Deriving pro drop in a non-paradigmatic approach

Abstract:

Despite the fact that pro drop is one of the better studied phenomena in linguistics, the question why pro drop is so pervasive in Romance and so unpervasive in Germanic languages has resisted a principled answer. It is generally agreed upon that agreement somehow plays a role, but both a paradigmatic and a contextual approach towards capturing this correlation run into problems. In this paper, we adopt the contextual approach to pro drop, as well as the commonly used constraint stating that that the morpheme licensing an empty subject cannot be underspecified, but we supplement it with a constraint stating that the licensing morpheme cannot be overspecified either. If the licensing morpheme also denotes tense features, pro drop is blocked. We subsequently argue that Romance languages express tense and agreement bi-morphemically, whereas they are expressed mono-morphemically in Germanic languages, contrary to what is commonly assumed. We propose that this distinction between Romance and Germanic languages is the outcome of a learning algorithm that adopts a bi-morphemic expression of tense and agreement as a default but abandons such a transparent analysis in the face of non-trivial complexity, e.g. if transparency can only be maintained with the help of a null allomorph.

1 Introduction

Some languages allow the argumental subject of a finite clause to be (phonologically) absent, whereas this leads to ungrammaticality in other languages. This difference can be illustrated with Italian and English.

(1) a. Gianni ha detto che ha telefonato *Italian*

Gianni has said that has.3SG telephoned

'Gianni said that he called'

b. *John said that telephoned *English*

Italian is a so-called pro drop, or null subject, language, in contrast to English. The classical question is what underlies this distinction, and the classical answer is that the source lies in the inflectional agreement systems (cf. Taraldsen 1978, Rizzi 1982, Jaeggli & Safir 1989, among many others). Focussing on Italian and English, one can observe that English is a poor agreement language, only displaying a distinction between the 3SG *-s* and a null form, whereas in Italian each slot of the paradigm is filled by a unique form:

(2) Italian and English agreement paradigms:

	Italian	*English*
	parlare ('to talk')	to talk
1SG	parl-o	talk-∅
2SG	parl-i	talk-∅
3SG	parl-a	talk-s
1PL	parl-iamo	talk-∅
2PL	parl-ate	talk-∅
3PL	parl-ano	talk-∅

One might therefore conclude that richly inflected languages have pro drop because the agreement on the verb is able to identify or reconstruct the missing subject. However, it is not entirely clear why English could not do that in 3SG contexts. After all, the *-s* form is as unique in the English paradigm as 3SG *-a* is in the Italian one. To account for the fact that English does not even allow null subjects in 3SG contexts, reference to the entire paradigm appears to be necessary: English agreement is poor *overall*, and therefore it does not allow empty subjects *overall*. Such a paradigmatic approach, however, runs into (minimally) three problems.

The first problem is that derivations do not have access to paradigms (cf. Bobaljik 2003). Derivations have access to individual forms in a paradigm but not to the paradigm as a whole; paradigms are epiphenomenal:. If so, how can it be determined that in a particular derivation a subject can be null, if the source for this option lies outside the derivation?

The second problem is the existence of so-called partial pro-drop languages. These are languages that allow null subjects but only in certain person/number contexts. Standard Finnish and Hebrew, for instance, only allow pro drop in 1st/2nd person contexts (cf. Vainikka & Levy 1999), though 3rd person pro drop is possible in a variety of contexts as well. Several Germanic varieties, such as Frisian and Bavarian German, are analyzed as partial pro-drop varieties (see section 4 for discussion). The existence of partial pro-drop languages suggests that pro drop does not have to be an all-or-nothing affair in which null subjects are categorically allowed or disallowed, as expected by the paradigmatic approach, but that the choice can be made contextually. This, however, begs the question why the same is not possible in English in 3SG contexts.

The third problem for a paradigmatic approach is that it requires a definition of what counts as a rich agreement paradigm. Otherwise, no clear generalisation is possible. In practice, defining richness turns out to be a difficult task. Standard German, Icelandic, European Portuguese and Romanian all have five distinctions in the present tense paradigm, as shown in (3).[1] Nevertheless, only

[1] This is true if we follow the standard assumption that the Standard German 3.SG-2.PL syncretism is an instance of homophony, not syncretism (but see Müller 2006). See also footnote 13.

the latter two are pro-drop languages. So whatever defines richness, simply counting the number of distinct forms is not the way.

(3) German, Icelandic, Eur. Portuguese and Romanian agreement paradigms:

	German	*Icelandic*	*Eur. Portuguese*	*Romanian*
	spazieren ('to walk')	heyra ('to hear')	cantar ('to sing')	a cânta ('to sing')
1SG	spazier-e	heyr-i	cant-o	cânt
2SG	spazier-st	heyr-ir	cant-as	cânți
3SG	spazier-t	heyr-ir	cant-a	cântă
1PL	spazier-en	heyr-jum	cant-amos	cântăm
2PL	spazier-t	heyr-ið	cant-am	cântați
3PL	spazier-en	heyr-a	cant-am	cântă

In contrast to a paradigmatic approach, one could pursue a contextual approach, as already alluded to above. Whether a null subject is possible in a particular context relies on the agreement form realized in that particular context, and not on overall richness. The main advantage is that the grammar does not have to refer to the whole paradigm anymore. Moreover, partial pro-drop languages are expected to exist, because they can have some context(s) in which agreement marking is rich enough to allow reconstruction of the missing subject. Italian could then be taken as a language that simply has many of those rich contexts, so that pro drop becomes an overall property. The problem with a contextual approach, however, is that it massively overgenerates. It expects null subjects to be possible in 3SG contexts in English, and in most of the contexts in Standard German and Icelandic, contrary to fact.

In sum, there are two approaches that enable us to establish a link between allowing empty subjects and richness and express the classical intuition that empty subjects must be identifiable: a paradigmatic and a contextual approach. The paradigmatic approach undergenerates in that it expects

less pro drop than we see in reality, whereas the contextual approach overgenerates in that it expects more pro drop than we see in reality.

The remainder of this paper is an attempt to get out of this conundrum. We will restrict ourselves to Romance and Germanic languages, because the contrast they display is not well understood and understanding it better will therefore also help in successfully enlarging the empirical coverage beyond the languages we discuss, a topic mostly beyond the scope of this paper. In a nutshell, we will argue that the conundrum was (partly) created by looking too myopically at present tense paradigms only. When other paradigms, such as past tense (or imperfect) paradigms, are taken into consideration, it becomes clear that in Romance null subject languages the agreement systems in the past tense can be related to the present tense agreement systems in a much more transparent way than in the Germanic non-null subject languages. We will in fact argue that Romance languages express tense and agreement bi-morphemically, whereas they are expressed by one and the same morpheme in Germanic languages, contra first appearances. The reason why null subjects are possible in Romance languages is that they employ a morpheme that is dedicated to the expression of agreement and this morpheme can straightforwardly license an empty subject. In Germanic languages, on the other hand, the morpheme that expresses agreement also expresses tense. This morpheme is overspecified for the licensing of null subjects, as it crucially encodes a feature that cannot be part of the (interpretation of) the subject, namely tense.

In section 2, we will look at the overspecification problem in more detail and show how it can be related to the bi- or mono-morphemic analysis of tense and agreement. Sections 3 and 4 will analyze several languages in detail (Italian, Spanish and Romanian as representatives of full pro-drop languages; Icelandic, German, English, Dutch, and Faroese for non-pro-drop languages with agreement; German dialects and Frisian for partial pro-drop languages). In section 5, we will show how our proposal can be embedded in current agreement theory, and what the implications are for the status of the null subject. Section 6 concludes and discusses some issues for further research

2 Overspecification as a problem for null subject licensing

The literature on null subjects makes a distinction between languages in which agreement properties determine whether argumental null subjects are an option and languages in which agreement properties are irrelevant, i.e. the languages that are currently known as the radical pro-drop languages (cf. Huang 1984; Jaeggli & Safir 1989; Neeleman & Szendrői 2007). In languages like Japanese and Chinese, null subjects, as well as null objects, are possible in the absence of an agreement system. Focussing on agreement-based pro drop and ignoring radical pro drop (which is what we will do in this paper), one can establish as a pervasive principle the idea that the agreement features enabling the subject to be null should be expressive enough to allow reconstruction of the missing subject. In other words, underspecification blocks the possibility to leave the subject empty. In this paper we argue that overspecification is just as much a problem for licensing null subject, namely if the overspecific feature is at odds with what the interpretation of the subject requires. How this works is explained in section 2.1. In section 2.2, we will make explicit what constraints underlie the analyses of morphological paradigms and how these are related to the pro-drop problem.

2.1 The overspecification problem

Take a look at the following table, indicating four possibilities for a hypothetical case involving a 1PL subject:

(4) Hypothetical scenarios:

Context	*Subject*	*Morpheme (on V)*	*Status*	*Pro drop*
1	[plural, speaker]	[plural, speaker]	specification	yes
2	[plural, speaker]	[plural]	underspecification	no
3	[plural, speaker]	[plural, speaker, past]	overspecification	no
4	[plural, speaker]	[plural, past]	under- and overspecification	no

Assume that the subject expresses the feature [plural, speaker]. In context 1, the features expressed by the morpheme on the verb coincide with those expressed by the subject. This means that an empty

subject should be possible because in context 1 the morpheme on the verb expresses the same features as those of the subject and is therefore rich enough to allow reconstruction. Context 2 involves underspecification, because the licensing morpheme fails to express one feature that the subject expresses. We therefore predict pro drop not to be possible here. Context 3 involves overspecification: the morpheme on the verb expresses more features than the subject does. Using an empty subject in this context is not possible, we argue, as the overspecific feature [past] is crucially one that cannot be part of the interpretation of the subject. As a consequence, no empty subject can be used. It is now logically possible to have a context with both under- and overspecification (one feature too many and one feature too few), and no null subjects should of course be possible in Context 4.[2]

The overspecification problem arising in Context 3 disappears if the language in question expresses tense on a separate morpheme, as illustrated in (5) below. In such contexts, there is one morpheme, namely Morpheme 1, that can adequately perform the licensing function because it is neither under- nor overspecified. The feature [past] does not interfere with null subject licensing because it is expressed by a separate morpheme. Hence, the fact that verbal inflectional may expresses tense (or other grammatical) features as well, is not a problem for licensing pro drop, as long as these features are morphologically separated.

(5) A bi-morphemic scenario:

Subject	*Morpheme 1*	*Morpheme 2*	*Status*	*Prodrop*
[plural, speaker]	[plural, speaker]	[past]	specification	yes

In sum, overspecification is a problem for null subject licensing but tense features can only block null subjects in languages that express tense and agreement mono-morphemically. If a language

[2] For some poorly understood reason, the licensing morpheme can be underspecified for gender. In 3rd person contexts, where gender marking occurs, pro drop is possible in a language like Italian, despite the fact that this language lacks gender marking on the finite verb. We speculate that the reason for this is that gender is not a general property of subjects, and its irrelevance in 1st and 2nd person contexts carries over to 3rd person contexts. Note that overspecification of gender should not be a problem, as gender can be interpreted as part of the subject, in contrast to tense. Therefore, pro-drop languages with gender marking only on the verb are compatible with our analysis.

expresses tense and agreement bi-morphemically, the morpheme dedicated to the expression of agreement can still license a null subject if it is sufficiently specified. Given this hypothesis, the task is to determine for each language whether tense and agreement are expressed mono- or bi-morphemically. As already stated earlier, we will argue that Romance pro-drop languages allow a bi-morphemic analysis of tense and agreement, whereas such an analysis is problematic for Germanic languages.

