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# What are categories? Adjective-like and noun-like semi-lexical numerals in Polish\*\*

**Abstract:** In many languages, numerals appear to straddle the boundary between adjectives and nouns, sometimes behaving like adjectives, sometimes like nouns, and sometimes showing a mix of behaviors (Corbett 1978). The intermediate status of numerals presents a problem for theories of categories: how can something be simultaneously adjectival and nominal? In this paper I address the issue from the perspective of Polish numerals and argue that categories are derived notions, definable (in part) through the phi-features of an element. Elements with full sets of valued phi-features are nouns and elements with full sets of unvalued phi-features are adjectives. Building on the notion of semi-lexicality in Emonds (1985) and Corver and van Riemsdijk (2001), I suggest that numerals represent a new sort of semi-lexicality, involving incomplete phi-feature sets or feature sets with a mix of valued and unvalued phi-features. Such semi-lexical elements are predicted to show idiosyncratic behaviors which may or may not resemble adjectives and nouns. This is the approach taken for the Polish numeral system. Numeral 1 is defined as an adjective (unvalued gender, unvalued number) and numeral 1000 as a noun (valued gender, valued number). Numerals 2, 3, and 4 are treated as adjectival nominals (valued number, unvalued gender) and numerals 5+ (5–10, 100) as deficient nominals (valued number, missing gender). With these assumptions in hand, the case and agreement facts of Polish numerals can be captured. The implication of this study is that categories are not syntactic primitives; by viewing them as derived notions, we have the flexibility to deal with those elements like numerals which normally defy categorization.

## 1. Introduction

In various languages, cardinal numerals behave in a way that syntactically sets them apart from the typical categories of adjective, noun, verb, and preposition.

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Importantly, in a theory of categories, the question arises, what are numerals and where do they fit in? Corbett (1978) conducted a survey of cardinal numerals in 60 languages and came to two conclusions: (i) simplex numerals tend to fall somewhere between adjectives and nouns and (ii) the higher the numeral is, the more noun-like it will be. These descriptive generalizations apply well to languages like Polish (see Table 1); however, it is unclear how they can be implemented in practice and what this means for our understanding of numerals and categories in general. In this paper, I address this issue, and provide some substance to the first generalization, on the basis of numerals in Polish. I present Table 1 as our first step into Polish numerals.

**Table 1:** Adjectival and nominal properties of Polish numerals<sup>1</sup>

Property	Adj	1	2, 3, 4	5–10, 100	1000	Noun
Structural case positions						
<i>Agrees (+), Genitive assignment (-)</i>	+	+	+	-	-	-
Oblique case positions						
<i>Agrees (+), Genitive assignment (-)</i>	+	+	+	+	-	-
Shows Gender Agreement	+	+	+	-	-	-
Shows Number Agreement	+	+	-	-	-	-

Table 1 explores the morphological properties of Polish numerals, in terms of agreement and case assignment. The dotted line marks the transition between nominal and adjectival properties. By these diagnostics, numeral 1 is indistinguishable from an adjective and numeral 1000 is indistinguishable from a noun. The numerals 2, 3, 4 and 5+ (5–10, 100), however, show mixed behavior, patterning in some ways like adjectives and in other ways like nouns. Thus, we see Corbett's two generalizations in action: numerals range between adjectives and nouns (generalization i) and the higher the numeral, the higher the number

<sup>1</sup> Other numerals and quantifiers which pattern with these numerals are listed below; this is not an exhaustive list. Note that there are also quantifiers which do not match fully to any of the numerals (e.g., *mało*, *trochę* – see Przepiórkowski (1999), and Rappaport (2003) for some discussions, details, and analyses).

- 1: *niektóry* 'some'; *żaden* 'none'; *każdy* 'every'
- 2, 3, 4: complex numerals ending in 2, 3, or 4 (e.g., 22–24, 32–34)
- 5–10, 100: numerals 11–19; complex numerals ending in 5–9 (e.g., 25–29, 35–39) or multiplicands of 10 (e.g., 20, 30); *wiele* 'many'; *kilka* 'a few'; *ile* 'how many'
- 1000: other higher numerals, such as 1000000 (million 'million') and 1000000000 (miliard 'billion')

of nominal properties (generalization ii). Importantly, this table also demonstrates that there is no single category “numeral” which could be uniformly applied to all numerals. Instead, there appears to be a four-way distinction among the numerals, defined by adjectival and nominal behaviors. The question then becomes, how can we define numerals in such a way that we capture their similarities to adjectives and nouns, while at the same time, modeling their distinctive and intermediate behaviors?

In this paper, I propose that these numerals show intermediate behaviors precisely because category-wise, they are a type of intermediate category between adjective and noun. Based on Baker (2003), I propose in section 2 that we can define the categories of adjective and noun on the basis of their phi-feature composition, where adjectives carry all unvalued phi-features and nouns all valued phi-features. Putting this together, numerals show an intermediate status because they have intermediate phi-feature sets, neither fully valued nor unvalued, or not with all features present. These properties can be used to address the internal and external syntax of numeral phrases. In section 3, I discuss the verbal agreement facts with numeral-noun constructions focusing particularly on a phenomenon I term “agreement mismatch,” and in section 4, I demonstrate how the case and agreement facts of section 3 can be accounted for under the present proposal. In section 5, I discuss the behavior of numerals in oblique case positions, exploring how this is related to their semi-lexical status. Section 6 concludes.

## 2. Defining nouns and adjectives: what are numerals?

### 2.1. Defining categories

Baker (2003) proposes a theory of lexical categories in which adjectives, nouns, and verbs constitute the set of universally available lexical categories (see also Baker (this volume)). These categories are defined on the basis of two properties: (i) the ability to host a specifier (verbs only) and (ii) the ability to carry a referential index (nouns only); adjectives lack both – no specifier and no referential index. Under this approach, adjectives and nouns form a natural class structurally, both lacking a specifier, and adjectives and verbs form a natural class through their lack of a referential index; this organization fits well with the observations of Ross (1972), who suggests a category “squish,” in which adjectives

mediate between nouns and verbs but nouns and verbs have no direct connection. The lexical categories are characterized as in (1).

- (1) Noun: No specifier, Referential index  
 Adjective: No specifier, No referential index  
 Verb: Specifier, No referential index

Morphologically, nouns are elements which independently host gender and number features, a controller in the terminology of Corbett (2006), while adjectives, as well as verbs, are dependent on other elements for their gender and number features, targets in Corbett's framework. If we relate these morphological properties of nouns, adjectives, and verbs to the presence or absence of a referential index, then there is a correlation between having a referential index and being a target or controller. Elements with referential indices are controllers, with valued phi-features, and those without are targets, with unvalued phi-features. Based on this observation, I take the presence or absence of a referential index as an indication of the status of the phi-features of an element, valued or unvalued. I, therefore, redefine the set of lexical categories as follows; this is intended to be compatible with Baker's original system.

- (2) Noun: No specifier, Valued phi-features  
 Adjective: No specifier, Unvalued phi-features  
 Verb: Specifier, Unvalued phi-features

With this in hand, we now have the tools necessary to define Polish numerals. By assuming that adjectives and nouns differ solely on the basis of their phi-features, it allows for the possibility that there might exist elements which, like nouns and adjectives, lack a specifier, but which, unlike nouns and adjectives, do not have homogeneous all valued or all unvalued phi-features sets – rather, there might exist elements with mixed sets of valued and unvalued phi-features, or perhaps even missing phi-features. This is the approach I take for numerals in Polish – like adjectives and nouns, they lack specifiers, but unlike adjectives and nouns, they do not have (full) homogeneous phi-feature sets; this can derive Corbett's generalization (i) and is the tool we will use to explain the behavior of numerals in the coming sections.

An important question that this brings to mind is, what does this mean for the referential index? Nouns, with all valued phi-features, had a referential index, while adjectives, with all unvalued phi-features, did not. If we introduce intermediate elements into the system, with mixed or incomplete feature sets, then can they also host a referential index of some sort? There are two ways to go on this. Firstly, we could say that referential indices are an all-or-nothing

phenomenon – either an element is phi-complete and therefore has a referential index, or it is not, and does not have a referential index. Under this approach, only lexical nouns could ever host a referential index; intermediate categories never would. A second approach would be to say that similarly to there being intermediate categories with mixed or incomplete phi-feature compositions, there are also partial referential indices, with the features of the index corresponding to the valued features on a particular element. In such cases, we might interpret the partial referential index to mean partial reference to the real world. Essentially, this is a question of whether referential indices are decomposable or not. If decomposable, we are led to many new questions, in particular, what it means to have a “partial referential index” and whether there is a one-to-one relation between the features of a referential index and the formal syntactic phi-features. I will return to these questions in reference to the numeral data, and speculate on the possibilities.

## 2.2. Defining numerals

I turn now to Polish numerals. I use agreement as a diagnostic and assume that unvalued phi-features will show dependence on the presence of other elements, while valued phi-features will not; missing phi-features will produce phi-defectivity, and thus, consequences for agreement. I use lexical adjectives and nouns as the comparison for numerals, with the assumption that lexical adjectives have a full set of unvalued phi-features and nouns a full set of valued phi-features. In the following sections, I consider each numeral type individually.

