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Case Alternations: The Interaction of Semi--Lexicality and Case Assignment

Abstract
Polish numerals and negation participate in case alternations, a phenomenon in which their ability to trigger genitive case assignment is determined by the case environment of the nominal. In particular, oblique case contexts appear to block the genitive of numerals and negation. This phenomenon is often contextualized within the structural-inherent case distinction (Chomsky 1981, 1986; Babby 1987), with the case type (structural, inherent) playing a primary role in determining case realization; a common assumption is that only a single case is assigned per nominal. This paper proposes an alternative analysis, which takes case stacking to be freely available in the syntax. A post-syntactic algorithm then determines the final choice of overt case in contexts of case competitions. This paper further shows that certain cases appear to have a lexical requirement, leading to case percolation in the context of numerals, which are argued to be semi-lexical. Together, these assumptions accurately model the case alternations of numerals and negation, and furthermore, tell us something about the nature of case.

Keywords
Polish numerals, genitive of negation, case stacking, structural case, inherent case, semi-lexicality

Streszczenie
Kontekst składniowy ma w polszczyźnie wpływ na wystąpienie dopełniacza jako członu syntaktycznie zależnego zarówno od liczebnika, jak i od operatora negacji. Składniki z przypadkiem, który jest nosicielem funkcji semantycznej, blokują strukturalny dopełniacz przyliczebnikowy, jak również strukturalny dopełniacz w kontekstach składniowych z negacją. Zjawisko to często jest ujmowane w kategoriach opozycji przypadka strukturalnego i semantycznego/konkretnego (Chomsky 1981, 1986; Babby 1987), w ramach której charakter przypadka (strukturalny lub semantyczny/konkretny) określa jego wykładniki morfologiczne. Zwykle zakłada się, że danej frazie nominalnej jest przypisany jeden przypadek. Niniejszy artykuł przedstawia nową analizę, w której fraza nominalna może w trakcie derywacji składniowej otrzymać dowolną liczbę wartości cechy przypadka. W przypadku konfliktu wartości przypadka skumulowanych na jednym składniku decyzja, która z przypisanych wartości przypadka otrzyma wykładnik morfologiczny, zapada w komponencie poskładniowym na podstawie algorytmu wartościującego przypadki. Autorka stawia tezę, że niektóre przypadki są nacechowane leksykalnie, co prowadzi do ich

projekcji w derywacji składniowej i obecności w rdzeniu konstrukcji nominalnej zawierającej liczebnik główny. Autorka wiąże tę właściwość polskich liczebników głównych z ich niepełną gramatykalizacją. Przedstawiona analiza umożliwia spójny opis alternacji przypadka członu syntaktycznie zależnego od liczebnika oraz od wykładnika negacji zdaniowej w różnych klasach kontekstów składniowych, jak również pozwala na nowe spojrzenie na rolę kategorii przypadka w języku.

Słowa kluczowe
polskie liczebniki główne, dopełniacz negacji, kumulacja wartości przypadka na jednym składniku, przypadek semantyczny, morfoskładniowe nacechowanie liczebników głównych

1. Introduction[1]

Polish numerals participate in a peculiar phenomenon of case alternations. In nominative and accusative case environments, they appear to assign genitive case to the noun they quantify (1a), whereas in other case environments, this genitive disappears to be replaced by the other case, which also surfaces on the numeral (1b).

(1)	a.	Ivan	kupił	pięć	samochodów.		*Accusative environment*
		Ivan	bought	five	car.GEN.PL		
		'Ivan	bought	five	cars.'		
	b.	... z	pięcioma		samochodami.		*Instrumental environment*
		... with	five.INST		car.INST.PL		
		'... with five cars.'					

These case alternations are interesting for a number of reasons. Firstly, they highlight the unique behavior of numerals, which appears to alternate between that of an adjective and a noun, sometimes showing case agreement and sometimes case assignment (see also Corbett 1978). Secondly, these case alternations point to an interesting split between the nominative and accusative and the other cases in the language, traditionally labeled as the structural-inherent case distinction (e.g. Chomsky 1981, 1986; Babby 1987; Franks 1994; Rutkowski 2002). In this paper, I explore these case alternations, and propose an account which draws on notions of semi-lexicality and case-stacking. Specifically, I claim that Polish numerals are semi-lexical and this leads to case percolation past the numeral, onto the noun; assuming case-stacking to be active in Polish, it determines which case appears overtly. I begin by addressing the

[1] I am thankful to Marjo van Koppen, Norbert Corver, Ewa Willim, and two anonymous reviewers for their input on this work. Parts of this paper were presented at The Internal and External Syntax of Nominal Expressions Workshop during the 44th Poznań Linguistic Meeting (2013); I would like to thank the audience for their comments and suggestions. I am also grateful to The Netherlands Organization for Scientific Research (NWO) for their financial support.

structural-inherent case distinction (section 2); I then turn to the semi-lexicality of the numerals (section 3), followed by a case stacking account (section 4).

2. The structural-inherent case distinction and case hierarchies

Formal syntactic literature traditionally distinguishes between structural and inherent case, for example, in works like Chomsky (1981, 1986) and within Slavic treatments of numerals (Babby 1987; Franks 1994). Structural case generally refers to the nominative and accusative cases. They are termed "structural" due to the widespread agreement within Chomskian linguistics that they are assigned within particular structural configurations by functional heads, for example, nominative as being a case assigned by T. An important hypothesis concerning structural case, having its origins in a letter by Vergnaud (2006 [1977]) to Chomsky and Lasnik, has been that case functions to license nouns. A correlation observed by Vergnaud between where NPs are permitted and where case can be assigned paved the road for a theory in which case is the factor that determines NP distribution. Chomsky (1981) proposed the Visibility Condition, whereby case is needed in order to make nouns visible for LF interpretation. Together, these hypotheses were formalized in Government and Binding through the Case Filter (every NP must have one and only one case) and more recently in Minimalism, through uninterpretable case features. Consequently, structural case is predicted to exist in every language, regardless of whether it manifests overtly or not. This has necessarily led to the notion of "abstract case": morphologically unexpressed case.

