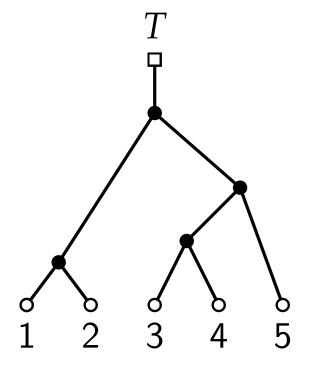
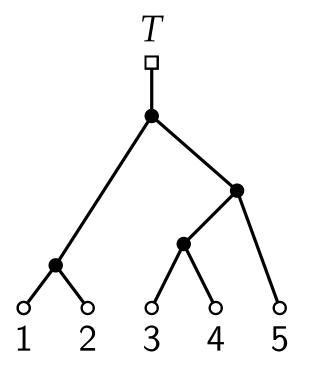
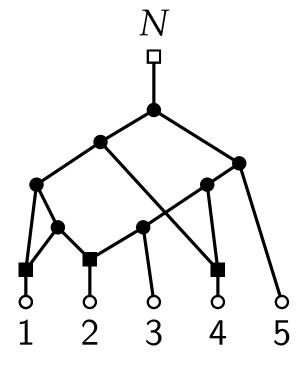
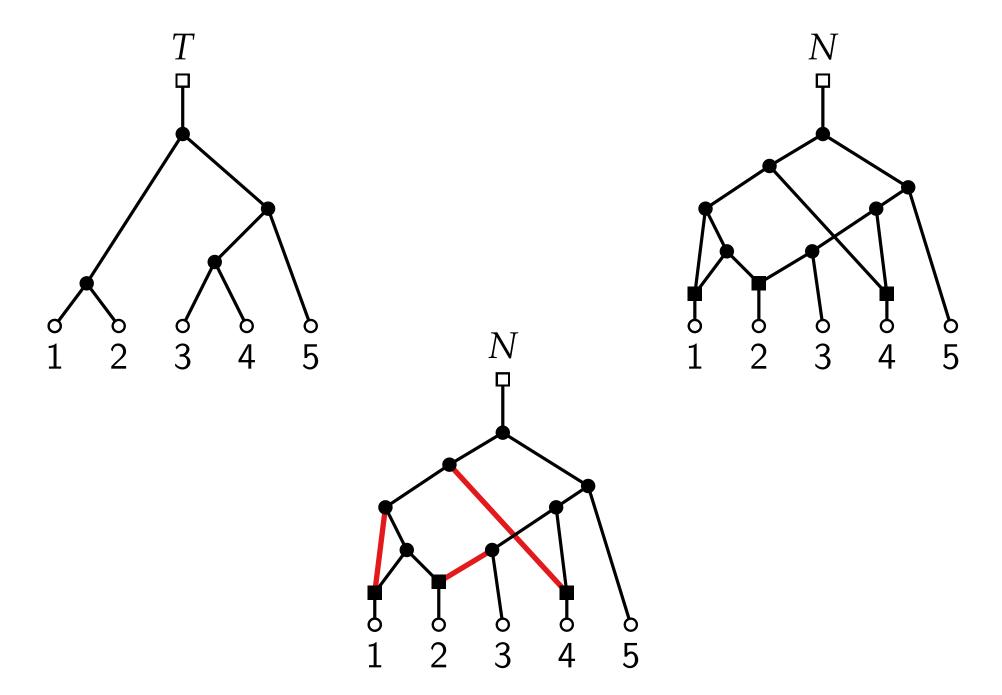
Drawing Tree-Based Phylogenetic Networks with Minimum Number of Crossings

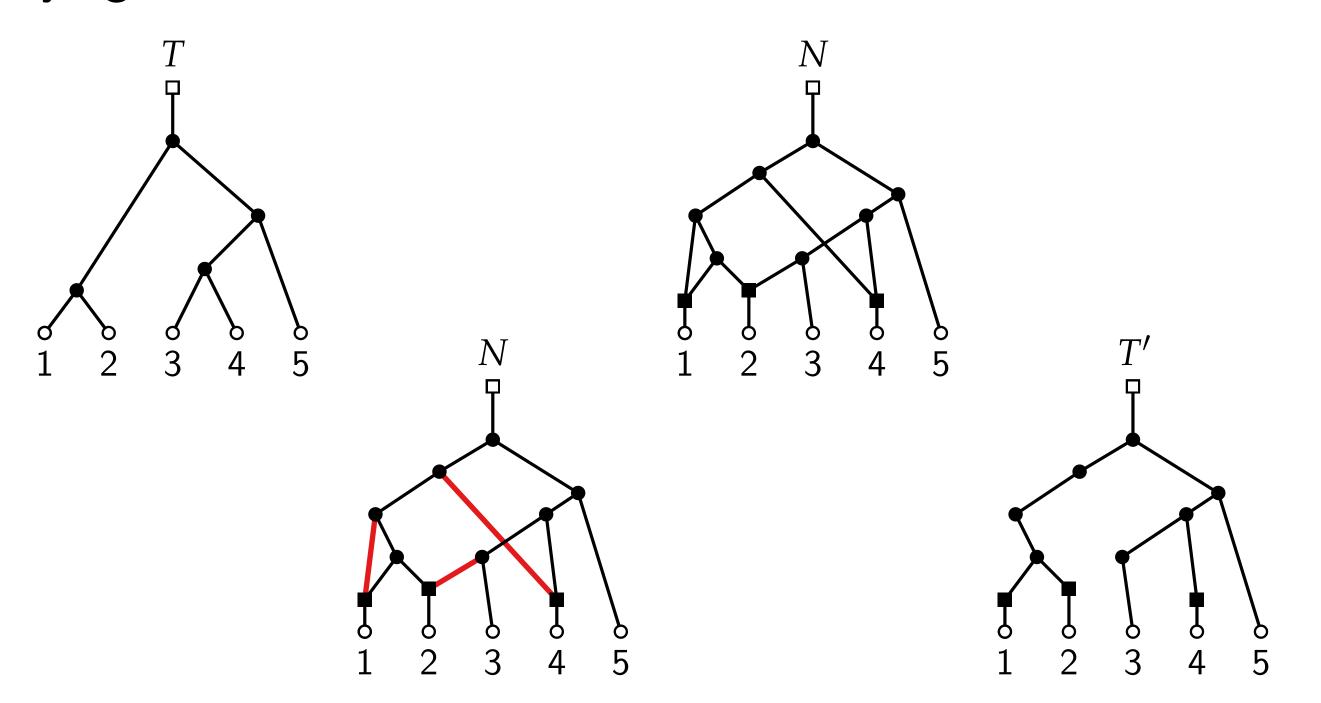
Jonathan Klawitter · Peter Stumpf
GD 2020

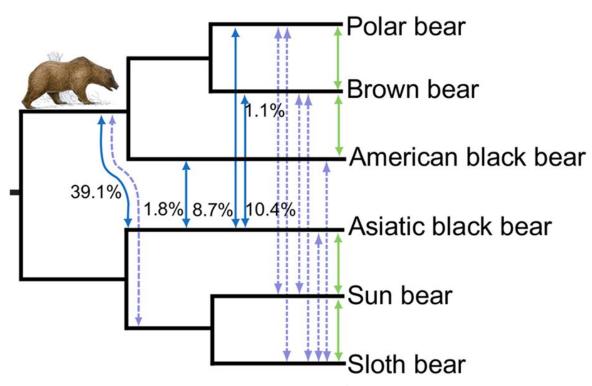




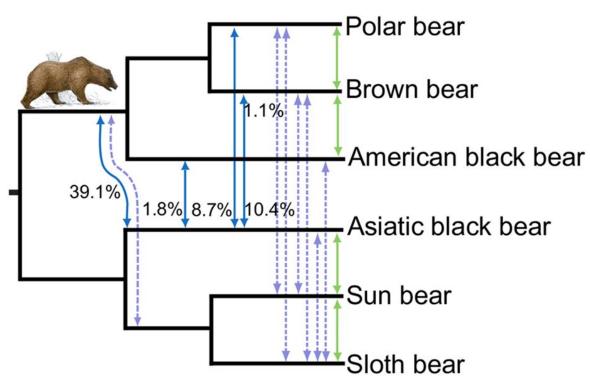






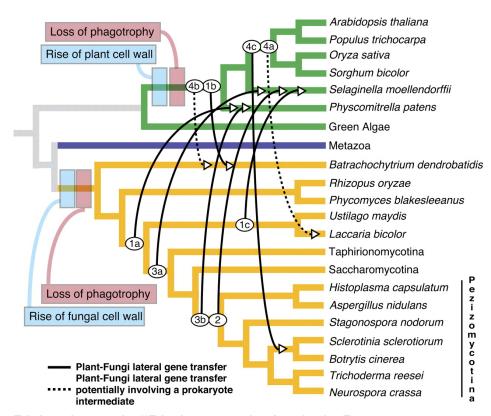


Kumar et al. "The evolutionary history of bears is characterized by gene flow across species"

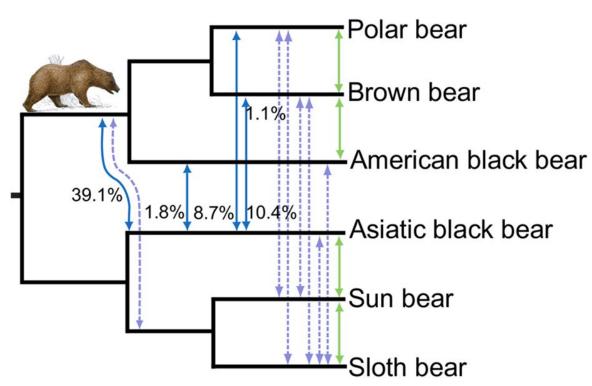


Kumar et al. "The evolutionary history of bears is characterized by gene flow across species"

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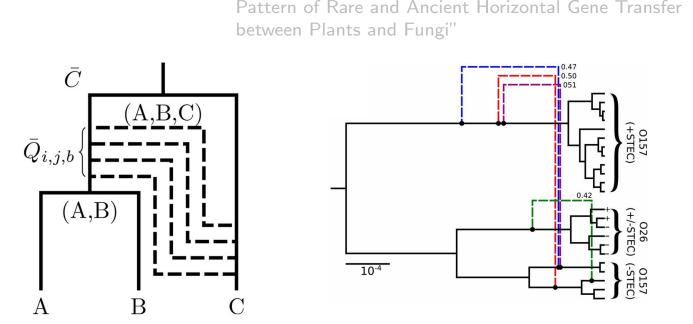


Richards et al. "Phylogenomic Analysis Demonstrates a Pattern of Rare and Ancient Horizontal Gene Transfer between Plants and Fungi"



Kumar et al. "The evolutionary history of bears is characterized by gene flow across species"