Now, at first view, this looks like a hypothesis that is hard to maintain. Take a look at the present and past tense paradigms of non-null subject languages German and Icelandic.

(6) German and Icelandic agreement paradigms:

	German		*Icelandic*	
	spazieren ('to walk')		heyra ('to hear')	
	present	*past*	*present*	*past*
1SG	spazier-e	spazier-**te**	heyr-i	heyr-**ð**-i
2SG	spazier-st	spazier-**te**-st	heyr-ir	heyr-**ð**-ir
3SG	spazier-t	spazier-**te**	heyr-ir	heyr-**ð**-i
1PL	spazier-en	spazier-**te**-(e)n	heyr-jum	heyr-**ð**-um
2PL	spazier-t	spazier-**te**-t	heyr-ið	heyr-**ð**-uð
3PL	spazier-en	spazier-**te**-(e)n	heyr-a	heyr-**ð**-u

It looks like both languages straightforwardly allow a bi-morphemic analysis, identifying *-te* and -ð- as forms realizing a past tense morpheme (present tense being zero), followed by forms realizing agreement features (cf. Bobaljik & Thráinsson 1998 for such an analysis). In a contextual approach to pro drop, such bi-morphemic analyses would wrongly predict both languages to have partial pro drop, namely in those environments where agreement is uniquely identifying. However, the fact that it is possible to analyze these paradigms bi-morphemically does not mean that they have to be. What is a

possible, or optimal, analysis depends on one's assumptions on the theoretical devices (features and rule types) but also on the hypothesis space available to a language learning child. Under the standard assumption that this space is constrained, so will the number of possible analyses. So let us be explicit about these constraints, which we will do in the next section.

2.2 Constraints on analyses for paradigms

Two types of constraints need to be considered: constraints that determine which formal features are acquired and constraints that determine how these features are assigned to particular forms.

As for the first type of constraint, there are two requirements that formal features are subject to and that therefore guide the language acquisition process. These are listed in (7)a-b.

(7) Constraints on paradigmatic analyses

a. *Semantic Evidence*: Only postulate formal features that are grammatical pendants of the semantic features (*in casu* that constitute the subject paradigm).

b. *Morpho-syntactic Evidence*: Only postulate formal features for which there is morpho-syntactic evidence.

Constraint (7)a, *Semantic Evidence*, is primarily motivated by the fact that uninterpretable φ-features are the semantically vacuous counterparts of interpretable φ-features (cf. Chomsky 1995, Svenonius 2006, Zeijlstra 2008, among many others). Consequently, for every formal, uninterpretable φ-feature that is active in the grammar, a corresponding interpretable φ-feature must be present as well. Hence, for every formal feature, semantic evidence is required.

One consequence of *Semantic Evidence* is that it favours privative features over bivalent ones for the analysis of agreement systems. Semantic features like [speaker] and [addressee] are well motivated. Subject pronouns like *I* and *you* in English make reference to the speaker or addressee, respectively. However, 3rd person subjects like *he* or *she* are known to be able to make reference to a speaker or hearer too. As Heim (2008) has shown, a sentence like (8) cannot only be used to talk about a set of girls that does not include the speaker or hearer. (8) can also be uttered by, or addressed

to, a member of the same set of the girls that are being talked about. This is evidenced by the fact that a continuation like 'including me (and you)' is not infelicitous.

(8) Every girl invited herself.

The meaning of an English third person, then, must come from the absence of a feature [speaker] or [addressee], not from a negative feature like [-participant] (see Sauerland 2008, Heim 2008, Kratzer 2009; for many more examples; see also Forschheimer 1953 and Benveniste 1971). Such a feature would invoke too strong a reading. Similar assumptions that are standardly made in this respect is that singular is nothing but the absence of a number feature [plural] (though see Sauerland et al. 2003) and present tense the absence of a tense feature [past] (cf. Sauerland 2002).

Constraint (7)b, *Morpho-syntactic Evidence*, states that semantic features only have a formal, uninterpretable counterpart if there is grammatical evidence for it. Even though English semantically distinguishes [speaker] and [addressee] features, there is no evidence for formal, uninterpretable [speaker] and [addressee] φ-features, for the simple reason that the choice between a first and second person subject triggers no further grammatical differences. The verbal agreement they trigger, for instance, is always the same. *Morpho-syntactic Evidence* is very easily motivated in terms of learnability. There is no reason for a child to assume the existence of formal, uninterpretable [speaker] and [hearer] features, if there is no grammatical cue for them present in the language input. Note that this constraint also guarantees that poor or no agreement is indeed just that. It excludes analyses of languages where every finite verb exhibits underlying co-varying φ-morphology that remains unpronounced (see also Preminger 2019).

The interplay between *Semantic Evidence* and *Morpho-syntactic Evidence* makes that any inflectional form that can be used for 3SG in the present tense must be an elsewhere form. As discussed above, 3rd person signals the absence of a person feature, just as the singular entails the absence of [plural] and present tense the absence of [past] (cf. Sauerland 2002, 2008, though see also Sauerland et al. 2005). Hence, a 3SG present agreement form (provided it does not spell out non-default gender) cannot be taken to reflect any semantic feature and must thus be analyzed as the elsewhere form. That

is certainly not a new idea, but a proposal that is still standardly accepted today (see Harley & Ritter 2002, Preminger 2014 for an overview and discussion of the evidence; though see Nevins 2007 for an alternative position).[3]

The two constraints in (7), *Semantic Evidence* and *Morpho-syntactic Evidence*, jointly determine the formal feature inventory of a particular language. These constraints actually form an algorithm. As a first step, a child has two find out which semantic features are part of the target language (in this case, part of the pronominal paradigm) and second, which of these features are also formally active. It is not possible for a child to postulate a particular formal feature that lacks a semantic counterpart.

For the assignment of features to particular forms, similar constraints are at stake, which we spell out in (9).

(9) Constraints on paradigmatic analyses

a. *Transparency*: assume a 1:1 mapping between a particular form and a particular feature, unless there is evidence to the contrary.

b. *Uniformity*: assume paradigms to be structurally uniform, unless there is evidence to the contrary.

Constraint (9)a, *Transparency*, goes back to Clark (1987), who proposes that when children identify which features are active in their target language, they will try to align these features with corresponding forms. Suppose that in the present tense the form *-x* occurs in 1SG contexts. Then the child can analyze this form as the spell out of an uninterpretable φ-feature [uφ: speaker], and this conclusion will be strengthened if *-x* reappears in 1SG contexts in another productive paradigm (tense, mood or aspect).[4] This is for instance the case with the Italian 1st singular marker *–o*, which re-appears in all paradigms. Suppose now that *-x* does not reappear in the past tense but that we find *-y* instead.

[3] Note that this does not entail that 3rd person agreement can never express a feature value. *Semantic Evidence* would only require that such a feature value is semantically motivated, which would be the case if 3rd person pronouns can never make reference to a conversational participant. This does not hold for any of the languages we discuss in this paper, though.

[4] Following standard practice, we use [uφ] when referring to an uninterpretable φ-feature, and [φ] to refer to an interpretable one.

This contradicts *Transparency*, but there are two ways in which transparency can be upheld, both pervasively motivated in the morphological literature.

The first one is impoverishment. It could be that *-y* instead of *-x* appears because the feature that *-x* spells out is impoverished in the past tense, for instance: [uφ: speaker] → [uφ:]/[T: past]. The consequence of this is that *-x* is blocked from reappearing in the past tense. This is especially a viable analysis if *-y* already appears in other person/number slots and can be analyzed as a less specific form: if the specific form is blocked as a consequence of impoverishment, the elsewhere form is inserted instead. In Spanish, we see that the 1SG marker *–o* in certain paradigms impoverishes to the elsewhere agreement marker *–a*.

The second way to avoid a violation of *Transparency* is to analyze *-y* as an allomorph of *-x*, specifically inserted in the past tense: for instance, *-y* <> [uφ: speaker]/[T: past]. This is especially a viable analysis if *-y* cannot be readily analyzed as a less specific form that is already present in the agreement paradigm. In Italian, such allomorphy is seen in 1PL contexts, where the realization is *-iamo* in the present tense and *-amo* in the imperfect.

Hence, as long as impoverishment or allomorphy can be alluded to, transparency does not have to be given up. However, there is a complicating factor, which has to do with the postulation of null forms. If invoking allomorphy is a way to uphold transparency and the postulated allomorph can in principle be zero, then it becomes much easier to uphold transparency. To see the issue, take the following English forms:

(10) sing – sang – *singed/*sanged

One way to analyze this paradigm is to take *sang* as the result of a context-sensitive stem alternation, here informally expressed by the rule in (11)b, and to block the past tense form *-ed* by a context-sensitive null allomorph, i.e. by application of rule (11)d. See Embick (2015) for such an analysis.

(11) a. *sing* <> [$_V$ SING]

b. *sang* <> [$_V$ SING]/__[$T_{[PAST]}$]

c. *-ed* <> [$T_{[PAST]}$]

d. -Ø <> [$T_{[PAST]}$] / [$_V$ SING]_

This analysis is transparent in the sense that it works identically to the spell-out procedure of regular verbs: only terminal nodes are spelled out and the only difference is the forms (vocabulary items) involved. *Sang*, just like *walk*, spells out the V terminal and Ø, just like *-ed*, spells out [T: past]. Of course, this transparency is achieved at the cost of postulating a null allomorph for *-ed*. An alternative analysis without such a null allomorph is one that allows a form to spell out a non-terminal (Weerman & Evers- Vermeul 2002). Such an analysis is given in (12):

(12) a. *sing* <> [$_V$ SING]

b. *sang* <> [$_V$ SING + $T_{[PAST]}$]

c. *-ed* <> [$T_{[PAST]}$]

The absence of **singed* now follows from the fact that a more specific spell-out form wins the competition with a less specific form (Kiparsky 1973). And since *sang* spells out two features (the verbal feature and the past tense feature, *sanged* can never be derived (see Radkevich 2010, Bobaljik 2012 and Caha 2018 for more discussion).

