

# Chapter 5 (draft): Data Lemmas

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weakening...

**Conjecture 1.** *Preservation-endpoint-subst*

$$\frac{\Gamma \vdash a \sqsupseteq a' : A' \quad \Gamma, x : A', \Gamma' \vdash b \sqsupseteq b' : B'}{\Gamma, (\Gamma' [x ::= a']) \vdash b[x ::= a] \sqsupseteq b'[x ::= a'] : B'[x ::= a']}$$

note that the typeing context only takes the relevent perspective

note the similarity to the regular subst

$$\frac{\Gamma \vdash a : A \quad \Gamma, x : A, \Gamma' \vdash b : B}{\Gamma, (\Gamma' [x ::= a]) \vdash b[x ::= a] : B[x ::= a]}$$

alt.

$$\frac{\Gamma \vdash a \sqsupseteq a' : A' \quad \Gamma', x : A' \vdash b \sqsupseteq b' : B'}{\Gamma, \Gamma' \vdash b[x ::= a] \sqsupseteq b'[x ::= a'] : B'[x ::= a']}$$

**Conjecture 2.** *Preservation-ok-union*

$$\frac{\begin{array}{c} \Gamma \vdash a \sqsupseteq a' : A' \\ \Gamma \vdash a \text{ ok} \\ \Gamma \vdash b \sqsupseteq a' : A' \\ \Gamma \vdash b \text{ ok} \end{array}}{\Gamma \vdash a \cup b \text{ ok}}$$

**Conjecture 3.** *Preservation-ok-subst*

$$\frac{\Gamma \vdash a \sqsupseteq a' : A' \quad \Gamma, x : A', \Gamma' \vdash b \text{ ok}}{\Gamma, \Gamma' [x ::= a'] \vdash b \text{ ok}}$$

**Conjecture 4.** *Preservation-enpoint- $\rightsquigarrow$*

$$\frac{a \rightsquigarrow b \quad \Gamma \vdash a \sqsupseteq a' : A'}{\Gamma \vdash b \sqsupseteq a' : A'}$$

**Conjecture 5.** *Preservation-ok- $\rightsquigarrow$*

$$\frac{a \rightsquigarrow b \quad \Gamma \vdash a \text{ ok}}{\Gamma \vdash b \text{ ok}}$$

**Conjecture 6.** *cast-progress*

if  $\Gamma \text{ Empty}$  and  $\Gamma \vdash a \sqsupseteq a' : A'$  then  $a \text{ Val}$ ,  $a \text{ Blame}_{\ell, o}$ , or  $a \rightsquigarrow b$

$$\frac{\Gamma \text{ Empty} \quad \Gamma \vdash a \sqsupseteq a' : A' \quad \Gamma \vdash a \sqsupseteq a' : A'}{\Gamma \vdash b \sqsupseteq a' : A'}$$