Too weak to be pronounced: *pro*-drop and PF-LF mismatches in pronouns

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Abstract

In *Gradient Harmonic Grammar* (Smolensky & Goldrick 2016), *syntactic strength* is considered an inherent property of linguistic items. In this paper, I propose that syntactic strength plays a crucial role in *pro*-drop and in other phenomena that have often been related to a vague concept of "strength". I suggest that *pro*-drop results from failed lexicalization of weak pronouns in the presence of a strong T. Subject clitics of non-*pro*-drop languages instead stem from the *strengthening* of weak pronouns in the context of a weak T. This strength-based approach to pronouns can be also extended to the independent phenomenon of mismatches between strong forms and weak semantics of pronouns, which is problematic for standard accounts à la Cardinaletti & Starke 1999 and it is not accounted for by any other theory of *pro*-drop. In general, such an approach is a mere extension of what has been tacitly presupposed while talking about strength for *pro*-drop (Rizzi 1986a; Alexiadou & Anagnostopoulou 1998), and for other phenomena (see Cardinaletti & Starke 1999 for pronouns; Chomsky 2013, 2015; Cecchetto & Donati 2022 for labeling).

1. Introduction

This paper proposes a new account of the following phenomena based on the concept of *syntactic strength*: *pro*-drop, the distribution of weak and strong pronominal elements, and PF-LF mismatches in pronouns. Syntactic strength is considered as an inherent property of linguistic items. A naive notion of strength has been extensively used in the previous literature within different grammatical theories and for different phenomena (for instance, see Chomsky (2015); Cecchetto & Donati (2022) for strength in the *labeling theory*, Rizzi (1986a) for the *GB* treatment of *pro*-drop, Alexiadou & Anagnostopoulou (1998); Holmberg (2010); Roberts (2010) for minimalist analyses of *pro*-drop, Chomsky (1991) for the general assumption that functional categories can be strong or weak). This paper provides a clear implementation of this rather abstract property that seems to be necessary for modeling various linguistic phenomena. Strength is a property of syntactic heads that can be measured by numerical weights and referred to by operations, rules, and constraints. The analysis is couched in *Gradient Harmonic Grammar*, which can be proven to be the only theory able to integrate the concept of strength in grammar.

In this article, it will be shown that Italian *pro*-drop is a case of "failed" Spell-out (section 5), clitics in French and Northern Italian dialects are the result of "strengthening" (section 6), and some apparently strong elements are instead "camouflaged" weak ones (section 7).

2. Null, weak, and strong pronouns

2.1. Competition between null/weak and strong pronouns in Standard Italian

Null subject languages, or *pro*-drop languages, allow pronominal subjects to remain implicit in the correct information-structure contexts. Null subjects have been traditionally called *pro*.[1] In languages of this type, there is competition between null/weak and strong pronouns. Strong pronouns are used under focus, topic, coordination, cleft, prepositions, and in isolation (Cardinaletti & Starke 1999). Elsewhere, the null subject should be chosen for a pragmatically felicitous utterance. This general description fully applies to Standard (St.) Italian, which is a canonical null subject language. As shown in (1), the pronominal subject can be either a null pronoun (1a), or a strong one (1b).[2] The unmarked way to express the meaning 'she eats' is with the null subject. A strong pronoun is also possible, under the conditions

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[1]   In this paper, I use the label '*pro*' to refer to the lack of an overt preverbal subject, but I do not commit to the theoretical status of *pro* as a special, empty pronoun. As will become clear in section 5, I consider *pro* as a super-weak pronoun that does not make it to Spell-out.

[2]   Unless otherwise indicated, the examples are my own. I am a native Italian speaker from Northern Tuscany.

described here above. For instance, the unmarked answer to a question such as 'what is Eva doing?' is (1a), while (1b) is naturally produced with contrastive focus (for instance, followed by the continuation *ma Paolo no* 'but Paolo does not').

(1)   Standard Italian
        a. Mangia.
           eat.PRS.3SG
           'She eats.'
        b. Lei   mangia.
           3SG.F   eat.PRS.3SG
           'She eats.'

The lexicon of Italian does not contain any nominative clitics. There is only one possible set of lexical entries for nominative pronouns, namely the strong pronouns as *lei* in (1b). On the surface, there is competition between an overt lexical entry (1b), and nothing (1a).

The realization of direct and indirect objects is different. In the internal argument position, strong pronouns alternate with clitic pronouns. An example is given in (2). The strong pronoun (2a) must be used in all cases discussed above (after a preposition, under focus...), while elsewhere the clitic object (2b) should be used, instead. Unlike in the subject position, a null referential object is not possible (2c), unless it is arbitrary (Rizzi 1986a).

(2)   Standard Italian
        a. Paola vede   lei.
           Paola see.PRS.3SG   3SG.F
           'Paola sees her.'
        b. Paola la=vede.
           Paola 3SG.F.ACC=see.PRS.3SG
           'Paola sees her.'
        c. Paola vede.
           Paola see.PRS.3SG
           'Paola sees.' (ungrammatical with the meaning 'Paola sees her')

2.2. Form and interpretation of pronouns in Standard Italian

When two items stand in competition, it is often the case that the phonologically and/or morphologically weaker element has more uses and interpretations than the stronger one, which contains more structure and is semantically specialized, in a sort of "iconicity" scenario (see the compositional accounts of pronouns by Cardinaletti & Starke 1999; Déchaine & Wiltschko 2002; Stegovec 2019). Among pronouns, clitics are phonologically weak (they need a host, cannot be stressed, and are monosyllabic), structurally small (they behave as heads), and have a wider distribution and fewer semantic restrictions than full pronouns. Clitic and strong pronouns also differ concerning bound variable/referential readings, strict/sloppy readings, and animacy restrictions. I illustrate these points in what follows.

The availability of bound variable readings depends on the type of pronoun. Clitics are either referential or bound variables, whereas strong pronouns must be

referential and do not admit bound variable interpretations (although they can be co-referential with other items). Hence, a non-referential quantifier such as *nessuno* 'nobody' can bind a pronoun as a variable only if this is a clitic, as shown in (3a), but not if it is a strong pronoun, as shown in (3b).

(3)   Standard Italian
        a. Nessuno$_i$ vuole   che io   lo$_{i,j}$=inviti.
           nobody   want.PRS.3SG that 1SG 3SG.M.ACC=invite.CONJ.PRS.1SG
           'Nobody$_i$ wants me to invite him$_{i,j}$.'
        b. Nessuno$_i$ vuole   che io   inviti   lui$_{*i,j}$.
           nobody   want.PRS.3SG that 1SG invite.CONJ.PRS.1SG 3SG.M
           'Nobody$_i$ wants me to invite him$_{*i,j}$.'

     In (3a), the clitic pronoun *lo* can refer to either the quantifier 'nobody' or someone else, while the strong pronoun *lui* in (3b) can only pick out the latter option.
     Another example concerns the possible readings of pronouns. Clitic pronouns allow for both strict and sloppy identity (4a), differently from strong pronouns that show a ban on sloppy readings (4b).

(4)   Standard Italian
        a. Paolo ha   guardato [suo fratello]$_i$ e   anche Eva
           Paolo have.PRS.3SG look.PRTC his brother   and also Eva
           l$_{i,j}$=ha   guardato.
           3SG.M.ACC=have.PRS.3SG look.PRTC
           'Paolo$_i$ looked at his$_i$ brother and Eva$_j$ looked at his$_i$/her$_j$ brother too.'
        b. Paolo ha   guardato [suo fratello]$_i$ e   anche Eva ha
           Paolo have.PRS.3SG look.PRTC his brother   and also Eva have.PRS.3SG
           guardato lui$_{i,*j}$.
           look.PRTC 3SG.M
           'Paolo$_i$ looked at his$_i$ brother and Eva$_j$ looked at his$_i$ brother too.'

     In (4a), the clitic can pick out either the antecedent 'Paolo's brother' (strict interpretation) or the property 'one's brother', thereby referring to Eva's brother (sloppy interpretation). In (4b), the strong pronoun forces the strict interpretation.
     Another contrast concerns animacy: only clitic pronouns can refer to both animate and inanimate referents, while strong pronouns are marked as [+animate].

(5)   Standard Italian
        a. Paolo la=sta   pulendo.
           Paolo 3SG.F.ACC=stay.PRS.3SG clean.GER
           'Paolo is cleaning her/it.'
        b. Paolo sta   pulendo   lei.
           Paolo stay.PRS.3SG clean.GER 3SG.F
           'Paolo is cleaning her.'

     In (5a), the object can refer to either Paolo's room or his little sister, for instance. Instead, the object in (5b) can only refer to a person, not to an object.

Interestingly, the contrasts above are only observed when there is competition between two elements (clitic vs. strong pronouns in the object position, *pro* vs. strong pronouns in the subject position). In those environments where the strong form must be used (such as in coordination, with prepositions, or under narrow focus with the operator *solo* 'only'), the strong pronoun loses its usual marked interpretation and the contrasts above are neutralized (see also Despić 2011; Stegovec 2019 for the same observation in Slavic languages). For instance, example (3) has shown that strong pronouns cannot be bound variables. Crucially, this requirement disappears when the strong pronoun is the only possible choice. In prepositional phrases (an environment where clitics cannot show up for independent reasons), the pronoun can only be realized in the strong version. In this case, the strong pronoun can be either referential or a bound variable, exactly as clitics do (cf. (3)). This is shown in (6).[3]

(6)   Standard Italian
        Nessuno$_i$ vuole   che io vada   con lui$_{i,j}$ alla festa.
        nobody want.PRS.3SG that 1SG go.CONJ.PRS.1SG with 3SG.M to.the party
        'Nobody$_i$ wants me to go with him$_{i,j}$ to the party.'

Similarly, example (4) has illustrated that only clitic pronouns can have both strict and sloppy readings, while strong pronouns enforce the strict reading. However, the strong pronoun in a prepositional phrase can have both strict and sloppy readings, as clitics do. This is shown in (7).

(7)   Standard Italian
        Paolo ha   parlato   con [suo fratello]$_i$ e   anche Eva
        Paolo have.PRS.3SG talk.PRTC with his brother   and also Eva
        ha   parlato con lui$_{i,j}$.
        have.PRS.3SG talk.PRTC with 3SG.M
        'Paolo$_i$ talked to his$_i$ brother and Eva$_j$ talked to his$_i$/her$_j$ brother too.'

Animacy restrictions are also lifted when the strong pronoun is the only possible choice. This is shown in (8), where the strong pronoun in the prepositional phrase refers to an inanimate object.

(8)   Standard Italian
        Paolo ha   una nuova auto. Senza   di lei   non va
        Paolo have.PRS.3SG a   new   car   without of 3SG.F not go.PRS.3SG
        più   da   nessuna parte.
        anymore from any   parts
        'Paolo has a new car. Without her, he no longer goes anywhere.'

So far, I have focused on the distinctions between clitic and strong pronouns in the direct/indirect object position. The same facts arise in the subject position. Example (9) shows a similar contrast to (3): null subjects can be either referential or

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3   For reasons of space, I have excluded the parallel examples with narrow focus and coordination. Strong pronouns also behave as clitics in these contexts.

bound variables (9a), whereas strong pronouns do not allow for the bound variable reading (9b).

