Unifying Anti-Agreement and *Wh*-Agreement

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Abstract

I argue that '*wh*-agreement', in which dedicated agreement morphology cross-references an Ā-extracted argument, and 'anti-agreement', in which an Ā-extracted argument cannot control full agreement, are two instantiations of the same abstract phenomenon. Both effects are are the result of a φ-probe copying both φ- and WH-features from a goal. Patterns of anti-agreement and *wh*-agreement arise when partial or total impoverishment applies to the [φ+WH] feature bundle in the morphological component, blocking insertion of an otherwise appropriate, more highly specified agreement exponent.

1 Introduction

In many languages, clausal morphology is sensitive to Ā-extraction. In one variety of this phenomenon, a dedicated form of φ-agreement indexes an argument that has been Ā-extracted.[1] For example, in Abaza, (1), the verb 'take' bears a special prefix *z-* to index its ergative *wh*-word subject.

(1) s-kʲtap **dəzda**$_i$ y-na-**z**$_i$-axʷ [Abaza]
1SG-book who 3SG.I-PFV-ERG.WH-take
'Who took my book?' (O'Herin 2002:252)

This type of special agreement has been referred to as *wh-agreement* in the literature (Chung 1994, 1998; Chung and Georgopoulos 1988; Georgopoulos 1991b; Watanabe 1996, a.o.). *Wh*-agreement has generally been treated as a 'normal' agreement process – the prefix *z-* in (1) reflects the fact that the verb has agreed with an Ā-trace (Chung 1994, 1998; Chung and Georgopoulos 1988; Georgopoulos 1991a; Watanabe 1996, a.o.).

In other languages, like Tarifit Berber, extracted subjects cannot control full φ-agreement. In Tarifit, the verb appears in a special non-agreeing 'participle' form when the subject has been extracted; in (2), agreement with the extracted 3rd person feminine subject is not possible. This lack of full agreement in the presence of Ā-extraction has been referred to as *anti-agreement* in the literature (Ouhalla 1993; Richards 1997; Schneider-Zioga 2007; Diercks 2010; Henderson 2013, a.o.).

(2) **man tamghart**$_i$ ay **yzrin**/*-**t**-zra $\_i$ Mohand [Tarifit]
which woman C see.PFV.PART/3SG.F-see.PFV Mohand
'Which woman saw Mohand?' (Ouhalla 1993:479)

Anti-agreement has been generally viewed as a disruption of agreement in the syntax; full φ-agreement does not surface because it has not occurred. Lack of agreement is often thought to result from a

[1] I use theory-neutral terminology from Corbett (2006) to describe participants in an agreement relationship. The agreement *controller* is the element that determines the agreement. The agreement *target* is the element whose form is determined by agreement. In examples and glosses, **agreement targets** and bolded and underlined, while **agreement controllers** are bolded and underlined with a wavy line. Abbreviations used include: 1 = first person, 2 = second person, 3 = third person, AAE = anti-agreement, ABS = absolutive, CL = class, DEF = definite, DEM = demonstrative, ERG = ergative, F = feminine, FOC = focus, FV = final vowel, I = inanimate, M = masculine, PART = participle, PFV = perfective, PL = plural, PRS = present, PST = past, REL = relative, SBJ = subject, SG = singular, WH = wh-related morpheme. .

restriction on Ā-movement of certain arguments or from certain positions (Ouhalla 1993; Richards 1997; Schneider-Zioga 2007; Diercks 2010; Henderson 2013, a.o.). Under this view, anti-agreement arises when these constraints are bypassed.[2]

Even though both *wh*-agreement and anti-agreement appear in contexts where the argument that controls the relevant agreement has undergone Ā-movement, the two phenomena have previously been regarded as distinct. I argue that this is a false dichotomy – *wh*-agreement and anti-agreement are two surface instantiations of the same abstract phenomenon. The core proposal is that both effects are the result of a φ-probe agreeing with an Ā-operator. Specifically, I argue that when a φ-probe finds a goal with both a WH-feature and φ-features in its extended projection, the resulting feature bundle on the probe includes both φ-features and a WH-feature.[3]

(3) **Configuration for Ā-sensitive agreement**

$[\ \ldots\ P_{[u\varphi]}\ [\ \ldots\ QP_{[\varphi,\ wh]}\ \ldots\ ]\ \rightarrow P_{[\varphi,\ wh]}$

(└ φ+WH ┘)

I argue that anti-agreement and *wh*-agreement arise when partial or total *impoverishment* of [φ] applies to the [φ+wh] feature bundle in the morphological component, blocking insertion of an otherwise appropriate, more highly specified agreement exponent. The same sequence of operations underlies both effects – 'normal' φ-agreement in the syntax via Agree, followed by impoverishment in the morphological component. Whether or not a language has 'wh-agreement' (that is, appearance of a special morpheme) or 'anti-agreement' (that is, lack of overt agreement) under Ā-extraction comes down to the agreement vocabulary items that language makes use of. If there is a morpheme that spells out [WH], it will be inserted; this is the case in Abaza. If there is no morpheme specified to spell out [WH], a default (or partial) agreement form will be realized; this is the case in Tarifit. In some languages, both options occur. In Abaza, Ā-extracted ergative arguments control a special agreement morpheme, while Ā-extracted absolutive arguments simply trigger default agreement. Languages without *wh*-agreement or anti-agreement lack impoverishment triggered by [WH] altogether.

Impoverishment of φ-features may be *partial*. For example, in Tashlhit Berber, plurality of an Ā-extracted subject is still marked on the participle, as seen in (4).

(4) **irgazn**$_i$ nna ffegh-**n-*(in)** —$_i$
man.PL C$_{REL}$ left-PFV.PART-PL
'the men who left.' (Ouhalla 2005 citing Chafiq 1990:123)

A wider implication of the partial impoverishment data is that there must be some agreement that succeeds, even under extraction. That is, at least some features of the extracted subject must be available to agreement in the syntax so that these features are available to be spelled out in the morphology. While this does not provide a knock down argument for a morphological account of Ā-sensitive agreement, it is an important explanandum for any general theory of such sensitivity. Whatever one's theory of anti-agreement is, it must allow some agreement to succeed.

The analysis developed here meets this requirement in a straightforward way: the syntactic operation underlying agreement in extraction contexts and non-extraction contexts does not differ. The syntactic side of agreement proceeds as normal. Where the two contexts differ is in the morphology.

[2]In the minimalist literature, different theoretical machinery has been invoked to formalize this idea, including Criterial Freezing (Diercks 2010; Shlonsky 2014); anti-locality (Erlewine 2016; Kinjo to appear) and feature strength (Boeckx 2003; Henderson 2013; Richards 1997). Accounts that do not rely on constraints on extraction invoke verb raising (Phillips 1998; Richards 2004); feature inheritance (Ouali 2011); the relative timing of probes (Georgi 2014); and trace conversion (Baker 2008). See Baker (2008) for a discussion of some of these approaches.

[3]Below, I argue that this is possible because φ-probes are able to interact with, and copy back to themselves,WH-features.

In declarative contexts, no impoverishment takes place, and agreement surfaces in full. In extraction contacts, impoverishment is triggered, and there is an apparent lack of agreement.

Under the current analysis, this is captured by partial impoverishment; only the feature [PERSON] is deleted from the [φ+wh] feature bundle. This contrasts with *total* impoverishment, where all φ-features are deleted from the [φ+wh] bundle. I further show that there are patterns of impoverishment in which deletion of one φ-feature is contingent on the presence of another φ-feature, in addition to a WH-feature. I call these patterns as *complex partial impoverishment*. These patterns provide more evidence for a morphological approach, in that they show that lack of agreement can be dependent on more than just the presence of movement.

Based on a survey of 40 languages, I show that the set of possible φ-feature impoverishment rules are constrained by the implicational hierarchy in (5).

(5) **Feature Impoverishment Hierarchy (FIH)**
PERSON ≫ GENDER ≫ NUMBER

If an impoverishment rule deletes a feature on the above hierarchy, all features to that feature's left must also be deleted. That is, there is no φ-impoverishment rule in the context of [WH] that deletes [GENDER] to the exclusion of [PERSON] and no rule that deletes [NUMBER] to the exclusion of [GENDER] or [NUMBER]. But there are languages that delete [PERSON] without deleting either [GENDER] and [NUMBER] and languages that delete [PERSON] and [GENDER] without deleting [NUMBER]. While it has previously been noticed that anti-agreement may delete [PERSON] without deleting other features (Diercks 2010; Henderson 2007, 2013; Ouhalla 2005), the full set of implicational relationships expressed in (5) have not been previously recognized.

Within the set of post-syntactic operations, impoverishment is a powerful tool. While I employ impoverishment to capture the systematic underspecification of agreement in the context of a WH-feature, the statement of impoverishment rules is not a priori constrained by any independent principles. That is, it is easy to imagine stipulating an impoverishment rule just to get one's morphological story to work out. A wider implication of the FIH is that the set of possible impoverishment rules *are* subject to constraints. I argue in section 4.4 that these constraints arise because of more general properties of the grammar. Specifically, I argue that the internal geometric organization of φ-features derives the FIH.

An important argument for the morphological account that I develop here comes from the lack of supposed subject/non-subject asymmetries in which arguments can potentially trigger anti-agreement. It is largely assumed in the literature that anti-agreement is a subject-object asymmetry akin to the that-*t* effect (Boeckx 2003; Ouhalla 1993; Pesetsky 2016), that is, only subjects trigger anti-agreement. However, a cross-linguistic study of 40 languages with anti-agreement reveals that any agreeing argument has the potential to trigger anti-agreement. In other words, there are languages in which only subject extraction triggers anti-agreement, but there are also languages in which only object extraction triggers anti-agreement. In addition, there are languages that have both subject and object triggered anti-agreement. This places a strong explanatory burden on any syntactic theory of anti-agreement.

Certainly, asymmetries with regard to which arguments can trigger anti-agreement in a single language do exist. For example, in Berber, subject extraction triggers anti-agreement but non-subject extraction does not. However, the generalization about which arguments can potentially trigger anti-agreement cross-linguistically must be revised. Namely, the generalization should be as follows:

(6) Ā-sensitive agreement on a φ-probe can only be triggered by extraction of an argument that has interacted with that φ-probe.

Thus, the traditional subject/non-subject asymmetry thought to be at the core of anti-agreement is

recast as an agreeing/non-agreeing asymmetry. In Berber, subjects are able to trigger anti-agreement on the verb because they interact in the syntax with the probe that is affected by anti-agreement. Non-subjects do not interact with this probe, and therefore will never trigger anti-agreement when they are extracted. In languages where objects do agree, this analysis predicts that an object/non-object anti-agreement asymmetry is and this indeed what we find.

The rest of this paper is structured as follows. In section 2, I discuss the pattern of Ā-sensitive agreement in Abaza and show that it derives from a process of impoverishment in the morphological component. In section 3, I extend this analysis to anti-agreement in Tarifit Berber. In section 4, I discuss patterns of partial φ-feature impoverishment and show that these patterns provide evidence for the morphological account. In section 5, I take a broad look at the evidence presented by the paper and compare my morphological approach to syntactic accounts of Ā-sensitive agreement.

2 Wh-agreement in Abaza

In this section, I show that the pattern of extraction sensitive agreement in Abaza (ISO: abq, Northwest Caucasian) provides strong evidence for a unified, morphological analysis of anti-agreement and *wh*-agreement. I first show in section 2.1 that Abaza exhibits two morphological patterns of extraction sensitive agreement; for one agreement paradigm, a special morpheme appears; for another agreement paradigm, a default appears. This difference would traditionally be cast as a difference between *wh*-agreement and anti-agreement, though both are cast as *wh*-agreement in the extant literature (O'Herin 2002; Caponigro and Polinsky 2015). I develop a unified analysis of these based on impoverishment in the morphology in section 2.2. In section 2.3, I examine data from *wh*-agreement with possessors. These data show that an agreement controller need not move to trigger *wh*-agreement, and thus further support a morphological view of Ā-sensitive agreement in Abaza.

