Corrections to "Preorders on Monads and Coalgebraic Simulations"

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After Example 3, p.2

Wrong "enrichment is pointwise, that is, $(\forall x \in \mathbf{Set}_{\mathcal{T}}(1, I) \,.\, f^{\#} \circ x \sqsubseteq_{1,J} g^{\#} \circ x)$ implies ..."

Correct "enrichment is pointwise, that is, $(\forall i \in I \,.\, f \bullet (\lambda * \,.\, \eta_I(i)) \sqsubseteq_{1,J} g \bullet (\lambda * \,.\, \eta_I(i)))$ implies ..." Here, $\lambda * \,.\, \eta_I(i)$ is the function of type $1 \to TI$ mapping $* \in 1$ to $\eta_I(i)$.

Proof of Lemma 1, p. 7 The proof in the paper only covers the case when $I \neq \emptyset$. We thus cover the case $I = \emptyset$ below. From $x[\sqsubseteq_J]^J_\emptyset y$, we have $!^{\#}_{TJ}(x) \sqsubseteq_J !^{\#}_{TJ}(y)$; here $!_{TJ} : \emptyset \to TJ$ is the unique function. Define a function $t : J \to T\emptyset$ by $t = \lambda j \in J \,.\, x$. From the substitutivity of $\sqsubseteq$, we have $t^{\#}(!^{\#}_{TJ}(x)) \sqsubseteq_\emptyset t^{\#}(!^{\#}_{TJ}(y))$. Now $t^{\#} \circ !^{\#}_{TJ} = (t^{\#} \circ !_{TJ})^{\#} = !^{\#}_{T\emptyset} = \eta^{\#}_\emptyset = \mathrm{id}_{T\emptyset}$. Therefore $x \sqsubseteq_\emptyset y$.

Equation (4) of Theorem 11, p.15

Wrong "... $\Longrightarrow \exists z \in TR \,.\, \forall x \in X, y \in Y \,.\, x \leq z \wedge z \leq y$"

Correct "... $\Longrightarrow \exists z \in TR \,.\, (\forall x \in X \,.\, x \leq z) \wedge (\forall y \in Y \,.\, z \leq y)$"

References

[1] Shin-ya Katsumata and Tetsuya Sato. Preorders on Monads and Coalgebraic Simulations. In Proc. FoSSaCS 2013, LNCS 7794, pp.145–160, Springer, Heidelberg, 2013.