61A Lecture 29

Monday, November 5

The Structure of an Interpreter

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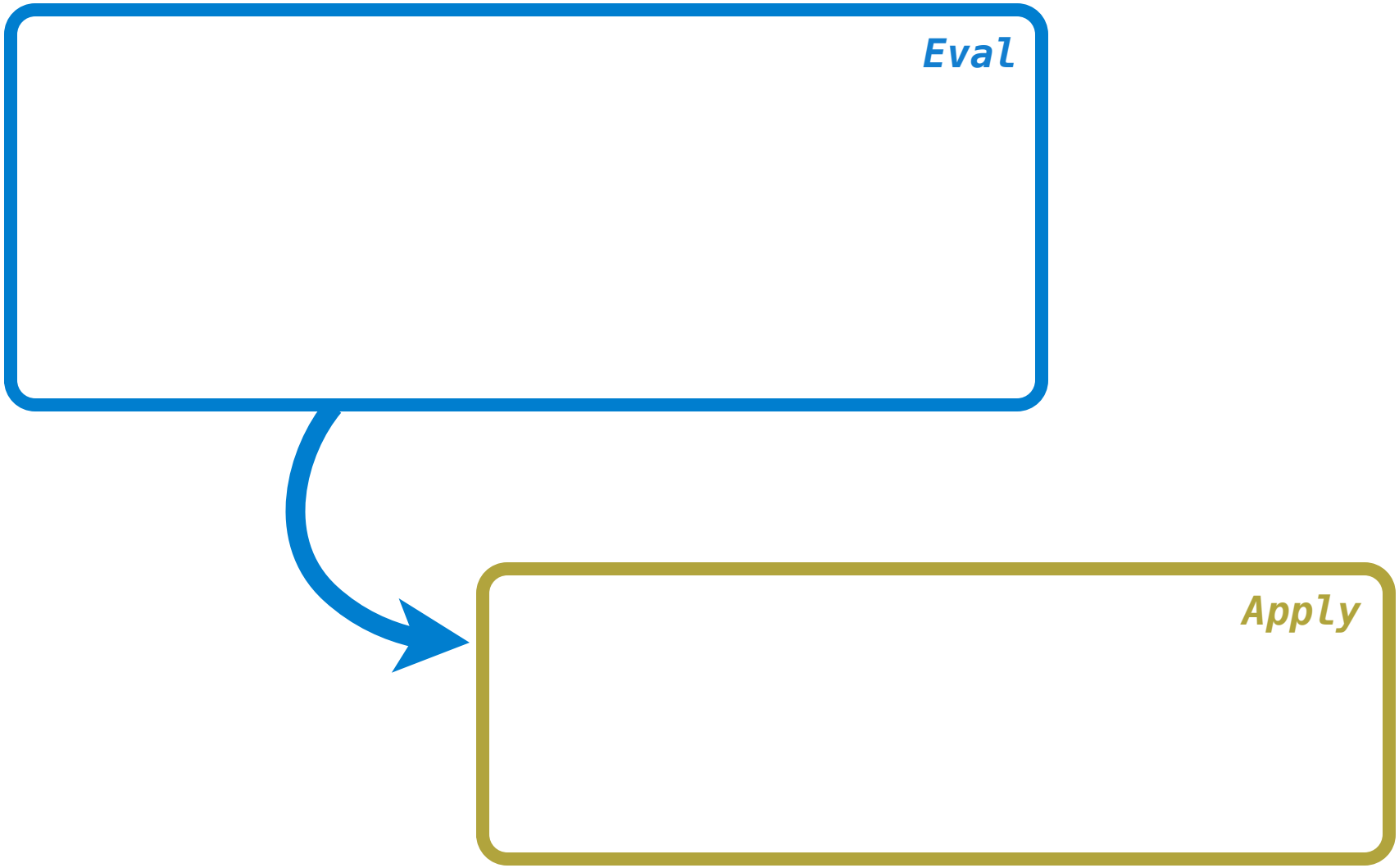

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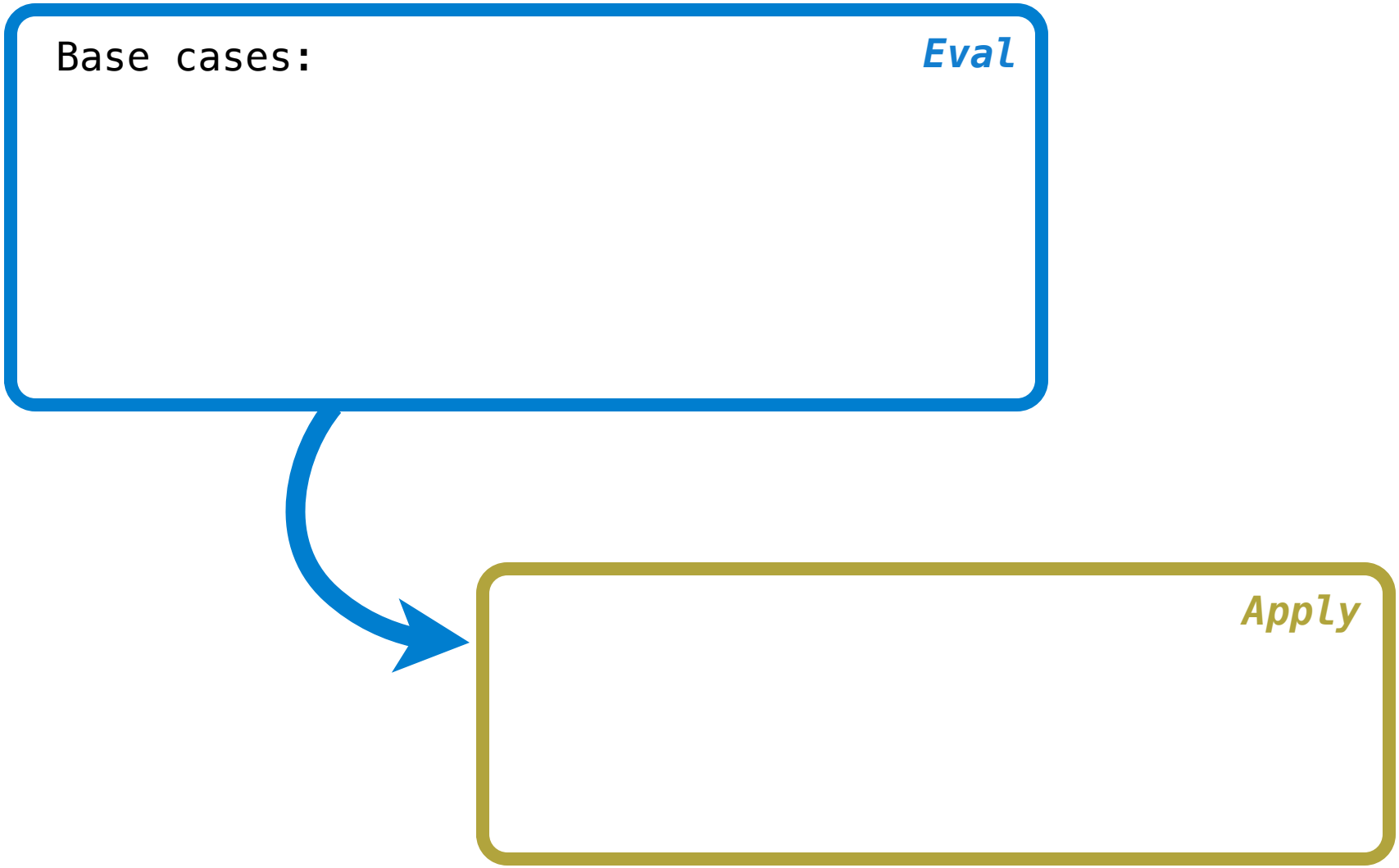