To facilitate the discussion, I present Table 2, which shows the form of the adjective or numeral in subject position when combined with a noun of the given gender and number; these are their nominative forms.

### 2.2.1. Adjectives

Adjectives vary their form based on the number and gender values of the noun which they modify. This can be clearly seen in the table. They make three distinctions in the nominative singular: masculine, feminine, and neuter, and two distinctions in the nominative plural: masculine personal, and the combination of masculine non-personal, feminine, and neuter. This coincides to the idea that adjectives have unvalued gender and number features. In addition, adjectives also show case agreement, thus, carrying an unvalued case feature.

**Table 2:** Adjective and numeral nominative form with a noun of the given features

	Singular			Plural			
	<i>Masculine</i>	<i>Feminine</i>	<i>Neuter</i>	<i>Masculine Personal</i>	<i>Masculine Non-Personal</i>	<i>Neuter</i>	<i>Feminine</i>
<b>small</b>	mały	mała	małe	mali	małe		
<b>1</b>	jeden	jedna	jedno	jedni	jedne		
<b>2</b>	—			dwaj	dwa		dwie
<b>3</b>	—			trzej	trzy		
<b>4</b>	—			czterej	cztery		
<b>5</b>	—			—	pięć		
<b>1000</b>	—			tysiąc			

### 2.2.2. Nouns

Nouns control gender and number agreement on accompanying adjectives and verbs, as in (3). In addition, they can appear in either the singular or plural, not dependent on other elements for this to occur, as in ‘boy’ *chłopiec* and ‘boys’ *chłopcy*. This is congruent with the idea that nouns are associated with valued gender and number<sup>2</sup> features. Like adjectives, nouns carry an unvalued case feature, being assigned different cases in different environments.

- (3) a. *Mały*                      *chłopiec*                      *spł.*<sup>3</sup>  
small.MP.SG.NOM boy.MP.SG.NOM slept.M.SG  
 ‘The small boy slept.’

<sup>2</sup> This is not to say that the number feature cannot become valued in the syntax itself, but rather that this feature belongs to the noun in a way it does not belong to adjectives or verbs, i.e., it is interpretable.

<sup>3</sup> Abbreviations used in the glosses of examples include the following: ACC, accusative; DAT, dative; DIST, distributive marker; MD, masculine devirilized gender; F, feminine gender; GEN, genitive; INST, instrumental; LOC, locative; M, masculine gender; MH, masculine human gender; MP, masculine personal gender; N, neuter gender; NON-MP, non-masculine-personal gender; NOM, nominative; NV, non-virile gender; PART, particle; PL, plural; SG, singular; V, virile gender. Plural verbal agreement takes two forms, virile (V) which occurs with nouns of masculine-personal (MP) gender, and non-virile (NV), which occurs with all other genders; singular verbal agreement is either masculine (M), feminine (F), or neuter (N).

- b. *Mała dziewczyna spała.*  
 small.F.SG.NOM girl.F.SG.NOM slept.F.SG  
 ‘The small girl slept.’
- c. *Małe dziecko spało.*  
 small.N.SG.NOM child.N.SG.NOM slept.N.SG  
 ‘The small child slept.’

### 2.2.3. Numeral 1

The numeral 1 varies its form based on the gender, number, and case values of the noun it modifies. It makes all the same gender distinctions adjectives do, in both the singular and plural. Plural forms are obligatory with *pluralia tantum* nouns, i.e., nouns without a singular form. The noun ‘door’ *drzwi* is one such example: *jedne<sub>PL</sub> drzwi<sub>PL</sub>* is ok, but *\*jeden/jedna/jedno<sub>SG</sub> drzwi<sub>PL</sub>* is not. The numeral 1 can also occur in the plural with nouns that are not *pluralia tantum*, but in this usage, it takes on the meaning of ‘some’ or ‘a few’, rather than ‘one’; this is presumably due to the semantic incompatibility of the meaning ‘one’ and the plural, leading to an alternate interpretation of the numeral. This ability is in contrast to languages like English, in which the numeral 1 cannot occur with *pluralia tantum* nouns (*\*one pants*) or plural nouns (*\*one boys*); in Polish, there is no such restriction on the use of numeral 1. This numeral also shows case agreement (e.g., for a masculine inanimate singular noun: *je-den<sub>NOM/ACC</sub>, jednego<sub>GEN</sub>, jednym<sub>INST/LOC</sub>, jednemu<sub>DAT</sub>*). Based on these diagnostics, numeral 1 has unvalued gender, number, and case features. It is, thus, by our definition, an adjective. This conclusion is generally accepted among Slavicists.

### 2.2.4. Numerals 2, 3, and 4

These numerals vary their form based on the gender of the noun which they modify. In the plural they make the same distinctions as adjectives, with numeral 2 making an extra distinction not found with the other numerals or adjectives (feminine vs. masculine non-personal and neuter); this is presumably a historical remnant of the dual which has been lost in present-day standard Polish. By this diagnostic, numerals 2, 3, and 4 have unvalued gender features.

Turning to number, the morphological paradigms of the numerals suggest an analysis in which their number feature can only be valued as plural. This can be seen in Table 3, which compares the numeral forms to the singular and plural of

“small store(s)” (masculine inanimate gender). The case forms of the numerals are more similar to those of the plural than those of the singular.

**Table 3:** Numeral case paradigms

	NOM	ACC	GEN	LOC	DAT	INST
<b>2</b>		dwa		dwóch	dwóm	dwoma
<b>3</b>		trzy		trzech	trzem	trzema
<b>4</b>		cztery		czterech	czterem	czterema
<b>small.PL</b>		mał-e		mał-ych	mał-ym	mał-ymi
<b>store.PL</b>		sklep-y	sklep-ów	sklep-ach	sklep-om	sklep-ami
<b>small.SG</b>		mał-y	mał-ego	mał-ym	mał-emu	mał-ym
<b>store.SG</b>		sklep	sklep-u	sklep-ie	sklep-owi	sklep-em

Additional evidence comes from outside agreement by demonstratives and adjectives which is obligatorily plural as in (4).

- (4) *te ostatnie dwie/ trzy/ cztery dziewczyny*  
 these.NON-MP.PL last.NON-MP.PL two.F/ three/ four girl.F.PL  
 ‘these last two/three/four girls’

Together, this supports the proposal in which the number feature is valued as plural. Taking this as fact, the next question is, did this number feature start off unvalued and become plural through agreement, similar to numeral 1 and adjectives, or did it start off valued, similar to nouns? I adopt an approach in which this feature is lexically specified as plural, much like with *pluralia tantum* nouns. One reason for this is as follows: if the feature is valued through agreement (thus, initially unvalued), then we would expect these numerals to mirror the behavior of numeral 1, which we know to have an unvalued number feature. This expectation, however, is not realized; unlike the numeral 1, these numerals cannot appear with singular nouns in any of their forms, the result being ungrammatical, as in (5).

- (5) a. \**dwa/ dwie/ dwaj chłopiec/ dziewczyna/ dziecko*  
 two.M/ two.F/ two.MP boy.MP.SG/ girl.F.SG/ child.N.SG  
 ‘two boy/girl/child’  
 b. \**trzy/ trzej chłopiec/ dziewczyna/ dziecko*  
 three/ three.MP boy.MP.SG/ girl.F.SG/ child.N.SG  
 ‘three boy/girl/child’



- c. \**cztery*/ *czterej* *chłopiec*/ *dziewczyna*/ *dziecko*  
 four/ four.MP boy.MP.SG/ girl.F.SG/ child.N.SG  
 ‘four boy/girl/child’

These numerals are restricted to modifying plurals, unlike the numeral 1, which had both a singular and a plural paradigm, appearing freely with either. In addition, these numerals also lack a strategy which would allow them to appear with singular nouns, again differing from numeral 1, which could shift its meaning to accompany the non-semantically-compatible plural nouns. This suggests a real difference between the numerals 1 and 2, 3, and 4 and I take this difference to be the initial status of the numeral’s number feature – with numeral 1, it is unvalued and can agree in the syntax (hence its ability to occur with both singular and plural nouns), whereas with numerals 2, 3, and 4 it is inherently plural.<sup>4</sup>

With regards to case, these numerals decline for case (e.g., for a masculine inanimate noun, numeral 2: *dwa*<sub>NOM/ACC</sub>, *dwóch*<sub>GEN</sub>, *dwoma*<sub>INST/LOC</sub>, *dwóm*<sub>DAT</sub>). Thus, they carry an unvalued case feature.

