

Appendix: Omitted label computations

This Appendix contains, for the sake of completeness and reference, computations of labels that have been omitted from the main body of the paper. The authors propose to remove the appendix for the final version of the paper.

Label calculations for the proof of Lemma 6.4

$$A(P) = [1, r+2] \setminus \{k+1, k+l+2\},$$

$$A(Q) = [1, r+2] \setminus \{k+2, k+l+2\},$$

$$\rho_{A(P)}|_{[1,r]} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k], \\ i+1, & \text{if } i \in [k+1, k+l], \\ i+2, & \text{if } i \in [k+l+1, r], \end{cases}$$

$$\rho_{A(Q)}|_{[1,r]} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k+1], \\ i+1, & \text{if } i \in [k+2, k+l], \\ i+2, & \text{if } i \in [k+l+1, r], \end{cases}$$

$$\rho_A^{-1}|_A : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-1, & \text{if } i \in [k+1, k+l+1], \\ i-2, & \text{if } i \in [k+l+3, r+2], \end{cases}$$

$$\rho_B^{-1}|_B : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k, & \text{if } i = k+1, \\ i-2, & \text{if } i \in [k+3, r+2], \end{cases}$$

$$\gamma_{P,A} : i \mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+1, k+l+2\}, \\ i+1, & \text{if } i = k, \end{cases}$$

$$\gamma_{P,B} : i \mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+1, k+2, k+l+2\}, \\ k+1, & \text{if } i = k, \\ k+l+2, & \text{if } i = k+2, \end{cases}$$

$$\gamma_{Q,A} : i \mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+2, k+l+2\}, \\ k+2, & \text{if } i = k, \end{cases}$$

$$\gamma_{Q,B} : i \mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+2, k+l+2\}, \\ k+l+2, & \text{if } i = k, \end{cases}$$

$$\lambda(P, A) = \rho_{A(P)}|_{[1,r]} \circ \gamma_{P,A} \circ \rho_A^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k, & \text{if } i = k, \\ i, & \text{if } i \in [k+1, k+l], \\ i, & \text{if } i \in [k+l+1, r], \end{cases}$$

$$\lambda(P, B) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,B} \rho_B^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k, & \text{if } i = k, \\ k+l, & \text{if } i = k+1, \\ i-1, & \text{if } i \in [k+2, k+l], \\ i, & \text{if } i \in [k+l+1, r], \end{cases}$$

$$\lambda(Q, A) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,A} \rho_A^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, k+l], \\ i, & \text{if } i \in [k+l+1, r], \end{cases}$$

$$\lambda(Q, B) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,B} \rho_B^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+l, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i-1, & \text{if } i \in [k+2, k+l], \\ i, & \text{if } i \in [k+l+1, r]. \end{cases}$$

Label calculations for the proof of Lemma 7.1

$$A(P) = \{p_1, \dots, p_r\},$$

$$A(Q) = \{p_1, \dots, p_{v-1}, a_{l_{v+1}}, \dots, a_{l_{v+w}}, a_{l_v}, a_{l_{v+w+1}}, \dots, a_{l_r}\} (= B),$$

$$\rho_{A(P)} \upharpoonright_{[1,r]} : i \mapsto p_i \ (i \in [1, r]),$$

$$\rho_{A(Q)} \upharpoonright_{[1,r]} : i \mapsto \begin{cases} p_i, & \text{for } i \in [1, v-1], \\ a_{l_{i+1}}, & \text{for } i \in [v, v+w-1], \\ a_{l_v}, & \text{for } i = v+w, \\ a_{l_i}, & \text{for } i \in [v+w+1, r], \end{cases}$$

$$\rho_A^{-1} \upharpoonright_A : a_{l_i} \mapsto l_i \ (i \in [1, r]),$$

$$\rho_B^{-1} \upharpoonright_B : x \mapsto \begin{cases} i, & \text{if } x = p_i, i \in [1, v-1], \\ i-1, & \text{if } x = a_{l_i}, i \in [v+1, v+w], \\ v+w, & \text{if } x = a_{l_v}, \\ i, & \text{if } x = a_{l_i}, i \in [v+w+1, r], \end{cases}$$

$$\gamma_{P,B} : p_i \mapsto \begin{cases} p_i, & \text{if } i \in [1, v-1], \\ a_{l_i}, & \text{if } i \in [v, r], \end{cases}$$

$$\gamma_{Q,A} : x \mapsto \begin{cases} a_{l_i}, & \text{if } x = p_i, i \in [1, v-1], \\ a_{l_i} & \text{if } x = a_{l_i}, i \in [v, r], \end{cases}$$

$$\begin{aligned}
\gamma_{Q,B} : x \mapsto & \begin{cases} p_i, & \text{if } x = p_i, i \in [1, v-1], \\ a_{l_i}, & \text{if } x = a_{l_i}, i \in [v, r], \end{cases} \\
\lambda(P, B) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,B} \rho_B^{-1} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, v-1], \\ v+w, & \text{if } i = v, \\ i-1, & \text{if } i \in [v+1, v+w], \\ i, & \text{if } i \in [v+w+1, r], \end{cases} \\
\lambda(Q, A) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,A} \rho_A^{-1} : i \mapsto & \begin{cases} l_i, & \text{if } i \in [1, v-1], \\ l_{i+1}, & \text{if } i \in [v, v+w-1], \\ l_v, & \text{if } i = v+w, \\ l_i, & \text{if } i \in [v+w+1, r], \end{cases} \\
\lambda(Q, B) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,B} \rho_B^{-1} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, v-1], \\ i, & \text{if } i \in [v, v+w-1], \\ v+w, & \text{if } i = v+w, \\ i, & \text{if } i \in [v+w+1, r]. \end{cases}
\end{aligned}$$

