1. Introduction: Case alternations

Numerals in Polish

(1) a. Ptaki spały.  
    Birds.NOM slept.NV.PL.  
    ‘(The) birds slept.’

b. Pięć ptaków spało.  
    Five birds.GEN slept.N.SG  
    ‘(The) five birds slept.’

c. ...z pięcioma ptakami  
    ...with five birds.

Negation in Polish

(2) a. Łukasz widział dziewczynę.  
    Łukasz.NOM saw.3.M.SG girl.ACC  
    ‘Łukasz saw a girl.’

b. Łukasz nie widział dziewczyny.  
    Łukasz.NOM not saw.3.M.SG girl.GEN  
    ‘Łukasz did not see a girl.’

(3) a. Łukasz ufa dziewczynie.  
    Łukasz trusts.3.SG girl.DAT  
    ‘Łukasz trusts the girl.’

b. Łukasz nie ufa dziewczynie.  
    Łukasz not trust.3.SG girl.DAT  
    ‘Łukasz does not trust the girl.’

Semi-lexical coś in Polish (Rutkowski & Szczegot 2001):

(4) a. On widział coś miłego.  
    He.NOM saw.3.SG something nice.GEN  
    ‘He saw something nice.’

b. ... z czymś miłym.  
    ... withINST something.INST nice.INST  
    ‘... with something nice.’
**Nominative/Accusative Environments:**
- Numerals: Quantified nominal marked GENITIVE
- Negation: Object marked GENITIVE
- *Coś*: Object marked GENITIVE

**Dative/Locative/Instrumental Environments:**
- Numerals: Numeral and quantified noun marked in the DATIVE/LOCATIVE/INSTRUMENTAL
- Negation: Object remains DATIVE/LOCATIVE/INSTRUMENTAL
- *Coś*: *Coś* and object marked in DATIVE/LOCATIVE/INSTRUMENTAL

**Genitive Environments:**
- Numerals: Unclear if GENITIVE on nominal due to numeral or genitive environment
- Negation: Unclear if GENITIVE on object due to negation or genitive environment
- *Coś*: Unclear if GENITIVE on object due to *coś* or genitive environment

**Generalization:** Genitive of numerals, negation, and *coś* blocked from occurring overtly in dative/locative/instrumental environments.

**Talk:** I will try to give an explanation for the generalization above.
- Case Hierarchies: Previous analyses have relied on a case hierarchy involving notions of structural and inherent case, but we will discuss some issues with this, related to Finnish.
- Case Stacking: I'll develop a case stacking analysis, while also considering specifically the role of numerals in this construction. This leads to the conclusions that (1) Polish allows case stacking and (2) some cases obligatorily involve the presence of a P-head.

2. **Case hierarchies and case stacking**

2.1 **Babby (1987): Case Hierarchies**

Babby (1987) on Russian numerals: Case alternations as found in (1)-(4) are resolved via a case hierarchy and locality constraints:

- **Case Hierarchy:** Inherent cases > Structural Cases
  - Dative, Instrumental, Locative > Genitive, Accusative, Nominative

  *If there is a competition between an inherent case and a structural case, realize it as the inherent case.*

This follows from the difference between D-structure and S-structure, where inherent cases are assigned at D-structure and structural cases at S-structure. Assignment of a case at D-structure blocks later assignment at S-structure.

  **Conceptual problem:** Without the distinction between D-structure and S-structure, this Case Hierarchy has no explanatory power.
• **Locality:** If two cases can be assigned to a nominal, assign the most local case.

This follows from the Case Filter, whereby one and only one case is assigned to a nominal. Assignment of case by the most local assigner will block external case assignment by some less local assigner.

**Sample Derivations:**

(5) Numerals: *Resolution via Case Hierarchy* (*XCASE > GEN*)

\[
\begin{array}{c}
    X_{\text{case}} & \text{Num}_{\text{gen}} & [N] \\
    \text{D-structure} & \text{S-structure}
\end{array}
\]

(6) Numerals: *Resolution via Locality* (*GEN > ACC*)

\[
\begin{array}{c}
    V_{\text{acc}} & \text{Num}_{\text{gen}} & [N] \\
    \text{S-structure} & \text{S-structure}
\end{array}
\]

