Agreement & Coordination in Grammar Customization

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Some Background

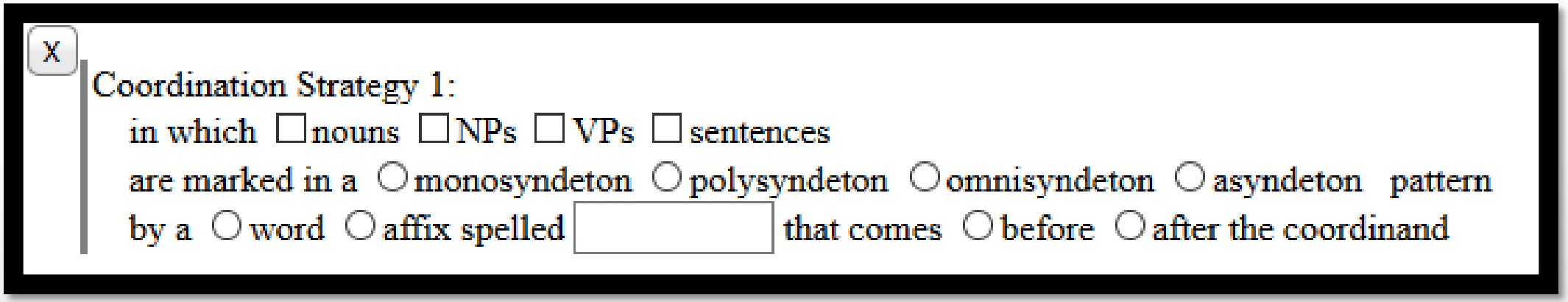
- I'm working on the Grammar Matrix (Bender et al. 2002), a system for rapid prototyping of precision grammars.
- Given a user's 'choices' about how a language behaves, the Grammar Matrix writes the language's grammar rules, speeding up development time.
- If a user wants to put agreement features into coordination, the rules must currently be written by hand, which is slow.

What we have already:

Separate modules for coordination and agreement, which don’t quite overlap.

Coordination in the Grammar Matrix

- Coordination rules were one of the first additions to the Grammar Matrix, modeling coordination across phrase types and various coordination strategies.



- These rules are underspecified for agreement features out of the box.
  - For example, both “You and I eat” and “You and I eats” will parse and be generated by a grammar created using this system.
  - That’s because feature resolution is a whole thing.

Agreement Features

- The Matrix already handles agreement features well overall, eliciting them from users and setting up hierarchies and values.
- However, we do not handle feature resolution in coordinated structures.
- Because valence features are already identified in verbal coordination, I'm focusing on handling agreement features in noun/NP coordination, which should generally be enough to bridge the gap.

The task:

Or at least what I know about it so far

Adding Agreement to Coordination

- The main task will be making additions to the coordination module that get information from the user about how agreement behaves in coordinated structures, then create the rules that model it.
- In some languages, for example, the verb agrees with the closest conjunct. In others, features are resolved according to systems that vary depending on language.
- If a user doesn't have information available about coordination and agreement in the language they are modeling, they will be able to leave the rules underspecified for agreement.

Feature Resolution

- If a language resolves features in coordination, we need to elicit information about the behavior of coordinated structures in the language the user is modeling.
- Agreement features might include person, number, gender…
- Some examples: Person in Fula Person in English, Spanish, Slovak…

$$
\begin{aligned}
1.\text{SG} \;\&\; 2 &= 1\text{INC.PL} \\
1.\text{SG} \;\&\; 2 \;\&\; 3 &= 1\text{INC.PL} \\
1.\text{SG} \;\&\; 3 &= 1\text{EXC.PL} \\
1\text{EXC.PL} \;\&\; 3 &= 1\text{EXC.PL} \\
2 \;\&\; 3 &= 2 \\
3 \;\&\; 3 &= 3
\end{aligned}
$$

$$
\begin{aligned}
1 \;\&\; 2 &= 1 \\
1 \;\&\; 3 &= 1 \\
2 \;\&\; 3 &= 2 \\
3 \;\&\; 3 &= 3
\end{aligned}
$$

More Examples

Gender in Hindi

MASC & MASC = MASC
MASC & FEM = MASC
FEM & FEM = FEM

Gender in Icelandic

MASC & MASC = MASC
FEM & FEM = FEM
NEUT & NEUT = NEUT
MASC & FEM = NEUT
MASC & NEUT = NEUT
FEM & NEUT = NEUT

Hindi: If at least one conjunct is masculine, the masculine form is used.

Icelandic: If all the conjuncts are masculine, the masculine form is used. If all the conjuncts are feminine, the feminine form is used. Otherwise, the neuter form is used.

(Examples from Dalrymple & Kaplan 2000)

Rule creation

- The Grammar Matrix will write the rules accounting for agreement features in coordinated structures similarly to the ones it already creates for coordination.
- This will still result in a lot of rules!
- For example, the Grammar Matrix currently creates sets of rules like:
  - NP1-TOP-COORD-PHRASE := NP-TOP-COORD-PHRASE & OMNI-TOP-COORD-PHRASE.
  - NP1-MID-COORD-PHRASE := NP-MID-COORD-PHRASE & OMNI-MID-COORD-PHRASE.
  - NP1-BOTTOM-COORD-PHRASE := NP-BOTTOM-COORD-PHRASE & OMNI-BOTTOM-COORD-PHRASE.
  - NP1-LEFT-COORD-PHRASE := NP-LEFT-COORD-PHRASE & OMNI-LEFT-COORD-PHRASE.

Adding agreement to coordination rules

- We might end up adding sets of coordination rules with…
  - Each person rule (1 & 2 = 1, etc)
  - Each number rule (sg & sg = du, sg & pl = pl…)
  - Each gender rule (m & f = m)

Thanks!
Questions?