Of Tops and Bottoms: 
The Algebra of Person Case Constraints

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What is the PCC?

Person Case Constraint (PCC)

Whether the direct object (DO) and the indirect object (IO) of a clause can both be cliticized is contingent on the person specification of DO and IO.

(1) Roger *me/le leur a présentié.
Roger 1SG/3SG.ACC 3PL.DAT has shown
‘Roger has shown me/him to them.’

The Problem & The Solution

- Existence of something like the PCC is not surprising. (Graf 2011; Kobele 2011)
- But why do we only find certain types of PCCs?
- Algebraic unification in terms of presemilattices
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Outline

1. PCC Typology
2. Characterizing the Class of PCCs
   - The Generalized PCC
   - Algebraic Characterization
3. Empirical Conjectures
   - Algonquian PCC
   - Sign Language PCC
The PCC: A Closer Look

- attested in a variety of languages, including French, Spanish, Catalan, and Classical Arabic (Kayne 1975; Bonet 1991, 1994)
- specifics of PCC differ between languages, dialects, idiolects

Four Attested PCC Variants

- **Strong PCC** (S-PCC; Bonet 1994)
  DO must be 3.

- **Ultrastrong PCC** (U-PCC; Nevins 2007)
  DO is less local than IO (where $3 < 2 < 1$).

- **Weak PCC** (W-PCC; Bonet 1994)
  3IO combines only with 3DO.

- **Me-first PCC** (M-PCC; Nevins 2007)
  If IO is 2 or 3, then DO is not 1.
The Four PCC Variants

<table>
<thead>
<tr>
<th></th>
<th>IO ↓ / DO →</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>*</td>
<td>*</td>
<td>NA</td>
<td></td>
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</table>

(a) S-PCC

<table>
<thead>
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<td>1</td>
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</tr>
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<td>2</td>
<td>✓</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>*</td>
<td>*</td>
<td>NA</td>
<td></td>
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</table>

(b) U-PCC

<table>
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<th>IO ↓ / DO →</th>
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<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>NA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>NA</td>
</tr>
</tbody>
</table>

(c) W-PCC

<table>
<thead>
<tr>
<th></th>
<th>IO ↓ / DO →</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>✓</td>
<td>NA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>NA</td>
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</table>

(d) M-PCC
The PCC in Minimalism

- The Minimalist feature calculus is exactly as powerful as so-called rational constraints. (Graf 2011; Kobele 2011)
- So unless one puts restrictions on the feature system any given language may employ, any kind of rational constraint could in principle be instantiated in some language.
- The existence of PCC-like constraints is unsurprising under this view because they are indeed rational constraints.
- But there are at least $2^6 = 64$ logically possible PCC variants. Why do we find only 4?
The Generalized PCC

All four PCC-types can be described similar to the U-PCC.

<table>
<thead>
<tr>
<th>Generalized PCC (G-PCC)</th>
<th></th>
</tr>
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<tbody>
<tr>
<td><strong>IO</strong> is not less local than <strong>DO</strong> (IO $\not&lt;$ DO), where</td>
<td></td>
</tr>
<tr>
<td><strong>S-PCC:</strong> 1 $&gt;$ 2 1 $&gt;$ 3 2 $&gt;$ 1 2 $&gt;$ 3</td>
<td></td>
</tr>
<tr>
<td><strong>U-PCC:</strong> 1 $&gt;$ 2 1 $&gt;$ 3</td>
<td>2 $&gt;$ 3</td>
</tr>
<tr>
<td><strong>W-PCC:</strong> 1 $&gt;$ 3</td>
<td>2 $&gt;$ 3</td>
</tr>
<tr>
<td><strong>M-PCC:</strong> 1 $&gt;$ 2 1 $&gt;$ 3</td>
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</table>
Person Locality Hierarchies

(a) S-PCC
(b) U-PCC
(c) W-PCC
(d) M-PCC
Example 1: S-PCC

\[
\begin{array}{ccc}
1 & 2 & 3 \\
1 > 2 \\
1 > 3 \\
2 > 1 \\
2 > 3 \\
\end{array}
\]

\[
\begin{array}{ccc}
1 & 2 & 3 \\
1 & NA & * & \checkmark \\
2 & * & NA & \checkmark \\
3 & * & * & NA \\
\end{array}
\]
Example 2: W-PCC

\[
\begin{array}{c}
\text{IO} \downarrow/D\text{O} \\
\text{1} & \text{2} & \text{3} \\
1 & \text{NA} & \checkmark & \checkmark \\
2 & \checkmark & \text{NA} & \checkmark \\
3 & \ast & \ast & \text{NA} \\
\end{array}
\]