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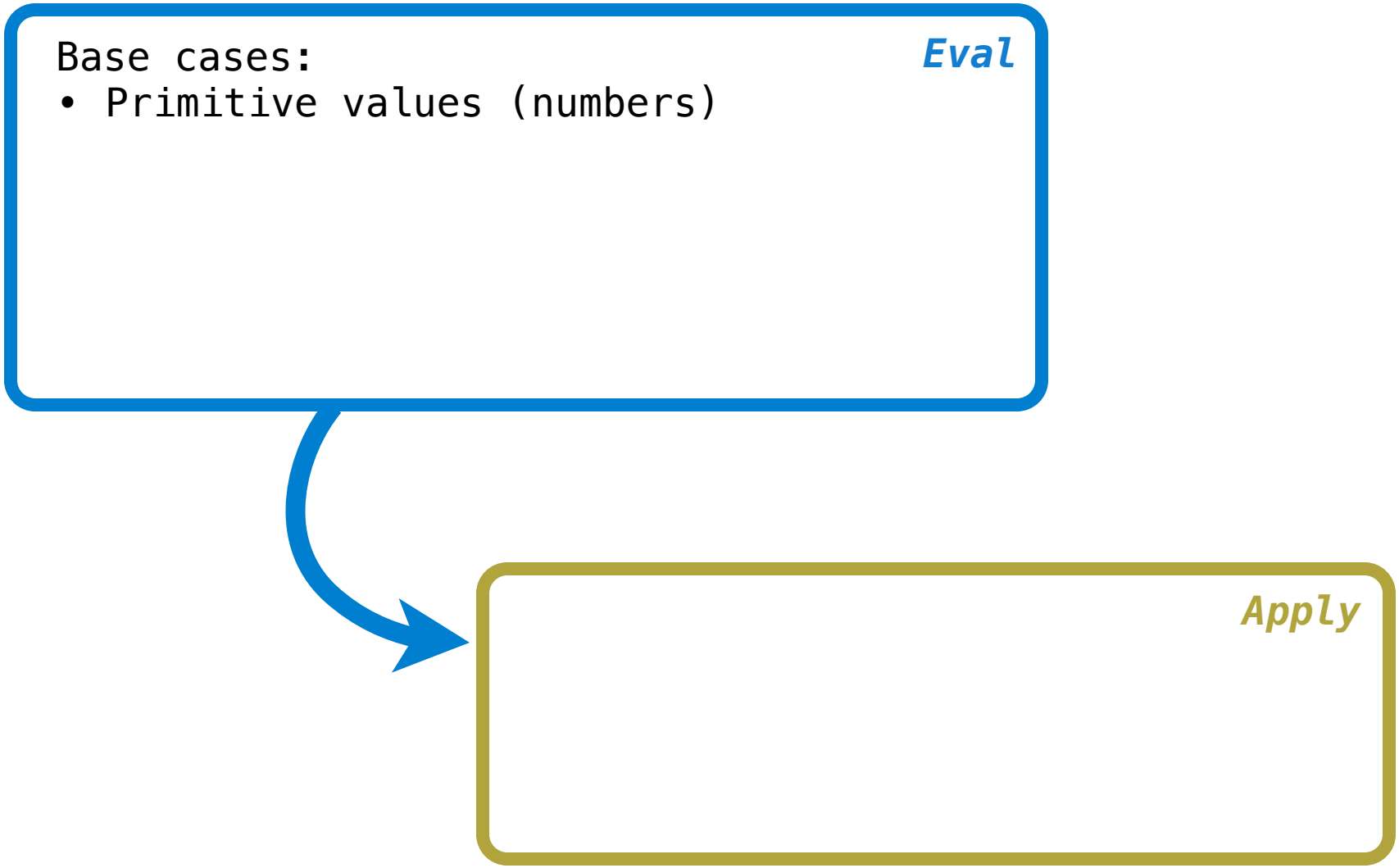

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