(9)   Standard Italian
     a. Nessuno$_i$ ha   detto   che sarebbe   venuto.
       nobody   have.PRS.3SG say.PRTC that be.COND.PRS.3SG come.PRTC
       'Nobody$_i$ said that he$_{i,j}$ would come.'
     b. Nessuno$_i$ ha   detto   che lui$_{*i,j}$ sarebbe   venuto.
       nobody   have.PRS.3SG say.PRTC that 3SG.M be.COND.PRS.3SG come.PRTC
       'Nobody$_i$ said that he$_{*i,j}$ would come.'

These data illustrate the Montalbetti effect (Montalbetti 1984): in languages where the opposition overt vs. null is present, there are specific semantic effects associated with overt vs. null embedded subjects in the scope of a quantifier (see also discussion in Barbosa 1995; Sheehan 2006; Despić 2011). Montalbetti (1984) has also noted that clitics pattern with null subjects because they easily function as variables, as already shown in (3).

This effect disappears when the strong pronoun is the only possible choice. Example (10) illustrates that under focus (realized with either the operator solo 'only' as in (10) or the subject in postverbal position) strong pronouns allow for both options.

(10)   Standard Italian
     Nessuno$_i$ ha   detto   che solo lui$_{i,j}$ sarebbe
     nobody   have.PRS.3SG say.PRTC that only 3SG.M be.COND.PRS.3SG
     venuto.
     come.PRTC
     'Nobody$_i$ said that only he$_{i,j}$ would come.'

Similar data have been provided by Sheehan (2006: 69,71) on the baseline of Barbosa (1995: 50).

Null subjects also allow for both sloppy and strict readings, like clitics and unlike strong pronouns (cf. (4)). This is shown in (11).

(11)   Standard Italian
     a. Paolo pensa   che [suo padre]$_i$ sia   il migliore e
       Paolo think.PRS.3SG that his father be.CONJ.PRS.3SG the best   and
       anche Eva pensa   che sia   il migliore.
       also   Eva think.PRS.3SG that be.CONJ.PRS.3SG the best
       'Paolo$_i$ thinks that his$_i$ father is the best and Eva$_j$ also think that his$_i$/her$_j$ father is the best.'
     b. Paolo pensa   che [suo padre]$_i$ sia   il migliore e
       Paolo think.PRS.3SG that his father be.CONJ.PRS.3SG the best   and
       anche Eva pensa   che lui$_{*i,j}$ sia   il migliore.
       also   Eva think.PRS.3SG that 3SG.M be.CONJ.PRS.3SG the best
       'Paolo$_i$ thinks that his$_i$ father is the best and Eva$_j$ also think that his$_i$ father is the best.'

Again, the contrast disappears under focus. Here, the strong pronoun is forced, and it allows for both interpretations as *pro* does. This is shown in (12).

(12)   Standard Italian
Paolo pensa   che solo [suo padre]ᵢ sia   il migliore e
Paolo think.PRS.3SG that only his father be.CONJ.PRS.3SG the best   and
anche Eva pensa   che solo luiᵢ,ⱼ   sia   il migliore.
also   Eva think.PRS.3SG that only 3SG.M be.CONJ.PRS.3SG the best
'Paoloᵢ thinks that hisᵢ father is the best and Evaⱼ also think that hisᵢ/herⱼ father is the best.'

The animacy restriction works exactly in the same way. *pro* allows both inanimate and animate referents (13a), while strong subjects do not (13b). Where *pro* is not a possible option, like after the focus operator 'only' (13c), the strong pronoun can also pick out an inanimate referent.

(13)   Standard Italian
a. Viene   pulita   da Paolo.
   come.PRS.3SG clean.PRTC by Paolo
   'She/it is cleaned by Paolo.'
b. Lei   viene   pulita   da Paolo.
   3SG.F come.PRS.3SG clean.PRTC by Paolo
   'She is cleaned by Paolo.'
c. Solo lei   viene   pulita   da Paolo.
   only 3SG.F come.PRS.3SG clean.PRTC by Paolo
   'Only she/it is cleaned by Paolo.'

These data show that Italian *pro* behaves as a clitic pronoun. Note that *pro* has been categorized as a weak pronoun (and not as a clitic) by Cardinaletti & Starke (1999), and this idea has been adopted by Holmberg (2005); Roberts (2010). In general, the arguments brought by Cardinaletti & Starke (1999) in favor of treating *pro* as a weak pronoun prove that *pro* is not a strong pronoun, and are all compatible with *pro* being a clitic pronoun.[4] The crucial fact here is that *pro* behaves as a weak element, it being either a clitic (a head) or a weak pronominal (a phrase).[5] In particular, I consider *pro* to be something even weaker than a clitic pronoun, as will become clear in section 5.

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[4]   Cardinaletti & Starke (1999) provide the following arguments for considering *pro* as a weak pronoun. (i) *pro* has the semantic properties of a deficient pronoun: it can be expletive, impersonal, and can have non-human referents; (ii) *pro* can only occur in designated positions, like weak pronouns; (iii) *pro* is always chosen when there is the choice between a strong pronoun and a *pro* counterpart. A further argument might come from right dislocation and marginalization, which show that clitics cannot be null (Cardinaletti 2002).

[5]   In different languages, *pro* might pattern more closely with clitics than in others. For instance, Slovenian *pro* behaves as a clitic as far as binding and animacy restrictions are concerned, but it only allows strict readings as strong pronouns do, unlike (13) (Runić 2014; Stegovec 2019).

2.3. Clitic subjects in Standard French and Northern Italian varieties

Unlike Standard Italian, other languages require overt subjects, which can be strong, weak, or clitic pronouns. For instance, in Standard French clitic pronouns are possible subjects, whereas null subjects are excluded. An example is given in (14).

(14)   Standard French
        a. Elle=mange.
           3SG.F=eat.PRS.3SG
           'She eats.'
        b. *Mange.
           eat.PRS.3SG
           'She eats.'

Most scholars agree that French pronominal subjects are clitics and French clitics have a clear pronominal status (since Rizzi 1986b). This is confirmed by their distribution with negation and under coordination.

Some languages exhibit a hybrid behavior between Standard French and Standard Italian: subjects can be left implicit (as in St. Italian), but only for certain person values, and elsewhere a clitic or a strong pronoun must instead appear (as in St. French). Languages of this type are many Northern Italian dialects (hence, NIDs), but also spoken French (Haegeman 2014) and some varieties of Southern France and Switzerland (Poletto & Tortora 2016). Depending on the language, in NIDs subjects are realized as null pronouns, non-specialized (invariant) clitics, or specialized (person-specific) clitics, which can be further distinguished for gender. There is massive variation among these varieties that are halfway between *pro*-drop and non-*pro*-drop languages (I refer the reader to Manzini & Savoia 2005: 117-118 for data). In this paper, I refer to data from Basso Polesano provided by Poletto (1996).

Basso Polesano is spoken in the province of Rovigo (Veneto). It has three types of subject clitics: one for third person specified for gender (*el* for masculine in (15)), an invariant one for first/second person and expletive subjects (*a* in (16) and (18)), and an extra marker for second person (*te* in (16) and (17)). Example (15) illustrates the possibilities for a third person subject. There must be an overt subject: a DP, a proper noun (15a), or a clitic (15b). The clitic and the DP can cooccur (15c), but according to Poletto (1996) then the DP is dislocated (as in the Italian *Mario, lui mangia tanto* 'Mario, he eats a lot'). A null pronoun is not possible (15d).

(15)   Basso Polesano, Poletto (1996: 275, 278)
        a. Mario magna   tanto.
           Mario eat.PRS.3SG a lot
           'Mario eats a lot.'
        b. El=magna.
           3SG=eat.PRS.3SG
           'He eats.'
        c. Mario el=magna   tanto.
           Mario 3SG=eat.PRS.3SG a lot
           'Mario eats a lot.'

      d. *Magna.*
        eat.PRS.3SG
        'He eats.'

First and second person subjects must also be overtly expressed. In the absence of a strong pronoun, the invariant clitic *a* must be used (16a,c). Sentences without *a* are ungrammatical (16b,d). This clitic is instead excluded with third person (16d).

(16)   Basso Polesano, Poletto (1996: 281, 293)
      a. A=magno.
        a=eat.PRS.1SG
        'I eat.'
      b. *Magno.
        eat.PRS.1SG
        'I eat.'
      c. A=te=magni.
        a=2SG=eat.PRS.2SG
        'You eat.'
      d. *Te=magni.
        2SG=eat.PRS.2SG
        'You eat.'
      e. *A=el=vien.
        a=3SG.M=eat.PRS.3SG
        'He comes.'

Note that second person requires not only the invariant clitic *a*, but also an extra clitic *te*, as shown in (16c). This second person clitic is always obligatory, even with the strong pronoun *ti*, as illustrated in (17).

(17)   Basso Polesano, Poletto (1996: 294)
      a. Ti   te=magni.
        2SG 2SG=eat.PRS.1SG
        'You eat.'
      b. *Ti magni.
        2SG eat.PRS.1SG
        'You eat.'

The subject cannot be null even when it has an expletive function. In this case, the invariant form *a* is used, as shown in (18).

(18)   Basso Polesano, Poletto (1996: 281)
      a. A piove.
        a rain.PRS.3SG
      b. *Piove.
        rain.PRS.3SG
        'It rains.'

Many other varieties behave as Basso Polesano, or slightly differently. In general, all NIDs have subject clitics in their lexicon, even though in many varieties the paradigm is not complete (Poletto 1997; Poletto & Tortora 2016). The availability of subject clitics depends on the person (and number) feature of the subject, as illustrated for Basso Polesano. Crucially, when a clitic is available in the lexicon of a NID, this is required and cannot be dropped, regardless of the discourse conditions. This seems to suggest that these languages are non-*pro*-drop. However, in the previous literature NIDs have been considered as *pro*-drop languages (Poletto 1996, 2000; Cardinaletti & Repetti 2008). An argument in favor of this view is the fact that subjects other than clitics (i.e., strong pronouns and DPs) can be dropped in the same structural and pragmatic conditions that determine subject drop in Standard Italian. In addition, many subject clitics of NIDs do not display the typical meaning and distribution of subjects (Poletto & Tortora 2016). Nonetheless, it is clear that in Basso Polesano and other NIDs with subject clitics there is always a subject expressed, it being either a clitic or a strong pronoun. For this reason, in section 6 I will argue that NIDs with overt subjects (these being clitics or inflectional affixes) belong to the non-*pro*-drop category (albeit in a different way than languages such as French). I consider evidence for this claim the fact that in these languages subject clitics cannot be dropped, thereby never allowing "completely null" subjects. It should also be noted that clitics of NIDs are mostly considered inflectional morphemes, rather than independent pronouns as the French ones (Rizzi 1986b; Brandi & Cordin 1989; Benincà 1994; Poletto 1996, 1997, 2000; Poletto & Tortora 2016).[6] For instance, NIDs clitics must be repeated in coordination, differently from French clitics; they also have a doubling character, differently from other pronominal clitics, such as Italian accusative clitics.