1 > 3
2 > 3
The locality hierarchies are *preorders*. (Reminder: we ignore the diagonal)

**Definition (Preorder)**

A binary relation \( \sqsubseteq \) is a preorder iff it is

- reflexive \((x \sqsubseteq x)\), and
- transitive \((x \sqsubseteq y & y \sqsubseteq z \Rightarrow x \sqsubseteq z)\)

In fact, they are all *presemilattices*.

**Definition (Presemilattices for linguists)**

A preorder \( \sqsubseteq \) over set \( S \) is a presemilattice iff for all \( u, v \in S \), there is some \( t \in S \) such that

- \( t \) “reflexively dominates” \( u \) and \( v \), or
- \( u \) and \( v \) “reflexively dominate” \( t \).
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- $u$ and $v$ “reflexively dominate” $t$. 
The number of presemilattices over \{1, 2, 3\} is still more than 4.

**Top and Bottom**

**Top** For all \(x\), \(1 < x\) implies \(x < 1\).

‘Every person feature is at most as local as 1.’

**Bottom** There is no \(x\) such that \(x < 3\).

‘No person feature is less local than 3.’

**Unifying the PCCs**

The class of attested PCCs is given by

- \(\text{IO} \nless \text{DO}\), where
- \(<\) defines a presemilattice over \{1, 2, 3\} respecting both Top and Bottom.
Two More Restrictions

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**Unifying the PCCs**

The class of attested PCCs is given by

- \( IO \not< DO \), where
- \(<\) defines a presemilattice over \( \{1, 2, 3\} \) respecting both Top and Bottom.
Generalizing Top

From a mathematical perspective, Top and Bottom aren’t duals.

**Redefining Top as the Dual of Bottom**

There is some $x$ such that $x < 1$.

‘Some person feature is less local than 1.’

Pairing Bottom with Top’ yields one more hierarchy.
Generalizing Top

From a mathematical perspective, Top and Bottom aren’t duals.

Redefining Top as the Dual of Bottom

Top′ There is some $x$ such that $x < 1$.
‘Some person feature is less local than 1.’

Pairing Bottom with Top′ yields one more hierarchy.
In some Algonquian languages 2 is apparently more local than 1. Nishnaabemwin affixes its verb with an inverse marker if DO is more local than SUBJ (Béjar and Rezac 2009:50).

(2)  
   a.  n-waabm-ig
       1-see-3.INV
       ‘He sees me.’
   b.  g-waabm-ig
       2-see-3.INV
       ‘He sees you.’
The marker also occurs if DO is 2 and SUBJ is 1, but not the other way round, where a default marker is used instead (Béjar and Rezac 2009:49). This indicates that 2 is indeed more local than 1.

(3) a. g-waabm-in
    2-see-1.INV
    ‘I see you.’

b. g-waabm-i
    2-see-DFLT.1
    ‘You see me.’
Redefining Bottom as the Dual of Top

**Bottom**’ For all \( x, x < 3 \) implies \( 3 < x \).

Coupling Top with Bottom’ yields two new hierarchies:

(a) IO must be 1
(b) No clitic combinations
The first new hierarchy might be present in sign languages, where 2 and 3 form a natural class. Are there sign languages that show PCC effects?

The second type disallows all clitic combinations. This behavior is attested in some languages such as Cairene Arabic (Shlonsky 1997:207; Martin Walkow p.c.).
Conclusion

What has been Accomplished?

- The four attested PCC variants are unified into the Generalized PCC: $\text{IO} \not< \text{DO}$.
- The possible interpretations of $<$ are given a succinct, natural algebraic characterization in terms of presemilattices.

Open Questions

- Do we find any of the conjectured patterns?
- Why $\text{IO} \not< \text{DO}$, and not $\text{DO} \not< \text{IO}$ or $\text{IO} \geq \text{DO}$?
- What motivates Top and Bottom?