Modern Minimalism (Chomsky 2000, 2001) has further drawn an explicit connection between structural case and agreement, building on the findings of earlier works such as Raposo (1987) and George and Kornfilt (1981), which found case to be dependent on the presence of agreement. Under this approach, structural case assigners, such as T and *v,* probe in their c-command domains in search of a nominal carrying an uninterpretable case feature. Agreement with this nominal results in agreement features on the case assigner and case features on the case assignee, hence the correlation between nominative case and subject agreement. This basic approach has been taken up in numerous works and adapted in various ways. Pesetsky and Torrego (2001, 2004), for example, propose that nominative and accusative case are actually the morphological manifestation of Tense features; their approach is an attempt to make sense of the exceptional nature of structural case, which, unlike the usual set of nominal features (e.g. person, number, gender, etc.), seems to lack any semantic content. Their theory has proven promising for English data, but it

is yet to be seen how it fares on a wider empirical scale. Work by Baker and Vinokurova (2010) on the Turkic language Sakha has further suggested that agreement may not be the only method of case assignment. They argue that in addition to agreement-assigned case, there is also case assigned through a dependent case mechanism (Marantz 1991). The dependent case mechanism does not require any functional head for case assignment; rather case is established purely on the basis of the structural configuration of nominals within a particular domain.[2]

With regards to inherent case, which is a term often used to refer to all other cases in a language, a very different profile emerges. Chomsky (1986) proposes that unlike structural case, inherent case is related to theta role assignment. Although the idea is attractive, it has proven difficult to establish a cross-linguistic, one-to-one relation between inherent case and theta roles – while some cases show regularity with regards to certain semantic meanings, others are entirely irregular, for example, dependent on the choice of verb. In an attempt to address this inconsistency, Woolford (2006) proposed that what Chomsky and others have called inherent case actually consists of two subtypes: this traditional notion of inherent case, where case relates directly to theta roles, and another type, termed lexical case. Lexical cases are those irregular, idiosyncratic cases, which cannot be predicted based on syntactic or semantic considerations, but are dependent on particular lexical items. By making this division, it becomes possible (to some degree) to set a relation between theta roles and case. As to the nature of inherent case assignment, this has remained particularly vague within the theory, and there seems to be no general consensus on it. While some assume that inherent/lexical cases are realized through prepositions or additional structure on top of the DP (e.g. Caha 2009; Řezáč 2008), others have assumed that inherent/lexical case is simply a feature on the DP, which, for example, differs from structural case by entering the syntax pre-valued (e.g. Rappaport 2003).

An important point of departure for this discussion is the work of Willim (1990). Willim argues that those cases which Woolford identified as lexical are in fact a type of structural case. Using Polish as her testing ground, there are four non-structural cases: genitive, dative, instrumental, and locative. While locative is always an inherent case, the genitive, dative, and instrumental can be either inherent or lexical. Focusing on their idiosyncratic use with verbs, Willim argues that in such instances, they are structural cases. Her idea is that a verb can either be specified for a particular case or unspecified (2).

[2] For a more in-depth overview of the major developments in case theory, I direct the reader to Pesetsky and Torrego (2011).

(2) *Accusative:* [+Case]
Dative: [+Case, /+dat/]
Genitive: [+Case, /+gen/]
Instrumental: [+Case, /+inst/]

Verbs specified for case assign what we would consider to be a lexical case; verbs unspecified for case assign what we would consider to be accusative. Both case types are assigned in the same structural configuration by a verbal head; they only differ as to whether case is specified on the verb (dative, genitive, instrumental) or it comes as a default (accusative). Under this approach, both accusative and lexical dative, genitive, and instrumental are structural in the traditional sense. True inherent cases, Willim assumes to be assigned by proxy, via some preposition or case-marker. The insight that Willim contributes here is a cleaner distinction between structural and inherent case: structural cases maintain this idea that they are purely structural, but in addition, the problematic lexical cases have been relegated to the realm of structural case, allowing us to relate inherent case to theta roles.

As Willim herself notes, however, in case alternations like the one given in (1), lexical cases pattern with inherent cases rather than structural cases. Thus, whereas the genitive assigned by the Polish numeral appears in a structural accusative environment (3a), it fails to appear in a lexical instrumental environment (3b) or an inherent instrumental environment (3c), the instrumental surfacing instead.

(3) a. Ivan kupił pięć samochodów. *Structural Accusative*
Ivan bought five car.GEN.PL
'Ivan bought five cars.'
b. Kierowałam pięcioma studentami. *Lexical Instrumental*
Directed.1SG five.INST students.INST
'I directed five students.'
c. Spałam z pięcioma kotami. *Inherent Instrumental*
Slept.1SG with five.INST cats.INST
'I slept with five cats.'

Polish has a second construction involving case alternations: the Genitive of Negation. Here, accusative objects are marked genitive when negation is present; lexical and inherent cased objects, however, remain unaffected. This case alternation mirrors the one found with numerals: structural accusatives are replaced by genitive (4), while lexical or inherent datives remain dative (5), (6).

(4) a. Widziałam dziewczynę. *Structural Accusative*
Saw.1SG girl.ACC
'I saw a girl.'
b. Nie widziałam dziewczyny / *dziewczynę.
Not saw.1SG girl.GEN / girl.ACC
'I didn't see a girl.'

(5) a. Ufam dziewczynie. *Lexical Dative*
Trust.1SG girl.DAT
'I trust the girl.'
b. Nie ufam dziewczynie / *dziewczyny.
Not trust.1SG girl.DAT / girl.GEN
'I don't trust the girl.'

(6) a. Dałam książkę dziewczynie. *Inherent Dative*
Gave.1SG book.ACC girl.DAT
'I gave a book to the girl.'
b. Nie dałam książki dziewczynie / *dziewczyny.
Not gave.1SG book.GEN girl.DAT / girl.GEN
'I didn't give a book to the girl.'