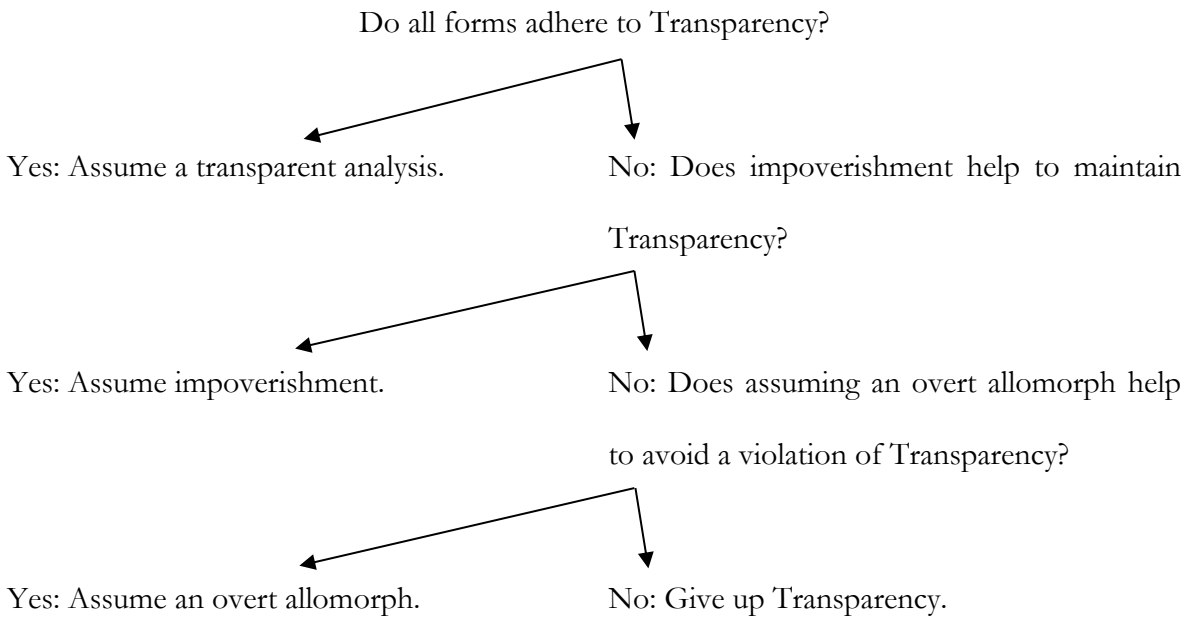
From a theoretical perspective, the choice between these two analyses is not straightforward, as there is a trade-off. The analysis in (12) may look more parsimonious but it violates *Transparency*, as the analysis for irregular verbs is not fully analogous to the analysis of regular verbs. The analysis in (11) respects *Transparency* but at the cost of postulating a null allomorph. One could, by sheer stipulation, assume that transparency should be leading but, as Caha (2018) convincingly shows, an analysis allowing the spelling out of multiple morphemes by one form is sometimes empirically superior to one that postulates a null allomorph for one of them. For instance, he observes that the analysis of case and person morphology in Classical Armenian that invokes null allomorphs, in opposition to an analysis in terms of phrasal spell-out, cannot account for the fact that only adjacent functions in the paradigm can be syncretic or suppletive (a phenomenon that falls under the well-known morphological constraint known as the *ABA pattern; see Bobaljik 2012). There are good

empirical reasons, therefore, to think that an analysis of the type in (12) should be possible, and able to function as an alternative to (11).

From a learnability perspective, the question arises to what extent null forms can be postulated by the child solely as a way to uphold *Transparency*. Is it even the child's job to uphold transparency at all costs, an issue that will be even more poignant in morphologically richer languages? In order to curtail the proliferation of null forms in morphological analysis and ward off learnability issues in a principled way, it is more plausible that the restriction on possible analyses lies not so much in the absolute adherence to transparency but rather in the necessity to postulate null forms: the child only postulates a null form if there is clear evidence for it. The clearest evidence for a null allomorph is the lack of an alternative analysis without this null form. Note that the strongest examples of empty categories in syntactic theory (traces, PRO) are indeed those for which real, thus far unsuccessful, efforts must be made to find an alternative. Thus, if non-transparent (12) is indeed an admissible, theoretical alternative to transparent (11), then from a learner's perspective (12) will block (11) in the absence of independent support for the existence of a null allomorph. The fact that (11) is more transparent than (12) is simply irrelevant.

This also shows us that adherence to *Transparency* is not so much a constraint imposed on natural language, which the language learner should try to maximally obey, but rather the first step in a learnability algorithm that determines whether the input data are subject to full *Transparency* or not. This leads us to postulate the following learning algorithm:

(13) Transparency-Uniformity algorithm:



Let us hasten to add that this restricted view on the postulation of null allomorphs should not be taken to imply a general ban on null forms. What happens in (12) is that an overt form, *sang*, is used as the spell out a second morpheme, namely [T: past], which would otherwise have to be spelled out by a null allomorph. Associating *sang* with [T: past] is straightforward and does not lead to an issue for the lexicon. This is not always the case, however. Take the Italian 1SG forms in the present and past tense, i.e. the contrast between (14)a and (14)b:

(14)	a.	am-o	b.	am-av-o	c.	am-Ø-o
		love.1SG		love.PST.1SG		love.$T_{[present]}$.1SG

In this case, a null form spelling out present (or default) tense, as in (14)c, can be straightforwardly postulated, because the alternative analysis without a null form would mean that either *am-* or *-o* must be taken as the spell out of present tense. But that form would immediately be homonymous to the same form occurring in the past tense, which does not spell out tense features because *-av-* does. This problem is reiterated for each person/number context and for all other regular verbs. To put it differently, the attempt to avoid a null form not only gives rise to a new analysis of particular forms (*am-* or *-o* as spell-out of a present tense verb plus agreement marker), but also requires that the old

analyses (*am-* as a stem and *–o* as an agreement marker) remain part of the grammar as well, thereby creating numerous homonyms. This contrasts with the case described earlier, where the alternative analysis without a null form wins from an analysis with a null form, and therefore does not lead to multiple analyses of the same form. The analysis of *sang* as an instance of non-terminal spell-out does not require *sang* to also be the exponent of a terminal spell-out rule.[5] Hence, any analysis without a null form that creates such massive homonymy cannot be a viable alternative to an analysis that postulates a null form; an analysis without a null form is only a viable alternative to an analysis with a null form if it does not create unnecessary homonyms.

In the next section, we will argue that the paradigms of the Romance null subject languages are all amenable to a transparent analysis of tense and agreement. It turns out that those cases where these paradigms do not seem fully transparent reflect either impoverishment or allomorphy. In terms of Giorgi & Pianesi's (1997) Feature Scattering Principle, tense and agreement features are then treated bi-morphemically, scattered over two syntactic heads. In Bobaljik & Thráinsson's terms, Romance languages have a split-IP. In the Germanic languages, however, transparency is unattainable, and tense and agreement features are part of the same, unsplit syntactic head.

Naturally, the question arises what happens when at least one form must be taken to be an intransparent form realizing both a [T: past] and a [uφ:] feature. In principle, nothing would forbid other contexts to be still analyzed as transparent. But that would mean that the structure of the paradigm is no longer uniform. In syntactic terms, this means that for some forms the language behaves like a split-IP language, with a bi-morphemic analysis of tense and agreement, whereas for other forms the language behaves like an unsplit-IP language, with tense and agreement part of the same morpheme. Such oddities are ruled out by the constraint in (9)b, *Uniformity*, which says that a paradigm should be taken to be as uniform as possible. The reason why *Uniformity* should apply when *Transparency* no longer upholds is due to simplicity. Any paradigm can in principle be analyzed in an

[5] This analysis entails that it is only in a restricted class of English irregular verbs with multiple identical forms (such as the infinitival, the present, past and perfect form in the case of *hit* or *put*), that postulation of a null tense form can be licensed.

intransparant way, with spell-out rules for every tense-agreement form. The reason why the child does not do this is because of *Transparency*. But if *Transparency* is given up, this results in a uniform analysis being the simplest available analysis.

Consequently, all forms in the paradigm should be taken as intransparent and reflect rules that spell out bundles of φ- and T-features. For this reason, pro drop will be blocked in Germanic languages across the board. As we will see, this is indeed the case for languages like Icelandic, German and English.

However, it does not mean that hybrid paradigms cannot exist. *Uniformity* explicitly says that paradigms have to be assumed to be structurally uniform, unless there is evidence to the contrary. If it turns out that there is evidence that some forms, say 3SG forms, should be taken as intransparant (i.e., monomorphemic), but other forms, say 2SG forms, as transparent (for instance, because of the re-appearance of such agreement forms outside the verbal agreement paradigm), hybrid paradigms should be possible. This is the case, we will show in section 4, for languages like Frisian and Bavarian. In these varieties, *Uniformity* is overruled and the verbal paradigm is transparent for some forms, but intransparant for others.

3 Testing the hypothesis: full vs. no pro drop

In this section, we first look at three Romance pro-drop languages, Italian, Spanish and Romanian, and show that they can be characterized as expressing tense and agreement bi-morphemically, despite the fact that there are sometimes differences in agreement realization across tenses. Transparency can be upheld in Spanish and Italian, be it in different ways: Spanish uses impoverishment, Italian a context-sensitive spell-out rule. We will also discuss Romanian because at first view it looks less transparent than the other two Romance languages but, as we will show, not in a significant way, as in uses both impoverishment and a context-sensitive spell-out rule. After this, we look at Germanic languages and argue that the non-transparency is so fundamental that a bi-morphemic analysis must be abandoned in favour of a mono-morphemic one.

3.1 Full pro-drop languages: Spanish, Italian and Romanian

Spanish has distinct pronouns for every number/person combination, as shown in (15).[6]

(15) Spanish subject pronouns:

	singular	*plural*
1	yo	nosostros/as
2	tú	vosostros/as
3	él, ella	ellos/ellas

These subjects can be analyzed in the following way, given our assumptions in (9):

(16) Spanish pronouns:

yo	<>	[φ: speaker]	*nosostros-as*	<>	[φ: speaker, plural]
tú	<>	[φ: addressee]	*vosostros/-as*	<>	[φ: addressee, plural]
él/ella	<>	[φ:]	*ellos/ellas*	<>	[φ: plural]

Spanish also has a rich agreement paradigm. It has six different forms in the present tense, so all relevant featural distinctions are made. Hence, it is rich in a trivial sense: every subject pronoun (modulo gender) corresponds with a different agreement marker. In addition, most agreement forms of the present reappear unchanged in the imperfect, where they follow the clearly identifiable past tense affix *-ab-* (see also the discussion in Section 2).

(17) Spanish present and imperfect agreement paradigms:

	present	*past (imperfect)*
1SG	am-o	am-**ab**-a
2SG	am-as	am-**ab**-as
3SG	am-a	am-**ab**-a
1PL	am-amos	am-**áb**-amos

[6] We will not go over all the pronominal systems of the languages we discuss. With the exception of English (where *you* is both the 2nd person singular and plural pronoun), all languages discussed in this article have different pronouns for all persons and numbers. See footnote 1 on the irrelevance of gender features.

2PL	am-áis	am-**ab**-ais
3PL	am-an	am-**ab**-an

There are only five agreement forms in the past tense, however: 1SG and 3SG become identical. The question is how to analyze the *–o/-a* alternation in the 1SG contexts. Since the form that appears in 1SG past contexts, namely *-a*, is identical to the one already occurring in 3SG contexts, the *-o/-a* alternation can be straightforwardly analyzed as the emergence of the elsewhere form in the past tense. Therefore, the first step in the algorithm in (13) will be pursued. Under the assumption that the feature value [uφ: speaker] is deleted prior to insertion, *-o* can no longer be inserted and the elsewhere form is inserted instead. The consequence of this analysis is that 1SG and 3SG are syncretic in the past, and not accidentally homonymous.[7]

This gives us the following analysis for Spanish:

(18)

φ-agreement:			*Impoverishment:*
-o	<>	[uφ: speaker]	[uφ: speaker] > [uφ:] / [T: past]
-as	<>	[uφ: addressee]	
-a	<>	[uφ:]	
-amos	<>	[uφ: speaker, plural]	
-áis	<>	[uφ: addressee, plural]	
-an	<>	[uφ: plural]	
Tense:			
-∅	<>	[T:]	
-ab-	<>	[T: past]	

Since none of these forms spells out a mixture of tense and agreement features, there is no trigger for a mono-morphemic analysis of Spanish. A bi-morphemic analysis can be adopted in a straightforward

[7] Note that an impoverishment analysis is supported by the fact that 1-3 syncretisms in the present tense are generally absent. Impoverishment rules only apply in marked contexts.

manner, which means that tense and agreement features are located at distinct syntactic heads. Spanish, then, has an underlying morpheme dedicated to the expression of agreement features. Since the agreement forms reflect the feature specification of their underlying morphemes, these morphemes must be taken to be fully specified and they can straightforwardly license null subjects.