2.1 Ā-sensitive agreement: the basic distribution

Verbs in Abaza display an absolutive-ergative agreement pattern. Agreement is for person, gender, and number. Agreement in declarative clauses with intransitive and transitive verbs is shown in (7).[4]

(7) **Agreement in Abaza declarative clauses**

a. *Intransitive verb*

ʃʷara$_i$ ʃʷ$_i$-ʕʷəyd
2PL 2PL-run
'You(PL) run. (O'Herin 2002:64)

b. *Transitive verb*

pro$_i$ ***pro***$_k$ **ʃʷə**$_k$-**l**$_i$-bat'
3SG.F 2PL 2PL-3SG.F-see
'She saw you(PL)' (O'Herin 2002:66)

[4]To remind the reader, I use theory-neutral terminology from Corbett (2006) to describe participants in an agreement relationship. The agreement *controller* is the element that determines the agreement. The agreement *target* is the element whose form is determined by agreement. In examples and glosses, **agreement targets** and bolded and underlined, while **agreement controllers** are bolded and underlined with a wavy line.

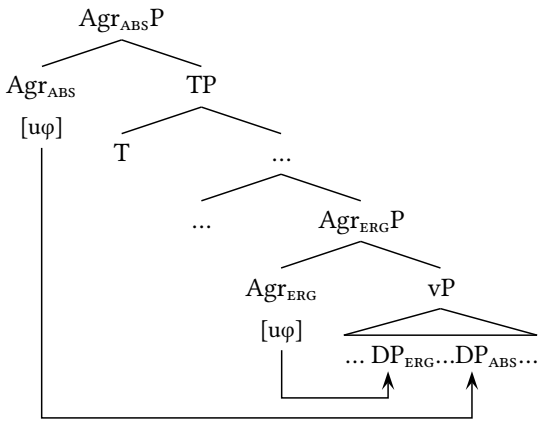
c. *Transitive verb*

pro$_i$ ***pro***$_k$ **y**$_k$-p-**s**$_i$-qəd
1SG 3SG.I 3SG.I-PFV-1SG-break
'I broke it' (O'Herin 2002:16)

Intransitive subjects and transitive objects control one agreement paradigm, here exemplified by the 2PL prefix *ʃʷ-*[5] in (7a) and (7b), respectively; transitive subjects control a different paradigm, here exemplified by the 3SG.F prefix *l-* in (7b) and the 1SG prefix *s-* in (7c). In addition, absolutive is distinguished from ergative by position in the verb; the absolutive prefix is the first prefix in the verb word, while ergative agreement occurs close to the root. This can be seen clearly in (7c), where the two prefixes are separated by a tense-aspect prefix (here glossed PFV).[6]

Following O'Herin's (2002) analysis of agreement in Abaza, I assume that agreement prefixes spell out φ-features hosted on dedicated Agr(eement) projections. For verbal agreement in clauses with transitive verbs, there are two AgrPs in the clausal spine. One is in the region of TP, the other is in the region of vP:[7]

(8)



Each Agr head hosts a φ-probe which searches its c-command domain and agrees with the first DP that it finds.[8] The lower φ-probe, Agr$_{ERG}$, agrees with the external argument in Spec-vP. The higher φ-probe, Agr$_{ABS}$, agrees with the other the next highest DP inside vP. I assume that Agr$_{ERG}$ is not generated in intransitive clauses.

Each agreement paradigm includes a morpheme that indexes Ā-extracted arguments: *y-* for absolutive agreement and *z-* for ergative agreement. I illustrate these prefixes with *wh*-questions in (9) and (10), respectively.

[5]Note the difference between *ʃʷ-* in (7a) and *ʃʷə-* in (7b). This is the result of a regular morphophonological process in Abaza in which many agreement prefixes alternate between a form consisting of a single consonant and one consisting of a consonant and a schwa. See O'Herin (2002) for details.

[6]The ergative agreement prefixes are also used to index possessors, complements of agreement postpositions, and applicative arguments. See O'Herin (2002) for discussion.

[7]Alternatively, the φ-probes could be hosted by other heads in the clausal spine, such as T and v. Nothing crucial rests on the identity of the specific heads that host these probes. What is crucial is that there are two separate heads in the clausal spine which host agreement. I have drawn the structure in (8) as head initial for ease of exposition.

[8]O'Herin (2002) assumes that these heads also assign Case to the argument they agree with. This is not a crucial part of the theory developed here.

(9) **Absolutive *wh*-agreement: y-**

a. a-č^{w}wal **dzač'^{w}əya** **yə**-ta-wa
DEF-sack what ABS.WH-in-PRS
'What is in the sack?' (O'Herin 2002:252)

b. Izmir *pro* **dzač'^{w}əya** **yə**-r-bak^{w}az
Izmir 3PL who ABS.WH-3PL-see.PL.PST
'Who did they see in Izmir?' (O'Herin 2002:252)

(10) **Ergative *wh*-agreement: z-**[9]

a. **dəzda** s-axč^{j}a **zə**-ɣəč^{j}
who 1SG-money ERG.WH-steal
'Who stole my money?' (O'Herin 2002:252)

b. a-fač^{j}əʕ^{w} a-finǰ^{j}an a-pnə **dəzda** y-na-**z**-ax^{w}
DEF-sugar DEF-cup 3SG.I-at who 3SG.I-PFV-ERG.WH-take
'Who took the sugar out of the cup?' (O'Herin 2002:252)

In addition to occurring in *wh*-questions, the prefixes *y-* and *z-* cross-reference the null operator found in relative clauses. An example is given for an absolutive relative head in (11):

(11) ***Absolutive relative clause***
[$_{CP}$ **Op**$_{i}$ *pro* **yə**-awə-y-ʃ^{j}tə-z] a-haq^{w}-dəw$_{i}$
[3SG.M ABS.WH-3SG.M-throw-PST] DEF-stone-big
'the big rock that he threw' (O'Herin 2002:260)

O'Herin (2002) refers to both *y-* and *z-* as *wh*-agreement, since they occur in environments where Ā-operators control the relevant agreement slot. They fit neatly into the normal system of agreement in Abaza in that they occur in the exact same position as other agreement prefixes. I follow O'Herin's core intuition that *wh*-agreement in Abaza is the result of an Agr head agreeing with a DP bearing the feature that drives Ā-movement, which I refer to here as [WH]. The full paradigms are shown in tables 1 and 2, where I combinewH-exponence with the rest of φ-paradigm.

	1	2F	2M	3F	3M	3I	WH
SG	*s-*	*b-*	*w-*	*l-*	*y-*	*a-*	*z-*
PL	*h-*	*ʃ^{w}-*	*ʃ^{w}-*	*r-*	*r-*	*r-*	*z-*

Table 1: Abaza Ergative Agreement

	1	2F	2M	3F	3M	3I	WH
SG	*s-*	*b-*	*w-*	*d-*	*d-*	*y-*	*y-*
PL	*h-*	*ʃ^{w}-*	*ʃ^{w}-*	*y-*	*y-*	*y-*	*y-*

Table 2: Abaza Absolutive Agreement

O'Herin argues that both *z-* and *y-* spell out the feature [WH], and this is why he labels them both '*wh*-agreement'. But a closer look at the tables reveals that these prefixes differ in the number of features that they spell out. Ergative *wh*-agreement *z-* does not occur elsewhere in the paradigm; there is no other instance of *z-* for any other combination of person/number/gender values. Thus, there must be a feature that this prefix spells out which distinguishes it from the rest of the paradigm. I take this feature to be [WH], as O'Herin does.

[9]Note that the verb in (10a) lacks an overt absolutive agreement prefix. O'Herin (2002) notes that this is optional when the absolutive argument directly precedes the verb.

On the other hand, the absolutive *wh*-agreement prefix *y- does* occur elsewhere in the tables. In fact, it occurs in both the ergative and absolutive paradigms, and it always occurs in 3rd person cells. Therefore, *y-* is best described as a morphological default – it spells out an Agr head for which there is no other vocabulary available. It cannot itself be said to spell out a WH-feature at all. In fact, it is better described as 'anti-agreement' – a morphological default agreement that occurs when an argument that controls that agreement is Ā-extracted.

Thus, Abaza actually has two superficially different types of extraction sensitive agreement – one that could be described as '*wh*-agreement' and one that could be described as 'anti-agreement'. But the distribution and conditioning environments of the morphemes in question don't differ at all. They both occur when the argument they cross-reference has been Ā-extracted. All that separates them is the type of vocabulary item that surfaces in this context. This suggests that the difference between the prefixes is very shallow; a unified analysis should capture this intuition. I turn now to capturing this intuition.

2.2 Analysis

My analysis is situated within the framework of Distributed Morphology (DM; Halle and Marantz 1993). Two aspects of DM will play a core role: *late insertion* and *underspecification.*

Late insertion refers to the idea that morphology follows syntax. The syntactic derivation operates on abstract morphosyntactic feature bundles. In the morphological component, *vocabulary insertion* inserts phonological features into syntactic terminals. A vocabulary item (VI) is a pairing of morphosyntactic features with phonological features.

(12) **General structure of vocabulary items**
[morphosyntactic features] ↔ /phonological features/

Underspecification refers to the idea that the morphosyntactic feature that a VI spells out need not be fully specified. There are two consequences of this. First, a given VI may show up in terminals with different feature bundles, yielding syncretism. Second, more than one VI may be compatible with a given feature bundle. Constraints are necessary to regulate the choice of which VI is inserted in the later case:

(13) **Subset Principle (based on Keine 2010)**
A vocabulary item V is inserted into a terminal node N iff (a) and (b) hold:

a. The morphosyntactic features of V are a subset of the morphosyntactic features of N.

b. V is the most specific vocabulary item that satisfies (a).

(14) **Specificity (based on Keine 2010)**
A vocabulary item V_1 is more specific than a vocabulary item V_2 iff V_1 contains more morphosyntactic features than V_2.

With these assumptions in place, I take as the starting place for the analysis of Abaza the observation that *wh*-agreement in Abaza is highly syncretic. *Wh*-agreement only expresses that a given Agr head has agreed with an Ā-operator; no other φ-feature contrasts are expressed. Assuming syncretism arises from underspecification, we come to the conclusion that the vocabulary items *z-* and *y-* are highly underspecified. They spell out a very small number of features. I argue that there are three types of agreement vocabulary items (VIs) in Abaza, shown in table 3:

	Features		Vocabulary item
Full agreement	[PERS:x, NUM:y, GEN:z, Agr]	↔	/s-/, /b-/, /ʃʷ-/, etc.
Wh-agreement	[WH, Agr_{ERG}]	↔	/z-/
Elsewhere	[Agr]	↔	/y-/

Table 3: Abaza Agreement VIs

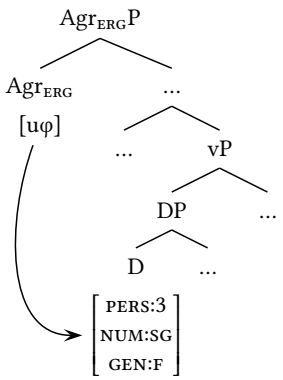
Full agreement VIs spell out some combination of person, gender, and number features. The type of Agr head is also relevant for spell out of agreement prefixes, as can can be seen by comparing 3rd person exponents for the two paradigms. For example, the 3rd person singular feminine arguments are cross-referenced with *l-* for ergatives and *d-* for absolutives. I assume that these prefixes have the following vocabulary items:

(15) a. [PERS:3, NUM:SG, GEN:F, Agr_{ERG}] ↔ /l-/

b. [PERS:3, NUM:SG, GEN:F, Agr_{ABS}] ↔ /d-/

I assume that the categorical feature of a head is available for vocabulary insertion during spell out.[10] An agreement prefix that is only used in the ergative paradigm spells out as part [Agr_{ERG}], while one that is only used in the absolutive paradigm spells out [Agr_{ERG}]. Consider why this is the case for the VIs in (15).

(16) a. **Agree in the Syntax**



b. **In the morphology**

i. Feature bundle on Agr_{ERG}: [Agr_{ERG}, PERS:3, NUM:SG, GEN:F]

ii. Vocabulary insertion: [Agr_{ERG}, PERS:3, NUM:SG, GEN:F] ↔ /l-/

~~[Agr_{ABS}, PERS:3, NUM:SG, GEN:F] ↔ /d-/~~

In (16a), the φ-probe on Agr_{ERG} finds the 3rd person singular feminine external argument and copies its features. In the morphological component, Agr_{ERG} has the feature bundle in (16b, i). At vocabulary insertion, (16b, ii), /l-/ is the only VI that is eligible to spell out Agr_{ERG}. The features of the /d-/ are not a subset of the features on Agr_{ERG}, as the categorical feature [Agr_{ABS}] is not included in Agr_{ERG}'s feature bundle. Thus, /d-/ violates the first clause of the subset principle, (13a).