Once again, lexical cases pattern with the inherent cases rather than the structural cases. This appears to be a direct contradiction to the idea that structural cases and lexical cases are of the same type. Willim addresses the issue by suggesting that the grammar privileges lexically specified cases, hence the fact that they take precedence over the (unspecified) structural cases; this leads to the illusion that they belong with the inherent cases. Although I will not adopt this assumption, it is clear that if we take lexical and structural cases to be assigned in a similar fashion, something additional must be said to explain why they differ with regards to case alternations. Finally, note that Willim's approach implies that the genitive case associated with numerals and negation is purely structural, like the nominative and accusative, since it can lose to lexical cases. This implication is corroborated by a number of tests in Przepiórkowski (1999), one of which I present below – structural nominals (7a), but not lexical nominals (7b), may be predicated of by instrumentals. Objects marked genitive through negation also allow predication, thus patterning with the structural nominals (7c).[3]

(7) a. Pamiętam go głupcem. *Structural Accusative*
Remember.1SG him.ACC fool.INST
'I remember him (as) a fool.'
b. *Brakowało mu ogłady królem. *Lexical Dative*
Lacked.3.N.SG him.DAT luster king.INST
(intended: 'He lacked luster as a king.')
c. Nie widziałem jej nigdy [taką piękną kobietą]. *Genitive of Negation*
Not saw.1SG her.GEN never [such beautiful woman].INST
'I've never seen her as such a beautiful woman.' (Przepiórkowski 1999: 120–121)

A common approach to the issues presented by case alternations of the type that we are seeing here is to assume a case hierarchy which governs the realiza-

[3] I thank an anonymous reviewer for bringing this diagnostic and these examples to my attention.

tion of case. Case hierarchies make their appearance in a number of approaches, under various guises. For example, in Optimality Theoretic approaches, some have posited a universal markedness hierarchy (*dative >> *accusative >> *nominative), which combines with faithfulness constraints for the realization of the inherent/lexical case features of verbs (see Grimshaw 2001; Woolford 2001, 2003). In a different vein, Marantz (1991) assumes that there is an ordering relation with regards to the timing of case assignment (inherent/lexical > accusative/ergative > nominative/absolutive); this gives the result that inherent/lexical case is assigned prior to structural case. In a related approach, Maling (1993) assumes that there is a tier of cases (related in concept to the autosegmental tiers of phonology), which are associated to nominals in a particular order. In each of these approaches, there is a distinction between what is traditionally called structural case and inherent/lexical case, where some factor (the case tier, order of assignment, faithfulness constraints) ensures that inherent/lexical cases take priority in being realized. Primus (1999) takes perhaps the conceptually simplest route and assumes that case hierarchies exist in natural language, not being derived from any other source.

Previous work on case alternations with numerals in Slavic has often made use of such case hierarchies to describe and explain the patterns. Babby (1987), who looked at Russian numerals, argued for a case hierarchy of the form lexical/inherent > structural.[4] Under his approach, when two cases would compete for realization on a single element, as we find when the genitive of the numeral conflicts with an externally assigned inherent/lexical case, inherent/lexical cases would take precedence over the structural genitive. In a competition of two structural cases, locality would determine winner – as the genitive of the numeral is more local than an externally assigned nominative or accusative, it would be the one to surface. Note that Babby's approach incorrectly predicts the genitive of negation to be an inherent case, since it wins out over a more local accusative.

Babby's approach was couched within the Government and Binding framework, and in this framework, his case hierarchy had explanatory value. Inherent cases were assigned at deep structure (in line with their proposed relation to theta roles), while structural cases were assigned at surface structure. Adopting the Case Filter, whereby each nominal could host one and only one case, the assignment of inherent/lexical case at deep structure effectively blocked the later assignment of a structural case. In the move to Minimalism, however, this distinction was lost, and with it, the power of the case hierarchy. Under a Minimalist approach, one might suppose that the case hierarchy could be derived in some way from the mechanism of case assignment; yet if Willim's observations about the nature of lexical case are correct, such a solution would

[4] Babby (1987), along with many others, did not distinguish between inherent and lexical case.

incorrectly predict the lexical cases to pattern with the structural cases for case alternations.

More recent approaches have attempted to find a new explanation for the case hierarchy. Brattico (2011), for example, claims that some cases are strong, requiring overt expression, while others are weak and that this is a language-specific decision. However, this approach suggests that we are dealing with an arbitrary distinction and predicts the existence of case hierarchies where, for example, the nominative could pattern with the other cases, but the accusative not. Similar case alternations in other Slavic languages, as well as Finnish, Estonian, and Inari Sami, which follow the general pattern of Polish, suggest that this is incorrect – the solution seems too unrestrictive.

Caha (2009) takes a unique approach to case hierarchies. Using syncretism as his main diagnostic, he argues for the existence of a universal sequence of case features, which are realized as functional heads dominating the nominal. These functional heads follow the order of the case hierarchy, with further divisions among the inherent/lexical cases. For the case system of Polish (excluding the locative, which has a more complex positioning), the case sequence would look something like the following:

(8) … [Instrumental [Dative [Genitive [Accusative [Nominative]]]]]

This approach to the case hierarchy differs in a number of crucial ways from previous approaches. Firstly, it treats the case hierarchy not as some external constraint on case realization, but as an epiphenomenon of the structure of cased nominals. Secondly, it makes no distinction between the notions of inherent, lexical, and structural case. This step allows for a more cross-linguistic approach to case – Finnish, for example, shows similar case alternations with numerals and negation, but the division between which cases pattern "inherently" and which "structurally" for these phenomena does not respect the otherwise argued-for structural-inherent case divide: whereas the genitive, partitive, accusative, and nominative cases are presumed structural, only the accusative and nominative show case alternations (see Brattico 2010, 2011). This then leads us also to a disadvantage of this approach – there is no obvious reason from the structure why the nominative and accusative might be different.[5]

From this discussion, it is clear that deriving the case hierarchy is not an easy task. Caha's approach seems promising, but more research is certainly necessary. For the moment, I will go the more traditional route and adopt a case hierarchy. In the spirit of Caha, I frame this hierarchy in terms of actual

[5] Caha (2009) suggests that the inherent-structural divide could reduce to the smallness of the nominative and accusative cases. However, defining smallness is not a simple task – why should the accusative also count as a "small" case, and why can the genitive not be a "small" case?

cases (nominative, accusative, etc.), rather than cases types (structural, inherent), and in addition, I only make divisions for that which we have seen evidence for. Our case hierarchy takes the form given in (9), thus, moving us away from terms like structural and inherent, which, if Willim is correct, are not an accurate characterization.