**Problem 1:** The genitive of negation can only be modeled as an inherent case (cf. (7a) vs. (7b))

(7) a. Negation: *Resolution via Locality, GENITIVE structural* (*acc > gen*)

\[
\begin{array}{c}
    \text{Neg}_{\text{gen}} & \text{V}_{\text{acc}} & [N] \\
    \text{S-structure}
\end{array}
\]

b. Negation: *Resolution via Case Hierarchy, GENITIVE inherent* (*Inherent > Structural*)

\[
\begin{array}{c}
    \text{Neg}_{\text{gen}} & \text{V}_{\text{acc}} & [N] \\
    \text{D-structure} & \text{S-structure}
\end{array}
\]

However, Przepiórkowski (1999) presents a number of tests which show that the genitive of negation patterns with the structural cases rather than the inherent cases. For example, only structurally case marked nominals can be predicated of by an INSTRUMENTAL – genitive of negation also allows instrumental predication:

(8) a. Pamiętam go głupcem. *Structural Accusative*  
‘I remember him (as) a fool.’

b. *Brakowało mu oglady królem. *Lexical Dative*  
‘He lacked luster as a king.’

c. Nie widziałem jej nigdy [taką piękną kobietą]. *Genitive of Negation*  
‘I’ve never seen her as such a beautiful woman.’ (Przepiórkowski 1999:120-121)
Problem 2: If we consider similar case alternations in other languages, the Case Hierarchy of Babby makes incorrect predictions. Consider Finnish, which has similar phenomena with regards to numerals and negation:

Numerals in Finnish

(9) a. Ivan osti viisi auto-a. \textit{Accusative Environment}
    Ivan bought five car-PART
    ‘Ivan bought five cars.’ (Brattico 2011: 1045)

b. Minä asuin kolmessa talossa. \textit{Semantic Case (Inessive) Environment}
    I lived three.INE house.INE
    ‘I lived in three houses.’ (Brattico 2011: 1051)

Negation in Finnish

(10) a. Pekka söi leivä-n \textit{Accusative Environment}
    Pekka.NOM ate bread-ACC
    ‘Pekka ate the bread.’ (Brattico 2011: 1055)

b. Pekka eisyönt leipä-ä
    Pekka not.eat bread-PART
    ‘Pekka didn’t eat the bread.’ (Brattico 2011: 1055)

(11) a. Pekka tuli kirjastosta \textit{Semantic Case Environment}
    Pekka came library-SEM
    ‘Pekka came from the library.’ (Brattico 2011: 1063)

b. Pekka ei tullut kirjastosta
    Pekka not.come library-SEM
    ‘Pekka did not come from the library.’ (Brattico 2011: 1063)

Nominative/Accusative Environment:
- Numerals: Quantified nominal marked PARTITIVE, SINGULAR
- Negation: Object marked PARTITIVE

Semantic Case Environment:
- Numerals: Numeral and quantified noun marked in the SEMANTIC CASE
- Negation: Object remains in the SEMANTIC CASE

According to Finnish linguists (see Brattico (2010, 2011) for further references), there are four structural cases in Finnish: NOMINATIVE, ACCUSITIVE, PARTITIVE, and GENITIVE. With regards to case alternations, the PARTITIVE and GENITIVE behave like the inherent cases for case alternations (Brattico 2010, 2011):

(12) a. Kolme-n talo-n ryhmä \textit{Genitive Numeral Environment}
    three-GEN house-GEN group
    ‘group of three houses.’ (Brattico 2010: 41)
b. Niitä kolme-a talo-a  
those.PART three.PART house.PART  
‘those three houses.’ (Brattico 2010: 41)

(13) a. Pekka näki Merja-n lähte-vän  
Pekka saw Merja-GEN leave-VA  
‘Pekka saw Merja’s leaving.’ (Brattico 2010: 59)

b. Pekka ei nänyt Merja-a / *Merja-a lähte-vän  
Pekka not.see Merja-PART leave-VA  
‘Pekka did not see Merja’s leaving.’ (Brattico 2010: 59)

Like Polish, it is specifically NOMINATIVE and ACCUSATIVE case environments that show the PARTITIVE of numerals and negation.

To summarize:
- **Conceptual issue with the hierarchy**: Without the distinction between D-structure and S-structure, the case hierarchy lacks external motivation.
- **Empirical issue with locality**: Locality predicts genitive of negation to pattern like an inherent case in Polish, contrary to fact.
- **Empirical issue with the hierarchy**: It makes incorrect predictions for the structural-inherent case divide in languages like Finnish

### 2.2 A Case Stacking Approach

**Case Stacking**: The concatenation of cases on a nominal in a particular language. Some languages may show it overtly (cf. Lardil, Richards (2007)), while others may restrict realization to a single morpheme (cf. Polish).