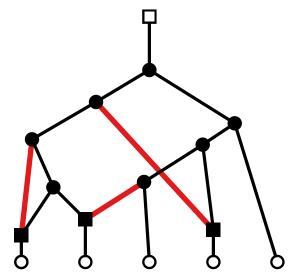
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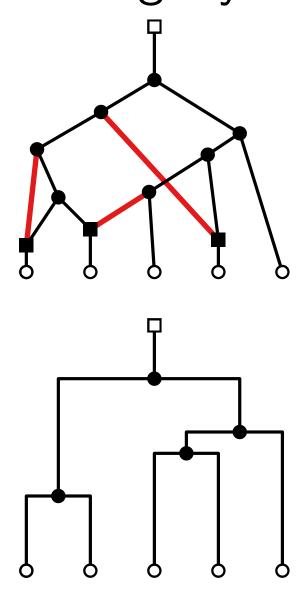


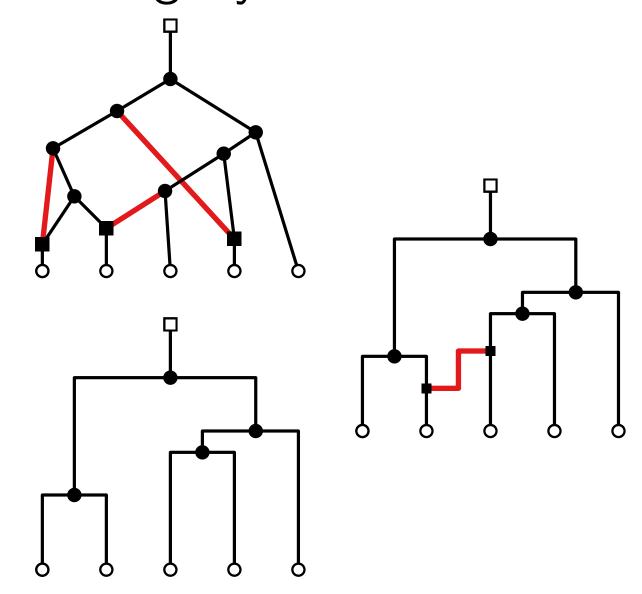
Vaughan et al. "Inferring Ancestral Recombination Graphs from Bacterial Genomic Data"

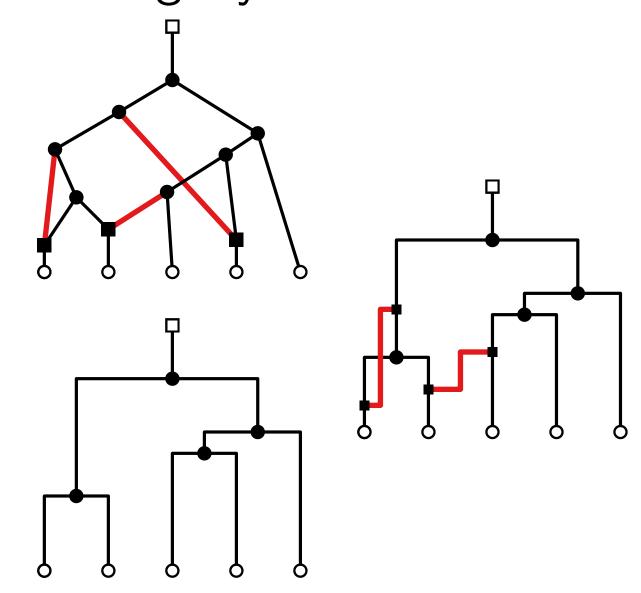
Arabidopsis thaliana Loss of phagotrophy Populus trichocarpa Rise of plant cell wall Oryza sativa Sorghum bicolor Selaginella moellendorffii Physcomitrella patens Green Algae Metazoa Batrachochytrium dendrobatidis Rhizopus oryzae Phycomyces blakesleeanus Ustilago maydis Laccaria bicolor Taphirionomycotina Saccharomycotina Histoplasma capsulatum Loss of phagotrophy Aspergillus nidulans Rise of fungal cell wall 3b(2) Stagonospora nodorum Sclerotinia sclerotiorum Botrytis cinerea Plant-Fungi lateral gene transfer Trichoderma reesei Plant-Fungi lateral gene transfer potentially involving a prokaryote Neurospora crassa

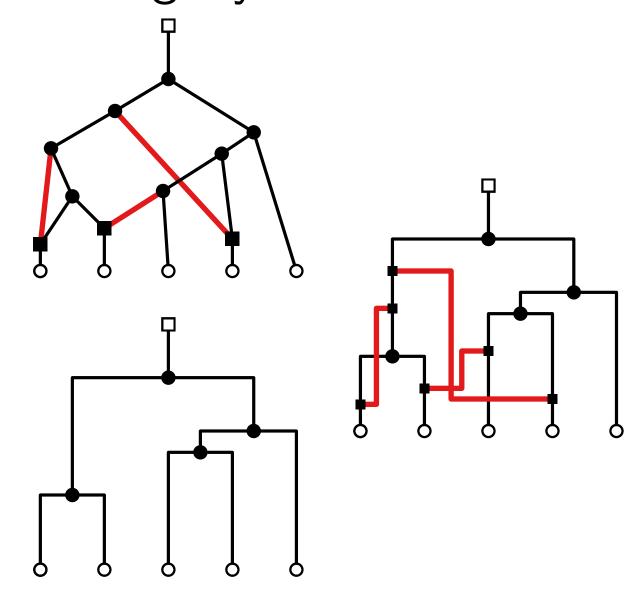
Richards et al. "Phylogenomic Analysis Demonstrates a Pattern of Rare and Ancient Horizontal Gene Transfer