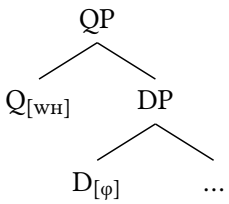
In this way, the subtype of Agr head determines which agreement VI is inserted into that head at the morphology. A prefix that is used in both paradigms spells out a generic [Agr] feature. This is the case for all non-3rd person agreement prefixes, which are identical in both the ergative and absolutive agreement paradigms (compare tables 1 and 2, above).

[10]Nothing crucial rests on this way of implementing this. Another possibility is the category features serve as a contextual constraint on vocabulary insertion, as argued by Arregi and Nevins (2012).

Besides the full agreement VIs, there are two underspecified agreement VIs, *z-* and *y-* (see table 3, above). The ergative *wh*-agreement prefix *z-* spells out a WH-feature and the ergative agreement feature [Agr_{ERG}]. Because *z-* is specified with [Agr_{ERG}], it can only used to cross-reference an ergative extracted argument. The prefix *y-* spells out an Agr head for which no other VI is appropriate. This captures the fact that it appears in both the ergative and absolutive paradigms.

At this point, the question arises as to how a WH-feature ends up in a feature bundle like [WH, Agr_{ERG}] in the first place. I argue that this is an option because of the way that φ-probes interact with the projections of the goal that they agree with. I follow Cable (2010) by assuming that Ā-movement is derived by movement of a category QP that selects the DP that (superficially) undergoes movement. The head Q hosts a [WH] feature. I assume that φ-features are distributed throughout the DP but ultimately end up on D so that they can be accessible outside DP (Danon 2011; Norris 2014) . Thus, a QP that undergoes Ā-movement will have the structure in (17):

(17)



To derive the fact that φ-probes end up with both [WH] and [φ] in Abaza, I follow the work of Deal (2015, 2016a), who argues that the features which are transferred to a probe by Agree need not be confined to those which the probe searches for. Specifically, Deal proposes that we must distinguish a probe's *interaction* condition(s) and *satisfaction* condition(s).

(18) A probe H may interact with feature set F even if it may only be satisfied by feature set G, G⊆F.

a. **Interaction**: Probe H interacts with feature F by copying F to H.

b. **Satisfaction**: Probe H is satisfied by feature G if copying G to H makes H stop probing. (Deal 2016b:3)

When a probe interacts with a feature but is not satisfied by that feature, it continues searching. Search only halts when probe's satisfaction condition is met. Deal's system allows for probes to get 'more than they bargain for' during the course of Agree, in that they may end up with a superset of the features they search for via interaction.

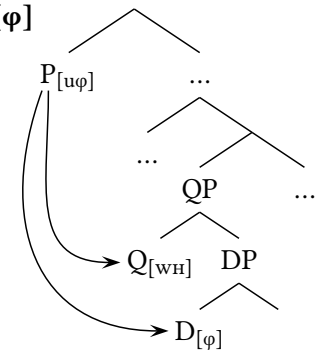
Deal conjectures that there is no variation in interaction conditions for φ-agreement, and that variation is in satisfaction conditions only. Taking this seriously, suppose that φ-features and the feature [WH] belong to a larger set of formal features, $\mathcal{F}$.

(19) $\mathcal{F}$ = {φ, WH}

If there is no variation in interaction, then both φ-probes and WH-probes both have the same interaction conditions: $\mathcal{F}$. Under this analysis, a 'φ-probe' is a probe that is satisfied by (some subset) of [φ] and a 'wh-probe' is a probe that is satisfied by [WH]. When a φ-probe P agrees with a QP, we will end up with the configuration in (20).[11]

[11]I distinguish probes from valued features on a head with the prefix 'u': [uφ] to refer to a probe that is satisfied by [φ]. Thus, [uF] should not be read as 'uninterpretable [F]'.

(20) **P interacts with [WH] and [φ]**



The φ-probe on P searches in its c-command domain for features and first encounters [WH] on Q. Because WH is a subset of $\mathcal{F}$, P interacts with [WH] and copies it back. However, P is not yet satisfied (because it has not interacted with [φ]) and search continues. On the next step of search, P finds [φ] on D, copies it back, and search ends.

Given (20), an Agr head that enters into an Agree relation with a *wh*-word or relative operator will always have (at least) the features in (21).

(21) **Form of Agr after Agree with operator:**
[Agr$_{\{\text{ERG, ABS}\}}$, PERS:X, NUM:Y, GEN:Z, WH]

However, if (21) is the form of an Agr bundle at the spell-out, *z-* and *y-* should never be inserted. This is because the full agreement VIs from table 3 will always realize more features of the feature bundle in (21) than *z-* or *y-*, and by the second clause of the Subset Principle, (13b), the VI with more features will be inserted.

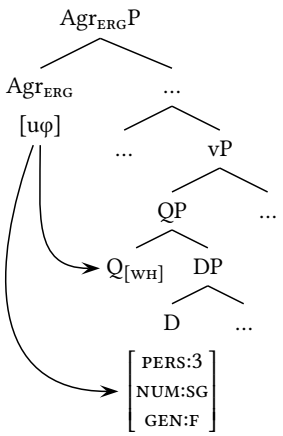
I propose that that *z-* and *y-* can be inserted in the first place because of the operation *impoverishment*, which is a widely adopted post-syntactic operation that deletes features before vocabulary insertion takes place (Bonet 1991; Noyer 1992, 1997; Halle and Marantz 1993; Keine 2010). By deleting features, it may block an otherwise possible VI from insertion if the Subset Principle is no longer satisfied after deletion, because that VI's features no longer form a subset of the feature bundle affected by impoverishment. Thus, impoverishment systematically leads to the insertion of underspecified morphemes in certain environments.

Specifically, I argue that the impoverishment rule in (22) applies prior to vocabulary insertion in Abaza.

(22) **Abaza φ-feature impoverishment**
[PERSON, NUMBER, GENDER] → Ø / [_, Agr, WH]

The rule in (22) states that all φ-features on an Agr head are deleted when there is a WH-feature in the same feature bundle (such as the one in 21, above). In doing so, it blocks insertion of an otherwise appropriate, more highly specified full agreement VI. This is because such VIs have a specification for person, gender, and number features (see table 3, above). When these features are deleted by impoverishment, the feature specification of a full agreement VI is no longer a subset of the remaining features ([WH] and [Agr]). Consider how this rule derives *wh*-agreement when an ergative Agr head has Agreed with a 3rd person feminine singular operator:

(23) a. **Agree in the Syntax**



b. **In the morphology**

i.	Feature bundle on Agr$_{ERG}$:	[Agr$_{ERG}$, PERS:3, NUM:SG, GEN:F, WH]
ii.	Impoverishment:	[Agr$_{ERG}$, PERS:3, NUM:SG, GEN:F, WH] → [Agr$_{ERG}$, WH]
iii.	Vocabulary insertion:	[Agr$_{ERG}$, WH] ↔ /z-/
		~~[Agr] ↔ /y-/~~
		~~[Agr$_{ERG}$, PERS:3, NUM:SG, GEN:F] ↔ /l-/~~

In the syntax, Agr$_{ERG}$ searches its c-command domain and finds both Q and D, interacts with each in turn, and copies back both [WH] and [PERS:3, NUM:SG, GEN:F]. In the morphology, the initial feature bundle on Agr$_{ERG}$ in (19a) undergoes impoverishment, (19b). This reduces the bundle to [Agr$_{ERG}$, WH]. During vocabulary insertion, (23b, iii), the only VI that is eligible for insertion into the impoverished feature bundle is /z-/. To see why, recall the two clauses of the subset principle, repeated here:

(24) **Subset Principle (based on Keine 2010)**
A vocabulary item V is inserted into a terminal node N iff (a) and (b) hold:

a. The morphosyntactic features of V are a subset of the morphosyntactic features of N.

b. V is the most specific vocabulary item that satisfies (a).

In (23b, iii), I compare three VIs: /z-/, the ergative *wh*-agreement prefix; /y-/, the fully underspecified default agreement prefix; and /l-/, the full agreement 3SG.F ergative prefix. Full agreement, /l-/ is ruled out by (24a): the features of /l-/ are not a subset of [Agr$_{ERG}$, WH]. The choice between the two underspecified VIs, /z-/ and /y-/ comes down to the second clause of the Subset Principle, (24b). Both prefixes spell out a subset of [Agr$_{ERG}$, WH], but /z-/ spells out a greater subset than /y-/. Therefore, /z-/ is inserted.

Absolutive '*wh*-agreement' arises when /y-/ is the only VI eligible for insertion after impoverishment. To see how this works, consider a scenario identical to the one given in (23) with the minimal difference that the agreement head is Agr$_{ABS}$:

(25) **Derivation of absolutive '*wh*-agreement'**

a.	Feature bundle on Agr_{ABS}:	[Agr_{ABS}, PERS:3, NUM:SG, GEN:F, WH]
b.	Impoverishment:	[Agr_{ABS}, PERS:3, NUM:SG, GEN:F, WH] → [Agr_{ABS}, WH]
c.	Vocabulary insertion:	~~[Agr_{ERG}, WH] ↔ /z-/~~
		[Agr] ↔ /y-/
		~~[Agr_{ABS}, PERS:3, NUM:SG, GEN:F] ↔ /d-/~~

In (25c), the only VI eligible for insertion is /y-/. The ergative *wh*-agreement prefix /z-/ is ruled out by the first clause of the subset principle, (24a). The same clause also eliminates the absolutive 3SG.F full agreement prefix /d-/.

The core intuition of the analysis, therefore, is that both '*wh*-agreement' and 'anti-agreement' are a morphological retreat to an underspecified morpheme that occurs in the environment of Ā-movement. Though there are two different underspecified agreement morphemes in Abaza, *z-* and *y-*, the conditioning environment is the same. The superficial difference between the two paradigms emerges because *z-* spells out the feature [WH], but it can only be inserted into specific heads. The other underspecified agreement prefix, *y-*, does not spell out [WH]. Therefore, *y-* spells out impoverished agreement heads where *z-* cannot be inserted. In both cases, no φ-feature contrasts are expressed by the agreement morphology that occurs on the verb.

This analysis diverges from accounts of anti-agreement where a lack of agreement morphology is taken to indicate a lack of agreement in the syntax. In the current model, agreement is fully operative in the syntax; the same fundamental sequence of operations underlies both Ā-sensitive agreement and full φ-agreement: Agree in the syntax followed by vocabulary insertion in the morphology. Apparent lack of agreement in contexts of Ā-movement results because φ-features are deleted *before* vocabulary insertion. In the next section, I examine data that further support this morphological account in Abaza.

2.3 Impoverished possessor agreement

In the account I am developing here, the connection between the (apparent) lack of φ-agreement with extracted arguments and Ā-movement is indirect: the WH-feature that drives Ā-movement also triggers impoverishment in the morphological component. This featural view of Ā-sensitive φ-agreement predicts that it could in principle be possible to see *wh-*/anti-agreement even when an agreement controller has not itself moved, as long as that controller bears a WH-feature. Abaza confirms this prediction. The relevant data come from possessor agreement.

Possessed nouns in Abaza take a prefix that indexes the φ-features of the possessor. These prefixes come from the ergative paradigm:

(26) **Possessor agreement**

a. **a-phas** **l**-qas'a
DEF-woman 3SG.F-man
'the woman's husband' (O'Herin 2002:50)

b. (**wara**) **w**-nap'ə
2SG.M 2SG.M-man
'your(M) hand' (O'Herin 2002:50)

Possessor agreement also participates in the *wh*-agreement system. When a possessor serves as the head of a relative clause, the agreement prefix that cross-references that possessor on the possessed

noun must be the *wh*-agreement prefix *z-*.

