Erratum to the paper “Metaconfluence of Calculi with Explicit Substitutions at a Distance”

F. L. C. de Moura, D. Kesner and M. Ayala-Rincón

2015, April 10th

In [1], we proved metaconfluence of three calculi with explicit substitutions without including equational axioms. Nevertheless, a correction in the proof of the case of the structural $\lambda$-calculus is necessary. Our approach is based on the Hindley-Milner Theorem, where we assume that the following rewriting system do not have critical pairs:

$$
\begin{align*}
  t[x/u] & \rightarrow_c t[x[y]y/u] & \text{if } |t|_x > 1 \\
  t[x/u] & \rightarrow_d t\{x/u\} & \text{if } |t|_x = 1 \\
  t[x/u] & \rightarrow_g t & \text{if } |t|_x = 0
\end{align*}
$$

However, the non-determinism of the rule $\rightarrow_c$ can lead to non-confluent terms. For instance, consider the following divergence:

$$
(X_y X_y)[y/a] \\
(X_z X_y)[y/a][z/a] \xleftarrow{c} \quad (X_y X_z)[y/a][z/a] 
$$

Note that the terms $(X_z X_y)[y/a][z/a]$ and $(X_y X_z)[y/a][z/a]$ are both in normal form. In order to close this diagram, one proceed as follows: $(X_z X_y)[y/a][z/a] =_{\alpha} (X_y X_z)[y/a][z/a] = (X_y X_z)[y/a][z/a]$, where $\equiv$ is an axiom for commutation of independent substitutions. A detailed proof using this approach can be found at [2].

Acknowledgement

We would like to thank Temur Kutsia for the fruitful discussions during a visit to our group.

References