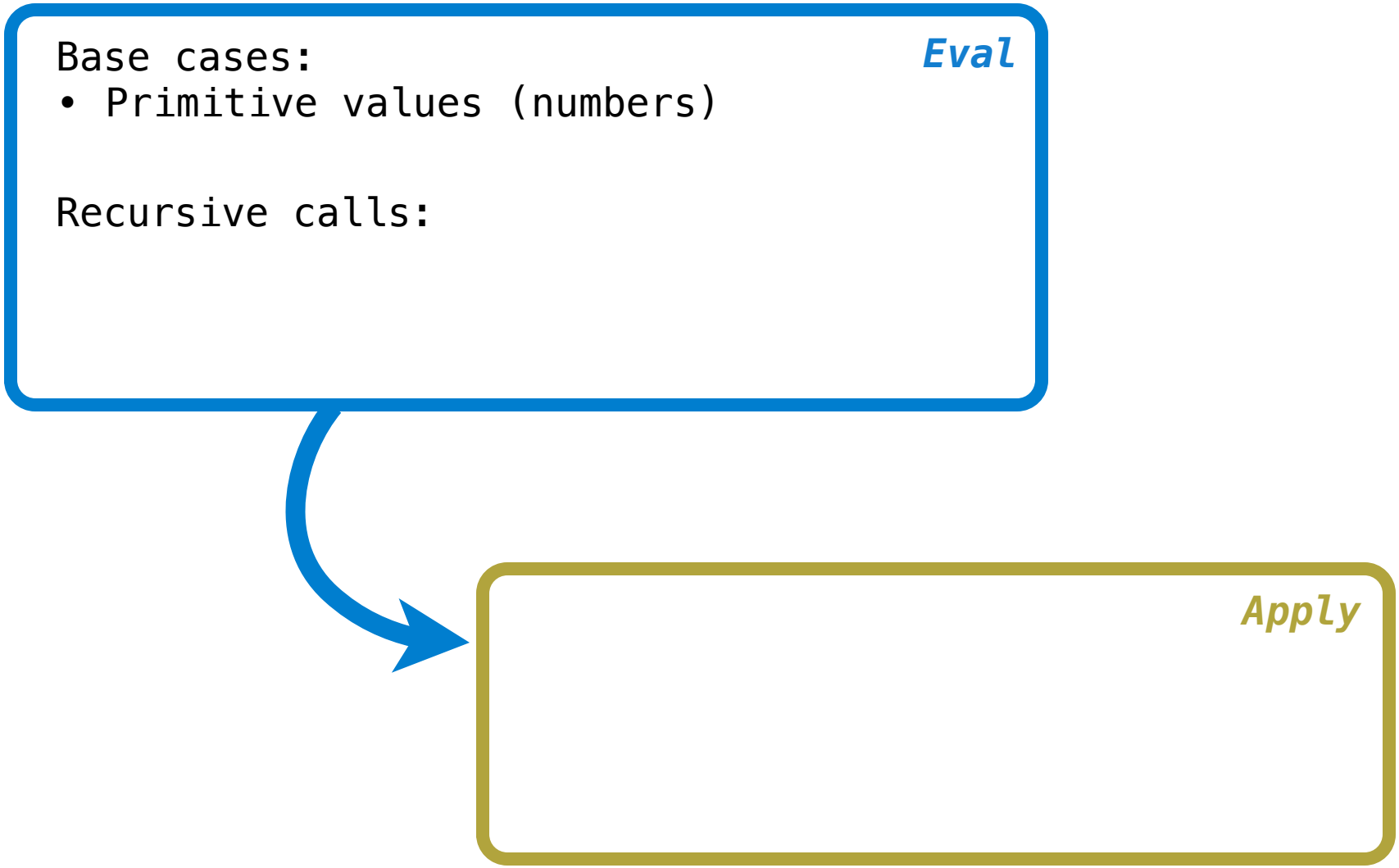

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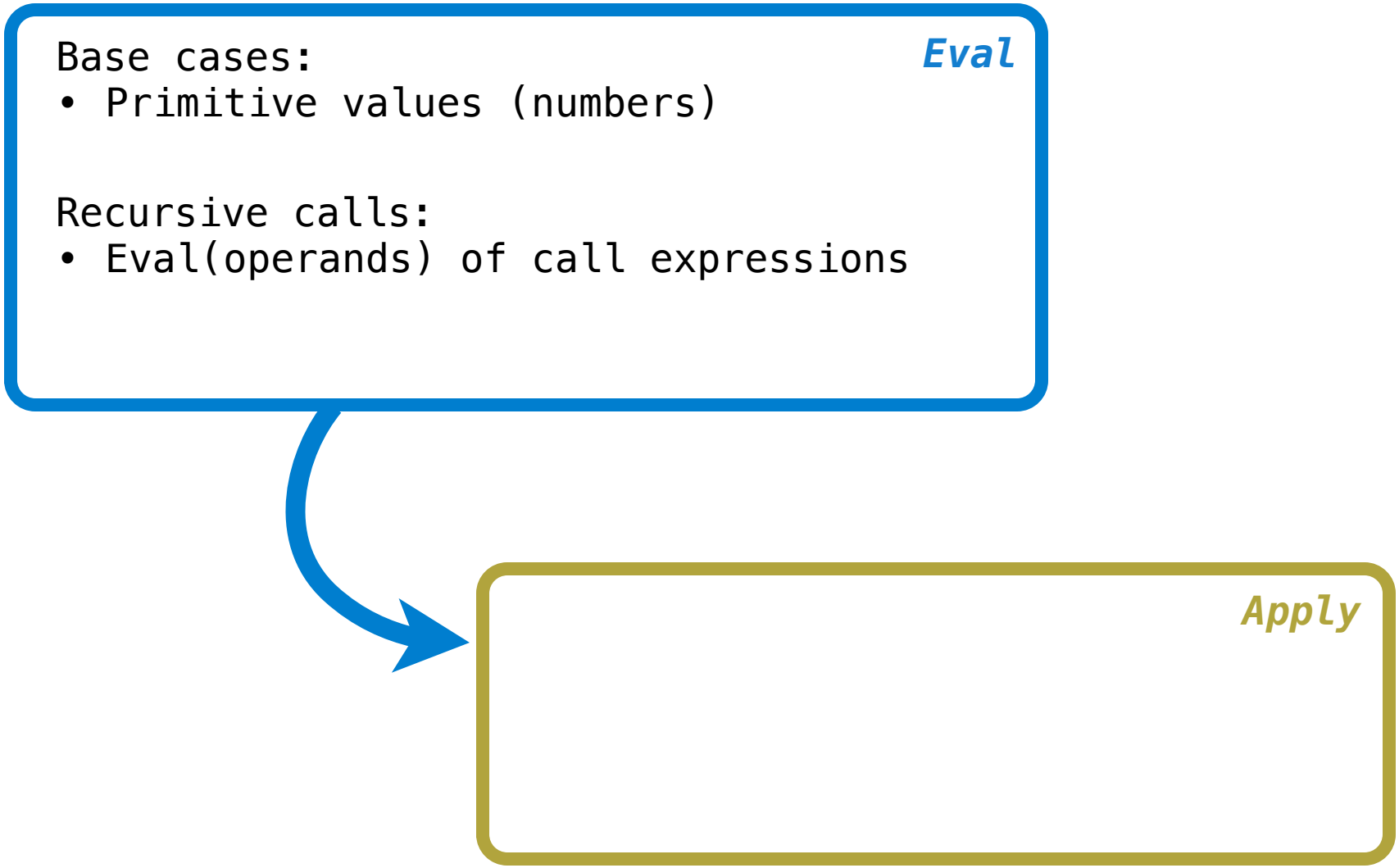

