Interaction, Satisfaction, and the PCC[*]

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Abstract. The person-case constraint (PCC) is a family of restrictions on the relative person of the two objects of a ditransitive. PCC effects offer a testing ground for theories of the Agree operation and of syntactic features, both those on nominals and (of special interest here) those found on agreement probes. In this paper, I offer a new theory of PCC effects in an interaction/satisfaction theory of Agree (Deal 2015a) and show the advantages of this framework in capturing PCC typology. On this model, probes are specified for interaction features, determining which features will be copied to them, and satisfaction features, determining which features will cause probing to stop. Applied to PCC, this theory (i) captures all four types of PCC effect recognized by Nevins (2007), under a unified notion of Agree; (ii) captures the restriction of PCC effects to contexts of "Double Weakness" in many prominent examples, e.g. in Italian, Greek, and Basque, where PCC effects hold only in cases where both the direct and indirect object are expressed with clitics; (iii) naturally extends to PCC effects in syntactic environments without visible clitics or agreement for one or both objects, as well as the absence of PCC effects in some languages with clitics or agreement for both the direct and indirect object. Two refinements of the interaction/satisfaction theory are offered. The first is a new notation for probes' interaction and satisfaction specifications, clarifying the absence from this theory of uninterpretable/unvalued features as drivers of Agree. The second is a proposal for the way that probes' behavior may change over the course of a derivation, dubbed *dynamic interaction*.

1   Introduction

Some of the most foundational questions of syntactic theory concern the properties of a small number of basic syntactic operations—at least Merge and Agree—and the nature of syntactic featural representations. These questions are deeply interconnected. One clear case of this interconnection is found in approaches to unexpectedly reduced or augmented levels of feature copying in Agree, in particular the notion of agreement failure (Preminger 2009, 2014) and "over-agreement" (Deal 2015a). This work has developed the theory of Agree in connection with new alternatives to Chomsky's (2000, 2001) notion of probes as possessors of uninterpretable, unvalued features. A second is found in syntactic approaches to hierarchy effects, in particular the Person-Case Constraint (PCC)—a family of restrictions on the relative person of the two objects of a ditransitive construction—several strands of which have developed the theory of Agree in connection with a refinement of the notion of ϕ-features in terms of structured, geometrically organized primitives (Béjar and Rezac 2003, Nevins 2007, 2008, 2011, Rezac 2008, 2011, Preminger 2019, Foley and Toosarvandani 2019, Yokoyama 2019b, Coon and Keine 2020, among others).

In this paper, I offer a synthesis of these lines of inquiry: an approach to PCC effects in a model of Agree without unvalued or uninterpretable features, in particular, the interaction/satisfaction model

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(Deal 2015a,b, Baier 2018, Halpert 2019, Clem 2019a,b,c, among others). Central to this theory is the notion that probes are specified in two ways. The first specification is an *interaction* condition, which determines what features will be copied back to the probe; the second is a *satisfaction* condition, which determines which features will cause the probe to halt its search. Notably absent from the theory is a notion of probes as necessary hosts of uninterpretable or unvalued features. Indeed, this approach makes it possible to strike such feature types from syntactic theory altogether. In bringing this approach to bear on PCC effects in this paper, I aim, first, to contribute a new demonstration of the empirical power of this conception of Agree, and second, to motivate two refinements vis-à-vis the presentation in Deal 2015a. The first is an improved notation for probe specifications for interaction and satisfaction. The second, more substantive refinement relates to the ways in which probe behavior may change over the course of a derivation. Drawing on evidence from several types of PCC patterns, I will argue that probes' interaction features need not be fixed once and for all, but rather may change dynamically in the course of feature copying from goals. I refer to this type of change as *dynamic interaction*.

The theory of PCC effects to be proposed in this paper responds to three central desiderata highlighted in the PCC literature. The first desideratum, following Nevins (2007), concerns coverage vis-à-vis various types of PCC effects known to be found in natural language. Perhaps best-known is the "Strong PCC" pattern, according to which the direct object (DO) must be third person in the presence of an indirect object (IO). As many have pointed out, however, the restriction also comes in at least three additional varieties, schematized in the tables below and in (2b-d).[1] Frequently discussed examples are Basque, French, and Greek, for the strong PCC (Laka 1993; Perlmutter 1971, Bonet 1991; Anagnostopoulou 2003, 2005); varieties of Catalan for the weak PCC (Bonet 1991); Romanian and Bulgarian for the me-first PCC (Nevins 2007; Reinheimer, Tasmowski, and Vasilescu 2013; Pancheva and Zubizarreta 2018); and Classical Arabic and additional varieties of Catalan for the strictly descending (or "ultrastrong") PCC (Nevins 2007, Anagnostopoulou 2017, Walkow 2012, 2013).

(1) PCC Varieties[2]

Strong				Weak				Me-first				Strictly descending (a.k.a. "Ultrastrong")		
IO	DO			IO	DO			IO	DO			IO	DO	
1	3	OK		1	3	OK		1	3	OK		1	3	OK
1	2	*		1	2	OK		1	2	OK		1	2	OK
2	1	*		2	1	OK		2	1	*		2	1	*
2	3	OK		2	3	OK		2	3	OK		2	3	OK
3	1	*		3	1	*		3	1	*		3	1	*
3	2	*		3	2	*		3	2	OK		3	2	*

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[1] Some work also recognizes a fifth variety, the so-called "Superstrong PCC", which consists of a strong PCC effect plus an additional restriction on combinations of two third person objects (Haspelmath 2004, Pancheva and Zubizarreta 2018, Yokoyama 2019b, i.a.). I return to the status of restrictions on pairs of third persons in 7 below, as well as the potential for other types of PCC patterns (e.g. 'you-first'; cp. Nevins 2007, Stegovec 2017b) in section 6.1.

[2] The names *weak* and *strong* are taken from Bonet (1991). The names *me-first* and *ultrastrong* are taken from Nevins (2007). As an alternative to *ultrastrong*, the (arguably more appropriate) term *strictly descending* is in use in Nevins (2008), Sturgeon et al. (2011), and Franks (2018), i.a.; "descendingness" is in reference to a person hierarchy, as in (2d).

(2)   In certain combinations of direct and indirect objects. . .

    a.   Strong PCC
        The direct object must be third person.

    b.   Weak PCC
        If there is a third person, the direct object must be third person.

    c.   Me-first PCC
        If there is a first person, it must be the indirect object.

    d.   Strictly descending (or "ultrastrong") PCC
        The IO must outrank the DO on the hierarchy 1 > 2 > 3.

The first desideratum is thus:

D1.   The theory should capture all four types of PCC, without multiplying the number of basic Agree(-type) operations necessary in natural language.

The second desideratum concerns a common, though not universal, restriction on the contexts in which PCC effects obtain. (It is in view of this type of restriction that I have stated the generalizations in (2) as applying only in *certain* combinations of DO and IO, rather than necessarily across-the-board.) In various well-known instances of PCC effects, person restrictions are in force specifically in cases where the DO and IO are both, in Bonet's (1991) terms, *phonologically weak*—that is, they are both clitics, other atonic pronouns, or agreement markers.[3] Bonet accordingly states the strong PCC as in (3), a formulation which has proven influential:

(3)   Strong PCC, *per* Bonet (1991, 177)

    a.   In a combination of a direct and an indirect object, the direct object has to be third person

    b.   [when] both the direct object and the indirect object are phonologically weak.

I will refer to the (3b)-type putative condition on application of the PCC, both for Strong PCC and for other varieties, as *Double Weakness*. Empirical effects of the Double Weakness condition have been much discussed (Albizu 1997; Anagnostopoulou 2003, 2017; Bianchi 2006; Ormazabal and Romero 2007; Nevins 2011; Sheehan To appear; Preminger 2019; Foley and Toosarvandani 2019; Stegovec 2020; Coon and Keine 2020, i.a.). In Italian, for instance, a PCC effect holds when both IO and DO are clitic pronouns, (4a), but the effect disappears when the either clitic is replaced with a tonic pronoun, (4b,c).

(4)   Italian (Bianchi, 2006)

    a.   * Mi   gli   presenteranno.
        1SG.CL 3SG.CL 3PL.will.introduce
        Intended: They will introduce me to him.

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[3]   In this paper, following Bonet, I use the term 'weak' as a cover term for agreement, clitics, and weak pronouns (in languages where these are distinguished from strong tonic pronouns; see Cardinaletti and Starke 1999). Some work on PCC effects holds that these effects are only found with a certain subtype of weak element: e.g. Nevins (2011) proposes that PCC effects arise only with clitics; Baker (2008) proposes that they arise only with true agreement; Preminger (2019) proposes that they hold only with clitics and agreement, not weak pronouns; Bonet (1994), Anagnostopoulou (2017), and Foley and Toosarvandani (2019) propose that the particular subtype of weak element found in a language correlates with its variety of PCC effect. Given the substantial difficulty inherent in reliably distinguishing agreement from clitics (esp. obligatory ones), I will take no stand on this set of questions here.

    b.   Mi   presenteranno   a lui.
         1SG.CL 3PL.will.introduce to him.TONIC
         They will introduce me to him.

    c.   Gli   presenteranno   me.
         3SG.CL 3PL.will.introduce me.TONIC
         They will introduce me to him.

A generalization about such cases is that PCC effects are obviated by avoiding weak realizations of either IO or DO. Capturing this effect is our second desideratum for a theory of PCC:

D2.   The theory should capture Double Weakness conditions on PCC application in cases where such conditions hold.

    The third criterion, related to the second, concerns the fact that Double Weakness conditions do *not* hold in certain cases. Two types of patterns are of special interest. First, in certain cases, PCC effects obtain even though either IO or DO is not realized in a weak way (Ormazabal and Romero 2007; Riedel 2009; Rezac 2011; Shklovsky 2012; Sheehan To appear). In Tseltal (Mayan; Shklovsky 2012), for instance, the verb hosts an object marker only for the IO; nevertheless, a strong PCC effect is in force, (5). Similar patterns are found elsewhere in Mayan (e.g. in Tzotzil, Aissen 1987) as well as in weak PCC language Swahili (Bantu; Riedel 2009).

(5)   Tseltal (Shklovsky, 2012)

    lah y-aʔ-b-at   me mut-eʔ   / * joʔon-eʔ / * pro_{1sg}
    PFV ERG3-give-APPL-ABS2 DET chicken-CL / * 1SG-CL / * 1SG
    She gave you a chicken/*me

The flip side of this pattern is found in languages in which both IO and DO *are* realized in a weak way, and yet there is no PCC restriction on their combination. This pattern is found, for instance, in Moro (Kordofanian), (6), where verb forms bearing weak object markers for IO and DO are possible regardless of the person specifications of the two arguments:

(6)   Moro (Jenks and Rose 2015)

    a.   g-a-natʃ-ó-ŋɔ́-ŋá-ŋo
         SM.CL-RTC-give-PFV-1SG.OM-2SG.OM-ŋo
         S/he gave me to you / you to me

    b.   g-a-natʃ-ó-ŋɔ́-ŋo
         SM.CL-RTC-give-PFV-1SG.OM-3SG.OM
         S/he gave me to her/him / her/him to me

The final desideratum is thus bipartite:

D3.   The theory should allow for PCC restrictions to hold even in cases where the Double Weakness condition is not met, as well as for cases where the Double Weakness condition is met but PCC restrictions do not hold.

Any theory that meets D2 as well as D3 will need to be one which allows for some degree of variation regarding the syntax-morphology interface. Accordingly, the theory defended here will localize the basic heart of the PCC effect in syntactic computations pertaining to the operation Agree (rather than

purely in morphological mechanisms, as per Bonet 1991, or in mechanisms at the syntax-morphology interface, as per Coon and Keine 2020). Variation in the PF ramifications of syntactic operations as well as variation in the feature specification of probes will allow us to capture cases in which Double Weakness conditions are in force as well as both types of cases in which they are not.

The paper is structured as follows. In the next section, I first introduce the interaction/satisfaction theory of Agree, along with a new notation for probe specifications that highlights this theory's most central properties. Section 3 applies the theory to the strong PCC. This work builds on Walkow's (2012, 2013) proposal that the probe enters into a relationship with the DO first—what I will call *DO preference*—as well as widely-adopted geometric representations of person features, following Harley and Ritter (2002), Béjar (2003), and many others. The core proposal is that the strong PCC arises because the DO's person feature satisfies the probe (i.e. halts further probing), leading to no interaction with (i.e. feature transfer from) the IO. This typically has the result that the IO cannot be expressed in a weak form, e.g. as a clitic. The section concludes with a discussion of exceptions to Double Weakness from Tseltal, previewed above, as well as from certain causatives in French. Section 4 shows how progressive narrowing of the satisfaction condition accounts for two more (increasingly more permissive) language types, namely the me-first PCC and the (Moro-type) absence of a PCC effect entirely. In the former case, the probe has satisfaction condition [SPKR]; in the latter, the probe has no satisfaction condition at all—it is insatiable. Section 5 turns to the weak and ultrastrong variants of the PCC, introducing the notion of dynamic interaction. Section 6 discusses two types of typological extensions to the theory: potential PCC patterns in which a distinctive second-person feature [ADDR] plays a role (Stegovec, 2017a) and "reverse PCC" type patterns, as in Slovenian (Stegovec, 2020). Finally, section 7 briefly compares the resulting theory to selected competitor proposals, and concludes.

2   Interaction and satisfaction

Since Chomsky (2000, 2001), a standard approach to Agree holds that this operation is essentially a device for repairing specific lexical deficiencies by feature transfer. Certain syntactic elements enter a derivation with unvalued, uninterpretable features (henceforth, u-features, or in general, uF). An element which bears such features is a *probe*. The operation Agree consists of: (i) the identification of an element within the c-command domain of the probe, henceforth the *goal*, which bears the valued, interpretable version of the u-feature(s) on the probe; (ii) copying of the valued features in question from the goal to the probe; (iii) deletion of the (now valued) features on the probe from the narrow syntax (see Chomsky 2001, 5).

At the heart of this conception is the idea that Agree exists to eliminate uninterpretable features from the input to semantic computation. This premise raises two central questions. The first is why the elimination of uninterpretable features should have to involve steps of feature copying, as in (i)-(ii) above. (This point has been made elsewhere, e.g. by Pesetsky and Torrego 2007). The most minimal system for eliminating uF would simply be an operation that identifies instances of uF and deletes them. Why should copying play a role?[4] The second question concerns the notion of a feature being

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[4] Chomsky (2001) suggests that copying/valuation is connected with uninterpretability effectively because the syntax uses unvaluedness as a proxy for uninterpretability: "The natural principle is that the uninterpretable features, and only these, enter the derivation without values, and are distinguished from interpretable features by virtue of this property" (p 5). The question is why this conception should be preferred over the alternative proposed in a previous passage, viz, "Though motivated at the interface, interpretability of a feature is an inherent property that is accessible throughout the derivation" (p 4).

"uninterpretable" (and thus requiring deletion before semantic interpretation) as opposed to merely "uninterpreted". One might, of course, very reasonably think that there are syntactic elements that receive no contentful semantic interpretation. (Indeed, this is Chomsky's (2001) starting observation concerning ϕ-features borne by T.) How should a compositional semantic system deal with such elements? The simple response is either to ignore them, leaving them out of the compositional machinery entirely as a matter of semantic rules, or alternatively to treat them as contributing identity functions.[5] This is in a sense parallel to the way that much of the richness of syntactic structure is ignored in constructing prosodic representations—some constituent boundaries are mapped to prosodic boundaries, and some are not, but this does not cast doubt on the syntactic reality of the latter class.[6] Nor does it motivate a syntactic operation whose essential function is to remove boundaries which cannot be interpreted prosodically.