Numerals 2, 3, and 4 have unvalued gender and case, but valued number. This makes them our first example of a hybrid case with a non-homogeneous phi-feature set. If we adopt the all-or-nothing approach to referential indices, then we must also say that these numerals lack a referential index. However, if we adopt an approach in which referential indices are decomposable, then we are presented with a partial referential index. As these numerals only have a valued number feature, we could imagine that this partial referential index is uniquely bound up in the meaning of number. In this way, it would “refer” to quantities in the real world, in this case, a plurality, and any other characteristics of that referred-to-plurality would be defined by the noun, via their mod-

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<sup>4</sup> An anonymous reviewer suggests that perhaps the numerals are only semantically compatible with plural nouns and thus, we are actually seeing agreement. Putting aside the question of why there would be no parallel requirement for numeral 1, such an analysis is problematic from a cross-linguistic perspective. If we consider Finnish and related languages, the numeral situation highly resembles that of the Slavic languages (Brattico 2011). Of particular interest here is the fact that Finnish numerals require the following noun to be singular and they are themselves singular (Brattico 2011). This parallels the Polish situation with the added twist that we are dealing with the singular rather than the plural. Importantly, it is the presence of the numeral which triggers singular marking. The phenomenon in the two languages is extremely similar, but a semantic-compatibility account can only be applied to one; it is untenable for Finnish and in fact, for a host of other languages in which numerals trigger singular nouns (e.g., Hungarian, Turkish). If we drop this agreement account, then we are left with an account in which the numeral has an (initially) valued number feature; this is a useful result as it allows us to give the numeral full control over the number feature of the noun, as is necessary for the Finnish case.

ifree-modifier relationship. This would not be a universal property of numerals since, as we have seen with numeral 1, it is possible for a numeral to have all unvalued features, and therefore, no possibility for a referential index. However, whether referential indices are decomposable or not is not something that we can answer on the basis of this data.

### 2.2.5. Numerals 5+

Like the numerals 2, 3, and 4, the 5+ numerals are restricted to modifying plural nouns and have no alternative strategies that allow them to appear with the singular. I take the position that these numerals also come equipped with a plural valued number feature. Similar reasons as were given for the 2, 3, 4 numerals apply to the 5+ numerals: outside agreement by adjectives and demonstratives is plural, as in (6); the case morphology on the numeral in the instrumental resembles the plural more so than the singular, as in (7) (using Table 3 as a comparison); and lastly, the numeral is only possible with a plural noun ('five bird (s)': *pięć ptaków<sub>PL</sub>*, \**pięć ptaka<sub>SG</sub>*). Thus, these numerals have a valued number feature.

(6) *te*                      *ostatnie*              *pięć dziewczyn*  
 these.NON-MP.PL last.NON-MP.PL five girl.F.PL.GEN  
 'these last five girls'

(7) NOM-ACC:    *pięć*  
 GEN-DAT-LOC: *pięciu*  
 INST:            *pięcioma*

As for gender, the form of the numeral remains constant within a particular case, lacking an equivalent of the gender agreement of numerals 2, 3, and 4;<sup>5</sup> this suggests that it does not have an unvalued gender feature. The question then is: are we dealing with a valued or a missing gender feature? I claim that the gender feature of 5+ numerals is actually missing. One argument for this concerns verbal

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<sup>5</sup> For some readers, this may strike a bell, as various approaches to the Polish numeral system argue that these numerals lack a nominative form and instead have gender agreement in the accusative (cf. Schenker 1971; Franks 1994). This is related to a specific interpretation of the data, which is termed the Accusative Hypothesis. For the moment, it suffices to say that I adopt a different hypothesis, the Nominative-Genitive Hypothesis (Doroszewski 1952; Klockmann 2012), in which the data is not interpreted as having gender agreement. I will give this more substance in section 3.2.

agreement with coordination. The 5+ numerals trigger neuter singular agreement on the verb, as in (8).

- (8) *Pięć ptaków spało.*  
 five.NOM bird.M.PL.GEN slept.N.SG  
 ‘Five birds slept.’

This might lead one to hypothesize that the numeral has a neuter gender feature. This then predicts that the coordination of two numeral-noun constructions should result in the same range of possibilities in verbal agreement as the coordination of two neuter nouns. This is tested in (9) – the verbal agreement, however, differs between the two cases, suggesting that we are not dealing with a neuter gender feature on the numeral.

- (9) a. *Krzeseł i biurko rozbiły się.*  
 chair.N.SG.NOM and desk.N.SG.NOM broke.NV.PL PART  
 ‘A chair and desk broke.’  
 b. *Pięć krzesel i sześć biurek rozbiło się.*  
 five.NOM chair.GEN and six.NOM desk.GEN broke.N.SG PART  
 ‘Five chairs and six desks broke.’

Likewise, the neuter singular form of the demonstrative is impossible.

- (10) \**to pięć ptaków*  
 this.N.SG.NOM five.NOM bird.M.PL.GEN  
 ‘this five birds’

Together, this suggests that the numeral is not controlling the gender features on the verb or accompanying modifiers. If we consider the historical development of the numeral, in old Polish, the 5+ numerals were feminine nouns that triggered feminine verbal agreement (Miechowicz-Mathiasen and Dziubała-Szrejbrowska 2012), as in (11). This no longer occurs, and I interpret this as meaning that they have lost their gender feature, in line with Miechowicz-Mathiasen and Dziubała-Szrejbrowska (2012).

- (11) *Ona siedm panien szła.*  
 that.F.NOM seven.NOM maidens.GEN walked.F.SG  
 ‘Those seven maidens were walking.’  
 (Old Polish, Rutkowski 2006a: 93)

Lastly, with regards to case, these numerals also decline for case, as in (7) above; presumably then, they also carry an unvalued case feature.



In (12a), the numeral triggers the plural form of demonstratives and adjectives as well as neuter singular marking on the verb; in this usage, it behaves like a 5+ numeral, suggesting that it might have the same feature set, missing gender, but carrying plural number. I put those instances aside, focusing on cases where we see evidence for agreement, as in (12b). Like nouns, this numeral does not vary depending on the gender of the noun it combines with, and more importantly, as shown in (12b), it triggers masculine gender agreement on the verb as well as the modifier *niecały*. This leads to the conclusion that this numeral has a valued gender feature. As for number, numeral 1000 can appear in the singular, *tysiąc*, or the plural, *tysiące*, triggering matching verbal and modifier agreement; it also requires the following noun to be plural ('1000 bird(s)': *tysiąc ptaków<sub>PL</sub>*, \**tysiąc ptaka<sub>SG</sub>*). Numeral 1000 has a valued number feature, which although it can vary, is not dependent on any other element. With regards to case, this numeral declines for case as if it were a masculine inanimate noun (*tysiąc<sub>NOM/ACC</sub>*, *tysiąca<sub>GEN</sub>*, *tysiącowi<sub>DAT</sub>*, *tysiącu<sub>LOC</sub>*, *tysiącem<sub>INST</sub>*). When the gender feature is available to the numeral, it is indistinguishable from a noun.

### 2.2.7. Summary

Table 4 summarizes the phi-feature and case specifications of numerals, adjectives, and nouns, based on the previous discussion.

**Table 4:** Feature specifications

	Adjective	1	2, 3, 4	5+	1000	Noun
<i>Number</i>	Unvalued	Unvalued	Valued, PL	Valued, PL	Valued	Valued
<i>Gender</i>	Unvalued	Unvalued	Unvalued	Missing	Valued, M (or missing)	Valued
<i>Case</i>	Unvalued	Unvalued	Unvalued	Unvalued	Unvalued	Unvalued

I conclude this section by addressing the issue of semi-lexicity. The division between lexical and functional becomes murky once so-called semi-lexical elements (Corver and van Riemsdijk 2001) or grammatical nouns, verbs, and adjectives (Emonds 1985) are considered. These are essentially elements which do not seem to be fully lexical or functional, but behave in an intermediate fashion, showing properties of both. With Polish numerals, we are not seeing a mix of lexical and functional properties, but rather a blurring of the notion of adjective and noun, suggesting a new sort of semi-lexicity. In the preceding sections, I have

defined lexical nouns and adjectives through their phi-compositions. As Table 4 shows, there are numeral types, which, although similar to nouns and adjectives, show only a partial adherence to these categories. Such elements might also be considered semi-lexical. This approach presents a new perspective into semi-lexicality, one in which semi-lexicality reflects a divergence from the prototypical feature set of some lexical category, as we see for numerals.

Having considered the internal syntax of numerals, I will now discuss external agreement with numeral-noun constructions.

### 3. Agreement mismatches with Polish numerals

In this section, I focus on subject-verb agreement, looking in particular at a phenomenon I have termed “agreement mismatch.” Agreement mismatches are mismatches between the features of a probe and its would-be goal, a comparable English example being [*A number<sub>SG</sub> of men<sub>PL</sub>*] *were<sub>PL</sub> sleeping*, where there is a mismatch between the number marking on the head noun (i.e., *number*) and the verb (i.e., *were*). There are two verbal agreement mismatch types with Polish numerals: 5+ induced and masculine human induced agreement mismatches. I will address each in turn.