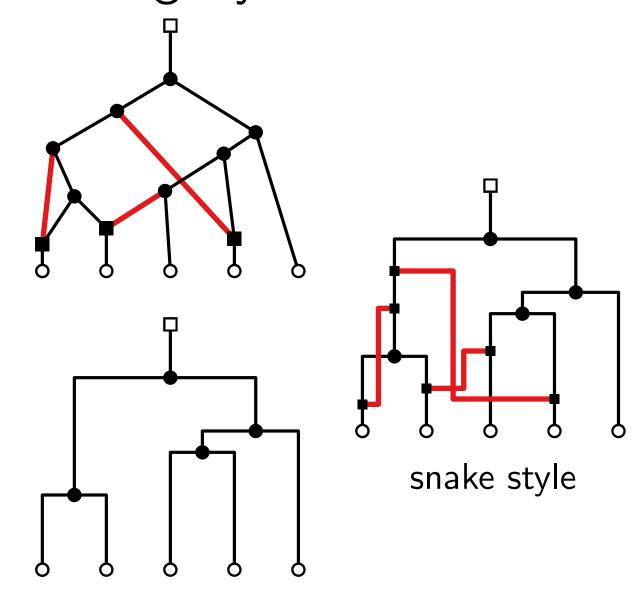


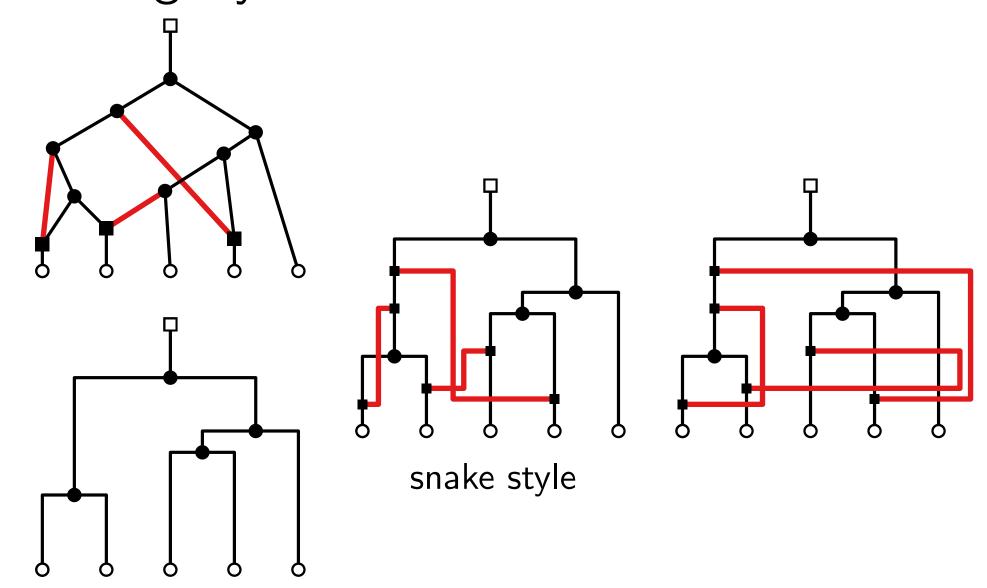


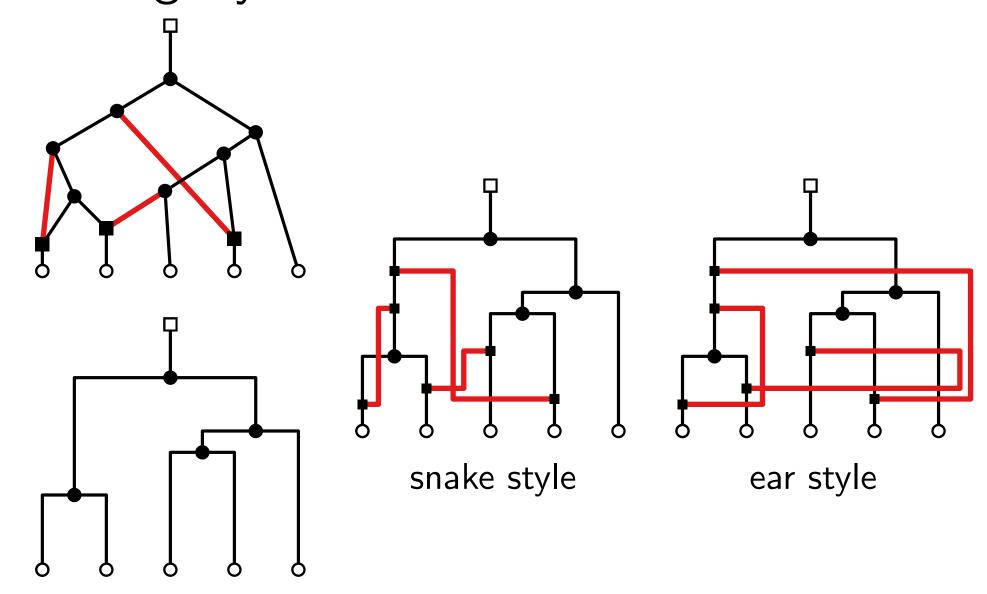


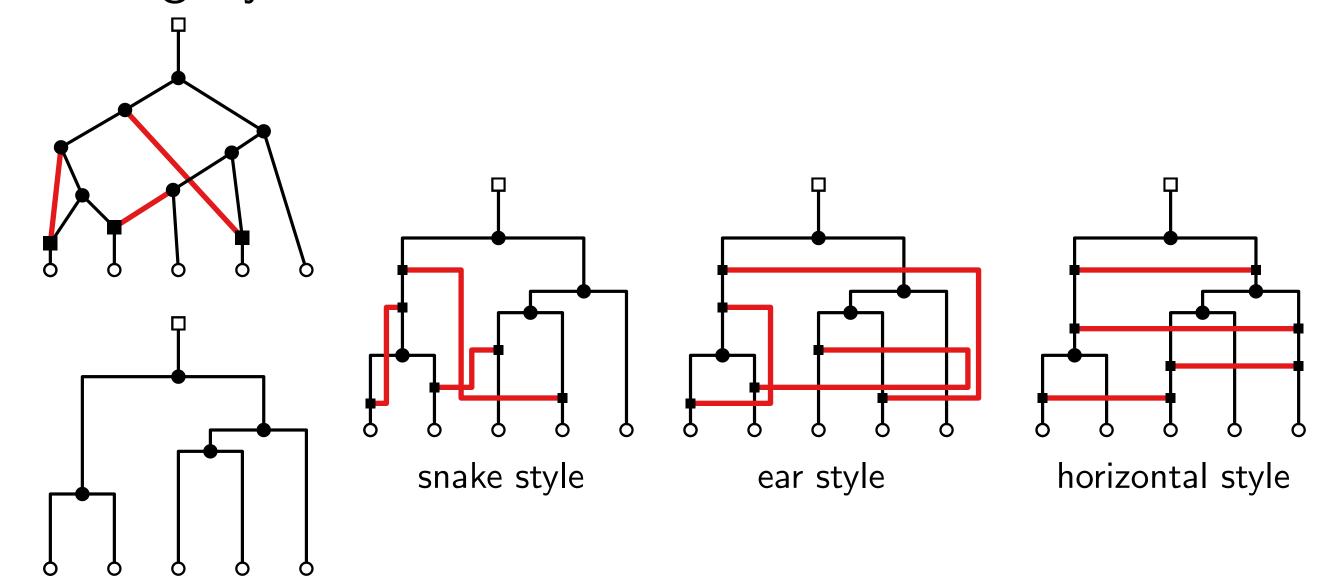


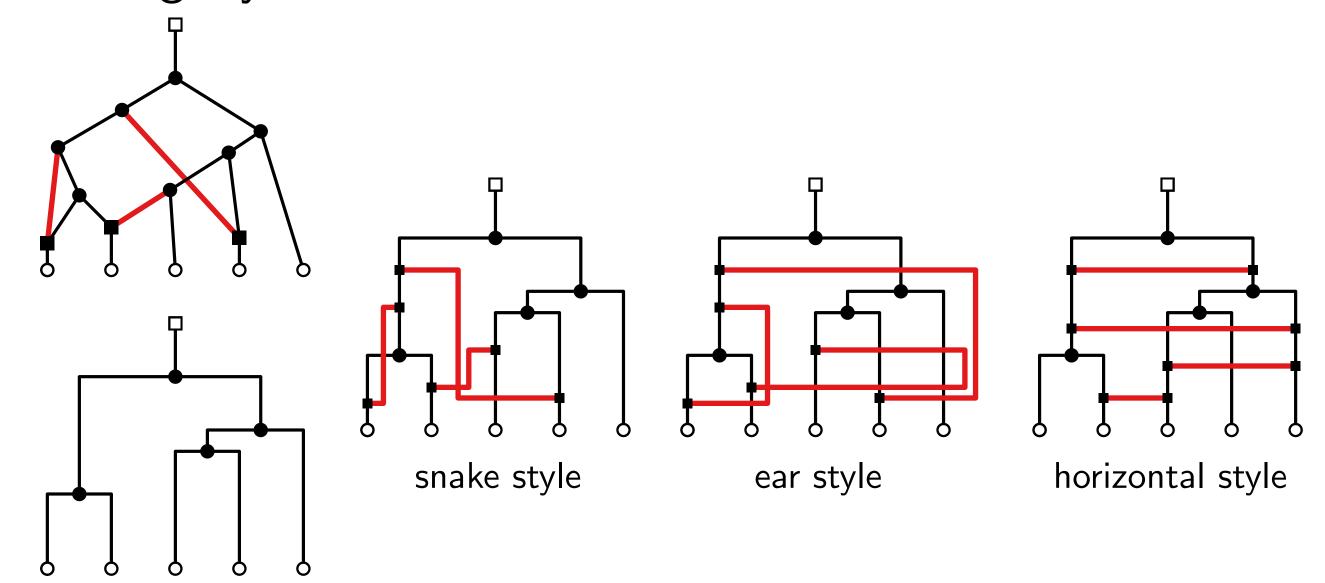


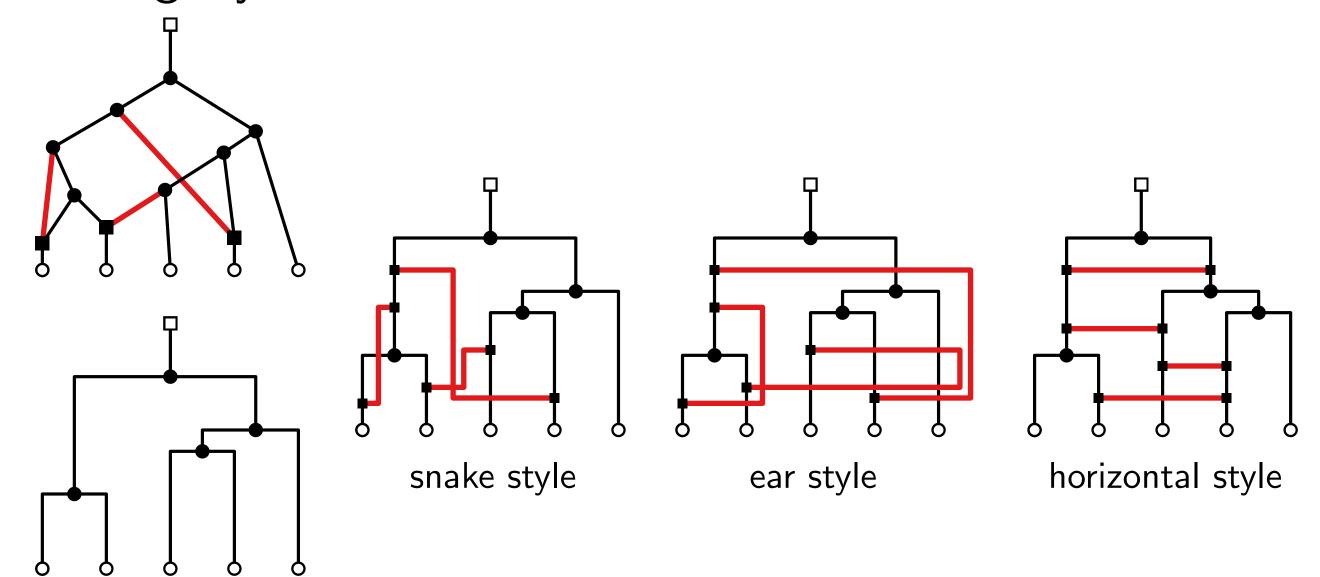


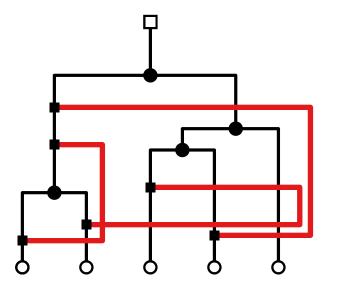


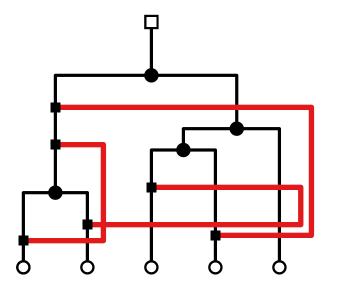


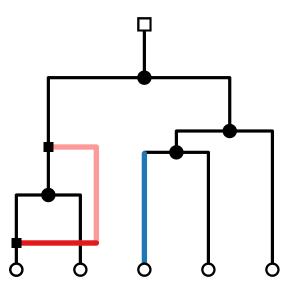


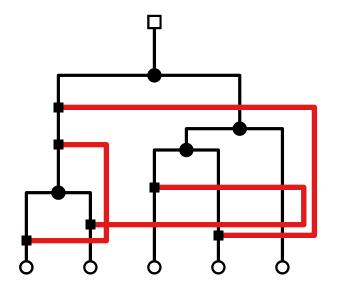


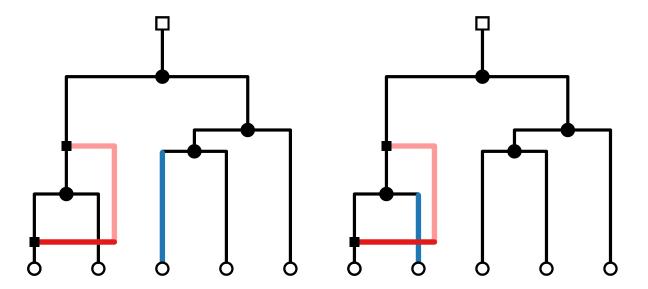


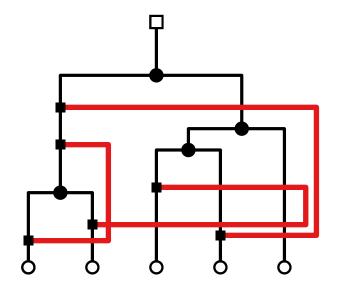