These concerns raise the question of whether a distinct etiology for Agree might be identified— one which would avoid the postulation of uninterpretable features, on one hand, and provide a more straightforward explanation for feature copying, on the other. Perhaps the most direct resolution of both issues lies in the suggestion that Agree most fundamentally is exactly what it looks like: a device for introducing featural redundancies in syntax. Why should natural language syntax have an operation with this property? Because syntactic structures shape the input to morphological and in turn phonological structures, which are used in human communication; redundancy in communication is useful for information transfer in view of noise. The existence of an operation that generates redundancies in syntactic representations has the downstream effect of allowing communication to be redundant without requiring redundant information to be stored in the lexicon (e.g. in verbs that lexically select only for very particular classes of potential arguments). From this perspective it might be further speculated that the operations Merge and Agree, between them, represent the two major functions for which human language is so well adapted: Merge facilitates recursive processes of cognition and thus higher-order thought, whereas Agree facilitates communication and thus collaboration and social organization.

Two types of limitations on a redundancy-forming algorithm are amply supported in natural language. The first of these concerns a limitation on the particular types of syntactic information that will be made redundant. Probes copy back certain features and ignore others—e.g. a probe on T generally ignores features on Asp (e.g. [PERF],[PROG]) while copying features from DPs. To capture such behavior, we must specify the features that a probe **interacts** with, i.e., copies to itself. The second limit concerns the fact that probes oftentimes are limited to copying features from just one goal. For instance, in many languages, a probe on T interacts with the subject's features only. To capture cases where a probe fails to Agree with all interaction features in its domain, we must specify at least an optional feature that **satisfies** the probe, i.e., halts further probing. The minimal specification of a probe thus consists of two types of information, an interaction condition and a satisfaction condition; a natural null hypothesis is that the two conditions need not be the same. This is because features are copied to create redundancy, *not* to repair a defect in the features of the probe such as uninterpretability or unvaluedness.

We might compare this basic setup for an interaction/satisfaction model with a standard Chomskian uF model along the following four dimensions, listed in the table below: What makes certain elements probes? Why does Agree happen? When does the Agree algorithm halt? What features are

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[5] The first of these possibilities is raised by Preminger (2014, 253), who suggests a parallel to c-selectional features.

[6] See, for instance, Selkirk's (2011) Match Theory, which ignores all intermediate projections and treats all non-clausal XPs identically.

transferred by Agree?

(7) Four dimensions of model comparison

	uF model	interaction/satisfaction model
1.	Certain lexical items are intrinsically defective	Certain lexical items have the ability to create redundancy
2.	Agree happens to repair these defects	Agree happens to create redundancy
3.	Agree stops when the deficiency is repaired (or there is no more structure)	Agree stops when the satisfaction condition is met (or there is no more structure)
4.	Agree transfers only the feature in which there is a deficiency	Agree transfers all interaction features until the satisfaction condition is met

It should be noted in particular in connection with dimensions 1 and 2 that common locutions such as "the features a probe is looking for" or "a probe [not] finding what it is looking for" have no natural single interpretation on the interaction/satisfaction model. These, of course, are simply ways of talking about uF. On a model without uF, a probe is capable of creating redundancy in terms of the features specified for interaction, but this should not be understood as a need to find these features in order (for instance) to forestall a crash of the derivation. Similarly, there is no need for a probe to meet the satisfaction condition. If a probe encounters the feature(s) that satisfy it, copying of features from subsequent goals will halt. If it does not encounter such features, on the other hand, it will continue to copy all interaction features present in its domain until all potential goals have been exhausted. In no case do the features on probes that drive Agree, or the Agree operation itself, lead to derivation meltdown.

Before turning to empirical areas in which the two models compared in (7) can be distinguished empirically, it will be helpful to introduce some simple notation for the representation of interaction and satisfaction information. I suggest that probes be represented, in general, in the following way: [INT:α,SAT:β]. In principle, α and β might range over individual features or sets of features; here, for simplicity, I adopt the former.[7] Let us suppose, following Harley and Ritter (2002), Béjar (2003) and other work, that the "ϕ set" (for which I will generally write Φ) consists of privative features organized into a feature geometry. For a case like English T, the probe should interact with all ϕ features and halt its search after copying features from the first bearer of ϕ features. In geometric terms, this suggests that the interaction feature should be the root of the geometry, and that interaction should be understood as copying the designated feature and all features that it geometrically dominates (or: is geometrically entailed by), e.g. in a simple geometry such as (8).[8]

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[7] See however Scott (2020) for some advantages of the sets-conception of satisfaction conditions. I will also note that a sets conception allows for the theory to proceed without any reference to feature geometries, following Harbour (2014, 2016), and would prove necessary for the modeling of PCC effects in an interaction/satisfaction theory paired with a bivalent, rather than privative, conception of ϕ-features (on which see note 35).

[8] I parenthesize the [ADDR] feature in keeping with Harley and Ritter's (2002) proposal that such a feature is made use of in some languages but not others (namely, they propose, only in languages with an inclusive/exclusive contrast).

(8) A basic feature geometry for Φ

$$[\phi]$$

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              [φ]
             /   \
        [PART]    [#]
         /  \       |
    [SPKR] ([ADDR]) [PL]
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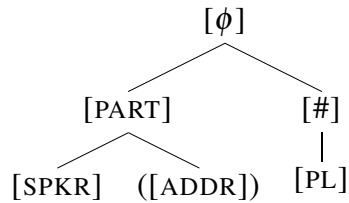
Given a privative feature theory, the full set of features in (8) will be found only on 1st person plural inclusives (more precisely, following Harley and Ritter 2002: it will be found on 1st person plural inclusives in languages with an active [ADDR] feature). Other types of DPs will host a subset of Φ, e.g. [ϕ,PART,PL] (second person plural in a language without an inclusive/exclusive contrast) or simply [ϕ] (third person singular). With interaction condition ϕ, an English-like T probe would copy all features in the Φ set from all such DPs, and allow any such DP to meet its satisfaction condition.

(9) English-like T probe: [INT:ϕ,SAT:ϕ]

    a. Interaction with [ϕ]: [ϕ] and all features that it geometrically dominates are copied to the probe

    b. Satisfaction by [ϕ]: copying [ϕ] halts further probing of additional potential goals

    I return now to the two general models of Agree compared in (7), and in particular, to dimensions 2 and 4 of that comparison. These dimensions point to two central areas in which the theories make divergent empirical predictions—in both cases, predictions which are confirmed only for the interaction/satisfaction model. The first concerns what we might call *underagreement*, or the pattern described by Preminger (2009, 2010, 2011, 2014) as "agreement failure". This describes scenarios in which a probe does not copy features from any goal, and yet ungrammaticality does not result. Such a situation, as Preminger (2014) argues at length, poses an empirical challenge from the standpoint of a uF theory: the central motivation for Agree on this theory is elimination of uF via an intermediate step of feature copying, and so in cases where uF is not eliminated in this way, the result should be ungrammaticality. The discovery of grammatical cases fitting this description suggests, at the limit, that uF can indeed be eliminated without any feature copying happening at all. This raises a conceptual challenge: the grammar must have at its disposal a mechanism for eliminating uF independent of Agree (see, e.g. Béjar 2003), which means that there is no ready explanation available in this theory for cases in which Agree is in fact obligatory—why could the alternative operation not be invoked instead?

    Underagreement looks different—and less problematic—from the perspective of the interaction/satisfaction theory. Here, perhaps the notions most closely corresponding to "agreement failure" are (a) cases where a probe locates no goals matching its interaction feature, and (b) cases where a probe locates a goal or goals matching its interaction feature, but does not encounter its satisfaction feature. As emphasized above, in neither scenario is ungrammaticality predicted. In the first situation, the probe is expected to copy no features at all, yielding a Preminger-style case of agreement failure. In the second situation, the probe is expected to copy features from *all* goals in its domain; we will see various instances of this pattern below. Because this theory grounds Agree in the ability to create redundancy, rather than in the need to remove what Preminger calls "derivational time-bombs", it does not predict derivation breakdown in cases where redundancy cannot be syntactically established (or where a surfeit of redundant information is produced).

A second area of empirical divergence might be described as *overagreement*, or, from the perspective of the uF theory, cases in which a probe copies back features other than the features which are uninterpretable/unvalued on the probe. Such cases are unexpected if the driving force for Agree is the elimination of uF on the probe, since any additional features copied to the probe as a result of the Agree process have nothing to contribute to the deletion of the original uF specification. Yet cases of exactly this type are routinely claimed to exist, especially following Béjar and Rezac's (2009, 45) proposal that a probe specified for uF copies back to itself all features that feature-geometrically entail F. This has the result that, in the geometry in (8), for instance, a probe specified for [uϕ] would copy [ϕ], [PART], and [SPKR] from a first person goal. The conceptual challenge for the uF theory is to explain why this "more than you bargained for" pattern of feature copying should emerge, as opposed to a simpler system in which only the unvalued, uninterpretable feature of the probe itself is targeted by Agree.

Matters again look different from an interaction/satisfaction perspective. This theory makes it readily possible for probes to behave in such a way as to copy broad sets of features from goals while only halting in the presence of one specific feature (as highlighted in (9)). Since probes copy features to create redundancy, not to repair featural deficiencies, copying of [ϕ], [PART], and [SPKR] to a probe with interaction or satisfaction condition [ϕ] no longer poses any particular conceptual problem. Grammatical cases of overagreement are predicted to exist just like grammatical cases of underagreement are.

As the mechanisms behind overagreement will be crucial for the theory of PCC effects to be developed in this paper, it may be helpful to review a few case studies of this behavior. A first comes from Baier's (2018) analysis of *wh*-agreement. In a language with subject *wh*-agreement (e.g. Palauan, Georgopoulos 1985, 1991), the probe on T copies both ϕ-features and Ā-features, if any, from the closest bearer of ϕ-features. The morphological result in Palauan is a null paradigm for the subject agreement marker, together with exponence of the Ā feature on the verb.[9] Contrast (10a), with an Ā subject in the embedded clause, with (10b), which lacks an Ā subject.

(10) a. Ng=teʔa [a   Ø-kileld-ii   a   sub]?
         3SG-who [DET SUBJ.AGR-Ā.heat-3SG.OBJ DET soup]
         Who was it that heated up the soup? (Georgopoulos, 1985, 67)

     b. Ng=menguiu   er   a   hong a   sensei.
         3SG=read.IMPF ACC DET book DET teacher
         The teacher is reading a/the book. (Nuger, 2010, 35)

In capturing such patterns, Baier proposes to augment ϕ-features geometries such as (8) by including Ā features on a node sister to ϕ:

(11) Baier's (2018) extended feature geometry

$$
\begin{array}{c}
[\text{F}] \\
\diagup\diagdown \\
[\phi] \quad [\bar{\text{A}}] \\
\diagup\diagdown \\
\ldots\ldots
\end{array}
$$
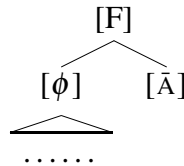
Given this hierarchy, he proposes that the Palauan T probe derives its *wh*-agreement behavior from the specification [INT:F,SAT:ϕ]. [F] and all features entailing it will be copied to the probe; this means

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[9] This exponence is described by Georgopoulos (1985, 1991) as (syncretic with) mood morphology and by Nuger (2010) as (syncretic with) tense morphology.

all ϕ features and all $\bar{\text{A}}$ features will be copied. After copying features from one bearer of the feature ϕ, the Agree algorithm will halt. If the first bearer of ϕ does not bear an $\bar{\text{A}}$ feature, however, no secondary probing for a feature of this kind will be carried out.

Patterns of overagreement of this type are not readily modeled on a uF theory without significant further stipulations. If T were to bear only [uϕ], no copying of $\bar{\text{A}}$ features is expected, and thus no pattern of *wh*-agreement. If, on the other hand, T were to bear both [uϕ] and [u$\bar{\text{A}}$] probes, we expect, given standard considerations of relativized minimality, that the two probes would find the same goal in cases of subject *wh* but separate goals in cases of object *wh*. In both cases, the featural end state of the probe is the same: it has obtained ϕ-features of the subject along with a set of $\bar{\text{A}}$ features. But this does not match the facts: a subject *wh*-phrase triggers verbal *wh*-agreement, as in the form in (10a), but an object *wh*-phrase strictly does not (Georgopoulos, 1985).

In this first case study, non-satisfying interaction features are found on the same goal as satisfying features are (viz., the subject).[10] Two other structural configurations are also possible. Suppose a probe is located above two elements meeting its interaction condition. If the higher one contains the satisfaction feature, we expect Agree to transfer features from the higher one only. If, however, only the lower one contains the satisfaction feature (or neither element does), we expect the probe to copy the specified interaction features from *both* goals. This type of "higher or both" agreement pattern is found in Nez Perce complementizer agreement, as discussed in Deal (2015a). Agreeing C in this language copies all ϕ-features from all DPs until it encounters [ADDR]. In (12a), the first ϕ-bearing element probed by C contains the [ADDR] feature; C copies features from this DP only, resulting in second person agreement affix *-m*. Because the satisfaction feature has been encountered, there is no further probing by C. In (12b), by contrast, the subject meets the interaction condition (it bears ϕ) but not the satisfaction condition (it lacks [ADDR]). Accordingly, C copies ϕ and all entailing features from both the subject and the object, resulting in a form of C that encodes plural (from the subject), second person (from the object), and first person (from the subject). (Note that the order of these affixes is templatically determined.) The relation of C to its two goals in (12b) is depicted in (13).

(12)   Nez Perce C: [INT:ϕ, SAT:ADDR]

a. ke-m kaa *pro* nees-cew'cew'-teetu *pro*
   C-2 then 2SG O.PL-call-HAB.S.SG 1PL
   2sg subj/1pl obj: When you call us

b. ke-pe-m-ex kaa *pro* cew'cew'-tee'nix *pro*
   C-PL-2-1 then 1PL call-HAB.S.PL 2SG
   1pl subj/2sg obj: When we call you

(13)

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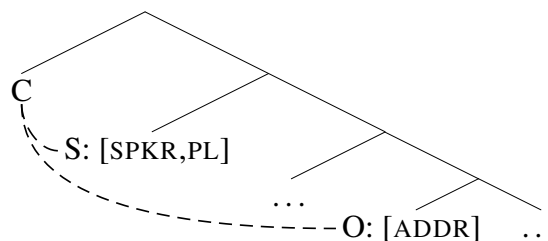
[10] This is always the case in the data Baier discusses, though it should be noted that his theory predicts a pattern more like the Nez Perce data discussed just below in potential cases where a non-ϕ-bearing $\bar{\text{A}}$ element (perhaps a medium-height *wh*-adverb) is probed before the subject is.

Note again the challenge for the uF theory. If C bears probes such as [uADDR] and [uPART], copying of [PL] from the subject is not predicted for (12b). If, on the other hand, it bears these person-related probes along with one or more probes related to number (e.g. [uPL]), we expect the number probe to copy features from the plural object in (12a), again contrary to the facts.[11]

A final structural configuration for overagreement is what we might call a "lower or both" pattern. Here the probe is associated to a head that undergoes Merge with two constituents, each of which contains (or is) an element meeting the interaction condition. One such constituent forms the standard c-command domain of the head; the other may be its specifier (as in the cases discussed by Béjar and Rezac 2009) or even a constituent to which the head's projection is adjoined (as in the case discussed by Clem 2019a,b). Both versions produce the setup for the interaction of Agree, Merge, and label projection that Rezac (2003) dubs *cyclic expansion*. Upon Merge of the first constituent, Agree applies; a probe on the head (H) scans the head's c-command domain. The resulting constituent (call it H') then receives a label from the head, as a result of which H' itself comes to host a probe. Upon Merge of the second constituent, Agree applies again: the probe on H' now has a c-command domain which can be scanned for potential goals. Suppose that the head in question is v (as in Béjar and Rezac 2009). The result is that the v probe Agrees first with elements in the complement of the v head and second with elements in v's specifier.

