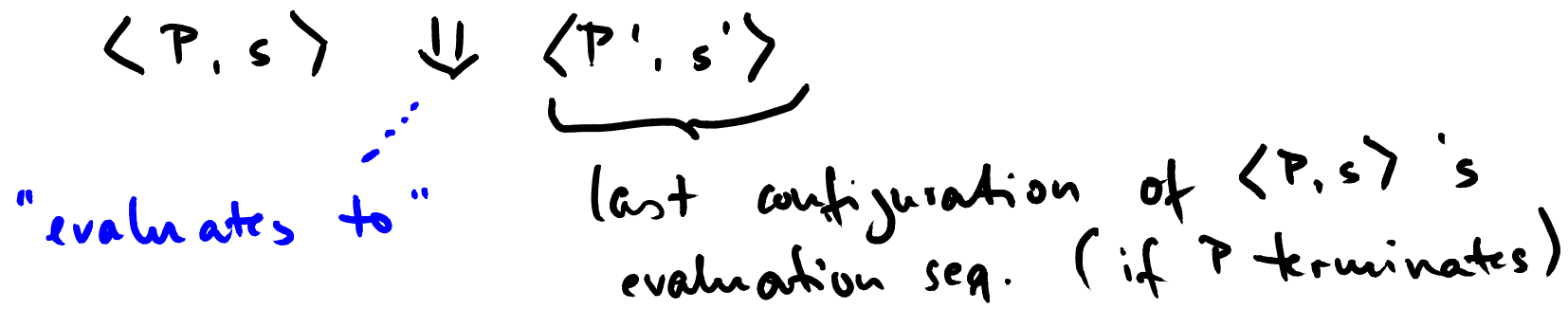


### 3b) Big-step Semantics

- small-step semantics; transition relation  
= individual steps of computation
- now: transition relation  
= full evaluation
- configuration remains the same
- evaluation relation:



(Some) axioms & rules

$$\frac{\langle !l, s \rangle \Downarrow \langle n, s \rangle \quad \text{if } s(l) = n}{\langle !l, s \rangle \Downarrow \langle n, s \rangle} \quad (\text{var}) \quad \text{almost as before}$$

$$\frac{\langle E, s \rangle \Downarrow \langle n, s' \rangle}{\langle l := E, s \rangle \Downarrow \langle \text{skip}, s'[l \mapsto n] \rangle} \quad (:=) \quad \text{much simpler: 1 rule instead of 2}$$

$$\frac{\langle C_1, s \rangle \Downarrow \langle \text{skip}, s' \rangle \quad \langle C_2, s' \rangle \Downarrow \langle \text{skip}, s'' \rangle}{\langle C_1; C_2, s \rangle \Downarrow \langle \text{skip}, s'' \rangle} \quad (\text{seq})$$

## Example

$$P = (z := !x; x := !y); y := !z$$

$$s = \{z \mapsto 0, x \mapsto 1, y \mapsto 2\}$$

$$\langle P, s \rangle \Downarrow \langle \text{skip}, s' \rangle$$

$$\text{where } s' = \{z \mapsto 1, x \mapsto 2, y \mapsto 1\}$$

Homework: Show using rules from previous slide