Pied-piping φ

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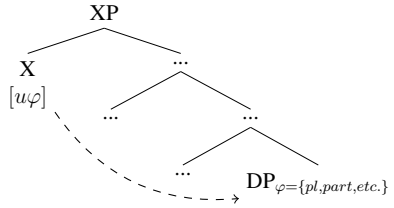
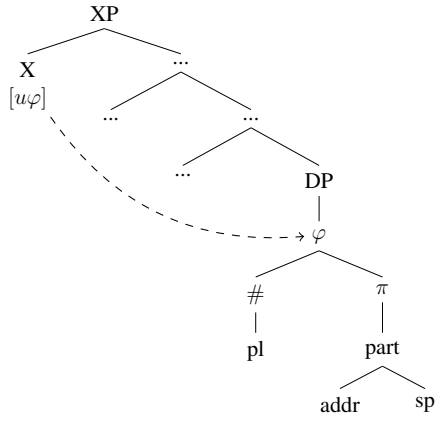
1 Introduction

- There is debate about the representation of φ-features on goals:
  - When a φ-probe identifies a φ-goal, whose features it wants to copy, do the φ-features look like (1) or (2) from the perspective of the probe?

    (1) Option 1: φ-probes interact with a bundle: φ=$\{pl, part, etc.\}$

    (2) Option 2: φ-probes interact with a structure, along the lines of Harley & Ritter (2002)

  - Side note: the geometry shown in (2) is a modified version of the one proposed by Harley and Ritter, based on those found in Béjar & Rezac (2009), Preminger (2014), and Deal (2015)

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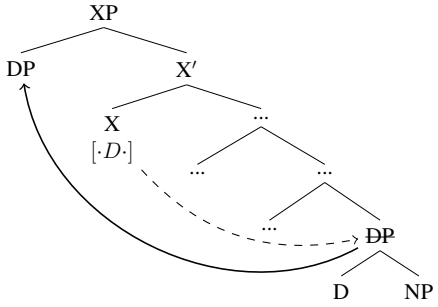
- **Proposal**: we have structural diagnostics that can distinguish these theories
  - having all of the features on the same node vs. distributed on different nodes makes concrete predictions about...
    - what features can and cannot get copied together
    - what probes can search for (and actually find)
  - I argue that both of these diagnostics lead us to the flat bundle theory, unless we want to substantially amend the theory of the operation Agree
    - Argument 1: probing for [part] can induce copying of [φ] – expected on the flat bundle theory but not expected on the geometric view
    - Argument 2: probes can search for the conjunction of [part+pl] – possible on the flat bundle theory but impossible on the geometric view
- Clarification: this is a talk about the representation of φ-features *that probes interact with*
  - It is possible that the flat bundle in (1) started out distributed through the nominal domain, but got assembled into a bundle via nominal-internal agreement, feature sharing, etc. (Danon, 2011)
  - The arguments that I present today do not bear on what happens inside a DP before it merges into the clause, only what it looks like from the perspective of higher heads
- Outline of talk
  - Pied-piping and the representation of features
  - A case of conjunctive probing from Mi'gmaq Coon & Bale (2014)
  - Arguments for, and consequences of, the geometric view
  - What we have and have not explained

2 Pied-piping: probing for X but getting Y

- Probes tend to attract more than they are looking for, sometimes in unexpected ways
  - Basic case: *movement*
    - Probing for the feature [D] often results in movement of an entire DP, which also contains other phrases/features (e.g. NP, φ, etc.)

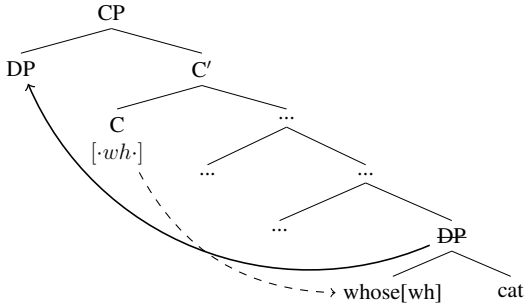
(3) Attracting DP instead of D



– A more elaborate case: pied-piping

* Probing for the feature [wh] can sometimes result in movement of more material than just the wh-expression

(4) Whose cat did Stuart lose?

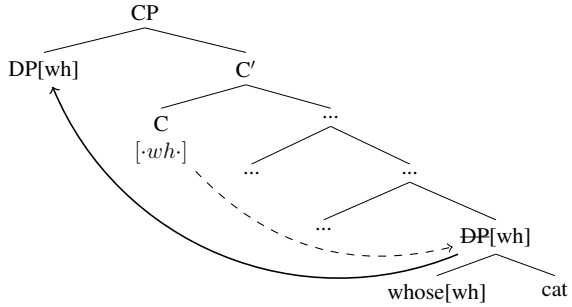


– Why is pied-piping puzzling?

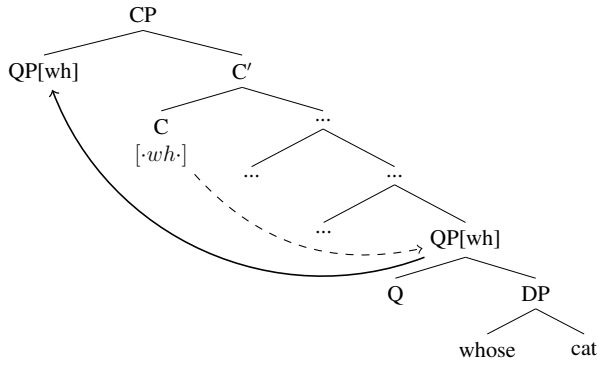
* We typically think of movement as being feature driven: an $[\cdot X \cdot]$ feature is satisfied if it probes for X and attracts (the node bearing) X; pied-piping looks like a case of probing for X but attracting something else
* In (4), probing for [wh] appears to attract a non-wh-DP
* How does this DP get considered for movement if it doesn't bear [wh]? And how does it check a $[\cdot wh \cdot]$ feature by movement?

