First-order person features and the contrastive hierarchy

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1. Introduction

- Harbour (2016) proposes that the range of attested contrasts in grammatical person, shown in (1), can be accounted for with two universal binary features, [±author] and [±participant].

  (1) Attested person systems (Harbour 2016)
  a. 'Monopartition': no person contrasts
  b. Author bipartition: 1 vs. 2/3
  c. Participant bipartition: 1/2 vs. 3
  d. Tripartition: 1 vs. 2 vs. 3
  e. Quadripartition: 1EX vs. INCL vs. 2 vs. 3

  – Unattested systems include, for example, hearer bipartition (2 vs. 1/3).
  – Like Harbour, we are concerned here with the overall set of person contrasts made in any given language, not with syncretisms in the morphological expression of these contrasts (which are much more varied, and can be generated through underspecification of vocabulary items under the assumptions of Distributed Morphology).

- Harbour's proposal improves on previous accounts (e.g., Halle 1997; Harley & Ritter 2002a,b), which either overgenerate or include ad-hoc stipulations.

- However, his account has a formal cost:

  – The features are more powerful: they are operations on lattices, adding and subtracting elements to or from the lattice they apply to, rather than first-order predicates that simply mark presence or absence.
  – Two additional mechanisms are needed:
    • one to eliminate empty sets (subtraction can result in the null set)
    • one to compare outputs of different feature combinations and remove overlap

- In both Harbour's approach and in feature-geometric approaches such as that of Harley & Ritter, features are ordered:

  – In feature geometries, ordering represents dependencies between features (either semantically intrinsic implications or stipulated ones).
  – In Harbour's system, features represent operations, and their ordering is the order in which these operations apply.

- We argue that a different kind of ordering can retain the elegance and empirical coverage of Harbour (2016) while simplifying the definitions of the features and reducing the need for additional mechanisms.

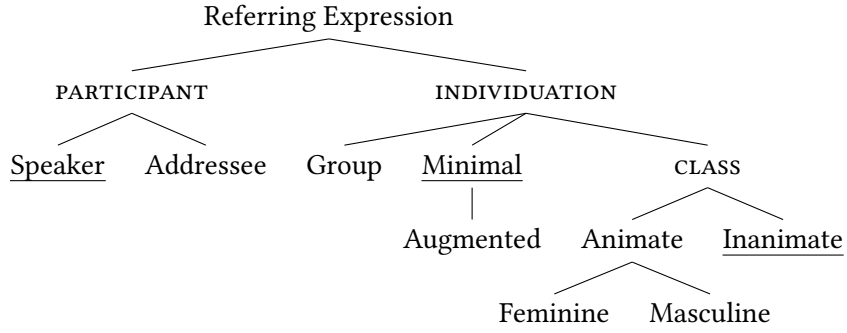
- Specifically, we propose that morphosyntactic features are organized into **contrastive hierarchies** representing their relative scope, as has been claimed for phonological features by Dresher (2009, 2015, 2016), among others.

2. Feature geometries and their faults

- Morphosyntactic feature geometries can express dependency relations and provide a useful visualization of what feature combinations are possible.

  – E.g., in (2) the presence of Speaker or Addressee entails PARTICIPANT, and the presence of Feminine or Masculine entails Animate.

(2) φ-feature geometry from Harley & Ritter (2002a: 486)

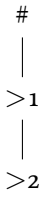


  – The dependency of one feature on another also indicates greater specificity, which is relevant for vocabulary insertion.

- Nonetheless, there is cause for doubt:

  – Morphosyntactic feature geometries don't do the same things phonological ones do.
    - Feature geometries in phonology are supported by processes that refer to non-terminal nodes in the dependency structure (feature spreading, OCP effects).
    - No such support is found in syntax for morphosyntactic feature geometries (syntactic movement of constituent parts of geometries, agreement as spreading sensitive to adjacency on a tier).
    - E.g., Béjar's (2003: 77, 81) proposal for feature deletion in complex agreement systems deletes all marked features, rather than delinking terminal subtrees of the geometry.
  – The motivation for geometric dependencies has also been challenged, notably by Harbour (2011, 2016) and Harbour & Elsholtz (2012).
    - Some dependencies are derivable from semantic entailment, and thus redundant. The feature geometry is just a visual representation of a logical necessity.