In Polish, prepositions provide minimal evidence for the existence of case stacking:
- The following set of prepositions assign INSTRUMENTAL case and take a stationary (no movement) interpretation:
  - *Między* ‘between’, *nad* ‘above’, *pod* ‘under’, *poza* ‘beyond’, *przed* ‘before’, *za* ‘behind’
- They can also assign ACCUSATIVE case, with the interpretation of movement towards the noun (goal).
- Finally, they can assign GENITIVE case, with the interpretation of movement away from the noun (source) – with this case, however, the form of the preposition differs:
  - *Spomiędzy*, *znad*, *spod*, *spoza*, *sprzed*, *zza*
- The morpheme ‘s/z’ resembles the preposition *z* ‘from’, which assigns GENITIVE.
- We could analyze these prepositions in the following way, assuming case stacking:

\[
\begin{array}{c}
(z_{gen} \left[ \begin{array}{c}
P_{inst} \left[ \begin{array}{c}
N
\end{array} \right] \\
\end{array} \right] \\
\end{array}
\end{array}
\]

(14) \[ [ z_{gen} [ P_{inst} [ N ] ] ] \]
We can model the data using the following case stacking mechanism:

**Case Stacking:**
- Assuming the syntax freely allows case stacking...
- Resolve case conflicts using the following Case Hierarchy
  
  _All other cases (Xcases) > Nominative, Accusative, Genitive_**Polish / Partitive**_Finnish_
- If there is still a case conflict, apply the One-Suffix Rule (Pesetsky 2013)
  
  _The last case assigned is the one overtly realized._

This works perfectly for negation:

(15) **Negation: Resolution via One-Suffix Rule (GEN/PART > ACC)**

\[
\begin{array}{c}
\text{Neg}_{\text{gen/part}} \\
\text{V}_{\text{acc}} \\
\text{N}
\end{array}
\]

(16) **Negation: Resolution via Case Hierarchy (XCASE > GEN/PART)**

\[
\begin{array}{c}
\text{Neg}_{\text{gen/part}} \\
\text{V}_{\text{Xcase}} \\
\text{N}
\end{array}
\]

But faces problems with numerals:

(17) **Numerals: Resolution via Case Hierarchy (XCASE > GEN/PART)**

\[
\begin{array}{c}
\text{XCASE} \\
\text{Num}_{\text{gen/part}} \\
\text{N}
\end{array}
\]

Specifically, we incorrectly predict the ACCUSATIVE to surface instead of the GENITIVE/PARTITIVE

(18) **Numerals: Prediction: Resolution via One-Suffix Rule (*ACC > GEN/PART)**

\[
\begin{array}{c}
\text{V}_{\text{acc}} \\
\text{Num}_{\text{gen/part}} \\
\text{N}
\end{array}
\]

Solution: We depicted both the ACCUSATIVE and the XCASES as having the power to percolate in numeral-noun constructions. Suppose only XCASES can percolate. Then, we redraw (18) as below, remedying the issue.

(19) **Numerals: No resolution necessary**

\[
\begin{array}{c}
\text{V}_{\text{acc}} \\
\text{Num}_{\text{gen/part}} \\
\text{N}
\end{array}
\]

Why might this be so? I propose that this is related to a lexical requirement of Xcases: they want to be expressed on something lexical, and numerals are semi-lexical, leading to percolation.
How are these numerals semi-lexical? Let’s see!

**The semi-lexicality of 5+ (5-10, 100) numerals:**

- **Lexical nouns:** Introduce valued phi features (number, gender)
- **Lexical adjectives:** Carry unvalued phi features (number, gender); dependent on something with valued phi for valuation.
- **Semi-lexical elements:** Some non-lexical combination of phi-features (e.g. valued number, unvalued gender; valued number, missing gender; etc.)

**Claim:** 5+ numerals are semi-lexical: they carry a number feature, but lack a gender feature.

**Number:** External agreement by a demonstrative or adjective is plural, not singular.

(20) a. Te_i / tych_j pięć dziewczyn_j
    These.NV.PL.NOM / these.NV.GEN five girl.F.PL.GEN
    ‘These five girls’
    b. *To / ten / ta pięć dziewczyn
    This.N.SG.NOM / this.M.SG.NOM / this.F.SG.NOM five girl.F.PL.GEN

**Gender:** Numerals trigger NEUTER SINGULAR verbal agreement; this contrasts with the behavior of the verb when no numeral is present, suggesting the numeral is directly responsible:

(21) Pięć dziewczyn spało.
    Five girl.F.PL.GEN slept.N.SG
    ‘(The) five girls slept.’