A pattern of overagreement under cyclic expansion by v can be seen in the Tupi-Guarani language Tupinambá (Jensen, 1990). In this language, v copies all ϕ from all DPs until it encounters [SPKR] (roughly—in section 5.2 I add one detail, pertaining to the behavior of second person); v first probes its c-command domain and then reprojects and Agrees with its specifier second. Accordingly, when the object is first person, the probe is satisfied and there is no subject agreement, (14a,a$'$). When the object is not first person, the probe interacts with the object, fails to be satisfied, reprojects, and interacts with the subject, (14b,b$'$). The overall result is a lower-or-both pattern.

(14)   Tupinambá v: [INT:ϕ, SAT:SPKR]

    a.   syé=repyák
          1SG=see
          He/she/it/they/you saw me.
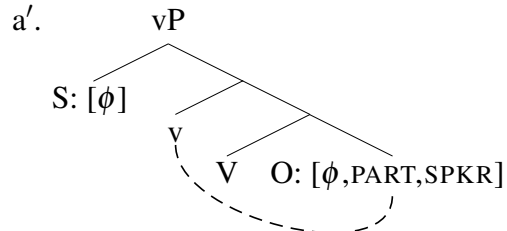
    b.   a-i-kutúk
          1SG-3-pierce
          I pierced him/her/it/them.

a$'$. [vP tree] S: [ϕ]; v; V; O: [ϕ,PART,SPKR]

b$'$. [vP tree] S: [ϕ,PART,SPKR]; ❷; v; V; O: [ϕ]; ❶
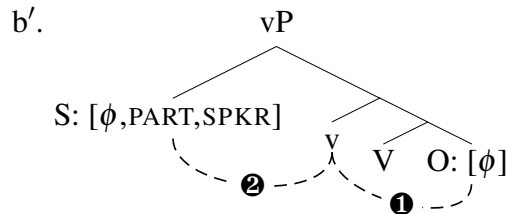
It should be emphasized in consideration of these various examples, especially those from Nez Perce and Tupinambá, that failure to Agree with certain arguments need not cause ungrammaticality, but it does limit the way that the results of Agree can be rendered morphologically. For instance, a Tupinambá example like (15a) cannot be generated. Given the specifications of v's probe and the structure it occupies, the only derivable output for (15a$'$) is (14a). Once the probe has encountered its satisfaction feature, in this case [SPKR], it cannot continue to interact with further goals.

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[11] For further discussion of these and other approaches on the uF theory, see Deal (2015a).

(15) a. * syé=i-(r)epyák
          1SG=3-see
          Intended: He/she/it/they saw me.

a′.
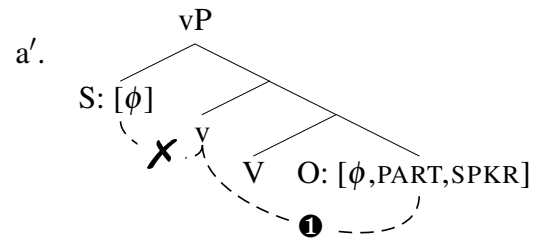
The logic of this case is simply that satisfaction by a first goal prevents interaction with any subsequent goals, which in turn rules out morphological forms which could only be generated if multiple goals had Agreed. This is the core logic I will now exploit to explain PCC effects.

3 Deriving the strong PCC

3.1 *The central approach*

The best-known and most studied PCC pattern is the Strong PCC, found in Basque, French, and Greek (Laka 1993; Perlmutter 1971, Bonet 1991, Rezac 2011; Anagnostopoulou 2003), among many other languages around the world (e.g. Kiowa (Kiowa-Tanoan, Adger and Harbour 2007), Warlpiri (Pama-Nyungan; Hale 1973), and Yimas (Lower Sepik Papuan; Foley 1991); see also the language lists in Haspelmath 2004).

(16) Strong PCC
      In certain combinations of direct and indirect objects, the direct object must be third person.

In Basque, French, and Greek, the combinations in question are those in which both objects are clitics, as in (17a-c). Accordingly, the PCC effect may be "repaired" by taking one or more clitics away, generally by substituting a tonic pronoun or non-pronominal expression, as in (17d).

(17) French
      a. Lucille { me / te } la   présentera.
          Lucille { 1SG / 2SG } 3SG.F.ACC will.introduce
          Lucille will introduce her to me/you.
      b. Lucille { la   / *me / *te } leur   présentera.
          Lucille { 3SG.F.ACC / *1SG / *2SG } 3PL.DAT will.introduce
          Lucille will introduce her/*me/*you to them.
      c. * Lucille { te   me / me te } présentera.
          Lucille { 2SG 1SG / 1SG 2SG } will.introduce
          Lucille will introduce you to me / me to you
      d. Lucille te   présentera   à { eux / moi } .
          Lucille 2SG.ACC will.introduce to { them / me }
          Lucille will introduce you to them/me.

The starting place for syntactic analyses of the PCC is the hypothesis that Agree builds the relationships necessary for cliticization (Anagnostopoulou 2003 *et seq.*, Béjar and Rezac 2003, Walkow 2012, Stegovec 2015, 2020, Preminger 2019, Coon and Keine 2020, among many others).[12] With-

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[12] I assume a syntactic approach without argument here. See Albizu (1997), Ormazabal and Romero (1998) and Rezac (2008) for explicit arguments in favor of a syntactic approach as opposed to a purely morphological one.

out Agree, clitics cannot be generated.[13] Given this premise, we can reason through an interaction/satisfaction approach to the strong PCC pattern as follows. *Ex hypothesi*, cliticization of both objects requires Agree with both. In the strong PCC pattern, there can be Agree with both objects when the DO is 3rd person, but not when the DO bears the feature [PART]. This suggests that [PART] on the DO satisfies the probe, which in turn points to two further conclusions: the probe must have satisfaction condition [PART], and it must interact with the DO before the IO.

Let us call the hypothesis that the probe interacts with the direct object first *direct object preference*. Why should this preference hold? If we set aside the possibility that the objects are first Merged in such a way as for the DO to asymmetrically c-command the IO (and the probe in turn c-commands both objects), there are two basic avenues for exploration. The first option is that the DO, in a structure subject to the strong PCC, obligatorily moves to a position above the IO but below a higher probe (see e.g. Walkow 2012, 2013). This yields a higher-or-both Agree pattern, as shown in (18a).[14] The second option is that the probe occurs on the head that introduces the IO, presumably Appl, and thus between the two objects (see e.g. Adger and Harbour 2007, Franks 2018, Pancheva and Zubizarreta 2018, Yokoyama 2019b). The probe cyclically expands, yielding the PCC pattern as a lower-or-both pattern as shown in (18b). Note that, given (18a), DO preference is parallel to subject preference in Nez Perce; given (18b), DO preference is parallel to object preference in Tupinambá.

(18) a.   b.
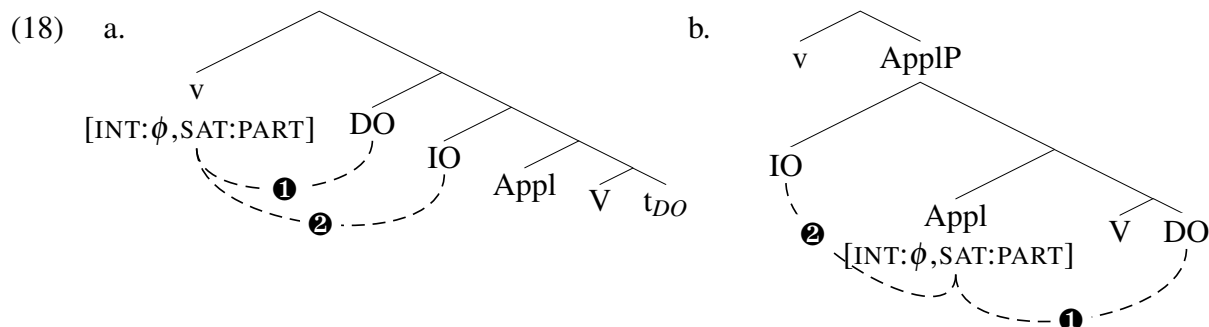
Either structure could be adopted for, e.g., simple ditransitives in French (a language where asymmetric c-command between objects is notoriously hard to establish, as Rezac 2011 notes), with the same results in terms of the basic interaction/satisfaction approach. Yet (18a) turns out to present several advantages over (18b) as applied to a larger data set; these relate to PCC effects in non-applicative structures (as discussed at the end of this section) as well as "reverse PCC" effects in languages such as Slovenian and Shabsug Adyghe (section 6). I will therefore assume a (18a) type of structure for the remainder of the paper. I return to some questions concerning the obligatoriness of DO movement (in particular, as a source of crosslinguistic variation) in section 6.

We can now return to the data points presented in (17). Consider first those structures with third person DOs. In these cases, the DO will not satisfy the probe; the probe will therefore interact with the IO as well, producing a double-clitic structure, e.g. (19). (Note here that the IO also does not satisfy the probe, but this is unremarkable; there are no additional DPs to probe, and failure to reach the satisfaction condition doesn't crash the derivation.)

(19)   Lucille la   leur   présentera.
        Lucille 3SG.F.ACC 3PL.DAT will.introduce

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[13] In principle, this might be because clitics are directly a result of Agree, or because clitics require a type of movement that in turn requires Agree—a matter I will not attempt to do justice to here. See Anagnostopoulou (2003), Harizanov (2014), and Preminger (2019) for discussion.

[14] Here I leave open the precise landing position of DO (e.g. as a specifier of Appl or as the specifier of a covert head).

Lucille will introduce her to them.

By contrast, a local person DO *will* satisfy the probe. The probe will therefore not interact with the IO. Like the missing Tupinambá double-agreement form in (15a), a French double-clitic ditransitive structure with a [PART] DO cannot be generated. In (20), there will be no way for the clitic *leur* to be produced, since the probe does not Agree with the IO.

(20) a. * Lucille te   leur   présentera.
          Lucille 2SG.ACC 3PL.DAT will.introduce
          Lucille will introduce you to them.

   b.

   v
   [INT:ϕ,SAT:PART]
          DO
          [ϕ,PART]
                   IO
                   [ϕ,PL,DAT]   Appl   …
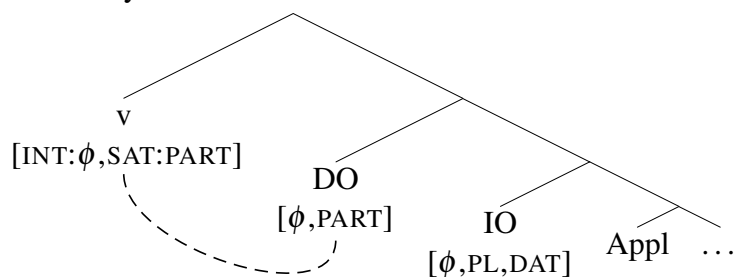
What actually *is* derived in structure (20b), if anything, depends on various assumptions, the choice among which is largely orthogonal to the primary arguments here. One option is that the unavailability of Agree with the IO simply leads to a morphological output with an *à* phrase (see (17d)) rather than a clitic pronoun. Another, somewhat more complex option is that the pronominal arguments that give rise to clitics in French have a different syntax than those that do not; there are syntactically special pronouns that require Agree and (upon Agree) are realized as clitics (see, e.g., Stegovec 2020). If (20) is constructed with such a pronoun in IO position, the derivation crashes, as the pronoun's Agree requirement is not met. By contrast, if (20) is constructed with a different type of pronoun in IO position, one which doesn't require Agree, then that pronoun is simply realized as an independent dative in an *à* phrase.[15] A third option invokes a different type of Agree requirement, one holding not of certain pronouns but broadly of all IOs in the applicative construction (I will call this an *Applicative Agree Requirement*; see e.g. Rackowski and Richards 2005). If the IO is not able to Agree, as in (20), the applicative construction cannot be used, and the IO must be introduced in a PP in a non-applicative structure (Rezac, 2011). (Thus (20) yields no output and the *à* phrase arises in a quite different structure.) We will see some evidence in support of this final type of approach in the discussion of Tseltal (Mayan) and Sambaa (Bantu) below.

3.2 Capturing Double Weakness

Let us now turn to the question of how the approach at hand can capture the Double Weakness condition on PCC effects in languages such as French, Basque, and Greek. The proposal above is purely a syntactic one; it derives the PCC effect entirely as a matter of what Agrees with a probe, with a downstream consequence for what clitics are generated. Accordingly, in a syntactic environment where

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[15] On such a view, the choice of a full dative is presumably a "non-economical" form which must be justified in some way (Cardinaletti and Starke 1999, Patel-Grosz and Grosz 2017, i.a.)—either due to the impossibility of Agree, or because the pronoun is focused. These correspond to the two reasons why simple French ditransitives with pronominal IOs are realized with *à* datives.

no Agree takes place, we expect no clitics and no person restriction. This is the pattern of nonfinite clauses in Basque. Basque finite clauses contain a clause-final auxiliary which bears DO and IO clitics, subject to a strong PCC effect, (21). Nonfinite clauses, by contrast, lack the auxiliary and its clitics. In these clauses no PCC effect is in place, (22).

(21) *Zu-k   harakina-ri ni   saldu n-(a)i-o-zu.
       you-ERG butcher-DAT me.ABS sold   1ABS-AUX-3DAT-2ERG
       You have sold me to the butcher. (Laka, 1993, 27)

(22) Gaizki iruditzen Ø-zai-t   [zu-k   harakina-ri ni
      wrong look.IPFV 3ABS-AUX-1DAT [you-ERG butcher-DAT me.ABS
      sal-tze-a   ].
      sold-NMLZ-ART.ABS]
      It seems wrong to me for you to sell me to the butcher. (Laka, 1993, 27)

I assume with Albizu (1997), Ormazabal and Romero (1998), Preminger (2019), and Coon and Keine (2020) that Basque nonfinite clauses are syntactically distinguished; they lack (at least one of) the probes(s) found in finite ones. The connection of PCC effects to Double Weakness arises because the ditransitive-relevant probe is present in some types of Basque clauses but not others. When it is present, PCC effects and clitics arise, and when it is absent, PCC effects and clitics are absent.[16]

Similar obviation of the PCC in connection with Double Weakness arises in cases where Agree does take place, but one argument is shielded from participation. In Greek, for instance, clitic-doubling of DOs (accusatives) is optional (Anagnostopoulou, 2003). I assume that this optionality arises because the DO's features may or may not be accessible to the probe for Agree.[17] If the DO does not Agree, its features being inaccessible to the probe, we expect no DO clitic and no person restriction. This is the case in (23a), where the DO is a strong pronoun. If the probe cannot access the DO's features, it cannot interact with or be satisfied by them. It therefore proceeds to interact with the IO, producing the IO clitic. By contrast, the ungrammatical (23b), with both DO and IO clitics, cannot be derived; if the probe is able to Agree with the DO, it is satisfied by it, bleeding Agree with the IO and creation of the IO clitic.

(23) a. *pro* tha tu   stilune   esena.
          3PL FUT CL.GEN.3SM send.3PL you
          They will send you to him. (Anagnostopoulou, 2003, 253)

      b. **pro* tha tu   se   stilune
          3PL FUT CL.GEN.3SM CL.ACC.2S send.3PL
          They will send you to him. (Anagnostopoulou, 2017, 4)

In French simple ditransitives, in exactly the same way, the IO may be shielded from Agree by the choice of an *à* phrase rather than a clitic. In (24a), the probe interacts with and is satisfied by the DO.

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[16] If the Applicative Agree Requirement introduced in the previous section is on the right track, examples like (22) must accordingly involve not an ApplP but rather a PP structure for the IO. Note this is in line with Rezac's (2011) analysis of non-agreeing Basque datives. Morphological support for this position may be found in the related pattern in Georgian, where PCC effects disappear in nonfinite (masdar) forms but IOs in these cases are expressed in clearly adpositional structures (Harris 1981; Bonet 1991; see recent discussion in Yokoyama 2019b, 161-162).