#### 3.1. 5+ induced agreement mismatches

The data to be discussed here pertain to modified nouns which are not of the masculine human gender. As the name suggests, 5+ induced agreement mismatches are triggered by the presence of a 5+ numeral (5–10, 100). When a subject (non-masculine-human) noun is modified by a 5+ numeral, the following noun is marked genitive and the verb appears marked neuter singular, as in (13).<sup>7</sup>

- (13) *Pięć ptaków spało.*  
 five.NOM bird.M.PL.GEN slept.N.SG  
 ‘Five birds slept.’

The numeral 1000 is currently in a state of flux (Rutkowski 2006b). As we have seen, for some speakers, it patterns with the 5+ numerals, triggering an agreement mismatch of the type described above, while for others, full agreement is possible, although, this seems to be dependent on the presence of a modifying

<sup>7</sup> Note, we are not interested here in mismatches between the case marking on the numeral and the noun.

element, *cały* ‘entire, whole’.<sup>8</sup> When there is full agreement, it occurs with the numeral, rather than the noun. Note the genitive case on the modified noun. The pattern is repeated in (14).

- (14) a. *Tysiąc krów spało.*  
 thousand.NOM COW.F.PL.GEN slept.N.SG  
 ‘A thousand cows slept.’  
 b. *?Cały tysiąc krów spał.*  
 whole.M.SG.NOM thousand.M.SG.NOM COW.F.PL.GEN slept.M.SG  
 ‘A whole thousand cows slept.’

The numerals 1, 2, 3, and 4 do not enter into agreement mismatches with non-masculine-human gendered nouns. With these numerals, both the numeral and noun appear in their nominative forms accompanied by full verbal agreement, as in (15).

- (15) a. *Jeden ptak spał.*  
 one.M.SG.NOM bird.M.SG.NOM slept.M.SG  
 ‘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.’

Finally, neither adjectives nor nouns show agreement mismatches; both are accompanied by full agreement and nominative marking. In adjective-noun constructions, agreement occurs with the noun, similar to numerals 1, 2, 3, and 4. In noun-complementation constructions, full agreement occurs with the head noun, resembling what we saw with numeral 1000.

- (16) *Zmęczony ptak spał.*  
 tired.M.SG.NOM bird.M.SG.NOM slept.M.SG  
 ‘The/a tired bird slept.’  
 (17) *Student fizyki spał.*  
 student.M.SG.NOM physics.F.SG.GEN slept.M.SG  
 ‘The/a student of physics slept.’

To summarize, 5+ numerals obligatorily enter into these agreement mismatches. The numeral 1000 is subject to speaker variation, but also participates in these mismatches. The numerals 1, 2, 3, and 4 do not and neither do adjectives or nouns.

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<sup>8</sup> My thanks to the attendees of the TRAIT conference and the discussion on this point.

### 3.2. Masculine human induced agreement mismatches

The patterns established in the preceding section hold only for nouns which are not of a masculine personal or masculine devirilized gender. When the noun is masculine personal or masculine devirilized, a different pattern ensues: the numeral and noun are both marked in what appears to be genitive and the verb is neuter singular. This is the masculine human induced agreement mismatch pattern and it occurs with the numerals 2, 3, 4 and 5+.

Masculine personal and masculine devirilized subgenera are found on nouns of masculine gender which refer to male humans, or human-like entities, such as dwarves and elves. Semantically, these genders are related, having the same requirements: masculine and human. Where they differ concerns their agreement patterns – masculine personal nouns take special masculine personal morphology in the nominative, while devirilized nouns do not; elsewhere, they pattern together, showing a genitive-accusative syncretism as opposed to the nominative-accusative syncretism characteristic of the other gender types (Corbett 1983). Table 5 is taken from Corbett (1983: 85), who, on the basis of this agreement paradigm and that of the singular, argues for four subgenera within the masculine gender.

**Table 5:** Agreement paradigms in the masculine subgenera, plural (Corbett 1983: 85)

	Personal		Devirilized		Animate		Inanimate	
<b>NOM</b>	duż-i	mnisi	duż-e	karły	duż-e	konie	duż-e	stoły
<b>ACC</b>	duż-ych	mnichów	duż-ych	karłów	duż-e	konie	duż-e	stoły
<b>GEN</b>	duż-ych	mnichów	duż-ych	karłów	duż-ych	koni	duż-ych	stołów
	'large	monks'	'large	dwarves'	'large	horses'	'large	tables'

For the purposes of masculine human induced agreement mismatches, it is not necessary to distinguish between the two – the trigger seems to be semantic in nature, where it is the combination of masculine and human that produces a mismatch. I will therefore refer to them together as “masculine human” in the text, using MD (“masculine devirilized”) and MP (“masculine personal”) as shorthand in the glosses.

If we consider numerals, they show the forms as given in Table 6 in nominative, accusative, and genitive positions. The shaded blocks show their form in masculine human induced agreement mismatch contexts.



**Table 6:** Numeral and noun forms in different case contexts for the masculine subgenerds

	Personal		Devirilized <sup>9</sup>		Animate		Inanimate	
<b>NOM</b>	dwaj	mnisi	dwa	karły	dwa	konie	dwa	stoły
	dwóch	mnichów	dwóch	karłów				
<b>ACC</b>	dwóch	mnichów	dwa	karły	dwa	konie	dwa	stoły
			dwóch	karłów				
<b>GEN</b>	dwóch	mnichów	dwóch	karłów	dwóch	koni	dwóch	stołów
	‘two	monks’	‘two	dwarves’	‘two	horses’	‘two	tables’
<b>NOM</b>	pięciu	mnichów	pięciu	karłów	pięć	koni	pięć	stołów
<b>ACC</b>	pięciu	mnichów	pięciu	karłów	pięć	koni	pięć	stołów
<b>GEN</b>	pięciu	mnichów	pięciu	karłów	pięciu	koni	pięciu	stołów
	‘five	monks’	‘five	dwarves’	‘five	horses’	‘five	tables’

When there is a masculine human induced agreement mismatch, the 5+ numerals obligatorily appear with additional morphology, the morpheme *-u*, which resembles the genitive-accusative. This is the only difference from 5+ induced agreement mismatches, as the verb is still marked neuter singular. This is shown in (18), with (13) repeated in (19) for comparison.

(18) *Pięciu mnichów/ karłów spało.*  
 five.GEN monk.MP.PL.GEN/ dwarf.MD.PL.GEN slept.N.SG  
 ‘Five monks/dwarves slept.’

(19) *Pięć ptaków spało.*  
 five.NOM bird.M.PL.GEN slept.N.SG  
 ‘Five birds slept.’

With regards to the 2, 3, 4 numerals, there are two patterns, the agreeing variant we saw in the preceding section (20) and the masculine human induced agreement mismatch (21),<sup>10</sup> characterized by genitive-accusative morphology on the numeral and noun, and neuter singular marking on the verb. This is the same pattern as for 5+ numerals in masculine human induced agreement mismatches.

<sup>9</sup> The patterns concerning the devirilized gender both with and without numerals seem to be to some degree speaker, and even word, dependent. This column represents one possible paradigm. Further research is necessary to fully understand the devirilized paradigm.

<sup>10</sup> The difference is stylistic, the pattern in (20) appearing more in written Polish and the pattern in (21) in spoken Polish (Swan 2002).

- (20) a. *Dwaj/            trzej/            cztery            mnisi            spali.*  
 two.MP.NOM/ three.MP.NOM/ four.MP.NOM monk.MP.PL.NOM slept.V.PL  
 ‘Two/three/four monks slept.’
- b. *Dwa/            trzy/            cztery            karły            spały.*  
 two.M.NOM/ three.NOM/ four.NOM dwarf.MD.PL.NOM slept.NV.PL  
 ‘Two/three/four dwarves slept.’
- (21) a. *Dwóch/            trzech/            czterech            mnichów            spało.*  
 two.GEN-ACC/ three.GEN-ACC/ four.GEN-ACC monk.MP.PL.GEN slept.N.SG  
 ‘Two/three/four monks slept.’
- b. *Dwóch/            trzech/            czterech            karłów            spało.*  
 two.GEN-ACC/ three.GEN-ACC/ four.GEN-ACC dwarf.MD.PL.GEN slept.N.SG  
 ‘Two/three/four dwarves slept.’

There are no similar effects of gender for numerals 1 and 1000. Numeral 1 shows full verbal agreement and nominative case marking, while numeral 1000 shows agreement with the numeral itself in the presence of *cały* and a 5+ induced agreement mismatch without it – there is no additional genitive-like morphology with masculine human gender. This is illustrated in (22) and (23).

- (22) a. *Jedni            mnisi            spali.*  
 one.MP.PL.NOM monk.MP.PL.NOM slept.V.PL  
 ‘Some monks slept.’
- b. *Jedne            karły            spały.*  
 one.M.PL.NOM dwarf.MD.PL.NOM slept.NV.PL  
 ‘Some dwarves slept.’
- (23) a. *Tysiąc            mnichów/            karłów            spało.*  
 thousand.NOM monk.MP.PL.GEN/ dwarf.MD.PL.GEN slept.N.SG  
 ‘A thousand monks/dwarves slept.’
- b. *?Cały            tysiąc            mnichów/            karłów            spał.*  
 whole.M.SG.NOM thousand.M.SG.NOM monk.MP.PL.GEN/ dwarf.MD.PL.GEN slept.M.SG  
 ‘A whole thousand monks/dwarves slept.’

