Inapplicable algorithm description

1 First downpass

1. Enter on any of the tips of the tree and focus on its closest ancestor (hereafter referred as the "focal node") then go to 2.

2. **If** there is a state in common between both descendants of the focal node, **set** the focal node state to the states in common **then** go to 3. **Else** go to 4.

3. **If** the state of the focal node is now only the inapplicable token but that both descendants also have at least one applicable state, **set** the focal node state to be the union of both descendants states; **then** go to 6.

4. **If** there is a no state in common between both descendants, **set** the focal node state to be the union of both descendants states; **then** go to 5.

5. **If** both descendants have also applicable states, **remove** the inapplicable token from the the focal node state; **then** go to 6.

6. Go to the closest ancestor from the focal node and repeat from 2 until all the nodes in the tree have been visited.

2 First uppass

1. Enter the tree on the root. **If** if the root has both inapplicable *and* applicable states, **remove** the inapplicable state; then go to 2.

2. Select the next focal node after the root; then go to 3.

3. **If** that focal node as an inapplicable token go to 4; **else** go to 6.

4. **If** the focal node also has any applicable state *and* **if** the state of the focal node's ancestor is the inapplicable token only, **set** the focal node state to be the inapplicable token; **then** go to 9. **Else** go to 5.

5. **Remove** the inapplicable token from the focal node states; **then** go to 9.

6. **If** the focal node's ancestor state is only inapplicable, **set** the focal node state to be the inapplicable token **then** go to 9. **Else** go to 7.

7. **If** the union between the descendants is applicable **set** the nodal state to be this union *and* **remove** any eventual inapplicable tokens; **then** go to 9. **Else** go to 7.

8. **Set** the focal node state to be the inapplicable token only; **then** go to 9.

9. Select to the next node and repeat from 3 until all nodes have been visited; then go to 6.

10. Exit the first uppass.

3 Second downpass

1. Enter on any of the tips of the tree and focus on its closest ancestor then go to 2.

2. **If** the focal node state has an applicable state, go to 3. **Else** go to 4.

3. **If** the the focal node's two descendants have both in common at least on state that is not the inapplicable token, **set** the focal node state to be this common state (without any inapplicable token); **then** go to 5.

4. **Else** the **set** the focal node's state to be the union between both descendants without any eventual inapplicable token; **then** go to 5.

5. **Else** leave the the focal node's state unchanged and repeat from 2 until all nodes have been visited; **then** go to 6.

6. Exit the second downpass

4 Second uppass

1. Enter the node next to the root; **then** go to 2

2. **If** any state on the focal node is applicable; **then** go to 3. **Else** go to 12.

3. **If** the ancestor also has at least one applicable state; **then** go to 4@. **Else** go to 11.

4. **If** the common state between the ancestor and the final is the ancestor, **set** the focal node's state to be the state of it's ancestor; **then** go to 12. **Else** go to 5.

5. **If** there is a state in common between the focal node's descendants, **set** the focal node's state to be the union between its previous state and the states in common between the focal node's ancestor and the union of the focal node's descendants; **then** go to 12. **Else** go to 6.

6. **If** the union between the focal node's descendants have an inapplicable token, go to 7; **else** go to 9.

7. **If** the union of the focal node's descendants have a state in common with its ancestor, **set** the node state to be the union of the ancestral states and the states in common between the union of descendants and the ancestor; **then** go to 12. **Else** go to 8.

8. **Set** the focal node state to be the union between the descendants and the ancestral states without any inapplicable token; **then** go to 12.

9. **Set** the focal node state to be the union between the node state from the previous pass and its ancestor state. **then**, go to 10.

10. **If** the state in common between the focal node and its ancestor is the state of the ancestor, **set** the focal node's state to be the state in common between the focal node and its ancestor; **then** go to 12. **Else**, go to 12.

11. **If** there is a state in common between the focal node's descendants, **set** the focal node state to be the states in common between it's descendants **then** go to 12. **Else**, go to 12.

12. Leave the focal node's state unchanged and repeat from 2 until all nodes have been visited; **then** go to 13.

13. Exit the second uppass