(9) *Case Hierarchy:* Dative, Locative, Instrumental > Genitive, Accusative, Nominative

In this section, we reconsidered the structural-inherent case distinction, particularly in the context of case alternations. If we adopt Willim (1990)'s arguments for treating lexical case as a lexically-specified variant of structural case, then the notions of "structural" and "inherent" no longer make the proper predictions. Instead, it becomes necessary to make reference to particular cases rather than case types, in line with the approach of Caha (2009). Thus, we are seeing a division in the system which depends on the case we are dealing with, and this is captured neatly with the case hierarchy in (9).[6]

I now continue the discussion through an in-depth consideration of Polish numerals.

3. Numerals are semi-lexical

To see how the case alternations of numerals are derived, it is first necessary to understand the nature of the numerals themselves. In this section, I consider the morphological properties of the numeral and explore how these can be captured with the term semi-lexical. I begin with a discussion of semi-lexicality.

3.1. Defining semi-lexicality

Corver and van Riemsdijk (2001: 3) sum up the nature of semi-lexicality fairly succinctly: "Certain lexical items display ambiguous behavior: they share properties with lexical categories and at the same time they display functional characteristics." While there are numerous examples of purely lexical or purely functional elements, there also seems to be a group of elements which defy classification, instead showing properties of both; these are our semi-lexical el-

[6] The case hierarchy, as is, is adequate for the data at hand. Note, however, that it still requires further refinement to be applicable to a wider range of data. For example, Willim (1990) identifies accusative adverbials in Polish which are not affected by negation; her explanation, and the one which I believe to be essentially correct, is that such adverbials are their own locality domain and thus, impervious to outside case assignment; in such instances, the case hierarchy plays no role.

ements. In this section, I make a case for another type of semi-lexical element, one which appears to cross category boundaries.

Baker (2003) proposes that there are three basic lexical categories: nouns, adjectives, and verbs. Verbs are verbs by virtue of licensing a specifier and nouns are nouns by virtue of carrying a referential index. Adjectives are the negation of these properties – they neither license a specifier, nor carry a referential index. In a sense, this makes adjectives the bridge between nouns and verbs – they share with verbs a lack of a referential index and with nouns, a lack of a specifier; nouns and verbs, on the other hand, share nothing (see the category squish of Ross (1972) for a similar conclusion). The three categories are summarized as in (10) below.

(10) Noun: [−Specifier, +Referential Index]
Adjective: [−Specifier, −Referential Index]
Verb: [+Specifier, −Referential Index]

Corbett (1978) considers numerals in various languages and concludes that their behavior tends to fall somewhere between adjectives and nouns, with the higher numerals behaving more like nouns and the lower numerals more like adjectives. This makes the comparison between adjectives and nouns the most interesting for numerals. For this reason, I disregard verbs for much of the discussion.

An important characteristic of nouns, as opposed to adjectives, is that they introduce interpretable/valued phi-features into the derivation. Thus, nouns are associated with their own number and gender values, while adjectives are entirely dependent on nouns for these values. In Corbett's (2006) system of agreement, nouns correspond to controllers and adjectives to targets. If we consider nouns and adjectives, we find a correlation with respect to certain properties: nouns introduce phi-features into the derivation, carry a referential index, and act as agreement controllers; adjectives (and verbs), on the other hand, bring no phi-features into the derivation, lack a referential index, and do not act as agreement controllers. With this in mind, we might restate Baker's system of lexical categories in the following way:

(11) Noun: [−Specifier, +Phi-features]
Adjective: [−Specifier, −Phi-features]
Verb: [+Specifier, −Phi-features]

The advantage of this approach over the original is that now we have the tools to play with the idea of "intermediate" categories, or rather, categories which resemble both adjectives and nouns but do not pattern fully with either. Considering that adjectives and nouns both lack specifiers, the defining difference between them is their phi-feature specifications (ignoring what their external

syntax might be) – nouns have all valued phi-features and adjectives all unvalued. We might also imagine that there are elements which lack a full set of phi-features or which carry a mixed set of features, for example, unvalued gender, but valued number. This is the approach I take towards Polish numerals, and in the following sections, I will demonstrate how the term semi-lexical is appropriate for these numerals.

3.2. Polish 5+ numerals (5–20, 25–29, 35–39, ..., 100, 105–120, ...)[7]

In order to determine whether Polish 5+ numerals are lexical, functional, or semi-lexical under the system suggested above, it is necessary to consider each phi-feature individually and how it behaves in the syntax. In this section, I consider first number, then gender. The Polish gender system also involves considerations of animacy, humanness, and pejorativity (see Corbett 1983; Brown 1998; Rappaport 2011), but I abstract over these for my purposes here, treating them together as "gender."

3.2.1. Number

Polish has a singular-plural number distinction. In terms of a number phi-feature, we have three alternatives: number is valued, unvalued, or missing. Each possibility makes different predictions. For example, a valued number feature would act as a controller for other elements. By contrast, an unvalued number feature would vary its value based on the number value of surrounding elements. Finally, a missing feature would entail that no number agreement with that element is possible, predicting some sort of default number agreement (e.g. Dziwirek 1990; Preminger 2011).

The claim I make and which I will defend shortly is that 5+ numerals have a valued plural number feature. Consider firstly external agreement by a demonstrative:

(12)	a.	Te$_i$	/	tych$_j$		pięć$_i$		dziewczyn$_j$
		These.NON-MH.PL.NOM	/	these.NON-MH.PL.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

In numeral-noun constructions, demonstratives have the option of agreeing with the numeral or the noun, as is shown with the indices in (12a). Polish demonstratives have three forms in the singular, dependent on the gender of

[7] The discussion is limited to the 5+ numerals because these are the ones which have case alternations. See Klockmann (2012, 2014) for analyses of the other numeral types in Polish.

the noun (masculine: *ten*, feminine*: ta*, neuter: *to*) and two forms in the plural dependent on whether the noun refers to a masculine human entity or not (masculine human: *ci*, non-masculine-human: *te*). When agreement occurs with the numeral, what we see is the non-masculine-human plural form. With regards to the number agreement, we are clearly seeing a plural, suggesting that there is no default number agreement.

