Corrections

The following errors in the second edition have been called to my attention.

• Back cover: Andrew Pitts’s affiliation is printed as “University of Cambridge University Press” rather than “University of Cambridge.” (This is the only mistake that is not under my control!)

• Page 4: In the description of abt’s, operators with no children should also be deemed “leaves.”

• Page 23, after displayed formula (3.6), “even from rules (2.2)” should read “even from rules (2.8)”.


• Page 82, Section 10.3: the definition of the recursor should be

\[
\text{iter}\{\langle z, e_0 \rangle; x', \langle \text{s}(x' \cdot 1), [x' \cdot 1, x' \cdot r/x, y | e_1] e_1 \rangle \}(e).
\]

• Page 75, Exercise 9.6: “then e is also hereditarily terminating . . . ” should be “then e’ is also hereditarily terminating . . . ”.

• Page 82, last line: the type of the bound variable \(n\) is given as \(\text{nat} \times \text{nat}\), but should be \(\text{nat}\).

• Page 88, first paragraph: replace “induction” by “inductive”.

• Page 90, “which” in the abstract syntax should be “ifnull”, consistently with the concrete syntax.

• Page 107, \(u_1, \ldots, u_n\) should be \(u_1, \ldots, u_m\).
• Page 128 et seq.: Rules (15.2d), (15.4f), (15.6d), (15.9d), and (15.9h) lack premises to require that the principal argument be a value as a condition on taking a step.

• Page 128, Rule (15.2a): add an optional premise $e \text{ val}$, and an optional rule to evaluate $e$ if the introduction form is to be eager.

• Page 129, Rule (15.4a): add an optional premise $e \text{ val}$, and an optional rule to evaluate $e$ if the generator is to be eager.

• Page 129, Rule (15.6a): add an optional premise $e_2 \text{ val}$ and a corresponding rule to evaluate $e_2$ if the introduction form is to be eager.

• Page 140, Rule (16.4a): the type label on the $\lambda$ should be $\tau_1$, not $\tau$.

• Page 147, line 13: “identification convention”, not “identification covention”.

• Page 152, line -8: $\langle bs, fs' \rangle$ should be $\text{just}(\langle f, \langle bs, fs' \rangle \rangle)$.

• Page 162, line 3: “In other words $e$ is defined to be …” should be “In other words $f$ is defined to be ….”

• Page 171: “functio” should be “function.”

• Page 191, dynamics of application: either a by-name or by-value interpretation is possible.

• Page 191, Rule (22.4h): 0 should be $z$.

• Page 191, Rule (22.4i): $n + 1$ should be $s(n)$.

• Page 219, paragraph 2: should read: “serve as behavioral specifications”.

• Page 228, Section 25.3: “$\Phi_\Gamma \vdash a \in_\tau \phi$” should be “$\Phi_\Gamma \vdash e \in_\tau \phi$.”

• Page 261, Rule (29.3a): Conclusion should be $e \triangleright e$ initial.

• Page 265, Exercises 29.4 and 29.5 are orphaned: the modal formulation of exceptions is no longer presented in the text.

• Page 267, Section 30.1: $\tau \text{ cont cont}$ should be $\tau'$ cont cont.

• Page 268, rule 30.2: the premise should read “$k \div \tau$.”

• Page 288, Section 32.5: “…the name of the fluid …”