Finally, neither adjective-noun nor noun-noun constructions show these types of effects for gender; instead, they behave as they would for any other gender, triggering full verbal agreement and nominative case as in (24) and (25).

- (24) a. *Duzi            mnisi            spali.*  
 large.MP.PL.NOM monk.MP.PL.NOM slept.V.PL  
 ‘Large monks slept.’
- b. *Duże            karły            spały.*  
 large.M.PL.NOM dwarf.MD.PL.NOM slept.NV.PL  
 ‘Large dwarves slept.’

- (25) a. *Student*                      *mnichów*                      *spał.*  
 student.MP.SG.NOM    monk.MP.PL.GEN    slept.M.SG  
 ‘The student of the monks slept.’
- b. *Student*                      *karłów*                      *spał.*  
 student.MP.SG.NOM    dwarf.MD.PL.GEN    slept.M.SG  
 ‘The student of the dwarves slept.’

To summarize, the numerals 2, 3, 4 and 5+ enter into masculine human induced agreement mismatches, whereby we find additional case morphology on the numeral, as well as genitive on the noun; verbs are obligatorily neuter singular. The numerals 1 and 1000 do not show this sort of effect for gender, and neither do noun-noun or adjective-noun constructions.

At this point, it is important to make a note concerning the 5+ numerals and gender agreement. Some have taken the variation in the form of the numeral with masculine personal and non-masculine-personal nouns to be the result of gender agreement (i. e., the *pięć-pięciu* distinction in (18) and (19)). For this hypothesis to work, it is necessary to state that the numeral is in a case other than the nominative since the numeral does not control verbal agreement. As masculine personal nouns are generally characterized by a genitive-accusative syncretism in the grammar, and non-masculine-personal nouns a nominative-accusative syncretism, many have taken this to mean that the numerals also have the syncretism, nominative-accusative with non-masculine-personal nouns and genitive-accusative with masculine personal nouns. Since accusative is the common case between the genders, the numeral is assumed to be cased as accusative, which varies its form based on gender. This approach has been termed the Accusative Hypothesis and is a prevalent view in many works on Polish numerals (Schenker 1971; Franks 1994; Przepiórkowski 1999; Franks 2002; Miechowicz-Mathiasen 2012). As an alternative, Rappaport (2003) assumes a Quantitative case which is copied from the numeral onto the noun (this being the general mechanism of case assignment in Rappaport’s approach); the Spell-Out rules for this case produce a result similar to that of the Accusative Hypothesis. Underlying both approaches is the intuition that the *pięć-pięciu* distinction is gender agreement.

Recall, however, that I have argued here that 5+ numerals lack a gender feature altogether. This is due to a different hypothesis, the Nominative-Genitive Hypothesis (Doroszewski 1952; Klockmann 2012). This hypothesis states that numerals are cased as nominative with non-masculine-personal nouns and genitive with masculine personal nouns. Thus, the *pięć-pięciu* distinction is taken to be a case distinction, rather than gender agreement. The main reason for adopting such an approach is to maximize the similarity between the behavior of numerals 2, 3, 4 and 5+ with masculine human nouns. The 2, 3, 4 numerals clearly have

an alternative pattern in which the noun is (perhaps indisputably) genitive and the numeral is likewise genitive – if we extend this to 5+ numerals, we are led to a conclusion in which these numerals are also marked genitive with masculine human nouns, but obligatorily for these numerals.

## 4. Analyzing agreement mismatches

In section 2, I claimed that numeral 1 is an adjective, numeral 1000 a noun, and numerals 2, 3, 4 and 5+ intermediate semi-lexical elements with feature sets differing from that of a typical noun or adjective. In this section, I demonstrate how those claims can be used to explain the verbal agreement data introduced in section 3. I begin by discussing my assumptions concerning agreement, and following this proceed to address the structure of numeral-noun constructions and finally, show how all these pieces fit together to produce 5+ induced agreement mismatches and masculine human induced agreement mismatches.

### 4.1. Framework

I assume the Minimalist framework and base my Agree on Chomsky (2000, 2001), with some minor adjustments. Under Chomsky's Agree, Agree represents a relation between a Probe and a Goal, both of which are active by virtue of some unvalued (uninterpretable) feature. An active Probe will search in its c-command (complement) domain for a matching active goal with which to value its features; if that Probe also has an EPP feature, the Goal will rise to Specifier position during agreement. An Agree relation can only be established with the closest matching Goal (i. e., no interveners). After valuation, an element becomes inactive and the uninterpretable (now valued) features are deleted before transfer. If there are any remaining unvalued features at the end of a derivation, it crashes.

There are a few changes that must be made to the theory of Agree presented above in order to account for the data here. The first concerns the derivation-crash aspect, the second the search space of a Probe, and the third is an addition rather than a change and concerns the idea of feature sharing. The changes I propose are not new and have already been suggested and developed with regard to data in other languages.

I begin with the crash aspect of Agree. According to the approach presented above, if there are any remaining unvalued features, a derivation will crash. However, a simple counter-example to this notion is found in default verbal

agreement. Polish weather verb constructions and impersonal constructions present a prime example:

(26) Weather verb

*Padalo.*  
 rained.N.SG  
 'It rained.'

(27) Impersonal construction

*Nudzilo mi się.*  
 bored.N.SG me.DAT PART  
 'I was bored.'

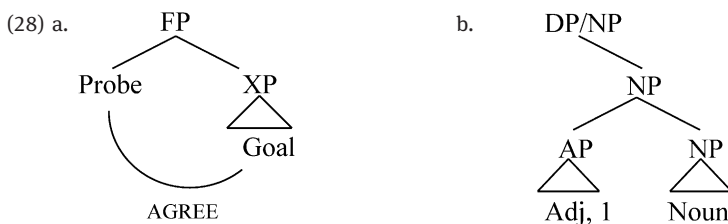
Weather verbs lack subjects as they do not select for them thematically; this is the explanation used for the presence of expletive *it* in English (*It rained.*), which fills the hole left by the missing subject. In Polish, weather verbs create a configuration in which there is no overt subject, and due to the availability of pro-drop in the language, no need for an expletive. As such, we would expect agreement to fail and the derivation to crash. Similarly, in the impersonal construction, there is a pronoun which could potentially serve as a Goal; however, it is case-marked as dative, and thus, presumably inactive. Again, we are faced with a configuration in which the unavailability of an active Goal would lead us to expect a derivation crash. However, both examples are perfectly acceptable. Dziwirek (1990) claims that such examples are cases of default agreement, and I follow this.

In his (2011) dissertation, Preminger argues for a crash-proof syntax. With regards to Agree, he states that while Agree must be attempted, it does not need to be successful. Thus, if a Probe searches and finds an active matching Goal to agree with, agreement results; if that Probe searches but does not find an active matching Goal, then default agreement surfaces – rather than assuming that a derivation should crash due to the presence of unvalued features, it is assumed that those unvalued features are filled by default values. In the case of default verbal agreement in Polish, those features are neuter singular. Note that this already gives us a potential answer to the agreement mismatches of Polish numerals – the neuter singular found in these cases could actually be default agreement; this idea is already implicit in previous works on Polish numerals. Thus, this is the first change assumed for Agree: defaults for unvalued features are possible. Note that there seems to be no principled (theoretical) reason for restricting this result to Probes, suggesting that there also exist defaults for Goals; empirically, default case would be an example of this (Schütze 2001).

The second change to the theory of Agree concerns the search domain of the Probe. There is discussion in the literature as to whether Agree works upwards,

downwards, or in both directions. The standard account assumes that a Probe searches in its c-command domain and therefore downwards. Work by Zeijlstra (2010) instead argues that Agree works upwards. The position I adopt here is that of Řezáč (2003) in which Agree looks both upwards and downwards; this is termed “Cyclic Agree.”

Cyclic Agree draws off 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.” By using this principle as the motivation for probing, we can form the basic idea of Cyclic Agree: search downwards and if no Goal is found, search upwards. This is illustrated in (28).