• The typical solution is find some way to project the probed-for feature on a higher node than we might have originally thought

(5) Feature percolation theory (Heck 2008 and predecessors): [wh] can percolate past the wh-expression to appear on a larger constituent



(6) QP Theory (Cable, 2010): [wh] is introduced by a separate projection QP, which may select for other projections containing wh-expressions



- Both theories reduce cases of pied-piping to the basic case of movement by making the closest wh-element some higher node containing the wh-expression
  - Assumption: probing for a single feature on a node with multiple features on that node can induce displacement of the whole node – i.e. probing for [D] or [wh] on a DP[wh] triggers movement of DP[wh], rather than subextraction of one of those features (Heck's extension of Chomsky 1995, citing PF constraints)
- A plausible theory that we don't really talk about: give up on the notion that movement is a process of probing for X and moving X
  - We could change the theory of movement to something like the following:

    (7) New theory of *Move XP*: Attract some/the first/closest/?? YP that dominates XP
  - We probably don't adopt this because it makes the operation *Move* more complicated: Move would have to reference multiple parts of a tree simultaneously to determine what counts as a goal for the probe, and what configurations can check features
  - Side note: Chomsky (1995) proposes something like this in passing, actually
    - "The features that legitimize the operation raising α to target K are therefore determined straightforwardly, however deeply embedded they may be in α and K: for example, the wh-feature in *pictures of whose mother did you think were on the mantelpieces*." MP, p. 269

      (8) A category α containing F moves along with F only as required for convergence (p. 270, ex. 33b)
    - Lutz & Trissler (1997) describe a number of empirical problems with this approach, such as cases where pied-piping is optional or cases where it is enforced but not for any clear PF reasons.
    - Heck also discusses some problems with this approach, given that we have to either give up on feature-driven Merge, or give up on checking under sisterhood.
- **Summary**: surviving analyses of pied-piping in movement essentially boil down to either putting multiple features on the same node, or adding a projection to a higher position

2.1 Pied-piping in agreement

- Movement is not the only place where we see pied-piping! Agreement often has a similar property.
  - First: what do I mean by "agreement"?

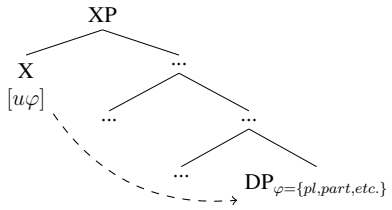
    (9) (from Preminger 2014) Agreement (or φ-agreement) is morphophonologically overt covariance in φ-features between a verb-like element and one or more nominal arguments, where
      a. verb-like element = a lexical verb, auxiliary verb, or tense/aspect/mood marker
      b. φ-features = some nonempty subset of {person, number, gender/noun class}
- Agree and Merge are analogous in a sense: both identify a constituent with a target feature – Merge displaces that constituent, while Agree copies its features

(10) Agreement as searching and copying (from Deal 2015)
   a. Search: A probe initiates a search for an element with matching features (a goal).
   b. Copying: Features are copied from the goal to the probe.
   c. Valuation: The probe's features are valued, and the search is halted.

(11) Merge as searching and feature checking (Chomsky, 2004; Atlamaz, 2019; Ke, 2019; Preminger, 2019; Chow, 2022; Krivochen, 2022; Branan & Erlewine, to appear)
   a. Search: A probe initiates a search for an element with matching features (a goal).
   b. Merge: Constituent bearing target feature is re-merged as sister to the probe.
   c. Checking: The probe's feature is checked, and the search is halted.

- The question is, what is the nature of the constituent that Agree acts upon? Is it a set of features? Is it a structured object?

(1) Option 1: φ-probes interact with a bundle: φ=$\{pl, part, etc.\}$



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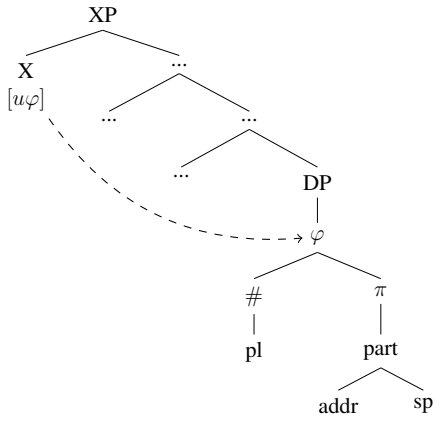


- Normally φ-agreement obeys relativized minimality by copying the [φ]-features of the closest nominal in the domain of the probe

(12) φ-probe copies back 1sg, not 3pl when a 1sg DP c-commands a 3pl DP
   a. [PROBE:φ - $\{1, sg\}$] ... [DP$_{1,sg}$ ... [DP$_{3,pl}$ ...
   b. * [PROBE:φ - $\{3, pl\}$] ... [DP$_{1,sg}$ ... [DP$_{3,pl}$ ...

- In the basic case, both theories make the same predictions
   – Agreement with φ can copy either a set, or everything dominated by φ, depending on the representation.