• Page 291, Section 33.1: “A dynamic class is a symbol that is generated …”
- Page 292, last paragraph: Revised per online edition to clarify discussion of disequality of names.
- Page 294, line 11: \( \text{isin} [a] (e; x, e_1; e_2) \) should be \( \text{isin} [a] (e; y, e_1; e_2) \) to align the variable name \( y \) with its definition to follow.
- Page 298, Exercises 33.3 and 33.4 depend on Exercises 29.4 and 29.5, which rely on the modal formulation of exceptions.
- Page 314, first display equation: the printed edition inexplicably has
  \[ \tau \cap \triangleq \tau \text{cmd} \times (\text{nat} \rightarrow \text{nat cmd}) \]
  which instead should be
  \[ \tau \cap \triangleq \tau \text{cmd} \times (\tau \rightarrow \tau \text{cmd}) \]
- Page 344, start of paragraph 2: should read: “finite mapping of the task names”.
- Pages 344-5: Rule 37.10(b) should have a premise \( \neg (e_2 \text{ val}) \) to prevent needless repetition. Rule 37.10(c) should send \( a_1 \) to \( e_1(e_2) \) in the result state, not to the senseless substitution instance.
- Page 366, Section 39.4, displayed example at end should be
- Page 380, displayed program has a missing use of \text{cmd}, should be
  \[ \text{fix loop: } \tau \text{cmd} \leftarrow \text{cmd} \{ x \leftarrow \text{acc}; \text{match} x \text{ as } a \cdot y \leftarrow \text{ret y ou} \leftarrow \text{emit}(x); \text{do loop} \} \]
- Page 381, Rules 4.10. There is no execution rule for \( \text{sync} (\text{never}) \), so that the intended, but unstated, progress theorem fails. A solution is to introduce a new action, say \#\#, representing synchronization on the never-occurring event, and to add the execution rule
  \[ \text{sync} (\text{never}) \#\# \xrightarrow{\Sigma} \text{sync} (\text{never}) \]
  The same correction applies to \text{DA}, which also has a null event.
- Page 387, Rule 41.2(b): Premise \( \Gamma \vdash e_1 : \tau_1 \text{cmd} @ w \) should be \( \Gamma \vdash e_1 : \text{cmd}[w](\tau_1) @ w. \)
- Page 389, Rule 41.6a: The process “\( \text{run}(m) \)” should be “\( \text{run}(\text{at}[w](m)) \)” to record the site of the spawned process.
- Page 390, Theorems 41.2 and 41.3, the transition judgments should be
  \[ p \xrightarrow{a@w} \Sigma \rightarrow p' \]
  the “\( w \)” should be above the transition arrow, not below it.
- Page 437, last paragraph: strike “obviously reflexive.” Reflexivity is exactly Theorem 46.13.
• Page 438, Section 46.1, definition of a congruence: require only that the relations be partial equivalence relations (symmetric and transitive, not necessarily reflexive).

• Page 442, proof of Lemma 46.16: Add “By Definition 46.8 and Lemma 46.11 . . . .” for clarity.

• Page 447, Section 47.3, “the following rule”.

• Page 448, Section 47.3, should be “…it is enough to show that $\hat{\gamma}(e_1) \sim_{\tau} \hat{\gamma}(e_1'), . . . .”

• Page 456, Section 48.2, statement and proof of Lemma 48.3, $\Delta, t$ should be $\Delta, t$ type.

• Page 459, Section 48.3, proof of Lemma 48.8: second $\rho$ should be $\rho'$:

$$d'[\rho'] \equiv_{[\rho'/t]\hat{\gamma}(\tau_2)} c'\left[\rho'\right].$$

• Page 462, line 8: the second occurrence of $\rho$ should be $\rho'$.

• Rules 12.9, 12.10a, 12.11a, and 12.11b revised to correct errors in premises.

$$(v \cdot (V_0 \otimes V_1)) \otimes U \rightarrow_{\Sigma} (v \cdot V_1 \otimes V_2) \otimes U \equiv v \cdot (V_1 \otimes V_2 \otimes U).$$

Improvements

The following changes improve the presentation in the text.

• Various places: ensure uniform use of “statics” and “dynamics” rather than “static semantics” and “dynamic semantics.”

• Chapter 6, Section 6.2: The statement and proof of the canonical forms lemma could be improved as follows:

Lemma 1 (Canonical Forms).

1. If $e : \text{num}$ and $e \text{ val}$, then $e = n$ for some number $n$.

2. If $e : \text{str}$ and $e \text{ val}$, then $e = "s"$ for some string $s$.

Proof. Each case is proved by induction on typing, making use of the definition of $e \text{ val}$. \hfill $\square$

• Chapter 11 and elsewhere: replace $\text{abort}(e)$ by $\text{case } e \{}$ to avoid the implication that “abort” causes a run-time fault, which it does not (and can not!).

• Page 130, the dynamics is specified to be lazy, though it is possible to specify both eager and lazy semantics using optional premises and rules. The rules given in Figure 1 do so.
Figure 1: Eager-or-Lazy Dynamics for Inductive and Coinductive Types
\[
\begin{align*}
\vdash \Sigma e : \text{clsfd} & \quad e \text{ val}_\Sigma \\
\vdash \Sigma !e \text{ proc} & \quad e \text{ val}_\Sigma \\
\text{emit}(e) & \quad \frac{e \text{ val}_\Sigma}{!} \\
\end{align*}
\]

Figure 2: Asynchronous Dynamics for Concurrent Algol

- Chapter 40 Concurrent Algol. The dynamics specifies \textit{synchronous} communication, in which an emit of a message does not terminate until the message has been received. An \textit{asynchronous} dynamics may be specified by making the alterations given in Figure 2. These rules define an asynchronous send process, and re-define the dynamics of emit to create such a process.

- Section 33.2. It would be more suggestive to write \texttt{inref}(e_1;e_2) in place of \texttt{mk}(e_1;e_2) to stress its role as the dynamic analogue of \texttt{in}[a](e), much as \texttt{getref}(e) is the dynamic analogue of \texttt{get}[a] for assignables.

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