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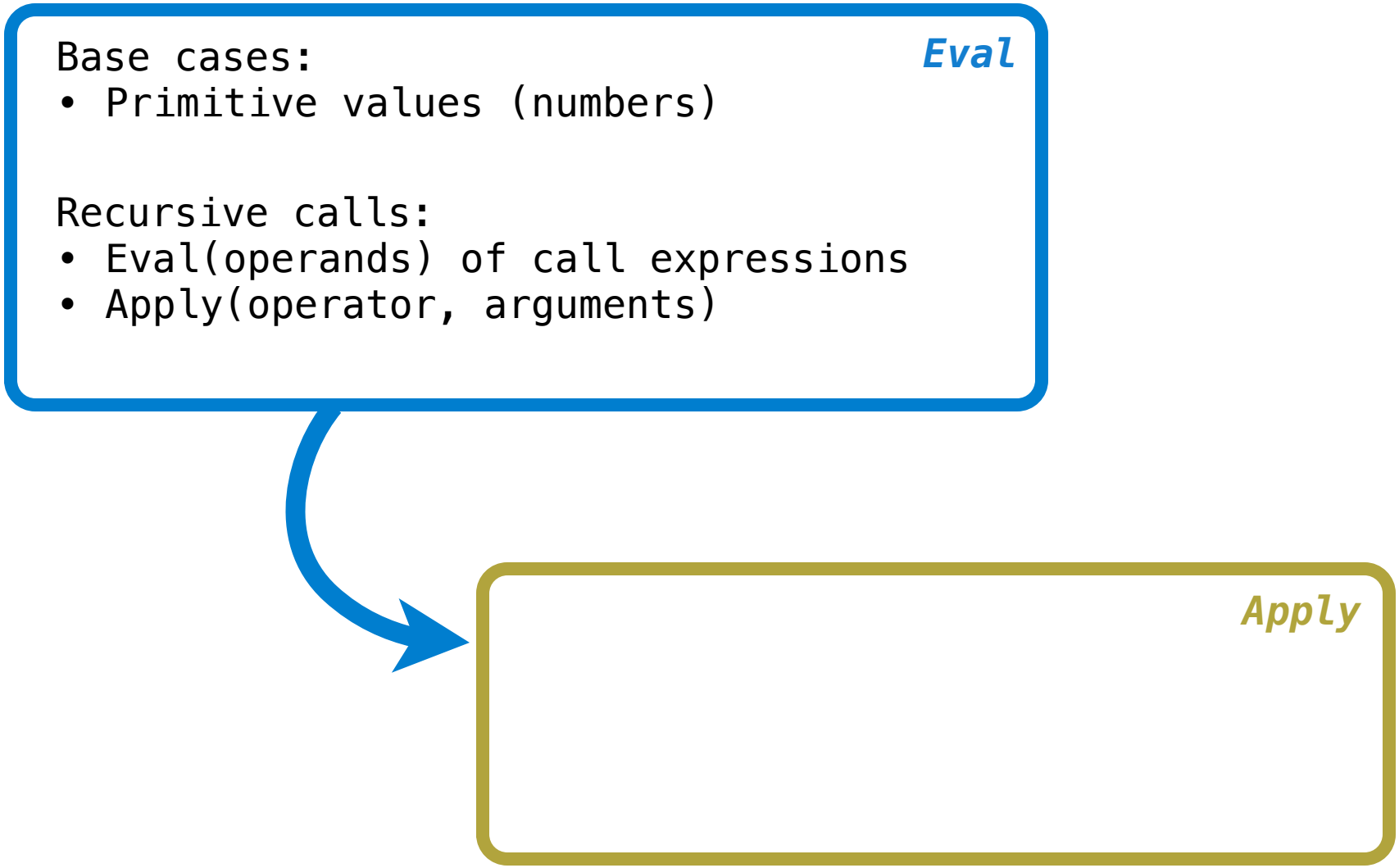

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