How to compile unification

In the WAM (1983)

- Single instruction stream
- A mode flag distinguishes between Read and Write mode
- Breadth-first traversal of terms: X=f(g(A),h(B)) is compiled as X=f(T,U), T=g(A), U=h(B)
- Problems:
  - Write mode is not propagated to substructures, resulting in superfluous variable creations and bindings
  - Every instruction sets or tests the mode flag
  - Superfluous work on failure, e.g. X=f(g(a),_,_) always unifies the last two arguments

The two-stream algorithm (1989)

- Two instruction streams: for Read and for Write mode
- Depth-first traversal of terms
- Key idea: a mechanism to jump between the Read and Write mode streams as needed, with very low overhead
- Advantages:
  - No superfluous operations
  - Downward propagation of Write mode (to substructures)
  - Linear code size
  - Efficient expansion to native code