisting of the head numeral and a PP adjunct headed by the preposition *na* ‘out of’ (literally ‘on’). The fact that there are two possibilities as regards the location of the quantified NP is accounted for by postulating that two NPs are actually present in the underlying structure of the phrase but one of them gets deleted at PF. The PP-external numeral determines person-number agreement with the verb and case agreement with the quantified noun. However, if the numeral inside the PP adjunct is a Q-numeral, the whole structure may undergo a process of what we call ‘reanalysis,’ resulting in a complex numeral phrase headed by the Q-numeral.

## 2. Numeral expressions in Polish

In Polish, it seems necessary to distinguish two types of what has traditionally been referred to as numerals: adjectival numerals such as *dwa* ‘two,’ and proper numerals such as *pięć* ‘five.’ Rutkowski (2001) calls them A-numerals and Q-numerals, respectively (this distinction has been made by other researchers as well—see, e.g., Neidle’s (1988) analysis of Russian). The difference between (10a) and (10b) illustrates the divergent behaviour of the two types in question.

(10a) *Dwie aktorki umiały pływać.*  
 two<sub>NOM</sub> actresses<sub>NOM</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>  
 ‘Two actresses could swim.’

(10b) *Pięć aktorek umiało pływać.*  
 five<sub>NOM</sub><sup>3</sup> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>  
 ‘Five actresses could swim.’

A-numerals manifest agreement with the head noun with respect to all features. This resembles the standard Polish agreement pattern of nouns and adjectives. On the other hand, Q-numerals do not agree with the head noun with respect to case. In the subject and accusative object positions, Q-numerals always assign genitive to the noun following them (the so-called Genitive of Quantification GEN(Q)—cf., e.g., Franks (1995)). Additionally, when in the subject position, the Q-numeral makes the verb assume the neuter singular form. If the subject is quantified by an A-numeral, the verb regularly agrees in number (plural) and gender (virile or non-virile, depending on the noun).

Following Rutkowski (2001) and (2002), we assume that Polish DPs are three-layered. Similarly to Picallo (1991), Ritter (1991) and Shlonsky (1991), among others, we postulate a functional projection between NP and DP. We will refer to that projection as Q(uantifier)P(hrase), following a well-established terminological tradition in Slavic linguistics (cf., e.g., Babby (1988), Franks (1995), Giusti and Leko (1996)). The Q-numeral occupying the Q head imposes GEN(Q) on the following NP. Since A-numerals always agree with the head noun, we will treat them as specifier-

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<sup>3</sup> Subject Q-numerals are sometimes considered to be accusative rather than nominative (see, e.g., Franks (1995)). We will not discuss this issue here because it does not influence the analysis presented in this paper.

based modifiers (cf. Chomsky (1995)).<sup>4</sup> Similar explanations of the difference between adjectival and non-adjectival numerals in other Slavic languages have been proposed by Giusti and Leko (1996) and Veselovská (2001) (for Bosnian and Czech, respectively). Adopting this model, we would like to show how to use it in order to account for certain peculiarities of constructions such as *dwie na pięć* ‘two out of five’ in Polish.

### 3. The structure NUM + [*na* NUM]<sub>PP</sub>

We argue that the syntactic structure of examples (1–4, repeated below as 1’–4’) should be schematically represented as in (11–14), respectively:

(1’) [*Dwie* *aktorki*] [*na pięć*]<sub>PP</sub> *umiały* *plywać*.  
 two<sub>NOM</sub> actresses<sub>NOM</sub> on five<sub>ACC</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

(2’) [*Dwie*] [*na pięć* *aktorek*]<sub>PP</sub> *umiały* *plywać*.  
 two<sub>NOM</sub> on five<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

(3’) [*Na pięć* *aktorek*]<sub>PP</sub> [*dwie*] *umiały* *plywać*.  
 on five<sub>ACC</sub> actresses<sub>GEN</sub> two<sub>NOM</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

(4’) [*Na pięć*]<sub>PP</sub> – [*dwie* *aktorki*] *umiały* *plywać*.  
 on five<sub>ACC</sub> two<sub>NOM</sub> actresses<sub>NOM</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

(11) [Num NP] [*na* Num]<sub>PP</sub>

(12) [Num] [*na* Num NP]<sub>PP</sub>

(13) [*na* Num NP]<sub>PP</sub> [Num]

(14) [*na* Num]<sub>PP</sub> [Num NP]

<sup>4</sup> We assume that all adjectival modifiers in Polish are specifiers. We do not follow Abney’s (1987) suggestion that AP dominates NP (i.e. that the A head takes NP as its complement). For an extensive discussion of the structural position of adjectival modifiers in Slavic see Bošković (2003). Note that, according to Bošković (2003), the fact that there is no ban on left-branch extraction of adjectives out of NP in languages such as Serbian (or Polish) indicates that adjectives occupy the Spec-NP position.