Label calculations for the proof of Lemma 8.1

$$\begin{aligned}
A(P) &= [1, r+2] \setminus \{k+2, k+3\}, \\
A(Q) &= [1, r+2] \setminus \{k, k+3\} (= A), \\
\rho_{A(P)} \upharpoonright_{[1,r]} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k+1], \\ i+2, & \text{if } i \in [k+2, r], \end{cases} \\
\rho_{A(Q)} \upharpoonright_{[1,r]} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ i+1, & \text{if } i \in \{k, k+1\}, \\ i+2, & \text{if } i \in [k+2, r], \end{cases} \\
\rho_A^{-1} \upharpoonright_A : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-1, & \text{if } i \in \{k+1, k+2\}, \\ i-2, & \text{if } i \in [k+4, r+2], \end{cases} \\
\rho_B^{-1} \upharpoonright_B : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-2, & \text{if } i \in \{k+2, r+2\}, \end{cases} \\
\gamma_{P,A} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+2, & \text{if } i = k, \\ k+1, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+4, r+2], \end{cases}
\end{aligned}$$

$$\begin{aligned}
\gamma_{P,B} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+2, & \text{if } i = k, \\ k+3, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+4, r+2], \end{cases} \\
\gamma_{Q,A} : i \mapsto & i \ (i \in [1, r+2] \setminus \{k, k+3\}), \\
\gamma_{Q,B} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+3, & \text{if } i = k+1, \\ k+2, & \text{if } i = k+2, \\ i, & \text{if } i \in [k+4, r+2], \end{cases} \\
\lambda(P, A) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,A} \rho_A^{-1} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, r], \end{cases} \\
\lambda(P, B) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,B} \rho_B^{-1} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k, & \text{if } i = k, \\ k+1, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, r], \end{cases} \\
\lambda(Q, A) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,A} \rho_A^{-1} : i \mapsto & i \ (i \in [1, r]), \\
\lambda(Q, B) = \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,B} \rho_B^{-1} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, r]. \end{cases}
\end{aligned}$$

Label calculations for the proof of Lemma 8.2

$$\begin{aligned}
A(P) &= [1, r+2] \setminus \{k+2, l+1\} \ (= A), \\
A(Q) &= [1, r+2] \setminus \{k+2, l+3\}, \\
A(R) &= [1, r+2] \setminus \{k, k+3\} \ (= C), \\
\rho_{A(P)} \upharpoonright_{[1,r]} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k+1], \\ i+1, & \text{if } i \in [k+2, l-1], \\ i+2, & \text{if } i \in [l, r], \end{cases} \\
\rho_{A(Q)} \upharpoonright_{[1,r]} : i \mapsto & \begin{cases} i, & \text{if } i \in [1, k+1], \\ i+1, & \text{if } i \in [k+2, l+1], \\ i+2, & \text{if } i \in [l+2, r], \end{cases}
\end{aligned}$$

$$\begin{aligned}
\rho_{A(R)} \upharpoonright_{[1,r]} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i+1, & \text{if } i \in [k, l+1], \\ i+2, & \text{if } i \in [l+2, r], \end{cases} \\
\rho_A^{-1} \upharpoonright_A : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k+1], \\ i-1, & \text{if } i \in [k+3, l], \\ i-2, & \text{if } i \in [l+2, r+2], \end{cases} \\
\rho_B^{-1} \upharpoonright_B : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-1, & \text{if } i \in [k+1, l], \\ i-2, & \text{if } i \in [l+2, r+2], \end{cases} \\
\rho_C^{-1} \upharpoonright_C : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-1, & \text{if } i \in [k+1, l+2], \\ i-2, & \text{if } i \in [l+4, r+2], \end{cases} \\
\gamma_{P,A} : i &\mapsto i \ (i \in [1, r+2] \setminus \{k+2, l+1\}), \\
\gamma_{P,B} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+2, l+1\}, \\ k+2, & \text{if } i = k, \end{cases} \\
\gamma_{Q,A} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k+2, l+1, l+3\}, \\ l+3, & \text{if } i = l+1, \end{cases} \\
\gamma_{Q,B} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+2, l+1, l+3\}, \\ k+2, & \text{if } i = k, \\ l+3, & \text{if } i = l+1, \end{cases} \\
\gamma_{Q,C} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+2, l+3\}, \\ k+2, & \text{if } i = k, \end{cases} \\
\gamma_{R,B} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, l+1, l+3\}, \\ l+3, & \text{if } i = l+1, \end{cases} \\
\gamma_{R,C} : i &\mapsto i \ (i \in [1, r+2] \setminus \{k, l+3\}), \\
\lambda(P, A) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,A} \rho_A^{-1} : i &\mapsto i \ (i \in [1, r]), \\
\lambda(P, B) = \rho_{A(P)} \upharpoonright_{[1,r]} \gamma_{P,B} \rho_B^{-1} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, l-1], \\ i, & \text{if } i \in [l, r], \end{cases}
\end{aligned}$$