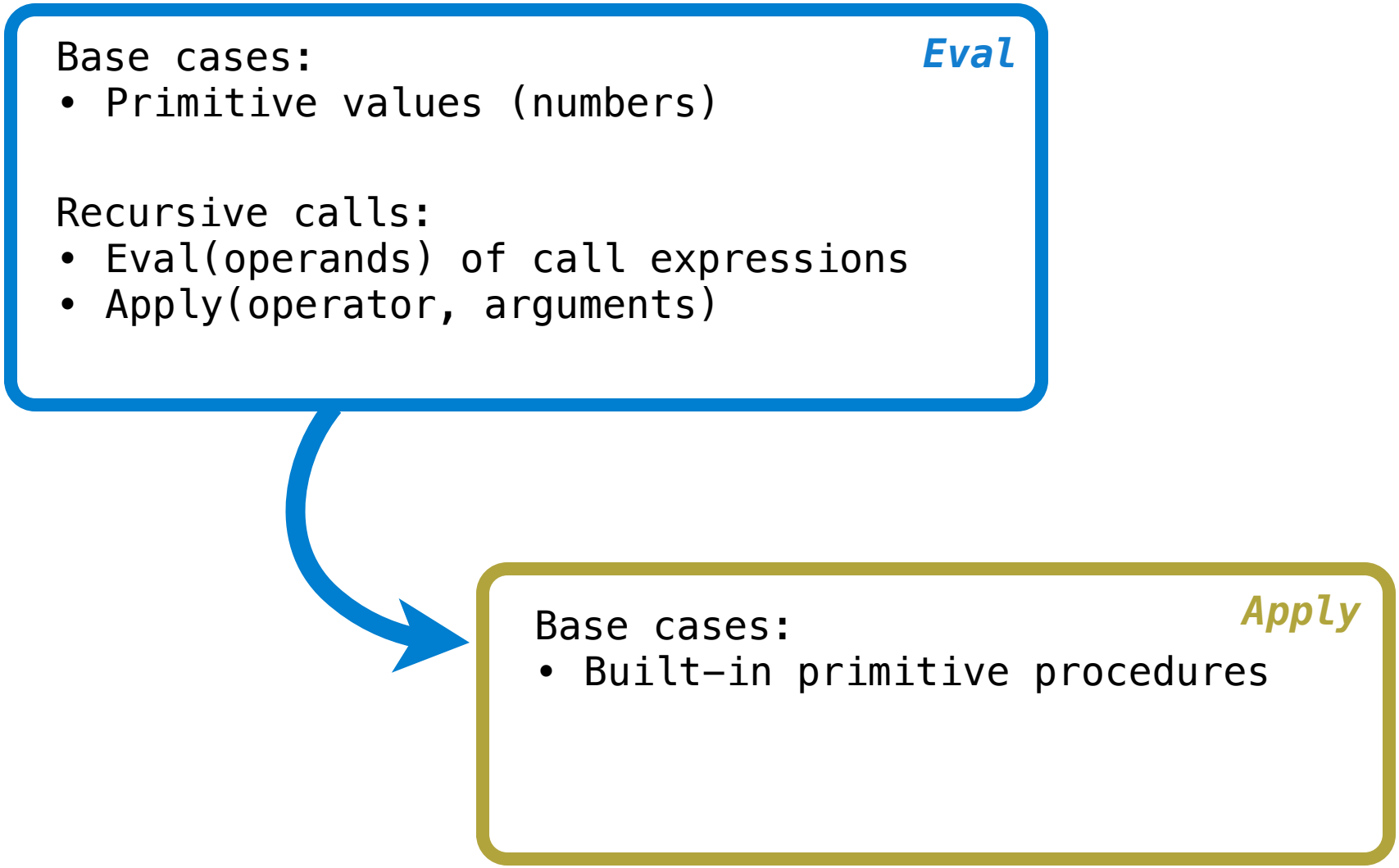

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