Phi-defective numerals in Polish: Bleeding and default agreement

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Agreement mismatches: Mismatches between the features of the probe (e.g. verb) and would-be goal (e.g. subject), triggered specifically by the presence of numerals in Polish:

(1) a. Ptaki spały. (No Mismatch)
   Birds.M.PL.NOM slept.NV.PL
   “Birds slept”

   b. Pięć ptaków spało. (Mismatch: gender, number)
      Five birds.M.PL.GEN slept.N.SG
      “Five birds slept”

In this talk, I will show such agreement mismatches to be the result of bleeding, triggered by the presence of a numeral. In particular, case assignment within numeral-noun constructions bleeds the verb of a proper goal, leading to default agreement.

Main claim: Case assignment prior to Agree causes bleeding, and thus, default agreement.

1. Data: Agreement Mismatches in Polish

1.1 5+ INDUCED AGREEMENT MISMATCHES

Numerals 5+, but not numerals 1, 2, 3, or 4 trigger an agreement mismatch and genitive marking on the noun:

(2) Pięć ptaków spało.
    Five birds.M.PL.GEN slept.N.SG
    “Five birds slept”

(3) a. Jeden ptak spał.
    “One bird slept”

   b. Dwa / trzy / cztery ptaki spały.
      Two.M.NOM / three.NOM / four.NOM
      bird.M.PL.NOM slept.NV.PL
      “Two / three / four birds slept”

1 In association with the VIDI Project “The Uniformity of Linguistic Variation”, http://linguisticvariation.com/en/
2 Abbreviations: ACC = accusative; DAT = dative; F = feminine; GEN = genitive; INST = instrumental; LOC = locative; M = masculine; MP = masculine personal gender; N = neuter; NOM = nominative; NV = non-virile gender; PART = particle; PL = plural; SG = singular; V = virile gender
Numerals 1, 2, 3, and 4, but not 5+ show gender agreement on the numeral itself. Gender agreement is always accompanied by agreement on the verb (in the number/gender of the noun) and NOMINATIVE case on both numeral and noun, as in (3) above.

### Table 1: Gender agreement in subject (nominative) position for numerals 1, 2, 3, 4, and 5

<table>
<thead>
<tr>
<th></th>
<th>Masculine</th>
<th>Animate / Inanimate</th>
<th>Neuter</th>
<th>Feminine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Personal (Mismatch)</td>
<td>Personal (No Mismatch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>—</td>
<td>jedni.PL</td>
<td>jeden</td>
<td>jedno</td>
</tr>
<tr>
<td>2</td>
<td>dwóch</td>
<td>dwaj</td>
<td>dwa</td>
<td>dwie</td>
</tr>
<tr>
<td>3</td>
<td>trzech</td>
<td>trzej</td>
<td></td>
<td>trzy</td>
</tr>
<tr>
<td>4</td>
<td>czterech</td>
<td>czterej</td>
<td>cztery</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>pięciu</td>
<td>—</td>
<td></td>
<td>pieć</td>
</tr>
</tbody>
</table>

Tangent: There are two competing hypotheses as to the case feature of 5+ numerals:

i. **Accusative Hypothesis**: 5+ numerals are accusative in structural case positions (Franks 1994, 2002; Przepiórkowski 2004).

ii. **Nominative-Genitive Hypothesis**: 5+ numerals (and optionally 2,3,4) are genitive with masculine personal gendered nouns (masculine + human) and nominative with non-masculine personal gendered nouns (neuter, feminine, masculine animate, masculine inanimate) in structural case positions (Przepiórkowski 2004; Doroszewski 1952; Klockmann 2012).

Under the **Nominative-Genitive Hypothesis**, which I follow here, the pięć-pięciu distinction is not gender agreement but a case difference. The dwaj-dwa-dwie, trzej-trzy, and czterej-cztery distinctions are gender agreement (as they are accompanied by verbal agreement and nominative case marking), while dwóch, trzech, czterech are genitive.