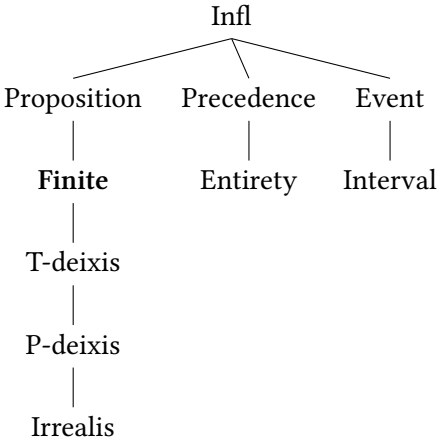
(3) Number feature geometry from Cowper (2005b: 446)



Béjar (2003: 44) also explicitly takes feature-geometric trees to represent entailments.

- Other dependencies are pure stipulations, encoding unexplained observations.

(4) Tense/mood/aspect feature geometry from Cowper (2005a: 14)



Finite in (4) has no semantic content, but it depends on Proposition, and T[emporal]-Deixis in turn depends on it.

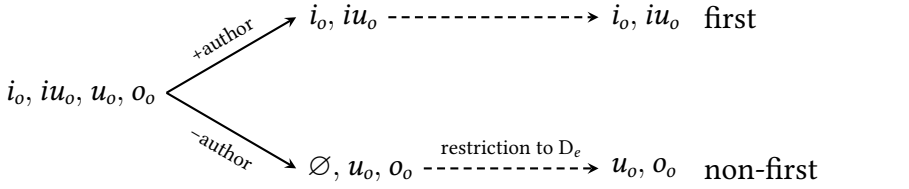
3. Harbour's person features

- Harbour (2016) presents a comprehensive theory of grammatical person that accounts for the typological range of attested systems of contrast, but requires features to be formalized as operators that add or subtract elements of lattices, rather than as first-order predicates.
- The features operate on a universal person ontology comprising a unique speaker *i*, a unique hearer *u*, and arbitrarily many others *o*.
- Harbour posits that UG provides two binary person features, [±author] and [±participant]:
  - [+author] adds the speaker *i* to a lattice.
  - [−author] subtracts the speaker *i* from a lattice.
  - [+participant] disjointly adds all discourse participants {*i*, *iu*, *u*} to a lattice.
  - [−participant] subtracts all participants {*i*, *iu*, *u*} from a lattice.

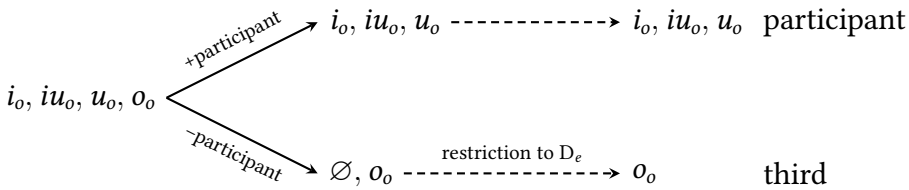
- The potentially distinguishable persons are:
  - i_o = the speaker and zero or more others
  - iu_o = the speaker and the hearer and zero or more others
  - u_o = the hearer and zero or more others
  - o_o = one or more others
- A language may use either or both (or neither) of the person features.
- The definitions of the features, combined with two principles of interpretation, ensure that any possible choice and ordering of features leads to a **partition** of the set $\{i_o, iu_o, u_o, o_o\}$:
  - The features cannot create any new combinations of persons that are not already present in $\{i_o, iu_o, u_o, o_o\}$, nor can they eliminate any member of this set.
  - **Lexical complementarity** eliminates overlap between subsets in accordance with the Elsewhere Principle. In (6), e.g., because [−author, +participant] $\{i_o, iu_o, u_o\}$ is a superset of [+author, +participant] $\{i_o, iu_o\}$, lexical complementarity restricts [−author, +participant] to u_o (its only member that is not also in [+author, +participant]).
  - **Restriction to the domain of entities** (D_e) excludes the empty person $\varnothing$ from the output.
- Because there is no feature [±hearer], no partition will group first and third persons on one side against second persons on the other.
- If a language does not use any person features, it has no grammatical person contrasts ('monopartition').
- If a language uses only one feature, it has a two-way person contrast (bipartition):