[17] I take it that any approach requires some similar assumption. The strong PCC effect in Greek, (23b), tells us that DO and IO clitics reflect the same probe. Therefore, given that the IO clitic is present in (23a), the probe is present. If a probe is present and the DO does not Agree with it, it must be that the DO is in some way shielded from Agree. See e.g. Coon and Keine (2020, §3.5) for one implementation of this shielding.

There is no Agree with the IO. This poses no grammaticality problem as the IO is not a clitic (and, *per* Rezac 2011, is not in the ApplP structure). This again can be contrasted with a PCC-violating form, (24b), which cannot be generated.

(24) a. Lucille te   présentera   à { moi / eux   } .
          Lucille 2SG.ACC will.introduce to { me / them }
          Lucille will introduce you to me/them.

      b. * Lucille te   { me / leur   } présentera.
          Lucille 2SG { 1SG / 3PL.DAT } will.introduce
          Intended: Lucille will introduce you to me/them

We began this section with the fundamental assumption that Agree builds the relationships necessary for cliticization. It should be noted that this is a one-way implication: whenever a clitic is present, Agree has taken place. What has been highlighted in this section is the strengthening of this connection to a *biconditional* relationship between Agree with an object and a visible object clitic in certain Basque, Greek and French data. This consistent relationship between a syntactic relation (Agree) and a morphological outcome (cliticization)—ultimately a fact related to the syntax-morphology interface—is what derives the Double Weakness generalization about PCC in these data.

3.3 Capturing exceptions to Double Weakness

If the PCC is really about Agree *qua* syntactic operation, considerations of modularity lead us to expect that Double Weakness should have exceptions. These are predicted to arise due to the several ways that Agree might take place without any effect on morphology. For instance, features may be transferred in syntax but not spelled out morphologically because there is no appropriate vocabulary item. Features may be impoverished at PF, bleeding vocabulary insertion, or otherwise disfavored for pronunciation due to the interaction of morphological rules and principles. Or, features may simply be realized with a vocabulary item whose phonology is null. As we will now see, at least one of these factors is available in certain cases where the syntax determines a strong PCC effect, with the result that the PCC holds even in the absence of Double Weakness.

A first such case is found in the Mayan language Tseltal (Shklovsky, 2012). In a Tseltal mono-transitive, subjects control ergative agreement and objects control absolutive agreement, (25). In a ditransitive, subjects continue to control ergative agreement; IOs control absolutive agreement; there is no visible morphological agreement possible for DOs, (26).[18] Thus in (26), the second person absolutive marker may only be interpreted as indicating a second person IO, rather than a DO. Indeed no additional marker for the DO is possible.

(25) lah aw-il-on
      PFV ERG2-see-ABS1
      You saw me. (Shklovsky, 2012, 441)

(26) lah x-chom-b-at
      PFV ERG3-sell-APPL-ABS2
      She sold it to you (✗ 'She sold you to it.') (Shklovsky, 2012, 443)

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[18] This alignment pattern for absolutive agreement makes Tseltal is a primary object language, in the sense of Dryer 1986, or a language demonstrating a secundative alignment, in the sense of Haspelmath 2005.

Given that only one internal argument may be realized via visible agreement morphology on the verb (viz., the IO), theories of PCC which tie person restrictions tightly to Double Weakness contexts lead us to expect that no person restriction will be in force.[19] This expectation is not met. Rather, Tseltal shows a strong PCC effect. Thus in (27), the DO may be third person but may not be either a visible first person pronoun or a first person *pro*.

(27) lah y-aʔ-b-at   me mut-eʔ   / * joʔon-eʔ / * *pro*$_{1sg}$
       PFV ERG3-give-APPL-ABS2 DET chicken-CL / * 1SG-CL / * 1SG
       She gave a chicken/*me to you. (Shklovsky, 2012, 445)

The analysis of this data is straightforward on the interaction/satisfaction approach. In terms of the syntax, the probe on Appl is specified for [INT:ϕ,SAT:PART], like in French, Greek, and Basque. The DO participates in Agree in the syntax (and the probe is subject to DO preference). The morphological expression of agreement with the DO is impossible for one of the reasons listed above (no vocabulary item; impoverishment or other morphological rule; silent vocabulary item); notably, the theory does not require choosing among these analyses, and in particular does not force a "zero clitic" analysis. (This is in contrast to Bianchi 2006, Nevins 2007, Franks 2018, Stegovec 2020, or other theories which implicate clitics in particular as the source of PCC effects; we will see a direct challenge to the null clitic response to Double Weakness violations later in this section.) Examples like the version of (27) with a first person DO cannot be derived because Agree, featurally satisfied by the DO, does not reach the IO. The fact that the features transferred from the DO to the probe receive no morphological realization plays no role in this purely syntactic state of affairs.

Certain details of the Tseltal data cast further light on questions raised above in connection with PCC "repairs". First, note that third person singular absolutive morphology is strictly null in Tseltal (as in much of the Mayan family). An example with a third person IO, such as (28), therefore contains no visible morphological mark of Agree with the IO. Why then can this form, with a second person DO and third person IO, not be derived?[20]

(28) lah y-aʔ-be
       PFV ERG3-give-APPL

       ✗She gave you to her. (OK as 'She gave it to her') (Shklovsky, 2012, 443,445)

I suggest that the unavailability of a 3>2 parse for this example demonstrates the need for an Applicative Agree Requirement, as discussed above in connection with (20b). Given that the probe on Appl is satisfied by the second person DO in (28), it does not Agree with the IO (and, I assume, no other probe does, either). This runs afoul of a requirement on the ApplP structure, rendering the form ungrammatical. Notably, the "repairs" for PCC effects in Tseltal discussed by Shklovsky (2012) are suggestive of this same conclusion: not only is the IO found in a PP[21] and its verbal agreement suppressed, the *-b(e)* applicative morphology is also obligatorily absent. Shklovsky provides the following sentences as examples of PCC "repairs".

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[19] This holds e.g. for approaches such as Bianchi (2006), Nevins (2007), Foley and Toosarvandani (2019), Coon and Keine (2020), and Stegovec (2020) (modulo a "zero clitic" analysis; see below) and in particular Preminger (2019) (who is very clear in rejecting analyses where an argument participates in Agree despite the consistent absence of morphological expression for this agreement).

[20] Thanks to Jessica Coon for raising this question.

[21] Note that the notional IO is in fact encoded as the possessor of a PP headed by the noun glossed 'power'. It is not clear to me from Shklovsky's description whether this noun has its full lexical meaning in cases such as (29), or is semantically bleached.

(29) a. ya   k-ak'   k-bah   ta   a-tojol
       IPFV ERG1-put-ABS3 POSS1-REFL PREP POSS2-power
       I give myself to your power (i.e. I give myself to you) (Shklovsky, 2012, 446)

   b. lah y-ak'-on   ta   a-tojol
       PFV ERG3-put-ABS1 PREP POSS2-power
       She gave me to your power. (Shklovsky, 2012, 446)

These data form a helpful addendum to the evidence from European languages such as French, Basque, and Greek, where applicative morphology is never overt, and therefore the presence or absence of an ApplP structure cannot be glimpsed directly. In view of these data, as well as (28), I conclude with Rezac (2011) that applicative IOs are subject to an Agree requirement—if the IO does not Agree, then a PP ditransitive without an applicative is mandatory.[22] I hasten to note that Agree requirements in ditransitives are independent of person specifications (*contra* Anagnostopoulou 2003, Béjar and Rezac 2003, and much following work). If the DO is 3rd person, it will not satisfy the probe, and thus the IO will also Agree, supporting grammaticality, *ceteris paribus*. If the DO is 1st/2nd person, it will satisfy the probe, and thus the IO must not be in the applicative construction, regardless of its features. We will see further morphological evidence for an Applicative Agree Requirement in section 5.1 below in the discussion of weak PCC language Sambaa.

   A final note before leaving the discussion of Double Weakness in connection with strong PCC concerns a class of causative constructions in certain Romance languages, e.g. French (Postal 1989; Rezac 2011; Sheehan To appear, i.a.), where causees have been noted to trigger a PCC effect even when *not* in clitic form. In (30), for instance, the DO is a third person clitic and the causee appears in an *à* phrase. We see in (31a) that this same structure becomes impossible when the DO is a local person clitic. In this case, the causee cannot appear in an *à* phrase and must be introduced by the preposition *par*, (31b).[23]

(30) Marcel les   a   fait dessiner à Ilse
     Marcel 3P.DO has made draw.INF to Ilse
     Marcel made Ilse draw them.

(31) a. * Marcel vous a   fait dessiner à Ilse
           Marcel 2P   has made draw.INF to Ilse
           Intended: Marcel made Ilse draw you

   b.   Marcel vous a   fait dessiner par Ilse
           Marcel 2P   has made draw.INF by Ilse
           Marcel made Ilse draw you

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[22] Pancheva and Zubizarreta (2018) analyze Kambera as a language in which ApplP structures persist in PCC "repairs". Note, though, that the putative Appl morpheme in Kambera is not fully segmentable apart from clitics/agreement affixes; it may plausibly be alternatively analyzed simply as an expression of dative case.

[23] The pattern in (31) is sometimes dubbed 'the fancy constraint', following Postal (1989). Some evidence that this is simply another form of PCC effect in various Romance languages comes from two sources. First, as Sheehan (To appear) demonstrates, the person restriction can be obviated by making the DO a tonic pronoun rather than a clitic, just as for standard PCC violations in e.g. Italian (see Bianchi 2006). Second, the type of person restriction found in the causative appears to correlate with the type of person restriction found in ordinary ditransitives: e.g. French speakers have a strong PCC pattern in both cases whereas some Catalan speakers have a weak PCC pattern in both cases. Thanks to Michelle Sheehan for discussion of this latter point.

Drawing on evidence from quantifier float, Rezac (2011) argues that there is no null clitic for the causee in structures like (30) and (31a). While cliticization generally licenses quantifier float in French, no floated quantifier is possible for *à* causees:

(32) Elle a   (*tous) fait   (*tous) manger (*tous) la tarte aux   enfants
      She has (*all)   made (*all) eat.inf (*all)   the cake to.the children
      She made the children (*all) eat the cake. (Rezac, 2011, 129)

Such data pose a challenge for approaches such as Stegovec (2020) and Coon and Keine (2020) which respond to the Tseltal-type challenge for Double Weakness by positing a null clitic for the DO (an approach with an antecedent in Albizu 1997). To the contrary, these data provide key evidence that the source of the person restriction cannot be found in principles that apply only in cases of Double Weakness—there is only one clitic in the ungrammatical (31a), not two.

The contrast between this type of example and ordinary ditransitives, where IOs in *à* phrases are seemingly invisible to PCC effects, provides good evidence that *à* phrases come in two varieties in French (Rezac 2011; Sheehan To appear, i.a.). Compare, for instance, the ungrammatical (31a) to the perfectly grammatical (33).

(33) Marcel vous a   présentés à Ilse
      Marcel 2P   has introduced to Ilse
      Marcel introduced you to Ilse.

I suggest that one type of *à*, found unambiguously in (33), is a P head introducing notional goals in ditransitives, roughly with meaning 'to'. This P head is necessary in (33) because the IO could not have Agreed in an ApplP structure (the DO having satisfied the probe). Given its lexical semantics, however, the P head *à* is not able to introduce causees; this is instead the job of P *par*, as in (31b). The other type of *à*, found unambiguously in (30), is a morphological mark of Agree with *v* (in particular, on the DO preference account, this is a mark for the second downward goal for *v*). It is the presence of this morphological mark of Agree in (31a) which makes the example impossible to generate. As in ordinary ditransitives like (33), the DO satisfies the probe, in this case bleeding Agree with the causee. The marker *à* on the causee is therefore impossible.[24]

4   Narrowing the satisfaction condition

The analysis just given for French, Greek, Basque, and Tseltal derives a strong PCC effect due to the feature specification of the probe. In particular, because the probe is satisfied by [PART], all and only local-person DOs are able to satisfy it, bleeding Agree with the IO. A satisfaction condition of this type for a given probe should of course be treated as a language-particular fact. A probe with a broader satisfaction condition, for instance [φ], would be satisfied by *all* DOs, making IOs universally unable to Agree. If Applicative Agree Requirements are universal, a language with a probe of this type would

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[24] Given this approach, example (i) is ambiguous. On one parse, the IO occupies Spec,Appl and Agrees with *v* after the DO does (the DO in this case *not* having satisfied the probe); *à* is a mark of agreement. On the other parse, the IO occupies a PP structure and *à* is the P head.

(i) Marcel les a   présentés à Ilse
     Marcel 3P has introduced to Ilse
     Marcel introduced them to Ilse.

require a PP structure for the introduction of IOs—a profile which is richly attested. What about a probe with a satisfaction condition narrower than [PART]? In this section I consider two particular subcases: a probe with satisfaction condition [SPKR] and a probe with no satisfaction condition at all. (I defer consideration of potential [ADDR]-satisfaction until section 6.1.) I will show how the first option gives rise to the me-first pattern found in Romanian and Bulgarian, whereas the second gives rise to the pattern of agreement with both DO and IO, regardless of person features, found in Moro.

The me-first pattern is demonstrated for Bulgarian in (34).[25] In (34a), we see that a second person DO clitic is possible in combination with an IO clitic (in sharp contrast to the pattern of strong PCC languages). The person restriction emerges in (34b), where the DO clitic is first person. In this case all IO clitics are ruled out.

(34) Bulgarian (Pancheva and Zubizarreta, 2018, 1315)

   a.   Preporâčaha   { mu   / mi   } te   entusiaziarano.
        recommended.3PL { 3SG.M.DAT / 1SG.DAT } 2SG.ACC enthusiastically
        They recommended you to him/me enthusiastially.

   b. * Preporâčaha   { mu   / ti   } me   entusiaziarano.
        recommended.3PL { 3SG.M.DAT / 2SG.DAT } 1SG.ACC enthusiastically
        They recommended me to him/you enthusiastially.

(35) Me-first PCC
In certain combinations of direct and indirect objects, if there is a first person, it must be the indirect object.

This pattern results straightforwardly from a probe with specification [INT:ϕ,SAT:SPKR]. A 2nd person DO does not satisfy the probe, (34a); the probe therefore interacts with the IO as well, producing a double-clitic structure. A 1st person DO, however, satisfies the probe, (34b). The probe therefore does not interact with the IO, meaning the double-clitic structure cannot be derived.

The satisfaction condition for the *v* probe in Bulgarian—[SPKR]—is narrower than its counterpart in French—[PART]—in that it occurs across fewer cells of a person paradigm; [PART] features are present on two of three persons, whereas [SPKR] features are present on only one. A still narrower satisfaction condition would be one that is not met in *any* cell of a person paradigm. I suggest that the simplest way to model such a probe is as lacking any satisfaction condition altogether; let us call such a probe *insatiable* (Deal, 2015b).[26] An insatiable probe with interaction condition [ϕ] will copy all ϕ-features from all goals in its domain, regardless of the number of goals or the features these goals contain. We might indicate such a probe as [INT:ϕ,SAT:-]. In a language where Agree gives rise to clitics, a probe of this type is expected to give rise to clitics for both DO and IO, regardless of person specifications.

Various languages of this type are attested. In Moro (Kordofanian), for instance, weak object markers for both DO and IO occur both in cases where both arguments are local person, as in (36a), and in cases where one argument is local person whereas the other is 3rd person, (36b). (Note that Moro object markers have the same morphological form for DO and IO and are ordered templatically;

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[25] As for many other PCC languages, some speaker variation is reported in Bulgarian as well as in me-first sister language Romanian; unfortunately, owing to gaps in reported data, it is not entirely clear which pattern(s) me-first alternates with. See Pancheva and Zubizarreta (2018) and Yokoyama (2019a, 112-113) for data and references.