In the above examples, the whole construction must be headed by the numeral we underline because it is this numeral (*dwie* ‘two,’ i.e. an A-numeral) that makes the verb assume the plural/agreeing form (and not the singular/non-agreeing form). It is crucial to note that, in sentences such as (2/2’), the verb agrees with the first numeral, although the noun *aktorek* ‘actresses,’ which is the semantic nucleus of the phrase, gets its genitival form from the second numeral (*pięć* ‘five’).

The structure of headedness proposed in (11–14) remains the same if we substitute a Q-numeral for the A-numeral *dwie*. This may be illustrated with examples (15–18), all meaning ‘five out of twenty-two actresses could swim.’<sup>5</sup> They correspond to sentences (1–4/1’–4’) but, in this case, the Q-numeral *pięć* ‘five,’ which heads the subject, requires the verb form to be neuter singular:

- (15) [Pięć aktorek] [na dwadzieścia dwie]<sub>PP</sub> umiało pływać.  
 five<sub>NOM</sub> actresses<sub>GEN</sub> on twenty-two<sub>ACC</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>
- (16) [Pięć] [na dwadzieścia dwie aktorki]<sub>PP</sub> umiało pływać.  
 five<sub>NOM</sub> on twenty-two<sub>ACC</sub> actresses<sub>ACC</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>
- (17) [Na dwadzieścia dwie aktorki]<sub>PP</sub> [pięć] umiało pływać.  
 on twenty-two<sub>ACC</sub> actresses<sub>ACC</sub> five<sub>NOM</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>
- (18) [Na dwadzieścia dwie]<sub>PP</sub> – [pięć aktorek] umiało pływać.  
 on twenty-two<sub>ACC</sub> five<sub>NOM</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

The numeral which is outside the Prepositional Phrase headed by *na* (‘out of,’ literally ‘on’) is always the syntactic subject of the sentence (whether or not it is followed by the quantified noun). The presence or absence of the noun can be explained as a PF ellipsis process. We propose that the base-structure for both (11) and (12) is the following:

- (19) [NUM NP] [na NUM NP]<sub>PP</sub>

Also (13) and (14) have a common underlying representation:

- (20) [na NUM NP]<sub>PP</sub> [NUM NP]

<sup>5</sup> Note that *dwadzieścia dwie* ‘twenty-two’ is a complex A-numeral.

Moreover, we argue that the structure in (20) is derived from the base-structure presented in (19) through a topicalising movement operation (the PP headed by *na* ‘out of’ is raised to a position in front of the main NUM-NP phrase and becomes a topic of the sentence).<sup>6</sup> Thus, (19) is the most basic representation of all the sentences listed in (1–4) and (15–18).

At PF, either the first or the second instance of NP gets deleted, under identity. The two options are illustrated below: the PP-internal deletion is represented in (21) and (24), whilst the PP-external deletion is shown in (22) and (23), with parentheses standing for ellipsis:

(21) [NUM NP] [*na* NUM (NP)]<sub>PP</sub> (corresponding to sentences (1) and (15))

(22) [NUM (NP)] [*na* NUM NP]<sub>PP</sub> (corresponding to sentences (2) and (16))

(23) [*na* NUM NP]<sub>PP</sub> [NUM (NP)] (corresponding to sentences (3) and (17))

(24) [*na* NUM (NP)]<sub>PP</sub> [NUM NP] (corresponding to sentences (4) and (18))

It has to be stressed once more that the PP-internal numeral does not determine agreement on the verb whether the noun quantified by this numeral is deleted or not. Therefore, we argue that, in all the four structures represented in (21–24), the PP headed by the accusative-assigning preposition *na* (‘out of,’ literally ‘on’) has to be analysed as adjoined to the rest of the DP in exactly the same way as the underlined non-numeral adjuncts in (25–28).

(25) *Dwie aktorki [spośród nas]<sub>PP</sub> umiały pływać.*  
 two<sub>NOM</sub> actresses<sub>NOM</sub> from<sub>USGEN</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>  
 ‘Among us, two actresses could swim.’

(26) *Tylko dwie [na całą masę aktorek]<sub>PP</sub> umiały pływać.*  
 only two<sub>NOM</sub> on whole<sub>ACC</sub> mass<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>  
 ‘Only two out of a whole mass of actresses could swim.’