- Famous exceptions: sometimes a φ-probe will agree with the first *participant* it finds, regardless of whether another nominal was closer to the probe

(13) *Basque* (Béjar & Rezac, 2009, ex.2)

a. ikusi **n**-u-en
seen **1**-have-PAST
'I saw him.' *Agreement w/subject*

b. ikusi **n**-ind-u-en
seen **1**-x-have-PAST
'He saw me.' *Agreement w/object*

(14) *Kaqchikel* (Preminger, 2014, ex.18)

a. ja yïn x-**in**-ax-an ri achin
FOC me COM-**1SG.ABS**-hear-AF the man
'I$_{foc}$ heard the man.' *Agreement w/subject*

b. ja ri achin x-**in**-ax-an yïn
FOC the man COM-**1SG.ABS**-hear-AF me
'The man$_{foc}$ heard me.' *Agreement w/object*

– Straightforward solution from Béjar & Rezac (2009); Preminger (2014): these are not cases of probing for φ, they are cases of probing for the more specific feature [part] (or [+part] depending on how you represent features)

(15) part-probe copies back 1sg regardless of configuration

a. [PROBE:part - $\{1, sg\}$] ... [DP$_{1,sg}$ ... [DP$_{3,sg}$ ...

b. [PROBE:part - $\{1, sg\}$] ... [DP$_{3,sg}$ ... [DP$_{1,sg}$ ...

– If this is right, then (13) and (14) are examples of pied-piping: probing for [part] results in copying of the entire φ-bundle – the agreement paradigms reflect number features as well as person features

(16) Basque absolutive "person" agreement: (Preminger, 2009, Table 2)

1sg	na
2sg	ha
3sg	
1pl	ga
2pl	za
3pl	

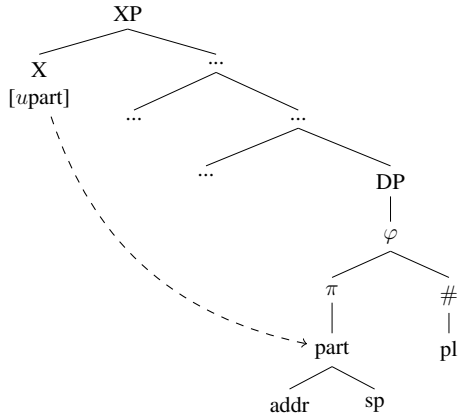
(17) Kaqchikel absolutive agreement: (Preminger, 2014, ex.74)

1sg	i(n)
2sg	a(t)
3sg	
1pl	oj
2pl	ix
3pl	e

- **Getting to the point**: Pied-piping in agreement is entirely unsurprising on some representations of φ-features, and very surprising on others
  - Just as putting [wh] on the same node as DP allowed probing for [wh] to pied-pipe DP, putting all of the φ-features on the same node should allow probing for [part] to copy all of them

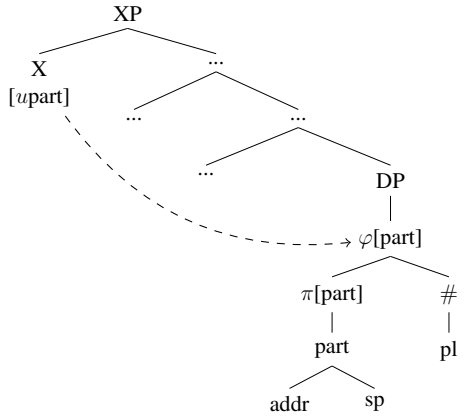
    (18) Flat bundle theory: pied-piping is unsurprising
    a. Probing for [wh] on {[D],[wh]} triggers movement of DP[wh]
    b. Probing for [part] on $\{[pl], [part], etc.\}$ triggers copying of all of the φ-features
  - On the geometric view, pied-piping is very surprising: probing for [part] should really copy only the [part] node and everything it dominates, not [pl].

    (19) Probing for [part] copies [part] not [φ]



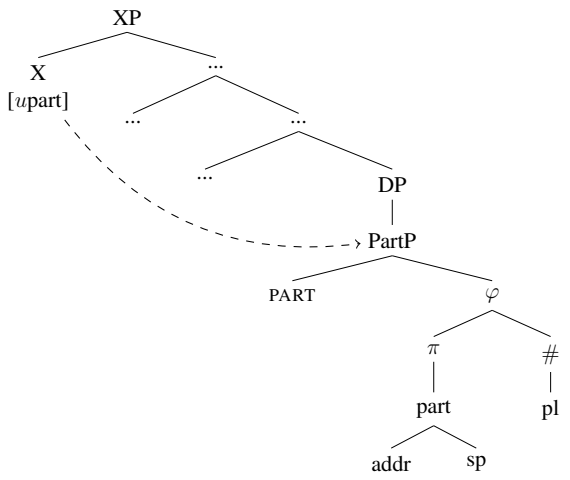
- Can theories of pied-piping in movement save the geometric view?
  - Option 1: percolate [part] to [φ], flattening part of the representation

    (20) Probing for [part] copies [φ] because [part] and [φ] are on the same node



  - Option 2: a version of Cable where [part] is a separate projection that selects for [φ]

    (21) Probing for [part] copies [φ] because PartP dominates [φ]



  - Option 3: invent a new pied-piping mechanism specifically for agreement
  - Option 4: give up on the idea that probing for X should copy X (maybe some probes that search for X actually copy Y) ☹

- A second property of agreement reveals that more than just [part] needs to end up in a higher position in some cases, which requires either the flat bundle theory or more flattening of the geometric one

  - **Argument**: conjunctive probing requires multiple φ-features to be present on the same node simultaneously
    - **Conclusion**: We need a flat bundle of φ-features

3 Conjunctive probing in Mi'gmaq

- The flat bundle theory and the geometric theory make decidedly different predictions about what probes can exist