(27) ***Wh*-agreement with possessor relative operator**

[$_{CP}$	[$_{DP}$	***Op***$_i$	**z**-tdzə	]	*pro*	yə-w-x^{w}aʕ-z	] a-qac'a$_i$
[	[		ERG.WH-house	]	2SG.M	ABS.WH-2SG-M-buy-PST	] DEF-man

'the man whose house you bought' (O'Herin 2002:260)

O'Herin (2002) argues that relative clauses involve Ā-movement of a null relative operator to Spec-CP in Abaza. When a relative operator serves as a possessor, it pied-pipes the DP that contains it to Spec-CP. Consider what this means for the analysis of the possessor *wh*-agreement in (27). The operator has not undergone Ā-movement, yet it triggers *wh*-agreement. Under the view advocated here this is expected. The φ-probe responsible for possessor agreement agrees with the operator, copies the WH-feature that it bears, resulting in *wh*-agreement. This is shown abstractly in (28):

(28) **Structure of Abaza possessor relativization**

[$_{CP}$ [$_{DP}$ Op$_{[φ, WH]}$ [uφ]-N] C [$_{TP}$ … ___ … V]]]]]

Importantly, in (28), the relative operator has not moved from its base position. Instead, the entire possessed DP has moved to Spec-CP. Thus, movement of the operator cannot be solely responsible for the *wh*-agreement on the possessed noun.

A similar effect is found when a possessor is bound by an extracted DP. In such cases, the bound possessor obligatorily triggers *wh*-agreement:

(29) ***Wh*-agreement with possessor bound by *wh*-word**

[$_{DP}$	**pro**$_i$	**z**$_i$-qk^{w}marga	]	ayʃa	ac'axk^{j}	**dəzda**$_i$	yə-qa-z-chwaxəz
[		ERG.WH-toy	]	table	under	who	3SG-PV-ERG.WH-hide

'Who$_i$ hid his$_i$ toy under the the table?' (O'Herin 2002:272)

In (29), the possessor of the 'toy' is obligatorily construed as bound by 'who'. *Wh*-agreement on the possessor forces this construal; when there is full possessor φ-agreement, construal of the extracted subject and the possessor is impossible.

It is generally accepted that (at least some) bound pronouns must match their binders in φ-features (Kratzer 2009; Rooryck and Vanden Wyngaerd 2011). I argue that what the data in (29) must match its binder in more than φ-features; the bound *pro* must also have a WH-feature for binding by the extracted subject to be licit.[12] When the possessive φ-probe agrees with the bound *pro*, it will copy back [WH]. This results in *wh*-agreement on the possessed noun. This is sketched below:

(30) **Bound *pro* matches [φ, WH] on *wh*-word**

[$_{DP}$ *pro*$_{i\,[φ, WH]}$ [uφ]-N] … who$_i$ … V

MATCHING

[12] One way of implementing feature matching is the process of Feature Transmission developed by Kratzer (2009). Kratzer argues that bound variables enter the syntactic derivation as minimal pronouns. They receive their features from the functional head that binds them. Here, this would entail that [WH] can enter into the Feature Transmission operation. I leave the precise implementation of this idea to future work.

In both cases of *wh*-agreement being triggered by a possessor, the possessor does not undergo movement from its base position. The morphological analysis offers a way of unifying these cases with instances of Ā-sensitive φ-agreement examined above. The common thread is that the agreement controller bears a WH-feature. When a φ-probe finds that feature on a goal, it will copy it back, and impoverishment will be triggered in the morphological component, *whether or not the goal undergoes wh-movement.*

On the other hand, if Ā-sensitive agreement is due to a syntactic restriction on Ā-movement of agreeing arguments, the possessor agreement cases just discussed are mysterious. This is because there is no movement of the possessor in the (27) and (29). If Ā-sensitive agreement is tied *directly* to Ā-movement of an agreement controller, possessor agreement in the above cases should not exhibit Ā-sensitivity.

3 Extending the analysis to anti-agreement

Since Ouhalla's (1993) seminal article on anti-agreement, the pattern of Ā-sensitive agreement found in Berber languages has been considered a canonical instance of the effect. In this section, I focus on anti-agreement in Tarifit Berber, (ISO: `rif`), the variety that Ouhalla originally discussed. I show that the Tarifit pattern is exactly parallel to Abaza Ā-sensitive agreement: agreeing with a subject bearing the feature [WH] triggers total impoverishment of the φ-features in the morphology. I extend the analysis developed for Abaza to Tarifit. This departs from Ouhalla's original analysis of anti-agreement, which he argues is due to binding constraints placed on resumptive pronouns in subject positions in rich agreement languages.[13] I show that the morphological approach leads to new insights into the morphology of Ā-sensitive agreement in Berber.[14] Specifically, I argue that Tarifit also expones the *wh*-feature responsible for this impoverishment. I propose that the suffix *-n* found on the verb in anti-agreement contexts spells out [WH]. Previous accounts of the Berber participle, including Ouhalla's original one, treat participle morphology as a discontinuous morpheme *y-…-n*.

Verbs in Tarifit agree with their subject in person, gender, and number, as shown in (31a). Ā-extraction of a subject in Tarifit requires the verb to be in a non-agreeing form, labeled the 'participle' form in the Berber literature. Full agreement is impossible, (31b):

(31) a. **t**-zra **tamghart** Mohand
3SG.F-see.PFV woman Mohand
'The woman saw Mohand.' (Ouhalla 1993:479)

b. **man tamghart**$_i$ ay **yzrin**/***t**-zra $\_i$ Mohand
which woman C see-PFV.PART/3SG.F-see-PFV Mohand
Intended: 'Which woman saw Mohand?' (Ouhalla 1993:479)

This pattern is not limited to subject *wh*-questions; it is also found in subject relative clauses, (32a), and subject clefts, (32b):

(32) a. **tamghart**$_i$ nni **yzrin** $\_i$ Mohand
woman C see-PFV.PART Mohand
'the woman who saw Mohand' (Ouhalla 1993:479)

[13]Specifically, Ouhalla argues that rich agreement in pro-drop languages identifies the empty category left by subject Ā-movement as a resumptive *pro*. He extends Aoun and Li's (1989) Ā-disjointness requirement to rule out such a pronoun in that position. Agreement is suppressed to avoid a violation of this constraint.

[14]See Baier (to appear) for additional arguments that a syntactic approach to Berber anti-agreement is not viable.

b. **tamghart-a**$_i$ ay **yzrin** $\_i$ Mohand
woman-DEM C see-PFV.PART Mohand
'It's this woman that saw Mohand.' (Ouhalla 1993:479)

The participle does not reflect any of the φ-features of the Ā-moved subject. This can be seen clearly in (33), where the extracted subject is 2nd person, masculine, and singular, and the verb appears in the same invariant participle form as in (31b) and (32), where the extracted subjects are 3rd person.

(33) **shek**$_i$ ay **iuggurn** $\_i$
you.SG.M C leave-PART
You are the one who left.' (Ouhalla 2005:675)

Thus, anti-agreement in Tarifit bears strong resemblance to the pattern of Ā-sensitive agreement in Abaza. Agreement with an argument undergoes a morphological retreat to an invariable form when that argument is extracted. In Abaza, an invariant agreement prefix surfaces. In Tarifit, the verb is locked into a special, invariant form. Tarifit's full subject-verb agreement paradigm is shown in table 4, and the participle paradigm is shown in table 5.

	SG	PL
1	V-x	n-V
2M	θ-V-ð	θ-V-m
2F	θ-V-ð	θ-V-nt
3M	i-V	V-n
3F	θ-V	V-nt

Table 4: Tarifit φ-agreement (Elouazizi 2012)

	SG	PL
1	y-V-n	y-V-n
2M	y-V-n	y-V-n
2F	y-V-n	y-V-n
3M	y-V-n	y-V-n
3F	y-V-n	y-V-n

Table 5: Tarifit participle

Ouhalla (1993) argues that the participle is a general, default agreement form. Evidence for this comes from the fact that the participle is invariant and that it contains the prefix *y-/i-*, the same prefix that is found in the 3rd person singular masculine form in table 4.[15] However, he does not offer a treatment of the suffix *-n* that is also found in these forms. Instead, he treats *y-…-n* as a discontinuous morpheme found in anti-agreement contexts.

I argue that both elements can analyzed in a unified way under the morphological account of Ā-sensitive morphology. I propose that the same type of impoverishment rule that is active in Abaza is active in Tarifit:

(34) **Tarifit Berber φ-feature impoverishment**
[PERSON, NUMBER, GENDER] → Ø / [_, WH, Agr]

The prefix *y-* is a morphological default that is inserted when there are no φ-features to be spelled out, as shown in (35). The suffix *-n* spells out theWH-feature that triggers conditions impoverishment.

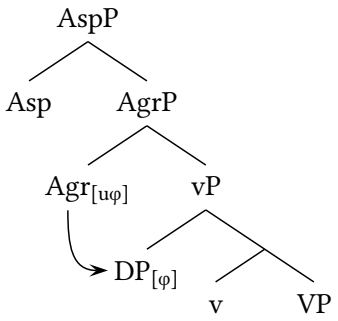
(35) **Tarifit default agreement**
[Agr] ↔ /i-/

[15]The difference between the *i-* and *y-* forms of this prefix is not entirely clear to me. In Ouhalla's work, participles are often written with *y-*, though see *iuggurn* 'leave' in (33) above. Whatever the difference, Ouhalla and others such as (Ouali 2008, 2011) explicitly argue that they are the same, and I will assume this as well.

(36) **Tarifit wh-exponence**
[WH] ↔ /-n/

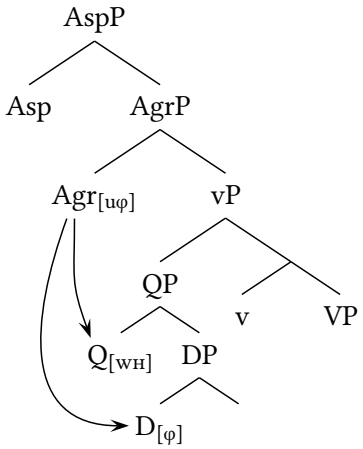
In terms of the syntactic derivation, I follow Ouali's (2011) work on Tamazight Berber clause structure and assume that VSO word order in Tarifit is derived by verb movement out of vP to a position above the subject. Specifically, Ouali argues that the landing site for such movement is an aspectual projection, AspP. I differ from Ouali in assuming tht subject-verb agreement in Tarifit is derived by a φ-probe hosted on a dedicated Agreement projection directly above vP. The φ-probe on the Agr projection agrees with the subject in Spec-vP.

(37) **Tarifit subject-verb agreement (w/o V-to-Asp)**



After head movement, V, Asp and Agr will form a complex head at Asp, allowing agreement morphology to be spelled out on the verb. As in Abaza, Ā-sensitive agreement is the result of the φ-probe on Agr agreeing with both [WH] and [φ]. This is shown in (38).

(38) **Agreement with QP**



As we have seen, the Berber participle has a default agreement prefix *y-/i-*, the VI for which is given above in (35). This prefix is inserted in extraction contexts because the impoverishment rule in (34) deletes all φ-features from the Agr head. Consider why this is the case when there is a 3rd person singular feminine extracted subject:

(39) **Derivation of anti-agreement in Tarifit**

a. Feature bundle on Agr: [Agr, PERS:3, NUM:SG, GEN:F, WH]
b. Impoverishment: [Agr, PERS:3, NUM:SG, GEN:F, WH] → [Agr, WH]
c. Vocabulary insertion: [Agr] ↔ /y-/
~~[PERS:3, NUM:SG, GEN:F, Agr] ↔ /θ-/~~

Agr enters the morphology bearing a full set of φ-features in addition to a WH-feature, (39a). Before vocabulary insertion, impoverishment deletes [φ] from the Agr bundle, leaving only [Agr, WH], (39b). This forces the insertion of the default agreement prefix /y-/, which spells out only the feature [Agr], as shown in (39c). Normal φ-agreement, /θ-/, cannot be spelled out because its feature set is no longer a subset of the feature bundle at the point of vocabulary insertion.

This leaves the suffix *-n*, which I argue spells out the feature [WH]. Specifically, I propose that *-n* is the spell-out of [WH] in the context of Asp, as shown in (36):

(40) **Tarifit WH-exponence**
[WH] ↔ /-n/ / _] Asp

Evidence for this analysis of *-n* comes from the fact that the aorist participle lacks *-n* while still containing *i-*. On the other hand, *-n* is found in perfective and imperfective participles (Drouin 1996).[16]

This analysis unifies Tarifit anti-agreement and Abaza Ā-sensitive agreement in two ways. First, both languages retreat to an underspecified form of agreement when the argument that controls that agreement is extracted. This is result of φ-impoverishment conditioned by [WH]. Second, in both languages, the [WH] feature that conditions impoverishment is sometimes spelled out. In Abaza, this is the case with ergative agreement; in Tarifit, this is the case in non-aorist participles.

