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CORRIGENDUM

ON INFINITE COMPUTATIONS IN DENOTATIONAL SEMANTICS

J.W. DE BAKKER

Department of Computer Science, Mathematical Center, 1098 SJ Amsterdam, The Netherlands

J.-J. Ch. MEYER

Department of Mathematics and Computer Science, Free University, 1081 HV Amsterdam, The Netherlands

J.I. ZUCKER

Department of Computer Science, State University of New York, Buffalo, NY 14226, U.S.A.

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We are indebted to colleagues and students of the University of Utrecht for pointing out to us the following two errors in our paper.

(1) The formalism to determine the finite and infinite parts as it is presented fails to work properly with respect to the abort statement Δ, due to the strictness of the semantic functions regarding the state δ. Technically this problem can be resolved by deleting this strictness and defining the following:

(a) $\delta\{\alpha/x\} = \delta$, i.e., modifications of the δ-state yield δ itself,

(b) $\mathcal{W}(b)(\delta) = ff$, which implies that for instance $\mathcal{R}(\textbf{false})(\delta) = \emptyset$ by Definition 2.4(c).

However, we appreciate that one may object that the operational intuition behind this resolution is less clear; one would perhaps expect that a boolean statement (e.g. **false**) to be performed in δ should leave a trace of δ in the resulting set of states.

(2) Lemma 2.3 as it stands is incorrect. In fact, for a chain $\langle \tau_i \rangle_i$ with $\tau_i \in \Theta$ we do not necessarily have that its lub exists (take, e.g., $\tau_i \in \Theta$ such that $\perp \notin \tau_i$ and such that $\bigcup_i \tau_i$ is infinite). What we need as ordering on Θ is the (usual) Egli–Milner ordering $\sqsubseteq_{\mathrm{EM}}$ defined by $\tau_1 \sqsubseteq_{\mathrm{EM}} \tau_2$ iff either $\perp \notin \tau_1$ and $\tau_1 \backslash \{\perp\} \subseteq \tau_2$ or $\perp \notin \tau_1$ and $\tau_1 = \tau_2$. It is well known (see, e.g., [4]) that Θ is a cpo with respect to $\sqsubseteq_{\mathrm{EM}}$, and

that the operations $\hat{}$, $\circ$ and $\cup$ are continuous with respect to $\sqsubseteq_{EM}$. However, on $\mathcal{P}(\Sigma)$ we need the more general ordering, say $\sqsubseteq_G$, as given in Definition 2.2(a): $\tau_1 \sqsubseteq_G \tau_2$ iff $\bot \in \tau_1$ and $\tau_1 \backslash \{\bot\} \subseteq \tau_2$, or $\bot \notin \tau_1$ and $\tau_1 \subseteq \tau_2$ and $\bot \notin \tau_2$. This ensures that the following is satisfied:

(a) $\tau_1 \subseteq \tau_2$ implies $\tau_1 \sqsubseteq_G \tau_2$ for sets τ_1, τ_2 that do not contain $\bot$,

(b) $\tau_1 \sqsubseteq_{EM} \tau_2$ implies $\tau_1 \sqsubseteq_G \tau_2$ for all sets $\tau_1, \tau_2 \in \Theta$,

(c) $(\mathcal{P}(\Sigma), \sqsubseteq_G)$ is a cpo, where a chain $\langle \tau_i \rangle_i$ has as lub

$$\bigsqcup\nolimits_G \tau_i = \begin{cases} \bigcup \tau_i & \text{if } \bot \in \tau_i \text{ for all } i, \\ (\bigcup \tau_i) \backslash \{\bot\} & \text{if } \bot \notin \tau_{i_0} \text{ for some } i_0, \end{cases}$$

and

(d) the operations $\hat{}$, $\circ$ and $\cup$ are monotonic with respect to $\sqsubseteq_G$.

We leave it to the reader to perform the corrections in Section 4 induced by the distinction between $\sqsubseteq_{EM}$ and $\sqsubseteq_G$. Note, in particular, that facts (a) and (b) are needed in the proof of Theorem 4.7(e).