(5) Two-way person contrasts (Harbour 2016: 98)

a. [±author] only

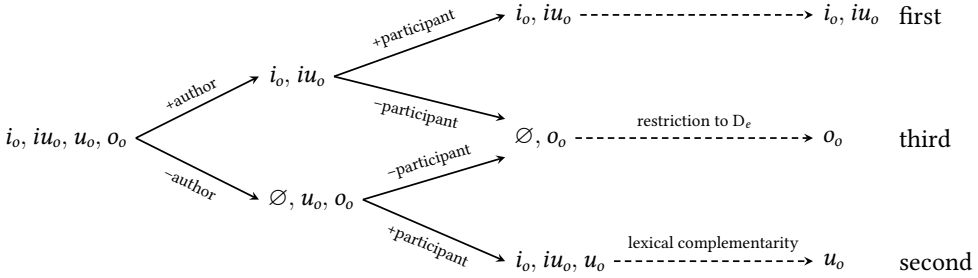


b. [±participant] only



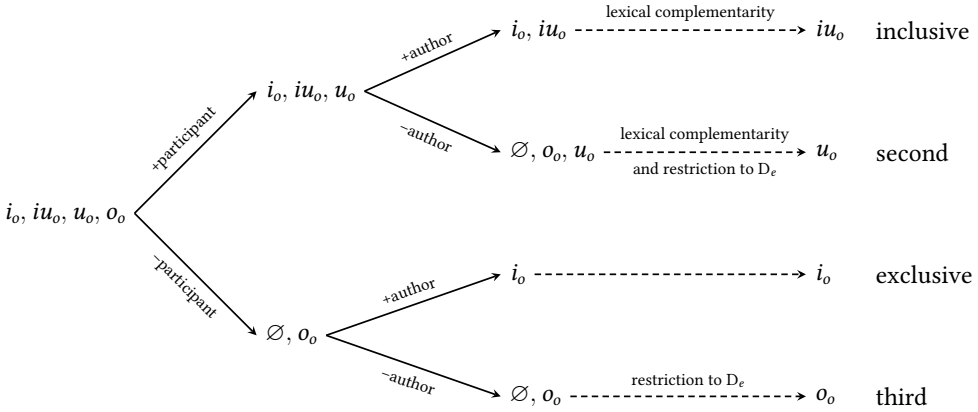
- If a language uses both features, then the order in which they apply is crucial to the number of person contrasts they derive:
  - Applying [±author] before [±participant] derives a three-way person system (tripartition) distinguishing first, second, and third persons.

    (6) [±author] before [±participant] (Harbour 2016: 99)



  - Applying [±participant] before [±author] derives a four-way person system (quadripartition) distinguishing first exclusive, first inclusive, second, and third.

    (7) [±participant] before [±author] (Harbour 2016: 99)



- Harbour's approach generates exactly the attested range of systems of grammatical person contrasts, but it requires significant formal machinery:
  - Features are operators on lattices, not first-order predicates.
  - Lexical complementarity must be invoked to prune some lattices outright (independently of the role of the subset principle in vocabulary insertion, or in Gricean implicature, etc.).
  - In tripartition (6), third person has two possible representations: [−author, −participant] or [+author, −participant]. Harbour (2016: 92–93) posits a parameter to allow tripartition languages to use one or the other, but not both.

4. The contrastive-hierarchy approach

We propose that organizing features into a contrastive hierarchy yields an account of grammatical person that retains the best aspects of Harbour (2016) while eliminating the need to say that features are operations on lattices.

4.1 Background: Contrastive hierarchies in phonology

- Dresher's (2009) Successive Division Algorithm (SDA) provides an explicit procedure for constructing a contrastive hierarchy.

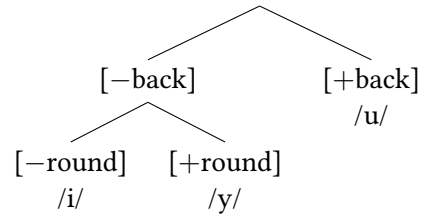
  (8) Successive Division Algorithm (Dresher 2009: 16)
  a. Begin with *no* feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
  b. If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.
  c. Repeat step (b) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

- The SDA is neutral as to whether features are selected from a universal set, or are induced by learners from the primary linguistic data.