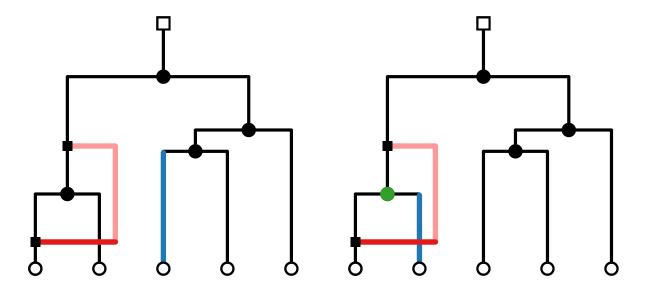


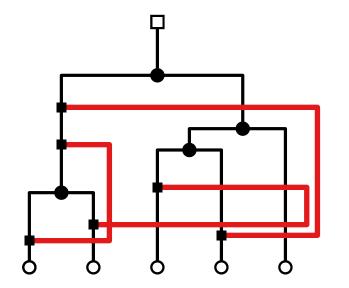


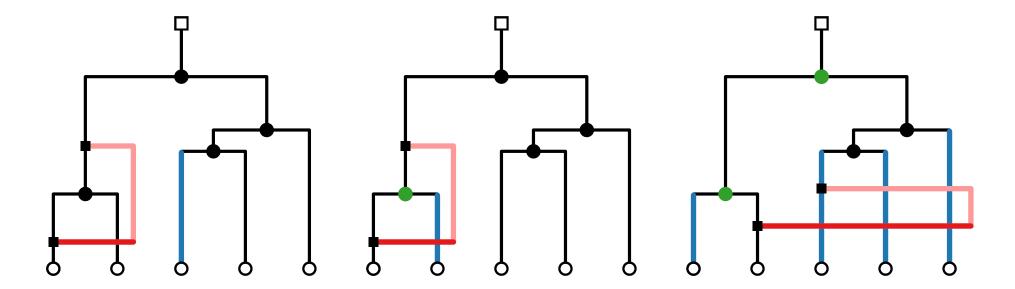


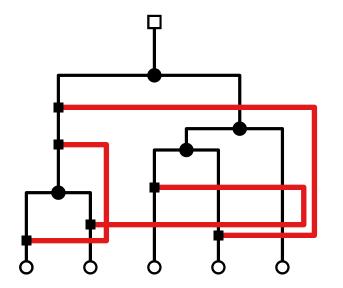


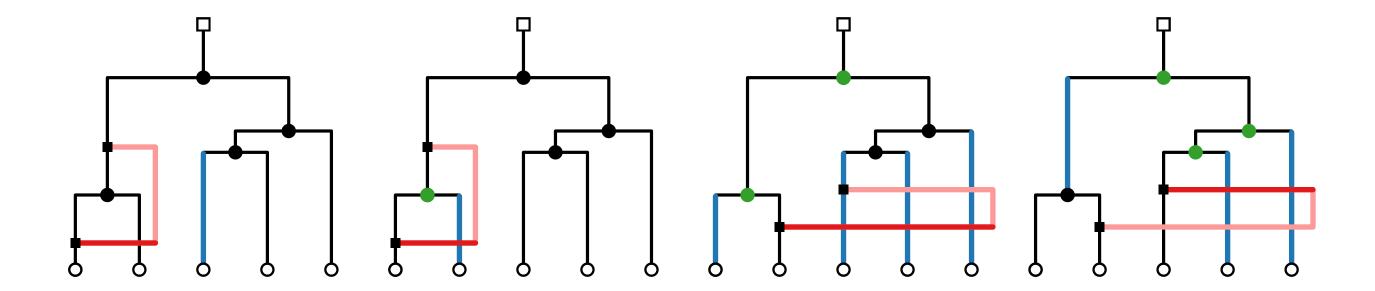


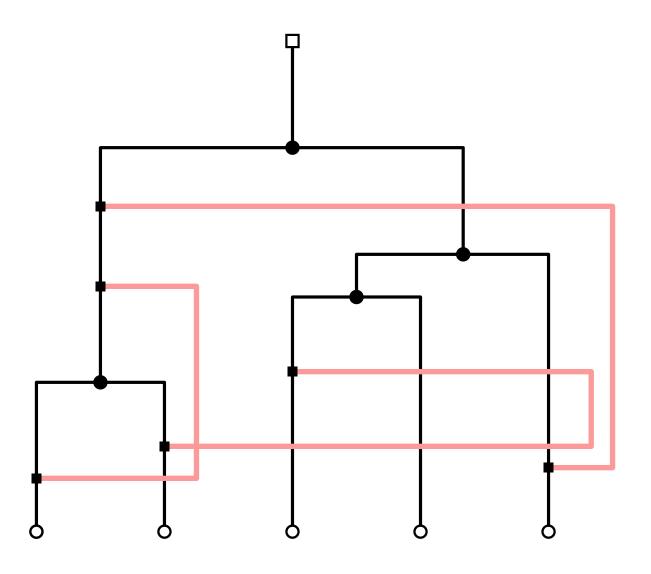


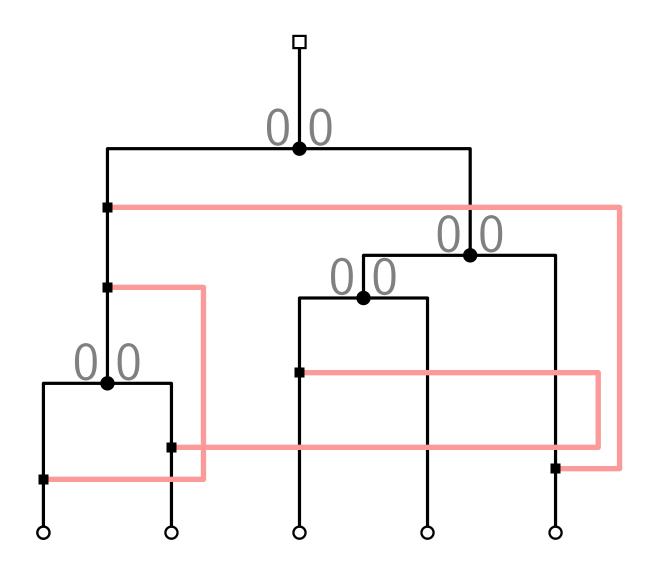


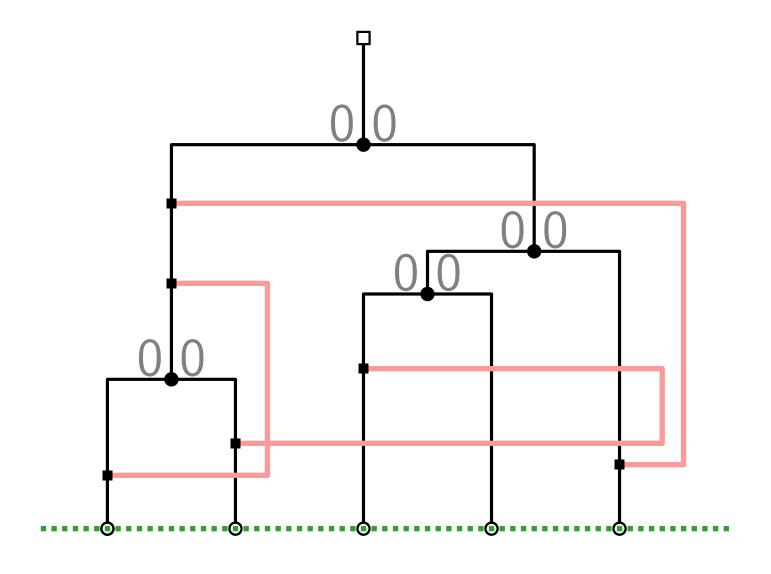


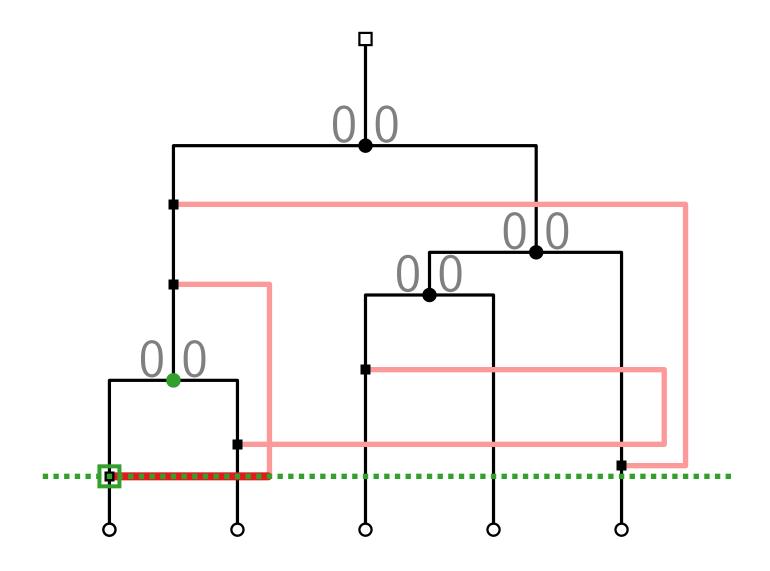


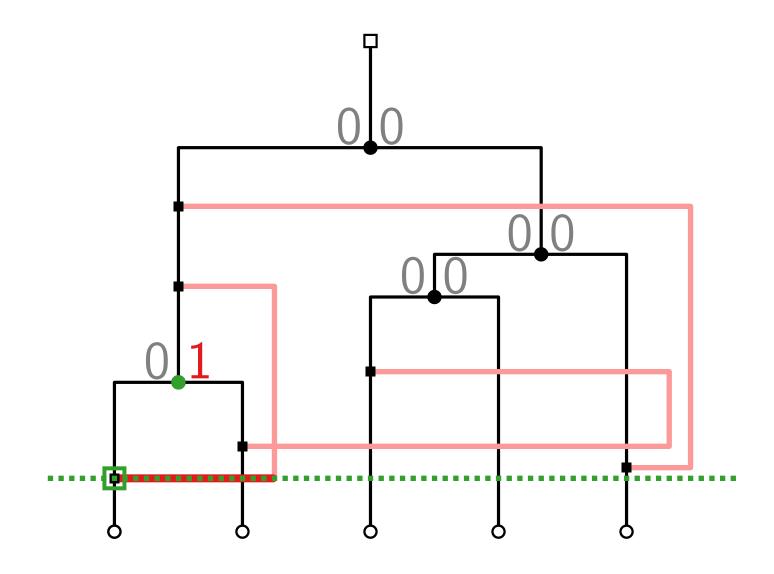


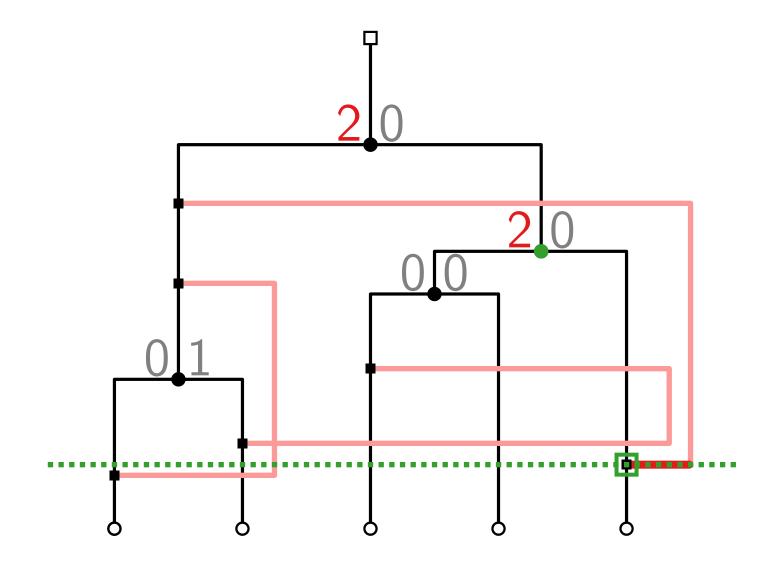


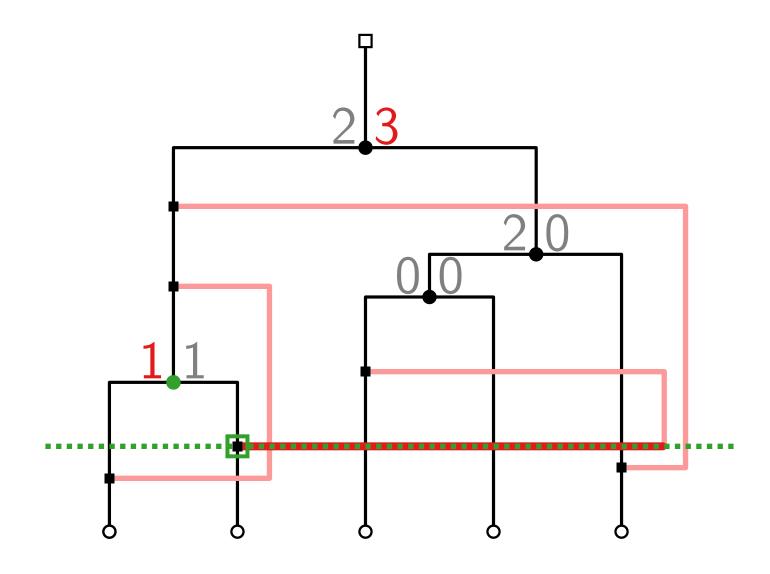


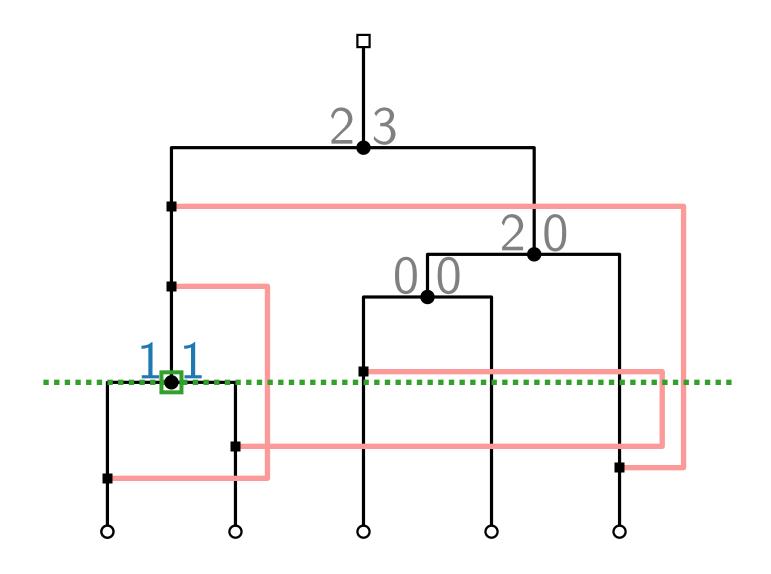


