Example Case 1

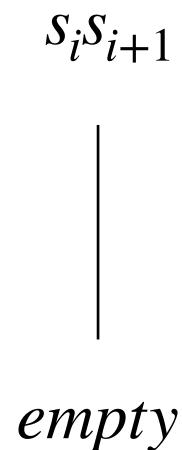s_i and s_{i+1} are removed by the same conjugation node:

$v = s_i s_{i+1}$

$\rho(v) = C(s_i s_{i+1}) = 0$

After reduction:

$\rho(v') = 0$

$s_i s_{i+1}$

empty

Example Case 2

s_i is a leaf s_{i+1} is removed by a conjugate
node, and s_i is its descendent

$v = s_i s_{i+1} u s_{i+1}^{-1}$ where u is a string

Assume s_i and $s_{i+1} w_1 s_{i+1}^{-1}$ are children.

$\rho(v) = \rho(s_i) + C(s_{i+1} u s_{i+1}^{-1}) = 1 + \rho(u)$

After reduction:

$\rho(v') \leq \rho(u s_{i+1}^{-1}) \leq \rho(u) + \rho(s_{i+1}^{-1}) = \rho(u) + 1$

$$s_i s_{i+1} u s_{i+1}^{-1}$$

$$s_i \qquad\qquad s_{i+1} u s_{i+1}^{-1}$$

$$u$$