Note that since the verbal forms in the left column of (17) give rise to a present tense interpretation, there must be an element present that carries [T:]. Here we follow the standard assumptions that present tense entails the absence of other tense values. Recall from the previous section that postulating a null form for the spell out of present tense features is the optimal analysis here since the alternative analysis without a null form requires postulation of six homonyms.

The situation in Italian is very similar, and transparency is the dominating pattern again.

(19) The Italian present and imperfect agreement paradigms

	present tense	*past (imperfect)*
1SG	am-o	am-**av**-o
2SG	am-i	am-**av**-i
3SG	am-a	am-**av**-a
1PL	am-iamo	am-**av**-amo
2PL	am-ate	am-**av**-ate
3PL	am-ano	am-**av**-ano

The only stain on the picture of perfect transparency is the fact that the 1PL form in the imperfect is not *-iamo* but *-amo*. Since *-amo* cannot be analyzed as an elsewhere form and, like *-iamo,* is restricted to 1PL contexts, an impoverishment analysis cannot be postulated here. Hence, we go to the next step in the learning algorithm in (13). The appearance of *-amo* can be captured by a context-sensitive spell-out rule that inserts *-amo* as the 1PL form in the imperfect: [8]

[8] An alternative, plausibly more correct, analysis would be one in which the context-sensitive rule inserts *-iamo* and refers to the present tense, as *-amo* is the form occurring everywhere except in the present tense. This does not affect our analysis, however.

(20) *-amo* <> [uφ: speaker] / [T: past]

Note that this does not entail that *-amo* spells out a past tense feature, but only that [T: past] defines the context of application of this rule.[9]

The most straightforward way to represent the Italian paradigm is then as follows:

(21) φ-*agreement:*

-o <> [uφ: speaker]

-i <> [uφ: addressee]

-a <> [uφ]

-iamo <> [uφ: speaker, plural] *-amo* <> [uφ: speaker] / [T: past]

-ate <> [uφ: addressee, plural]

-ano <> [uφ: plural]

Tense:

-∅ <> [T:] (present)

-av- <> [T: past]

Since again none of the forms spell out a mixture of tense and agreement features, Italian is analyzed as a fully transparent, split-IP language, in which tense and agreement features are introduced by distinct syntactic heads. The availability of a head solely expressing agreement features ensures that Italian does not run into an overspecification problem. The licensing of null subjects is therefore straightforward.

[9] Instead of analyzing the *-iamo*/*-amo* alternation as a consequence of the morphological component inserting a different morpho-phonological form, one could analyze it as the consequence of later phonological adjustment. The advantage is that one would capture the phonological overlap between these two forms, which is a coincidence under the analysis in (20): The context-sensitive realization could in principle have no resemblance. The disadvantage of such an analysis, however, is that what triggers the adjustment must be something quite arbitrary. It cannot be the *-v-* of the imperfect marker, since present tense stems ending in *-v-* do not trigger deletion of *-i-* (e.g. *lav-iamo* 'we wash'). Second, we will come across other agreement alternations below that are clearly less likely to result from phonological adjustment. We therefore see the approach taken here as a more neutral way to capture all these cases. The resemblance of the 1PL present and past forms is then merely a historical left-over from more transparent days.

A potential caveat concerns the so-called absolute past or *passato remoto* in Italian. This tense is not expressed by a phonologically rigid marker but rather by a vowel that is dependent on the conjugation:

(22) The Italian absolute past agreement paradigms (for *-are* and *-ire* conjugations)

	absolute past amare ('love')	*absolute past* dormire ('sleep')
1SG	am-**a**-i	dorm-**i**-i
2SG	am-**a**-sti	dorm-**i**-sti
3SG	am-**ò**	dorm-**ì**
1PL	am-**a**-mmo	dorm **i**-mmo
2PL	am-**a**-mmaste	dorm-**i**-mmiste
3PL	am-**a**-rono	dorm-**i**-rono

We take this to mean that the absolute past tense markers is realized by an abstract vowel:

(23) [T: abs.past] <> -V-

The surface realization of this vowel depends on the conjugation of the verb that it attaches to. That these surface vowels are not merely conjugation markers is shown by the fact that they do not systematically appear in the present tense; for instance, 1SG present tense is *amo* and not *amao.*[10]

Let us next discuss Romanian, a language that may look a bit more complex but is in fact also fully transparent. The language has different verb classes and we will focus on the first conjugation here. The paradigms look as follows:

(24) Romanian present and imperfect agreement paradigms (1st conjugation)

[10] It is unlikely that in the present tense a conjugation marker *-a* is also present but assimilates with other vowels in the singular, i.e. to take 1SG present tense *-o* as an assimilation of the conjugation marker *-a* plus the agreement marker-*o*. First of all, 2SG *-i* would then have to be analyzed as *-a* + *-i* as well, whereas *-ai* surfaces as such in 1SG absolute past contexts. Second, assimilation is a plausible analysis for the 3SG absolute past form *-ò*, the only absolute past form without an overt *-a*. The fact that the affix attracts the stress can be taken as a reflection of a richer underlying syllabic structure, which includes the absolute past marker and the agreement marker. Since *-o* in 1SG present tense contexts does not attract the stress, an analysis that takes it to include an assimilated conjugation marker is not plausible.

	present	*past (imperfect)*
1SG	cânt	cântam
2SG	cânți	cântai
3SG	cântă	cânta
1PL	cântăm	cântam
2PL	cântați	cântați
3PL	cântă	cântau

As can be observed, Romanian only displays five distinctions in the present tense, due to a 3SG-3PL syncretism that disappears in the past tense. The past tense, in turn, displays another syncretism, namely between 1SG and 1PL. How do we account for the agreement alternations between present and past?

Since there is a clearly identifiable past tense affix, *-a-*, and since most agreement affixes come back in the past tense, Romanian tense and agreement can be analyzed bi-morphemically in the following way:

(25) φ-*agreement:* *Impoverishment:*

-∅ <> [uφ: speaker, singular] [uφ: speaker, singular] → [uφ: speaker]/[T: past]

-i <> [uφ: addressee]

-ă <> [uφ:]

-(ă)m <> [uφ: speaker]

-ați <> [uφ: addressee, plural]

-u <> [uφ: plural] / [T: past]

Tense:

-∅- <> [T:] (present)

-a- <> [T: past]

Note that 1SG -∅ must be taken to spell out a [singular] feature that gets impoverished in the past, so that the numberless *-(ă)m* can consequently appear in 1SG imperfect contexts. In this way, the 1SG-1PL similarity is captured as a syncretism. Here, the child thus receives morphological evidence for both [singular] and [plural] features. One might at first be inclined to analyze *-au* in the 3PL imperfect context as the outcome of the imperfect marker *-a* plus the agreement elsewhere *–ă* and dismiss the context-sensitive rule that inserts *-u*. There are two problems with such an analysis, however. First, it does not account for the appearance of *-a* in the 3SG imperfect context. In fact, one would expect the 3SG-3PL syncretism to be maintained in the imperfect. One cannot salvage this wrong expectation by invoking impoverishment. If *-ă* is the elsewhere agreement form, it does not realize a feature value that can subsequently be impoverished in the imperfect so as to block it from appearing in the 3SG context. Second, there is independent evidence that *-ă* assimilates to a neighbouring *-a* phonologically. The feminine noun *casă* ('house') combined with the definite article *-a* becomes *casa*, whereas *lume* ('world') + *-a* becomes *lumea*.[11] We conclude, therefore, that the 3SG past context is actually regular (*cant-* + *a* + *ă* = *canta*) and that 3PL *-au* is the outcome of an imperfect marker *-a* plus the agreement form *-u*, which spells [uφ: plural] in the past tense.[12]

We conclude that Romanian must be analyzed as a language expressing tense and agreement bi-morphemically, since none of the forms in (25) spells out a mixture of tense and agreement features. Since the language has a morpheme dedicated to the expression of agreement, it meets the prerequisite for licensing null subjects.

The last issue to address is then whether the agreement specifications are rich enough to license null subjects. They should be, because Romanian is a full null subject language. One may wonder, however, whether the two syncretisms in the system (3SG-3PL in the present, and 1SG-1PL in the imperfect) do not cancel that possibility. Again, the answer is no. Just like we argued in the case

[11] Thanks to Dana Niculescu for bringing this to our attention.

[12] There is in all fairness some evidence for the existence of an *-ă* form spelling out [plural], which would then be accidentally homonymous to the 3SG elsewhere form. The simple perfect and pluperfect of the fourth conjugation display *-ă* in all plural contexts (including 3PL contexts: *vorbiră* and *vorbiseră*, respectively) but not in any singular contexts (including 3SG contexts: *vorbi* and *vorbise*).

of Spanish, even though the forms we see on the surface may be underspecified, it is the underlying morpheme that is responsible for the licensing of a null subject. Romanian provides clear evidence for the existence of six distinct morphemes, which leads to null subjects across the board.

Although Romanian requires a more careful look than Italian and Spanish, there is no qualitative difference in the end. We have seen that looking at the present and past paradigms of these Romance languages brings to light agreement alternations. These can be tackled by inducing impoverishment rules and/or context-sensitive spell-out rules. In the next section, we will see that Germanic languages display agreement alternations too, but in contrast to what we have seen in this section, context-sensitive spell-out rules and impoverishment will not bring them closer to the ability to license null subjects.

3.2 Non pro-drop languages: a detailed look at Germanic

The main question for Germanic languages is why pro drop is such a rare phenomenon. None of them is a full pro-drop language, and the richest Germanic languages (Standard German and Icelandic) do not even display partial pro drop. Our hypothesis, set out in section 2, is that Germanic languages generally express tense and agreement mono-morphemically. The syntactic component uses morphemes that encode both tense and agreement features, and the consequence is that these morphemes are overspecified for the purpose of licensing null subjects. What we need to do, therefore, is show that a bi-morphemic analysis is not plausible for the Germanic languages given the assumptions set out in Section 2.

There is one observation that is central in obtaining this result. When we look at the paradigms of the Germanic languages, then it is exceptionlessly the case that those that encode agreement display a form in the 3SG present tense context that does not reappear in the 3SG past tense context. Take English as an example: the 3SG *-s* does not reappear in the past tense, where the past tense marker *-ed* appears in the absence of agreement: *walk-ed* vs. **walk-ed-s*. This intransparency is also attested in Icelandic and Faroese (where *-ir* becomes *-i*), and Dutch, German and Frisian (where *-t* becomes -∅). This, we will show, leads to a mono-morphemic analysis of tense and agreement in these languages.