3. The problem of *pro*

Pro-drop is a very well-studied phenomenon. For this reason, a comprehensive discussion of all the previous approaches to *pro*-drop lies outside the scope of this article (I refer the reader to D'Alessandro (2015) for an overview from the historical perspective, and Sheehan (2016) for the evaluation of the different predictions of various accounts). In this section I will just summarize some of the existing approaches by focusing on the main points of debate: the presence and licensing of a null element in the argument position, and the role of the head bearing agreement (this head being Agr, Infl, or T). There are four main approaches to Romance null subjects, respectively based on empty *pro* (Rizzi 1986a), pronominal T (Alexiadou & Anagnostopoulou 1998), deletion (Holmberg 2010; Roberts 2010), and ellipsis (Duguine 2013).

The very influential analysis by Rizzi (1986a) assumes the existence of an empty category called *pro*, which is a pronoun with no content at LF and PF. This item

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[6]   Subject clitics in NIDs are considered as inflectional markers since Rizzi (1986b). However, Poletto & Tortora (2016) pointed out that the tests used by Rizzi (1986b) are partially unreliable (because negation does not always occupy the same position in different languages) or have exceptions (see the coordination test). The discussion of these points goes beyond the scope of this paper. Nonetheless, this uncertainty about the status of (at least some of) clitics in NIDs confirms that an approach capable of integrating gradience in grammar would be ideal. A strength-based approach may model these distinctions as a consequence of different strength values.

needs to be licensed and identified by certain mechanisms. The main drawback of this approach is the postulation of a nominal category inherently unspecified for number, person, and gender. Moreover, the mechanisms of licensing and identification, formulated within Government and Binding theory, cannot be easily reformulated within current frameworks such as Minimalism (see discussion in Holmberg 2005). In fact, *pro* should be assigned feature values by Agr, but the head responsible for agreement is standardly considered to be inherently unvalued and to receive its feature values by the subject.

An approach that dispenses with *pro* has originally been formulated by Borer (1986), and further developed by Barbosa (1995, 2011); Alexiadou & Anagnostopoulou (1998, 2021). The central idea is that in null subject languages there is no need for an empty pronoun because T is pronominal and its morphological agreement is interpretable. According to Alexiadou & Anagnostopoulou (1998), T bears a [D] feature, as pronouns do, and this is enough to satisfy the requirement of having a subject, without any additional empty element. This assumption presents some complications regarding issues such as Theta role assignment, or the source of ϕ-features. In subsequent work, Alexiadou & Anagnostopoulou (2021) have suggested that in null subject languages T bears interpretable but unvalued ϕ-features ([iϕ:_]). These are valued by Agree with a covert Topic operator in the CP periphery (following Frascarelli 2007). These ϕ-features, phonologically realized as an affix, are assigned a Theta role because they head a chain whose foot is a null subject *pro* in Spec,VoiceP. The disadvantages of this approach are the technicalities (such as Agree with an empty topic). More in general, analyses based on the role of rich morphological agreement (which go back to Taraldsen 1980) raise some general concerns. First of all, it is not obvious how to establish when agreement is morphologically strong and when is not. Moreover, phonological information should not be able to influence syntax, within a strict modular theory of grammar as the one adopted here and by previous analyses (see discussion in Müller 2006). It should also be noted that, although there is a general correlation between *pro*-drop and overt agreement in consistent null subject languages, this connection is only a tendency, as proved by the empirical survey by Gilligan (1987).

Other analyses attribute some particular features to T that allow the subject pronoun to be deleted. Proponents of the deletion approach are Holmberg (2005, 2010); Sheehan (2006); Roberts (2010). Under this view, *pro*-drop is failed PF-realization of a pronoun, and agreement is the Spell-out of uninterpretable features. According to Holmberg (2010), T bears a [uD] feature. Null subjects are inherently deficient pronouns in the form of ϕP. Agree between [uD] and ϕP has two consequences: it makes the pronoun definite and values the ϕ-probe on T. Given that now T and this ϕP forms a chain, the pronoun is not pronounced; only the highest copy of the subject, incorporated into T as agreement, is pronounced as an affix on the verb. Approaches of this type require various technical assumptions to delete the pronoun: deficient pronouns, "rich T", plus a deletion mechanism such as phonological reduction in chains (Holmberg 2010), impoverishment (Roberts 2010), or deletion under feature non-distinctness (Sheehan 2006).

A particular type of deletion approach is the ellipsis account by Duguine (2013, 2014). Duguine proposes that regular ellipsis can account for Romance *pro*-drop, similarly to what is generally assumed for languages such as Japanese (see Neeleman & Szendrői 2007). A similar analysis is also proposed by Holmberg (2005) for first

and second person null subjects in Finnish. The main problem of the ellipsis approach is that a null subject is expected to behave as a canonical DP and, in particular, to have the same referential properties of its antecedent. However, in section 2.2 I have shown that null subjects do not behave as overt subjects (i.e., strong pronouns in Italian).

In addition to the problems related to *pro*, all the above-mentioned analyses cannot account for either the PF-LF mismatches in Italian pronouns (see section 2.2) or the obligatory subject clitics of inflectional type in Northern Italian dialects (see section 2.3). In contrast, the analysis developed in this paper considers syntactic strength to be the property responsible for *pro*-drop, obligatory subject clitics, PF-LF mismatches in pronouns, and morphological agreement. Nonetheless, it shares with the deletion/ellipsis accounts the idea that *pro*-drop is the failed realization of a defective pronoun, as will become clear in section 5.

4. Strength in syntax

4.1. Gradient Harmonic Grammar

The analysis developed in this paper is couched in the framework of *Gradient Harmonic Grammar (GHG)*, launched by Smolensky & Goldrick (2016). GHG is a version of *Optimality Theory (OT)*, a linguistic theory based on competition among candidates that are evaluated by conflicting constraints. The peculiarity of GHG is the use of *weights*, which are assigned to both constraints (as in *Harmonic Grammar*, Smolensky & Legendre 2006) and symbols in linguistic expressions (*gradient symbolic representations*). The different weights of the constraints simply translate a constraint ranking into numbers. Violations ascribed to the candidates by the constraints are gradient, depending both on the weight of the offended constraint and on the weight (i.e., strength) of the offending items. The strength of linguistic elements is discussed in section 4.2.

This framework offers a new perspective on how to derive different types of phenomena where syntactic strength seems to play a role (see Müller 2022 for an adequate discussion of the framework and other case studies). So far, most of the work couched in Gradient Harmonic Grammar has been carried out in phonology; some articles address issues about multilingualism (Goldrick et al. 2016; Schwarz & Putnam 2017; Putnam & Klosinski 2020); recently, GHG has also been increasingly applied to syntactic problems (Aarts 2007; Putnam & Schwarz 2017; Lee 2018; Lee & Müller 2018; Müller 2017, 2019; Müller et al. 2022; Müller 2022; Schwarz 2020; Hsu 2021).

Applying this framework to *pro*-drop (and to the other topics discussed in this paper) has many advantages over previous theories of null subjects. GHG is the only theory that allows to implement the widely accepted view that *pro*-drop is related to the strength of the verbal heads. GHG introduces in the grammar a concrete implementation of the vague concept of strength of syntactic categories. With the simple assumption that strength is a property of linguistic items (which is always made, but left implicit in almost every theory so far, see section 3), various stipulations and problems of other theories of *pro*-drop can be eliminated. The same tool can also be used independently to explain the mismatches in form and meaning of clitic and strong pronouns presented in section 2.2, which have never yet been linked to the issue of *pro*-drop. Moreover, strength gradience makes it possible to model asymmetries

that go beyond the presence or absence of a feature, as seems the case for subject clitics in NIDs.

4.2. Syntactic strength

Linguistic elements are not categorical but may have different levels of activity (i.e., they can be strong or weak, as known since Ross 1973a,b; see Aarts 2007 for a formalization of syntactic gradience as a graded distinction between more or less prototypical members of classes). For syntactic heads, I consider this activity to be *syntactic strength*. Strength is a syntactic feature associated with a number that encodes the presence and activity of a head in the syntactic structure. In general, numerical strength values assigned to linguistic objects are taken to be within the interval [0, 1] (see other works couched in this framework, mentioned in section 4.1). Default elements have a discrete strength of value 1, while defective items are weaker elements. Optimization procedures only allow for a discrete inventory of values. In this paper, I assume three possibilities: full elements with strength 1, weak elements with strength 0.6, and super-weak elements with strength 0.1.

In addition, I introduce a new element with respect to standard GHG approaches to syntax. I propose that strength can be modified by operations during optimization steps. In particular, strength can be derivationally increased. *Strengthening* from input to output is a possible repair to avoid violations of markedness constraints. Strengthening leads to violations of a Dep constraint related to strength, Dep[strength] (see (25)), which penalizes changing strength values from input to output. Note that the process of strengthening is by no means new in GHG applications in the field of phonology (see Smolensky & Goldrick 2016; Rosen 2016; Zimmermann 2019, 2021, among others).
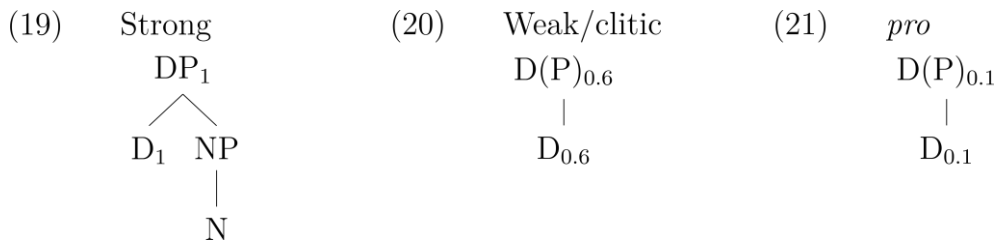
As far as the source of strength is concerned, this is a deep question that still needs to be answered. Future works couched in this framework, together with what has already been done, will certainly contribute to the resolution of this question. In general, strength is motivated by the behavior of linguistic elements. As there is no source for ϕ-features, but there is evidence for them because there are operations that refer to them, perhaps there is no source for strength-features, but there is evidence for them because there are operations that refer to them. In the specific case of pronouns, I assume that the amount of strength of a pronoun correlates with the amount of structure that the pronoun contains (see also Hsu 2021: 46 for a sketch of this idea). Following the well-known approaches by Cardinaletti & Starke 1999; Déchaine & Wiltschko 2002, not all pronouns have the same size. Pronouns can be distinguished at least among three types: strong, weak, and clitic. Their status depends on the number and type of features (and nodes, which are bundles of features). Building on this, I assume that more structure can be translated into more strength. I indicate strength levels as subscripts. DP_1 corresponds to strong pronouns, which involve all pronominal projections. If some heads are missing, i.e. the pronoun is defective in some respects, this is reflected by a weaker value of strength on the D head: $DP_{0.6}$, $DP_{0.1}$. I consider weak pronouns and clitics to be items with 0.6 strength: they are both defective, and the difference is that one is a phrase, the other just a head.[7] I suggest that very weak

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[7]   Since I do not deal with weak pronouns in this paper, for the time being I consider them together with clitics. Of course, weak pronouns should be slightly stronger than clitics

DPs ($DP_{0.1}$) correspond to what is traditionally called *pro*, i.e. a non-pronounced pronoun.