An alternative analysis might be to claim that the numeral has an unvalued number feature, valued plural through agreement with the plural noun; this will then lead to a plural on the demonstrative. However, this predicts that the number feature of the numeral is fully dependent on the number feature of the noun, and hence, it should be logically possible for the numeral to modify a singular noun, and therefore, for the demonstrative to show singular agreement, via the numeral.

(13) *To / ten / ta pięć dziewczyny
This.N.SG / M.SG / F.SG five girl.F.SG.GEN

This, however, is impossible. With a 5+ numeral, the noun is obligatorily plural, as is the demonstrative. If the numeral had an adjective-like unvalued number feature, we would not expect to see any restrictions on the number feature of the noun. This is exactly what happens with the numeral 1, for example, which clearly shows adjectival properties – regardless of whether the noun is singular or plural, the numeral agrees accordingly, as in (14), and has full paradigms for both singular and plural agreement.

(14) a. Jedna dziewczyna
One.F.SG.NOM girl.F.SG.NOM
'One girl'
b. Jedne drzwi
One.PL door.PL
'One door'

Not only is the 5+ numeral blocked from occurring with singular nouns, it lacks a true singular paradigm. Furthermore, this difference between numerals 5+ and 1 suggests that an explanation in terms of semantic agreement is untenable for Polish, as it would be forced to apply selectively to some numerals, but not others.

An interesting issue for this hypothesis concerns the morphology of the numeral itself. In the nominative/accusative, case morphology is null, while in oblique environments, it takes the form of *–u* (optionally *–oma* in the instrumental). As a reviewer points out, the null morphology is reminiscent of the nominative singular, while the *–u* is the form found in some allomorphs of the genitive, locative, and dative singulars, a seeming contradiction under the

hypothesis that the numeral is inherently plural. Despite the superficial similarity, there do not seem to be (to my knowledge) any nouns which can take *–u* across-the-board for the oblique cases, making the use of this morpheme unique for the numerals. According to Dziubała-Szrejbrowska (2014), this *–u* had its origins in the genitive dual, which may suggest that we are seeing an accidental syncretism with allomorphs of some of the oblique cases in the singular. Importantly, the demonstrative test above strongly suggests that with regards to agreement, these numerals project plural – whether or not there is some singular feature underneath this projecting plural is a matter open for debate.[8]

External agreement with 5+ numerals is plural, and furthermore, this plural value is not controlled by other elements; by these diagnostics, 5+ numerals carry a valued plural number feature. I turn now to gender.

3.2.2. Gender

The tests for whether gender is valued, unvalued, or missing are largely the same as for number. We must consider in particular what external agreement looks like and if there are any effects internal to the numeral-noun construction. The approach I adopt and defend is one in which 5+ numerals lack gender altogether.

If we consider external verbal agreement, we find a neuter singular.

(15) Pięć dziewczyn spało.
Five girl.F.PL.GEN slept.N.SG
'(The) five girls slept.'

This contrasts with the behavior of the noun without a numeral, suggesting that the numeral is directly responsible for the neuter singular on the verb.

(16) Dziewczyny spały.
Girl.F.PL.NOM slept.NON-MH.PL
'(The) girls slept.'

The null hypothesis is that the numeral carries neuter singular features (directly contradicting our previous claim that the numeral is plural). However, this hypothesis is quite easily disproven. As we saw in (12b) above, the neuter singular form of an agreeing demonstrative is ungrammatical. In addition, we can apply a coordination test, in which we compare the verbal agreement of two coordinated neuter singular nouns with the verbal agreement of two coor-

[8] In this regard, an interesting comparison involves the class of masculine nouns which decline as feminine nouns, but take masculine agreement (e.g. *tata* 'dad', *mężczyzna* 'man'). A similar question arises as to how the gender switch is enacted.

dinated numeral-noun constructions. If the numerals are neuter singular, we should see the same range of agreement as for neuter singular nouns. However, as demonstrated in (17), this prediction falls through – the coordination of neuter singular nouns produces a non-masculine-human plural on the verb, while the coordination of numeral-noun constructions only ever produces a neuter singular. This suggests that the numerals themselves are not featured as neuter singular, despite the features of the verb.[9]

(17) a. Krzesło i biurko rozbiły się.
Chair.N.SG and desk.N.SG broke.NON-MH.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.'

This odd pattern of verbal agreement has a simple explanation. Polish allows for default agreement in constructions where, for example, there is no underlying subject, as with weather verbs, or where possible subjects are already case-marked and thereby inactive, as with impersonal constructions (see Dziwirek 1990). These are illustrated in (18) and (19).

(18) Padało.
Rained.N.SG
'It rained.'

(19) Nudziło mi się.
Bored.N.SG me.DAT PT
'I was bored.'

These are both examples in which we expect agreement to fail and in both cases, we find the neuter singular verbal agreement, the same features found with numeral-noun constructions. Based on this comparison, I hypothesize that the verbal agreement we see in numeral-noun constructions is also default.

The next question is of course why and here I suggest that this is due to a missing gender feature on the numeral. Consider for a moment how this would work and why we would expect default agreement. Under the Mini-

[9] Previous work on Polish numerals has claimed that the numeral is actually accusative (termed the Accusative Hypothesis, cf. Franks (1994, 2002), Przepiórkowski (1999), among others), hence the lack of agreement in contexts such as (15) and (17). This hypothesis contrasts with the Nominative-Genitive Hypothesis (Doroszewski 1952; Klockmann 2012, 2014), in which the numeral alternates between a nominative and genitive form depending on the gender of the noun it modifies. I adopt this second interpretation of Polish numeral morphology, as it is more adept at modeling the gender-conditioned case facts of the lower numerals (2, 3, 4), paving the way for a unified account of gender effects with numerals (see Klockmann 2012, 2014).