$$\begin{aligned}
\lambda(Q, A) &= \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,A} \rho_A^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k+1], \\ i, & \text{if } i \in [k+2, l-1], \\ l+1, & \text{if } i = l, \\ l, & \text{if } i = l+1, \\ i, & \text{if } i \in [l+2, r], \end{cases} \\
\lambda(Q, B) &= \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,B} \rho_B^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, l-1], \\ l+1, & \text{if } i = l, \\ l, & \text{if } i = l+1, \\ i, & \text{if } i \in [l+2, r], \end{cases} \\
\lambda(Q, C) &= \rho_{A(Q)} \upharpoonright_{[1,r]} \gamma_{Q,C} \rho_C^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+1, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ i, & \text{if } i \in [k+2, l+1], \\ i, & \text{if } i \in [l+2, r], \end{cases} \\
\lambda(R, B) &= \rho_{A(R)} \upharpoonright_{[1,r]} \gamma_{R,B} \rho_B^{-1} : i \mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i, & \text{if } i \in [k, l-1], \\ l+1, & \text{if } i = l, \\ l, & \text{if } i = l+1, \\ i, & \text{if } i \in [l+2, r], \end{cases} \\
\lambda(R, C) &= \rho_{A(R)} \upharpoonright_{[1,r]} \gamma_{R,C} \rho_C^{-1} : i \mapsto i \ (i \in [1, r+2] \setminus \{k, l+3\}).
\end{aligned}$$

Label calculations for the proof of Lemma 8.3

$$\begin{aligned}
A(P) &= [1, r+2] \setminus \{k+1, k+4\} \ (= A), \\
A(Q) &= [1, r+2] \setminus \{k+3, k+4\}, \\
\rho_{A(P)} \upharpoonright_{[1,r]} : i \mapsto &\begin{cases} i, & \text{if } i \in [1, k], \\ i+1, & \text{if } i \in \{k+1, k+2\}, \\ i+2, & \text{if } i \in [k+3, r], \end{cases} \\
\rho_{A(Q)} \upharpoonright_{[1,r]} : i \mapsto &\begin{cases} i, & \text{if } i \in [1, k+2], \\ i+2, & \text{if } i \in [k+3, r], \end{cases}
\end{aligned}$$

$$\begin{aligned}
\rho_A^{-1}|_A : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k], \\ i-1, & \text{if } i \in \{k+2, k+3\}, \\ i-2, & \text{if } i \in [k+5, r+2], \end{cases} \\
\rho_B^{-1}|_B : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ i-2, & \text{if } i \in [k+2, r+2], \end{cases} \\
\gamma_{P,A} : i &\mapsto i \ (i \in [1, r+2] \setminus \{k+1, k+4\}), \\
\gamma_{P,B} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+1, k+4\}, \\ k+4, & \text{if } i = k, \end{cases} \\
\gamma_{Q,A} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k+1, k+3, k+4\}, \\ k+3, & \text{if } i = k+1, \end{cases} \\
\gamma_{Q,B} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, r+2] \setminus \{k, k+1, k+3, k+4\}, \\ k+4, & \text{if } i = k, \\ k+3, & \text{if } i = k+1, \end{cases} \\
\lambda(P, A) = \rho_{A(P)}|_{[1,r]} \gamma_{P,A} \rho_A^{-1} : i &\mapsto i \ (i \in [1, r]), \\
\lambda(P, B) = \rho_{A(P)}|_{[1,r]} \gamma_{P,B} \rho_B^{-1} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+2, & \text{if } i = k, \\ k, & \text{if } i = k+1, \\ k+1, & \text{if } i = k+2, \\ i, & \text{if } i \in [k+3, r], \end{cases} \\
\lambda(Q, A) = \rho_{A(Q)}|_{[1,r]} \gamma_{Q,A} \rho_A^{-1} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k, & \text{if } i = k, \\ k+2, & \text{if } i = k+1, \\ k+1, & \text{if } i = k+2, \\ i, & \text{if } i \in [k+3, r], \end{cases} \\
\lambda(Q, B) = \rho_{A(Q)}|_{[1,r]} \gamma_{Q,B} \rho_B^{-1} : i &\mapsto \begin{cases} i, & \text{if } i \in [1, k-1], \\ k+2, & \text{if } i = k, \\ k+1, & \text{if } i = k+1, \\ k, & \text{if } i = k+2, \\ i, & \text{if } i \in [k+3, r]. \end{cases}
\end{aligned}$$