The mapping between structure layers and strength levels is schematized in (19)–(21). The label D(P) in (20) indicates that weak and clitic pronouns are considered together, and also that clitics have a mixed behavior between heads and phrases; D(P) in (21) refers to the dubious status of null subjects (see short discussion in section 2.2).

(19) Strong   (20) Weak/clitic   (21) *pro*
      DP_1 $D(P)_{0.6}$ $D(P)_{0.1}$
      /\ | |
   D_1 NP $D_{0.6}$ $D_{0.1}$
          |
          N

Ultimately, strength correlates with the features on the head: the head D_1 in (19) has a c-selectional [•N•] feature that allows it to select for a NP complement. $D_{0.6}$ and $D_{0.1}$ in (20)–(21) do not have it. Hence, a difference in heads/features results in a difference in strength. Different syntactic structures are mapped to different strength values, which are used as shortcuts for the whole structure by the different syntactic operations.

Since strength is a syntactic property, it is not visible after Spell-out: output forms are not associated with gradient strength values, which only matter for syntactic computation (as also assumed in most works framed in GHG). For example, trees (19) and (20) can be translated into the following vocabulary entries of Standard Italian for strong /lei/ (nom, acc) and clitic /la/ (acc).

(22)   Vocabulary entries for Standard Italian
       a. /lei/ ↔ D[ϕ:3SG.F] + NP
       b. /la/ ↔ D[ϕ:3SG.F, case:ACC]

As (22) shows, vocabulary entries do not refer to strength value, since this is a pure syntactic element. Strength is like a diacritic that regulates syntactic operations and does not survive at Spell-out. The syntactic structure and morpho-syntactic features are, however, still visible for lexical substitution.[8]

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because they are phrases (i.e., heads that project). One possibility would be to introduce a strength distinction: weak pronouns are 0.7 strong, clitics 0.5. I leave the fine-grained distinctions among different pronouns to further research. I also leave the question of pronominal decomposition open. It is certainly possible to assign strength to different subparts of the pronouns, in the spirit of Kayne (2000); Cardinaletti & Starke (1999); Déchaine & Wiltschko (2002); Stegovec (2019). Different strength values could also be attributed to different features on the same head.

[8]   Here and throughout this paper, I adopt various concepts from *Distributed Morphology* (Halle & Marantz 1993; Harley & Noyer 1999). In general, I assume a modular view of grammar, where syntax feeds both phonology and semantics. There are various derivational stages, as described below: syntactic/pre-lexical, transfer/lexical, PF/LF/post-lexical. A question arises about the position of strength across these different modules. I think that strength should be syntactic because syntactic operations make reference to it. I do not

The correlation between strength and morpho-syntactic features just established can be easily extended to heads such as T and V. For example, various accounts of *pro*-drop have proposed that the T head of null subject languages is strong. This strength has been interpreted in different ways: T is a special kind of governing head because it can assign nominative case (Rizzi 1986a), T is pronominal because it has interpretable ϕ-features (Alexiadou & Anagnostopoulou 1998, 2021) or bears a [D] feature (Holmberg 2005; Roberts 2010). The particular features postulated for the T head of null subject languages, which result in a "strong" behavior, are here substituted by a single strength value. In null subject languages such as Italian, finite T is strong: T_1. This high strength value correlates with the amount of features that T bears: [Tense], [•D•], [•v•], [uϕ:_], [ucase:NOM]. T_1 determines independent tense, triggers EPP movement and head movement, copies the ϕ-features from the subject, and assigns nominative case.[9] In other languages, such as Standard French and Basso Polesano, finite T is instead weak: $T_{0.6}$.

Note that compositional approaches to weak and strong pronouns à la Cardinaletti & Starke (1999) cannot be easily applied to the clausal spine: it cannot be simply said that Italian T is stronger due to the presence of more nodes because there should be no variation in the hierarchy of functional projections. Instead, strength seems to be the best tool to handle this kind of phenomena.

5. *Pro*-drop is no PF-realization

In this section, I develop a strength-based analysis of *pro*-drop, which dispenses with the empty category *pro*, any particular feature of T apart from strength, and any special mechanism for the identification of the ϕ-features of null subjects. The central idea is that *pro*-drop is the result of *not* spelling out weak elements. So-called *pro* is a "normal" pronoun, but it is too weak to undergo certain processes such as lexicalization. Super-weak pronouns are possible in other languages as well (see section 6). Cross-linguistically, the different outcomes of the derivation depend on both the strength of the head T and the weight of the relevant constraints. It is the combination of a weak DP and a strong T that leads to *pro*-drop. These two elements are related to the subject position, which is traditionally associated with the specifier of T.

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consider it as an interface property because there are other properties that play a role at the interface, such as the morpho-syntactic features for vocabulary insertion. I believe that strength, phrase structure, and morpho-syntactic features (which determine the strength values) are visible at the same time in the syntax as equivalent and redundant information, as shown in trees (19)–(21). However, the lexical entries take into consideration the morpho-syntactic features. Future research should establish the nature of strength and its role in the architecture of the grammar.

[9]   The correlation between all these properties may break down in different ways. For instance, French has V-to-T movement, but no *pro*-drop; Russian has rich subject agreement morphology, but no V-to-T movement. Translated into strength, French T behaves as weak for *pro*-drop and as strong for head-movement, Russian T is weak concerning head-movement and strong concerning agreement. The availability of such processes in a given language depends not only on the strength of T, but also on the weight of the relevant constraints. I refer the reader to Müller (2022) for details.

Here and in the next sections, I provide various OT-tableaux with different elements. The first column contains the input with strength and a set of possible output candidates (one of which is the optimal one). The other columns are dedicated to the constraints and the penalties they assign. The weights of the constraints (written next to their names) were calculated according to the *maximum entropy model learning algorithm* (Goldwater & Johnson 2003), implemented in the *MaxEnt Grammar Tool* by Hayes (2009) (see also Goldrick et al. 2016 for a previous work adopting the same strategy). A weak uniform prior was used for each constraint ($\mu=0$; $\sigma=10^5$). The weights were rounded to the upper integer values for ease of exposition. For each candidate, the violations given by the constraints (written in the corresponding cells) are obtained by multiplying the weight of the offended constraint by the strength of the offending element (written in the input). Harmonic scores are represented in the last column and are obtained by summing all the violations together. The candidate with the better harmonic score (i.e., the closest to 0) wins the competition.

There are three derivational stages (only the relevant steps for each case are shown): syntactic/pre-lexical, transfer/lexical, and PF/LF/post-lexical. In the first stage, some optimizations are carried out before lexical insertion: discharging syntactic features, changing strength values, and so on. These operations are sensitive to strength. The second stage leads to lexical insertion, which is sensitive to the morpho-syntactic features and the positions of the items reached after the syntactic stage. The third step consists of both LF interpretation of the output of lexical insertion and the final post-lexical stage of PF computation, an optimization that yields a non-gradient output.

I will now present the main derivational steps for subject pronouns in Standard Italian. Starting from the syntactic stage, various syntactic operations are carried out before Spell-out. For instance, the subject is merged in its base position and then moves to the preverbal subject position. Movement to the subject position, traditionally called EPP movement, is the step that provides the input for Spell-out, which will be shown in tableaux (30), (31), (33). I adopt the standard assumption that this movement happens because the T head bears an EPP feature [•D•] that triggers internal Merge of the subject to Spec,T. The constraint responsible for discharging the EPP feature is Merge Condition (MC), defined in (23).

(23)   Merge Condition (MC): structure-building features participate in Merge (Heck & Müller 2013).

MC triggers Merge, penalizing undischarged Merge features. The gradient violation is equal to the strength of the head triggering Merge (i.e., the T head).[10]

Discharge of an internal Merge feature results in the creation of a specifier. I suggest that there is a constraint that evaluates the strength of the dependency between the head and its specifier (for every specifier in the case of multiple specifiers). The constraint, called *Head+Spec<1, is defined as follows.

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[10]   MC is contrasted by the constraint Stay!, which penalizes internal Merge. Stay! assigns a gradient violation equal to the strength of the undergoer of internal Merge (i.e., the DP subject). However, this constraint will not be shown in the tableaux because in the languages under consideration it does not play a role: the calculation of the constraint weights via MaxEnt has indicated that the weight of Stay! is 0.

(24)   *Head+Spec<1: the strength of a head and its specifier must be > 1.

This is a markedness constraint on the output: weak heads (i.e., weaker than 1) should not have weak specifiers. The gradient violations are assigned as follows: $1\text{-}x$ (if $x<1$), where x is the strength of the head plus the strength of the item in the specifier position. This constraint formalizes the requirement that the strength of the TP must reach a minimal level.

In addition, strength can be derivationally increased, as suggested in section 4.2. However, this process causes a violation of a faithfulness constraint that specifically controls the amount of strength, Dep[strength], defined in (25).

(25)   Dep[strength]: the total strength of the input must be equal to the strength of the output.

Dep[strength] penalizes the addition of strength from the input to the output. It assigns a gradient violation equal to the strength of the output minus the strength of the input.

We can now see what happens to a super-weak subject in Standard Italian. Tableau (26) represents the syntactic optimization related to the subject. The input of this derivational step is a structure with a strong T with a non-discharged EPP feature and a super-weak pronoun in its base-merged position. The optimal candidate, which will then become the input of the lexical step in Tableau (30), contains the super-weak pronoun in the specifier of T.

(26)   EPP satisfaction in Standard Italian $\rightarrow DP_{0.1}\ T_1$

$T[\bullet D\bullet]_1$ ... $DP_{0.1}$	*Head+Spec<1$_{-86}$	MC$_{-36}$	Dep[strength]$_{-15}$	H
a. $T[\bullet D\bullet]_1\ DP_{0.1}$	0	1	0	-36
b. $DP_{0.1}\ T[\bullet D\bullet]_1$	0	0	0	0
c. $DP_{0.6}\ T[\bullet D\bullet]_1$	0	0	0.5	-7.5
d. $DP_1\ T[\bullet D\bullet]_1$	0	0	0.9	-13.5

Candidate (a) leaves the subject in situ, thereby incurring a violation by MC (of value 1 because the strength of T is 1). Candidate (b) moves the subject to Spec,T. The harmonic score of this candidate turns out to be the best one because no violation is registered: the EPP feature is satisfied, the total strength of the TP is greater than 1, and strength has not been derivationally increased. Candidate (c) does the same as candidate (b), but it also increases the strength of the DP up to 0.6: this causes a violation of value 0.5 (the amount of added strength) by Dep[strength]. The same happens in candidate (d), where the DP strength reaches the value 1 (incurring 0.9 violation of Dep[strength]). None of the candidates violate *Head+Spec<1 because T is strong enough to satisfy this constraint even in the presence of a super-weak DP.

As derivation (26) shows, in Standard Italian a super-weak DP moves to the subject position, satisfying the EPP feature of a strong T. The strong T head of Italian has a strong EPP feature, so strong that it can be satisfied even by a very weak element. Super-weak DPs can occupy Spec,T in the syntax. However, if T is weaker, as in French and Basso Polesano, its EPP feature requires a strong element that can

"compensate" for its weakness. In non-*pro*-drop languages, satisfaction of the EPP causes the DP to be *strengthened*. This will be explained in section 6.

The result of the derivational step described in (26) is a syntactic structure with a weak DP and a strong T, as in (27).