malist theory of Agree (Chomsky 2000, 2001), a Probe searches for a Goal matching in phi-features with which to value its own features. Phi-features are taken to be imperfections on Probes and thus, a derivation is only successful if all such imperfections are removed via Agreement and deletion. The original assumption is that if there are any remaining unvalued phi-features on a Probe, it will cause the derivation to crash – this is an assumption that I will discard, instead opting for the obligatory operations model of Preminger (2011), which allows for a notion of failed operations, and thereby, failed agreement followed by default feature insertion; this move is necessary for weather verbs and impersonal constructions and can easily be extended to numerals. Consider again the scenario with 5+ numerals. Assuming the numerals are the head of the construction, taking the noun as their complement, verbal agreement occurs with them. However, due to the missing gender feature, the verbal Probe cannot value its own gender feature on the numeral, and likewise, were it able to reach the noun, the noun would be inactive due to the genitive case marking (see Klockmann 2012, 2014). As a result, the verb is unable to value all of its phi-features. Following Preminger (2011), this does not result in a crash; rather, default neuter singular features are inserted on the verb.[10]

In short, the 5+ numeral lacks a gender feature but has a number feature. By the definition of semi-lexicality developed above, this makes these numerals semi-lexical. This result is crucial for the analysis to follow.

4. Factoring in case stacking

With the semi-lexicality of numerals under our belts, we now turn to the notion of case-stacking and its interaction with semi-lexicality. I repeat example (1) below as (20):

[10] A final loose end concerns the differences in agreement between demonstratives and verbs. As we saw previously, demonstratives can agree with the gender-less numeral, surfacing as a non-masculine-human plural; with the same agreement target, however, verbs suffer an agreement failure, surfacing with default features. A possible explanation for the behavior of demonstratives can be found in the nature of gender agreement in the plural. Plural demonstratives only distinguish between masculine-human (masculine nouns which refer to a human) and non-masculine-human (everything else); presumably this non-masculine-human is a residue and as such, the actual gender of the agreement target is irrelevant for its realization. This fact might allow for successful agreement without a gender feature. If correct, however, it suggests that demonstratives and verbs have different requirements for successful agreement, since verbs make the same distinctions in the plural as demonstratives. This is something that I cannot solve here, but will save for future work.

(20) a. Ivan kupił pięć samochodów. *Accusative environment*
Ivan bought five car.GEN.PL
'Ivan bought five cars.'
b. ... z pięcioma samochodami. *Instrumental environment*
with five.INST car.INST.PL
'... with five cars.'

There are two puzzles in particular: (1) in non-nominative/accusative case environments, what has happened to the genitive of the numeral? and (2) in these same environments, how does the non-nominative/accusative case reach the noun? The first puzzle can be solved through case-stacking and the second by considering the interaction of semi-lexicality and case stacking. I address each in turn.

4.1. Case stacking: Where did the genitive go?

In numeral-noun constructions, numerals lead to a genitive case on the quantified noun in nominative/accusative case environments, but nowhere else; likewise, negation would cause accusative objects to become genitive, but not other objects. Under a Minimalist approach, there are two alternatives: (1) numerals/negation lose the ability to assign genitive in certain case environments or (2) they maintain this ability, despite any overt exponence of that case. Let us explore for a moment the consequences of each alternative.

Under the first approach, we might say numerals vary their category based on case environment. Thus, they are nouns in nominative/accusative positions and adjectives elsewhere (see Franks (2002) and Giusti and Leko (2004) for analyses along these lines). With regards to negation, the implication is that negation can only assign case if the object would otherwise be accusative. Any analysis that would attempt to model this as a category change (or something else) would be hard-pressed to explain why the case environment of the Goal determines the case assigning ability of the Probe, and conversely, how the presence of a structurally higher negation interacts with the verb's assignment of accusative. As such, it seems unlikely that a uniform analysis could be applied to both numerals and negation – these would need to be treated as separate phenomena; however, given the strong similarities between the nature of their case alternations, I find this undesirable and disregard such approaches.

Under the second approach, numerals and negation retain their case-assigning abilities, but the genitive is not manifested. In the literature, analyses of this type fall into two major classes: case competition approaches (e.g. Babby 1987; Rutkowski 2002; Brattico 2010) and case stacking approaches (Pesetsky 2012; Matushansky 2008, 2010; Brattico 2011). Case competition analyses employ case hierarchies to determine the winner in the event of a case competition. These analyses are an attempt to maintain the Case Criterion (one and only one case per NP). However, as Brattico (2011) points out, for a case hier-

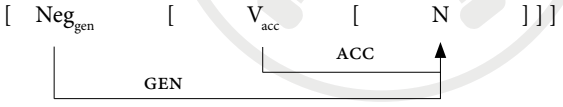
archy to resolve such conflicts, multiple cases must be associated with single elements at some level of the derivation; another way of looking at it would be to call this case stacking. As we cannot avoid the step of multiple cases associating with single elements, I abandon the Case Criterion and adopt a case-stacking analysis. This move has consequences for approaches to Agree and the Activity Condition; however, this issue extends beyond the scope of this paper and I do not address it further.[11] Case stacking analyses assume that cases can stack, and while some languages allow overtly for multiple cases on an element (Richards 2007), some languages, like Polish, do not.

I turn now to an implementation of a case-stacking approach. There are two components necessary to determine which case appears overtly – the case hierarchy developed previously, and a rule for determining the winner when cases on the same side of the hierarchy compete. The rule I adopt for this comes from Pesetsky (2012), termed the One-Suffix Rule. This rule states that the last assigned case is the one overtly realized. The case stacking mechanism can then be modeled as in (21) below:

(21) Case stacking:
   a. Resolve case conflicts with the Case Hierarchy:
      All other cases > Nominative, Accusative, Genitive
   b. If there is still a case conflict, apply the One-Suffix Rule.
      The last assigned case is the one realized.

Let us first consider examples of negation. I begin with the situation in which the object would otherwise be marked accusative. As shown in (22), there is a competition between the genitive of the negation and the accusative of the verb; this is resolved as genitive.

(22) Negation: *Resolution via One-Suffix Rule (gen>acc)*



Under case stacking, we first apply the Case Hierarchy. However, both genitive and accusative are on the same side of the Case Hierarchy and thus, there is still a case competition. We then apply the One-Suffix Rule – by the One-Suffix Rule, the last assigned case, namely the genitive, is the one which is predicted to appear overtly.[12]

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[11] See Nevins (2005) for an attempt to eliminate the Activity Condition.