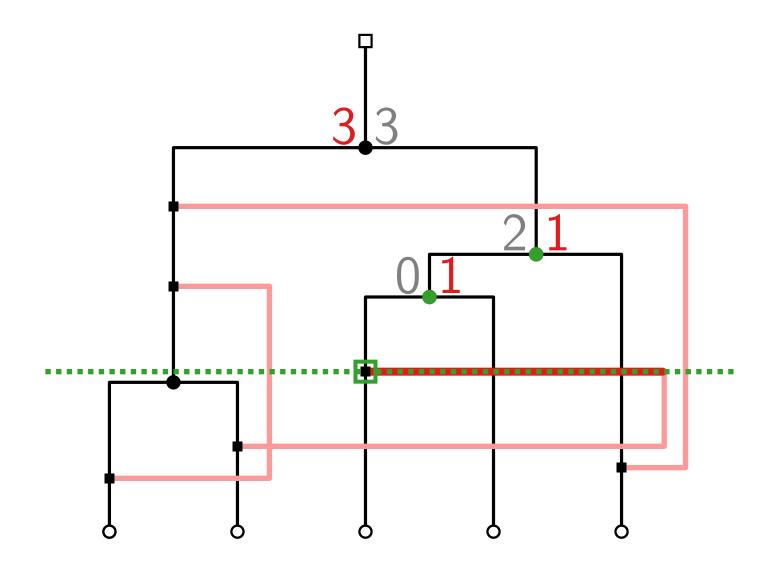


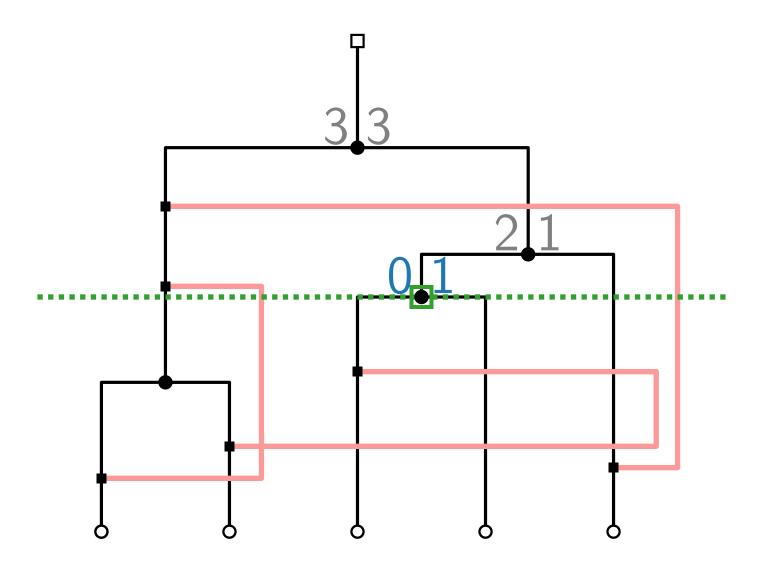


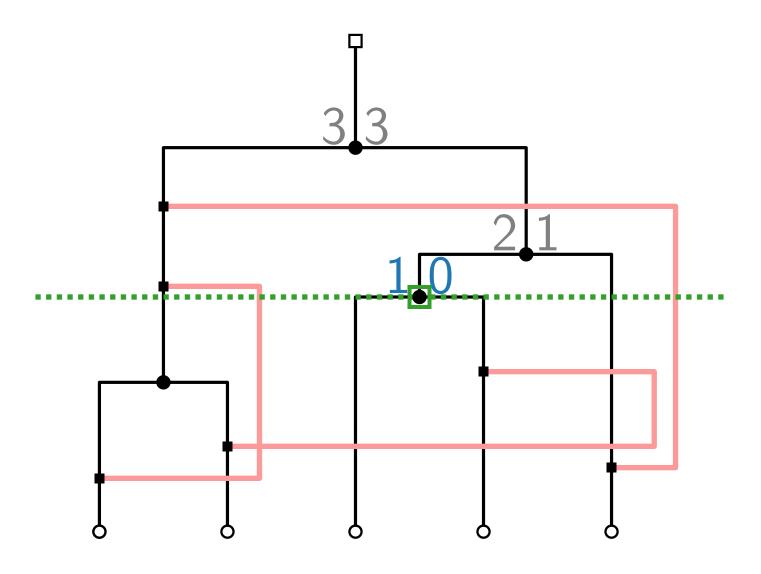


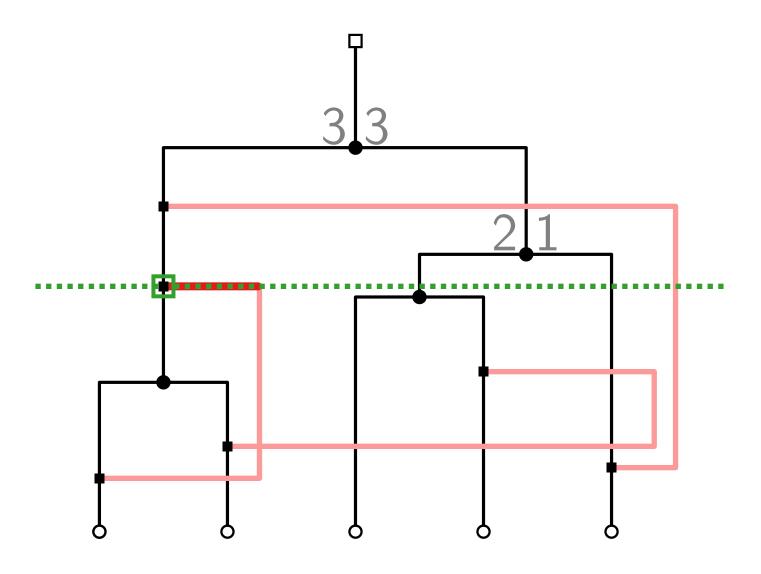


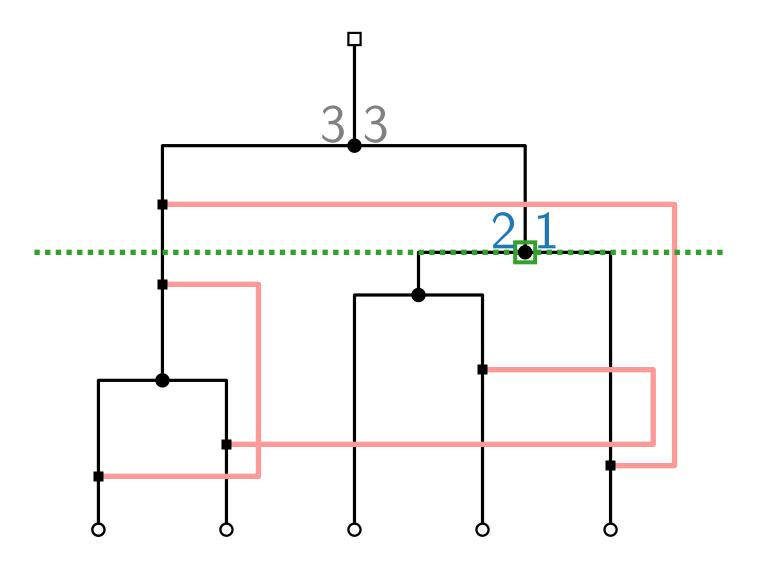


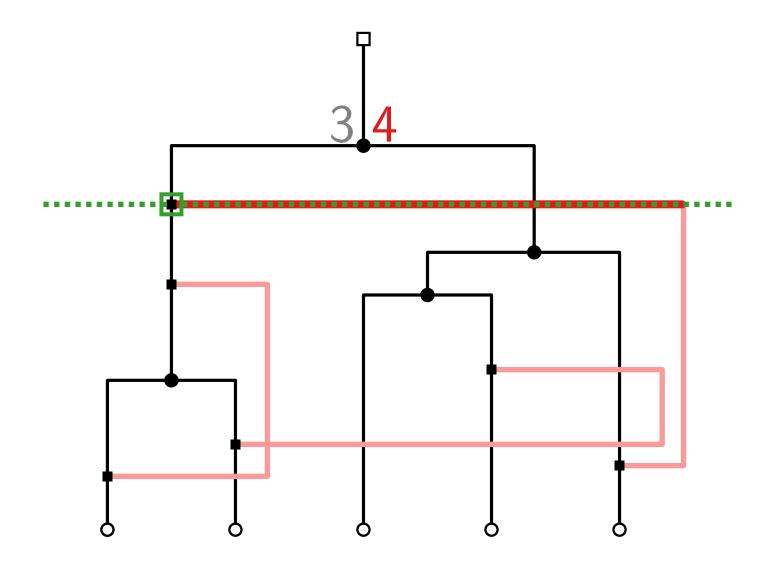


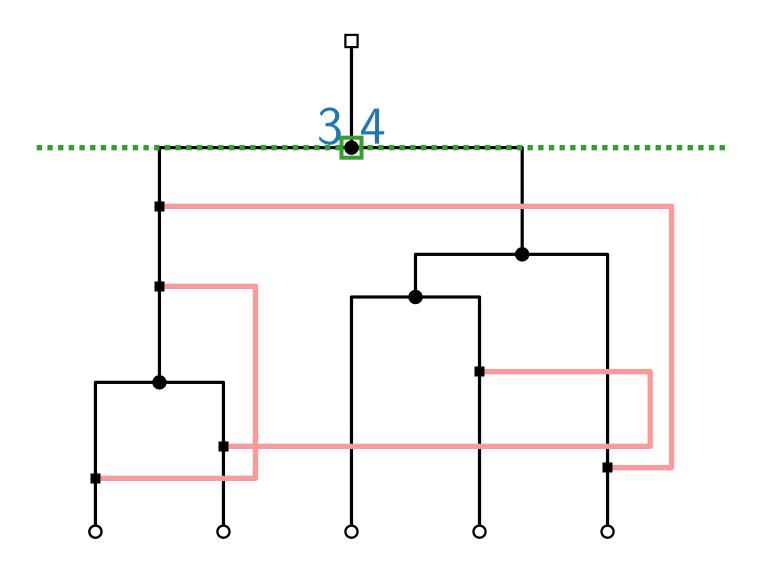


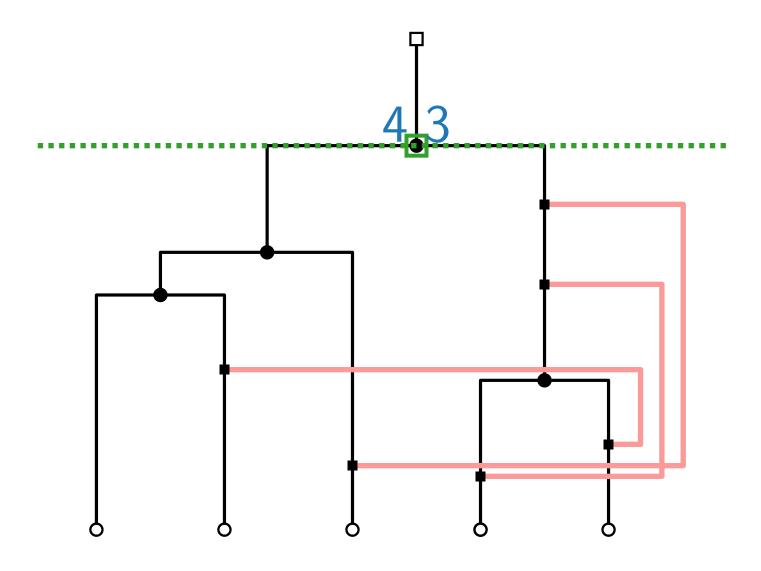


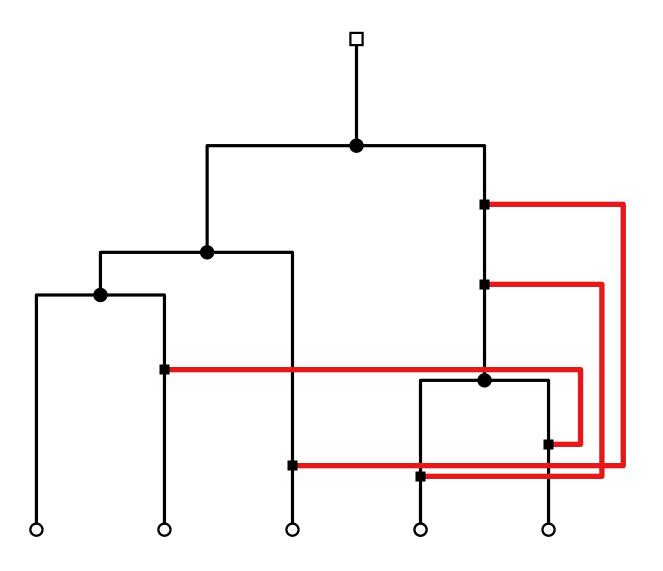


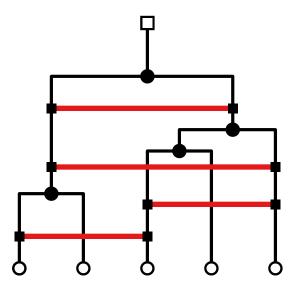




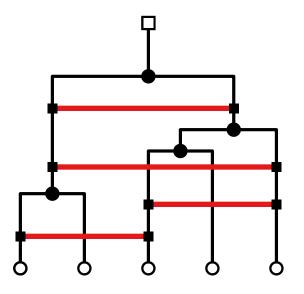




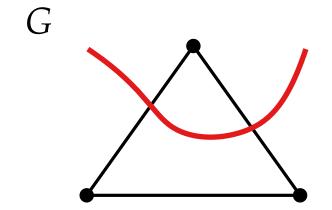