The reasoning for this goes as follows. When a Probe is first merged into a structure, it is active; by the Earliness Principle, it needs to mark its features for deletion. It can do this by probing and as it only has a complement, this is where it must search. This derives the concept of the canonical search domain of a Probe as being in its c-command domain. In many cases, a Probe is able to mark its features for deletion through agreement with something in its complement and this is where its probing stops. However, in certain cases, the Probe does not find a Goal in the c-command domain and is therefore still active, unable to mark its features for deletion. The innovation with regards to Cyclic Agree is that it assumes that if a Probe remains active after this first search, then it is allowed to search again, driven by the need to delete its uninterpretable features. When the specifier is merged into the structure, this provides additional material for probing, and thus, the Probe searches upwards into its specifier. Hypothetically, if a search in the specifier is unsuccessful, perhaps because there is no available Goal or as in the case of adjectives, no specifier, higher searches should be possible, so long as no barrier, such as a phase boundary, is reached (at which point, we might expect some form of default agreement on the Probe). In sum, the Earliness Principle says nothing about the search domains of a Probe, but by adopting it, this is not necessary. It predicts canonical downwards Agree, as well as non-canonical upwards Agree where downwards Agree has failed. Řezáč (2003) has made use of this mechanism to explain verbal agreement in Georgian and ergative displacement in Basque, and Baker (2003: 77–

83) has discussed how this notion of cyclic agreement might be used to explain ergative agreement patterns in various languages. Following the logic of Žezáč, I discard the notion that agreement must be in the c-command domain and adopt the Earliness Principle, with the result that Cyclic Agree is a possibility.

Finally, I turn to feature sharing. This is not so much a change as an addition. The notion of feature sharing is found in Frampton and Gutmann (2006), Rappaport (2006), Pesetsky and Torrego (2007), and Danon (2010), among others. In the Agree of Chomsky (2000, 2001), the Probe carries an unvalued feature and the Goal a valued feature. When they Agree, the value of the Goal's feature is copied onto the Probe. Under feature sharing, however, copying in this sense does not occur. Rather, the features cease to be separate instances, and instead become a single "shared" feature available to both the Probe and the Goal. This approach is particularly useful for dealing with DP-internal agreement (Concord), which has often been treated separately from Agree; notably, under feature sharing, Concord and Agree can be unified, and various problems, such as those noted by Danon (2010) on the distribution of phi-features DP internally, can be addressed. I will be making use of feature sharing in dealing with the Polish data.

## 4.2. Structure

Using Baker's approach, neither adjectives nor nouns license specifiers, and thus, if we are to maintain the comparison, the conclusion is that numerals do not either. There is no intermediate behavior possible when it comes to structure.

I assume that adjectives adjoin to NPs (below the DP level). Nouns, on the other hand, involve complementation with their nominal complements. The Case Resistance Principle, an observation by Stowell (1981), notes that elements which are assigned case do not likewise assign case. This suggests that since nouns are assigned case and inflect for it, they cannot likewise be case-assigners. This motivates the need for an intermediate functional projection, FP, which is responsible for genitive case assignment, comparable to English *of*.<sup>11</sup> Further-

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<sup>11</sup> The Case Resistance Principle is implicit in Rappaport's (2002, 2003) approaches to Slavic numerals. According to Rappaport, the assignment of case is actually the copying of a case feature from the Probe onto the Goal, much like agreement copies phi-features from a Goal onto a Probe. Elements enter a derivation either with a valued or unvalued case feature, and when they have a valued case feature, they are "case-assigners" and when they have an unvalued case feature, they are "case assignees." Since there can only be one case feature per element, elements

more, since F is a case-assigner, this must mean that it is an active Probe with some unvalued features, which I assume here to be phi-features. Note that in some languages, some adpositions show phi-feature agreement with the noun they govern (e. g., Welsh, Tsakhur, Abkhaz (Corbett 2006: 46)), lending plausibility to the hypothesis that the F, which I take to be preposition-like, could have phi-features.<sup>12</sup> The two structures are depicted in (29) below.

Turning back to numerals, numeral 1 is an adjective and thus, it takes the structure as in (29a). Numerals 2, 3, 4, 5+, and 1000 can all be associated at some point with genitive case on the noun. I take this genitive case to be indicative of the presence of an FP and therefore assign them each the structure as in (29b) with the numeral heading the higher DP/NP and the noun heading the lower DP/NP.<sup>13</sup> This is in line with the analysis of Ionin and Matushansky (2006), in which numerals are essentially nouns in noun-complementation configurations.

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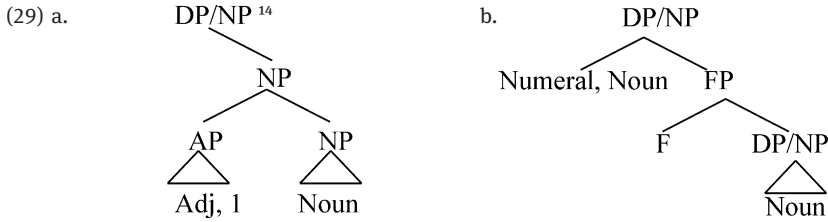
can only either assign or be assigned case – never both. Note that under this approach, Rapport would still need some extra element to assign genitive case in noun-noun structures.

**12** See also Řezáč (2008) for an agreeing P in Basque which lacks phi-feature morphology on the P.

**13** An alternative approach might be to suggest that 2, 3, 4 numerals alternate between an adjectival and a nominal structure, based on whether they agree or there is genitive morphology. However, there is evidence against this approach, most importantly, the fact that these numerals often pattern with the 5+ numerals rather than numeral 1, even in their agreeing variant. One such example comes from the distributive marker *po* – the following noun is marked locative when bare, with adjectives, or with the numeral 1, but as nominative or accusative when modified by numerals 2, 3, 4, 5+, and optionally 1000 (Przepiórkowski 2006, 2010). This is illustrated in (i). Other evidence is found with coordination, where numerals 2, 3, 4 pattern differently again from numeral 1; see Klockmann (2012: 32–33) for more details on this point.

- (i) *Dałam      każdej      dziewczynie ...*  
 gave.F.1SG every.DAT girl.DAT  
 'I gave each girl ...'
- a. *po      (jednym)      (małym)      cukierku*  
 DIST one.LOC small.LOC candy.LOC  
 'a/one small candy'
- b. *po      dwa      cukierki/      pięć cukierków*  
 DIST two.M.ACC candy.M.PL.ACC/ five candy.M.PL.GEN  
 'two candies/five candies'
- c. *po      tysiąc/      tysiącu      cukierków*  
 DIST thousand.ACC/ thousand.LOC candy.GEN  
 'a thousand candies'





I now return to the agreement mismatches.

### 4.3. Numeral-noun constructions with non-masculine-human gender

Recall that 5+ numerals participated in an agreement mismatch in which the noun was marked genitive and the verb neuter singular, when the noun had a non-masculine-human gender (feminine, neuter, masculine inanimate and animate). Numerals 1 and 2, 3, 4, on the other hand, did not have an agreement mismatch, instead exhibiting full verbal agreement in the features of the noun, which were shared by the numeral; the numeral 1000 also showed verbal agreement, but with the numeral rather than the noun. In this section, I will address these facts, beginning with the 5+ numerals and turning to 1, 2, 3, 4 and 1000.

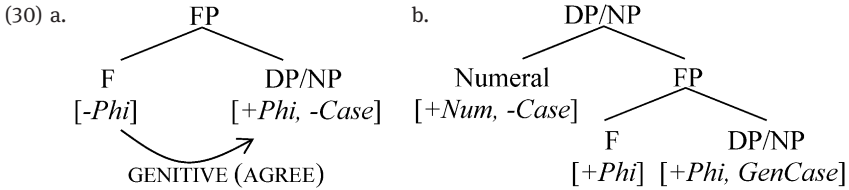
#### 4.3.1. Numerals 5+

I use the results of the preceding sections to explain the 5+ data. Recall that these numerals were posited to have a valued number feature, an unvalued case feature, and missing gender. Additionally, they took the noun as their complement, with an intermediate FP responsible for genitive case. With these facts in hand, the agreement mismatch follows straightforwardly: the intermediate FP assigns the genitive case to the noun, and as numerals 5+ lack gender, they are phi-defective Goals; when agreement is attempted with these numerals, it will fail and this will lead to default agreement on the verb, which is neuter singular in Polish.

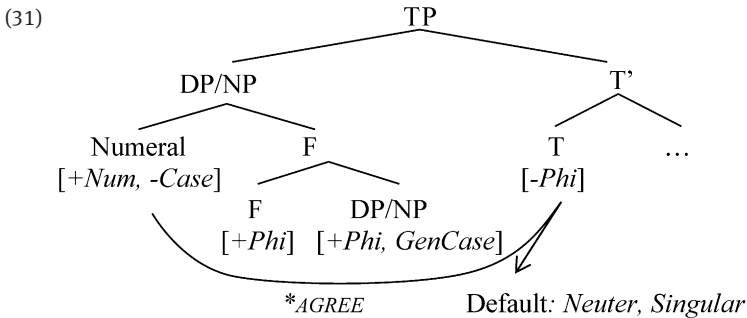
I illustrate the mechanism of this below. Initially, FP merges with the noun, and as it is active with unvalued phi-features, it agrees with and assigns genitive

<sup>14</sup> I write DP/NP throughout so as to remain agnostic on the question of whether Polish has DPs or not.

case to the noun (30a). This structure is then merged with the gender-less numeral (30b).