It has not previously been recognized in the literature on Berber anti-agreement that participle form spells out the feature [WH], and this new observation deserves some attention in relation to the Abaza data discussed in the previous section. In both languages, there are some forms in which [WH] is explicitly realized, while there are others where it is not. In all of these contexts, however, an underspecified agreement form surfaces, *regardless of whether the* WH*-feature is spelled out or not.* In addition, exponence of WH-feature is morphologically idiosyncratic. In Abaza, it is limited to one paradigm of agreement markers, those used for ergatives (and other non-absolutive arguments). In Tarifit, WH-exponence is blocked in one aspectual form. This supports the idea that underspecified agreement in Ā-extraction contexts is tied to the presence of WH-feature, and that '*wh*-agreement' (that is WH-exponence) and 'anti-agreement' as surface-variants of the same underlying phenomenon.

Before finishing this section, it is worth commenting on the fact that in Berber, only subject extraction requires that the verb take the participle form; non-subject extraction does not trigger suppression of subject agreement, as shown by the object *wh*-question in (41).

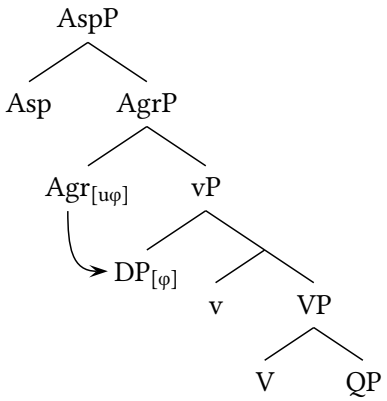
(41) ma$_i$ ag **iswa** ʕ**li** $_i$
what C drink.PFV.3SG.M Ali
'What did Ali drink?' (Ouali 2011:99)

This is completely expected under the current analysis, given that Berber lacks object agreement. This is because impoverishment will only occur when a φ-probe has agreed with a QP, causing [WH] and [φ] to be in the same bundle. Under non-subject extraction, the φ-probe on Agr will find a normal DP in Spec-vP and no WH-feature will end up on the probe. The WH-feature on the QP is unaccessible because the φ-probe on Agr is *satisfied* when it finds [φ] on the external argument and probing halts (see (18b), above). The abstract structure of (41) at the time of agreement is shown in (42):[17]

[16]This means that (40) actually needs to be made more precise, in that the aspectual forms that condition *-n* should have some feature that sets them apart the aorist which does not. I will leave this to further work.

[17]It generally assumed that Spec-vP is a target for intermediate Ā-movement (Chomsky 2000, 2001; Legate 2003; van Urk 2015). Crucially, I assume that the object not undergone moved to the edge of vP at the time when Agr probes in (42). Otherwise, it is possible that the φ-probe on Agr could find the QP object in an outer Spec-vP.

(42) **Agreement in object extraction contexts**



Note that the conditions for trigger Ā-sensitive agreement in both Abaza and Tarifit are the same. Namely, the grammatical functional of the extracted argument must be one that generally controls agreement in the language and the controller of agreement must be extracted. In other words, the configuration in (43) required to trigger Ā-sensitive agreement:

(43) **Configuration for Ā-sensitive agreement**
[… $P_{[u\varphi]}$ [… $QP_{[\varphi,\ wh]}$ …]
└ φ+WH ┘

In Tarifit, object extraction does not trigger Ā-sensitive agreement because an object does not interact with the φ-probe that is responsible for subject agreement. In addition, the Abaza data are important confirmation of (43). Each argument that controls φ-agreement in Abaza is capable of triggering Ā-sensitive agreement. However, an extracted argument will only trigger Ā-sensitive agreement on a probe with which it has interacted. Thus, in both Abaza and Tarifit, the distribution of Ā-sensitive agreement derives entirely from the constraints placed on the operation Agree and without stipulation.

In the next section, I present further evidence for the morphological account from patterns of *partial impoverishment* in which a proper subset of φ-features are deleted, but others remain.

4 Patterns of impoverishment

In Abaza and Tarifit Berber, impoverishment in the context of [WH] results in the *total leveling* of all φ-feature contrasts in an agreement paradigm. I proposed the same impoverishment rule that deletes all φ-features located in a feature bundle with a WH-feature for both languages:

(44) **Total φ-impoverishment triggered by WH**
[PERSON, GENDER, NUMBER] → Ø / [_, WH]

Total φ-impoverishment is not the only possibility; *partial φ-impoverishment* also occurs. An example of partial impoverishment comes from Seereer (Atlantic, Senegal):

(45) a. ***pro***$_i$ **i-njaw**-a ñaamel ke. [Seereer]
1PL 1PL-cook.PL-FV food the
'We cooked the food.' (Baier, elicitation, 2014)

b. ***in***$_i$ **njaw**-u ñaamel ke. [Seereer]
1PL cook.PL-FOC food the
'It's us who cooked the food.' (Baier, elicitation, 2014)

In Seereer, subject-verb agreement involves two types of marking. First, there is a prefix that indexes the person/number of the subject, (45a). This prefix cannot appear under subject focus fronting, (45b). Second, the verb stem undergoes initial consonant mutation when the subject is plural. This marking does not disappear under subject extraction. In (45b), the verb *njaw* 'cook' still indicates that the subject is plural.[18] In terms of the morphological account offered here, impoverishment of φ-features in Seereer is *partial* – only [PERSON] is deleted from the agreement bundle in (45b).

In a cross-linguistic survey of 40 languages exhibiting φ-agreement sensitivity to Ā-extraction, the possible patterns of impoverishment were found to be extremely limited (Baier 2014b, 2016). The results of this survey are summarized in table 6.[19]

	Normal Agreement			Impoverished Agreement		
	Person	Gender	Number	Person	Gender	Number
Type 1	✓	(✓)	✓			
Type 2	✓	(✓)	✓			✓
Type 3	✓	✓	✓		✓	✓

Table 6: Feature impoverishment patterns

The left side of the table shows which φ-features are indexed in regular, declarative clauses. The right hand of the table shows which of those features are indexed when the agreement controller is extracted. In type 1 impoverishment, all normal agreement features are neutralized (as in Abaza and Tarifit). In type 2, all normal agreement features other than number are neutralized (as in Seereer and in Tashlhit Berber, discussed in detail below). In type 3, only person agreement is neutralized, while gender and number agreement remain indexed (illustrations from Bantu discussed below).

The abstract effect of such impoverishment rules is reflected in tables 7 through 10. Table 7 shows an abstract agreement paradigm that distinguishes three features: person, gender, and number; each capital letter represents a unique agreement exponent. Subsequent tables show the expected leveling in the paradigm under a given type of impoverishment type, with color representing leveled cells.

	SG	PL
1	A	E
2	B	F
3M	C	G
3F	D	G

Table 7: PGN paradigm

	SG	PL
1	C	C
2	C	C
3M	C	C
3F	C	C

Table 8: Type 1

	SG	PL
1	C	G
2	C	G
3M	C	G
3F	C	G

Table 9: Type 2

	SG	PL
1	C	G
2	C	G
3M	C	G
3F	D	G

Table 10: Type 3

Under the analysis here, the limited number of leveling patterns suggests that the set of possible φ-feature impoverishment rules triggered by the presence of [WH] is itself limited. In fact, tables 8 through 10 can be captured by appealing to just three impoverishment rules. These are shown in 11:

[18]Seereer also exhibits a another type of morphological sensitivity to Ā-extraction. In declarative clauses, the verb bears the suffix *-a*, whereas in clauses in which Ā-movement has occurred the verb bears the suffix *-u*. This suffix appears in *all* clauses with which Ā-movement has crossed, that is, it is not sensitive to just subject extraction. For this reason, I set it aside here. For more discussion, see Baier (2014a).

[19]Checkmarks in parenthesis do not indicate optionality within a single language, but instead a conflation of two sub-patterns in the table. 'Type 1' applies equally to languages that suppress person and number and languages that suppress person, number, and gender.

Rule	Abstract Pattern	Language(s)
[PERSON] → Ø / [_, WH]	Table 10	Bantu, Seereer
[PERSON, GENDER] → Ø / [_, WH]	Table 9	Tashlhit Berber
[PERSON, GENDER, NUMBER] → Ø / [_, WH]	Table 8	Abaza, Tarifit Berber

Table 11: Possible φ-impoverishment rules

These impoverishment rules do not correspond perfectly to the types in table 6. For example, the rule which deletes only person derives both type 2 leveling (in a language that has only person and number agreement, Seereer) and type 3 leveling (in a language that has person, gender, and number agreement, Lubukusu, see below).

Descriptively, the set of possible φ-impoverishment rules is all of the schematic form in (46) and is constrained by the implicational hierarchy in (47):

(46) **Schematic impoverishment rule**
[⊆φ] → Ø / [_, WH]

(47) **Feature Impoverishment Hierarchy (FIH)**
PERSON ≫ GENDER ≫ NUMBER

The FIH constrains the schematic rule in (46) in the following way. If an impoverishment rule deletes a feature on the FIH, all features to that feature's left must also be deleted. That is, there is no φ-impoverishment in the context of [WH] that deletes [GENDER] to the exclusion of [PERSON] and no rule that deletes [NUMBER] to the exclusion of [GENDER] or [PERSON].

It has been noticed before that some anti-agreement languages suppress person features while leaving other features intact (Diercks 2010; Henderson 2007, 2013; Ouhalla 2005). However, the implicational relationship between person, gender and number was not discussed until Baier 2014b, and it is an important explanandum for any general theory of anti-agreement. In section 4.4, I return to this hierarchy and argue that it can be derived from relationships within the φ-feature geometry.

We have already seen total impoverishment (type 1) in Abaza and Tarifit. Seereer exhibits type 2 impoverishment. In this section, I further exemplify type 2 impoverishment with another Berber variety, Tashlhit, and type 3 impoverishment with the Bantu language Lubukusu. I show that the impoverishment mechanism developed for Abaza and Tarifit extends elegantly to these languages. The minimal change needed is that instead of a total impoverishment rule, a subset of φ-features are deleted.

I further show that there are patterns of what I call *complex partial impoverishment* in which impoverishment of one φ-feature is contingent on the presence of another φ-feature, in addition to aWH-feature. Taken together, partial and complex partial impoverishment provide strong evidence for the morphological approach to Ā-sensitive agreement developed here.

4.1 Tashlhit Berber: [PERSON, GENDER] deleted

Anti-agreement within the Berber family varies along a number of parameters, one of which is the pattern of φ-feature leveling that occurs in anti-agreement contexts. While Tarifit has total φ-leveling, Tashlhit, a Berber language spoken in Western Morocco, exhibits partial φ-leveling.

Like in Tarifit, verbs in Tashlhit agree with their subject for person, gender, and number. Unlike in Tarifit, number agreement is retained under extraction of a plural subject. Consider the relative clause in (48).

(48) **irgazn**$_i$ nna ffegh-**n-*(in)** $\_i$
man.PL C_{REL} left-PFV.PART-PL
'the men who left.' (Ouhalla 2005 citing Chafiq 1990:123)

The head of the relative clause in (48) is masculine and plural. Like in Tarifit, the verb appears with the participle suffix *-n*. I continue to assume that this form is the spell-out of the feature [WH] in the context of certain aspectual heads.[20]

Unlike Tarifit, however, the verb in (48) must obligatorily take the plural suffix *-in*. Thus, agreement still makes a distinction between singular and plural subjects in subject extraction contexts. In the theory developed here, this is accomplished by an impoverishment rule that does not target [NUMBER], but does delete [PERSON] and [GENDER] in the context of [WH]:

(49) **Tashlhit Berber φ-feature impoverishment**
[PERSON, GENDER] → Ø / [_, WH, Agr]

The rule in (49) deletes [PERSON] and [GENDER] from an agreement feature bundle that also contains a WH-feature. Because [NUMBER] is left intact, it is available for vocabulary insertion to reference. I assume that the suffix *-in* in (48) spells out an Agr head with plural number feature, as in (50).