In section 3.2.1 we demonstrate how this works for Standard German and Icelandic, the rich Germanic languages, and section 3.2.2 extends the analysis to the poor Germanic languages with agreement (English, Dutch and Faroese).

3.2.1 No pro drop despite richness: Icelandic and Standard German

Prima facie, Icelandic looks like a language where tense and agreement morphology are distinct, given that all past forms contain **-***ð*, and all present tense forms do not.

(26) Icelandic present and past tense paradigms:

	present	past
1SG	-i	**-**ð-i
2SG	-ir	**-**ð-ir
3SG	-ir	**-**ð-i
1PL	-jum	**-**ð-um
2PL	-ið	**-**ð-uð
3PL	-a	**-**ð-u

Along these lines, one could postulate the following rules for tense:

(27) *Tense*

-ð <> [T: past]

-∅- <> [T:] (present)

In addition, Icelandic looks like a rich agreement language, where in the present tense paradigm there is only one syncretism, between 2SG and 3SG. In compliance with (9), the singular forms could be captured by the following rules:

(28) *-i* <> [uφ: speaker]

-ir <> [uφ:]

Like in Romanian, this syncretism disappears in the past tense but in Icelandic it would be replaced by an another syncretism, namely between 1SG and 3SG. The question is how to analyze these distinct syncretic patterns in present and past tense agreement paradigms. More specifically, how can we capture the fact that *-ir*, the 3SG form in the present tense, does not reappear in the 3SG past tense slot, though it does in the 2SG slot?

The first option would be to induce impoverishment, instigated by the fact that the new form occurring in 3SG past contexts, *-i*, is not a completely new form. It already occurs in present contexts, namely in 1SG contexts. The distribution of these forms is such, however, that impoverishment cannot be taken to apply here. In the present tense *-ir* appears in the 3SG context and thereby functions as the elsewhere form of the system, expressing no feature values. Hence, there is no feature value that can be impoverished such that in the past tense insertion of *-ir* is blocked in 3SG contexts. And since *-ir* is the elsewhere form in the present, *-i* is not. So even if impoverishment were possible, it would not lead to *-i* surfacing instead. The fact that in Icelandic the agreement alternation takes place in the 3SG (and not in the 1SG, as in Spanish) causes the problem.

A potential way out would be to assume that, in sheer violation of (7), 1SG *-i* is the elsewhere form and 2/3SG *-ir* the spell out of [uφ: non-speaker]:

(29) [uφ: non-speaker] <> *-ir*

[uφ:] <> *-i*

Then, in addition, an impoverishment rule like (30) would need to be assumed, which refers to a second negatively marked feature [uφ: non-addressee] in the specification of the context (Alternatively, [uφ: non-participant] could be assumed).

(30) [uφ: non-speaker] → [uφ:] / __[uφ: non-addressee], [T: past]

Although the facts come out, the rule in (30) is highly problematic. First, there is no syntactic agreement slot where [uφ: non-addressee] could be hosted, as that slot would already be occupied by [uφ: non-speaker] itself. Moreover, there cannot be an agreement morpheme that carries the feature

[uφ: non-addressee], as none of the agreement spell-out rules (i.e. the ones in (29)) refers to this feature, in line with (9)a. Hence, (30) is an impossible impoverishment rule within the Icelandic grammar. This exhausts impoverishment as a way to capture the intransparency between present and past agreement in Icelandic.

A second potential way to try and keep Icelandic transparent would be with the use of a context-sensitive spell-out rule, like we did for Italian. One could assume that *-i* is an allomorph of *-ir*, inserted by the rule in (31).

(31) *-i* <> [uφ:] / [T: past]

In principle, such context-sensitive rules are possible. Moreover, one should allude to such context-sensitive rules anyways to account for the differences between the Icelandic present and past tense agreement markers in the plural (where *-jum* becomes *-um*, *-ið -uð*, and *-a -u*). Nevertheless, (31) cannot be correct either as it predicts that the 2SG *-ir* is also replaced by *-i* in the past tense, contrary to fact. A solution would be to assume that in the present tense 2SG *-ir* and 3SG *-ir* are homonyms, inserted by distinct rules:

(32) *-ir* <> [uφ: addressee]

-ir <> [uφ:]

Although we now no longer predict *-i* to appear in the 2SG slot in the past tense, this analysis comes at a cost. First of all, (32) constitutes a direct violation of (9)a, as the analysis assumes two *-ir* homonyms. In addition, it also postulates two *-i* homonyms: one form that in the present tense exclusively appears in 1SG context and must be the spell out of [uφ: speaker], and a second one that appears in the 3SG slot in the past tense, inserted by (31), another violation of (9)a. In sum, there are two cases of potential syncretism, one in the present and one in the past tense, and the analysis fails to capture either of them. The attempt to account for the disappearance of *-ir* in the 3SG past tense context by means of a context-sensitive rule causes two new cases of intransparency. It therefore does not achieve what it is supposed to achieve, namely maintain transparency.

So, context-sensitive rules cannot straightforwardly save the bi-morphemic analysis and an impoverishment analysis must simply be dismissed. Neither of the two analyses thus offers help in understanding the agreement alternation observed in 3SG contexts. This exhausts the possibilities of maintaining transparency in the language.

Now, what would straightforwardly capture the absence of *-ir* in the 3SG past tense context is an analysis in which *-ir* not only competes with *-i* in the present tense singular, but also with the past tense form **-ði**: *-ir* is not inserted in 3SG contexts in the past tense because **-ði** is inserted instead. In other words, an agreement form *-ir*, spelling out [uφ:], competes for insertion in 3SG slots with a form that also spells out a tense feature [T: past]. The elsewhere form is not an agreement elsewhere, but a more general inflectional elsewhere spelling out both [T:] and [uφ:]. This analytical move entails adopting a mono-morphemic analysis of tense and agreement in 2SG and 3SG contexts: if *-ir* can compete with *-ði* for insertion, there must be an underlying morpheme slot that encode both tense and agreement information. In principle, this conclusion could be restricted to 2SG and 3SG contexts, if it was not for Uniformity (cf. (9)b). This gives the analysis in (33):

(33) *Inflection (tense and agreement):*

-i <> [T:], [uφ: speaker][13]

-ir <> [T:], [uφ:]

-jum <> [T:], [uφ: speaker, plural]

-ið <> [T:], [uφ: addressee, plural]

-a <> [T:], [uφ: plural]

-ði <> [T: past], [uφ:]

-ðir <> [T: past], [uφ: addressee]

-ðum <> [T: past], [uφ: speaker, plural]

[13] Here, we represent the features underlying mono-morphemic tense/agreement markers as two independent features. Whether these features should indeed be taken to be separate or instead as two different feature value slots that are present on a single I(nflection)-feature is something we will discuss in detail in Section 5.

-ðuð <> [T: past], [uφ: addressee, plural]

-ðu <> [T: past], [uφ: plural]

As can be observed, the forms refer to both tense and agreement features. Consequently, Icelandic is a language where there is no split IP and where inflectional morphology is overspecified in the sense of section 2, and hence, correctly, pro drop is predicted to be absent in Icelandic.[14]

One may perhaps be inclined to interpret the move from a bi-morphemic to a mono-morphemic analysis as a defeat, as it gives up on a transparent analysis of agreement, in which a certain number of agreement forms is listed only once and used in present and past tense contexts alike (as the case in Romance languages), but that would be a mistake. Given the specific situation of Icelandic, one can also consider (33) a learner's triumph: the analysis violates not a single constraint in (7) or (9), it does not postulate any null allomorphs or homonymous forms and, in addition, induces no context-sensitive rules or impoverishment. Should one believe that rule counting matters (which we do not assume), it is interesting to observe that the mono-morphemic analysis (10 rules) is more parsimonious than a bi-morphemic one (12 rules). An important reason for this is that the agreement forms in the plural all show (minor) alternations (cf. (26)), which in a bi-morphemic analysis requires the postulation of three context-sensitive spell-out rules.

We thus conclude that Icelandic, despite its featural richness, does not have null subjects because the morphemes that should license them encode both tense and agreement features, and are therefore overspecified.

Like Icelandic, Standard German has a fairly rich agreement paradigm with a 1SG/3SG syncretism in the past tense.

(34) German present and past tense paradigms

	present	past
1SG	-e	-te

[14] The fact that tense and agreement in Icelandic receive a mono-morphemic analysis does not entail that no effects of rich agreement can be observed. Pro drop is impossible for the reasons sketched above, but V-to-I movement can still be linked to rich agreement (see Koeneman & Zeijlstra 2014 for a specific account).

2SG	-st	-te-st
3SG	-t	-te
1PL	-en	-te-n
2PL	-t	-te-t
3PL	-en	-te-n

Even though at first sight Standard German seems to have a separate, dedicated past tense marker –*t*-, we again observe an agreement alternation in 3SG contexts, so that the question is how to account for the absence of the -*t* in 3SG past contexts. Impoverishment does not work for the same reason it didn't in Icelandic: since -*t* is an elsewhere form, there is no feature value that can be impoverished in past tense contexts, blocking -*t* from occurring there.[15]

It is technically possible, however, to induce a context-sensitive spell-out rule for the elsewhere form:

(35) -Ø <> [uφ:] / [T: past]

We have argued in section 2, however, that null forms are only postulated by the child in the absence of a viable alternative analysis without a null form; upholding transparency is not a goal in itself. Now, we have seen in the discussion on Icelandic that such a viable alternative analysis *is* available, namely one that assumes direct competition between the forms appearing in 3SG present and 3SG past contexts. The 3SG form -*t* does not appear in 3SG past tense contexts because -*te* is inserted there. The form -*te* spells out [T: past] and is also associated with [uφ:] so that no null form has to be postulated to spell out agreement in 3SG past contexts. Competition with -*t* entails that 3SG -*t* is associated with [T:]. This entails that both these forms are associated with tense and agreement

[15] Note that 2PL -*t* does not disappear in the past tense, which provides an argument against 2SG and 2PL being syncretic, unless it can be argued that -*t* expresses a feature that only gets impoverished in the 3rd person and/or singular context (cf. Frampton 2002). If impoverishment is unavailable in 3SG contexts, a consequence of the constraints in (7), the two -*t* forms must be treated as a case of accidental homonymy, an unavoidable violation of ((9)a).

information, leading to the postulation of an underlying morpheme that encodes both properties. Given uniformity, this conclusion is generalized across the paradigm. The result is given in (36):[16]

(36) *Inflection*

-e	<>	[T:], [uφ: speaker]
-st	<>	[T:], [uφ: addressee]
-t	<>	[T:], [uφ:]
-en	<>	[T:], [uφ: plural]
-t	<>	[T:], [uφ: addressee, plural]
-te	<>	[T: past], [uφ:]
-test	<>	[T: past], [uφ: addressee]
-ten	<>	[T: past], [uφ: plural]
-tet	<>	[T: past], [uφ; addressee, plural]

In contrast to the bi-morphemic analyses of Standard German, this one does not violate any of the constraints in (9). The consequence of this analysis is that German does not have pro drop, because its agreement morphemes are overspecified. They also express tense information. This is, of course, the right result.