This, in turn, is merged in the main structure (31). When T attempts to Agree, however, agreement fails, due to the phi-defectivity of the numeral. This leads to the insertion of default features, neuter singular.<sup>15</sup> Note that this use of agreement does not differ conceptually from agreement with a phi-defective expletive, for example, *there* in English, which is presumed to have only a person feature. With expletives, the claim is that the Probe simultaneously agrees with the expletive and its phi-complete associate; as such, agreement can be successful. The difference here is that there is no phi-complete associate which could supply the needed gender feature for T; this means that the missing gender value on the numeral will remain a problem and full agreement will fail, leading to default agreement.



A remaining question concerns the case feature of the 5+ numerals. As agreement is unsuccessful, presumably, so is nominative case assignment. If we return to the idea of default feature valuation, which is available to both Probes

<sup>15</sup> Presumably default feature valuation occurs in the morphological component, after syntax. If syntax is crash-proof, then structures with unvalued features can be sent to PF. PF, however, would be unable to Spell-Out elements lacking phi-feature specifications; this is where default feature valuation would come in, PF assigning feature values to problematic elements. This would, I expect, work the same for Probes and Goals.

and Goals, then the answer is that the numerals are cased by default. As the nominative is the default case in Polish, as demonstrated in (32), this is the case the numeral takes.<sup>16</sup>

- (32) a. *Ja? Nie chce mi się iść dzisiaj.*  
 I.NOM not want.3SG me.DAT PART to.go today  
 ‘Me (lit. I)? I don’t feel like going today.’
- b. *Jan i ja/ \*mnie poszliśmy do kina.*  
 Jan and I.NOM/ me.ACC went.1PL to cinema  
 ‘Jan and me (lit. I) went to the cinema.’

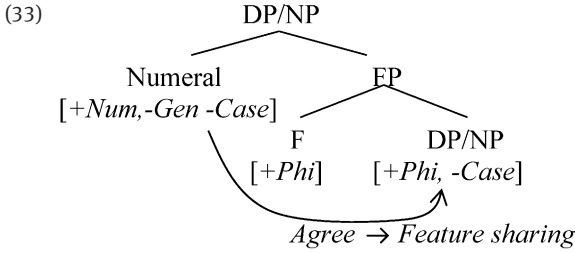
#### 4.3.2. Numerals 2, 3, 4

We require a stipulation with the 2, 3, 4 numerals with regards to their behavior with non-masculine-human nouns: the genitive-assigning FP is inactive. That said, the rest follows straightforwardly. Having unvalued gender and case features, the numeral is an active Probe and agrees with the noun. This agreement leads to shared gender and case between the numeral and the noun. When agreement by T occurs, it encounters the shared instantiations of these features – T and the numeral agree and due to feature sharing, both are cased as nominative. Thus, we end up with full agreement and nominative case marking with these numerals. I illustrate this below.

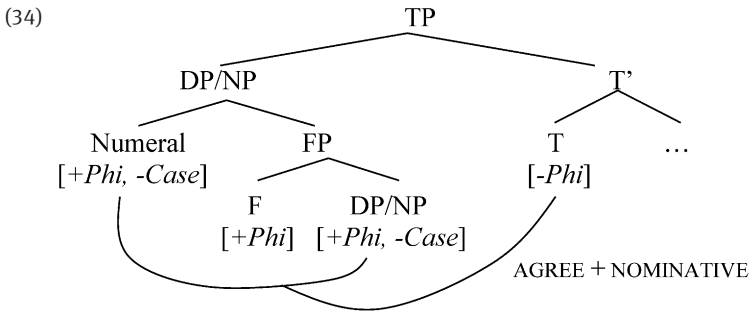
Assuming FP is inactive, it does not assign case upon merger. We can model activity by saying F already has valued phi-features and is, therefore, not a Probe. When the numeral is merged above the FP, it agrees in gender and case with the noun, these becoming shared.

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<sup>16</sup> The case feature of a nominal is usually considered to be the feature which makes it active for agreement. This case feature has also often been linked to noun licensing, where a noun must be cased to be licensed. However, if we are to assume that both Probes and Goals can have defaults, then we encounter a problem with regards to the case-licensing link – if nouns can also value their case through default case insertion, what is to prevent this default case from licensing nouns which would otherwise not be licensed, as in *I like [John]<sub>ACC</sub> [a girl]<sub>DEFAULT?</sub>*? The answer seems to be that we must divorce case assignment from noun licensing. This is a large issue, and an idea which still requires development, but see Schütze (2001) and McFadden and Sundaresan (2011) for a discussion of default case. Presumably, any default case assignment occurs after the syntax in the morphological component.



This is merged into the main structure. When agreement is attempted, it is successful – the numeral/noun carries a full set of valued phi-features and is active by virtue of the unvalued case feature. The verb copies the phi-features of the numeral/noun and assigns it nominative.



#### 4.3.3. Numerals 1 and 1000

The numerals 1 and 1000 (when it has gender) are the simplest cases and work as we would expect adjectives and nouns to. As an adjective, numeral 1 first agrees with the noun in phi-features and case (leading to a set of shared features). When the Probe T finds the numeral-noun construction, it agrees, assigning nominative case to both via feature sharing. This is the same for adjectives. The numeral 1000 is a noun and as such, it carries its own gender and number features, and assigns genitive to its complement through the intermediate FP. When the Probe T finds the numeral-noun construction, it agrees with and assigns nominative to the numeral, which is the closest active phi-complete Goal. The same occurs for nouns in noun-complementation constructions.

To summarize, agreement with 5+ numerals fails because these numerals lack a gender feature; as a result, there is no active, phi-complete Goal for the verb to agree with, leading to default agreement. With the 2, 3, 4 numerals,

the numeral is not phi-defective, and thus, after agreement with the noun, it carries a full set of valued phi-features. No genitive assignment occurs with non-masculine-human gender for these numerals. Thus, when the verb agrees, it finds a phi-complete Goal and agreement is successful. Numerals 1 and 1000 behave as adjectives and nouns, respectively. I turn now to the second agreement mismatch, the masculine-human agreement mismatch.

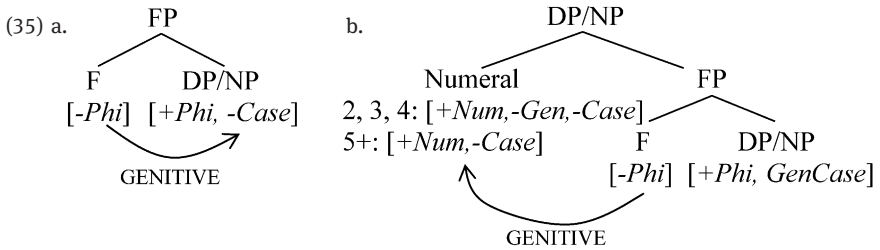
#### 4.4. Numeral-noun constructions with masculine human gender

Masculine human induced agreement mismatches were found with the numerals 2, 3, 4 and 5+ when in combination with nouns of masculine human gender. In this configuration, genitive occurred on both the numeral and the noun and default agreement on the verb. I assume the agreement variety of the 2, 3, 4 numerals with masculine human gender proceeds as in section 4.3. At this point, the reason for default agreement is simple: both the numeral and noun are cased as genitive and thereby inactive; as a result, verbal agreement cannot be successful, leading to obligatory default feature insertion. The more intriguing question then is, where does the genitive case come from? In this section, I propose a mechanism by which genitive appears on both the numeral and the noun; however, it still remains to be explained what triggers this mechanism and I can only offer tentative suggestions at the moment.

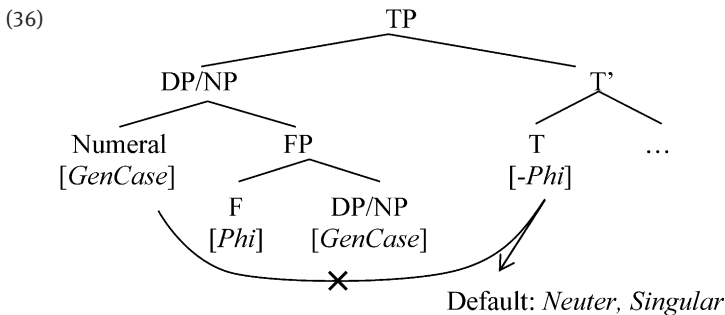
Let us return to the notion of Cyclic Agree introduced in section 4.1. If a Probe is unable to deactivate after a search in its c-command domain, it extends its search space and looks upwards. I use this mechanism to explain the distribution of genitive case. With masculine human gender, FP is active; for 5+ numerals, this is nothing new, as FP is always active, but for the 2, 3, 4 numerals, this is the only time in which the Probe is active. Because genitive appears on both the numeral and the noun, Cyclic Agree suggests that the FP has first assigned genitive case to the noun and then to the numeral. This indicates that the Probe is unable to deactivate after agreement with the noun, although it can assign it case. As far as I can say here, this may be related to the more semantic nature of the masculine human in contrast to other genders. As argued by Rappaport (2011), masculine human genders require reference to a male entity, in addition to masculine gender on the noun; thus, it is not enough to have masculine gender and be human (for example, nouns which are masculine but refer to a female, such as *babsztyl* ‘old hag’ lack masculine human agreement) – the noun must also refer to a male person. In this characteristic, the masculine human differs from the non-masculine-human, which is indifferent to the sex of

the referent. The FP of numerals must differ from the FP of nouns (since Cyclic Agree applies in the one case, but not the other), and perhaps for this FP, certain features of the masculine human gender are illegible. I say nothing more on this here, but note that this issue needs further research into the nature of masculine human gender to say more concretely how the gender blocks FP from deactivating.