### 1.2 Gender Induced Agreement Mismatches

In addition to triggering an agreement mismatch and genitive marking on the noun (cf. (2)), 5+ numerals are also marked genitive in the presence of masculine personal gender (4a) (according to the Nominative-Genitive Hypothesis), in contrast to non-masculine personal gender (4b):

(4)  a. **Pięciu** | chłopców | spało.  
     Five.GEN | boy.MP.PL.GEN | slept.N.SG
     “Five boys slept”

     b. **Pięć** | ptaków | spało.  
    Five | bird.M.PL.GEN | slept.N.SG
    “Five birds slept”

Numerals 2,3,4 do one of two things: (a) they agree with the noun in gender and show full verbal agreement (as in (3) above) or (b) they and the noun are marked as genitive accompanied by an agreement mismatch.³

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³ The difference is stylistic, (a) being used more in written Polish and (b) more in spoken Polish (Swan, 2002).
Numeral 1 agrees with the noun accompanied by full verbal agreement. There is no effect of gender.

(6) Jedni chłopcy spali.
    One.PL.NOM boy.PL.NOM slept.
    “Some boys slept”

2. Analysis

Three main components to the analysis:

i. Default agreement (Preminger 2011)
ii. Feature sets of the numerals
iii. Case assignment in numeral-noun constructions

In a nutshell, the features of 5+ numerals make them improper goals for the verb. Genitive case assignment of the noun in numeral-noun constructions likewise makes the noun an improper (inactive) goal, with masculine personal gender triggering genitive case leaking onto the numeral also. As a result, once the numeral-noun construction is finally merged in the main structure, there is nothing for the verb to agree with – it has been bled of potential goals and instead receives default agreement (Preminger 2011).

2.1 DEFAULT AGREEMENT

Default Agreement (Preminger, 2011): Agree is obligatory, but its success is not. If agree fails, default features are inserted.

In Polish, default verbal features are neuter singular (Dziwirek, 1990):

Infinitival subjects

(7) Wyłysieć byłoby dla mnie tragedią.
    To.grow.bald would.be.N.SG for me.GEN tragedy.INST
    “To grow bald would be a tragedy for me” (modeled after Swan 2002: 391)

Impersonals

(8) Nudziło mi się.
    Was.bored.N.SG me.DAT PART
    “I was bored”

Weather verbs

(9) Padało.
    Rained.N.SG
    “It rained”
Claim: Agreement mismatches are instances of default agreement

**Question:** What triggers the default agreement?

**Answer:** No available goal for the verb due to previous applications of genitive case assignment and the fact that the 5+ numerals do not make proper goals.

2.2 **NUMERALS AS IMPROPER GOALS: THEIR FEATURE SETS**

**Nouns vs. Adjectives** (based on Baker 2003): Nouns can be distinguished from adjectives through their feature sets: nouns carry all valued phi-features and adjectives carry all unvalued phi-features.

**Adjectives** (example: “small”): Agree in
- gender (maly\textsubscript{M.SG}, male\textsubscript{N.SG}, mala\textsubscript{F.SG})
- number (male\textsubscript{N.V.PL}, mał\textsubscript{V.PL}).
- and case (for example, masculine inanimate singular nouns: maly\textsubscript{NOM/ACC}, male\textsubscript{GEN}, matym\textsubscript{INST/LOC}, male\textsubscript{uDAT})

Therefore, they have unvalued gender, number, and case features.

**Claim:** Adjectives have only unvalued features. They can serve as verbal goals once their phi-features have been valued.

**Numeral 1:** Agrees in
- gender (jeden\textsubscript{M.SG}, jedno\textsubscript{N.SG}, jedna\textsubscript{F.SG})
- number (jedne\textsubscript{N.V.PL}, jedni\textsubscript{V.PL} – relevant with pluralia tantum words, such as drzwi\textsubscript{PL} ‘door’),
- and case (for masculine inanimate singular nouns: jeden\textsubscript{NOM/ACC}, jednego\textsubscript{GEN}, jednym\textsubscript{INST/LOC}, jednu\textsubscript{DAT})

Therefore, it has unvalued gender, number, and case features.

