A Modification of the 0-Categories

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1   The Problem

The categories 0a and 0b in Mark Steedman's grammar allow consecutive similar chords to be treated as a single chord:

0a. $X(m)$:= $I_X(m)\backslash I_X(m) : \lambda x.x$
0b. $X(m)^7$:= $I_X(m)^7\backslash I_X(m)^{(7)} : \lambda x.x$

There is a problem with the second of these which means that, as well as generating derivations like 1, it also generates 2.

(1)

$$
\begin{array}{cccc}
I & V(7) & I & I(7) \\
\hline
\mathsf{I}:\mathbf{I} & \mathsf{V^7/I^7} : \lambda x.leftonto(x) & \mathsf{I}:\mathbf{I} & \mathsf{I\backslash I} : \lambda x.x
\end{array}
$$

$$(\mathsf{I\backslash I})\backslash(\mathsf{Y^7/I^7}) : \lambda C.\lambda P.P + C(\mathbf{I}) \quad {>_\mathbf{T}}$$
$$\mathsf{I\backslash I} : \lambda x.x + leftonto(\mathbf{I}) \quad {<}$$
$$\mathsf{I} : \mathbf{I} + leftonto(\mathbf{I}) \quad {<}$$
$$\mathsf{I} : \mathbf{I} + leftonto(\mathbf{I}) \quad {<}$$

(2)

$$
\begin{array}{cccc}
I & V(7) & I & I(7) \\
\hline
\mathsf{I}:\mathbf{I} & \mathsf{V^7/I^7} : \lambda x.leftonto(x) & \mathsf{I}:\mathbf{I} & \mathsf{I^7\backslash I} : \lambda x.x
\end{array}
$$

$$(\mathsf{I\backslash I})\backslash(\mathsf{Y^7/I^7}) : \lambda C.\lambda P.P + C(\mathbf{I}) \quad {>_\mathbf{T}}$$
$$\mathsf{I\backslash I} : \lambda x.x + leftonto(\mathbf{I}) \quad {<}$$
$$\mathsf{I} : \mathbf{I} + leftonto(\mathbf{I}) \quad {<}$$
$$\mathsf{I^7} : \mathbf{I} + leftonto(\mathbf{I}) \quad {<}$$

Isolated X^7 symbols such as that seen as the result of 2 should never appear in a derivation.

Worse still, the sequence I V V(7) I receives the results $I : rightonto(I)$ and $I : rightonto(V) + leftonto(I)$[1], but not the $I : I + leftonto(I)$ that we would hope for.

2   Dominant Seventh Similar Sequences

As the current categories make clear, we expect the dominant seventhness of a sequence of chords on the same root to come from their rightmost chord. That is, we can interpret V V(7) and a dominant seventh, but not V(7) V. However, the current 0-categories combine from the leftwards, so the rightmost chord cannot both receive a dominant seventh interpretation (for example, by the 3-categories) and combine with its left neighbours. A sequence V(7) V(7) can function as a dominant seventh only because the first chord receives such an interpretation and the second combines with it using 0b.

We must allow the final chord to receive the cadential interpretation as a dominant seventh and combine the preceding ones with it using the 0-categories. Non-seventh chords may combine simply as before, though it makes sense to give these a forward slash, so that they work in the same way as the

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[1]Incidentally, neither of these results should be produced and both are in fact excluded by the use of cadential slash modes. See the document *Using Slash Modes for Cadences* for an explanation of this.

seventh interpretations. A seventh chord may compose with subsequent cadential sevenths, allowing the final one to take the true cadential category. Non-seventh chords may also compose with subsequent seventh chords in the same way, since it is only the final chord in the similar sequence that must be a seventh chord to allow a dominant seventh interpretation of the sequence.

3 The New Categories

I therefore propose the following pair of categories to replace the old 0a and 0b:

0a. $X(m)$ $\; := \;$ $I_X(m)/I_X(m) : \lambda x.x$

0b. $X(m)^{(7)}$ $\; := \;$ $I_X(m)^7/I_X(m)^7 : \lambda x.x$

These categories are incorporated into grammar 0.4. See the document *A CCG Chord Grammar v0.4* for the full grammar.