(27)   TP
          ⟋‾‾⟍
    DP$_{0.1}$ T$_1$
    [ϕ:3SG.F]
    [case:NOM]
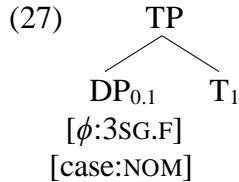
This structure now undergoes Spell-out. Phonological exponents are inserted into the terminal nodes in (27). The complex head T+v+V is substituted by the lexical verb (for example, the verb *mangiare* 'eat') with the corresponding agreement inflection (3 person singular). The super-weak DP in (27) must also undergo lexical realization. The relevant constraints for vocabulary insertion are VI and Dep.

(28)   VI(Vocabulary Insertion): *X^0 if X^0 is not realized by vocabulary insertion (Lee & Müller 2018).

This constraint assigns a gradient penalty for a syntactic head that is not realized by any phonological exponent. The violation is equal to the strength of the head that is not realized by any exponent. Vocabulary insertion, triggered by this constraint, is instead hindered by Dep.

(29)   Dep: All material that shows up in the output is present in the input (Lee & Müller 2018).

This is a version of the faithfulness constraint Dep, standardly used in Optimality Theory. Dep is violated when an output element has no corresponding element in the input. In the case of lexical insertion, the input is a syntactic structure; the output candidates contain lexical exponents that are inserted into the terminal nodes. Each operation of vocabulary insertion introduces one discrete violation of Dep because output forms do not have gradient strength.

The derivational step of lexical insertion for super-weak pronouns in Standard Italian is represented in Tableau (30). For ease of exposure, only the realization of the DP is illustrated (i.e., T is already substituted by the inflected verb).

(30)   Spell-out of DP$_{0.1}$ in Standard Italian → *mangia* 'she eats'

DP$_{0.1}$ T$_1$(mangia)	VI$_{-54}$	Dep$_{-25}$	H
a. mangia	0.1	0	-5.4
b. lei mangia	0	1	-25

The input of Tableau (30) is the optimal candidate for the pre-lexical stage (26), DP$_{0.1}$ T$_{[\bullet D\bullet]}$. Candidate (a) does not insert any Vocabulary Item for the weak DP. Because the D head is not realized by vocabulary insertion, this candidate incurs a

violation by VI (equal to the strength of the non-substituted head, 0.1). Candidate (b) substitutes the D head with the only compatible pronoun in the lexicon of Italian, the strong form *lei*.[11] By doing so, it causes a violation by Dep that is more severe than the violation incurred by candidate (a). Hence, candidate (a) in Tableau (30) wins. At PF, only the verb *mangia* will surface. This means that in languages with strong T (such as Standard Italian), weak subjects are not substituted by any vocabulary entry. The two constraints VI and Dep are responsible for the "failed" lexicalization of the weak DP. Note that strong T does not play a role in the step in (30). However, it is crucial in creating the input of (30), as was explained in the discussion around Tableau (26). Note that even if Standard Italian had a dedicated form for a super-weak pronoun (for example, a clitic subject), a candidate with this form would still not have won the competition. In fact, the insertion of either a strong or weak pronoun still incurs 1 violation of VI, while the penalty for non-realizing a super-weak DP is very marginal (0.1). In general, if a language allows an input for the lexical step as in (30) (which happens when there is a strong T), then it is never convenient to lexically realize the super-weak pronoun (whereas it is different for slightly stronger pronouns, see derivation (33)). It is therefore possible to link this lexical gap to Italian syntax and constraint competition.[12]

In Tableau (30), failure to spell out a super-weak element is not very "costly" compared to the insertion of lexical material. However, the result changes if the pronoun in the input is strong: not realizing a strong head (D_1) is much worse than not realizing a weak head ($D_{0.1}$), as shown in Tableau (31).

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[11]   To be more precise, the form *lei* is not compatible with the current input, because it requires a bigger syntactic structure that is not there (see vocabulary entries in (22)). I have put this candidate with the form *lei* in Tableau (30) only to clarify the point, but this is not a licit candidate for this input. Given that there are no subject clitics in Italian, there is no possible exponent for a weak D head. Cf. Tableau (33) for a similar case and relevant discussion.

[12]   As pointed out by an anonymous reviewer, lexical gaps should be explained as emerging by the constraint interaction. The present analysis can do so at least for super-weak DPs: the computation in (30) never allows for lexical realization of super-weak DPs, thereby leading to a lexical gap. In contrast, for weak pronouns the lexical gap must be taken for granted (see derivation (33)). Deriving lexical gaps as a consequence of the constraint ranking would be a clear improvement in our understanding of how pronouns (and the interface between syntax, morphology, and phonology) work. Note, however, that null forms that are derived via constraint competition (e.g., Grimshaw's (1997) analysis of the lack of *do*-support or the absence of a complementizer in interrogative CPs in English) are often cases where nothing would go wrong in assuming that such a piece of structure is not present in the input. In the case of *pro*-drop, in contrast, there must be a pronoun in the input because it controls agreement on the verb and is semantically interpreted. An alternative would be to delete weak pronouns from the structure in the pre-lexical stage of the derivation, rather than bringing them up to Spell-out and then resorting to a lexical gap. I leave the exploration of this possibility to further work.

(31)   Spell-out of DP_1 in Standard Italian → *lei mangia* 'she eats'

$DP_1 T_1$(mangia)	VI_{-54}	Dep_{-25}	H
a. mangia	1	0	-54
b. lei mangia	0	1	-25

The input of Tableau (31) is the optimal candidate for the pre-lexical stage of the derivation with a strong pronoun, $DP_1 T_{[\bullet D \bullet]}$. The optimal candidate is (b), which lexically realizes the pronoun, because the penalty introduced by lexical substitution (1 violation by Dep) is lower than the penalty caused by failed realization (1 violation by VI). At PF the resulting string is *lei mangia*. The constraints VI and Dep determine that non-defective DPs are spelled out as strong pronouns.

Weak elements that are a bit stronger than the super-weak element $DP_{0.1}$ should also be spelled out. If the DP in the input is not a subject (i.e., it is marked as accusative or dative: $DP[acc]_{0.6} T_{[\bullet D \bullet]}$), then it is spelled out by the corresponding clitic. This is shown in the derivation (32), which illustrates vocabulary insertion for the object clitic in the sentence *lo mangia* 'she eats it' (the subject is now ignored for ease of exposure).

(32)   Spell-out of $DP_{0.6}$ (object) in Standard Italian → *lo mangia* 'she eats it'

$DP[acc]_{0.6} T_1$(mangia)	VI_{-54}	Dep_{-25}	H
a. mangia	0.6	0	-32.4
b. lo mangia	0	1	-25

The input contains a weak DP that has head-moved to T (the syntactic derivational step of cliticization is not provided for reason of space). Candidate (a) does not realize the $DP_{0.6}$, incurring 0.6 violation by VI. The lexicon of Italian contains a form whose context of insertion is compatible with the input of (32), an accusative clitic. Candidate (b) substitutes the DP object with this exponent, obtaining the best harmonic score because the penalty by Dep is less than candidate (a)'s penalty.

If the weak DP in the input is a subject, in Standard Italian no Vocabulary Items are available for substitution. A $DP_{0.6}$ corresponds to a clitic, as illustrated in the structure in (20). Crucially, the paradigm of clitics contains a lexical gap for nominative case, i.e. a null form ∅. In Tableau (33), the candidates and their harmonic scores are the same as in Tableau (32). The only difference is that now there is no overt exponent for the DP.

(33)   Spell-out of $DP_{0.6}$ in Standard Italian → *mangia* 'she eats'

$DP_{0.6} T_1$(mangia)	VI_{-54}	Dep_{-25}	H
a. mangia	0.6	0	-32.4
b. ∅ mangia	0	1	-25

Candidate (a) does not substitute the DP with any exponent, incurring 0.6 violation by VI. Candidate (b) performs lexical substitution for the DP, obtaining the

best harmonic score. However, the lexicon of St. Italian does not contain any clitics that are marked for nominative case: no overt exponent can be inserted in candidate (b). Only a null realization is possible because there is no competing candidate with an overt pronoun that would be better than candidate (b) (the strong pronoun is not compatible with the input, see footnote 11). At PF, the resulting string is *mangia*. This is a case of *ineffability*: an input fails to receive a surface realization (Pesetsky 1997). Thus, this derivation results again in *pro*-drop, although this time the cause for the null subject lies in the morpho-phonology, and not in the morpho-syntax (as was instead the case in (30)).

6. Non-pro-drop languages: strengthening as a repair

In this section, I suggest that lack of *pro*-drop is due to strengthening of weak DPs in the presence of weak T. In those languages where the head T is defective, i.e. weaker than 1, the EPP feature of T cannot be satisfied by a weak element (because of the markedness constraint *Head+Spec<1). Adding strength to the DP is a strategy to avoid the violation of *Head+Spec<1, despite the introduction of a violation of Dep[str].

Standard French is a language where *pro*-drop is not possible. I assume that St. French T is weak (0.6), unlike St. Italian T. The derivational step of EPP satisfaction is shown in Tableau (34) (to be compared with the Italian equivalent in (26)).

(34)   EPP satisfaction in Standard French ($T_{0.6}$) $\rightarrow$ $DP_{0.6}\,T_1$

$T[\bullet D\bullet]_{0.6} \dots DP_{0.1}$	*Head+Spec<1$_{-86}$	MC$_{-36}$	Dep[str]$_{-15}$	H
a. $T[\bullet D\bullet]_{0.6}\,DP_{0.1}$	0	0.6	0	-21.6
b. $DP_{0.1}\,T[\bullet D\bullet]_{0.6}$	0.3	0	0	-25.8
c. $DP_{0.6}\,T[\bullet D\bullet]_{0.6}$	0	0	0.5	-7.5
d. $DP_1\,T[\bullet D\bullet]_{0.6}$	0	0	0.9	-13.5

The input contains a weak T head (equipped with an EPP feature) and a super-weak DP in the base-merged position. Candidate (a) does not carry out movement. Failure to discharge the movement-inducing feature [•D•] is penalized by MC. The violation is equal to the strength of the head hosting the non-discharged feature (0.6). In candidate (b), subject movement avoids the violation of MC. However, by creating a specifier, it violates *Head+Spec<1 because the total strength of the head and its specifier is too low. The violation is equal to the strength that is missing to reach the default level, i.e. 1-(0.6+0.1). This problem is solved by candidate (c) by increasing the DP strength. Although this introduces a violation of Dep[str] (equal to the amount of added strength, i.e. 0.5), candidate (c) receives the best harmonic score. Strengthening the DP up to 1 (candidate (d)) is not optimal because the penalty introduced by Dep[str] increases too much. Hence, the selected output is candidate (c): in Standard French, a super-weak pronoun ($DP_{0.1}$) is strengthened up to a weak

pronoun ($DP_{0.6}$). The weak EPP feature of a weak T head cannot be satisfied by just anything: it requires a strong element that can "compensate" for the weakness of T.[13]

The output of the syntactic derivation in (34) contains a weak DP in the specifier of T. This becomes the input of the lexical derivational step in (35), to be compared with the Italian equivalent in (33) (insertion of the lexical verb is not shown in the Tableau).