(50) **Tarifit default agreement**
[NUMBER:PL, Agr] ↔ /-in/

Consider how the partial impoverishment rule in (49) leads to the insertion of the participle suffix and the plural suffix *-n* in (48):

(51) **Derivation of partial anti-agreement in Tashlhit**

a.	Feature bundle on Agr:	[Agr, PERS:3, NUM:PL, GEN:M, WH]
b.	Impoverishment:	[Agr, PERS:3, NUM:PL, GEN:M, WH] → [Agr, NUM:PL, WH]
c.	Vocabulary insertion:	[Agr, NUM:PL] ↔ /-in/
		[WH] ↔ /-n/ / _] Asp

The process is exactly parallel to the Tarifit case above. The Agr head enters the morphology with the feature bundle in (51a). Impoverishment is then triggered by the presence of [WH] in (51b). Crucially, the number feature survives impoverishment and is available for vocabulary insertion at step (51c). During vocabulary insertion, *-in* is inserted to spell out [Agr, NUM:PL] and *-n* spells out [WH].

4.2 Lubukusu: only [PERSON] deleted

In Lubukusu, a Bantu language of Kenya, verbs take a prefix that indexes the person, gender, and number of their subject. Examples of agreement in declarative clauses are shown in (52).

(52) a. ***pro*** **n**-a-bona o-mu-seecha
1SG 1SG-PST-see CL1-CL1-man
'I saw the man.' (Diercks 2010:113)

b. **o-mwa-ana** **a**-a-tim-a
CL1-CL1-child CL1.SBJ-PST-run-FV
'The child ran.' (Diercks 2010:87)

[20]Tashlhit exhibits the same aorist/non-aorist split in whether *-n* appears or not (Drouin 1996).

c. **si-si-indu** **sy**-a-kwa
CL7-CL7-thing CL7.SBJ-PST-fall
'The thing fell.' (Diercks 2010:117)

Gender and number agreement in Lubukusu (and the rest of Bantu) is realized as a set of noun classes, which are numbered in consecutive pairings where odd numbers (1, 3, 5, and so on) represent the singular of a noun class, and even numbers (2, 4, 6, and so on) represent the plural of a noun class. Following Carstens (1991, 2010), I assume that gender and number features are distinct at an abstract, formal level- that is, there is no primitive 'noun class' feature in Bantu. Carstens labels gender features with letters in the following way:

(53) **Bantu genders for classes 1-10** (Carstens 1991)

a. Gender A: classes 1/2

b. Gender B: classes 3/4

c. Gender C: classes 5/6

d. Gender D: classes 7/8

e. Gender E: classes 9/10

Gender A paired with a singular number feature results in class 1, while gender A paired with a plural number feature results in class 2, and so on. This allows gender and number to be formally distinguished in the agreement system of Bantu languages.

I follow Diercks's (2010) analysis of Lubukusu subject agreement, which builds off of Carstens's system. Diercks argues that first and second person pronouns are always specified for gender A. A partial list of the subject-verb agreement paradigm is given in table 12:

	SG	PL	Features of subject
1st	n-	khu-	PERS:1, GEN:A, …
2nd	o-	mu-	PERS:2, GEN:A,…
3rd & CL1/2	a-	ba-	PERS:3, GEN:A
CL3/4	ku-	ki-	PERS:3, GEN:B
	…	…	
CL7/8	si-	bi-	PERS:3, GEN:D

Table 12: Lubukusu φ-agreement (partial list)

Lubukusu distinguishes subject and non-subject Ā-extraction morphosyntactically in a number of ways. First, subject extraction requires that the verb take an additional prefix that agrees with the extracted subject. Diercks argues that this prefix is an agreeing complementizer, calling it the C-prefix, and I follow this analysis here. Second, extraction of a class 1 subject requires replacement of the normal subject marker *a-* with the morpheme *o-*.[21]

(54) **naanu** o-**w**-a-tim-a
CL1.who CL1-CL1.AAE-PST-run-FV
'Who ran?'

[21]In (54), the normal subject prefix is realized as [w] because of a normal phonological process of hiatus resolution. The [o] preceding it is the agreeing complementizer.

Henderson (2009, 2013) and Diercks (2009, 2010) have argued that anti-agreement in Bantu suppresses the feature [PERSON], while leaving other φ-features, [GENDER] and [NUMBER], intact. Evidence for this comes from the behavior of extracted 1st and 2nd person subjects. Consider what happens when 1st person singular and 1st person plural subjects are extracted in (55):

(55) **Lubukusu: Person distinctions leveled**

a. **Nise** o-**w**-onak-e kumulyango kuno
1SG CL1-CL1.AAE-PST-damage-PST CL3.door CL3.DEM
It is I who damaged the door'

b. **Nifwe** ba-**b**-onak-e kumulyango kuno
1PL CL2-CL2.SBJ-damage-PST CL3.door CL.DEM
It is us who damaged the door'

When a 1st person singular subject is extracted, (55a), both the C-prefix and the subject agreement prefix take the form *o-*, the same form that occurs with extracted class 1 subjects, instead of the expected *n-*. The extracted 1st person plural subject in (55b) controls the class 2 form *ba-*, instead of the expected *khu-*. Assuming that 1st and 2nd person pronouns are of gender A, as are classes 1 and 2, this means that a person distinction has been leveled but gender and number agreement has been kept intact.

This analysis is supported by the fact that subjects of an abstract gender other than [A] do not show any alternation under subject extraction. Notice that the C-prefix still survives.

(56) **Lubukusu: Cl7 subjects don't change**

si-si-indu si-**sy**-a-kwa
CL7-CL7-thing CL7.SBJ-PST-fall
'the thing which fell'

When the class 7 subject 'thing' is relativized in (56), there is no change to the expected subject marking. Compare the baseline Lubukusu agreement paradigm in table 12 to the corresponding forms that occur with Ā-extracted subjects:

	SG	PL	Features of subject
1st	o-	ba-	PERS:1, GEN:A, …
2nd	o-	ba-	PERS:2, GEN:A,…
3rd & CL1/2	o-	ba-	PERS:3, GEN:A
CL7/8	si-	bi-	PERS:3, GEN:D

Table 13: φ-agreement under subject extraction (partial list)

Like the patterns of Ā-sensitive agreement that we have observed already, this pattern involves the leveling of distinctions. First, the prefix *o-* levels to replace all the agreement prefixes for singular gender A subjects. Second, the 3PL/Class 2 agreement prefix *ba-* replaces the baseline 1PL/2PL agreement prefixes. Otherwise, there is no leveling.

The Lubukusu pattern is unique in the leveling patterns we have examined so far in that the marker that generalizes is not a 3rd person one, and therefore seems like it is less easily treated as a default. The core insight of Diercks's (2010) investigation of Lubukusu Ā-sensitive agreement is that *o-* is indeed an underspecified VI. It just happens surface in a different slot of the paradigm than 3rd person. Diercks' analysis of Lubukusu agreement VIs are given in 14:

	Features		Vocabulary item
Fully Specified	[PERS:1, GEN:A, NUM:SG, Agr]	↔	/n-/
	[PERS:1, GEN:A, NUM:PL, Agr]	↔	/khu-/
	[PERS:3, GEN:A, NUM:SG, Agr]	↔	/a-/
	[PERS:2, GEN:A, NUM:PL, Agr]	↔	/mu-/
Underspecified	[GEN:A, NUM:SG, Agr]	↔	/o-/
	[GEN:A, NUM:PL, Agr]	↔	/ba-/
	[GEN:D, NUM:SG, Agr]	↔	/si-/

Table 14: Lubukusu Agreement VIs

Lubukusu has a set of agreement VIs that are fully specified and spell out person, gender, and number. Included in this set is the prefix *a-*, which spells out [PERS:3, GEN:A, NUM:SG, Agr] (3rd person singular and class 1). Other agreement VIs in the language are underspecified for person. This set includes the prefix *o-*, which only spells out [GEN:A, NUM:SG, Agr]. The fact that *o-* is the marker used for 2nd person singular subjects derives from there being no more highly specified VI that can spell out a bundle with 2nd person and singular features in the language.

With Diercks' analysis in mind, Lubukusu Ā-sensitive agreement looks exactly like the patterns of Ā-sensitive agreement exhibited by Abaza and Tarifit. Subject extraction triggers a morphological retreat to an underspecified morpheme. Again, I argue that this is due to impoverishment. Specifically, I propose the rule in (57).

(57) **Lubukusu φ-feature impoverishment**
[PERSON] → Ø / [Agr, _, WH]

When this rule applies, [PERSON] is deleted from the relevant Agr head and no prefix that realizes the feature [PERSON] will be able to be inserted due to the Subset principle. Instead, the VIs *o-* and *ba-* generalize, because they are underspecified for PERSON, but are still specified for GENDER and NUMBER. If the subject is of abstract gender A, only *o-* or *ba-* will be able to be inserted after the impoverishment rule takes place. If the extracted subject is of another abstract gender, the regular agreement prefix will be inserted, as these VIs are always underspecified for PERSON.

The facts described in this section for Lubukusu hold more generally across Bantu languages with Ā-sensitive agreement.[22] Importantly, the deletion of [PERSON] in Bantu is observed independently of the morphological exponent that generalizes in Ā-extraction contexts. For example, Luganda exhibits the same pattern of partial impoverishment that Lubukusu does. However, in Luganda, it is the the 3rd person singular agreement prefix *y-* that generalizes to 1st and 2nd person singular, instead of the exponent for 2nd person singular as in Lubukusu:[23].

[22]See Henderson (2013) and Diercks (2010) for discussion.These authors argue that Bantu partial impoverishment results from the strategy these languages use to circumvent syntactic constraints on subject extraction. The common thread between the two accounts is that the subject agreement in these contexts is nominal in character, resulting in the leveling of [PERSON]. The scope of this paper does not allow for a full discussion of these accounts. See Henderson (2013) and Diercks (2010) for details.

[23]The data in tables 15 and 16 come from Diercks (2010:145), who cites Ashton et al. (1954:142)

	SG	PL
1	nn-	tu-
2	o-	mu-
3	y-	ba-

Table 15: Luganda baseline agreement

	SG	PL
1	y-	ba-
2	y-	ba-
3	y-	ba-

Table 16: Luganda agreement under subject extraction

This is expected under the approach developed in this paper. The pattern of φ-impoverishment present in a given language is independent of the morphemes that generalize when φ-impoverishment has applied.

What we have just seen is that the exact same process leads to the insertion of underspecified agreement morphology in Lubukusu, Tarifit, Tahslhit, and Abaza. The differences between these languages lies squarely in the morphology. Languages can differ in which features are impoverished in the context of a [WH] feature, and they can also differ in the vocabulary items available in such contexts.

The partial impoverishment data is significant because it indicates that there must be some agreement with an Ā-extracted argument that succeeds in these languages. That is, in Tashlhit, Seereer, and Lubukusu, at least some features of the extracted subject must be available to agreement in the syntax so that these features are available to be spelled out in the morphology. Partial impoverishment is therefore an important explanandum for any general theory of Ā-sensitive agreement Whatever one's theory of Ā-sensitive agreement is, that theory must allow for some agreement to succeed.

The present analysis meets this requirement in a straightforward way – the syntactic operation underlying agreement in extraction contexts and non-extraction contexts does not differ. The syntactic side of agreement proceeds as normal. Where the two contexts differ is in the morphology. In declarative contexts, no impoverishment takes place, and agreement surfaces in full. In extraction contacts, impoverishment is triggered, and there is an apparent lack of agreement.

4.3 Complex Partial Impoverishment

Partial impoverishment is not always as straightforward as the patterns discussed in the previous section may suggest. In fact, there are languages in which impoverishment of one φ-feature is contingent on the presence of another φ-feature, in addition to a WH-feature. Take the abstract patterns in tables 17 through 19 as a starting point.

	SG	PL
1	A	D
2	B	E
3	C	F

Table 17: PN agreement

	SG	PL
1	C	D
2	C	E
3	C	F

Table 18: Pattern A

	SG	PL
1	C	C
2	C	C
3	C	F

Table 19: Pattern B

Table 17 represents an agreement paradigm distinguishing person and number. Table 18 shows a leveling pattern in which person is leveled, but only when the agreeing argument is singular. Table 19 shows a leveling pattern in which both person and number are leveled, but only when the agreeing argument is 1st or second person. I refer to these patterns as *complex partial impoverishment*.

Pattern A complex partial impoverishment is attested is attested in Lubukusu, and may be attested elsewhere in Bantu.[24] Diercks (2010) reports that there are two patterns of leveling exhibited by

[24]Other potential Bantu languages with this pattern of complex partial impoverishment are Kinande (P. Schneider-Zioga, p.c.) and Zulu (J. Zeller, p.c.).