  - Flat bundle theory: probes can search for any individual feature or any combination

    (22) Example probes on the flat bundle theory
    a. [φ]
    b. [part]
    c. [pl]
    d. [part+pl]

  - A participant, plural DP will be a viable goal for any of these probes because it will have the representation of φ-features: φ=$\{part, pl\}$, which contains features [part], [pl], and their conjunction [part+pl]
  - Geometric theory: probes can search for any *node* in the geometry

    (23) Example probes on the geometric theory
    a. [φ]
    b. [π]

c. [#]
d. [part]
e. [pl]

– Crucial difference: there is no node [part+pl] on the geometric theory, so a probe [part+pl] should not exist – it would be unsatisfiable since there is no such node

- If we were to find such a probe, it would falsify the geometric theory
- Coon & Bale (2014): Mi'gmaq has a probe that simultaneously searches for [part+pl]
  - Though they don't really discuss the φ-feature geometry there, their findings falsify the geometric view
- Generalization about Mi'gmaq: the verb-final agreement affix targets the subject of the clause whenever the object is *either* singular *or* third person. When the object is both participant and plural, this agreement affix targets the object.

(24) When the affix is subject agreement (Coon & Bale, 2014, ex.25)

a. Mu nem-i'li-w-**g**.
NEG see-1OBJ-NEG-3
'**She** doesn't see me.'

b. Mu nem-u'ln-u-**eg**.
NEG see-2OBJ-NEG-1EXCL
'**We**$_{excl}$ don't see you.'

c. Mu nemi-a-w-**gw**.
NEG see-3OBJ-NEG-1INCL
'**We**$_{incl}$ don't see her.'

(25) When the affix is object agreement (Coon & Bale, 2014, ex.26)

a. Mu nem-ugsi-w-**gw**.
NEG see-3>PART.PL-NEG-1INCL
'He doesn't see **us**$_{incl}$.'

b. Mu nem-ugsi-w-**eg**.
NEG see-3>PART.PL-NEG-1EXCL
'He doesn't see **us**$_{excl}$.'

c. Mu nem-ugsi-w-**oq**.
NEG see-3>PART.PL-NEG-2PL
'He doesn't see **you**$_{pl}$.'

d. Mu nem-i'li-w-**eg**.
NEG see-1OBJ-NEG-1EXCL
'You don't see **us**$_{excl}$.'

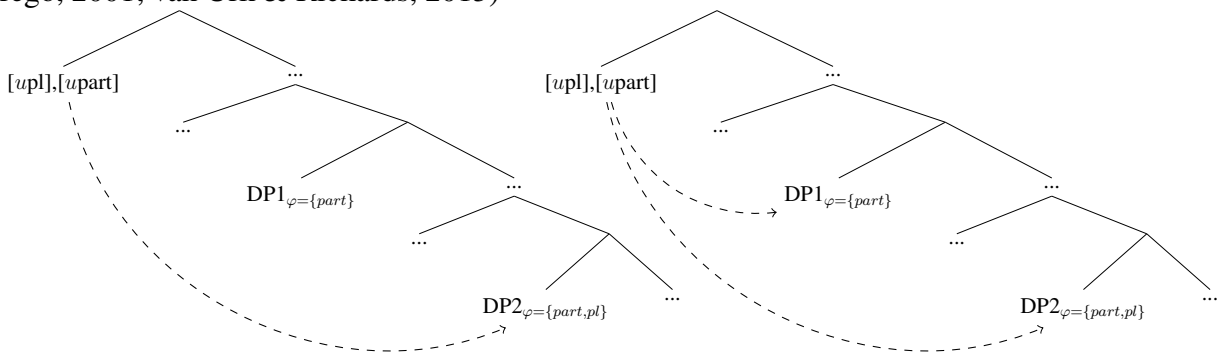
e. Mu nem-u'ln-u-**oq**.
NEG see-2OBJ-NEG-2PL
'I don't see **you**$_{pl}$.'

- **Summary**: we have a probe that agrees with the closest participant, plural argument, if there is one, and the closest nominal if there isn't a participant, plural argument
  - Assuming that locality conditions on Agree tell us something about the feature makeup of a probe (as we considered for part-sensitive probing in Basque, Kaqchikel), we need two probes: [part+pl] and a generic [φ] that becomes active if [part+pl] fails
  - It has to be a [part+pl] probe: couldn't get this with separate [pl] and [part] probes
    - If [part] can probe separately, it should target the object in (24a), contrary to fact

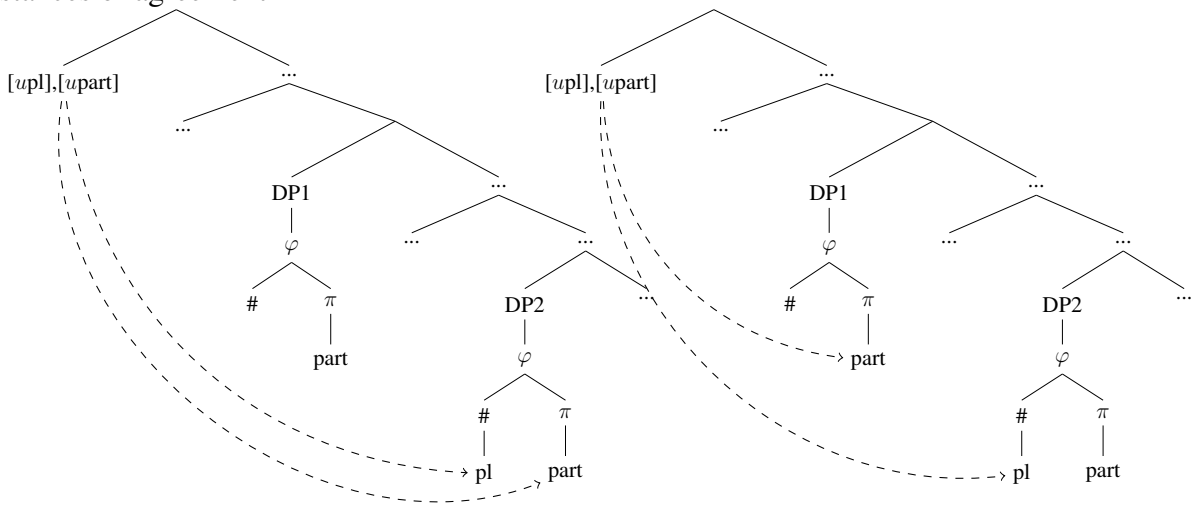
      (24a) Mu nem-i'li-w-**g**.
      NEG see-1OBJ-NEG-3
      '**She** doesn't see me.'