(22) Dziewczyny spały.
    Girl.F.PL.NOM slept.NV.PL
    ‘(The) girls slept.’

The verbal agreement is not the result of N.SG features on the numeral. If it were, then the coordination of two numeral phrases should allow the same range of agreement as the coordination of two N.SG nouns. This is false – agreement remains N.SG:

(23) a. Krzesło i biurko rozbiły się.
    Chair.N.SG and desk.N.SG broke.NV.PL PT
    ‘A chair and desk broke.’
    b. Pięć krzeseł i sześć biurek rozbiło się.
    Five chair.GEN and six desk.GEN broke.N.SG PT
    ‘Five chairs and six desks broke.’

We can understand this if we treat the N.SG as default agreement (Preminger 2011; Dziwirek 1990). Numerals are an agreement target, but they lack gender, leading to default agreement.

⇒ 5+ numerals are semi-lexical.
Now, compare the verbal agreement of numeral 5 to numeral 1000:

(24) Pięć ptaków spało
    Five birds.Gen slept.N.SG
    ‘Five birds slept.’
(25) %Cały tysiąc ptaków spał
    ‘A whole thousand birds slept.’

Numeral 1000 triggers MASCULINE SINGULAR agreement, suggesting it carries both gender and number, like a lexical noun. Like numeral 5, numeral 1000 triggers GENITIVE case.

Now compare numeral 1000 in an oblique environment to numeral 5:

(26) …z pięcioma ptakami
    with five_INST birds.INST
    ‘…with five birds.’
(27) …z tysiącem ptaków
    with thousand.INST birds.Gen
    ‘…with a thousand birds.’

The quantified noun remains GENITIVE with numeral 1000, but not numeral 5.

If numeral 1000 is lexical, but numeral 5 semi-lexical, it follows that case percolation is triggered by semi-lexicality.

Summary: We can accurately model the numeral and negation data via case stacking. The mechanism relies on the following:
- Case Hierarchy: Xcases > Nominative, Accusative, GenitivePolish/PartitiveFinnish
- One-Suffix Rule: Realize the last assigned case.
- Lexical Requirement: Xcases look for something lexical, percolating if necessary.

3. Reanalyzing the Case Hierarchy and Case Stacking

We can unite the Case Hierarchy and the Lexical Requirement into a split between cases with the lexical requirement and cases without:

(28) Case Hierarchy (revised): Lexical-requirement cases > Non-lexical-requirement cases
    DAT, INST, LOC, etc > NOM, ACC, GENPol, PARTFin

Thus, we are left with cases which have a lexical requirement and cases which do not, and those with a lexical requirement have two properties: percolation in the syntax and forced realization.

There are more intricate differences between cases than yet demonstrated. The following table is taken from Przepiórkowski (1999: 123), who used a variety of tests to determine the structural/inherent nature of particular cases:
Tests consisted of the following:
- **GEN OF NEG**: Ability to be marked GENITIVE in the presence of negation
- **NOM**: Ability to be marked GENITIVE in nominalizations
- **Dužo/nic**: Availability of these elements in a particular case positions
- **Po**: Availability of the distributive marker po
- **NP[INST]**: Possibility of being predicated on by an INSTRUMENTAL nominal

While the NOMINATIVE, ACCUSATIVE, DATIVE, and INSTRUMENTAL seem to have a single variant, there appear to be differing flavors of the GENITIVE. I will ignore GENITIVE for the moment.

**Case Percolation**:

I propose that the lexical-requiring cases involve some sort of P-head, which selects for a lexical noun; for now, we can model this relation through agreement, although nothing hinges on it. As an agree relation, we predict the P-head to probe for something with a full set of phi-features.

(29) 

\[
\text{PP} \quad \text{P}_{\text{DAT/LOC/INST}} \quad \text{DP} \\
\quad \quad \text{Num}_{[+PL]} \quad \text{NP/DP} \\
\quad \quad \text{agr} \quad \text{Noun}_{[+\text{NUM}, +\text{GEND}]} \\
\quad \quad \text{agr}
\]

**NOMINATIVE** and **ACCUSATIVE** cases do not involve a P-head.

⇒ This would give us case percolation, with XCASES, but not NOM/ACC.
⇒ Note that this implies verbal selection of a lexical case is selection for a PP (potentially comparable to the particle-verbs of languages like English/Dutch?)
Forced realization:

If we assume PPs are essentially closed domains, inaccessible to external case assignment, it follows, in the context of negation and numerals, that the P-case will be overtly realized.