[26] Potential further applications of insatiable probing include multiple *wh*-movement (Deal, 2017); person portmanteaux (Deal, 2015b); "agreement displacement" (Foley, 2017); and switch reference (Clem, 2019a,c).

this is parallel to the situation for 1st / 2nd person in French, which by contrast shows a PCC effect.[27])

(36) Moro (Jenks and Rose 2015)

    a. g-a-natʃ-ə́-ŋə́-ŋá-ŋo
       SM.CL-RTC-give-PFV-1SG.OM-2SG.OM-ŋo
       S/he gave me to you / you to me

    b. g-a-natʃ-ə́-ŋə́-ŋo
       SM.CL-RTC-give-PFV-1SG.OM-3SG.OM
       S/he gave me to her/him / her/him to me

A similar situation obtains in Caquinte (Arawak; Drummond and O'Hagan To appear); in Kinyarwanda (Bantu; Contini-Morava 1983); in various languages of the Caucasus including Ubykh (Dumézil, 1975), Kabardian, Abkhaz, and Abaza (Peter Arkadiev, p.c.); and perhaps as well in Lakhota (Van Valin, 1977), Ariellese (D'Alessandro and Pescarini, 2016), and Noon (Soukka, 2000).[28] This language type reveals the flip side of the challenge to Double Weakness from Tseltal, rounding out a simple case for double dissociation between Double Weakness and PCC effects:

(37) PCC vs. Double Weakness

		Double Weakness	
		Yes	No
PCC	Yes	Italian with clitic pronouns	Tseltal
	No	Moro	Italian with a tonic pronoun

This finding further strengthens the case for a theory of PCC effects which rejects an overtly tight connection to the morphological or syntactic properties of weak elements. Rather, PCC effects arise due to constraints on what a probe can Agree with—constraints which may be determined by the probe's satisfaction conditions, yielding four possible patterns discussed so far:

(38) Variation by probe satisfaction condition

    a. [INT:ϕ,SAT:ϕ]: "indirective" pattern (only DO Agrees, regardless of person)

    b. [INT:ϕ,SAT:PART]: Strong PCC

    c. [INT:ϕ,SAT:SPKR]: Me-first PCC

    d. [INT:ϕ,SAT:-]: Double Weakness, no PCC

At this point, in terms of the three desiderata for a theory of PCC with which we began, the central pieces of a response to D2 and D3 are now in place.

D2. The theory should capture Double Weakness conditions on PCC application in cases where such conditions hold.

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[27] An alternative description of these facts is that Moro shows persistent DO/IO syncretism. Syncretisms of this type are, however, typically taken to be linked to the *presence* of PCC effects, rather than their absence; see Nicol (2005), Adger and Harbour (2007) for discussion.

[28] An alternative possibility is that Lakhota, Ariellese, and/or Noon have a me-first PCC pattern; the cited sources provide data only on combinations of 3rd person IOs and 2nd person DOs. An additional language sometimes cited as lacking a PCC effect, in spite of Double Weakness, is Haya (Duranti, 1979). Note though that Riedel (2009) was unable to replicate the crucial Haya judgment, finding only Haya speakers who do in fact have a PCC effect.

D3. The theory should allow for PCC restrictions to hold even in cases where the Double Weakness condition is not met, as well as for cases where the Double Weakness condition is met but PCC restrictions do not hold.

Double Weakness conditions on PCC application arise in cases where two conditions are met: the presence of weak elements (esp. clitics) in the morphological output is biconditionally correlated with the presence of Agree in the syntax (a fact about the syntax-morphology interface) and Agree with one argument may bleed Agree with another (a fact about probe satisfaction conditions). The exceptions to Double Weakness summed up in D3 reflect two departures from this picture. First, cases of PCC effects without Double Weakness arise where the relationship between weak forms and Agree is merely one-way—weak forms are traceable to Agree, but not all instances of Agree give rise to weak forms. (They may give rise to no morphological output at all, as in the case of DO Agree in Tseltal, or to morphological marks other than weak forms, as in French causatives.) Second, cases of Double Weakness without PCC effects arise where Agree with one argument is not able to bleed Agree with another, owing to the insatiable character of the probe.

5   Dynamic interaction

The discussion thus far has highlighted satisfaction conditions as a source of variation related to PCC effects. Of course, an interaction/satisfaction theory also raises the possibility of potential variation related to interaction conditions. In the literature to date, interaction condition variation has remained considerably underexplored as compared to satisfaction condition variation. Deal (2015a) hypothesizes, for instance, that interaction conditions are invariant: for a probe satisfied by any ϕ-feature, the interaction condition is always $[\phi]$. This makes for a notable contrast with uF theories, where what can be copied to the probe is a dimension with rich variation, dynamically affected by Agree; Agree with a first goal constrains what can be copied from a second goal (see esp. Béjar 2003, Béjar and Rezac 2003). Here I pursue an intermediate hypothesis: a probe satisfied by any ϕ-feature must begin with $[\phi]$ as its interaction condition, but this condition can be changed in the course of cycles of Agree. In particular, interaction conditions change when features of the goal are copied into the interaction specification of the probe. I will refer to changes to the interaction condition in the course of a derivation as *dynamic interaction*. In this section, I make an empirical case for dynamic interaction in the derivation of two additional types of PCC effect: weak PCC and strictly descending PCC.

5.1   Weak PCC

Weak PCC patterns are broadly attested in southern Romance languages, holding for various speakers of Italian (Monachesi, 1998; Bianchi, 2006), Catalan (Bonet, 1991, 2008), and Spanish (Perlmutter, 1971; Laenzlinger, 1993), as well as Old Occitan (Nicol, 2005).[29] They are also found among some speakers of Slovenian (Stegovec, 2020); in Yakkha, a Kiranti language of Nepal (Schackow, 2012); as well as quite broadly in Bantu languages, for instance Haya, Nyaturu, Sambaa, and Swahili (Riedel

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[29] Speakers of these Romance languages with patterns other than weak PCC can be further divided among PCC varieties. For instance, the strong PCC pattern coexists with weak PCC in Italian (Monachesi, 1998; Bianchi, 2006); strong and strictly descending patterns coexist with weak PCC in Catalan (Bonet 1991, Walkow 2013); strictly descending PCC coexists with weak and strong PCC in Spanish (Pancheva and Zubizarreta, 2018).

2009).[30] [31]

(39) Weak PCC

In certain combinations of direct and indirect objects, if there is a third person, the direct object must be third person.

In Italian, the relevant combinations are those where both objects are clitics. The weak PCC variety of Italian allows (40a) below and finds it ambiguous: either DO or IO may be first person. (The ambiguity of this example suggests that clitic order is determined templatically; note that the opposite order of clitics is simply ungrammatical.) Example (40c), however, is ruled out: here a third person clitic is present but the direct object is non-third.

(40) Italian (Bianchi, 2006)

   a. % Mi ti ha affidato.
       1S 2S has entrusted
       He entrusted me to you / you to me.

   b.   Me lo   ha affidato.
       1S 3S.ACC has entrusted
       He entrusted him to me.

   c. * Gli   mi ha affidato.
       3S.DAT 1S has entrusted
       Intended: He entrusted me to him.

Similarly, Bantu languages such as Haya and Sambaa show the weak PCC effect in cases where both objects are indexed on the verb by object markers.[32] In Swahili, by contrast, the relevant combinations are simply those where the IO is realized weakly. Like Tseltal, Swahili is a primary object language (though unlike Tseltal, its verbal marking follows a nominative/accusative alignment); only one object marker appears in a ditransitive, and this marker must reflect the features of the IO, never the DO. (In the examples below, I use a box to enclose both the object marker and the element of the translation corresponding to the argument the object marker indexes.) Accordingly, Swahili shows no ambiguity like Italian (40a). When the IO is first person, the verb bears a first person object marker only, (41a); when the IO is second person, the verb bears a second person object marker only, (41b). Both examples are fully grammatical.[33]

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[30] This description follows Riedel (2009). Duranti's (1979) influential description of Haya involves no PCC effect; in particular, the combination of 3 IO and 1 DO is reported to be grammatical. This would make Haya akin to fellow Bantu language Kinyarwanda (Contini-Morava 1983), or to Moro, discussed in section 4; however Riedel's (2009) Haya consultant does not share the judgments Duranti reports. Duranti also reports a strong PCC pattern for Sambaa (also known as Shambala), making it parallel to French, in contrast to the pattern found for Riedel's consultants. In the text I refer only to the varieties of Haya and Sambaa documented by Riedel, as it is unclear whether these differing reports reflect speaker variation, language change, or differences in documentary/analytic practices.

[31] Pancheva and Zubizarreta (2018) claim that weak PCC is a highly marked pattern, "more idiolectal than dialectal," which can only be learned if input from strictly descending grammars is present in the speech community (p 1309). As this list of languages shows, it is not at all clear that this connection between weak and strictly descending PCC holds beyond Catalan and Spanish.

[32] Haya shows the Italian-like pattern where local person object markers are ordered templatically, giving rise to an ambiguous form (Riedel, 2009, 142). In Sambaa, however, the order of 1st and 2nd person object markers disambiguates (Riedel, 2009, 140).

[33] Note that the Swahili and Sambaa glosses in this section follow Bantuist conventions, which require distinguishing class

(41) Swahili (Riedel 2009, 152)

    a. A-li-`ni`-onyesha   wewe.
          SM.CLASS1-PAST-OM.1S-show you
          He showed you to `me` .

    b. A-li-`ku`-onyesha   mimi.
          SM.CLASS1-PAST-OM.2S-show me
          He showed me to `you` .

The weak PCC effect is seen in Swahili in examples like (42), where a third person argument is present but the direct object is non-third; compare Italian (40c).

(42)   * Ni-li-`mw`-onyesha   Juma wewe.
           SM.1SG-PAST-OM.CLASS1-show 1.Juma you

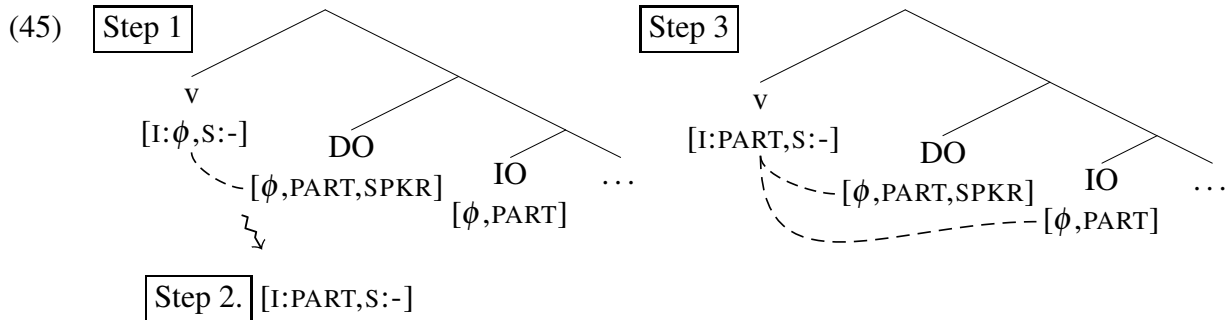   Intended: I showed you to `Juma` . (Riedel, 2009, 151)

A central generalization about the weak PCC pattern is that Agree with both arguments is possible regardless of the DO's features—that is, for any choice of DO, there is at least one well-formed choice of IO. Combinations of local>local IO and DO are possible, as seen in (40a) and (41); so are combinations of 3>3 IO and DO:

(43)   Glie-lo   ha affidato.
        3S.DAT-3S.ACC has entrusted
        He entrusted him to him (Italian; Bianchi 2006, 2027).

(44)   Stella   a-li-`mw`-onyesha   mtoto mama yake.
        1.Stella SM.CLASS1-PAST-OM.CLASS1-show 1.child 9.mother 9.his
        Stella showed `the child` his mother. (Swahili; Riedel 2009, 131)

I conclude that the probe must be insatiable, as there is no choice of DO features that would cause it to stop probing. However, once the probe has Agreed with 1st/2nd person—bearers of the feature [PART]—it can only Agree with another argument that also has this feature. This suggests that Agree with the DO changes the specification of the probe. I propose that the change concerns the interaction condition. Weak PCC arises when interaction with [PART] on the DO results in copying [PART] *into the interaction condition of the probe*, preventing further Agree with a 3rd person.

Let us first consider cases where both objects bear the feature [PART]. In keeping with the hypothesis indicated at the top of this section concerning interaction features, as well as the conclusion reached just above concerning probe insatiability, I propose that the probe enters the derivation with the specification [INT:ϕ,SAT:-]. (This is the specification proposed above for Moro.) Agree first targets the DO, as discussed above; this results in a DO clitic in Italian but no morphological output in Swahili (as discussed for Tseltal). The DO will not satisfy the probe, but will have its [PART] feature copied to the probe's interaction condition. The probe will therefore Agree with the [PART] IO as well. In Italian, this produces a double-clitic structure; in Swahili, it produces the lone overt object marker, indexing the IO. The derivation in (45) corresponds to the Italian and Swahili examples repeated in (46).

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1 (a subclass of 3rd person; generally, singular animates) from 1st person. In verb glossing, I indicate class 1 agreement explicitly, and use '1s' to indicate first person singular. In glossing nominals, class information is indicated by a prefixed number; e.g. the gloss '9.mother' indicates a noun meaning 'mother', of class 9. Other abbreviations: SM = subject marker; OM = object marker.

(45) **Step 1**

v
[I:φ,S:-] DO IO …
[φ,PART,SPKR] [φ,PART]

Step 2. [I:PART,S:-]

Step 3

v
[I:PART,S:-] DO IO …
[φ,PART,SPKR] [φ,PART]

(46) a. Mi ti ha affidato.
1S 2S has entrusted
He entrusted me to you. (Italian)

b. A-li-ku-onyesha   mimi.
SM.CLASS1-PAST-OM2S-show me
He showed me to you. (Swahili)

Dynamic interaction with the feature [PART] has the result that, when the IO is third person, a clitic or object marker for it can be derived *only if the DO lacks* [PART]. When the DO has [PART], the probe copies this feature into its interaction condition and therefore can only copy [PART] and features that geometrically entail it from an IO; third persons, lacking [PART] (and features that geometrically entail it), possess no features that the probe can interact with. In (47), which shows the attempted derivation of a structure with a first person DO and third person IO, the possibilities for feature copying are therefore exhausted upon DO interaction. The impossibility of interaction with the IO here underlies the ungrammaticality of examples such as (48).

(47) **Step 1**

v
[I:φ,S:-] DO IO …
[φ,PART,SPKR] [φ]

Step 2. [I:PART,S:-]

No Step 3!

v
[I:PART,S:-] DO IO …
[φ,PART,SPKR] ✗ [φ]
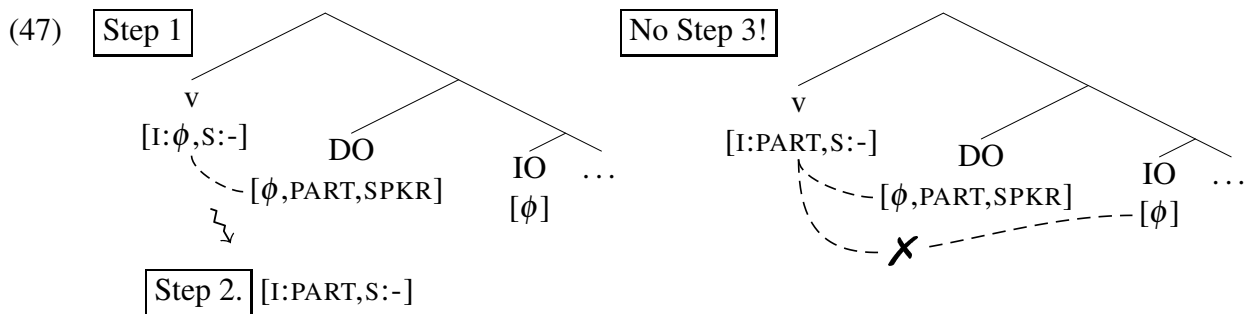
(48) a. * Gli   mi ha affidato.
3S.DAT 1S has entrusted
Intended: He entrusted me to him. (Italian)

b. * A-li-mw-onyesha   Juma mimi.
SM.CLASS1-PAST-OM.CLASS1-show 1.Juma me
Intended: He showed me to Juma. (Swahili)

Crucially, narrowing of the interaction condition in these derivations (step 2) must be understood as part of the process of copying features from the DO. Narrowing obtains only if DO has the feature [PART]—if the DO is 3rd person, no [PART] feature can be copied, and the probe's interaction condition remains [φ]. The Italian and Swahili examples repeated below involve derivations where, by comparison to the derivations above, step 2 is missing; the DO provides no [PART] feature that can be copied into the interaction condition. The probe's interaction condition therefore remains [φ], and

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interaction with the IO is fully possible. In Italian (49a), this produces the IO clitic *glie*; in Swahili (49b), it produces the object marker *mw*.