(35)   Spell-out of $DP_{0.6}$ in Standard French → *elle mange* 'she eats'

$DP_{0.6}T_{0.6}$ (mange)	VI_{-54}	Dep_{-25}	H
a. mange	0.6	0	-32.4
b. elle mange	0	1	-25

Candidate (a) does not substitute the DP with any exponent. This incurs 0.6 violation of VI. In candidate (b), the DP is substituted by a Vocabulary Item. The violation of Dep introduced by vocabulary insertion leads to a better harmonic score than candidate (a). A further candidate with a null form ($\emptyset$ *mange*) is not possible because there is no lexical gap in the lexicon of Standard French (the same can be said for NIDs below in Tableau (37)). Thus, in Standard French a weak DP is substituted by an overt clitic pronoun. A strong DP is also substituted by an exponent, namely a strong pronoun (the derivation is as for Italian in (31)). Instead, a super-weak DP never makes it to this stage because it is strengthened in the previous derivational step (as illustrated in (34)).

Moving now to Northern Italian dialects, the derivation is very similar to French. It has been argued that subject clitics in NIDs do not behave as pronominal items, but rather as agreement morphemes with a doubling function (see Poletto 1996: 272 and references in section 2.3). Assuming that this view is correct, I suggest that the contrast between Standard French and NIDs can be derived if in NIDs strengthening is achieved by introducing an extra D head. The extra D head, incorporated into T, strengthens the T head to avoid the violation of *Head+Spec<1. Both French and NIDs have a weak

T head and resort to strengthening in case of a super-weak DP, but this process targets the DP in French, and the T head in NIDs. This preference is implemented via different weights of the constraint Dep[str], which has more importance (i.e., weight) in NIDs than it has in French: increasing strength is more "costly" in NIDs than in French. In NIDs, it is better to introduce new material (thereby violating Dep, which controls the insertion of material in the output), rather than to increase strength. The derivation is shown in Tableau (36).

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[13]   This consideration is reminiscent of what is implicitly assumed as the cause of subject movement within the *labeling theory* (Chomsky 2015; Cecchetto & Donati 2022). In languages where T is too weak, such as English, T cannot label the projection. To solve this issue, the subject moves to Spec,T. If there is a subject in Spec,TP, the label becomes '$<\phi, \phi>$: ϕP'. Hence, English weak T can label the TP only after it is "strengthened" by the subject (Chomsky 2015: 10).

(36)   EPP satisfaction in NIDs ($T_{0.6}$) $\rightarrow$ $DP_{0.1}$ $D_{0.6}$ $T_{0.6}$

$T[\bullet D\bullet]_{0.6}$ ... $DP_{0.1}$	*Head+Spec<1$_{-86}$	Dep[str]$_{-43}$	MC$_{-36}$	Dep$_{-25}$	H
a. $T[\bullet D\bullet]_{0.6}$ $DP_{0.1}$	0	0	0.6	0	-21.6
b. $DP_{0.1}$ $T[\bullet D\bullet]_{0.6}$	0.3	0	0	0	-25.8
c. $DP_{0.6}$ $T[\bullet D\bullet]_{0.6}$	0	0.5	0	0	-21.5
d. DP_1 $T[\bullet D\bullet]_{0.6}$	0	0.9	0	0	-38.7
e. $DP_{0.1}D_{0.1}T[\bullet D\bullet]_{0.6}$	0.2	0	0	0.1	-19.7
f. $DP_{0.1}D_{0.6}T[\bullet D\bullet]_{0.6}$	0	0	0	0.6	-15

The input contains a weak T with its EPP feature and a super-weak DP in its base-merged position. Candidate (a) does not discharge the EPP feature, thereby violating MC (with a penalty of 0.6). In candidate (b), the satisfaction of the EPP feature introduces a violation of *Head+Spec<1 (equal to 1-(0.1+06)) because both T and the DP are weak. Adding strength to the DP is a possibility, but candidates (c) and (d) are not the optimal ones because of the penalty from Dep[str] (compare these candidates with candidates (c) and (d) of Tableau (34)). However, there is another strategy to avoid the violation of *Head+Spec<1: inserting an extra D head in the structure, as candidates (e) and (f) do. This introduces a violation of Dep, equal to the strength of the inserted element. In candidate (e), insertion of the weakest D head as possible ($D_{0.1}$) cannot solve the problem: *Head+Spec<1 is still violated. The head to be inserted is 0.6 strong, as the optimal candidate (f) shows. This head increases the total strength of the TP, eliminating the violation given by *Head+Spec<1. Adding a stronger D head (D_1) would lower again the harmonic score because of the higher violation of Dep. Hence, candidate (f) is the output of the EPP satisfaction step in (36).[14]

Note that candidates (e) and (f) were not included in the candidate sets of Italian and French so as not to complicate the discussion. Nonetheless, such candidates are also possible in these languages. In French (Tableau (34)), candidate (e) would receive the same scores as in NIDs (H=-19.7 for candidate (e), and H=-15 for candidate (f)). However, candidate (c) in (34) still gets a better score (H=-7.5). In Italian (Tableau (26)), candidate (e) would receive the score -2.5 (because it only causes 0.1 violation of Dep, and no violation of *Head+Spec<1), and candidate (f) the same score as in NIDs and French (H=-15). Nonetheless, the optimal output in (26) remains candidate (b) with zero violation and H=0.

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[14]   An alternative analysis would be to add strength to T without inserting any additional D head. The corresponding candidate in Tableau (36) would be $DP_{0.1}$ T_1, but this is sub-optimal because of 0.4 violation of Dep[str] (H=-17.2). Moreover, this approach presents various general problems. Firstly, it is not obvious how to realize the additional strength on T as a clitic and how to reconcile it with finite agreement on T, which is instead the Spell-out of a ϕ-probe. Secondly, recall that more strength may correspond to more structure (see 4.2). Thus, strengthening of T can be easily "translated" into adding more structure, which happens by adjoining an additional D head to the T head, while adding strength to T would not mean adding more structure to it. Thirdly, the doubling character of NIDs clitics would not be captured by such an account, whereas it is explained by the present analysis.

Coming back to NIDs, the optimal candidate of the EPP satisfaction step in (36) becomes the input for the Spell-out step in (37) (insertion of the lexical verb is not shown in the Tableau).

(37)   Spell-out of $DP_{0.1} D_{0.6}$ in Basso Polesano → *el magna* 'he eats'

$DP_{0.1} D_{0.6} T_{0.6}$(magna)	VI_{-54}	Dep_{-25}	H
a. magna	0.6 + 0.1	0	-37.8
b. el magna	0.6	1	-57.4
c. el magna	0.1	1	-30.4
d. el el magna	0	2	-50

The input contains a super-weak DP in Spec,T, a weak D head incorporated into T, and a weak T head. Candidate (a) substitutes neither the DP nor the D head, incurring 0.7 violation by VI (0.7 is the sum of the strengths of the DP and the D head). Candidate (b) only substitutes the super-weak DP with a clitic, resulting in a worse harmonic score because of the introduction of 1 penalty by Dep (although the violation by VI is reduced to 0.6). Candidate (c), homophone to candidate (b), only substitutes the weak D head with a clitic. Although it introduces 1 penalty by Dep, it reduces the violation of VI to 0.1, obtaining the best harmonic score. Candidate (d) substitutes both the DP and the D head with two clitics. It is sub-optimal because it introduces 2 violations of Dep, despite eliminating the violation of VI. Hence, the winner is (c): the extra material added in the presence of a super-weak subject (see (36)) is spelled out by a clitic pronoun. The "real" subject, $DP_{0.1}$, is not spelled out. In this sense, NIDs are *pro*-drop languages, as argued in much of the previous literature (see section 2.3): super-weak DPs can occupy the subject position (i.e., they are contained in the output of derivation (36), differently from French in (34)), but they fail to undergo lexicalization, as is the case in Standard Italian. The situation is different from non-*pro*-drop languages, where a super-weak DP can never appear in the specifier of T (see derivation (34) for French). However, NIDs allow super-weak subjects only if extra strength is added in the form of a "supporting" D head. This extra D head is spelled out by a clitic pronoun. In this sense, NIDs are non-*pro*-drop languages: null subjects always require the presence of a doubling element, which is realized as an overt clitic because these languages have lexical entries for subject clitic pronouns in their lexicon.

The strengthening function of NIDs clitics might also be identified in some special clitics of some varieties. Some NIDs have clitics that seem to contribute to the well-formedness of the structure, but disappear when there are other clitics. For instance, in Friulan subject clitics are obligatory. However, they are not phonologically realized when they appear in a cluster with other clitics, including negation, direct and indirect objects, impersonal and reflexive arguments (Poletto 1997: 785). A similar case is probably that of auxiliary clitics in the dialect of Cornuda (Poletto & Tortora 2016: 784–785). This phenomenon seems to indicate that subject clitics of this type have nothing to do with subject realization. Rather, they are a kind of "strength support" when the T head and its specifier are not strong enough. In fact, they are not present when the total strength is already sufficient.

This analysis predicts that subject clitics in NIDs may result from two different processes: they are either doubling elements for super-weak pronouns, as in derivation (37), or the Spell-out of weak DPs (an input $T_{[\cdot D \cdot]0.6} \ldots DP_{0.6}$ in (36) leads to the output $DP_{0.6} T_{0.6}$, and the DP is then spelled out as a clitic, as in (37)). In the former scenario, clitics are closely related to the verb and behave as inflectional affixes. In the latter case, clitics are pronominal and behave as their French counterparts. Thus, a gradient picture emerges: not all subject clitics have the same status. This prediction needs to be evaluated with further studies, but at first sight it seems on the right track. As the overview by Poletto & Tortora (2016) shows, subject clitics in NIDs do not form a homogeneous class. In particular, some subject clitics are of the French type. For instance, the dialect of Alasso has the French order between negation and the subject clitic (Poletto & Tortora 2016: 774); in the variety of Loreo, subject clitics are not repeated in coordination as is the case in French (Poletto & Tortora 2016: 778).

A final remark concerns ϕ-features. In some NIDs, there is sensitivity to different ϕ-features: not all person features require the support of clitics to the same extent. Second person clitics are the most common ones across NIDs. If a NID has only one clitic, this is a second person clitic (cf. Renzi & Vanelli's (1983) generalization). In general, second person always requires a clitic or more than one (for instance, see Basso Polesano in section 2.3). Note that even in Standard Italian second person is "less *pro*-drop" than the other persons: the pronoun for second person cannot be dropped in the subjunctive, as shown in (38).

(38)   Standard Italian, Cardinaletti (1997: 79)
        Che *(tu)   possa   riuscirci non è   chiaro
        that   2SG.NOM can.SUBJ.2SG manage not be.PRS.3SG clear
        'That you can do it is not clear.'

One way to handle these facts is to assign different strength values to different features. In particular, second person might be weaker than the other person features, thus always requiring some support. Another strategy is to specify constraints for different features. For example, the markedness constraint *Head+Spec<1 could be specified for second person (e.g., *Head[ϕ:2]+Spec[ϕ:2]<2) or there could be a constraint that favors the second person's realization at Spell-out, such as Max[ϕ:2].