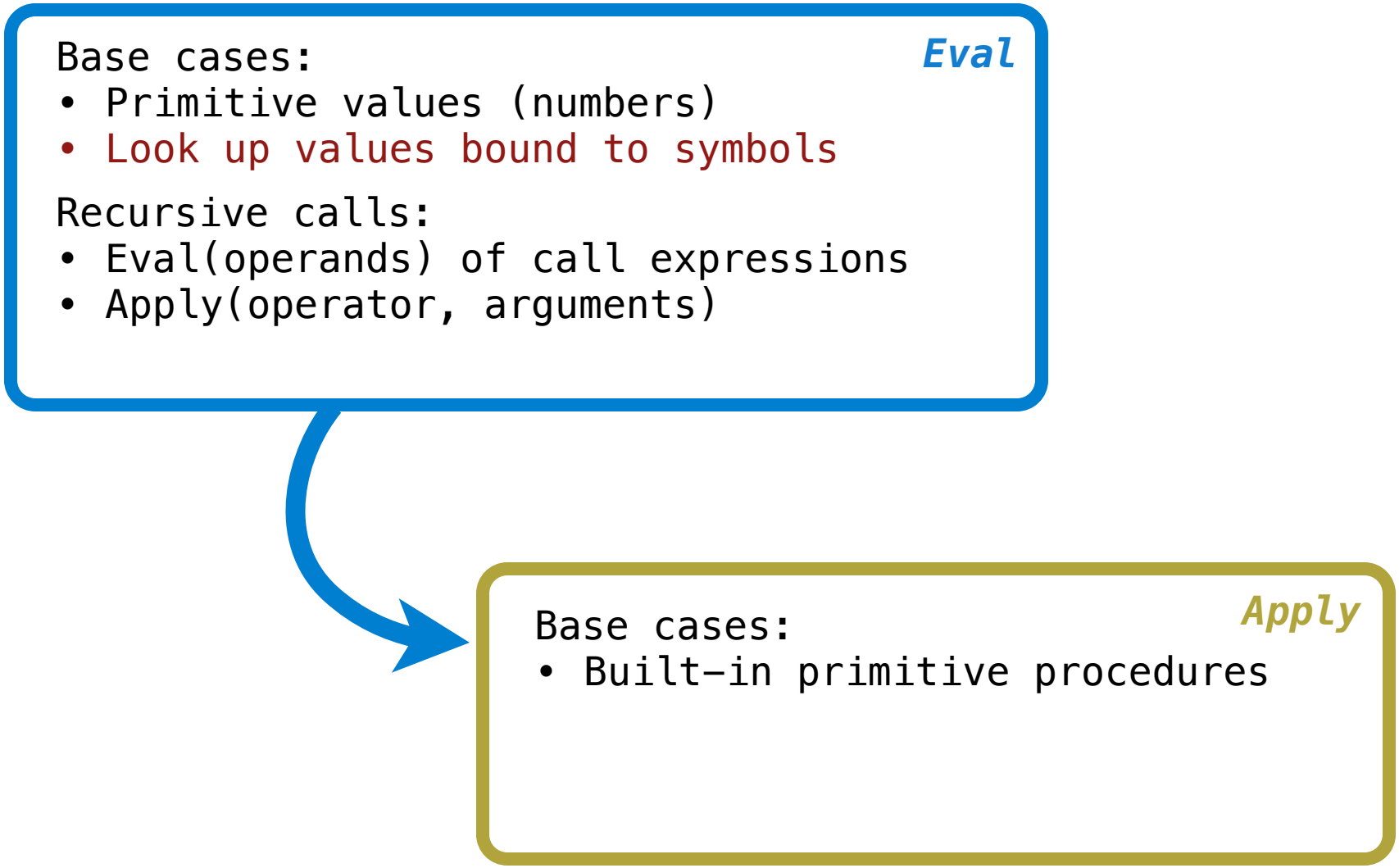

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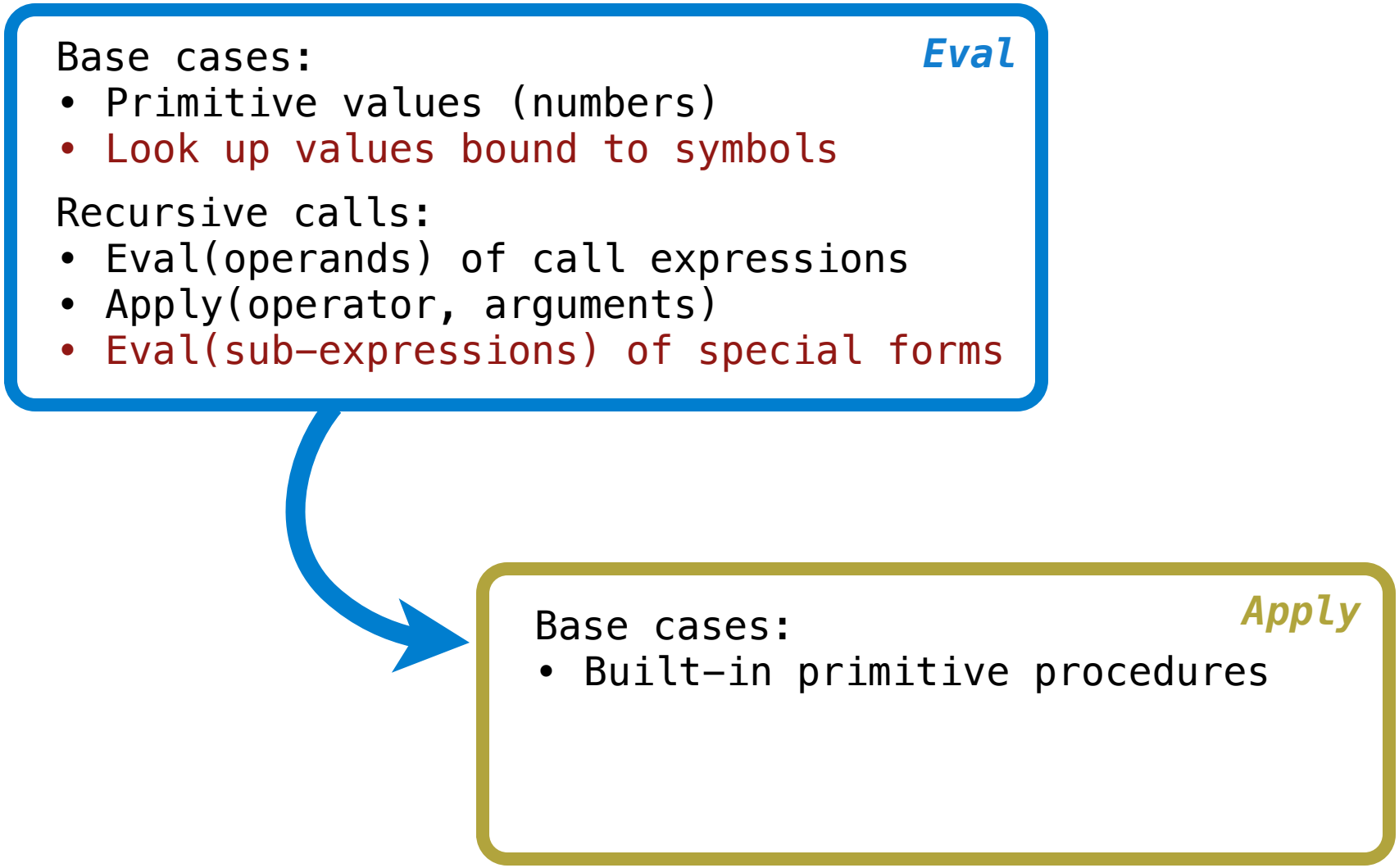