**Claim:** Numeral 1 is syntactically an adjective. It can serve as a verbal goal once its phi-features have been valued.

**Numerals 2,3,4:** Agree in
- gender (two: dwa\textsubscript{M.N}, dwie\textsubscript{F}, dwaj\textsubscript{M.P})
- and case (two, masculine inanimate: dwa\textsubscript{NOM/ACC}, dwóch\textsubscript{GEN}, dwoma\textsubscript{INST/LOC}, dwom\textsubscript{DAT})
- but not in number as they have no number morphology and are restricted to modifying plural nouns (two bird(s): dwa ptaki\textsubscript{PL}, *dwa ptak\textsubscript{SG})

Therefore, they have unvalued gender and case, but valued number (assumed to be PL).

**Claim:** Numerals 2,3,4 are featurally a cross between adjective and noun. They can serve as verbal goals once their phi-features have been valued.
Numerals 5+:
- Have case morphology (five: pięć\textsubscript{NOM/ACC}, pięciu\textsubscript{GEN/LOC/DAT}, pięcioma\textsubscript{INST})
- Do not agree in number, as they have no number morphology and are restricted to modifying plural nouns (five bird(s): pięć ptaków\textsubscript{PL}, *pięć ptaka\textsubscript{SG})
- Do not agree in gender
- Seem to be missing a gender feature altogether (also claimed in Dziwirek, 1990):

> **Historical argument:** 5+ numerals were once nominal heads that triggered feminine singular agreement on the verb (Miechowicz-Mathias & Dziubała-Szrejbroska, 2012; Rutkowski, 2006). Now they do not which could indicate a loss of gender.

(10) Ona siedm  panien  szła.
\text{that.F.NOM seven.NOM maidens.GEN walked.F.SG}

“Those seven maidens were walking” (Old Polish – Rutkowski, 2006: 93)

> **Coordination argument:** If 5+ numerals had a neuter gender feature (as they trigger N.SG on the verb), we would expect the coordination of two 5+ numeral phrases to lead to NV.PL on the verb, like neuter nouns do – however, it still leads to N.SG.

(11) a. Krzesła i biurka rozbiły się.
\text{Chair.N.PL.NOM and desk.N.PL.NOM broke.N.PL PART}

“Chairs and desks broke”

b. Pięć krzeseł i sześć biurek rozbiło się.
\text{Five chair.GEN and six desk.GEN broke.N.SG PART}

“Five chairs and six desks broke”

Therefore, they have unvalued case, missing gender, and valued number (PL).

> **Claim:** 5+ numerals are semi-lexical, phi-defective (in gender) nouns which assign genitive to their complements. They cannot serve as a verbal goal, as they lack a full set of phi-features.

Nouns:
- Have valued gender (dziewczyna\textsubscript{F} ‘girl’, stół\textsubscript{M} ‘table’, krzesło\textsubscript{N} ‘chair’)
- Have number morphology (dziewczyna\textsubscript{SG}/dziewczyny\textsubscript{PL} ‘girl(s)’, stół\textsubscript{SG}/stóły\textsubscript{PL} ‘table(s)’, krzesło\textsubscript{SG}/krzesła\textsubscript{PL} ‘chair(s)’)
- Have case morphology (‘girl’, feminine singular: dziewczyna\textsubscript{NOM}, dziewczynę\textsubscript{ACC}, dziewczyny\textsubscript{GEN}, dziewczynie\textsubscript{LOC/DAT}, dziewczyną\textsubscript{INST})

Therefore, they have valued gender and number, and unvalued case.

> **Claim:** Nouns have all valued phi-features. They make proper goals for verbs.

<table>
<thead>
<tr>
<th>Table 2: Feature Specifications</th>
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<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Adjective</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2,3,4</td>
</tr>
<tr>
<td>5+</td>
</tr>
<tr>
<td>Noun</td>
</tr>
</tbody>
</table>
**Conclusion:** Numerals 5+ can never serve as verbal goals, as they lack the required valued gender and number features. Numerals 1 and 2,3,4 can serve as verbal goals, provided they have valued their features through gender/(number) agreement.