To sum up, different languages may exhibit slightly different strategies to reduce the markedness of a weak T with a weak DP. Adding strength is a repair to avoid the violation given by *Head+Spec<1 when the strength of the items within the TP is too low. Strength can be added to the DP (as in French) or to T via an extra D head (as in NIDs). The difference between the two strategies is modeled with different weights assigned to the constraint Dep[str].

7. PF-LF mismatches

In section 2.2, I have discussed some interpretational differences between *pro* and strong pronouns (in the subject position), and between clitic and strong pronouns (in the object position). I have also shown that these differences are lost when the competition between these items breaks down. In this case, the stronger form surfaces but loses its specific interpretation (Despić 2011; Stegovec 2019). In other words, a

pattern that is typically ungrammatical (e.g., a strong pronoun with sloppy reading) becomes possible due to the absence of an alternative (e.g., after prepositions, where weak pronouns are not allowed).[15] One of the relevant examples is repeated in (39). Clitics can be interpreted as either referential or bound variables (39a), whereas strong pronouns must be referential (39b). With prepositions, only strong pronouns can appear. When the choice is forced, the strong pronoun behaves as a clitic: it has both strict and sloppy interpretation (39c).

(39)   Standard Italian
        a. Nessuno$_i$ vuole   che io   lo$_{i,j}$=inviti.
           nobody   want.PRS.3SG that 1SG 3SG.M.ACC=invite.CONJ.PRS.1SG
           'Nobody$_i$ wants me to invite him$_{i,j}$.'
        b. Nessuno$_i$ vuole   che io   inviti   lui$_{*i,j}$.
           nobody   want.PRS.3SG that 1SG invite.CONJ.PRS.1SG 3SG.M
           'Nobody$_i$ wants me to invite him$_{*i,j}$.'
        c. Nessuno$_i$ vuole   che io   vada   con   lui$_{i,j}$.
           nobody   want.PRS.3SG that 1SG go.CONJ.PRS.1SG with 3SG.M
           'Nobody$_i$ wants me to go with him$_{i,j}$.'

The contrast in (39a,b) is explained if clitics are weak pronouns not only in the syntax but also in the semantics. At LF, a syntactically strong pronoun (DP$_1$) receives a strong interpretation (i.e., strict, referential), and a weak pronoun a weak interpretation (i.e., strict or sloppy, referential or bound). A DP$_{0.6}$ is interpreted in the semantics with fewer specifications than a DP$_1$. Instead, strong pronouns receive a complete semantic interpretation, also because they introduce a referential index. This is modeled with extra syntactic structure by Cardinaletti & Starke (1999); Déchaine & Wiltschko (2002); Stegovec (2019). Nonetheless, mismatches between form and interpretation are possible. In (39c), we see a phonologically strong pronoun with a weak interpretation. This pattern can be explained if the DP is underlyingly weak in the syntax, but it is strengthened at Spell-out. It is a "fake" strong pronoun (or "camouflaged", following Despić 2011): the strong form is only superficial and does not correspond to the expected syntactic (and semantic) structure.

        For PF-LF mismatches of this type, I suggest a similar approach to what I have proposed for lack of *pro*-drop in French and NIDs in section 6. Exactly as the constraint *Head+Spec<1 leads to strengthening of the subject pronoun when T is weak, other markedness constraints cause DP strengthening in other configurations. The strong pronoun in (39c) is actually weak, as its interpretation shows. However, it is strengthened to avoid the violation of a markedness constraint that does not tolerate weak elements in the complement position of certain heads. In the context of prepositions, a constraint such as (40) penalizes prepositions that combine with weak complements.

(40)   *P+Compl<2: the strength of a preposition and its complement must be ≥ 2.

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[15]   An anonymous reviewer noted that these 'anti-blocking' patterns can be handled by those versions of OT where there is competition between candidate sets at both PF and LF, such as *Super-optimality* (Blutner 2000; Legendre & Smolensky 2017). An analysis of the present case study in terms of bidirectional optimization over expressions/interpretations pairs may be explored in future work.

The derivation for the PP complement in (40c) is provided in Tableau (41). This represents a pre-lexical optimization that happens immediately before Spell-out. Crucially, LF interpretation is computed before the optimization in (41).[16]

(40)   Strengthening of clitics after prepositions in Standard Italian $\rightarrow P_1 DP_1$

$P_1 DP_{0.6}$	*P+Compl<2$_{-32}$	Dep[str]$_{-15}$	H
a. $P_1 DP_{0.6}$	0.4	0	-12.8
b. $P_1 DP_1$	0	0.4	-6

The input contains a preposition with a weak DP as its complement. Candidate (a) does not perform any operation, incurring a violation by *P+Compl<2 (0.4 is the amount of strength missing to reach the well-formed value of 2). This problem is solved by candidate (b) by strengthening the pronoun up to 1. This is the optimal output: the preposition is now followed by a strong pronoun. Since Italian prepositions require strong complements, a weak DP complement must undergo strengthening. At the stage of lexical insertion, not represented here, DP_1 will be substituted by a strong pronoun (as in (31)). Importantly, LF interpretation is computed before the pre-lexical stage in (41): the weak pronoun is interpreted as a weak pronoun, although it will end up being realized by a strong pronoun at PF (see also footnote 16). This conclusion is similar to what has been argued by Despić (2011: 19): "in many cases, overtly strong pronouns in focus positions are in fact *camouflaged* clitics which display all bona fide properties of weak/deficient pronouns". The strength-based analysis of *pro*-drop proposed in this paper can easily cover these cases where a strong pronoun behaves as a weak one. Other PF-LF mismatches, such as those discussed in section 2.2, are analyzed in a similar way. Strong pronouns with weak interpretation correspond to weak elements that have been strengthened in their form due to independent requirements.

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[16]   I adopt the Y-model of grammar: syntax feeds PF (the phonological module) and LF (the semantic module). The strengthening process discussed in this section, which leads to fake strong pronouns, should happen at a derivational point when it does not influence semantics, namely after Transfer and immediately before Spell-out. This means that the constraint *P+Compl<2 (and similar constraints that evaluate the structure before sending it to Spell-out) operates in the post-syntax, differently from *Head+Spec<1 (and similar constraints that concern the discharge of syntactic features). The pre-lexical stages described in (26) for the EPP-feature and (41) for this optimization are not simultaneous but happen in different layers of the derivation.

Alternatively, it is also possible that the pronoun is strengthened only after its reference has been established, and that this process happens before Spell-out, as soon as the conditions for its interpretation are met (hence, immediately for strong pronouns, and after binding for clitics).

8. Conclusion

In this paper, I have proposed that syntactic strength is a property of linguist items that influences their distribution, realization, and interpretation. This is the natural implementation of many previous accounts of various phenomena that have been related to a vague concept of "strength", not encoded in the grammar. One such phenomenon is *pro*-drop. I have proposed that a null subject is the null realization of a very weak element. This is an option only for those languages where the inflectional head is strong enough, such as Italian. In languages where this is not the case, the weakness of the relevant argument must be compensated with some extra strengthening. Either the argument is strengthened, thereby favoring its lexical realization and preventing *pro*-drop, as in French, or the verbal head is strengthened by inserting more structure, resulting in an ambiguous status between *pro*-drop and non-*pro*-drop, as is the case in Northern Italian dialects. Beyond *pro*-drop, this analysis can also explain why a strong element behaves as a weak one in some syntactic contexts: it has been strengthened in the pre-lexical stage of the derivation because of markedness constraints.

There are many other phenomena, which I could not address for reasons of space, that can be analyzed with syntactic strength. An example is the ban on weak elements in the object position in Standard Italian (no null referential arguments, and no clitics in the base-merged position). These facts can be simply modeled with a weak V head and a constraint that causes its complement to be strengthened. The violation of the relevant markedness constraint is avoided by either strengthening the object (no object *pro*) or destroying the offending configuration via repel-based movement (cliticization). Another application of this analysis concerns morphological agreement, which tends to be fully realized in languages with strong T. The idea is that agreement can be subject to impoverishment rules that are sensitive to the strength of the T head. Because strong T resists impoverishment, its ϕ-features make it to Spell-out.

Acknowledgments

References

Aarts, Bas. 2007. *Syntactic gradience: The nature of grammatical indeterminacy*. New York: Oxford University Press https://doi.org/10.1093/oso/9780199219261.001.0001.

Alexiadou, Artemis, & Elena Anagnostopoulou. 1998. Parametrizing AGR: Word order, V-movement and EPP-checking. *Natural Language & Linguistic Theory* 16: 491–539. https://doi.org/10.1023/A:1006090432389

Alexiadou, Artemis, & Elena Anagnostopoulou. 2021. Rethinking the nature of nominative case. In J. Douglas, A. Bárány, T. Biberauer, & S. Vikner (eds), *Syntactic structure and its consequences III*, 69–93. Berlin: Language Science Press. https://zenodo.org/records/4680301

Barbosa, Pilar. 1995. *Null arguments*. Ph.D. thesis, MIT, Cambridge, Mass.

Barbosa, Pilar. 2011. Pro-drop and theories of pro in the minimalist program part 1: Consistent null subject languages and the pronominal-Agr hypothesis. *Language and Linguistics Compass* 5: 551–570. https://doi.org/10.1111/j.1749-818X.2011.00293.x

Benincà, Paola. 1994. *La variazione sintattica*. Bologna: Il Mulino.

Blutner, Reinhard. 2000. Some aspects of optimality in natural language interpretation. *Journal of semantics* 17(3): 189–216. https://doi.org/10.1093/jos/17.3.189

Borer, Hagit. 1986. I-subjects. *Linguistic Inquiry* 17(3): 375–416.

Brandi, Luciana, & Patrizia Cordin. 1989. Two Italian dialects and the Null Subject Parameter. In O. A. Jaeggli, & K. J. Safir (eds), *The Null Subject Parameter*, 111–142. Dordrecht: Springer.

Cardinaletti, Anna. 1997. Subjects and clause structure. In L. Haegeman (ed.), *The new comparative syntax*, 55–95. London and New York: Longman.

Cardinaletti, Anna. 2002. Against optional and null clitics. right dislocation vs. marginalization. *Studia linguistica* 56: 29–57. https://doi.org/10.1111/1467-9582.00086

Cardinaletti, Anna, & Lori Repetti. 2008. The phonology and syntax of preverbal and postverbal subject clitics in Northern Italian dialects. *Linguistic Inquiry* 39: 523–563. https://doi.org/10.1162/ling.2008.39.4.523

Cardinaletti, Anna, & Michal Starke. 1999. The typology of structural deficiency: A case study in the three classes of pronouns. In H. van Riemsdijk (ed.), *Clitics in the languages of Europe*, 145–233. Berlin: De Gruyter. https://doi.org/10.1515/9783110804010.145

Cecchetto, Carlo, & Caterina Donati. 2022. Labeling (reduced) structures: When VPs are sentences. *Linguistic Inquiry* 55(1): 1–50. https://doi.org/10.1162/LING_a_00460

Chomsky, Noam. 1991. Some notes on economy of derivation and representation. In R. Freidin (ed.), *Principles and parameters in comparative grammar*, 417–454. Cambridge, Mass.: The MIT Press.

