THE FINAL SECTIONS

7. More on soundness
   - more constraints on the letter-refiner (than just e-soundness): conditional frame soundness

8. [very briefly] Directions towards practical applications
   - coalescence of the refinement contexts
   - introducing coupled leaf expansion
   - what about back-tracking?

9. Summary

REWRITING MAPS

- a **map** is a set of 4-tuples of words
- $\langle w_1, w, w_2, w' \rangle \in m$ can be depicted as

$$\begin{array}{c|c|c} \multicolumn{3}{c}{m} \\ \hline w_1 & \begin{array}{c} w \\ \downarrow \\ w' \end{array} & w_2 \end{array}$$

- m is **e-sound** if

$$w_1 w w_2 \overset{e}{\sim} w_1 w' w_2$$

for all 4-tuples

$$\langle w_1, w, w_2, w' \rangle \in m$$

LETTER-REFINER m-LEGITIMACY

- a letter-refiner r is **m-legitimate** if

$$w' \in r(w_1, c, w_2)$$

$$\Longrightarrow$$

$$\begin{array}{c|c|c} \multicolumn{3}{c}{m} \\ \hline w_1 & \begin{array}{c} c \\ \downarrow \\ w' \end{array} & w_2 \end{array}$$

- **Note**: we assume $r(w_1, a, w_2) = \{a\}$ for every terminal a

CONDITIONAL FRAME SOUNDNESS

- a frame is <u>m-sound</u> if every tetrasystem with the frame is e-sound whenver
  1. the letter-refiner is m-legitimate

     and
  2. m is e-sound

- Let M be a set of maps. We say a frame is <u>M-sound</u> if it is m-sound for every $m \in M$

- We are interested in classes consisting of all maps with particular closure properties ...

MAP ADJUNCTIVITY

$$w_1 \left| \begin{matrix} w' \\ \downarrow \\ w'' \end{matrix} \right| w^{*} w_2 \wedge w_1 w' \left| \begin{matrix} w^{*} \\ \downarrow \\ w^{**} \end{matrix} \right| w_2$$

$$\Longrightarrow w_1 \left| \begin{matrix} w' w^{*} \\ \downarrow \\ w'' w^{**} \end{matrix} \right| w_2$$

- Let M_A denote the class of all adjunctive maps
- for example:

$$\Lambda \left| \begin{matrix} A \\ \downarrow \\ P \end{matrix} \right| B \wedge A \left| \begin{matrix} B \\ \downarrow \\ Q \end{matrix} \right| \Lambda$$

$$\Rightarrow \Lambda \left| \begin{matrix} AB \\ \downarrow \\ PQ \end{matrix} \right| \Lambda$$

Theorem: $\langle \sigma_C, \sigma_C, \sigma_C, \sigma_C \rangle$
$\langle \sigma_C, \sigma_C, \Delta\sigma_C, \Delta\sigma_C \rangle$
$\langle \sigma_C, \sigma_C, \sigma_E, \sigma_E \rangle$

are all M_A-sound

MAP TRANSITIVITY

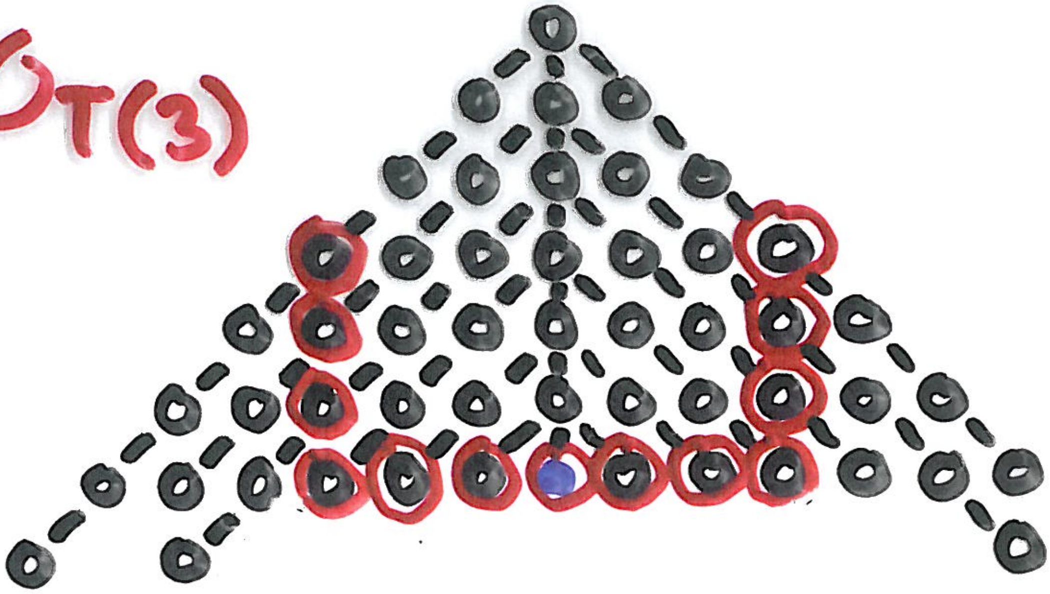
$$w_1 \left| \begin{smallmatrix} w \\ \downarrow \\ w' \end{smallmatrix} \right| w_2 \;\wedge\; w_1 \left| \begin{smallmatrix} w' \\ \downarrow \\ w'' \end{smallmatrix} \right| w_2$$

$$\Rightarrow w_1 \left| \begin{smallmatrix} w \\ \downarrow \\ w'' \end{smallmatrix} \right| w_2$$

- Let M_{TA} denote the class of all such maps that are both transitive and adjunctive

Remark: This is where we cut a longer story short in this introductory presentation: we do not consider any other closure properties than these two

$O_{T(3)}$



Let $1 \leq k < \infty$.

$\varphi_{O_{T(k)}}(i) = \min\{|i|, k\}$

Consider frame $\langle O_{T(k)}, O_{T(k)}, O_E, O_E \rangle$

- it is confluent
- it is k-distributively progressive

Theorem:

- it is also M_{TA}-sound