Lubukusu speakers. The first, discussed above, deletes [PERSON] agreement regardless of the number value of subject. In the second pattern, extracted 1st person singular and 2nd person singular subjects require the prefix *o-*, as in the first pattern. Extracted 1st person plural and 2nd person plural subjects, on the other hand, trigger normal person/number agreement. This is shown in table 20.

	SING	PLUR	
PERS:1, GEN:A	o-	khu-	1SG/PL
PERS:2, GEN:A	o-	mu-	2SG/PL
PERS:3, GEN:A	o-	ba-	3SG/PL & CL1/2
PERS:3, GEN:D	si-	bi-	CL7/8

Table 20: Lubukusu: pattern A complex partial impoverishment

The pattern of leveling in the singular, highlighted in green, arises because of the deletion of [PERSON]. However, the deletion of t[NUMBERhat feature is dependent on the number value of the agreeing argument. I argue that this is straightforwardly captured in the current account by allowing φ-features to be part of the conditioning environment for a φ-impoverishment rule. Specifically, I propose that the pattern in table 20 is captured by the following impoverishment rule:

(58) **Lubukusu pattern A complex partial impoverishment rule**
[PERSON] → Ø / [Agr, _, NUMBER:SG, WH]

The rule in (58) applies only when an agreement feature bundle contains both [NUMBER:SG] *and* [WH]. Thus, when the subject is plural, no leveling will occur, as there is no impoverishment.

Pattern B complex partial impoverishment is attested in the Dogon language Ben Tey. Subject focus in Ben Tey triggers a loss of person and number marking on the verb if the focused subject is 1st or 2nd person.

(59) **Ben Tey: [PERSON] and [NUMBER] leveled with focused 1st/2nd person subjects**

a. **íǹ** lò-**Ø**
1SG=FOC go.PFV-3SG
It's I who went.'

b. **îǹ** lò-rì-**Ø**
1PL=FOC go-PFV.NEG-3SG
'It was we who did not go.'

c. **úǹ** ló-m̀-dó-**Ø**
2SG=FOC go-IMPFV-NEG-3SG
'It's you.SG who will not go.'

d. **ûǹ** lò-**Ø**
2PL=FOC go.PFV-3SG
It's you.PL who went.'

When the focused subject is 3rd person, however, number is still marked on the verb, as shown in (60).

(60) **Ben Tey: No leveling with focused 3rd person plural subject**

bûǹ ló-m̀-n-**ɛ́**
3PL=FOC go-IMPFV.NEG-3PL
'It's they [focus] who will not go.'

Thus, morphological leveling of number agreement in Ben Tey is dependent on the person value of the focused subject. When the focused subject is 1st or 2nd person, number agreement is leveled. When the focused subject is 3rd person it is not.[25]

[25]This pattern of complex partial impoverishment is also found in Yukaghir (Maslova 2003; Schmalz n.d.).

This dependency between number agreement leveling and person can be captured in the same way that pattern A complex partial impoverishment in Lubukusu is modeled above. Assuming that 1st person and 2nd person are distinguished from 3rd person by the feature [PART(ICIPANT)], I propose that the following impoverishment rule is active in Ben Tey.

(61) **Ben Tey pattern B complex partial impoverishment rule**
[PERSON, NUMBER] → Ø / [Agr, _, PERSON:PART, WH]

This rule deletes [PERSON] and [NUMBER] only when there is a the person feature valued as [PARTICIPANT] in the same bundle. This captures the dependence between number agreement leveling and certain values of person in Ben Tey.

The existence of complex partial impoverishment is important because it places a further burden on any theory of Ā-sensitive agreement that is designed to explain both total anti-agreement and partial anti-agreement. Whatever one's theory of partial anti-agreement is, it should also be able to capture the interdependence between two φ-features in leading to impoverishment.

It is unclear how analyses of Ā-sensitive agreement based on syntactic constraints on Ā-movement would capture complex partial impoverishment. Such accounts generally treat φ-agreement underspecification in contexts of Ā-extraction as a lack of agreement in the narrow syntax. Cases of simple partial impoverishment must arise because some agreement still succeeds when an argument is extracted. In a language like Tashlhit Berber, where person and gender agreement are leveled but number agreement is retained, a syntactic account would be forced to conclude that the relevant constraints on extraction do not affect number agreement.[26] At the same time, such an account would also be forced to conclude that the presence of certain φ-features on the target of agreement *forces* agreement for other φ-features that would otherwise fail. For the Lubukusu pattern of complex partial impoverishment, for example, this would amount to saying that [PERSON] agreement fails when the subject is [singular], but when the subject is [plural], [PERSON] agreement must succeed, regardless of the constraints on extraction that normally rule [PERSON] agreement out.

On the other hand, the morphological theory of Ā-sensitive agreement developed here has a straightforward way of dealing with complex partial impoverishment. As we have just seen, the relationship is captured by adding one of the φ-features to the conditioning environment of the impoverishment rule. Thus, patterns of complex impoverishment provide an argument for the morphological account.

4.4 Constraining impoverishment

Impoverishment plays an important role in DM because it models systematic patterns of morphological neutralization. In the context of the current analysis, I have employed impoverishment to capture systematic underspecification of agreement in the context of a WH-feature. As we have already seen, there are a limited number of possible φ-feature impoverishment rules that occur in the context of a [WH]. These are given in table 21, repeated from above.

[26] A possible analysis could be the following. Assume that NUMBER- and GENDER- and PERSON-probes are decomposed and occupy separate heads in the clausal spine. With such a structure, one could argue that Agree with the GENDER- and PERSON-probes is bled by Ā-movement, while Agree with the NUMBER-probe is not. Perhaps PERSON-agreement is strictly local and Ā-movement from the Spec of the head hosting the PERSON-probe bleeds PERSON-agreement (cf. Baker 2011). This leaves open the question as to why the PERSON- and GENDER-probes are restricted in this way, but the NUMBER-probe is not, though see Baker (2011) and Preminger (2011) for accounts of why PERSON-agreement could be bled.

Rule	Abstract Pattern	Language(s)
[PERSON] → Ø / [_, WH]	Table 10	Bantu, Seereer
[PERSON, GENDER] → Ø / [_, WH]	Table 9	Tashlhit Berber
[PERSON, GENDER, NUMBER] → Ø / [_, WH]	Table 8	Abaza, Tarifit Berber

Table 21: Possible φ-impoverishment rules

This set of three impoverishment rules can be schematized as the general rule in (62).

(62) **Schematic impoverishment rule**
[⊆φ] → Ø / [_, WH]

The schematic rule in (62) describes any impoverishment rule that deletes some subset of φ-features from a feature bundle containing [WH]. However, without further limits, it describes rules that do not exist. For example, a rule that deletes only [GENDER] in the context of [WH] is perfectly compatible with (62). To remedy this, I proposed that impoverishment is constrained by the the implicational hierarchy in (63):

(63) **Feature Impoverishment Hierarchy (FIH)**
PERSON ≫ GENDER ≫ NUMBER

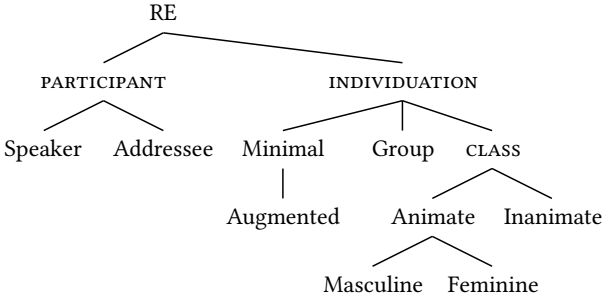
If an impoverishment rule deletes a feature on the FIH, all features to that feature's left must also be deleted. That is, there is no φ-impoverishment in the context of [WH] that deletes [GENDER] to the exclusion of [PERSON] and no rule that deletes [NUMBER] to the exclusion of [GENDER] or [PERSON].

As it stands, impoverishment is a powerful theoretical tool, in that it can be invoked to erase features that are otherwise thought to be present in a syntactic derivation. A priori, it is not constrained by any independent principles. The FIH is therefore a significant result – it defines which φ-impoverishment rules are licit and which φ-impoverishment rules are illicit.

The FIH captures a generalization in the cross-linguistic survey of Ā-sensitive φ-agreement that is reported on here. However, as it stands, it is still a stipulation – it is unclear why (63) is the observed hierarchy as opposed to some other. Therefore, an important question is whether or not FIH is a primitive of the grammar or whether it can be derived from more general principles. I would like to suggest that work on the geometric organization of φ-features provides a promising candidate for the second option.

Many authors have argued that the set of φ-features is internally organized in a *feature geometry* (Béjar 2000; Béjar and Rezac 2009; Campbell 2012; Harley and Ritter 2002; Preminger 2014). Feature geometries encode natural classes of features and entailment relations between features. For example, in their work on the possible φ-feature specifications of pronoun inventories cross-linguistically, Harley and Ritter (2002) argue for the φ-feature geometry shown in (64).

(64) **Feature Geometry for Pronouns, (Harley and Ritter 2002)**



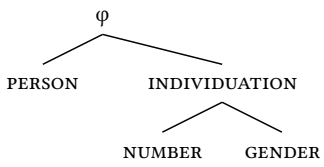
In order to derive the FIH from a geometry like (64), we could design a principle that constrains feature impoverishment based on relationships between nodes in the geometry. Abstractly stated, such a rule would read like (65).

(65) An impoverishment rule that deletes a feature α must also delete any feature β that stands in relation $\mathcal{R}$ to α.

In other words, the implicational relationships between features in the FIH would be derived by appealing to any independently needed relationships between nodes in a geometry. If such a geometry contrains more than just impoverishment, we would be on the way to explaining why certain φ-feature impoverishments rules exists and others do not.

An immediate question is whether Harley and Ritter's (2002) system can be used wholesale to derive constraints on impoverishment. Unfortunately, it cannot. To see why, consider how Harley and Ritter's geometry corresponds to the feature system I have used in impoverishment rules above. In (64), the [participant] node and its daughters correspond to [PERSON] and its values; the [class] node and its daughters correspond to [GENDER] values; and the [minimal], [augmented] and [group] nodes correspond to [NUMBER] and its values. Thus, we can broadly simplify the geometry in (64) into (66):

(66)



In order to derive the effects of the FIH, a feature geometry must capture two asymmetries. First, there must be an asymmetry between person on the one hand, and gender and number on the other. This asymmetry is captured in (66): [PERSON] is separated from [NUMBER] and [GENDER] by the [INDIVIDUATION] node. Second, there must be an asymmetry between gender and number. This asymmetry is *not* captured in (66), where [NUMBER] and [GENDER] are both immediate daughters of [INDIVIDUATION].

In terms of (65), then, there is no relation $\mathcal{R}$ that can be used to force impoverishment of [GENDER] when [NUMBER] is impoverished. This is in fact a more general issue with the simplified hiearchy in (66). If impoverishment rules are limited by referring to nodes in a geometry, there doesn't seem to be a relation $\mathcal{R}$ that would privilege [PERSON] over [GENDER] or [NUMBER], even though they stand in an asymmetric relationship.

Altogether, this suggests that Harley and Ritter's feature geometry cannot be adopted whole-cloth to constrain φ-impoverishment. Despite this, I think the idea deserves further scrutiny. There is an advantage to deriving constraints on impoverishment rules in this way over brute force stipulation of an implicational hierarchy like the FIH. Namely, feature geometries have been employed to derive more than just impoverishment. As mentioned above, Harley and Ritter use their feature geometry to derive the set of possible pronoun inventories. Others use φ-feature geometries to derive relativized probing effects (Preminger 2014) or patterns of discontinuous exponence (Campbell 2012). If we are able to find a geometry that fits all these analyses, we will have uncovered a deeper aspect of language.

5 Extraction asymmetries

The intuition at the core of the analysis in this paper is that Ā-sensitive φ-agreement occurs when a φ-probe agrees with a goal bearing a WH-feature. Thus, Ā-sensitive agreement is triggered by a featural property of the argument that undergoes movement. This property gives rise to φ-impoverishment on (certain) φ-probes in the morphological component, allowing insertion of an underspecified agreement

exponent. By extending my analysis cover both anti-agreement and *wh*-agreement, I have argued that both '*wh*-agreement' and 'anti-agreement' should be analyzed as a result of this process.

The unification of *wh*-agreement and anti-agreement under the umbrella of a single process has an important consequence regarding the distribution of Ā-sensitive agreement. Recall that Abaza and Tarifit differ with regard to which arguments trigger Ā-sensitive agreement when they are extracted. In Abaza, the effect is ubiquitous. Ā-extraction of any agreeing argument triggers *wh*-agreement. This is shown for transitive subjects and objects in (67).