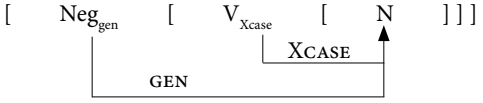
[12] The negated existential-locative construction presents an apparent counterexample. In negated sentences, a normally nominative subject is marked genitive, illustrated in (i) and (ii):

(i) W domu była woda.
At home.LOC was.F.SG water.NOM.F.SG
'There was water at home.'

(ii) W domu nie było wody.
At home.LOC not was.N.SG water.GEN.F.SG
'There was no water at home.'

Consider now the situation in which the object appears in a case other than accusative. As shown in (23), there is a competition between the genitive of the negation and the case of the verb, called here Xcase; this is resolved as the Xcase.

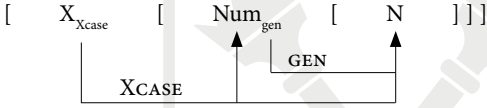
(23) Negation: *Resolution via Case Hierarchy (Xcase>gen)*



We first apply the Case Hierarchy. The Xcase of the verb and the genitive of the negation are on opposite sides of the hierarchy; thus, the Case Hierarchy determines that the Xcase should appear overtly. The One-Suffix Rule need not apply as there is only a single case left. Thus, case stacking correctly predicts which case appears overtly with negation.

Let us turn now to numerals. As we shall see shortly, the situation is more complex. Let us consider first the case in which the genitive of the numeral does not appear.

(24) Numerals: *Resolution via Case Hierarchy (Xcase>gen)*



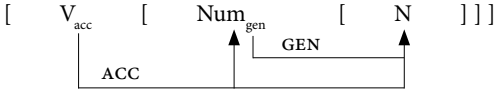
The fact that the external case appears on both numeral and noun implies that it is able to reach both. The numeral is not assigned (yet) any other case, so it simply appears in the Xcase. The noun, however, is faced with a case competition – the genitive from the numeral and the Xcase from the external element.

Under our analysis, we predict the nominative of T to overwrite the genitive of negation, since T's nominative should be the last assigned case. This prediction is false, as we clearly see a genitive. There are a number of potential solutions, which I will briefly outline here. Firstly, we might treat the nominative as a lack of case, drawing on its use as a default case in Polish. This approach predicts that nominative cannot overwrite anything at all. Alternatively, we might adopt Pesetsky's (2012) approach and treat nominative as being assigned by D rather than T; genitive would then be the outermost case, and therefore, predicted to surface. Finally, we could turn to Błaszczak (2007, 2008) who examines this construction in detail and shows that the genitive nominal is underlyingly an object, further suggesting that it is actually the locative which moves to Spec,TP. If true, the phasehood of *v* could freeze the nominal in its genitive form, making it impervious to outside assignment. Note that this solves only half the puzzle, as something more would need to be said to explain the nominative in (i). These solutions may provide us with an answer, and in addition, tell us something interesting about the nominative, but more work is necessary to determine the best approach. I thank an anonymous reviewer for bringing this construction and this issue to my attention.

Once again, applying case stacking, the Case Hierarchy determines that the Xcase should appear overtly.

Now we apply this logic to the last situation, that in which the genitive of the numeral shows up. By analogy with the previous scenario, in the scenario in (25), we expect the accusative of the verb to reach both the numeral and the noun.

(25) Numerals: *Prediction: Resolution via One-Suffix Rule (*acc>gen)*



Application of the Case Hierarchy has no effect, as the cases involved are on the same side of the hierarchy. Thus, it falls to the One-Suffix Rule. However, herein lies the problem. The accusative is the last assigned case, and thus, it is predicted to be the case which appears overtly on both the numeral and the noun; in reality, the genitive appears on the noun. Case stacking makes an incorrect prediction with regard to this construction. What can we do?

To salvage the case stacking approach, it is necessary to state that while the Xcase can reach the noun in numeral-noun constructions, the accusative case cannot. Ionin and Matushansky (2006) argue that numerals form noun-complementation structures with the quantified noun, an analysis adopted in Klockmann (2012, 2014) for Polish numerals. Under this approach, we would expect that neither the Xcase, nor the accusative case, can reach the noun. The question then is not why the accusative does not appear on the noun, but rather, how the Xcase can reach the noun in the first place. This takes us to the second puzzle, and the topic of the next subsection.

4.2. Semi-lexicality and case stacking interaction: Why is the Xcase on the noun?

It is at this point that the notions of semi-lexicality developed in section 3 become relevant. As demonstrated above, the Polish numerals that undergo these case alternations are actually semi-lexical. In this section, I argue that the semi-lexicality of the numeral is responsible for case percolation in the presence of Xcases – or rather, cases on the one side of the hierarchy percolate when the numeral is semi-lexical, whereas cases on the other side do not. I hypothesize that this is related to a need of these cases to be expressed on something that is lexical; this implies that the case split encompassed by the Case Hierarchy actually reflects a distinction of "express me on something lexical" versus "I don't care where I am or if I am even there." To begin my argument, I

will first compare Polish numeral 5, which is semi-lexical, with Polish numeral 1000, which is lexical.[13]

As we have seen previously, numeral 5 engages in case alternations, whereby, for example, in an instrumental environment, the instrumental case appears on both the numeral and the noun. Numeral 1000, on the other hand, does not engage in case alternations. It surfaces in the instrumental, but the quantified noun remains genitive.

(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.'

A further difference between the two is that numeral 1000 can trigger masculine singular verbal agreement, while numeral 5 only triggers default agreement, as in (28) and (29). Note also that the adjective agrees with the numeral 1000 in gender and number.

(28) Pięć ptaków spało.
Five birds.GEN slept.N.SG
'Five birds slept.'

(29) Cały tysiąc ptaków spał.[14]
Whole.M.SG.NOM thousand.M.SG.NOM birds.GEN slept.M.SG
'A whole thousand birds slept.'

The fact that the numeral can trigger agreement on adjectives and verbs suggests that it is an agreement controller and carries its own gender and number features. By our definitions, then, numeral 1000 is a lexical noun. This means that semi-lexicality is the defining difference between numerals 5 and 1000. If this is true, then the fact that numeral 5 has case alternations, whereas numeral 1000 does not, is most easily seen as a result of this difference in semi-lexicality – the semi-lexical nature of the numeral leads to case alternations.

