Erratum

Eta-Conversion for the Languages of Explicit Substitutions

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In my paper, it is claimed that the system $\lambda\sigma$, augmented with the rewriting relation $c\eta$, is confluent. This result does not hold. $\lambda\sigma$ and $c\eta$ are confluent. But, these two rewriting relations do not commute: the proposition 5.7 is wrong. However, this proposition remains true on ground terms. So, the correct result is:

Proposition. The system $\lambda\sigma$, augmented with the rewriting relation $c\eta$, is ground confluent.

In the proof of proposition 5.7, the following case is missing (I label the λ to ease the explanations).

Let S be a $c\eta$ -redex of the form $S \equiv \lambda_2((\lambda_1 a_1)1)$. By definition, $\lambda_1 a_1 = {}_o b[\uparrow]$ so $b = \lambda_1(b_1)$ and $a_1 = b_1[\uparrow(\uparrow)]$. Now, let $R = (\lambda_1 a_1)1$. We have to prove that $sim\eta$ and $sim\beta$ commute.

$$R \xrightarrow{(\text{Beta})} a_1[1.id] \text{ and } S \equiv \lambda_2((\lambda_1 a_1)1) \xrightarrow{(\text{Beta})} \lambda_2(a_1[1.id]). \text{ Now, } S \xrightarrow{c\eta} \lambda_1(b_1).$$

We have to prove that $a_1[1.id] = {}_o b_1$, so to prove that $b_1[\uparrow(\uparrow)][1.id] = {}_o b_1$. But, $b_1[\uparrow(\uparrow)][1.id] = {}_s b_1[1.\uparrow]$ and it is not true in general that $b_1 = {}_s b_1[1.\uparrow]$. However, this equality remains true if b_1 is a ground term, by applying the interpretation method.