    - Alternative: what if these are separate [part] and [pl] probes that agree with the same DP for other reasons, e.g. economy?

      (26) Flat bundle theory allows you to agree once and satisfy two features (Pesetsky & Torrego, 2001; van Urk & Richards, 2015)



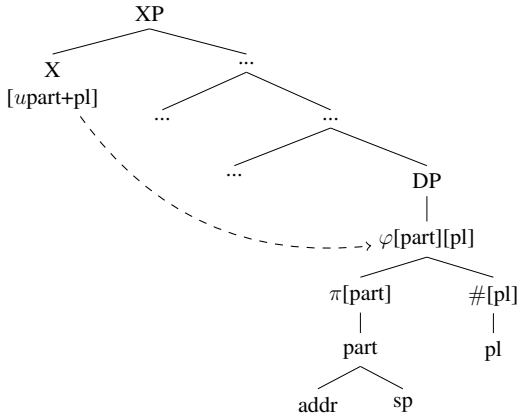
      (27) Doesn't work for the geometric view: the geometric view always requires two instances of agreement



  - Economy doesn't help the geometric view because there is no constituent besides [part] or [pl] that the probe can refer to

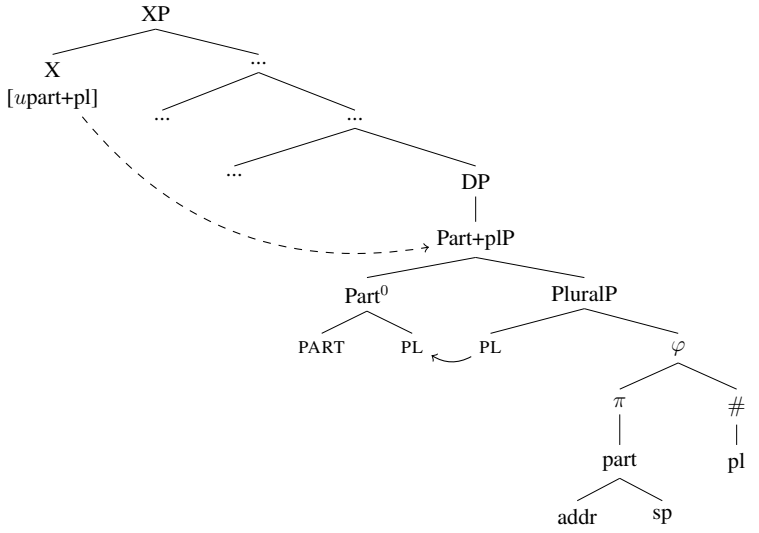
- So we need a probe [part+pl], which can find a goal on the flat bundle theory, but cannot find a goal on the geometric view
  - If we want to save the geometric view, we need to flatten it more than just percolating [part] or adding a PartP
    - Feature percolation: percolate both [part] and [pl] to [φ]

      (28) Probing for [part+pl] copies [φ] because [part], [pl] and [φ] are on the same node



    - Cable-like theory: maybe [part] and [pl] are separate projections that select for [φ] – and head movement brings them both onto the same node

      (29) Probing for [part+pl] finds a [part+pl]P if there are separate projections PartP and PlP, where the head of one moves to the other



    - If we enriched the operation Agree so that it had the character of the enriched *Move* α theory, we could save the geometric view without any flattening

      (30) Enriched *Agree*: Copy the minimal Y such that Y dominates [part] and Y dominates [pl]

  - ⋆ If we were unwilling to do this for Move, we should be unwilling to do this for Agree.

- Puzzle: [part+pl] sensitive to a hierarchy – when both arguments are participant and plural, the probe agrees with the first person plural argument over the second person plural argument

(31) When both subject and object are part-pl: 1EXCL>>2PL (ex. 28)

a. Mu nem-i'li-w-**eg**.
NEG see-1OBJ-NEG-1EXCL
'You$_{\text{SG/PL}}$ don't see **us**$_{excl}$.'

b. Mu nem-u'ln-u-**eg**.
NEG see-2OBJ-NEG-1EXCL
'**We**$_{excl}$ don't see you$_{\text{SG/PL}}$.'