[13] Numeral 1000 does show some semi-lexical properties, namely that with regards to verbal agreement, it has the option of patterning with numeral 5 (default agreement) rather than with nouns. Despite this, it seems to be more "lexical" than numeral 5. This suggests that cases are sensitive to a finer distinction than simply "lexical" vs. "non-lexical," but until more work can be done to determine how exactly numeral 1000 differs from numeral 5 and nouns, I will simply group numeral 1000 with the lexical nouns and adopt this coarser distinction.

[14] A quirk of numeral 1000 seems to be that the agreement shown in (31) is only possible if a modifier such as *cały* is present. The reason behind this remains unclear and requires further research.

Based on this, I hypothesize that Xcases have a need to be expressed on something that is lexical.[15] This is very similar to the idea by Brattico (2011) in which some cases are "strong" and others "weak", where strong cases need to be expressed overtly, but weak cases do not; however, my claim is stronger, in that the so-called strong cases need to be expressed on something lexical. It predicts that if there is something semi-lexical, like the numeral 5, then the Xcase, Brattico's strong case, will percolate past the semi-lexical element, to a lexical element, that being the quantified noun in the constructions considered here. This prediction is borne out with other hypothesized semi-lexical elements, like the indefinite pronoun *coś*, which also participates in a case alternation (Rutkowski and Szczegot 2001).

(30) Widziałam coś miłego.
Saw.1SG something.ACC nice.GEN
'I saw something nice.'

(31) …z czymś miłym
with something.INST nice.INST
'…with something nice.'

If we think back on the numeral data, then what we now have is that there is case percolation with Xcases, but not with the other cases. Case stacking will then determine that when the Xcase percolates to the noun, it will appear on the noun, since it is higher in the case hierarchy than the genitive. By contrast, accusatives, nominatives, and genitives do not percolate, and thus, the genitive of the numeral will appear overtly.

4.3. Discussion

We have now seen the use of two rules of a very different caliber in the preceding sections. The first rule, the Case Hierarchy, determines which case takes precedence when multiple cases are in competition for realization on a nominal. Importantly, some Polish cases also have a lexical requirement, such that they require expression on a lexical element, if possible. This corresponds precisely to the set of cases which are given precedence by the case hierarchy, and thus, we might restate the case hierarchy in terms of this requirement, where cases on the left side of the hierarchy are those which require lexical realization and cases on the right side of the hierarchy are those which do not. Cases requiring lexical realization will percolate to find a lexical element, while cases without this requirement simply stay where initially assigned. This, in effect,

[15] I do not exclude the possibility that a particular Xcase might not find something lexical. If that were to occur, then, following Preminger's (2011) obligatory operations approach, I would assume that the operation has failed but the derivation does not crash.

transforms our case hierarchy from a seemingly unmotivated distinction between cases, to one which says something about the cases themselves: cases with a lexical requirement are "greedy" and will percolate and take priority over other cases for realization. The next question to ask, of course, is why some cases have this requirement while others do not. Is the division among cases completely arbitrary, or is there a deeper explanation for it?

The second rule, the One-Suffix Rule, is derivational in nature. Given a nominal with multiple cases on it, this rule marks the last assigned case for realization. We can motivate this rule by morphological considerations – nominals in Polish are restricted to realizing only a single case morpheme (unlike languages such as Lardil, cf. Richards 2007) and thus, when multiple cases are found on a single element, the language must decide in some way which case will be realized. This is accomplished through the One-Suffix Rule.

Putting these two rules together, we have a system which is concerned primarily with the realization of case morphemes on nominals. Let us assume that the syntax can freely stack case morphemes as necessary, and does not care about the actual value of those case morphemes. We must then also assume that the lexical requirement is enforced in the syntax during case assignment to allow for the percolation of cases. When the nominal is later sent to Spell-Out, the PF component, inhibited by the requirement that a nominal can only realize one case morpheme, must choose which morpheme to realize. This takes the form of a two-step process, whereby (1) priority is given to cases which require realization on a lexical element and (2) all but the very last case is deleted.

The lexical requirement, as is, forces percolation in the syntax, and realization in the morphology. This begs the question of what it is about these cases that leads to the lexical requirement. Marantz (1991) and Norris (2014)-style analyses, which involve the notion of dependent case assignment, would treat these phenomena as a timing issue, where the lexical-requiring cases are assigned prior to the non-lexical-requiring cases; such analyses would still require something like the lexical requirement to drive case percolation. Such an analysis is a potential explanation, but it also leaves open the question of why these cases have the property of being assigned earlier than other cases (in addition to why they have the lexical requirement). Alternative analyses might take a Caha (2009)-style approach and claim that the lexical-requiring cases involve additional structure, and that the non-lexical-requiring cases do not. The positing of additional structure may give us a handle on the lexical requirement (this additional structure forces percolation), but it does not explain why these cases are given priority for realization. The actual answer may lie somewhere in between these two analyses, where additional structure may force percolation, and a difference in timing may somehow lead to the forced realization. There is clearly more work that needs to be done to truly under-

stand the nature of these cases, how they are assigned, and what they look like structurally, among other things, and I leave it an open issue what the source of the lexical requirement may be.

5. Conclusion

In this paper, I have considered the case alternations found with numerals and negation and their implications for notions of case. The structural-inherent case distinction was found to be inadequate, and instead, a case hierarchy making reference to specific cases rather than case types was devised. With the introduction of a case-stacking mechanism, the case alternation facts of negation could easily be modeled for Polish. However, numerals required a consideration of their semi-lexical status; in particular, it was found that when a semi-lexical numeral was present, the Xcase would percolate down to the quantified noun, related to a need of these cases to be expressed on something lexical. With the inclusion of a lexical requirement, the Case Hierarchy and One-Suffix rule could successfully model the behavior of numerals and negation in case alternations. It was further suggested that these rules are part of a post-syntactic algorithm for the realization of case, assuming that the syntax freely allows case stacking. More work is needed to understand the lexical requirement, but it takes us one step further in understanding the nature of certain cases.

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