Chomsky, Noam. 2013. Problems of projection. *Lingua* 130: 33–49. https://doi.org/10.1016/j.lingua.2012.12.003

Chomsky, Noam. 2015. Problems of projection: Extensions. In E. Di Domenico, C. Hamann, & S. Matteini (eds), *Structures, strategies and beyond: Studies in honour of Adriana Belletti*, 223: 1–16. https://doi.org/10. 1075/la.223.01cho

Déchaine, Rose-Marie, & Martina Wiltschko. 2002. Decomposing pronouns. *Linguistic Inquiry* 33: 409–442. https://doi.org/10.1162/002438902760168554

Despić, Miloje. 2011. *Syntax in the absence of determiner phrase*. Ph.D. thesis, UConn.

Duguine, Maia. 2013. *Null arguments and linguistic variation: a minimalist analysis of pro-drop*. Ph.D. thesis, Université de Nantes.

Duguine, Maia. 2014. Argument ellipsis: a unitary approach to pro-drop. *The Linguistic Review* 31: 515–549. https://doi.org/10.1515/tlr-2014-0010

D'Alessandro, Roberta. 2015. Null subjects. In J. Mateu, A. Fábregas, & M. T. Putnam (eds), *Contemporary linguistic parameters*, 201–226. London: Bloomsbury Press.

Frascarelli, Mara. 2007. Subjects, topics and the interpretation of referential *pro*. *Natural Language & Linguistic Theory* 25: 691–734. https://doi.org/10.1007/ s11049-007-9025-x

Gilligan, Gary. 1987. *A cross-linguistic approach to the pro-drop parameter*. Ph.D. thesis, Los Angeles: University of Southern California.

Goldrick, Matthew, Putnam, Michael T., & Lara Schwarz. 2016. Coactivation in bilingual grammars: A computational account of code mixing. *Bilingualism: Language and Cognition* 19: 857–876. https://doi.org/10.1017/S1366728915000802

Goldwater, Sharon, & Mark Johnson. 2003. Learning OT constraint rankings using a maximum entropy model. In J. Spenader, A. Eriksson, & Ö. Dahl (eds), *Proceedings of the Stockholm workshop on variation within Optimality Theory*, 111–120. Stockholm: Stockholm University.

Grimshaw, Jane. 1997. Projection, heads, and optimality. *Linguistic Inquiry* 28: 373–422. https://www.jstor.org/stable/4178985

Haegeman, Liliane. 2014. Adult null subjects in non *pro*-drop languages. In M.-A. Friedemann, & L. Rizzi (eds), *The acquisition of syntax*, 129–169. London: Routledge. https://doi.org/10.4324/9781315839899-6

Halle, Morris, & Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In K. Hale, & S. J. Keyser (eds), *The View from Building 20: Essays in*

Linguistics in Honor of Sylvain Bromberger, 111–176. Cambridge, Mass.: The MIT Press.

Harley, Heidi, & Rolf Noyer. 1999. Distributed morphology. *Glot international* 4: 3–9.

Hayes, Bruce. 2009. MaxEnt Grammar Tool [Software]. *Retrieved from http://www.linguistics.ucla.edu/people/hayes/MaxentGrammarTool*.

Heck, Fabian, & Gereon Müller. 2013. Extremely local optimization. In H. Broekhuis, & R. Vogel (eds), *Linguistic derivations and filtering*, 135–166. Sheffield: Equinox.

Holmberg, Anders. 2005. Is there a little *pro*? Evidence from Finnish. *Linguistic Inquiry* 36: 533–564. https://doi.org/10.1162/002438905774464322

Holmberg, Anders. 2010. Null subject parameters. In I. Roberts, T. Biberauer, A. Holmberg, & M. Sheehan (eds), *Parametric variation: Null subjects in minimalist theory*, 88–124. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511770784.003

Hsu, Brian. 2021. Harmonic grammar in phrasal movement: an account of probe competition and blocking. In A. Farinella, & A. Hill, *NELS 51: Proceedings of the 51st annual meeting of the North East Linguistic Society*, 237–250. University of Massachusetts Amherst: GLSA.

Kayne, Richard S. 2000. *Parameters and universals*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780195102352.001.0001

Lee, Hyunjung. 2018. Generalized complementizer-trace effects in Gradient Harmonic Grammar: Deriving extraction asymmetries. Talk given at DGfS 40, Universität Stuttgart.

Lee, Hyunjung, & Gereon Müller. 2018. Asymmetries in long-distance dependencies: A view from Gradient Harmonic Grammar. Talk given at Workshop on Long-Distance Dependencies, HU Berlin.

Legendre, Géraldine, & Paul Smolensky. 2017. A competition-based analysis of French anticausatives. *Lingvisticæ Investigationes* 40: 25–42. https://doi.org/10.1075/ li.40.1.02leg

Manzini, Maria Rita, & Leonardo Maria Savoia. 2005. *I dialetti italiani: sintassi delle varietà italiane e romance*. Alessandria: Edizioni dell'Orso.

Montalbetti, Mario M. 1984. *After binding: On the interpretation of pronouns*. Ph.D. thesis, MIT, Cambridge, Mass.

Müller, Gereon. 2006. *Pro*-drop and impoverishment. In P. Brandt, & E. Fuss, *Form, Structure, and Grammar. A Festschrift Presented to Günther Grewendorf on occasion of his 60th Birthday*, 93–115. Berlin: Akademie Verlag. https://doi.org/10.1524/9783050085555.93

Müller, Gereon. 2017. Gradient symbolic representations in syntax. Universität Leipzig.

Müller, Gereon. 2019. The third construction and strength of C: A Gradient Harmonic Grammar approach. In J. Wood, K. Ramshøj Christensen, & H. Jørgensen (eds), *The sign of the V - Papers in honour of Sten Vikner*, 419–448. Aarhus: Aarhus University. https://doi.org/10.7146/aul.348.107

Müller, Gereon. 2022. Strength in Germanic syntax. Talk given at CGSW 36, The University of Chicago.

Müller, Gereon, Englisch, Johannes, & Andreas Opitz. 2022. Extraction from NP, frequency, and minimalist Gradient Harmonic Grammar. *Linguistics* 60(5): 1619–1662. https://doi.org/10.1515/ling-2020-0049

Neeleman, Ad, & Kriszta Szendrői. 2007. Radical *pro*-drop and the morphology of pronouns. *Linguistic Inquiry* 38: 671–714. https://doi.org/10.1162/ling.2007.38.4.671

Pesetsky, David. 1997. Syntax and optimality. In D. Archangeli, & T. Langendoen (eds), *Optimality theory*. London: Blackwell.

Poletto, Cecilia. 1996. Three kinds of subject clitics. In A. Belletti, & L. Rizzi (eds), *Parameters and functional heads: Essays in comparative syntax*, 269–300. New York: Oxford University Press. https://doi.org/10.1093/oso/ 9780195087932.003.0009

Poletto, Cecilia. 1997. Pronominal syntax. In M. Maiden, & M. Parry (eds), *The dialects of Italy*, 137–144. London and New York: Routledge.

Poletto, Cecilia. 2000. *The higher functional field: Evidence from Northern Italian dialects*. New York: Oxford University Press. https://doi.org/10.1093/oso/9780195133561.001.0001

Poletto, Cecilia, & Christina Tortora. 2016. Subject clitics. In A. Ledgeway, & M. Maiden (eds), *The Oxford guide to the Romance languages*, 772–785. New York: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199677108.003.0047

Putnam, Michael T., & Lara Schwarz. 2017. Predicting the well-formedness of hybrid representations in emergent production. Ms., Penn State University.

Putnam, Michael T., & Robert Klosinski. 2020. The good, the bad, and the gradient: The role of losers in code-switching. *Linguistic Approaches to Bilingualism* 10: 5–34. https://doi.org/10.1075/lab.16008.put

Renzi, Lorenzo, & Laura Vanelli. 1983. I pronomi soggetto in alcune varietà romanze. In *Scritti linguistici in onore di Giovan Battista Pellegrini*, 121–145. Pisa: Pacini Editore.

Rizzi, Luigi. 1986a. Null objects in Italian and the theory of *pro*. *Linguistic Inquiry* 17: 501–557.

Rizzi, Luigi. 1986b. On the status of subject clitics in Romance. *Studies in Romance linguistics* 24: 391–419. https://doi.org/10.1515/9783110878516-025

Roberts, Ian. 2010. A deletion analysis of null subjects. In I. Roberts, T. Biberauer, A. Holmberg, & M. Sheehan (eds), *Parametric variation: Null subjects in minimalist theory*, 58–87. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511770784.002

Rosen, Eric. 2016. Predicting the unpredictable: Capturing the apparent semiregularity of Rendaku voicing in Japanese through Harmonic Grammar. In A. Shen, A. Horan Skilton, G. Bacon, A. Cheng, E. Clem, V. Dawson, & E. Hans Maier (eds), *Proceedings of BLS 42*, 235–249. Berkeley: Berkeley Linguistic Society.

Ross, John. 1973a. A fake NP squish. In C.-J. Bailey, & R. Shuy (eds), *New ways of analyzing variation in English*, 96–140. Washington, DC: Georgetown University Press.

Ross, John. 1973b. Nouniness. In O. Fujimura (ed.), *Three dimensions of linguistic research*, 137–257. Tokyo: TEC Company Ltd.

Runić, Jelena. 2014. *A new look at clitics, clitic doubling, and argument ellipsis*. Ph.D. thesis, UConn.

Schwarz, Lara. 2020. Accepting our mistakes: How variation completes the linguistic puzzle. Talk given at DGfS 42, Universität Hamburg.

Schwarz, Lara, & Michael T. Putnam. 2017. Expanding the pipeline: A prolegomenon to modeling multilingual grammars in LFG. In M. Butt, & T. H. King (eds), *Proceedings of the LFG'17 Conference*, 368–386. Stanford, CA: CSLI Publications.

Sheehan, Michelle. 2006. *The EPP and null subjects in Romance*. Ph.D. thesis, Newcastle University.

Sheehan, Michelle. 2016. Subjects, null subjects and expletives in Romance. In S. Fischer, & C. Gabriel (eds), *Manual of grammatical interfaces in Romance*, 329–362. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110311860-014.

Smolensky, Paul, & Matthew Goldrick. 2016. Gradient symbolic representations in grammar: The case of French liaison. *ROA 1286*.

Smolensky, Paul, & Geraldine Legendre. 2006. *The harmonic mind*. Cambridge, Mass.: The MIT Press.

Stegovec, Adrian. 2019. Crop to fit: Pronoun size and its relation to strict/sloppy identity and animacy. Talk given at the 93rd Annual Meeting of the Linguistic Society of America (LSA), New York.

Taraldsen, Knut Tarald. 1980. *On the nominative island condition, vacuous application and the that-trace filter*. Bloomington: Indiana University Linguistics Club.

Zimmermann, Eva. 2019. Gradient symbolic representations and the typology of ghost segments. In A. McCollum, S. Rose, K. Hout, A. Mai, & M. Zaslansky (eds), *Proceedings of AMP 2018*, 1–12. Linguistic Society of America. https://doi.org/10.3765/amp.v7i0.4576

Zimmermann, Eva. 2021. Faded copies: Reduplication as distribution of activity. *Glossa: a journal of general linguistics* 6(1): 58. https://doi.org/10.5334/gjgl.1117