3.2.2 No pro drop despite contextual richness: English, Dutch and Faroese

English, Dutch and Faroese are not languages that are richly inflected. English has two distinctions in the agreement paradigm, Dutch and Faroese have three. Despite the fact that these languages can be qualified as poor, they all have an affix that uniquely marks a particular person/number slot of the paradigm. English uniquely marks 3SG with an *-s*, and Dutch and Faroese uniquely mark the 1SG, with -∅ and *-i* respectively.

[16] A reader may wonder why in, for instance, 1st/2nd person singular past, *-e* and *-st*, lose the competition with *–te*. [T: past] on *-te* is more specific than [T:] on *-e* and *-st*, but [uφ: speaker] and [uφ: addressee] on *-e* and *-st* are more specific than [uφ:] on *–te*. We tentatively assume that in such competition lexically valued features win from contextually valued ones, although there may also be alternative ways to account for this. Nothing crucial in our analysis hinges on that, though.

(37) English, Dutch and Faroese present tense paradigms:

	English	*Dutch*	*Faroese*
	to talk	denken ('to think')	døma ('to judge')
1SG	talk-∅	denk-∅	døm-i
2SG	talk-∅	denk-t	døm-ir
3SG	talk-s	denk-t	døm-ir
1PL	talk-∅	denk-en	døm-a
2PL	talk-∅	denk-en	døm-a
3PL	talk-∅	denk-en	døm-a

Therefore, a contextual approach to pro drop would expect that these languages (i) lack pro drop in contexts with syncretic forms, due to underspecifiation and (ii) have pro drop in those contexts that are uniquely marked (3SG in English and 1SG in Dutch and Faroese). Expectation (i) is borne out, but (ii) is not. We therefore have to explain why these languages do not have partial pro drop.

The analysis we propose for these languages is essentially uniform to those for the other Germanic languages, given the shared agreement alternation in 3SG present and past contexts. Starting with English, the crucial property is that the 3SG *-s* in the present tense does not reappear in the past tense.

(38) English present and past paradigms of *to talk*

	Present tense	Past tense
1SG	talk-∅	talk-ed
2SG	talk-∅	talk-ed
3SG	talk-s	talk-ed
1PL	talk-∅	talk-ed

2PL	talk-∅	talk-ed
3PL	talk-∅	talk-ed

Given (7), we can thus not assume that *-s* spells out [uφ: non-participant] Instead, *-s* must be analyzed as an elsewhere form. The automatic, and unavoidable, consequence of this is that English has two null forms, one expressing [participant] and the other [plural].[17] Since 3SG *-s* does not return in the past tense, it must compete with *-ed* directly. This gives the analysis in (39), where forms spell out a mixture of tense and agreement features and render tense and agreement morphology mono-morphemic in English.

(39) *Inflection*

-∅ <> [T:], [uφ: participant]

-∅ <> [T:], [uφ: plural]

-s <> [T:], [uφ:]

-ed <> [T: past], [uφ:]

Hence, the English agreement paradigm is not only poor, but also monomorphemic and therefore runs into the overspecification problem for pro drop licensing.

Dutch and Faroese are strikingly similar in their distribution of forms across the paradigm. 2nd and 3rd person singular are syncretic, there is one form for the plural, and in the past tense person marking disappears but number marking remains.

(40) Dutch and Faroese present and past paradigms

	Dutch		Faroese	
	Present tense	Past tense	Present tense	Past tense
1SG	dank-∅	dank-te	døm-i	døm-di

[17] Note that even an analysis that violates (7) and takes -∅ to be the an agreement elsewhere needs two null forms: one agreement and a null form spelling out [T:].

2SG	dank-t	dank-te	døm-ir	døm-di
3SG	dank-t	dank-te	døm-ir	døm-di
1PL	dank-en	dank-ten	døm-a	døm-du
2PL	dank-en	dank-ten	døm-a	døm-du
3PL	dank-en	dank-ten	døm-a	døm-du

These similarities make them amenable to the same analysis. Assuming that *-t* and *-ir* are the elsewhere forms respectively, the analysis must ensure that they do not reappear in the 3SG past context. Letting these forms compete with the past tense forms (*-te(n)* and *-di*/*-du*) ensures this. These analyses again require a conflated morphological category, so that the spell-out rules look as follows:

(41) Analysis of Dutch:

Inflection:

-∅	<>	[T:], [uφ: speaker, singular]
-t	<>	[T:], [uφ:]
-en	<>	[T:], [uφ: plural]
-te	<>	[T: past], [uφ:]
-ten	<>	[T: past], [uφ: plural]

Analysis of Faroese:

Inflection:

-i	<>	[T:], [uφ: speaker, sing.]
-ir	<>	[T:]. [uφ:]
-a	<>	[T:], [uφ: plural]
-di	<>	[T: past], [uφ:]
-du	<>	[T: past], [uφ: plural]

Since all forms expressing agreement features also express tense features, Dutch and Faroese run into the overspecification trap and pro drop is excluded across the board.[18]

3.3 Taking stock

In this section, we have provided a new explanation for why the Germanic languages generally lack pro drop, in contrast to the Romance languages, despite the fact that the number of formal distinctions is sometimes the same: Romanian and Icelandic, for instance, both have five distinctions in the present tense agreement paradigm, whereas they hold opposite positions on the pro drop spectrum. We have

[18] Given space limitations, we will not discuss the Mainland Scandinavian languages (Norwegian, Swedish and Danish). Since they have no agreement distinctions whatsoever, the fact that these languages lack pro drop will not be surprising.

argued that a look at the other paradigms, such as past/imperfect paradigms, is fundamental. By doing this, it can be established whether or not tense and agreement are expressed bi- or mono-morphemically. In case of the latter, even rich agreement forms will fail to license pro drop, as they will be featurally overspecified.

It is in principle possible to provide a transparent analysis for all languages that we have discussed (which would predict null subjects to occur in all of them), just as it is possible to provide an intransparent analysis for all of them (which would predict lack of pro drop in all of them). The contemporary linguistic analytical toolkit, for instance the one used in Distributed Morphology, is sufficiently (and notoriously) rich to allow both. The existence of transparent and intransparant morphological systems across the world's languages conjures up the question of where to place the tipping point. This decision can only be informed by learnability. Instead of taking transparency as an analytical goal, we take it to be an acquisitional starting point, a default assumption of the learner which is abandoned if it conflicts with other considerations. It is then an empirical question which considerations may trigger an intransparant analysis. We have proposed that this trigger is the postulation of unmotivated null allomorphy: upholding transparency by postulating a null fallomorph is blocked by the existence of a viable alternative analysis that does not postulate it (the reason being that in that case there is no longer evidence for the existence of such a null form). We have shown that such an alternative analysis is readily available, namely a mono-morphemic analysis of tense and agreement. Hence, in the Germanic languages the language learner will give up transparency.

Note, though, that the proposal now undergenerates, as it leaves open the question of how to account for partial pro-drop languages, in which null subjects are licensed in specific person/number contexts. In principle, nothing blocks us from adopting an analysis is which languages generate both separate or conflated categories, depending on the specific properties of particular person/number contexts. Like Transparency, Uniformity is also an initial assumption that the learner will have about morphological paradigms, but it can be abandoned in the face of clear evidence. Now, a learner of standard Icelandic or German who acquires that tense and agreement are expressed mono-

morphemically has no reason to abandon uniformity, which leads to an analysis that disallows pro drop across the board. The situation may be different in other varieties, however, and this can give rise to partial pro drop patterns. This is the topic of the next section.

4. Partial pro drop

Despite the fact that none of the Germanic languages has argumental pro drop across the board, it is possible in quite a few varieties to leave the subject unexpressed in specific person/number contexts. Partial pro drop mostly occurs in 2nd person singular contexts, as examples in (42) from Bavarian (cf. Bayer 1984) and (43) from Frisian (cf. De Haan 1984) illustrate, but pro drop in 1st and 2nd person plural are also attested in some Bavarian varieties as shown in (44).

(42) a. Kumm-st (du) noch Minga, dann muas-st *pro* me bsuacha
Come.2SG (you) to Munich, then must.2SG me visit
'If you come to Munich, you must visit me'.

b. Ob-st (du) noch Minga kumm-st, …
if.2SG (you) to Munich come.2SG
'If you come to Munich, ...'

(43) a. Miskien moat-st (do) my helpe
Perhaps must.2SG (you) me help
'Perhaps you should help me.'

b. Ik denk dat-st (do) my helpe moatst
I think that.2SG me help must
'I think that you should help me.'

(44) a. Fahr-ma (mir) noch Minga?
drive.1PL (we) to Munich
'Do we drive to Munich?'

b. Ob-ts (es/ihr) noch Minga kumm-ts,…
whether.2PL (you.PL) to Munich come.2PL

'Whether you come to Munich, …'

Since the *-st* marker in Bavarian and Frisian also shows up on the verb in main clause straight orders, in which the finite verb follows the subject ('du kumm-st' (you come.2SG), 'do moat-st' (you must.2SG), etc.), it is naturally analyzed as an agreement ending. This ending may also show up on the complementizer in these varieties, as illustrated in the b-examples. The fact that the subject (*du* or *do*) does not show up obligatorily after the finite verb or complementizer can then be construed as an argument in favour of pro drop occurring in these specific contexts, as the authors mentioned above did.

Crucially though, this is not the only possible analysis. Van Alem (2020; forthcoming) starts out from the b-examples and argues that what looks like complementizer agreement in the examples above is actually a clitic doubling the subject. For instance, she shows that these markers pass the tests for clitichood proposed in the literature. Her most convincing arguments for this analysis pertain to Dutch dialects and Frisian. In the latter, for instance, there is a strict adjacency between the verb or complementizer and the overt subject: the two may not be linearly separated.

(45) * dat-st ek do [...] fegetarysk vegetarian ytst.
that-2SG also you vegetarian eat.2SG
'that you, too, eat vegetarian.'

Since there is no general adjacency requirement on subject agreement in these varieties (i.e., the subject and agreeing verb can be separated, as standardly happens in embedded clauses in these OV languages), the fact that it holds for complementizer agreement is then mysterious. Another argument van Alem puts forward against these markers being agreement markers is that in Limburgian Dutch, the hypothetical complementizer agreement marker *-s* can also show up internal to the subject, the category it is supposed to agree with:

(46) dat auch-s-tich waal ens vegetarisch uts
that also-2SG-you sometimes vegetarian eat-2SG
'that you, too, sometimes eat vegetarian.'

The consequence of van Alem's analysis for Frisian is that this language should not be analyzed as a partial pro drop language, so that there is nothing to explain for us: what looks like an agreement marker is actually a subject clitic, and thus, a pronominal subject is always present. In Bavarian, however, these subject markers do not have to be adjacent to the subject and they never show up internal to the subject (cf. van Alem 2021). It is therefore quite conceivable that for this variety the marker should be analyzed as complementizer agreement. The consequence is then that these Bavarian dialects indeed display partial pro drop. Naturally, then the question arises how to account for the phenomenon.

In order to understand Bavarian partial pro drop, let us first look at the two main differences between Standard German and the Bavarian dialects that may be relevant in this respect. First of all, it is well known that Bavarian dialects lack a past tense and that past events are expressed with perfect constructions, involving a form of "have" or "be". Second, a robust property of Bavarian dialects is that they display complementizer agreement (Fuss 2005). In fact, it is exceptionlessly the case (Rosenkvist 2009: 163) that pro drop in Bavarian is only allowed in person/number contexts that allow complementizer agreement, so it is natural to try and tie these properties together. Let us look at each in turn.