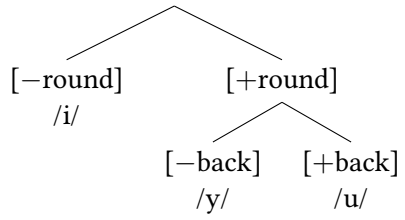
- But, even if the set of features is universal:

  – The SDA does not stipulate the order of divisions or the features to be used, so languages with similar inventories may specify them differently.
  E.g., if we want to differentiate the French high vowels /i y u/ using the features [±back] and [±round], there are two possibilities (Burstynsky 1968: 11):

(9) [±back] ≫ [±round]



(10) [±round] ≫ [±back]



  – The SDA guarantees that no more features will be used than are required to differentiate the contrasting elements in the inventory.

- Contrastive hierarchies also offer insight into the typology of inventories (Hall 2011), patterns of reduction (Spahr 2014), and diachronic change (Dresher et al. 2014).

4.2 Application to person features

The contrastive-hierarchy approach allows person features to be first-order predicates.

- Assume Harbour's (2016) ontology of persons $\pi = \{i, u, o, o', o'', \ldots\}$.

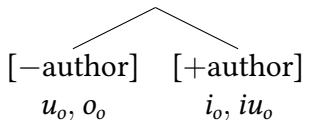
- The inventory to be divided is the set of sets of persons—i.e., the power set of π.[1]

1. Or perhaps only the non-empty members of $\mathcal{P}(\pi)$, as per Harbour's operation of restriction to D_e. Note, however, that for us this would be a restriction on the input to the SDA rather than a repair on its output, and that in any case both our system and Harbour's predict (plausibly enough) that if empty persons are conceptually possible at all (cf. Harbour 2016: 85–86), they will be referred to with the same forms as third persons (0_o).

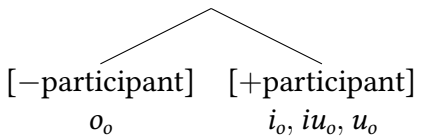
- As in Harbour's system, there are two binary features, [±author] and [±participant], but these are first-order predicates, not operations on lattices:
  - [+author] = 'includes the speaker'
  - [−author] = 'does not include the speaker'
  - [+participant] = 'includes a(t least one) discourse participant'
  - [−participant] = 'does not include a discourse participant'
- Languages may use none, either, or both of the features.
- As with Harbour's features, the persons that can potentially be distinguished using these features are $\{i_o, iu_o, u_o, o_o\}$.
- If a language uses both features, one of the features will take scope over the other, and either order is possible.
- If [±author] takes wider scope, then we propose that the interpretation of [±participant] is automatically narrowed to '{includes, does not include} a participant **other than speaker**'—the only possible interpretation that allows it to be contrastive where the inclusion or exclusion of the speaker has already been marked.
- Harbour (2016: §8.2) argues against similar approaches that involve parametric choice either between the use of [±participant] and [±hearer] or between allowing and excluding the combination of values that would distinguish inclusive from exclusive first persons:
  - If UG provides [±author], [±participant], and [±hearer], why aren't all logically possible combinations of these features attested?
  - If one combination of features can be "parametrically deactivated," why can't others?
- By linking the parametric variation in the semantics of [±participant] to its contrastive scope, our proposal avoids these objections: the interpretation of a feature is consistently contingent on the domain in which it marks a contrast.
- This gives exactly the required set of possible person systems:

(11) a. 'Monopartition': No features, no person contrasts

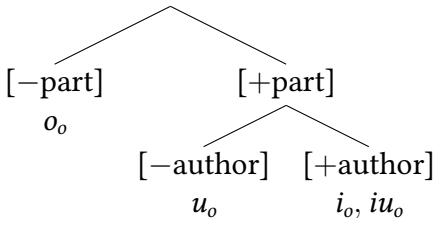
b. Author bipartition:



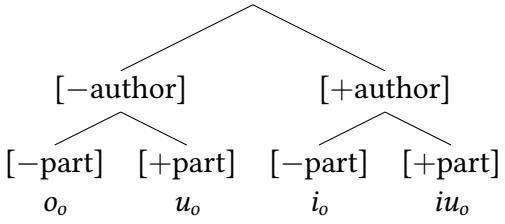
c. Participant bipartition:



d. Tripartition: [±participant] takes scope over [±author]



e. Quadripartition: [±author] takes scope over [±participant]



- No appeal to lexical complementarity is required; there is a unique path to each member of the inventory in each system.
- The narrowing of [±participant], which gives essentially [±hearer], derives from its position in the contrastive hierarchy:
  - It has a narrow interpretation if and only if it has narrow scope.
  - Its meaning thus depends on the domain it divides.
  - No analogous narrowing of [±author] is possible to allow full cross-classification in (11d); the interpretation 'speaker other than a discourse participant' is nonsensical.
- We conclude that with a contrastive hierarchy, it is possible to account for exactly the attested person partitions with first-order features and no more additional machinery than Harbour (2016) requires (possibly less).

5. Acquisition

- In addition to ensuring that representations include only contrastive features, the SDA also suggests a learning path: as children acquire contrasts, they build the representations that encode them.
- Ideally, we might expect the order of acquisition to correspond to hierarchical scope: features that are higher in the tree would be acquired first.
- Things will probably turn out to be more complicated than this.
- Some proposed phonological contrastive hierarchies do not map readily to acquisition sequences, and suggest that learners may need to do some backtracking.

- E.g., Hall (2007) proposes a hierarchy for Czech consonants in which the first two features divide the inventory into sonorants, obstruents, and the trilled fricative /r̝/; /r̝/ is typically the *last* consonant Czech children accurately produce, though that could be attributed to its articulatory complexity rather than to its phonological encoding.
- Our person feature hierarchies potentially predict the following:
  - In a tripartition language, children will begin by distinguishing participants from third persons; early learners may fail to distinguish the representations of first and second person, and thus seem to confuse first- and second-person pronouns.
  - In a quadripartition language, children will begin by distinguishing first persons from second and third; early learners may conflate second person with third, and inclusive with exclusive.
- Children acquiring tripartition languages do sometimes confuse first and second person in production, but second person is often the first to be mastered in comprehension; see, e.g., Moyer et al. (2015: 2) and references cited therein, especially Oshima-Takane (1992). (There's much less work on acquisition of quadripartition languages.)
- Production–comprehension mismatches and the possible need for backtracking complicate the picture, but the contrastive-hierarchy approach suggests that research in this area should focus on acquisition of *distinctions* (à la Jakobson 1941) rather than of *items*.

6. Conclusion

- The dependencies expressed in morphosyntactic feature geometries are real. We propose that the right way to represent these dependencies is in the form of contrastive hierarchies.
- In phonology, feature geometries are motivated not only by dependency relations among features, but also by the fact that those dependencies have been argued to be active in autosegmental processes (spreading and delinking). In other words, there is evidence that the dependencies are part of the structural representation of each segment.
- It's an open question exactly how phonological contrastive hierarchies relate to phonological feature geometries, since they seem to encode some of the same information in different ways. It could turn out that once the right contrastive hierarchy is established for a given language, feature geometries are not required.
- Broadly speaking, though, contrastive hierarchies are paradigmatic, defining systems of oppositions, and feature geometries are syntagmatic, structuring combinations of features in the representation of linguistic expressions.
- In morphosyntax, our syntagmatic representations are phrase structure (and word structure) trees, and operations like Merge, Move, and Agree apply to them. So far, the dependencies among morphosyntactic features do not seem to be relevant to any of these operations.

- Contrastive hierarchies offer a way of representing these dependencies that…
  - encodes the relative scope of contrasts;
  - accounts for the fact that the interpretation of a feature depends in part on the domain in which it is contrastive;
  - makes it possible for one feature to depend on the absence of another;
  - is compatible with multiple views of what features themselves are;
  - doesn't predict that morphosyntactic features should behave like phonological autosegments;
  - can, in at least one case, reduce the required formal complexity of the features themselves;
  - and can perhaps shed new light on the acquisition of grammatical elements by framing the question as pertaining to distinctions rather than vocabulary items.

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