### 2.3 Nouns as Improper Goals: Genitive Case Assignment

**Agreement Mechanism:** Agree proceeds as described for Cyclic Agree (Rezac 2003).

*Cyclic Agree* (Rezac 2003): If a probe does not deactivate after a search into its c-command domain, it can also search upwards when new material is Merged. This is a consequence of the *Earliness Principle* of Pesetsky and Torrego (2001: 400) which states that “an uninterpretable feature must be marked for deletion as early in the derivation as possible”.

\[
\text{(12) a. } \quad \begin{array}{c}
\text{FP} \\
\text{Probe} \\
\text{XP} \\
\text{Goal}
\end{array}
\quad \text{b. } \quad \begin{array}{c}
\text{FP} \\
\text{XP} \\
\text{F'} \\
\text{Goal} \\
\text{Probe} \\
\text{XP}
\end{array}
\]

**Structural Claim:** Numeral-noun constructions have the syntax of noun-noun constructions (Ionin and Matushansky 2006). In particular, I claim this involves an intermediate functional projection between the two elements which is responsible for genitive case assignment (potentially, the correlate of English *of*).

\[
\text{(13) } \quad \begin{array}{c}
\text{DP/NP} \\
\text{Numeral/Noun} \\
\text{FP} \\
\text{f} \\
\text{DP/NP} \\
\text{f Noun}
\end{array}
\]

**Case assignment:**

i. The intermediate genitive case-assigning functional project, FP, occurs with numerals 2,3,4 and 5+; unlike the FP of lexical nouns, this particular FP is deficient (related to the deficient semi-lexical nature of the numerals themselves).

ii. In 5+ numerals, FP always assigns a genitive case. In 2,3,4 numerals, FP is usually inactive, but can become active in the presence of masculine personal gender (idiomsyncratic property of these three numerals).

iii. For the numeral-selected deficient FP, it cannot deactivate after agreement with a masculine personal gendered noun, leading to case leaking, or rather agreement (and thereby genitive case assignment) upwards with the numeral.
Thus, case assignment goes as schematized below:

(14)

Thus, case assignment goes as schematized below:

(14)

Consequence: Only with the numerals 2,3,4 (the circled case) is N a proper goal for verbal agreement. In all other cases, N is inactive and thus, an unavailable goal for agreement.

2.4 INTERMEDIATE SUMMARY: GENITIVE CASE ASSIGNMENT BLEEDS VERBAL AGREEMENT

Three conclusions from the previous sections:

i. Agreement mismatches are instances of default agreement.

ii. Numerals 5+ can never serve as verbal goals, as they lack the required valued gender and number features. Numerals 1 and 2,3,4 can serve as verbal goals, provided they have valued their features through gender/(number) agreement.

iii. Only with the numerals 2,3,4 is N a proper goal for verbal agreement. In all other cases, N is inactive and thus, an unavailable goal for agreement.

Putting this together, 5+ numerals are never proper goals, and 2,3,4 numerals and nouns are only proper goals when FP is inactive. The genitive case assignment by active FPs essentially removes all potential goals in the subject, the noun with 5+ and the numeral and noun with 2,3,4. When there are no proper goals, the verb receives default agreement. Therefore, the assignment of genitive case bleeds the verb of its goal, leading to default agreement.

In other words: Application of case assignment prior to Agree leads to bleeding.
2.5 ILLUSTRATIONS

No FP (Numeral 1, all genders): Numeral agrees in gender and number (and case) with the noun; noun remains uncased (15a). Verb agrees, assigning nominative case (15b).