4 Some explicit theory comparison

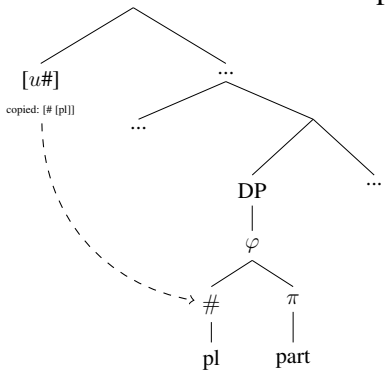
- Many authors are aware of pied-piping in agreement, but many of those same authors nonetheless argue for a geometric representation of φ-features on goals. Why?
  - **Argument 1**: separate person and number agreement (or *anti-pied-piping*)
    - Some agreement paradigms only inflect for e.g. number, without reflecting any of the person values of the agreed-with argument

(32) Basque absolutive number agreement: (Preminger, 2009, Table 2)

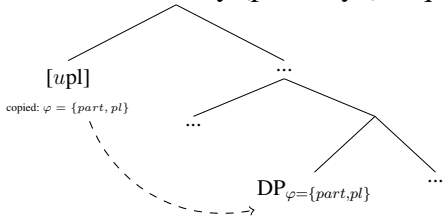
1sg	
2sg	
3sg	
1pl	zki
2pl	zki
3pl	zki

    - On the feature geometric view, agreement morphology transparently tracks the features copied by the syntactic agreement operation

(33) Geometric view allows for copying of just number

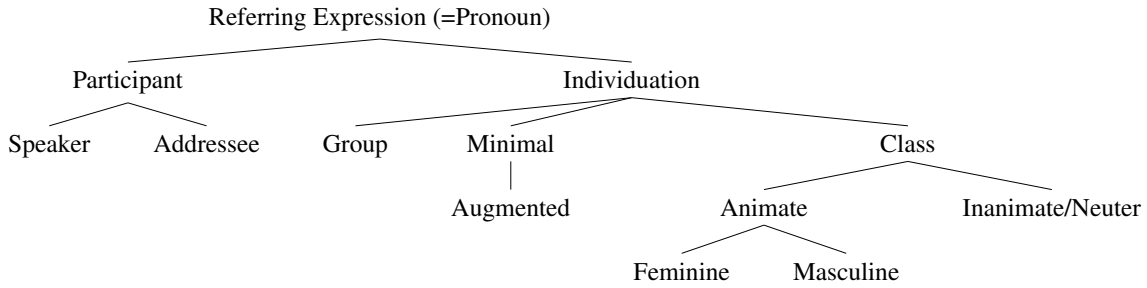


(34) Flat bundle theory (possibly?) requires all of the φ-features to be copied

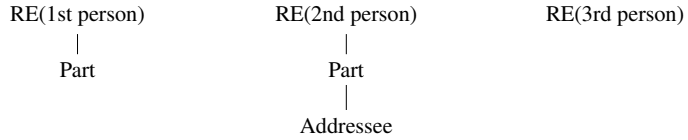


– **Counterpoint**: just because a feature is copied by the syntax doesn't mean it has to have a phonological output
  * Some paradigms have syncretism for some reason – could be impoverishment, could be accidental homophony...
  * A morphological interface that ignores some features sent by the syntax is plausible
– **Argument 2**: the typology of pronouns can be captured if there are implicational relationships between φ-features (Harley & Ritter, 2002)

(35) Harley and Ritter's original geometry



(36) Some possible person distinctions, constrained by the feature geometry



(37) Some generalizations explained by the feature geometry
  a. Universal 32: 'Whenever a verb agrees with a nominal subject or object in gender it also agrees in number.'
  b. Universal 34: 'No language has a dual [number] unless it has a plural.' (Greenberg 1963:94)
  c. Universal 37: 'A language never has more gender categories in nonsingular numbers than in the singular.' (Greenberg 1963:95)
  d. Universal 45: 'If there are any gender distinctions in the plural of the pronoun, there are some gender distinctions in the singular also.' (Greenberg 1963:96)

– **Counterpoint**: the feature geometry doesn't have to reflect the representation of features *that probes interact with* in order to constrain the typology of pronouns
  * Two options: 1) the feature geometry is a meta constraint on the possible bundles we can have, or 2) the feature geometry is the base generated version of φ-features, but they get flattened somehow
  * The literature has considered both options to some degree, but not every theory explicitly acknowledges these choices
    · Danon (2011); Norris (2014): φ-features start out on all different heads, and then nominal internal agreement/feature sharing flattens them
    · Alam & Kumaran (to appear); Deal (2022) represents φ-features as bundles, which are "feature-geometrically encoded":

(38) Feature representation of person (Alam & Kumaran, to appear, ex.6)
  a. 3rd person $\rightarrow$ [φ]

b. 2nd person → [φ,part,addr]

c. 1st person → [φ,part,sp]

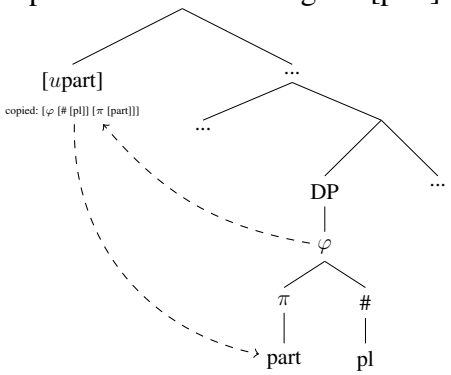
* Side note: the theory of probing doesn't strictly need features like [part], [π] and [#], if probes can have disjunction as well as conjunction: [part] = [addr $\vee$ sp]
* From that perspective, the theory of probing doesn't need the feature geometry, though the theory of nominals might

- **Conclusion**: by saying that φ-features get probed as a bundle, we might overgenerate slightly with respect to apparent number agreement, but at least there are plausible ways to constrain it, and we don't undergenerate, which is what the geometric view does
  - Let's look at what some authors propose to capture pied-piping in agreement

4.1 What the geometric view has to say about pied-piping

- Recall pied-piping in agreement:

(39) A probe that is searching for [part] copies back [φ]



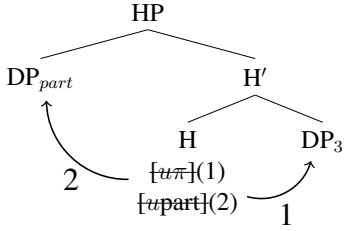
- We will now discuss some machinery developed by several authors that were proposed to account for this problem, while maintaining the geometric view

4.1.1 Bejar & Rezac 2009

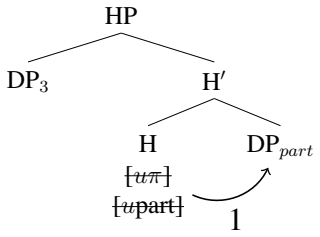
- B&R don't discuss pied-piping in agreement, but they develop several proposals about agreement that could capture pied-piping
  - **Proposal 1**: several probes may co-occur on a head simultaneously, some more specific than others

(40) H satisfies [π] and [part] with either one or two instances of Agree

a. H satisfies [π] by probing DP_3 first → [part] probes again for DP_{part}



b. DP_{part} satisfies both [π] and [part] first → DP_3 is never probed

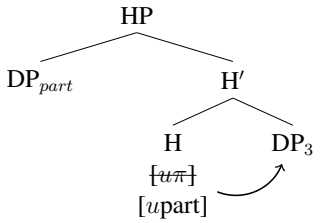


∗ **In a nutshell**: a subset relationship between the probes ensures that probing will target both nominals unless the first goal is a participant

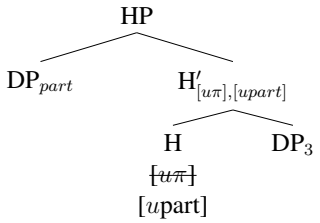
– **Proposal 2**: valued probes can sometimes reproject as unvalued probes

(41) In some languages, B&R propose that an already valued probe can probe again (as an unvalued probe) in the context of another unvalued probe

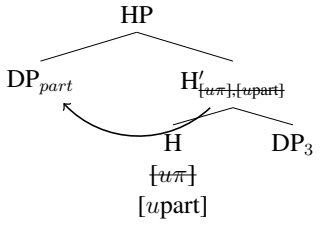
a. Step 1: probe complement for [π], [part]; value [π]



b. Step 2: project unvalued probes to H′; [π] becomes unvalued again in the context of an unvalued [part]



c. Step 3: probe specifier, which values both [π], [part]



• How does this help the pied-piping problem?

– We could imagine a language that is almost exactly like the one described above, except that [π] is replaced with [φ]

∗ In such a language, probing for [part] would always correspond to simultaneous probing for [φ], which copies more than just [part]

Probe	Goal	What's copied
[*u*part]	[φ [# pl] [π [part addressee]]]	[part addressee]
[$u\varphi$]	[φ [# pl] [π [part addressee]]]	[φ [# pl] [π [part addressee]]]
[*u*part],[$u\varphi$]	[φ [# pl] [π [part addressee]]]	[part addressee], [φ [# pl] [π [part addressee]]]

* If redundant features get deleted, we end up with one full φ-bundle copied whenever [part] and [φ] probe together

- **Summary**: multiple probes + probe resprouting + feature deletion can get pied-piping, but not conjunctive probing

4.1.2 Preminger 2009, 2014

- Preminger suggests different solutions in different contexts
  - Basque: there is no pied-piping problem; the Basque paradigm is a case of number-sensitive allomorphy in the person paradigm

(16) Basque absolutive "person" agreement: (Preminger, 2009, Table 2)

1sg	na
2sg	ha
3sg	
1pl	ga
2pl	za
3pl	

(32) Basque absolutive number agreement: (Preminger, 2009, Table 2)

1sg	
2sg	
3sg	
1pl	zki
2pl	zki
3pl	zki

(42) Some plausible allomorphy rules:

a. na $\rightarrow$ ga // ___-...-[pl]

b. ha $\rightarrow$ za // ___-...-[pl]

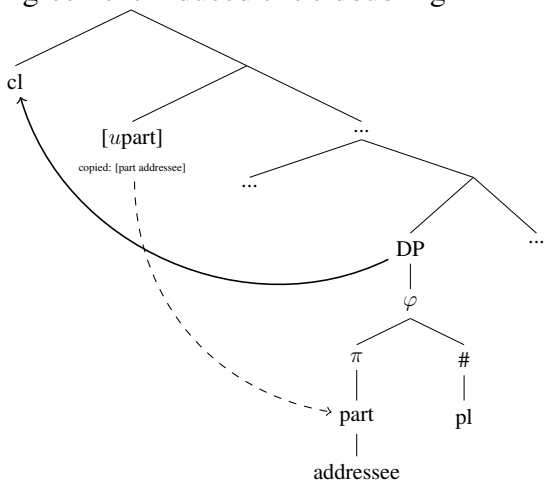
  - Kaqchikel: the morphology we observe is not φ-agreement, it is agreement-induced clitic doubling

(43) Kaqchikel absolutive agreement vs. strong pronouns: (Preminger, 2014, ex.30)

	ABS marker	pronoun
1sg	i(n)	yïn
2sg	a(t)	rat
3sg		rja'
1pl	oj	röj
2pl	ix	rïx
3pl	e	rje'

  - **Claim**: agreement with [part] only copies [part], but can induce pronominalization of the entire DP

(44) Agreement-induced clitic doubling



– This seems to be a restatement of the pied-piping problem: if agreement with [part] can't induce copying of [φ], how can it induce any other operation involving [φ] or DP?