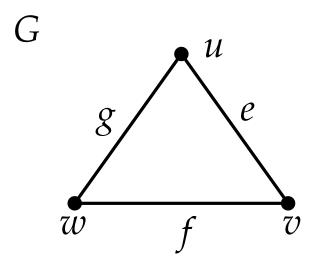
The CROSSING MINIMISATION problem for horizontal-style drawings of tree-based networks is NP-complete.

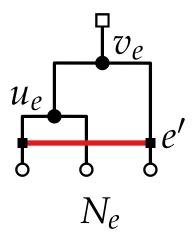


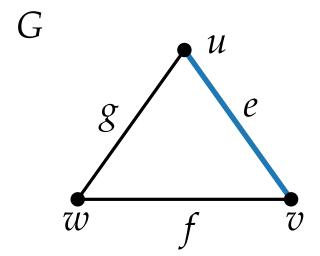
The CROSSING MINIMISATION problem for horizontal-style drawings of tree-based networks is NP-complete.

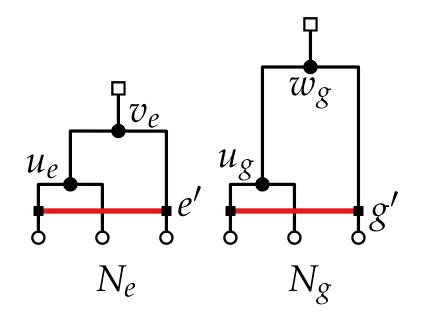


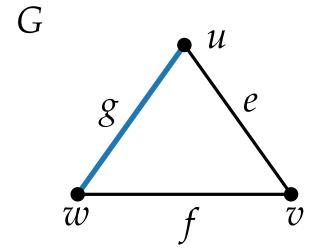
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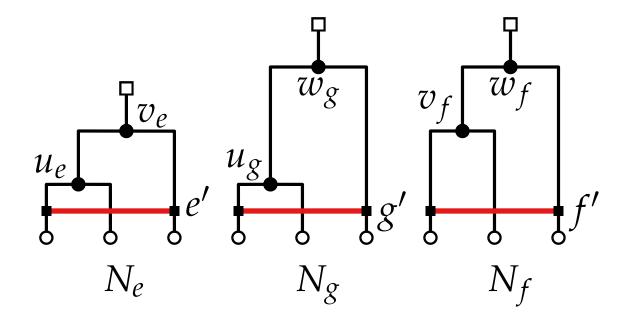