(27) *[Na pułk żołnierzy]<sub>PP</sub> tylko pięciu umiało pływać.*  
 on regiment<sub>ACC</sub> soldiers<sub>GEN</sub> only five<sub>NOM</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>  
 ‘Only five soldiers from the regiment could swim.’

<sup>6</sup> The anonymous reviewer notes that this is reflected in a change of intonation: the topicalised PP has to be followed by a pause.

- (28) [*W całej grupie*]<sub>PP</sub> tylko pięciu aktorów umiało pływać.  
 in whole<sub>ACC</sub> group<sub>ACC</sub> only five<sub>NOM</sub> actors<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>  
 ‘In the whole group, only five actors could swim.’

In other words, we propose that phrases such as *na dwadzieścia dwie* ‘out of twenty-two’ in (15) and *na dwadzieścia dwie aktorki* ‘out of twenty-two actresses’ in (17) should not be treated as belonging to the core numerical expressions in respective sentences.

Example (29) shows that the PP cannot separate the head Q from its complement NP, which confirms that the adjunction approach is correct (phrases are never adjoined in between a head and its complement):

- (29) \**Pięć [na dwadzieścia dwie] aktorek umiało pływać.*  
 five<sub>NOM</sub> on twenty-two<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

#### 4. Reanalysis: shift in headedness

If we accept the analysis sketched above, the ungrammaticality of examples such as (30) is not surprising. The phrase *na dwadzieścia dwie aktorki* ‘out of twenty-two actresses’ is a PP-adjunct so the head Q-numeral is expected to make the verb assume the neuter singular form. Since the verb is plural, the example cannot be grammatical.

- (30) \**Pięć [na dwadzieścia dwie aktorki] umiały pływać.*  
 five<sub>NOM</sub> on twenty-two<sub>ACC</sub> actresses<sub>ACC</sub> could<sub>PL, NONVIR</sub> swim<sub>INF</sub>

However, example (31) seems to contradict the analysis we have argued for so far:

- (31) *Dwie na pięć aktorek umiało pływać.*  
 two<sub>NOM</sub> on five<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

The above example is grammatical although it is parallel to the ungrammatical example (30). It is the Q-numeral *pięć* ‘five’ (i.e. a part of the PP adjunct), and not the A-numeral *dwie* ‘two’ (which should head the phrase from the semantic point of view) that controls the verb form. How should we account for this exceptional construction? We propose that, in this case, the whole structure *dwie na pięć* ‘two on five’ should be interpreted as one numerical expression. We consider it parallel to complex

numerals such as *dwieście dwadzieścia pięć* ‘two hundred twenty-five’ in (32) below:

(31') [*Dwie na pięć*]<sub>Q</sub> *aktorek* *umiało* *plywać*.  
 two<sub>NOM</sub> on five<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

(32) [*Dwieście dwadzieścia pięć*]<sub>Q</sub> *aktorek* *umiało* *plywać*.  
 two-hundred<sub>NOM</sub> twenty<sub>NOM</sub> five<sub>NOM</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

The last element of such structures always becomes the syntactic head of the whole (therefore, it is underlined in the above examples). Since the last element is a Q-numeral, the entire complex selects a genitive complement and imposes the neuter singular on the verb. We assume that the preceding elements (such as *dwie na* ‘two out of’ in (31/31’) and *dwieście* ‘two hundred’ in (32))<sup>7</sup> are adjoined inside the main QP.

The structure in (31’) is a grammatical innovation—it is possible only due to a syntactic reanalysis of the adjunct PP that has been split into two parts: the elements *na pięć* ‘on five’ have merged with the original head numeral *dwie* ‘two’ to form just one Q-type structure.<sup>8</sup> The input and output of this process could be represented as follows (with syntactic subjects underlined):

(33a) [A-NUM] [*na* Q-NUM NP]<sub>PP</sub> VP<sub>PL, NONVIR</sub> (input – corresponding to (2))

(33b) [A-NUM na Q-NUM]<sub>Q</sub> NP VP<sub>SING, NEUT</sub> (output – corresponding to (31))

We understand the term ‘reanalysis’ as a syntactic innovation in terms of acquisition (i.e. introduction of a new complex Q-type numeral structure to

<sup>7</sup> The anonymous referee notes that, in structures such as (31’), *dwie na* ‘two out of’ could be viewed as, in a way, parallel to English *kind of/kinda* and *sort of/sorta*:

(i) *these kind of girls*

(ii) *those sort of cars*

Both the element *dwie* in (31’) and the element *kind/sort* in (i–ii) are syntactic heads that have been reanalysed as modifiers.

