The Theory of Quantum Information

Errata

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The following list of errata are for the version of the book published by Cambridge University Press. There are some additional typos in the manuscript available from my web page, as that version did not undergo professional copy-editing.

Please do not hesitate to let me know if you find other mistakes (either in the published or the manuscript version), by email to watrous@uwaterloo.ca.

1. Page 107: ρ should be replaced by τ in Equation 2.230.
2. Page 117: In the last line of the proof of Corollary 2.50, $\alpha \in \mathbb{C}$ should be replaced by $\alpha \in \mathbb{R}$.
3. Pages 183–184: The implication of Theorem 3.56 should read that

   $$\left|\left|\left|\Phi - \mathbb{1}_{\mathrm{L}(\mathcal{X})}\right|\right|\right|_1 \leq 2\sqrt{\varepsilon},$$

   rather than $\sqrt{2\varepsilon}$ on the right-hand side.

   The error occurs in the second line of Equation 3.333; each term of the sum is upper-bounded by ε, from which one may conclude that

   $$\| \Phi(uv^*) - uv^* \| \leq \varepsilon,$$

   as opposed to $\varepsilon/2$, implying that

   $$|\langle uv^*, \Phi(uv^*) - uv^* \rangle| \leq \varepsilon,$$

   as opposed to $\varepsilon/2$. Carrying this correction through the proof results in the additional factor of $\sqrt{2}$ in the theorem statement.

   The error propagates to Theorem 8.45, where one must take $\varepsilon = 4\sqrt{2}\delta^{1/4}$ rather than $\varepsilon = 4\delta^{1/4}$, and in turn a minor adjustment is required in the choice of δ in the proof of Theorem 8.46 on page 518.

4. Page 191: It is stated that, by Theorem 2.22, a complex Euclidean space $\mathcal{Z}$ admits a Stinespring representation of the form shown in Equation 3.367 if and only if the dimension of $\mathcal{Z}$ is at least the Choi rank of Φ. The statement is true, but it is not established by Theorem 2.22, which only concerns completely positive maps.

   The fact that a representation of the form given in Equation 3.367 implies that the dimension of $\mathcal{Z}$ is at least the Choi rank of Φ follows from the equivalence of this representation with Equation 3.368, together with the observation that the right-hand side of that equation may have rank at most the dimension of $\mathcal{Z}$. Conversely, the fact that a representation of the form given in Equation 3.367 exists whenever $\dim(\mathcal{Z}) \geq \operatorname{rank}(J(\Phi))$ is implied by Corollary 2.21.

5. Page 319: In Example 6.10, the trivial case that $n = |\Sigma| = 1$ should be excluded for the part of the example concerning Werner states, to avoid division by $\binom{n}{2} = 0$.

6. Page 321: the inequality immediately before Equation 6.66 should read

$$(\Phi \otimes \mathbb{1}_{\mathrm{L}(\mathcal{Y})})(H) \leq \mathbb{1}_{\mathcal{Y}} \otimes \mathbb{1}_{\mathcal{Y}},$$

   rather than $\mathbb{1}_{\mathcal{X}} \otimes \mathbb{1}_{\mathcal{Y}}$ on the right-hand side, and similarly Equation 6.66 should read

$$(\Phi \otimes \mathbb{1}_{\mathrm{L}(\mathcal{Y})})(\mathbb{1}_{\mathcal{X}} \otimes \mathbb{1}_{\mathcal{Y}} - H) = \mathbb{1}_{\mathcal{Y}} \otimes \mathbb{1}_{\mathcal{Y}} - (\Phi \otimes \mathbb{1}_{\mathrm{L}(\mathcal{Y})})(H) \geq 0.$$

7. Page 325: First subsubsection title should be "Separable maps and channels," not "Separable map and channels."

8. Page 325: Φ should be replaced by Ξ in Equation 6.87.

9. Page 348: V_n^* should be replaced by U_n^* in the second inequality in Equation 6.223, so that it reads

$$\mathrm{F}\big(\Psi_n(U_n \rho^{\otimes n} U_n^*), V_k \tau^{\otimes k} V_k^*\big) > 1 - \varepsilon.$$

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