4.1.3 Deal 2015

- Deal discusses a pattern of complementizer agreement in Nez Perce with some of the properties of [part]-sensitive probing we have been discussing, plus a more striking pied-piping problem
  - **Property 1**: this is a probe that always agrees with an addressee, if present, regardless of configuration (we could call it an [addr] probe instead of a [part] probe)

    (45) Nez Perce (Deal, 2015, ex.12,13)

    a. ke-m kaa *pro* cewcew-téetum *pro*
    C-2 then PRO.2SG telephone-TAM PRO.1SG
    'when you call me'

    b. ke-m-ex kaa *pro* cewcew-téetu *pro*
    C-2-1 then PRO.1SG telephone-TAM PRO.2SG
    'when I call you'

    (46) Nez Perce (Deal, 2015, ex.17,18)

    a. ke-pe-m kaa *pro* 'e-cewcew-té'nix A.-ne
    C-PL-2 then PRO.2PL 3OBJ-telephone-TAM A.-ACC
    'when you(pl) call A."

    b. ke-pe-m kaa A.-nim hi-cewcew-téetu *pro*
    C-PL-2 then A.-ERG 3SUBJ-telephone-TAM PRO.2PL
    'when A. calls you(pl)"
  - **Property 2**: it copies back more than just [addr] – it copies back any and all other [φ] both on the addressee, and on any nominals in between the probe and the addressee (see the 1st person feature on (45b) and plural feature on (46))
- Deal argues at great length that complementizer agreement is not clitic doubling
  - Argument 1: agreement morphemes appear templatically, without respecting constituency of the goals

(47) ke-pe-m-ex kaa *pro* cewcew-tée'nix *pro*
C-PL-2-1 then PRO.1PL telephone-TAM PRO.2SG
'when we call you' (Deal, 2015, ex.25)

– Argument 2: agreement morphemes look nothing like pronouns in Nez Perce

(48) Nez Perce strong pronouns: (Deal, 2015, ex.30a)

	pronoun
1sg	'iin
2sg	'iim
3sg	'ipí
1pl	nuun
2pl	'imé
3pl	'imé

(49) Nez Perce CA affixes (Deal 2015, ex. 30b)

1	(e)x
2	m
1+2	nm
pl	pe

- Deal also argues that Bejar and Rezac's multiple probes can't help us
  - Since both DPs are in the scope of the probe, there is no re-projection of probes, which would allow an already valued probe to become active again
  - So if Nez Perce C had two probes [uφ] and [uAddr], only the first argument the probe finds would have all of its features copied – the second argument could only have an addressee feature copied, contrary to (46b)

(46b) ke-pe-m kaa A.-nim hi-cewcew-téetu *pro*
C-PL-2 then A.-ERG 3SUBJ-telephone-TAM PRO.2PL
'when A. calls you(pl)"

- **Conclusion**: Deal argues that the mechanism of Agree needs to be able to independently specify the copying and satisfaction conditions.

(50) Nez Perce φ-agreement
a. interacts with/copies: φ-node in the feature geometry
b. is satisfied/stops probing: if it finds [addr]

- This is the enriched Agree theory that we didn't adopt for Move!
- Raises many questions:
  1. Is this solution to pied-piping only suitable for agreement? Or can we apply it to movement as well? If so, with what consequences? If not, why not?
  2. What constrains the possible specifications of probes?
     – Only constraint I am aware of: satisfaction condition has to be a subset of the interaction condition

  - How complicated can the satisfaction condition be? Can you have a probe that is satisfied only if the copied material contains both [part] and [pl] as we need for Mi'gmaq?
  - If so, does this account make any different predictions compared to the flat bundle theory? If not, Mi'gmaq falsifies this theory too.

- If probing for [addr] could copy φ, because all φ-features are on the same node, Bejar and Rezac-style multiple probing should work for Nez Perce, without interaction vs. satisfaction

- **Puzzle**: Nez Perce has a very fine grained hierarchy-sensitive probe:
  - If there is an addressee, agree with every argument up to and including the addressee
  - If there is no addressee, but there is a participant, agree with every argument up to and including the participant
  - If there are no participants, hard to tell – there is no exponent for third person morphology, and plural morphology is obligatorily null in the absence of an addressee

- Possible solution: three probes $\{[u\varphi], [upart], [uaddr]\}$
  - Addressees can value all three simultaneously
  - Speakers can value two out of three simultaneously
  - Third person arguments can only value one

- Should we be concerned about having heads with three probes?
  - We presumably have heads with three Merge features, why not heads with three probes?
  - v: needs a feature for merging with a VP complement, a feature for introducing an external argument, and a feature for hosting successive cyclic wh-movement
  - Perhaps Nez Perce complementizers are the agreement-inducing version of that, with three probes with different feature specifications

5 Conclusion

- What we have done today:
  - looked at theories of pied-piping in movement
  - looked at analogous examples of pied-piping in agreement
  - applied the logic of pied-piping in movement to pied-piping in agreement to motivate a flat representation of φ-features
  - showed that this representation of φ-features was needed to capture conjunctive probing in Mi'gmaq

- What we have *not* done today:
  - Analyzed any actual agreement paradigms

- To analyze actual agreement paradigms, we can still rely on observations from the feature-geometric world

- So what are φ-features? Two options:
  - Option 1: Bundles all the way down
  - Option 2: Geometries that get flattened into bundles
- We have seen some evidence that *syntactic operations* are only sensitive to φ-features as a bundle, not as a geometry
  - If our only evidence for feature geometries is non-syntactic, maybe they don't belong in the syntax at any part of the derivation

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