In the context of numerals:

\[
(30) \quad \text{PP} \quad \text{DP} \quad \text{Num}_{[+\text{pl}]} + \text{INST} \quad \text{DP/NP} \quad \text{Noun}_{[+\text{num}, +\text{gend}]} + \text{GEN} + \text{INST}
\]

In the context of negation:

\[
(31) \quad \text{NegP} \quad \text{VP} \quad \text{V} \quad \text{PP} \quad \text{P}_{\text{DAT/INST}} \quad \text{DP} \quad \text{Noun}_{[+\text{num}, +\text{gend}]} + \text{DAT/INST} (\ast + \text{GEN})
\]

\( \Rightarrow \) This would give us forced realization.

Summary:

- With these additional assumptions, we can drop both the Case Hierarchy and Lexical Requirement – they follow from the P-selected nature of certain cases.
- Case stacking now consists of the One-Suffix Rule: Assuming languages can freely stack cases, the morphology realizes only the last assigned case.

Remaining Issue 1: The Polish GENITIVE has multiple flavors, some of which pattern with the DAT/INST and others which pattern with the NOM/ACC. We could interpret this as meaning that lexical GEN is a P-selected case, whereas negation/nominalization GEN is not.

Remaining Issue 2: The Finnish PARTITIVE and GENITIVE, although structural, behave like P-heads for case alternations. Can these cases be analyzed as P-cases within Finnish syntax?
4. Conclusions

- Numerals are semi-lexical – this leads to case percolation in the presence of what is usually termed inherent case (which faces difficulties with Finnish), due to having a lexical requirement.
- This lexical requirement can be related to the idea that these cases are instantiated through some form of a P-head, which then searches for something lexical.
  - A similar idea to the P-head (or traces of it) is found in: Asbury (2008), Bittner and Hale (1996), Caha (2009), McFadden (2004), Pesetsky (2013), Řezáč (2008), Willim (1990), among others.
- Combining this with case stacking in Polish, we predict the case alternations.
- This has implications for Finnish, which still need to be verified.

5. References

Appendix I: Additional fun facts about negation!

The genitive of negation does not only affect the object of the clause it negates. It can also affect the embedded objects of an infinitival clause, in addition to the matrix object:

(32) a. **Nie kazalem Mariii pisać listów.** 
   Not order.1SG.M Mary.DAT write.INF letters.GEN
   ‘I didn’t order/ask Mary to write letters.’ 
   
b. **Nie chciałem pisać listów.** 
   Not wanted.1SG.M write.INF letters.GEN
   ‘I didn’t want to write letters.’ 
   
c. **Nie wydawał się pisać listów.** 
   Not seem PART write.INF letters.GEN
   ‘He didn’t seem to be writing letters.’ 
   
d. **Nie musisz zamierzać przestać studiować algebry.** 
   Not must.2SG intend.INF stop.INF study.INF algebra.GEN
   ‘You don’t have to intend to stop studying algebra.’ (Przepiórkowski, 1999: 143-144)

(33) a. **Janek nie uczył Mariii lepić garnków.** 
   John not taught Mary.GEN mold.INF pots.GEN
   ‘John didn’t teach Mary how to make pottern.’ (Przepiórkowski 1999: 147)
   
b. **Nie mam zamiaru pisać listu.** 
   Not have.1SG intention.GEN write.INF letter.GEN
   ‘I don’t intend to write a letter.’ (Przepiórkowski 1999: 149)

(34) **Nie mam ochoty uczyć Mariii lepić garnków.** 
   Not have.1SG liking.GEN teach.INF Mary.GEN mold.INF pots.GEN
   ‘I don’t feel like teaching Mary how to make pottery.’ (Przepiórkowski 1999: 149)

Similar facts are true for Finnish:

(35) **Pekka ei uskonut Merjan olevan syömässä *?leivän / leipää.** 
   Pekka not believe Merja be.VA eat.MA bread-ACC / bread.PART
   ‘Pekka did not believe Merja to be eating the bread.’ (Brattico 2011: 1059)