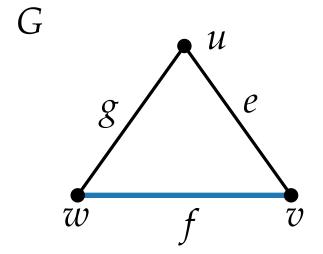


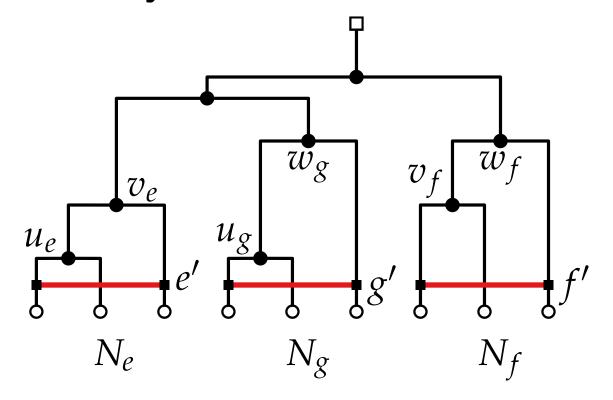


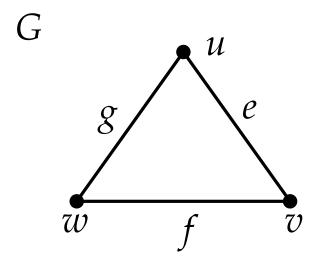


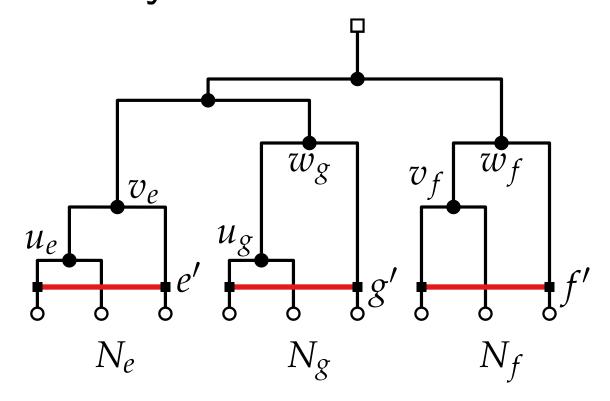


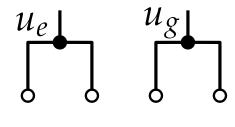


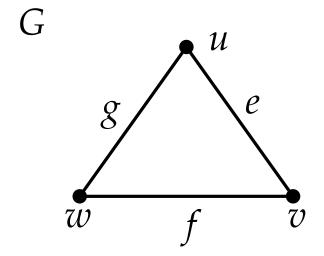


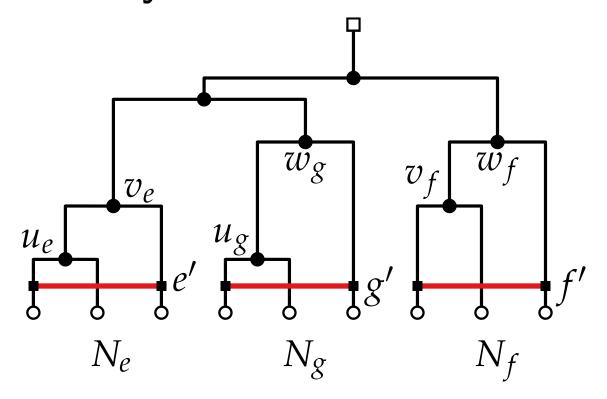


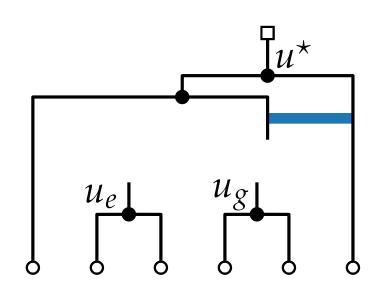


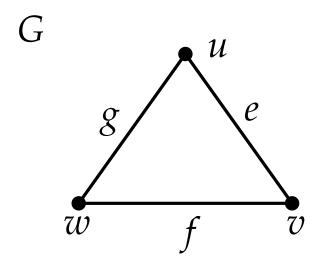


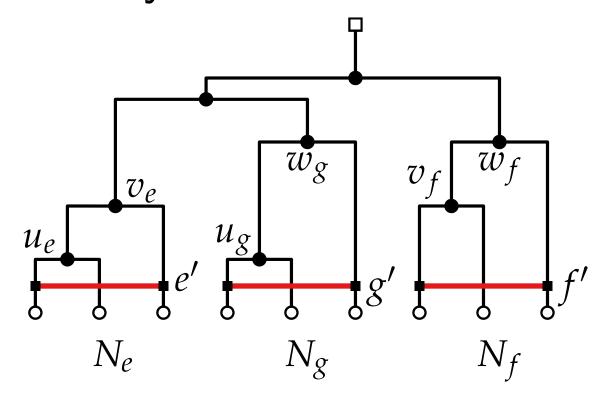


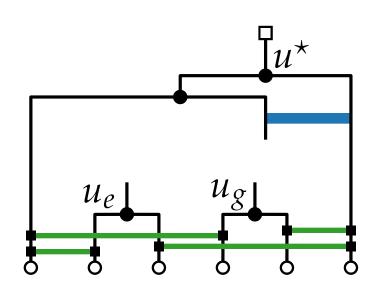


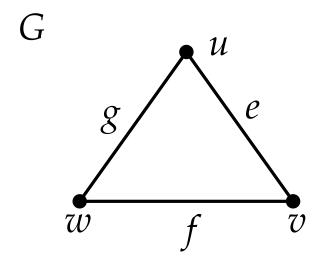




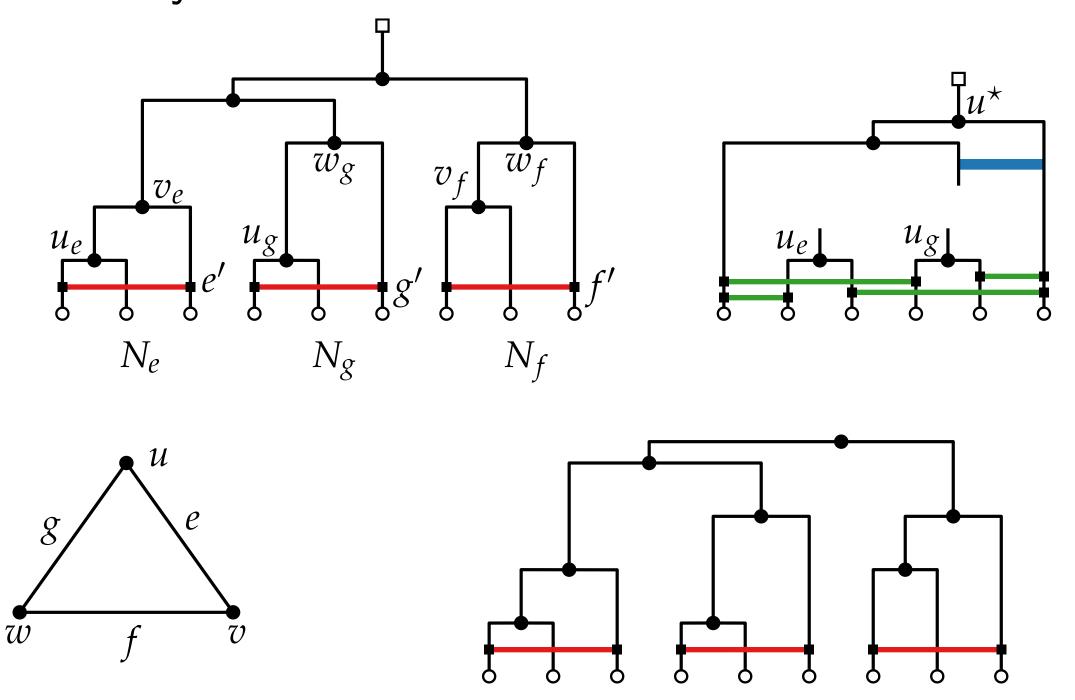


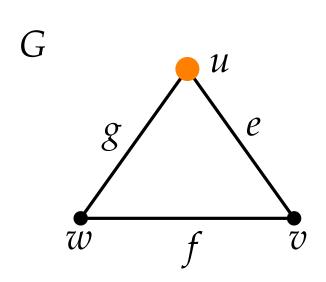


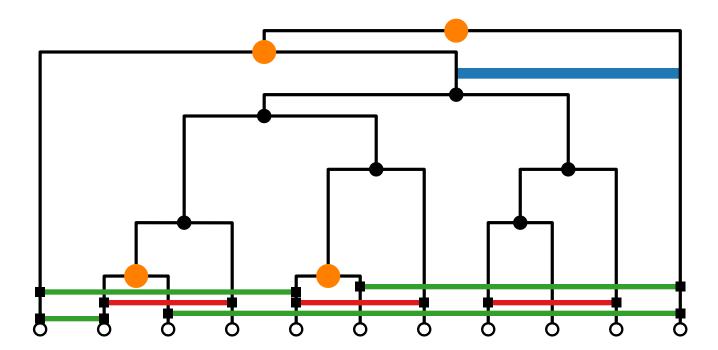


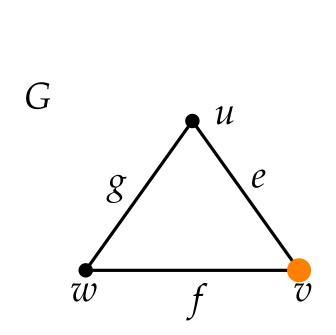


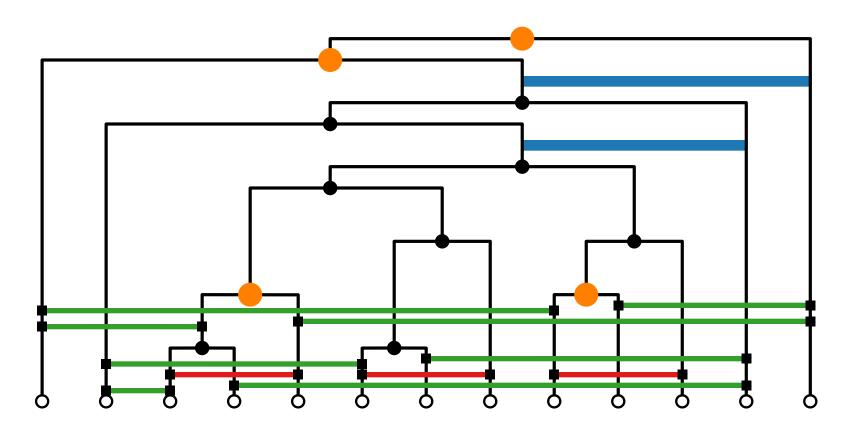
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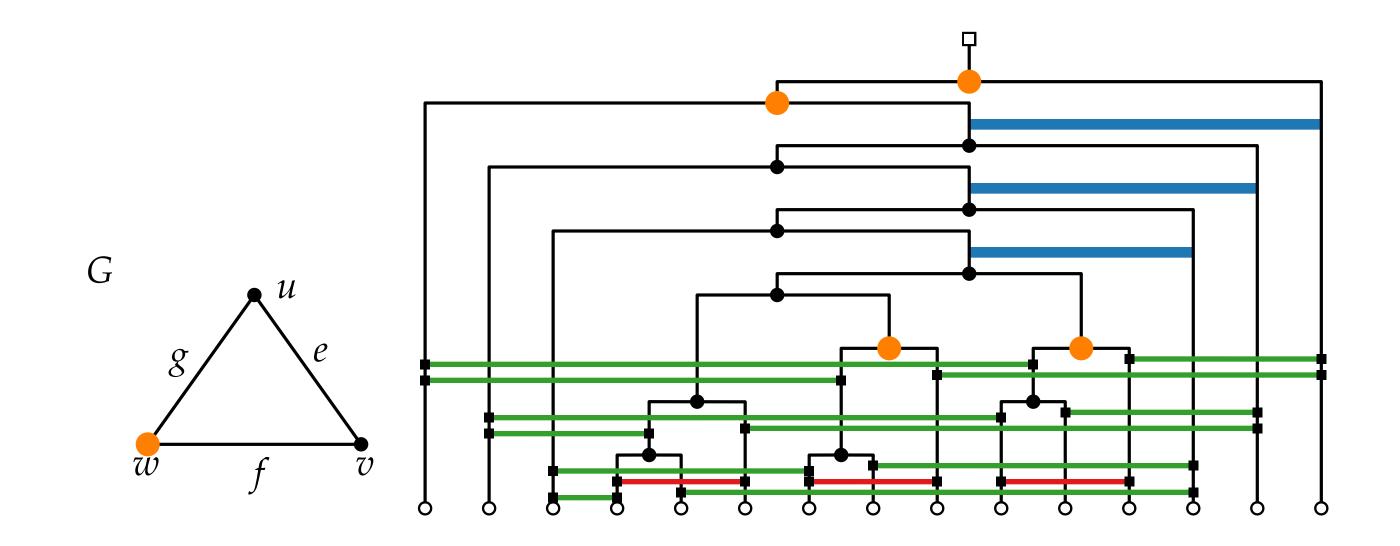