(49) a. Glie-lo   ha affidato.
        3S.DAT-3S.ACC has entrusted
        He entrusted him to him. (Italian)

      b. Stella   a-li-mw-onyesha   mtoto mama   yake.
        1.Stella SM.CLASS1-PAST-OM.CLASS1-show 1.child 9.mother 9.his
        Stella showed the child his mother. (Swahili)

Certain languages with weak PCC effects provide further support for the Applicative Agree Requirement. In Sambaa (Bantu; Riedel 2009), for instance, ditransitives allow two object markers, parallel to cases of double cliticization in Italian. Sambaa verbs however also show a visible applicative form. In (50), the applicative form is *ighaiya* 'send'; the non-applicative form of this verb is *ighaa*.

(50) Sambaa (Riedel, 2009, 145)

      a.   Stella   a-za-ku-ni-ighaiya.
           1.Stella SM.CLASS1-PERF.DJ-OM.2SG-OM.1SG-send.APPL
           Stella sent you to me.

      b. * Stella   a-za-ni-mw-ighaiya.
           1.Stella SM.CLASS1-PERF.DJ-OM.1SG-OM.CLASS1-send.APPL
           Intended: Stella sent me to him.

Notably, "repairs" for the PCC in Sambaa involve not only the absence of an object marker for the IO, but also the absence of the applicative verb form (Riedel, 2009, 148). In the well-formed (51a), the IO appears in a PP and the verb appears in its non-applicative form. In the ungrammatical (51b), by contrast, the verb remains in the applicative form.

(51) a.   N-za-ku-ighaa   [$_{PP}$ kwa   Juma   ].
        SM.1SG-PERF.DJ-OM.2SG-send   17.ASSOC 1.Juma
        I sent you to Juma. (Riedel, 2009, 148)

      b. * N-za-ku-ighaiya   [$_{PP}$ kwa   Juma   ].
        SM.1SG-PERF.DJ-OM.2SG-send.APPL   17.ASSOC 1.Juma
        Intended: I sent you to Juma. (Riedel, 2009, 149)

These data confirm the morphological evidence from Tseltal discussed in section 3.3 above. The recurrence of this pattern across Strong and Weak PCC systems shows that when the probe is prohibited from Agree with the IO *for any reason*—in Tseltal, because a local person DO satisfies the probe, or in Sambaa, because a local person DO dynamically interacts with the probe and narrows its interaction condition to [PART]—the IO cannot remain in an applicative structure. A derivation involving no ApplP is instead required.

5.2   *Strictly descending PCC*

In terms of the first of our three desiderata for a theory of PCC effects, it remains to account for the strictly descending (or "ultrastrong") PCC, found in some varieties of Spanish (Perlmutter, 1971;

Pancheva and Zubizarreta, 2018), Czech (Sturgeon et al., 2011), Arabic (Nevins, 2007; Walkow, 2012, 2013), and Catalan (Bonet, 1991). (This is also the full pattern found in subject-object agreement in Tupinambá, discussed in section 2 above.)

(52) Strictly descending PCC
In certain combinations of direct and indirect objects, the IO must outrank the DO on the hierarchy 1 > 2 > 3.

This pattern is exemplified for Spanish in (53), where the relevant combinations are those that feature two clitics.

(53) Spanish (Perlmutter 1970, 230, Pancheva and Zubizarreta 2018)

    a.   Me/te/se   lo   recomendaron.
            1SG/2SG/3SG 3ACC recommend
            They recommended him to me/you/him.

    b.   El te   me recomendó
            he 2SG 1SG recommended

            He recommended you to me. ✗He recommended me to you.

    c. * Me/te   le   recomendaron
            1SG/2SG 3DAT recommend
            They recommended me/you to him.

The strictly descending pattern is essentially the combination of a me-first PCC with a weak PCC. Accordingly, a first way to capture this pattern in an interaction/satisfaction theory is with the help of a probe showing both Bulgarian-like and Italian-like behaviors; it begins the derivation with satisfaction condition [SPKR], and dynamically interacts with the feature [PART]. A first person DO, bearing feature [SPKR], satisfies the probe; therefore, if the DO is first person, double clitics cannot be derived, (53b,c). A second person DO bears feature [PART]; it doesn't satisfy the probe, but it does change the interaction condition for subsequent Agree, (53b,c). Accordingly, the IO must also be [PART], meaning only a first person IO is possible. Finally, a third person DO neither satisfies the probe nor dynamically interacts with it. Agree with any person of IO is therefore possible when the DO is third person, (53a).

This account of the pattern builds on the case for dynamic interaction of [PART] presented above in connection with weak PCC. The basic mechanism of dynamic interaction of course points to no special expectation for the feature [PART]. Dynamic interaction of other features, for instance [SPKR], should also be possible. Adopting dynamic interaction of [SPKR] paves the way for an additional account of the me-first PCC, as exemplified for instance in the Bulgarian data repeated below. On a dynamic interaction account of these data, upon Agree with a first person DO, the feature [SPKR] is copied into the interaction condition of the probe. Agree with a second or third person IO is then impossible, as these elements do not include the interaction feature for which the probe is now specified. Dynamic interaction with [SPKR] and probe satisfaction by [SPKR] each being sufficient to rule out (54b), the Bulgarian pattern may be derived in three ways. First, as above, the probe may have satisfaction condition [SPKR], and there may be no dynamic interaction feature. Second, the probe may dynamically interact with [SPKR] and have no satisfaction condition (being insatiable). Third, there may be *both* dynamic interaction with [SPKR] and satisfaction condition [SPKR] for the probe.

(54) Bulgarian (Pancheva and Zubizarreta, 2018, 1315)

    a.   Preporâčaha   { mu   / mi   } te   entusiaziarano.
        recommended.3PL { 3SG.M.DAT / 1SG.DAT } 2SG.ACC enthusiastically
        They recommended you to him/me enthusiastially.

    b.   * Preporâčaha   { mu   / ti   } me   entusiaziarano.
        recommended.3PL { 3SG.M.DAT / 2SG.DAT } 1SG.ACC enthusiastically
        They recommended me to him/you enthusiastically.

Combining the second and third of these possibilities with dynamic interaction by [PART] yields two additional derivations for the strictly descending pattern of Spanish (53). On both derivations, there are two features that interact dynamically, [SPKR] and [PART]. Dynamic interaction with [SPKR] on the DO rules out interaction with any second or third person IO; dynamic interaction with [PART] on the DO rules out interaction with any third person IO. The derivations differ in the satisfaction condition of the probe. This may be either empty (insatiable), in which case the restriction on IO person in the presence of a first person DO is ruled out purely by dynamic interaction. Or, it may be [SPKR], in which case satisfaction and dynamic interaction (redundantly) produce the same restriction.

6   Typological extensions

Table (55) shows the overall space of PCC patterns derivable by manipulation of probe satisfaction conditions and dynamic interaction features in a system with features [PART] and [SPKR]. (We turn to the typological impact of [ADDR] features later in this section.) The notation ↑ is used to indicate features that dynamically interact. The table reflects the three ways just discussed to derive me-first patterns, and accordingly, strictly descending patterns as well. The derivations for Moro-type PCC absence and weak PCC remain uniquely as described in sections 4 and 5.1 above. Strong PCC, for its part, may be derived in four ways, corresponding to total freedom in the choice of which features interact dynamically, if any. Given that a [PART]-bearing DO satisfies the probe, and that [SPKR] entails [PART], there is no choice of interaction feature that will further narrow the PCC restriction away from a strong PCC pattern.[34]

(55)   Typology of PCC effects by satisfaction condition and dynamic interaction feature

Dyn. int. feature(s)	Satisfaction condition		
	[PART]	[SPKR]	[-]
[PART]$^\uparrow$	strong	strictly descending	weak
[SPKR]$^\uparrow$	strong	me-first	me-first
[PART]$^\uparrow$ and [SPKR]$^\uparrow$	strong	strictly descending	strictly descending
none	strong	me-first	no PCC

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[34] Note that I do *not* assume a correlation between the number of ways in which a particular pattern may be derived and the relative level of attestation of that pattern (as would parallel, e.g., Anttila's (1997) treatment of probablistic phonological patterns; see discussion in Coetzee and Pater 2011). It is notable that PCC patterns are highly variable across many populations, suggesting that such systems pose challenges for learning. This same fact also suggests that more empirical work is required in order to assess exactly how common, in statistical terms, various PCC patterns actually are—a data set which would form a cornerstone of the assessment of any proposed acquisition model for PCC. In the absence of a clear picture of the statistical distribution at present, I emphasize that the typology in (55) represents the *possible* grammars derivable by the present system and is neutral as to the (most) *probable* ones; I assume that facts concerning the relative attestation rate of PCC systems may reflect many factors, not all of them purely grammatical. See Newmeyer (2005).

In showing how the four types of PCC recognized by Nevins (2007) can be derived, this typology provides the response to our first desideratum for a theory of PCC effects:

D1. The theory should capture all four types of PCC, without multiplying the number of basic Agree(-type) operations necessary in natural language.

It raises the further question of whether the four types of PCC listed in (55) exhaust the possibility space—a question to be asked both in theoretical terms (what additional patterns, if any, does the theory predict?) and empirical terms (what additional patterns, if any, are attested in natural language?). I take up two such typological extensions in this section. The first concerns the featural representation of second person and the potential impact of the feature [ADDR] on the predicted space of PCC patterns; the second concerns the relative structural position of DO and IO in the search space of the probe, and the corresponding possibility of "reverse PCC" effects.

6.1 The feature [ADDR]

Our discussion thus far has worked with a privative, geometrically organized feature system, (8), largely following Harley and Ritter (2002). Notably, geometry (8) contains three features related to the encoding of local person: [PART], [SPKR] and [ADDR]. The inclusion of an [ADDR] feature in the geometry is motivated by facts of several sorts. In the Nez Perce C agreement data repeated below, for instance, the probe is satisfied only by a second person DP, not by a first person DP. This behavior is not readily captured in a system where second persons possess a strict subset of the features of first persons, e.g. [PART] (2nd person) vs. [PART,SPKR] (1st person).

(56) Nez Perce C: [INT:ϕ, SAT:ADDR]

    a. ke-m kaa *pro* nees-cew'cew'-teetu *pro*
       C-2 then 2SG O.PL-call-HAB.S.SG 1PL
       2sg subj/1pl obj: When you call us

    b. ke-pe-m-ex kaa *pro* cew'cew'-tee'nix *pro*
       C-PL-2-1 then 1PL call-HAB.S.PL 2SG
       1pl subj/2sg obj: When we call you

Further evidence for a featural representation of second person that is not strictly a subset of first person comes from Kadiwéu (Sandalo, 2011), where verbs with both first and second person arguments must agree with the second person argument rather than the first person. Finally, in a privative feature system, [ADDR] features are necessary to represent the distinction between inclusive and exclusive first person plural.[35]

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[35] As an alternative to the postulation of [ADDR] features, these data can be captured by a bivalent feature system with features [±PART] and [±AUTH] (Nevins 2007; Harbour 2016, i.a.); in such a system, second person is [+PART,−AUTH] whereas first person is [+PART,+AUTH]. (On inclusive/exclusive distinctions, see the extensive discussion in Harbour 2016). This type of feature system is readily compatible with an interaction/satisfaction approach *if* we model satisfaction features as sets, where every member of the set must be found on the same goal (cp. Scott 2020). Thus Nez Perce C, for instance, would have satisfaction condition {+PART,−AUTH}. So long as no *ad hoc* constraints related to positive/negative values of features are introduced, I am not aware of any empirical impact arising from the reframing of the feature theory

What is the impact of [ADDR] features on the predicted typology of PCC effects? Two additional types of PCC effects are now predicted. The first is a 'you-first' PCC (so named by Nevins 2007): if the ditransitive probe is satisfied by [ADDR], the result will be that there can be no Agree with the IO when the DO is second person. Nevins (2007) rules out this option by adopting a feature system that makes it impossible for Agree to target second persons featurally. A prohibition of this type faces an immediate challenge in accounting for agreement data such as Nez Perce (56); after all, it should be noted that a you-first PCC is simply the transposition into the ditransitive realm of the Nez Perce C agreement pattern. In view of these data, I suggest that the you-first pattern is indeed possible and that it constitutes an accidental gap in the currently attested space of PCC patterns. Three factors make an accidental gap of this type particularly unremarkable. First, I assume with Harley and Ritter (2002) that not all languages make use of an [ADDR] feature; rather, it may be that children only posit such a feature in the face of positive evidence (e.g. from inclusive-exclusive contrasts). Languages without an [ADDR] feature in their grammar could not have a probe satisfied by (or dynamically interacting with) such a feature and thus could not have a you-first PCC. Second, it is worth remarking that, based on current evidence, the me-first pattern itself is only attested in one linguistic area (in contrast to patterns such as strong and weak PCC, attested around the world). It is described as holding broadly for essentially only two languages, Romanian and Bulgarian, in long-standing contact, and may be found as well for some speakers of other languages in the Balkan sprachbund such as Serbo-Croatian (Runić, 2013) and Czech (Sturgeon et al., 2011), as well as nearby Polish (Cetnarowska 2003 *apud* Pancheva and Zubizarreta 2018). This notably limited geographical distribution might be taken to suggest that very narrow satisfaction conditions for the ditransitive probe are independently disfavored in some way, a condition which would apply to [ADDR]-satisfaction equally well as [SPKR]-satisfaction. Third, both the present approach and many other approaches to PCC effects find a close connection between patterns in ditransitives and similar person restrictions holding in monotransitives, between subjects and objects (e.g. Anagnostopoulou 2003; Béjar and Rezac 2003, 2009; Baker 2008; Foley and Toosarvandani 2019). In the realm of subject-object person restrictions, you-first patterns do appear to be found in various Quechua dialects (Weber 1976; Myler 2017).

We saw above how the strictly descending PCC can be captured as the consequence of [SPKR]-satisfaction (which by itself yields me-first PCC) along with dynamic interaction of [PART] (which by itself yields weak PCC). The result is a system where the IO must outrank the DO on the hierarchy 1 > 2 > 3. In much the same way, if [ADDR]-satisfaction is a possibility in natural language, we expect a second additional type of PCC pattern, which I call *A-descending*: the IO must outrank the DO on the hierarchy 2 > 1 > 3.[36] Descriptions which hint at a pattern like this can be found in Laenzlinger (1993, fn 6), for some speakers of Italian, and Bonet (2008), for some speakers of Catalan. Notably, it is again the case that the pattern is indeed found in subject-object person restrictions, with examples coming from Algonquian languages such as Delaware (Goddard, 1979) and Potawatomi (Hockett, 1939).

A full typology of expected PCC types in a system with [ADDR] features is given in table (57).

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in this way as compared to the approach with a privative [ADDR] feature in the text. In particular, both the privative and the bivalent feature theories predict the same two additional types of PCC effects discussed in this section (viz. you-first and A-descending).

[36] The name *A-descending* can be understood as a mnemonic either for 'addressee' (in reference to the role of the [ADDR] feature) or 'Algonquian' (in reference to classic claims of a 2 > 1 > 3 hierarchy in this language family). Note that this pattern is discussed by Stegovec (2017a,b) under the label 'mixed-2'.