<sup>8</sup> Example (29) shows that such a complex Q-numeral can only be formed on the basis of the sequence NUM *na* Q-NUM, and not NUM *na* A-NUM (where NUM could be both Q- and A-numeral).



the Polish language), and not as a derivational process. Thus, the structure in (33b) does not derive synchronically from the structure in (19). The complex in question has to be base-generated as [A-NUM *na* Q-NUM]<sub>Q</sub> NP— with only one NP and no PF-deletion.

Note that the reanalysis presented here is subject to some restrictions. For example, it is not possible in structures with the A-numeral *jedna* ‘one’:

- (33) \**[Jedna na pięć]<sub>Q</sub> aktorek umiało pływać.*  
 one<sub>NOM</sub> on five<sub>ACC</sub> actresses<sub>GEN</sub> could<sub>SING, NEUT</sub> swim<sub>INF</sub>

We assume that the shift in headedness observed in (31/31’) and schematised in (33b) is a relatively new innovation and, therefore, its impact is still limited.

The reanalysis is not possible also in structures that have an A-numeral as the last element. As shown in examples (16) and (30), A-numerals cannot become heads of complex NUM *na* NUM quantifiers:

- (35a) *[Q-NUM] [na A-NUM NP]<sub>PP</sub> VP<sub>SING, NEUT</sub>* (corresponding to (16))

- (35b) \**[Q-NUM na A-NUM]<sub>A</sub> NP VP<sub>PL, NONVIR</sub>* (corresponding to (30))

We assume that this is because the A-numeral cannot occupy the functional position Q (which is the only slot that the reanalysed structure can occupy) but this issue requires further research. As suggested by the reviewer, the fact that the sequence Q-NUM *na* A-NUM cannot be a complex A-type numeral could be accounted for by saying that the A-numeral have properties of agreement, which the Q-numeral disrupts.

Interestingly, as noted by the anonymous referee, English numeral constructions of the type NUM *out of* NUM seem to undergo a restructuring that is very similar to the Polish reanalysis described above. Let us have a look at the following examples:

- (36) *Only one actress [out of five]<sub>PP</sub> is swimming.*

- (37) *Only one [out of five actresses]<sub>PP</sub> is swimming.*

- (38) *[Out of five actresses]<sub>PP</sub>, only one is swimming.*

(39) [*Out of five*]<sub>PP</sub>, *only one actress is swimming.*

The above sentences are clearly parallel to the Polish examples in (1–4) and (15–18). It is always the PP-external numeral that determines the form of the verb (in examples (36–39), the numeral *one* makes the verb assume the third-person singular form *is*). Therefore, sentences such as (40–41) are ungrammatical:

(40) \**Only one actress [out of five]<sub>PP</sub> are swimming.*

(41) \**[Out of five actresses]<sub>PP</sub>, only one are swimming.*

However, the anonymous reviewer points out that the following example is grammatical (at least for some speakers of English):

(42) *Only one out of five actresses are swimming.*

The plural form *are* can be explained if we interpret the above example as parallel to (31), and, therefore, structured as in (43a), and not as in (43b):

(43a) *Only [one out of five]<sub>O</sub> actresses are swimming.*

(43b) *Only one \*[out of five actresses]<sub>PP</sub> are swimming.*

The difference between these two patterns could be illustrated schematically in the following way:

(44a) [NUM *na* NUM]<sub>O</sub> [NP]

(44b) [NUM] [*na* NUM NP]<sub>PP</sub>

## 5. Conclusion

To summarise, this paper has argued for a syntactic distinction between the two numerals present in the structure NUM ‘out of’ NUM in Polish. We have attempted to show that (at least in most cases) one of them has to be analysed as the head of the whole construction, whilst the other must be interpreted as belonging to an adjunct PP headed by the preposition *na* ‘out

of'. This, however, changes when the PP-external numeral is a Q-numeral. Such structures may be reanalysed as one complex numeral headed by the Q-numeral.

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## Contact information:

Paweł Rutkowski  
Katedra Językoznawstwa Ogólnego i Bałtystyki  
Wydział Polonistyki, Uniwersytet Warszawski  
ul. Krakowskie Przedmieście 26/28, p. 28A  
00-927 Warszawa  
Poland  
[p.rutkowski@uw.edu.pl](mailto:p.rutkowski@uw.edu.pl)