

# Context Free Languages

Sipser 2.3 (pages 123-127)

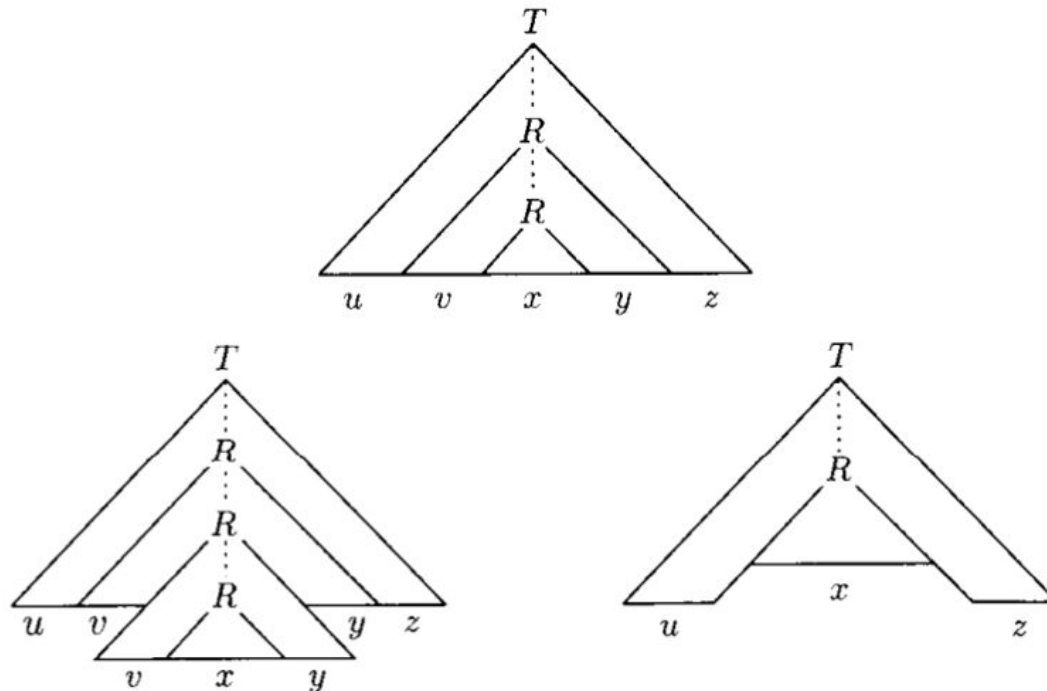
# A Context-free Grammar for

$$\{a^n b^n c^n \mid n \geq 0\}?$$

- Theorem 2.34 (Pumping lemma for CFLs): If  $A$  is a CFL, then there is a number  $p$  where,  
if  $s$  is any string in  $A$  of length  $\geq p$ ,  
then  $s = uvxyz$  such that:
  1. For each  $i \geq 0$ ,  $uv^i xy^i z \in A$ ,
  2.  $|vy| > 0$ , and
  3.  $|vxy| \leq p$

# Proof idea

- Surgery on parse trees



# So...

- Is  $\{a^n b^n c^n \mid n \geq 0\}$  a CFL?