(57) Typology of PCC effects, recognizing [ADDR] features

Dyn. int. feature(s)	Satisfaction condition			
	[PART]	[SPKR]	[ADDR]	[-]
[PART]$^\uparrow$	strong	strictly descending	A-descending	weak
[SPKR]$^\uparrow$	strong	me-first	strong	me-first
[ADDR]$^\uparrow$	strong	strong	you-first	you-first
[PART]$^\uparrow$ and [SPKR]$^\uparrow$	strong	strictly descending	strong	strictly descending
[PART]$^\uparrow$ and [ADDR]$^\uparrow$	strong	A-descending	A-descending	A-descending
[SPKR]$^\uparrow$ and [ADDR]$^\uparrow$	strong	strong	strong	strong
[PART]$^\uparrow$, [SPKR]$^\uparrow$, [ADDR]$^\uparrow$	strong	strong	strong	strong
none	strong	me-first	you-first	no PCC

As the table indicates, no additional PCC types beyond you-first and A-descending are introduced by the recognition of [ADDR] features. Rather, a full theory with [ADDR] features provides for additional ways in which strong PCC effects may be derived. When the probe's satisfaction condition is [ADDR] and [SPKR] dynamically interacts, or vice versa, a strong PCC effect results.
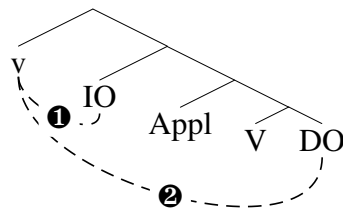
6.2 Reverse PCC

Central to the derivation of PCC effects is direct object preference: the probe interacts with the DO before the IO. DO preference may be derived in multiple ways, as we saw in (18) above. The route I have consistently represented throughout this paper involves a structure in which the probe c-commands both DO and IO, and in which the DO has moved to a position between the probe and the IO, (58). This movement presumably is to be modeled as a type of short scrambling, obligatory for the DO in various languages with PCC effects.

(58) Classic PCC: DO preference
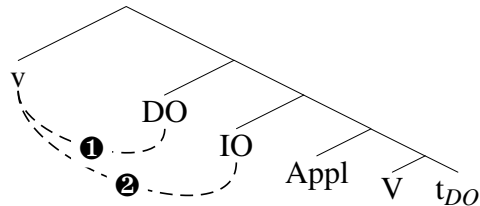
An immediate typological prediction concerns potential structures in which DO movement is *not* obligatory (potentially as well as languages in which DO movement is obligatory but is followed by additional "leapfrogging" movement of IO to a position between *v* and the highest copy of DO). In such structures, we predict the emergence of IO preference, and accordingly, the type of effect that Stegovec (2017a,b, 2020) dubs "reverse PCC". It is now the IO that has a first chance to satisfy the probe, or to dynamically interact with it.

(59) Reverse PCC: IO preference

Reverse PCC effects are attested in natural language. Known examples can be found in Shabsug Adyghe (Driemel, Özdemir, and Popp, 2019) as well as varieties of Swiss German (Werner,

1999; Stegovec, 2020), Czech (Sturgeon et al., 2011), and Slovenian (Stegovec, 2015, 2017a, 2020)—grammars which, between them, attest to reverse strong, weak, and strictly descending PCC types.[37] Shabsug Adyghe shows a reverse strictly descending PCC: without a "repair", the only permissible combinations of DO and IO are those in which the DO outranks the IO on the scale $1 > 2 > 3$.[38]

(60) Shabsug Adyghe grammatical forms (Driemel et al., 2019): DO outranks IO

    a. Se wo Ali-jəm wə-sə-tə.
        1SG 2SG Ali-OBL 2SG-1SG-give
        3 IO > 2 DO: I give you to Ali.

    b. Wo se   Ali-jəm sə-wə-tə.
        2SG 1SG Ali-OBL 1SG-2SG-give
        3 IO > 1 DO: You give me to Ali.

    c. Hasan-əm se   wo sə-wə-rə-tə.
        Hasan-OBL 1SG 2SG 1SG-2SG-3SG-give
        2 IO > 1 DO: Hasan gives me to you.

(61) Shabsug Adyghe ungrammatical forms (Driemel et al., 2019): IO outranks DO

    a. * Se Ali-jə   wo wə-sə-tə.
          1SG Ali-ABS 2SG 2SG-1SG-give
          2 IO > 3 DO: I give Ali to you.

    b. * Wo Ali-jə se   sə-wə-tə.
          1SG Ali-ABS 2SG 1SG-2SG-give
          1 IO > 3 DO: You give Ali to me.

    c. * Hasan-əm wo se   wə-sə-rə-tə.
          Hasan-OBL 1SG 2SG 1SG-2SG-3SG-give
          1 IO > 2 DO: Hasan gives you to me.

Derivation of this pattern may proceed in any of the ways described for Spanish in section 5.2 (see also table (57)), with the exception of the fact that probing now occurs in structure (59) rather than (58). The obligatoriness of the reverse PCC pattern in Shabsug Adyghe suggests that structure (58) is not possible in this language; the DO is not able to occupy a position between IO and v.[39]

    Zurich German, Czech, and Slovenian occupy a typological position between Shabsug Adyghe and classic PCC languages in that they permit but do not require DO movement. Accordingly, both structure (58) and structure (59) are possible, with disambiguation largely determined by clitic order.[40] Varieties of Slovenian, for instance, differ as to whether they feature a strong or weak PCC restriction; Stegovec (2020) reports that both classic and reverse PCC patterns are found for both groups of Slovenian speakers, with no interaction between PCC type and classic/reverse directionality. In both

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[37] I take the absence of known reverse me-first, you-first, and A-descending patterns to be accidental, recalling that these patterns are generally attested the least.

[38] This pattern holds both for morphologically simplex ditransitives, as in (60)-(61), and for benefactives with a visible applicative marker (Driemel et al., 2019).

[39] Note that this is contrary to the structure advocated by Driemel et al. (2019), who propose that the DO asymmetrically c-commands the IO in Shabsug Adyghe. The binding evidence presented for this position is not precisely clear, as it involves a double absolutive construction rather than the absolutive-oblique case frame found in the ditransitives in (60)-(61). Note however that Driemel et al.'s proposal *does* involve IO preference; the probe is taken to be located between the (lower) IO and (higher) DO (viz on V, in a structure in which IO is V's complement and DO its specifier).

[40] See Stegovec (2020) for details of some contexts in which clitic order does not disambiguate.

cases, a person restriction holds for the clitic that appears linearly second in the object clitic string, whether DO or IO.

(62) Slovenian IO before DO (Stegovec, 2020): DO person is restricted, i.e. classic PCC

    a.   Mama { mi   / ti   / mu   } ga   bo   predstavila.
        mom   1.DAT / 2.DAT / 3.M.DAT   3.M.ACC will.3 introduce.F
        Mom will introduce him to me/you/him.

    b.   * Mama mu   { me   / te   } bo   predstavila.
        mom 3.M.DAT   1.ACC / 2.ACC   will.3 introduce.F
        Mom will introduce me/you to him.

(63) Slovenian DO before IO (Stegovec, 2020): IO person is restricted, i.e. reverse PCC

    a.   Mama { me   / te   / ga   } mu   bo   predstavila.
        mom   1.ACC / 2.ACC / 3.M.ACC   3.M.DAT will.3 introduce.F
        Mom will introduce me/you/him to him.

    b.   * Mama ga   { mi   / ti   } bo   predstavila.
        mom 3.M.ACC   1.DAT / 2.DAT   will.3 introduce.F
        Mom will introduce him to me/you.

The weak PCC Slovenian grammar may be derived as indicated for Italian in section 5.1. The strong PCC version may be derived by any of the paths to strong PCC indicated in table (57). The key difference from classical strong and weak PCC lies merely in the fact that Slovenian permits the DO to remain in situ in the domain of the *v* probe whereas (e.g.) French and Italian do not.

7 Conclusions and brief remarks on competitor proposals

The advantages of an interaction/satisfaction approach to PCC effects are both theoretical and empirical. On theoretical grounds, this view affords a syntactic approach to PCC effects while avoiding all invocation of uninterpretable or unvalued features. In this way, it contributes to an emerging picture of Agree dependencies that avoids the challenges for a uF theory raised by overagreement and underagreement effects, as discussed in section 2. On empirical grounds, it responds to the three desiderata with which we began: it accounts for Nevins's (2007) four types of PCC effects within a unified theory of Agree (D1), while allowing both for cases in which PCC effects are constrained by Double Weakness (D2) and those in which no such constraint is in place (D3). Beyond this, it extends naturally to an account of reverse PCC effects of several varieties, as discussed in section 6.2. Last but not least, it is perhaps advantageous that the core interaction/satisfaction syntactic machinery is in principle compatible with a variety of approaches to PCC "repairs", themselves a rich topic of ongoing inquiry (Bonet 2008; Rezac 2008, 2011; Walkow 2012, 2013; Yokoyama 2019a; Murphy 2019, i.a.). While we have seen morphological evidence from Tseltal and Sambaa supportive of an Applicative Agree Requirement, there is nothing in the interaction/satisfaction machinery itself that necessitates an approach of this type—the core thesis about Agree defended here is logically independent of the thesis about PCC repair. (More concretely: the theory of Agree explains why certain forms are not derived, but leaves open various options for how the notional meaning expected for those forms might alternatively be expressed.) Thus one might expect the basic interaction/satisfaction approach to remain applicable in view of future developments in our understanding of PCC repair across languages.

    I contend that this range of advantages is not shared with any alternative theory of PCC effects. While space precludes a properly in-depth assessment of the body of previous approaches, which are

numerous, it may nevertheless be helpful to roughly categorize various previous proposals according to the empirical advantages listed above.[41] For instance, the present approach holds an explanatory advantage over certain theories targeted toward particular types of PCC patterns, e.g. just the strong PCC (e.g. Bonet 1991; Béjar and Rezac 2003; Anagnostopoulou 2003; Adger and Harbour 2007; Ormazabal and Romero 2007; Baker 2008), and over theories that invoke different basic Agree mechanisms for different PCC patterns (e.g. Anagnostopoulou 2005); both of these fall short of our first desideratum (D1). In addition, as discussed above in connection with data from Tseltal, Swahili, and causatives in French, the present theory also compares favorably with alternatives that tie PCC effects too tightly to Double Weakness contexts, failing to capture PCC restrictions in syntactic environments where one or both objects is not subject to weak realization, as per (D3) (e.g. Bianchi 2006; Foley and Toosarvandani 2019; Coon and Keine 2020; Stegovec 2020). In still other cases, the advantage over alternative accounts lies in accounting for reverse PCC effects. These effects are unexpected on theories that posit special properties of datives and/or goal arguments (e.g. Béjar and Rezac 2003; Anagnostopoulou 2003; Pancheva and Zubizarreta 2018; Yokoyama 2019b), rather than tying reverse PCC effects to the order in which the probe interacts with IO and DO.

It must of course be asked whether competing proposals offer compensatory empirical advantages that may nevertheless tip the scoreboard in the opposite direction. I will briefly offer some evaluatory comments on this topic as concerns two recent approaches, Coon and Keine (2020) and Pancheva and Zubizarreta (2018), each of which accounts for all four core PCC effect types and thus meets desideratum D1. These approaches are quite different from the present theory, as well as from each other, in the type of grammatical phenomenon in which they seek to ground PCC effects. On the present approach, PCC effects are a matter of pure syntax, in the sense that they arise when Agree with one object bleeds Agree with another. By contrast, for Coon and Keine (2020), PCC effects arise from factors tied to the syntax-morphology interface; for Pancheva and Zubizarreta (2018), they arise from factors tied to the syntax-semantics interface. I will target my comments towards those aspects of these papers which highlight distinctive predictions and which aim to justify this localization in the grammatical architecture.

7.1 Coon and Keine (2020): PCC effects at the syntax/morphology interface

Coon and Keine (2020) approach PCC effects involving clitics in a uF model of Agree with the following central properties. First, probes may consist of multiple *segments*, each represented as a distinct u-feature; e.g. [uϕ – uPART].[42] Second, the different segments of a probe seek their goals simultaneously, but may ultimately find different goals. For instance, in a *probe > 3 > 2* c-command configuration, [uϕ] on the probe finds the higher 3rd person argument whereas [uPART] finds only the lower 2nd person argument, but crucially, this happens in the same derivational step. Third, probes which require clitic doubling are subject to a condition that requires every DP they Agree with to cliticize onto them *as soon as Agree with the DP is established*. Fourth, it is not possible for two DPs to cliticize in the same derivational step.[43] Because, by assumption, segments probe simultaneously, this setup leads to an ordering problem when (as in the 3 > 2 example above) two segments of the same probe Agree with different goals. The two goals must each cliticize immediately, and cannot

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[41] For a general review of a range of proposals in accounting for PCC effects, see Anagnostopoulou (2017).

[42] Coon and Keine represent third persons with a [uPERS] feature rather than [uϕ]; as the choice has no effect on the central argumentation reviewed here, I use the latter for consistency with previous assumptions.

[43] Coon and Keine posit that this is because cliticization involves Merge, which is binary, and thus could not move two clitics in the same step. Note though that the same assumption is not made for Agree.

do so simultaneously. Any attempt to order them leads to a fatal violation of the requirement that cliticization immediately follows Agree. (Whichever step is ordered second does not count as taking place immediately.) Accordingly, pairs of clitics which would reflect Agree with different segments of the same probe are ruled out.[44] Coon and Keine emphasize that the PCC prohibition results not from the syntax of Agree—there is no ungrammaticality incurred *per se* by two segments of the same probe Agreeing with different goals—but rather from a factor related to the externalization of the relevant structures, viz. the proposed principle requiring that cliticization immediately follow Agree.

While Coon and Keine confine their discussion of PCC effects proper to cases involving clitics,[45] their approach extends to hierarchy effects involving simple agreement as well. When two segments of a probe Agree with different goals and cliticization is *not* triggered (this being a matter of some type of feature specification of the probe), issues at the syntax-morphology interface may nevertheless arise in relation to the process of Vocabulary Insertion. In particular, Vocabulary Insertion for probes is assumed to proceed on a segment-by-segment basis; each segment is matched to the best vocabulary item (in keeping with standard principles of underspecification) *for that segment*. However (modulo a morphological rule of Fission), only one vocabulary item (VI) may be inserted for the overall node hosting the probe, no matter how many segments this may subdivide into. This leads again to an unresolvable conflict. By hypothesis, it is not possible to insert multiple VIs, and there is no way to rank VIs or otherwise to choose between them, such that only one is inserted. The result, arising again in a case where different segments of the same probe have Agreed with different goals, is ineffability.

Coon and Keine marshall two central types of evidence for the position that PCC and hierarchy effects arise at the syntax/PF interface in this way. First, they note a connection between obviation of PCC/hierarchy effects and lack of Double Weakness in certain cases (cp. D2): PCC effects in Basque and related subject-object hierarchy effects in Icelandic and German are obviated in (nonfinite) contexts that lack visible agreement. Note, though, that to account for the absence of agreement morphology in these cases, Coon and Keine posit that Agree does not take place in the syntax; this is in parallel to the approach pursued in section 3.2 on the interaction/satisfaction approach.[46] Thus PCC obviation in certain contexts without visible agreement does not decide between the theories. To the contrary, cases which show a dissociation between PCC/hierarchy effects and Double Weakness (cp. D3) force the postulation of either a silent clitic or a silent VI on the Coon and Keine approach, though not on the approach pursued here. (This means that, in the case of French causatives with *à*-phrase causees (section 3.3), for instance, the current approach is better able to account for Rezac's (2011) argument against null cliticization.) Overall, the central challenge from (D3) for an approach based at the syntax/morphology interface is to account for why, in some cases but not others, removal of visible agreement morphology bleeds PCC/hierarchy effects. On the present approach, this is the difference between the absence of Agree and the presence of Agree with no phonological output (for whatever

[44] The central explanatory role accorded to simultaneous probing raises questions about the compatibility of this approach with Cyclic Expansion (Rezac 2003; Béjar and Rezac 2009), given that (as discussed in section 2) the latter requires Agree with two different goals to be interspersed with Merge. In this type of circumstance, the ordering of cliticization should pose no particular challenge, and PCC-type effects would not be derived. This prediction is worthy of further study as concerns hierarchy effects between subject and object clitics, given that the analysis of these often features Cyclic Expansion (Béjar and Rezac 2009).