The lack of a past tense is difficult to link to partial pro drop as it seems to predict more pro drop under our analysis than what we in fact see. Recall that in Standard German the disappearance of 3SG *-t* in the past tense formed the trigger for a mono-morphemic analysis of tense and agreement. One might therefore be inclined to think that in the absence of a past tense this trigger disappears and a bi-morphemic analysis will be adopted. If so, pro drop is expected in all environments with a unique agreement form, including the 1SG context uniquely marked by *-e*, contrary to fact.

However, this inclination would be wrong. The reason why tense and agreement are also mono-morphemic in Bavarian is as follows. For semantic reasons, finite tense must still be part of syntactic representations of Bavarian too (otherwise finite verbs would not be finite), so the question is whether unvalued [T:] is taken by the learner as a separate morpheme or as features expressed by

the same morpheme that also expresses agreement features. Note that the first option would force the learner to assume that the spell out of the separate T head is always null. That would not be a problem if the same language has an overt past tense morpheme, like in Italian, as in that event the null morpheme is licensed under opposition with an overt form. In Bavarian dialects, however, this contrasting form is absent. Under the assumption, spelled out in section 2.2, that the learner will not postulate null forms unless their presence is independently motivated, a separate T morpheme would constitute the marked option, and the learner prefers to assume that tense and agreement are associated with the same morpheme. This would give rise to spell-out rules such as (47), where *-e* is the vocabulary item inserted in a conflated morpheme.

(47) *-e* <> [T:], [uφ: speaker]

Since the absence of a past tense is therefore unlikely to explain the partial pro drop phenomenon, let us now turn to the second difference between Bavarian and Standard German, the presence and absence of complementizer agreement. This contrast raises the following specific questions:

(i) Why would complementizer agreement, which basically introduces the same affix in the clause a second time, be related to partial pro drop?

(ii) Why is partial pro drop possible in Bavarian main clauses, where no complementizer occurs?

The two questions yield a paradox: (i) suggests that complementizer agreement is essential in the licensing of partial pro drop in Bavarian, but (ii) suggests that it cannot be.

From the perspective of our analysis, this paradox can be resolved as follows. Complementizer agreement creates morphemic transparency and shows the learner an environment in which an agreement form clearly occurs in the absence of other inflectional features. After all, (Germanic) inflected complementizers do not show alternations caused by tense properties expressed elsewhere in the clause, revealing that complementizers cannot be exponents of tense/aspect features. This

evidence for a morpheme expressing solely agreement enables the learner of such a variety to generalize over the *-st* form occurring on V and the complementizer with the spell-out rule in (48):

(48) *-st* <> [uφ: addressee, singular]

Complementizer agreement in a particular person/number context then triggers a syntactic analysis for that context with separate tense and agreement heads. Since 2SG *-st*, as well as 1PL *-ma* and 2PL *-ts*, are neither featurally under- nor overspecified, they will license pro drop straightforwardly.

Note that it is specific to a contextual approach to pro drop that analytical differences between contexts can be made. We take Uniformity, as in (9)b, to be nothing more than a default assumption of the learner which, just like Transparency, can be violated in the face of independent evidence. Now, in the case of Standard German we argued that the learner settles on a non-transparent analysis for 3SG contexts and subsequently assumes this to be a uniform feature of the Standard German paradigm. There are no data internal to that paradigm showing the child that this assumption is wrong. The Bavarian child, in contrast, takes complementizer agreement as independent evidence for the existence of a separate 2SG agreement morpheme, a decision informed by Transparency. Since the same child also concludes that Bavarian encodes tense and agreement mono-morphemically, it must deal with conflicting information at the Transparency stage of the learning algorithm. The only resolve is to violate Uniformity at the next stage.

In sum, the complementizer agreement input leads to a specific bi-morphemic analysis of the context in which it appears, while the mono-morphemic analyses are retained for the other person/number contexts. Consequently, pro drop is licensed in all contexts in which complementizer agreement appears (e.g. in all 2SG contexts), including main clauses, where no complementizer is present. It is not the presence of the complementizer as such that matters but rather the fact that the syntactic representation in that relevant context has separate tense and agreement morphemes.

Note that complementizer agreement in particular forms does not have to be obligatory to grammatically guarantee partial pro drop. In Zurich German (Cooper & Engdahl 1989; Cooper 1994,

see also Weiss 2005 for discussion), for instance, complementizer agreement is optional, as shown in (49):

(49) a. Ich ha nöd gwüsst dass in Züri wohnsch Zurich German
I have not known that __ in Zurich lives

b. Ich ha nöd gwüsst dass-t in Züri wohnsch
I have not known that.2SG in Zurich lives
'I did not know that you live in Zurich

The existence of optional complementizer agreement still renders pro drop possible, as it still provides evidence for the language learner against Uniformity.

It is unfortunately not the case that partial pro drop is only claimed to exist in varieties with obligatory or optional complementizer agreement, and counter examples exist. Here, we refer, to Swabian, an Alemannic variety where no overt 2SG subject has to occur in the absence of an overt marker on the complementizer (Haag-Merz 2006; Bohnacker 2013):

(50) weil wenn Ø daa runder kucksch, des isch [total!] [tief!] Swabian
because if __there down look.2SG it is totally deep
'…because if you look down there, it's totally deep.'

Bohnacker notes that there is an interesting asymmetry here: 2SG pronouns are omitted significantly more often after an inverted verb than after a complementizer (71% versus 14% of 2SG contexts).[19] This may suggest that what looks like pro drop here is actually a different, more local phenomenon. The reason is that 'real' pro drop involves licensing of a null subject as a syntactic category (see also the next section), whereas the data in Swabian are more compatible with the fact that an adjacency relation between an agreement affix and a subject pronoun immediately following is particularly amenable to processes of phonological reduction in spontaneous speech (which in fact is where Bohnacker draws her data from). Such phonological reduction processes can be observed in Standard German as well, particularly in fast speech (cf. Trutkowski 2016; thanks to Eric Fuss for pointing this

[19] For straight orders, with the subject in first and finite verb in second position, the percentage of pro drop cannot be established as it interferes with topic drop, an independent phenomenon.

out to us). We leave it to future research to establish whether the rate of pro drop in main and embedded clauses can be used to make an analytical choice between pro drop or phonological reduction more generally.

5 Theoretical consequences

Naturally, the question arises why in null subject languages agreement markers may neither be underspecified nor overspecified with respect to the (φ-)features of their corresponding pronominal subjects. Why must the featural make-up of the pronominal subject and the agreement marker be identical?

There are essentially two ways to account for this, both defended in the literature: either the agreement stands in some kind of feature-sharing relation with an unpronounced pronominal subject, dubbed *pro*, or, even stronger, the agreement marker *is* the subject pronoun. Below, we show that our generalization is fully compatible with either proposal. We first demonstrate that the first, *pro*-based approach is tailor-made to explain the observed empirical facts. We then argue that, even though the second approach faces challenges that the other approach does not meet, it is still also fully compatible with the empirical data.

5.1 Pro-*based analyses*

The first position postulates the existence of an empty subject pronoun that syntactically takes the same position as an overt one. The difference between languages like Italian and English is then minimal: Both have subjects agreeing with the verb but in Italian this subject can be covert, *pro*. This means that syntactic uniformity between pro-drop and non-pro-drop languages can be upheld.

Under the view that pro drop involves the presence of a covert subject *pro*, a correlation between the richness of agreement and pro drop naturally follows. As there is only one *pro*, it must be featurally underspecified in the lexicon. After all, enriching the number of *pro*s in the lexicon to at least six (one for every person/number context) would be conceptually very awkward (cf. Holmberg 2005). At the same time, *pro* must end up carrying the relevant φ-features, as otherwise it cannot be

interpreted as a real pronoun at LF. The way to make *pro* receive those φ-features, then, is by having the agreement markers themselves value it.

To give an example, the uninterpretable 1SG φ-feature values on the agreement marker in the Italian example in (51) value *pro*'s unvalued φ-feature, as shown in (52). At LF *pro* is consequently interpreted as the 1st person singular pronominal subject.

(51) Canto Italian

Sing.1SG

'I sing'

(52) Before valuation: $[_{AgrP}\ [_{DP}\ [\phi:\ \underline{\quad\quad}]$ ... Agr [uϕ: speaker]]

After valuation: $[_{AgrP}\ [_{DP}\ [\phi:\ \underline{\text{speaker}}\ ]$ ... Agr [uϕ: speaker]]

Such an analysis straightforwardly predicts that the agreement paradigm must be rich, as otherwise *pro* can never receive the same interpretation as the corresponding overt pronouns. If pronominal paradigms are rich, the agreement paradigm should be equally rich as well for *pro* to be interpreted as a subject.

The idea that the agreement marker values the features of the subject has been criticized by Holmberg (2005, 2010) and Roberts (2010), who argue that agreement features are not only uninterpretable on F, but also unvalued. In this, they follow Chomsky (2000, 2001), who takes lexically valued features to be only interpretable features. If *pro* is an empty subject, however, pro drop cannot be treated along the same lines. In the traditional conception, *pro* needs to be identified by rich agreement, and not the other way around. If only interpretable elements can value uninterpretable features, such as the ones underlying agreement morphology, and *pro* is by definition unvalued, there can be no φ-features present in the tree that can value *pro*. For these reasons, Holmberg and Roberts take the empty subject to be a regular pronoun, the only difference being that it does not receive phonological content at PF (Perlmutter 1971), thus postulating a third perspective on pro drop, next to the two discussed before. Especially in a grammatical model in which insertion of morpho-

phonological forms follows the creation of morpho-syntactic representations (Halle & Marantz 1993; Embick & Noyer 2007), this can be naturally stated.

However, this criticism against uninterpretable features valuing interpretable ones is currently not grounded in existing theories of agreement anymore. Following Pesetsky & Torrego (2007), Arregui & Nevins (2012), Bjorkman & Zeijlstra (2019) and many others, checking and valuation are nowadays taken to be operationally distinct. Uninterpretable features must be checked; unvalued features must be valued, and nothing forbids interpretable, unvalued features or valued, uninterpretable features (cf. Pesetsky & Torrego 2007). Hence, there is no theoretical objection against uninterpretable features valuing *pro*.[20]

That pro drop is licensed in languages where tense and (rich) agreement morphology is bi-morphemic, and where the relevant features are hosted on two different functional heads, like in the Romance languages we discussed, now straightforwardly follows. However, the above does not explain yet why in languages like Icelandic and Standard German, in which tense and agreement morphology are monomorphemic and the relevant features must be hosted on the same projecting functional head, the agreement marker cannot license pro drop. After all, why couldn't the φ-values on a functional head I° simply value the φ-feature of the subject DP, as in (52)?