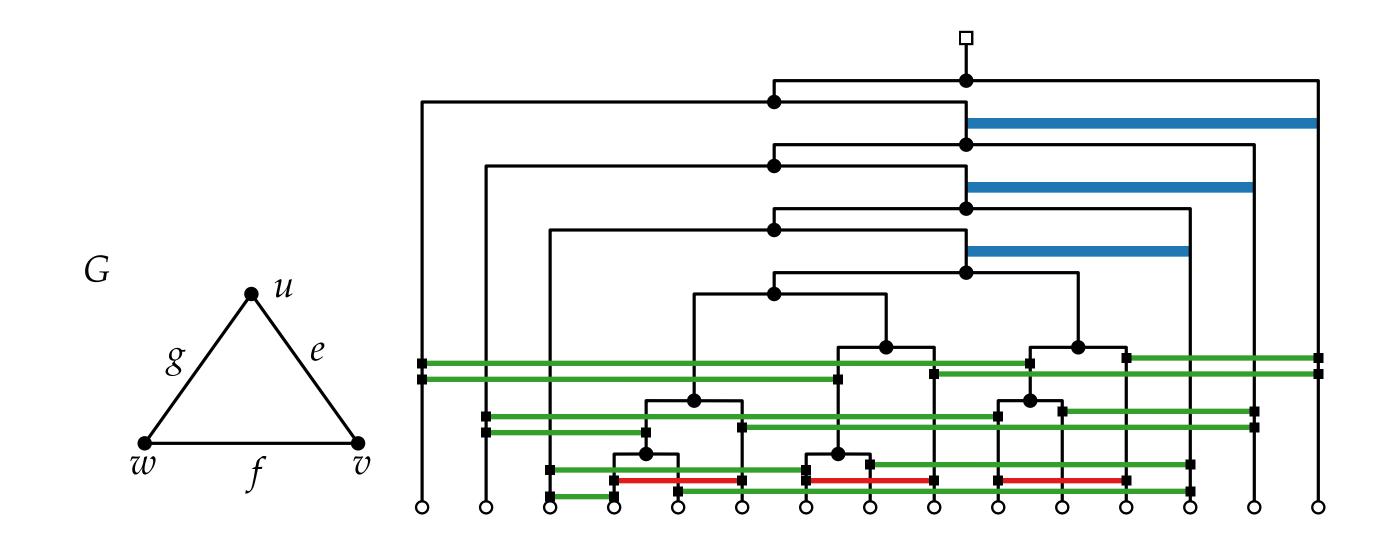


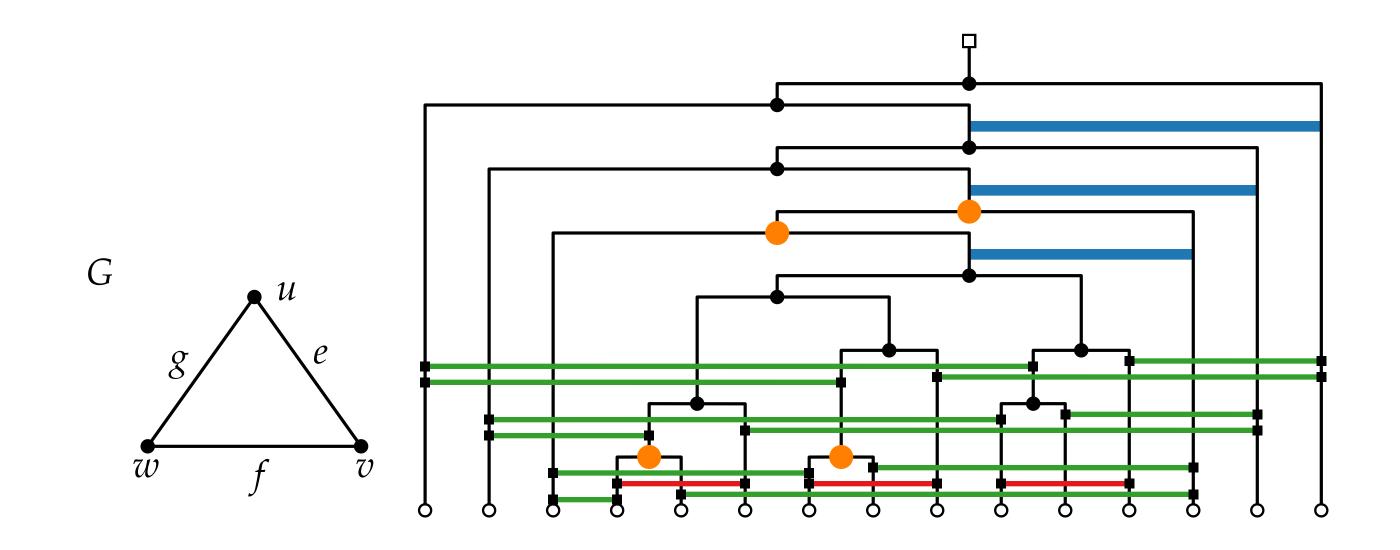


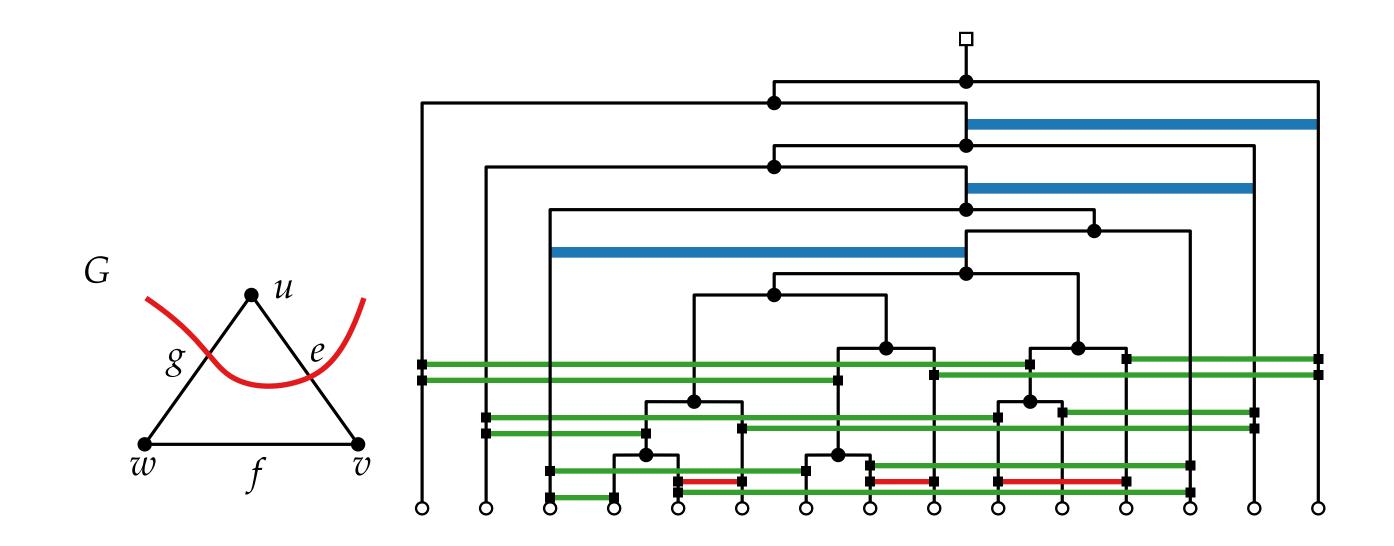


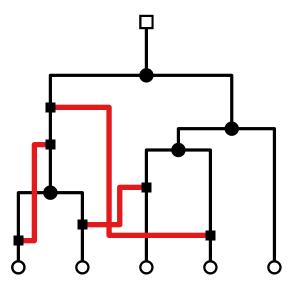






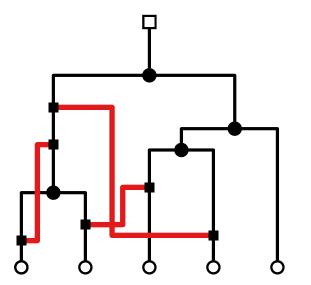






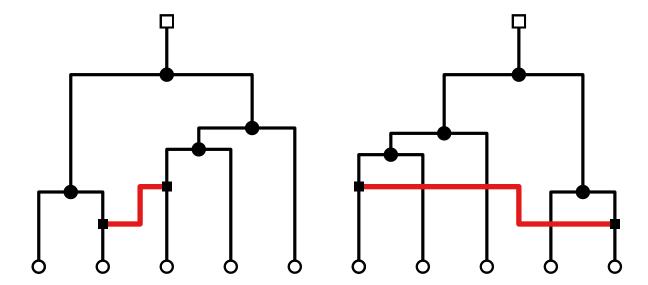
Let N be a tree-based network on n leaves and k reticulation edges. A crossing-minimal snake-style drawing

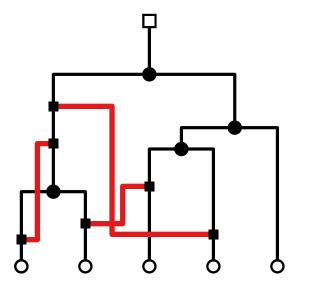
of N can be computed in $\mathcal{O}(2^k nk)$ time.



Let N be a tree-based network on n leaves and k reticulation edges.

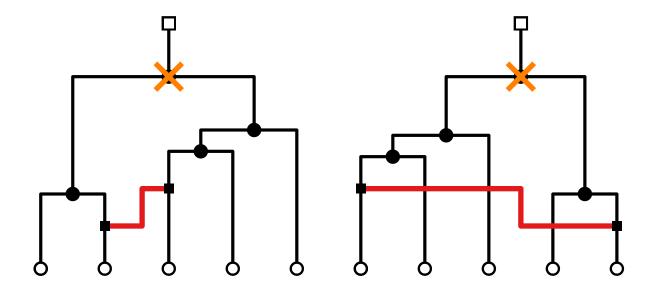
A crossing-minimal snake-style drawing of N can be computed in $\mathcal{O}(2^k nk)$ time.

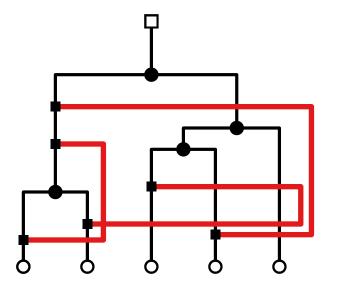




Let N be a tree-based network on n leaves and k reticulation edges.

A crossing-minimal snake-style drawing of N can be computed in $\mathcal{O}(2^k nk)$ time.

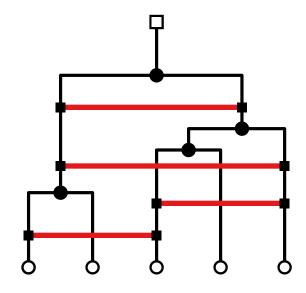


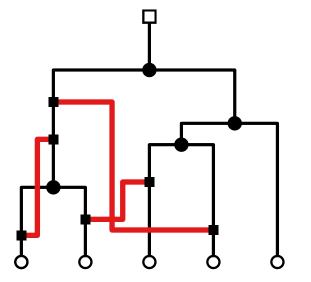


Let N be a tree-based network on n leaves and k reticulation edges.

A crossing-minimal ear-style drawing of N can be computed in $\mathcal{O}(nk)$ time.

The CROSSING MINIMISATION problem for horizontal-style drawings of tree-based networks is NP-complete.





Let N be a tree-based network on n leaves and k reticulation edges.

A crossing-minimal snake-style drawing of N can be computed in $\mathcal{O}(2^k nk)$ time.