[45] This is in keeping with Nevins's (2011) claim that all PCC effects involve clitics. See note 3 for discussion.

[46] The challenge of nonfinite environments emphasized by Coon and Keine relates in particular to theories that posit Agree-based syntactic licensing requirements (e.g. the Person Licensing Constraint, Béjar and Rezac 2003). While this is easily separable from the central interaction/satisfaction account *per se*, we have seen evidence for one such requirement, the Applicative Agree Requirement, throughout this paper. It is not obvious that Applicative Agree Requirements are voided in nonfinite contexts; see esp. fn. 16 for suggestive evidence from Georgian.

reason). On the Coon and Keine approach, this is the difference between the absence of Agree and the presence of Agree which, while leading to no observable phonological output, nevertheless has specific morphological properties that lead to PF ineffability.

The second type of argument for a syntax/morphology approach comes from the behavior of syncretic verb forms in certain types of hierarchy effect contexts. Icelandic, for instance, forbids certain nominative objects from being first or second person (Sigurðsson, 1996), a pattern reminiscent of the strong PCC (Boeckx 2000, Béjar 2003, Anagnostopoulou 2003).

(64) a. Henni leiddust strákarnir.
          her.DAT bored.3PL the.boys.NOM
          She found the boys boring. (Sigurðsson, 1996, 21)

  b. * Henni leiddumst við.
          her.DAT bored.1PL we.NOM
          Intended: She found us boring. (Sigurðsson, 1996, 24)

Sigurðsson (1996) notes that nominative objects in such sentences show improvement when the verb is syncretic between the appropriate local person form and 3rd person. This is the case in (65), for instance, where the form *líkaði* occurs in both 1sg and 3sg cells of the verbal paradigm.

(65) ?? Henni líkaði ég.
          her.DAT liked.1SG∼3SG I.NOM
          She liked me. (Sigurðsson, 1996, 27)

Coon and Keine follow Schütze (2003) in taking the improved status of (65) viz-a-viz (64b) as evidence that (64b) is degraded for morphological reasons, thus supporting a PF approach to hierarchy effects. On their proposal, syncretism reflects cases in which two probe segments each demand the *same* exponent. In this case, insertion of the syncretic exponent counts as realizing the features of both segments, avoiding the ineffability otherwise triggered by an unresolvable choice among VIs. The challenge lies in accounting for the fact that the acceptability of sentences like (65) is still degraded for many speakers (including Sigurðsson, whose ?? judgment is reproduced here): syncretism has an ameliorating effect, but it does not restore full acceptability. In perhaps the most extensive experimental study of this phenomenon, involving 60 native Icelandic speakers, Hartmann and Heycock (2018) find both that syncretism ameliorates rating scores and that scores for examples with local person nominative objects overall remain quite low, syncretism or no, as compared to grammatical controls. If "rescuing by syncretism" is to be taken as support for a PF approach to hierarchy effects, an account for this remaining degradation is required.

An alternative (and, so far as I am aware, novel) approach to the partial rescuing effect of syncretism, compatible with the interaction/satisfaction proposal, would treat the intermediate status of cases like (65) as indicative of an agreement attraction effect in language processing (see i.a. Bock and Miller 1991; Hartsuiker, Antón-Méndez, and van Zee 2001; Wagers, Lau, and Phillips 2009).[47] This effect is found in judgments on sentences such as *The key to the cabinets are on the table*, wherein the verb fails to agree with the subject, being instead "attracted" to another DP.[48] Judgments on agreement attraction sentences are notably parallel to cases like (65) in their intermediate status; these examples, too, are not as acceptable as fully grammatical controls (e.g. *The keys to the cabinets are on the table*) nor as unacceptable as certain other ungrammatical sentences (e.g. *The key to the cabinet are on the*

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[47] Thanks to Brian Dillon for discussion of this proposal.

[48] This DP may be an object; see Hartsuiker et al. (2001).

table). A preliminary hypothesis connecting agreement attraction and cases like (65) would draw a parallel between the "attractor" in the English sentences—a DP which is not in a structural position to Agree with the verb/T, e.g. *cabinets*—and the low nominative in the Icelandic examples, given that the latter is structurally barred from participation in Agree in the relevant sentences. Despite this prohibition in the grammar, the nominative is sufficiently surface-similar to agreement controllers in other contexts to create an attraction effect in processing.[49] This effect boosts the acceptability of (ungrammatical) forms which show sufficient similarity to the form or features that would result from the nominative agreeing. On this view, the findings from syncretism can be connected with a further finding from Sigurðsson (1996): forms which match the nominative in number, though not in person, are also improved with respect to fully agreeing person forms. This result perhaps reflects the frequent role of number in particular in triggering agreement attraction. For (66), Sigurðsson's survey of nine speakers finds that the default, 3sg form is most acceptable, *leiddist*; *leiddust*, a form which reflects plural number, though is not syncretic with 1pl, has a medial status; finally, a fully agreeing 1pl form, *leiddumst*, is least accepted.

(66) Henni { leiddist > leiddust > leiddumst } við.
      her.DAT bored.3SG > bored.2PL∼3PL > bored.1PL we.NOM
      Intended: She found us boring. (Sigurðsson, 1996, 29-30)

Such effects suggest that syncretism in particular may not be the key source of the amelioration in (65), as the medial form *leiddust* is not syncretic with 1st person. Example (65) may be improved by the fact that its verb form can be parsed as default 3sg, or furthermore, by the fact that its verb form nevertheless resembles in some way the form the nominative would control. The further development of such a hypothesis of course calls for additional research, both theoretical and experimental. What emerges nevertheless is the possibility of an account for the somewhat improved status of syncretic examples like (65) even under a view that locates PCC/hierarchy effects in the syntax proper, rather than at the syntax/PF interface.

7.2   *Pancheva and Zubizarreta (2018): PCC effects at the syntax/semantics interface*

Pancheva and Zubizarreta (2018) approach PCC effects in a model that draws on the basic intuition that person hierarchy effects are connected to point of view. They propose that a locus of point of view is established for each syntactic phase, and that this includes a phase delimited by Appl. Agreement plays a crucial role in determining PCC effects because the Appl head bears an interpretable, valued person feature that undergoes agreement of some type with the DP in Spec,ApplP, which establishes this DP, the IO, as a perspectival center.[50] In addition, Appl also possesses an uninterpretable, unvalued person feature that undergoes Agree with the DO. The result is an Appl head that contains two sets of person features, one interpretable and one uninterpretable. Constraints on combinations of various persons within the ApplP arise from a series of filters on these features and their combinations,

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[49] Notably, forms that are merely surface-identical with nominative have been found to exert an attraction effect by Hartsuiker et al. (2001) and Slioussar (2018); thus truly grammatically nominative objects might be expected to expert a particularly strong attraction effect.

[50] Pancheva and Zubizarreta do not clarify the syntactic mechanism by which this agreement takes place, though their discussion perhaps implies (see esp. pp 1302, 1330) that they do not intend to reduce it to Agree (which they connect, following Chomsky (2000), to uninterpretable features). They also do not clarify the compositional mechanism by which the IO comes to be interpreted as a perspectival center, and in particular, why this mechanism (in contrast to standard matters such as the agentive interpretation of the specifier of Voice_{AG}) requires spec-head agreement.

which work to ensure that "the most appropriate argument in the ApplP domain is marked as the point of view center (with the appropriateness metric being subject to some cross-linguistic variation)" (p. 1303). One such filter requires that the IO bear the feature [+proximate]—the default setting—or, failing this, that it be restricted to [+participant] or [+author].[51] [52] Pancheva and Zubizarreta assume that 1st and 2nd persons are inherently [+proximate], and that 3rd persons IOs are also [+proximate] only if the DO is 3rd person as well. Therefore, in the default case, the filter has the effect of restricting IO person to either 1st or 2nd, or to 3rd person in the special case where both arguments are 3rd person. Combinations of a 3rd person IO and a 1st or 2nd person DO are filtered out; this restriction is in common across weak and strong PCC. An additional filter, active by default, requires that the DP that matches the designated feature on Appl (e.g. [+proximate]) is the *only* DP with this feature within the ApplP phase. This filter is implemented by a comparison of the two sets of person features, interpretable and uninterpretable, which are found on the Appl head. Where the feature in question is [+proximate], this has the effect of also filtering out cases where both DO and IO are local person. Together with the previous filter, this derives the strong PCC. Finally, two additional filters (also subject to default and marked settings) require that ApplP indeed possess an interpretable person feature, leading to the calculations above, and that DPs with a [+author] feature have priority for the IO position. These final filters play a central role in deriving me-first and strictly descending PCC.

An empirical aspect of this view emphasized by Pancheva and Zubizarreta is its ability to capture not just the four main Nevins (2007) PCC patterns, but also a series of patterns that impose restrictions on combinations of two 3rd person arguments. The Malayo-Polynesian language Kambera, for instance, shows a strong PCC pattern and in addition rules out all third person IOs (Klamer, 1997).[53] (This pattern has been dubbed the 'superstrong PCC' by Haspelmath 2004.) This results, in Pancheva and Zubizarreta's system, from a requirement that IOs bear the feature [+participant], rather than simply [+proximate] (as in strong PCC grammars). Typologically, their theory predicts that versions of a PCC pattern that additionally impose a *3>3 requirement should be found for strong, weak, and strictly descending PCC types, but not for the me-first PCC. While this prediction is borne out for those few grammars in which me-first patterns are attested, the overall low (and highly areally confined) attestation rate of me-first PCC makes it hard to confirm that this is not just an accidental gap. An alternative, widely pursued approach to *3>3 requirements handles these as essentially morphological clitic dissimilation patterns distinct in origin from PCC effects (e.g. Perlmutter 1971, Bonet 1991 et seq., Nevins 2007, 2011, Stegovec 2015, Drummond and O'Hagan To appear; see also Grimshaw 1997 for a dissimilation analysis that is less clearly morphological). Notably, an approach which severs PCC proper from clitic dissimilation allows several ditransitive object marking patterns to be captured which *are* attested but which the Pancheva and Zubizarreta theory does *not* predict. These include the patterns in Caquinte (Drummond and O'Hagan, To appear) and Ubykh (Dumézil, 1975), where combinations of a 3rd person IO and a 1st person DO are allowed, but 3IO>3DO combinations remain restricted.[54] On an interaction/satisfaction approach, such systems can be simply

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[51] Pancheva and Zubizarreta work in a system of bivalent features, rather than privative ones. On this choice see Béjar (2003), Nevins (2007), Harbour (2016), and discussion in footnote 35.

[52] Reference to 'default' (vs. 'marked') choices here is intended to capture quantitative aspects of PCC typology; in general, by assigning greater degrees of markedness to particular filter settings, Pancheva and Zubizarreta aim to capture not only which PCC grammars are possible but also which are (most) probable. On this issue, see fn 34.

[53] Pancheva and Zubizarreta also report that this pattern is found in Matsigenka (Arawak), citing O'Hagan (2014). In closely related Caquinte, however, both local>3 and 3>local object combinations are permitted, though 3>3 combinations are ruled out (Drummond and O'Hagan, To appear). Zachary O'Hagan (p.c.) notes that further research is required to firmly establish whether Matsigenka indeed disallows the 3>local possibility attested in Caquinte.

[54] Caquinte also restricts combinations of two local person arguments, which Drummond and O'Hagan (To appear) argue

captured by means of an insatiable probe and a post-syntactic rule of dissimilation.

In terms of the proposed localization of the PCC restriction at the syntax/semantics interface, the arguments offered by Pancheva and Zubizarreta are indirect. It is certainly true, as they emphasize, that point of view is in some way involved in a variety of lexical and grammatical phenomena of natural language. Such phenomena have drawn substantial interest in recent years in formal semantics (see e.g. Lasersohn 2005; Oshima 2006; Anand 2006; Stephenson 2007; Pearson 2015; Roberts 2015; Barlew 2017; Deal 2019, among a great many others), where they have been largely modeled with tools related to context-dependence and *de se* quantification. Of course, the existence of such phenomena elsewhere in grammar does not demonstrate that PCC effects themselves involve perspective; nor does the availability of semantic explanations for other types of patterns show that PCC effects are semantically motivated. One phenomenon which seems on the surface somewhat similar to PCC effects, and for which Pancheva and Zubizarreta endorse a fully semantic solution, is the Clitic Logophoric Restriction (CLR; Bhatt and Šimík 2009; Charnavel and Mateu 2015): in French, certain other Romance languages, and Czech, a DO clitic in a ditransitive clitic cluster cannot refer to an attitude holder *de se*.

(67) Según   el niño$_i$, las maestras se$_k$ lo$_{*i,j}$ encomendarán, a la asistenta$_k$.
      according.to the boy   the teachers 3DAT 3ACC.M.SG entrust.FUT.3PL to the assistant
      According to the child$_i$, the teachers will entrust him$_{*i,j}$ to the assistant.

Pancheva and Zubizarreta propose that the CLR effect arises due to a semantic principle that is violated when one of the DPs within ApplP denotes an attitude holder, but this is not the IO. Positing that first and second persons are natural attitude holders, they suggest that the mechanisms of PCC, by privileging alignments between attitude holders and the IO grammatical role / point-of-view center logophoric role, "[result] in a syntactic representation that is optimally interpretable" (p. 1328). Notably, while drawing an indirect connection between the two, this account does not reduce the CLR to the PCC—after all, clitic combinations as in (67) are PCC-compliant—but rather relies on an independent semantic principle to derive CLR effects on top of the basic PCC grammar. Thus an approach such as the interaction/satisfaction theory could in principle adopt largely the same semantic principle (whether as stated by Pancheva and Zubizarreta 2018 or in the form proposed by Charnavel and Mateu 2015, for instance) with no loss of coverage and with no increase in the relative number of independent mechanisms needed. More work is certainly needed to understand the origins and more foundational motivations of the semantic generalizations behind the CLR, as well as the overall typology of CLR effects. Intruigingly, Pancheva and Zubizarreta (2018) observe that CLR effects are not found in Bulgarian, a fact that they connect to the me-first PCC grammar of this language. It remains to be shown, however, that CLR obviation and me-first PCC correlate in a broader data sample that includes (for instance) those Czech and Polish speakers with me-first PCC.

Overall, the connection between PCC effects and perspective- or point-of-view-related phenomena—whether these are taken narrowly, e.g. to include just the CLR, or broadly, to include logophoricity, predicates of taste, perspectival verbs and other matters—is somewhat reminiscent of the connection between PCC effects and matters of discourse frequency highlighted by Haspelmath (2004). Haspelmath notes that PCC-compliant IO/DO person pairs are more frequently observed in a German corpus than are non-PCC-compliant pairs, and hypothesizes that the relative discourse usefulness of the former combinations has led to grammaticalization of discourse patterns as PCC effects. See Anagnostopoulou (2017, §7) for some criticial discussion (as well as Driemel et al. (2019) for a perspective

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should be treated as a morphological effect; Ubykh has no parallel restriction.

from reverse PCC effects). For present purposes I would like to highlight simply that the existence of a correlation between discourse frequency and PCC effects does not show that either may be reduced to the other, whether synchronically or diachronically (the latter being Haspelmath's proposal). It may be that an improved understanding of the acquisition of PCC effects—a matter I have left open here—points a way to better understand some aspect of both types of patterns, and for that matter the relationship between them. At present, such discoveries remain more a hope for the future than a way to decide between competing analyses of PCC.

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