(67) **Abaza *wh*-agreement is symmetrical**

a. *Ergative wh-agreement*
a-fačʲəʕʷ a-finǰʲan a-pnə **dəzda** y-na-**z**-axʷ
DEF-sugar DEF-cup 3SG.I-at who 3SG.I-PFV-ERG.WH-take
'Who took the sugar out of the cup?' (O'Herin 2002:252)

b. *Absolutive wh-agreement*
Izmir *pro* **dzač'ʷəya** **yə**-r-bakʷaz
Izmir 3PL who ABS.WH-3PL-see.PL.PST
'Who did they see in Izmir?' (O'Herin 2002:252)

On the other hand, in Tarifit Berber, only Ā-extracted *subjects* trigger anti-agreement, (68a);[27] Ā-extracted *objects* do not trigger the effect, (68b)

(68) **Tarifit anti-agreement is asymmetrical**

a. **man tamghart**$_i$ ay **yzrin**/*t-zra $_{-i}$ Mohand
which woman C see-PFV.PART/3SG.F-see-PFV Mohand
Intended: 'Which woman saw Mohand?' (Ouhalla 1993:479)

b. ma$_i$ ag **iswa** **ʕli** $_{-i}$
what C drink.PFV.3SG.M Ali
'What did Ali drink?' (Ouali 2011:99)

Data like those in (68) has led anti-agreement in Berber and other languages to be classified as a subject/non-subject extraction asymmetry on par with that-*t* effects (Boeckx 2003; Ouhalla 1993; Erlewine 2016; Pesetsky 2016). The idea behind such accounts is that there are constraints on subject movement in (68a) that preclude extraction from a position that controls agreement. These constraints do not apply to objects, and thus objects do not trigger anti-agreement. A crucial aspect of these syntactic accounts is that Ā-movement itself is to blame for the appearance of Ā-sensitive agreement. Independent constraints on Ā-movement conspire to bleed agreement in derivations with extraction.

Such syntactic analyses cannot easily be generalized to the Abaza *wh*-agreement pattern. First, the ubiquity of Ā-sensitive agreement with *any* extracted argument in Abaza would mean that the same syntactic constraint on Ā-movement applies to all arguments equally in the language. Second, and more importantly, there are examples in Abaza of *wh*-agreement that is triggered by an element that has not undergone Ā-movement itself, as discussed above in section 2.3,

However, a key similarity between the distribution of Ā-sensitive agreement in Tarifit and in Abaza emerges when one considers these data in light of the morphological theory advocated for in this paper.

[27] In fact, only *locally* Ā-extracted subjects trigger anti-agreement in Berber; long-distance subject extraction does not induce the effect. This difference is beyond the scope of the current paper. See Ouhalla (1993), Ouali (2011), Shlonsky (2014) for details and discussion.

Namely, both languages conform to the following generalization:

(69) Ā-sensitive agreement on a φ-probe can only be triggered by extraction of an argument that has interacted with that φ-probe.

In other words, there is a crucial configuration that gives rise to Ā-sensitive agreement, shown in (70):

(70) **Configuration for Ā-sensitive agreement**
[… $P_{[u\varphi]}$ [… $QP_{[\varphi,\ wh]}$ …]
└ φ+WH ┘

In (70), when the φ-probe on P finds QP, it copies back both [φ] and [WH], which in turn leads to impoverishment, since these features are now in the same bundle. What is important to keep in mind in the ensuing discussion is that this is a 'normal' result of Agree. The syntax of Agree in (70) does not differ from the syntax of Agree in derivations without extraction.

Thus, the difference between Abaza and Tarifit derives from which arguments interact with agreement probes in the first place. In both languages, there is a one to one correspondence between being targeted by a φ-probe and triggering Ā-sensitive agreement. In Tarifit, only the subject is targeted by a φ-probe. Therefore, only subject extraction causes anti-agreement. The difference between subject extraction and object extraction in Tarifit is schematized in (71) and (72), respectively.

(71) **Subject QP: probe finds [φ, WH]**
[… $P_{[u\varphi]}$ [… [$_{vP}$ $QP_{[\varphi,\ wh]}$ v [$_{VP}$ V $DP_{[\varphi]}$]]]]
└ φ+WH ┘↑

(72) **Object QP: probe finds [φ]**
[… $P_{[u\varphi]}$ [… [$_{vP}$ $DP_{[\varphi]}$ v [$_{VP}$ V $QP_{[\varphi,WH]}$]]]]
└ φ ┘↑

In (71), where the subject is a QP, and when the P finds and copies [φ] and [WH], leading to impoverishment. In (72), where the subject is a simple DP, P finds and copies back only [φ]. There is no impoverishment because P never copies a [WH] feature, since one is not accessible to it in the syntax. The difference between two extraction contexts in a single language reduces to a difference in the distribution and number of φ-probes in a clause and the location of [WH]. This difference applies across languages as well. The difference between Abaza and Tarifit reduces to the fact that in Abaza, every extracted argument interacts with a φ-probe, while in Tarifit, only the subject interacts with a φ-probe.

Thus, the morphological account erases the illusion that there is a fundamental subject/non-subject asymmetry in which arguments can trigger Ā-sensitive agreement effects. Instead, apparent asymmetries reduce to which arguments can interact with which probes. This is confirmed by the typologically.

Agreement	**Impoverishment trigger(s)**	**Language**
Nom	Nom	Berber (Ouhalla 1993)
Nom + Acc	Nom	Palauan (Georgopoulos 1991b)
Nom + Acc	Nom + Acc	Zulu (Doke 1927)
Nom + Acc	Acc	Ndebele (Shenk 1970)

Table 22: Impoverishment triggers in NOM-ACC languages

Agreement	**Impoverishment trigger(s)**	**Language**
Abs	Abs	Karitiana (Storto 1999)
Erg + Abs	Erg	Kaqchikel (Erlewine 2016)
Erg + Abs	Erg + Abs	Abaza (O'Herin 2002)
Erg + Abs	Abs	Selayarese (Finer 1997)

Table 23: Impoverishment triggers in ERG-ABS languages

Tables 22 and 23 show clearly that, cross-linguistically, there is no asymmetry in which arguments can potentially trigger anti-agreement in languages with multi-argument agreement. In languages with an ergative-absolutive agreement pattern, anti-agreement can be triggered by only absolutive arguments (Karitana; Selayarese); only ergative arguments (Kaqchikel); or both ergative and absolutive arguments (Abaza). Likewise, in nominative-accusative agreement languages, anti-agreement can be triggered by only nominative arguments (Palauan); only accusative arguments (Ndebele); or both nominative and accusative arguments (Zulu).

Tables 22 and 23 also show that asymmetries certainly do exist within individual languages. As we have seen for Berber, this asymmetry comes about due to the fact that there is one φ-probe in the Berber clause and it targets the highest argument inside vP. However, there is a question regarding how to derive the difference between a language like Abaza, in which both ergative and absolutive arguments trigger Ā-sensitive agreement, and Kaqchikel, in which only ergative arguments trigger such effects.

In the morphological approach, this difference must reduce a difference in impoverishment rules between Abaza and Kaqchikel. In Abaza, the φ-impoverishment rule that applies to a [φ+wh] bundle is *generalized to all probes*. In Kaqchikel, on the other hand, the equivalent φ-impoverishment rule is limited in its application. Specifically, the φ-impoverishment applies only to the probe that finds the external argument of a transitive predicate. The same analysis can be applied to the difference between Paluan, which has only subject Ā-agreement, and Zulu, which has both subject and object Ā-agreement effects.

The core result of morphological unification of *wh*-agreement and anti-agreement eliminates a supposed subject/non-subject asymmetry in which arguments can trigger Ā-sensitive agreement. These facts have previously gone unnoticed in the literature and pose a serious challenge to accounts that rely on specific structural characteristics of certain arguments to derive the effect, such as those based on Criterial Freezing (Diercks 2010; Rizzi and Shlonsky 2007; Shlonsky 2014) or Anti-Locality (Cheng 2006; Erlewine 2016; Schneider-Zioga 2007). These accounts have gained traction largely because anti-agreement has been discussed for languages in which it is triggered by (local) Ā-movement of subjects only. By taking a large sample of languages into view, we get more insight into how the anti-agreement and *wh*-agreement patterns are similar.

6 Conclusion

By pursuing a unified, morphological analysis of anti-agreement and *wh*-agreement, we also gain an elegant way of explaining cross-linguistic variation in Ā-sensitive agreement patterns. In fact, there are three core morphological parameters that determine cross-linguistic variation.

(73) **Parameters of variation in Ā-sensitive agreement**

a. Which φ-probes does φ-impoverishment apply to?

b. Which φ-features do φ-impoverishment rules delete?

c. What is the feature specification of agreement VIs?

First, languages vary as to which heads hosting agreement probes are are targeted by φ-impoverishment and what type of φ-impoverishment rule targets a given head, (73a). In languages lacking Ā-sensitive agreement, such as English, no head is targeted for φ-feature impoverishment. In a language like Kaqchikel, where only transitive subjects trigger Ā-sensitive agreement effects, φ-impoverishment applies only to the probe that finds the external argument of a transitive predicate. Finally, in a language like Abaza, where all arguments trigger Ā-sensitive agreement, the φ-impoverishment rule that applies to all φ-probes.

Second, languages vary with regard to which φ-features are deleted when an impoverishment rule does apply, (73b). In languages like Tarifit Berber and Abaza, φ-impoverishment in total, deleting all φ-features. In other languages, like Tashlhit Berber, Seereer, and Lubukusu, φ-impoverishment is partial, deleting only a subset of φ-features. Furthermore, partial impoverishment may be complex. These patterns are constrained by the Feature Impoverishment Hiearchy (see example (47), above).

Third, languages vary in which vocabulary items (VI) can be inserted after impoverishment has occurred, (73c). This was seen clearly with Abaza. In that language, the ergative agreement paradigm has a dedicated prefix, *z-*, that spells out [WH] and surfaces in Ā-extraction contexts. On the other hand, the absolutive agreement paradigm retreats to a true default agreement prefix *y-* in extraction contexts. Other languages may lack any morpheme that spells out [WH], and therefore will always surface with a default.

The third factor of variation is not restricted to my account of Ā-sensintive agreement. In fact, it is a more general parameter of morphological variation. Languages simply differ in the features that their vocabulary items spell out. This is an advantage of the morphological approach, in that one degree of variation is reduced to an independently needed parameter.

The syntactic side of the account also has a role to play in variation. Specifically, the two syntactic parameters of agreement in (74) constrain where Ā-sensitive agreement may surface in a given language.

(74) **Parameters determining distribution of Ā-sensitive agreement**

a. How many φ-probes are there in a clause?

b. Where are these φ-probes located?

Notice, however, that the two parameters in (74) do not directly determine the distribution of Ā-sensitive agreement in a given language. Instead, they are properties that independently determine the distribution of φ-agreement as a whole in a given language. Thus, they indirectly constrain how many potential targets there are for φ-impoverishment and which arguments will potential trigger Ā-sensitive agreement. For example, in Berber, only subjects can trigger Ā-sensitive agreement because there is only one φ-probe and it is located in a position such that it preferentially targets the highest argument in the clause. As a whole, then, cross-linguistic variation in Ā-sensitive agreement effects reduces to properties of the morphological component, not the syntactic component.

On a broader scale, there are two other important differences between syntactic accounts and the morphological approach offered here. First, under the morphological approach, this syntax is uniform – agreement functions the same way in both extraction and non-extraction contexts. In syntactic approaches based on restrictions on Ā-movement, however, the derivation of a clause with Ā-sensitive agreement and one without may differ radically. Thus, in these accounts, there is a more enriched syntactic component, whereas in the morphological approach the syntax in these two contexts is uniform.

Second, my analysis bears on an understanding of the nature of countercyclic phenomena in syntax. Ā-sensitive agreement appears to be such a phenomenon – φ-agreement is generally thought to occur

before A'-movement, but in anti-agreement configurations, φ-agreement is bled by such movement. For syntactic approaches, this forces a relaxing of the cyclic nature of syntactic derivations. Under the morphological approach, however, this countercylicity disappears. Abstract agreement occurs in the syntactic component, but evidence of this operation is obscured in the morphology.

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