The answer, we argue, has to do with the following. Under the assumption that morphemes are categorially defined by the feature they express, T and Agr are the relevant morphemes in a language like Italian. In a language like Icelandic, however, this morpheme must be a feature that encompasses both tense and agreement, called I(NFL). Tense and agreement are subfeatures of I in that case and this has non-trivial consequences for the content of the agreement subfeature. Since tense is an interpretable subfeature, I itself must be interpretable. But this means that the agreement subfeature must be an interpretable feature too. The single I-feature [$_{I}$ T: past; φ: speaker, plural]

[20] Apart from this, a problem concerning PF-deletion of the subject DP is that it is not necessarily triggered by rich agreement. In other words, there is no reason why agreement morphology should be rich (though see Roberts 2010 for a particular attempt to remedy this), nor why it may not contain any other features than φ-features.

cannot appear fully valued in the derivation prior to the split to LF. If it were, both the φ- and the tense subfeature would feed interpretation at LF, which would make the sentence crash: tense and φ-features cannot be interpreted in the same semantic position, as part of the same superfeature I, because they are of different pragma-semantic types. In other words, no coherent interpretation for the morpheme I is possible.

The only way for the relevant I-feature to circumvent LF-crashing is by being lexically unvalued for either tense or φ, not for both. Since tense feature values are not present anywhere else in the derivation, those values must be directly inserted from the lexicon; otherwise, a past tense value would not be visible at LF. But if tense must be valued on the relevant I-subfeature, φ cannot be. Hence, I-features that comprise both tense and φ-subfeatures must have their φ-subfeatures valued in the course of derivation. To come back to the Icelandic example, only [$_{I}$ T: past; φ: _,_] can be a lexical item, not [$_{I}$ T: past; φ: speaker, plural]. Even though the φ-subfeature is strictly speaking part of an interpretable feature, this way, it never feeds LF.

Now, the only way left to value the φ-subfeature on the I-head is through agreement with the subject. Consequently, the DP subject cannot be φ-unvalued either; otherwise there would be no relevant φ-values in the derivation at all. Since *pro* is inherently unvalued, it is an impossible subject to have. It would leave the agreement feature unvalued and at the same time it cannot be valued by the agreement feature itself, as the latter is necessarily unvalued prior to spell out. This, then, rules out pro drop in a language where agreement is a subfeature of I.[21]

The difference between pro-drop languages and non-pro-drop languages, then, is that in the former, agreement markers are inherently φ-valued members coming from the lexicon, whereas in the latter they can only be φ-valued in the course of the derivation. The distinction between pro-drop and

[21] If *pro* were the subject, it would always remain unvalued. To the extent that this is grammatical at all, this may be what underlies expletive pro drop in Icelandic, presuming that expletives are inherently φ-valueless.

non-pro-drop languages thus reduces to the traditional distinction between inherent vs. contextual agreement morphology.

5.2 Agreement markers as pronouns

Even though our approach is fully compatible with *pro* being a subject DP that is valued by agreement markers, it is not the case that our approach can only be cast in these terms. It is also compatible with the alternative approach, in which rich agreement markers are taken to be actual pronouns, i.e., weak subject markers whose rich φ-features enable them to be interpreted as such.

This is the position adopted by Barbosa (2009) (see also Borer 1986, and Alexiadou & Anagnostopoulou 1995, among others, for similar proposals). Tentative evidence for such an approach comes from EPP-effects. If agreement markers in pro-drop languages are subjects, this should allow agreement on the verb to already satisfy the EPP-requirement. This means in canonical pro-drop languages the EPP should not trigger any further instances of (subject) movement, whereas in other languages it should. Barbosa (2009) has argued on the basis of a comparison between European and Brazilian Portuguese that this is indeed the case. On the other hand, Pinto (1997) and Sheehan (2010) have provided arguments that in most Romance pro-drop languages, there must nevertheless be (a possibly empty) constituent in the raised subject position.

Naturally, the assumption that agreement markers are pronouns is trivially compatible with our generalization. If the features of the agreement marker are φ-identical with those of the subject, the null hypothesis should even be that the two are identical. Moreover, the fact that overt subjects never show any kind of tense morphology (there seem to be no languages in the world in which the morpho-phonological form of a subject depends on the tense of the clause it is a subject of) actually predicts that agreement markers cannot be overspecified either.

Despite the fact that this approach is fully compatible with our generalization, it faces at least a conceptual problem: syncretisms easily arise in agreement paradigms, but much less so in subject paradigms. Pronominal paradigms always, directly or indirectly, make 1^{st}–2^{nd}–3^{rd} person distinctions. The only languages with syncretisms in the subject paradigm are those in which agreement

morphology is not syncretic in the same contexts (see Tvica 2017 for more details). However, agreement paradigms in pro-drop languages exhibit many instances of person syncretisms. Romanian, for instance, exhibits a syncretism between 3rd person singular and plural. Still, it is a pro-drop language. The same holds for Spanish, which has a 1-3 singular syncretism in most paradigms outside the present tense paradigm. If those agreement markers were real pronouns themselves, this would be hard to explain. If, however, these agreement markers are the result of spell-out rules of uninterpretable φ-agreement features, such syncretisms are very natural.

Hence, unless this difference between agreement markers and 'real' pronouns is resolved, we take the *pro*-based account to best capture the existence of null subjects and their morpho-syntactic correlates. However, we emphasize that our empirical generalisations also follow if it turns out that agreement markers are actual pronouns.

6 Conclusions and open questions

Despite the fact that pro drop is one of the better studied phenomena in linguistics, the question why pro drop is so pervasive in Romance and so *un*pervasive in Germanic has resisted a principled answer. It is generally agreed upon that agreement somehow plays a role but, as we have shown, both a paradigmatic and a contextual approach towards capturing this correlation run into problems. This must mean that at least one of the assumptions generally employed, either explicitly or implicitly, could be wrong. The job is then to identify it.

In this paper, we have proposed that part of the explanatory burden should be placed outside of the grammar, namely in the acquisition process. Concretely, we argued that bi-morphemic expression of tense and agreement (which we refer to as Transparency) is not an analytical goal of the learner but merely a default assumption in a learning algorithm. Second, we argued that the postulation of a null allomorph is constrained and will only be entertained as an option by the child if a viable alternative is not available. Together, these assumptions create the grammars we see in Romance and Germanic, with the fundamental pro drop difference captured: Only bi-morphemic expression of tense and agreement can license pro drop, provided that the agreement is rich enough. Although these

assumptions obviously have repercussions, we believe that they are well-founded. The fact that morphological intransparency exists means that there must generally be an end to a fully transparent syntax-morphology mapping. Adopting null forms to uphold morphological transparency is incompatible with the fact that from a learnability perspective null forms require clear evidence.

Given the vast literature on pro drop, there are many issues that we have skimmed over or not even addressed. In the remained of the paper, we bring up a few of these.

For one, we have deliberately restricted ourselves to discussing a small number of Germanic and Romance varieties. The reason for this is that only by comparing small differences between relatively closely related languages can one come up with the fine-grained analyses pursued above. Needless to say, such analyses should be subject to typological evaluation, a project that will be subject of further research.

Apart from this, much more can be said about diachronic developments. Both Old Norse and Old High German were pro-drop languages, but Icelandic and Standard German lost this property. In principle, the loss of pro drop could be the result of a small change in the agreement patterns of these languages in our analysis, causing a switch from a bi- to mono-morphemic analysis, which leads to a catastrophic change. If Standard German were to adopt an overt allomorph for the 3SG past context, we predict it would immediately become a pro-drop language. A contextual approach to pro drop also allows a more fine-grained development, in contrast to a paradigmatic approach. We have seen that there can be circumstances under which pro drop is partially possible in a non-pro drop language. This means that pro drop can be partially retained in specific contexts if a language switches from a bi-morphemic to a mono-morphemic analysis of tense and agreement. A proper understanding of these diachronic changes in the realm of pro drop, and one that gets the timing right, requires a careful look at the data, which exceeds the purposes of the present paper.

Another area where future research is called for is the acquisition of pro drop. We argue that pro drop can only be acquired when children start to entertain the hypothesis that the agreement pattern of their mother tongue is bi-morphemic. As we take featural transparency as a starting point

(children only converge to featurally intransparant mono-morphemic agreement paradigms if bi-morphemicity turns out to be unlearnable), we predict that children acquiring Icelandic or Standard German (and arguably also English and Dutch) temporarily go through a pro drop stage before acquiring that the language lacks it. We also make very precise predictions for the acquisition of partial pro drop. For instance, as pointed out by Theresa Biberauer (p.c.), children can only understand partial pro drop in Bavarian in our analysis after having acquired complementizer agreement. Again, this should be subject of further study too.

We should point out, as we already did in section 2, that what we have discussed in this paper is (partial) pro drop that is always available for specific person and number contexts. There is nothing in our analysis that makes this the only type of agreement possible. For one, there are partial pro-drop languages like Finnish, Brazilian and Portuguese, where pro drop is always possible for 1st and 2nd person but only sometimes for 3rd person. For example, the Finnish agreement paradigm is as in (53), and appears, at least at first sight, to be bi-morphemic.

(53) Standard Finnish paradigm of *puhu* ('speak'):

	Present indicative	Imperfect ind.	Conditionalis
1SG	puhu-n	puhu-i-n	puhu-isi-n
2SG	puhu-t	puhu-i-t	puhu-isi-t
3SG	puhu-V	puhu-i	puhu-isi
1PL	puhu-mme	puhu-i-mme	puhu-isi-mme
2PL	puhu-tte	puhu-i-tte	puhu-isi-tte
3PL	puhu-vAt	puhu-i-vAt	puhu-isi-vAt

Nevertheless, 3rd person pro drop appears to be forbidden:

(54) a. (Minä) puhun englantia
I speak.1SG English

b. (Sinä) puhut englantia

d. (Me) puhumme englantia
We speak.1PL English

e. (Te) puhutte englantia

	You=SG speak.2SG English		You=PL speak.2PL English
c.	*(Hän) puhuu englantia.	f.	*(Te) puhutte englantia
	He speak.3SG English		They speak.3PL English

However, a 3rd person subject pronoun can be null when it is bound by a higher argument, as the following examples by Holmberg (2005) show:

(55) a. Se oli Tarjallei pettymys [ettei häni,j/ ∅$_{i/*j}$ saanut lukea latinaa koulussa].
it was Tarja-ALL disappointment that-not she could study Latin school-INE
'It was a disappointment for Tarja that she couldn't study Latin at school.'

b. Poikieni mielestä oli noloa kun hei,j/ ∅$_{i/*j}$ jäivät kilpailussa viimeiseksi.
boys-GEN opinion-ABL was embarrassing when they came race-INE last
'The boys found it embarrassing when they came last in the race.'

This shows that what underlies Finnish pro drop is a different phenomenon from the one we described and, following Holmberg & Sheehan (2010), arguably involves Control instead of *pro*. The fact that in these languages the distribution of PRO is substantially richer than in the languages we discuss, may naturally have consequences for the existence and/or distribution of *pro*. Hence, these languages are outside the domain of application of our proposal.

Finally, we note that the phenomenon known as the radical pro-drop languages, where every argumental and non-argumental pronoun can be dropped (cf. Huang 1984, Jaeggli & Safir 1989, Neeleman & Szendroi 2007) cannot be the result of the same agreement licensing mechanism either. In languages like Japanese and Chinese, null subjects, as well as null objects, are possible in the absence of an agreement system. This phenomenon should therefore be analyzed in different terms, as has been done by Neeleman & Szendroi (2007). Importantly, though, there is nothing in their analysis that is incompatible with ours.

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