(15)  
\[
\begin{align*}
\textbf{a.} & \quad \text{DP/NP} \\
& \quad \text{AP} \quad \text{N} \\
& \quad \text{Adjective, 1} \quad \text{Noun} \\
& \quad \text{[Gen]} \quad \text{[Gen]} \\
& \quad \text{[Num]} \quad \text{[Num]} \\
& \quad \text{[Case]} \quad \text{[Case]} \\
& \uparrow \quad \uparrow \\
\end{align*}
\]

\[
\begin{align*}
\textbf{b.} & \quad \text{TP} \\
& \quad \text{DP/NP} \quad \text{AGREE} \quad T' \\
& \quad \text{AP} \quad \text{N} \quad \text{T} \quad \text{VP} \\
& \quad \text{Adjective, 1} \quad \text{Noun} \quad \text{verb} \\
& \quad \text{[Gen]} \quad \text{[Gen]} \\
& \quad \text{[Num]} \quad \text{[Num]} \\
& \quad \text{[nom-Case]} \quad \text{[nom-Case]} \\
\end{align*}
\]

Inactive FP (Numerals 2,3,4, all genders): Numeral agrees in gender and case with the noun, the case feature becoming shared (Pesetsky and Torrego 2004); noun and numeral remain uncased, as FP is inactive (16a). Verb agrees, assigning nominative case (16b).

(16)  
\[
\begin{align*}
\textbf{a.} & \quad \text{DP/NP} \\
& \quad \text{A/N} \quad \text{FP} \\
& \quad \text{\quad 2,3,4} \quad \text{\quad inactive} \\
& \quad \text{\quad [Gen]} \quad \text{\quad [Gen]} \\
& \quad \text{\quad [Num]} \quad \text{\quad [Num]} \\
& \quad \text{\quad [Case]} \quad \text{\quad [Case]} \\
\end{align*}
\]

\[
\begin{align*}
\textbf{b.} & \quad \text{TP} \\
& \quad \text{DP/NP} \quad \text{AGREE} \quad T' \\
& \quad \text{A/N} \quad \text{FP} \quad \text{T} \quad \text{VP} \\
& \quad \text{\quad 2,3,4} \quad \text{\quad verb} \\
& \quad \text{\quad [Gen]} \quad \text{\quad [Gen]} \\
& \quad \text{\quad [Num]} \quad \text{\quad [Num]} \\
& \quad \text{\quad [nom-Case]} \quad \text{\quad [nom-Case]} \\
\end{align*}
\]
**Active FP** (numerals 5+, all genders; numerals 2,3,4, masculine personal gender): Upon merger, FP agrees downward, assigning genitive case to the noun; noun is cased and thereby inactive (17a). For masculine personal gender, FP remains active after agreement downwards and upon merger of the numeral, also agrees with and assigns genitive case to the numeral (17b).

Upon merger of the numeral-noun construction into the main structure, the verb attempts agreement. In the case of non-masculine personal gender (5+ only), the numeral is an improper goal and the noun is inactive, due to the previous genitive case assignment; thus, neither can be agreed with (18).
In the case of masculine personal gender (2,3,4 and 5+), both the numeral and the noun are cased as genitive, making them inactive goals; thus, neither can be agreed with (19).

(19)

As there is nothing available for the verb to agree with (due to previous applications of genitive case assignment), the verb receives default agreement features (20).

(20)

3. Conclusions

SUMMARY: 5+ numerals in Polish are improper goals for verbal agreement, as they lack a full set of phi-features. Numerals 1 and 2,3,4 carry unvalued phi-features and will thus, agree with the noun, resulting in a shared case feature; both numeral and noun can serve as verbal goals. In addition, numerals 2,3,4 and 5+ select an FP case-assigner, which, when active, causes the noun to be cased as genitive, and in the case of masculine personal gender, the
numeral also – this makes them improper (inactive) goals. Thus, the question of whether there is a proper goal or not depends on the presence of FP and whether it is active or inactive. If active, the verb loses its goals; if inactive, it does not. Thus, case assignment by FP bleeds the verb of a goal.

CONCLUSIONS:

- Application of case assignment (genitive) prior to Agree results in Bleeding.
- Default agreement can be characterized as a response to bleeding effects: bled of a goal, verbs will receive default features.
- This analysis takes the mechanisms of Cyclic Agree (Rezac 2003) and Default Agreement (Preminger 2011) to be syntactic primitives. The interaction of these primitives with the phi-features and selectional requirements of the numerals are responsible for the data described in section 1.

4. References


