**Context-Sensitive Languages**

* **Context-sensitive analysis**
  + Which properties of valid C programs still cannot be enforced by CFGs?
    - Declaration before use
    - Const correctness
    - Type correctness
    - Multiple-declared variables
  + Context-sensitive language
    - E.g. dA → dab; d provides context
* Declaration errors
  + Multiple or missing declarations
  + Solution: construct a symbol table
  + i.e. traverse parse tree to collect all declarations
    - for each node with rule “dcl → TYPE ID”
      * extract name and type
      * if name already in symbol table
        + ERROR
      * else
        + add (name, type) to symbol table
* Variable use w/o declaration
  + Solution: traverse parse tree and look for rules with RHS “ID”
    - If ID name is not in symbol table, ERROR
* These two passes of the parse tree can be merged
* How do we implement scopes – i.e. forbid duplicate definitions in the same procedure, but allow in different procedures?
  + Solution: separate symbol table for each procedure & a top-level symbol table that holds procedure names