I provide a sample derivation. The active F Probe merges with the noun and attempts agreement, assigning genitive to the noun; due to the masculine human gender of the noun, however, it remains active (35a). When the numeral is merged, it probes the numeral, assigning genitive (35b).



The numeral-noun construction is then merged into the main structure. T acts as a Probe, searching for an active phi-complete Goal. Due to the genitive case marking on the numeral, T cannot agree with it, and instead, it is assigned default features, agreement having failed.



For the numerals 1 and 1000 and lexical nouns and adjectives, the derivation proceeds as outlined previously. They show no evidence for Cyclic Agree, suggesting that the FPs associated with them differ from those of the numerals.

To summarize, default agreement is found in gender induced agreement mismatches as a result of the genitive case on the numeral and noun, which have

made both inactive goals. This genitive case originates from the intermediate genitive-assigning FP, which, unable to activate in the presence of masculine human gender, initiates a sequence of Cyclic Agree whereby it first attempts agreement with the noun and when that fails, the numeral.

## 5. Semi-lexicity and case assignment

No discussion of Slavic numerals would be complete without a look at their behavior in different case contexts. In Polish, as in numerous other Slavic languages, the 5+ numerals show a heterogeneous-homogeneous case alternation depending on the case context (see Babby 1987; Franks 1994; Rutkowski and Szczegot 2001; Franks 2002; Rutkowski 2002, and Rappaport 2003, among others). In structural case environments (nominative, accusative), the case patterns for the 5+ numerals are exactly those that have been discussed throughout this paper: the noun surfaces as genitive, and the 5+ numeral is either nominative or genitive, depending on the gender of the noun. This has been termed heterogeneous case syntax by Babby (1987). In oblique case environments (instrumental, locative, dative, genitive), however, both the numeral and the noun surface in the oblique case, as in (37); this is homogeneous case syntax.

- (37) *Spatam z pięcioma ptakami/ chłopcami/ dziewczynami.*  
 slept.F.1SG with[INST] five.INST birds.INST/ boys.INST/ girls.INST  
 ‘I slept with five birds/boys/girls.’

Under the analysis developed so far, the question is, how can homogeneous case patterns be accounted for? What I argue here is that this pattern is a result of the semi-lexicity of the 5+ numerals, or rather, the fact that they are neither lexical nouns nor lexical adjectives, but something in between. I will only outline the analysis here, but I direct the reader to Klockmann (2013) for further details.

Consider again the difference between numeral 1000 and numeral 5. Numeral 5 triggers default agreement, whereas numeral 1000 does not.

- (38) a. *Pięć ptaków spało.*  
 five.NOM birds.GEN slept.N.SG  
 ‘Five birds slept.’  
 b. *?Cały tysiąc ptaków spał.*  
 whole.M.SG.NOM thousand.M.SG.NOM birds.GEN slept.M.SG  
 ‘A whole thousand birds slept.’

Furthermore, numeral 1000 only has heterogeneous case syntax, lacking the homogeneous pattern in oblique case environments.

- (39) *Spalam z tysiącem ptaków/ \*ptakami.*  
 slept.F.1SG with[INST] thousand.INST birds.GEN/ \*birds.INST  
 'I slept with a thousand birds.'

In the analysis developed so far, the main difference between agreeing, non-alternating 1000 and non-agreeing, alternating 5+ is the missing gender feature. It is this gender feature which is responsible for the semi-lexical status of 5+ as opposed to the more lexical status of 1000. The generalization then seems to be that the semi-lexical numerals participate in these case alternations, while lexical numerals do not. It seems possible to extend this generalization to other semi-lexical elements, such as the indefinite pronoun *coś* which also shows a case alternation between heterogeneous and homogeneous case syntax; this observation is due to Rutkowski and Szczegot (2001).

- (40) a. *Widziałam coś milego.*  
 saw.F.1SG something.ACC nice.GEN  
 'I saw something nice.'
- b. *Spalam z czymś miłym.*  
 slept.F.1SG with[INST] something.INST nice.INST  
 'I slept with something nice.'

Thus, semi-lexicity triggers case alternations whereas lexicality does not.<sup>17</sup> One possible way to model this is to claim that oblique cases are interested in lexical elements. Thus, if there is something semi-lexical, oblique case assignment will percolate downwards until a lexical element (the noun) is encountered. This oblique case then overwrites the genitive assigned by the FP. Assuming that Polish allows for case stacking, as has been argued for Russian by Matushansky (2010) and Pesetsky (2012), it is decided during Spell-Out which case will surface. When an oblique case competes with a structural case, as in homogeneous case patterns, it is the oblique case which takes precedence and is expressed on the noun. This is highly reminiscent of the Case Hierarchy of Babby (1987), but

<sup>17</sup> This statement is not entirely accurate in light of the fact that numeral 1000 can also trigger default agreement, but never triggers case alternations. One could say that the non-gendered variant is never used in oblique environments, but this tells us nothing interesting and is purely stipulative. Instead, we might say that there are finer distinctions among semi-lexical elements than presented here; 1000, then, is more nominal than 5+, even when lacking gender, and the case alternation trigger is sensitive to this. How to implement this, though, is a matter for further consideration.



takes the idea of “case competition” as meaning that both cases have been assigned and compete for phonological realization. Brattico (2011) develops a similar analysis for identical phenomena in Finnish, but is forced to abandon the structural-oblique case distinction due to some structural cases patterning with the obliques with regards to case competition. Thus, this particular issue can be accounted for by adopting a case stacking approach and attributing the difference to the semi-lexicality of the numeral.

## 6. Conclusions

Polish numerals present an interesting conundrum for a theory of categories. In some ways, they behave like adjectives, in other ways like nouns, and yet in other ways, like neither. More so, it is not even the case that all numerals behave alike making it impossible to use some category label “numeral” to describe them. This is the problem this paper has set out to solve: numerals look similar to adjectives and nouns, but they also differ from them – what are they? This paper proposed that one of the defining differences between adjectives and nouns is their phi-features: adjectives have all unvalued phi-features and nouns all valued phi-features. The reason numerals behave so similarly to, but at the same time so differently from, adjectives and nouns originates in their phi-feature sets, where they have a mix of valued, unvalued, and missing features. The interaction of this with agreement produces agreement mismatches, and furthermore, the semi-lexical status leads to case alternations.

Polish numeral 1 carried unvalued number and gender features, making it syntactically identical to an adjective. With regards to agreement, it behaved just like a lexical adjective, never producing agreement mismatches. Polish numerals 2, 3, 4 carried valued number, but unvalued gender, and took their nouns as complements. These numerals agreed in gender with their nominal complements; in the presence of masculine human gender, they optionally assigned genitive case, which due to the presence of masculine human gender on the noun, led to Cyclic Agree. This led to genitive on both the numeral and the noun, producing agreement mismatches, or rather, default agreement. Polish numerals 5+ carried only a number feature, lacking gender altogether. The result was that agreement could never occur with these numerals, forcing default agreement. In the presence of masculine human gender, Cyclic Agree would also occur, resulting in genitive on the numeral itself. In addition, due to its semi-lexical status, it triggered a case alternation between homogeneous and heterogeneous case syntax. Polish numeral 1000 carried valued number and gender features (putting aside the case in which it patterns like 5+ for agree-

ment), making it syntactically identical to a noun; like a lexical noun, it assigned genitive to its complements, did not produce default agreement, did not trigger Cyclic Agree, and lacked case alternations. Thus, there is a four-way distinction among the Polish numerals and we find a variety of behaviors associated with them. By assuming the feature sets as given, many of these behaviors can be explained in a simple way – as an interaction between features, agreement, and case assignment.

A number of works in this volume (e.g., Baker (this volume); Braithwaite (this volume); Constantinescu (this volume)) come to the conclusion that lexical categories like noun, verb, and adjective do exist. The implication of the present work is that such categories exist only as derived notions, not primitives. They are derived from their structures (specifier or not) and phi-feature combinations, where atypical phi-feature combinations can produce atypical patterns of case and agreement. Haspelmath (this volume) argues that there is no universal set of categories from which languages draw on, due in major part to the fact that in many cases it is not possible to find a set of linguistic tests that will clearly identify a particular linguistic category cross-linguistically. The current paper supports this conclusion in the sense that the different numeral categories identified here for Polish are wholly language-dependent, and not expected to appear in an identical way in other languages. However, while the categories themselves are not universal, the building blocks (phi-features, specifiers) may very well be, with languages varying in their manipulation of these primitives. The next task is to come to an understanding of what combinations are possible, whether or not they are constrained in some way, and if so, why.

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