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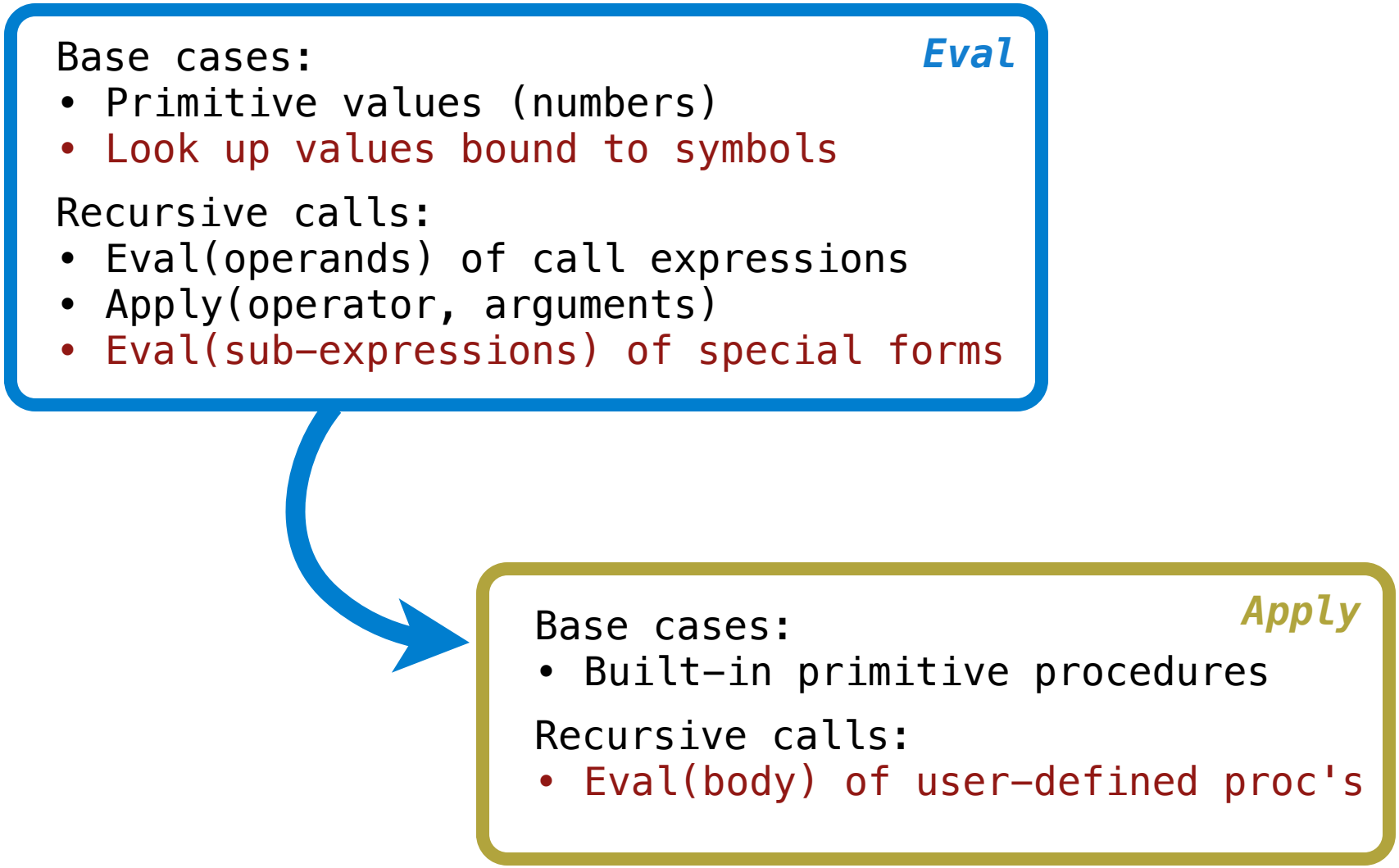

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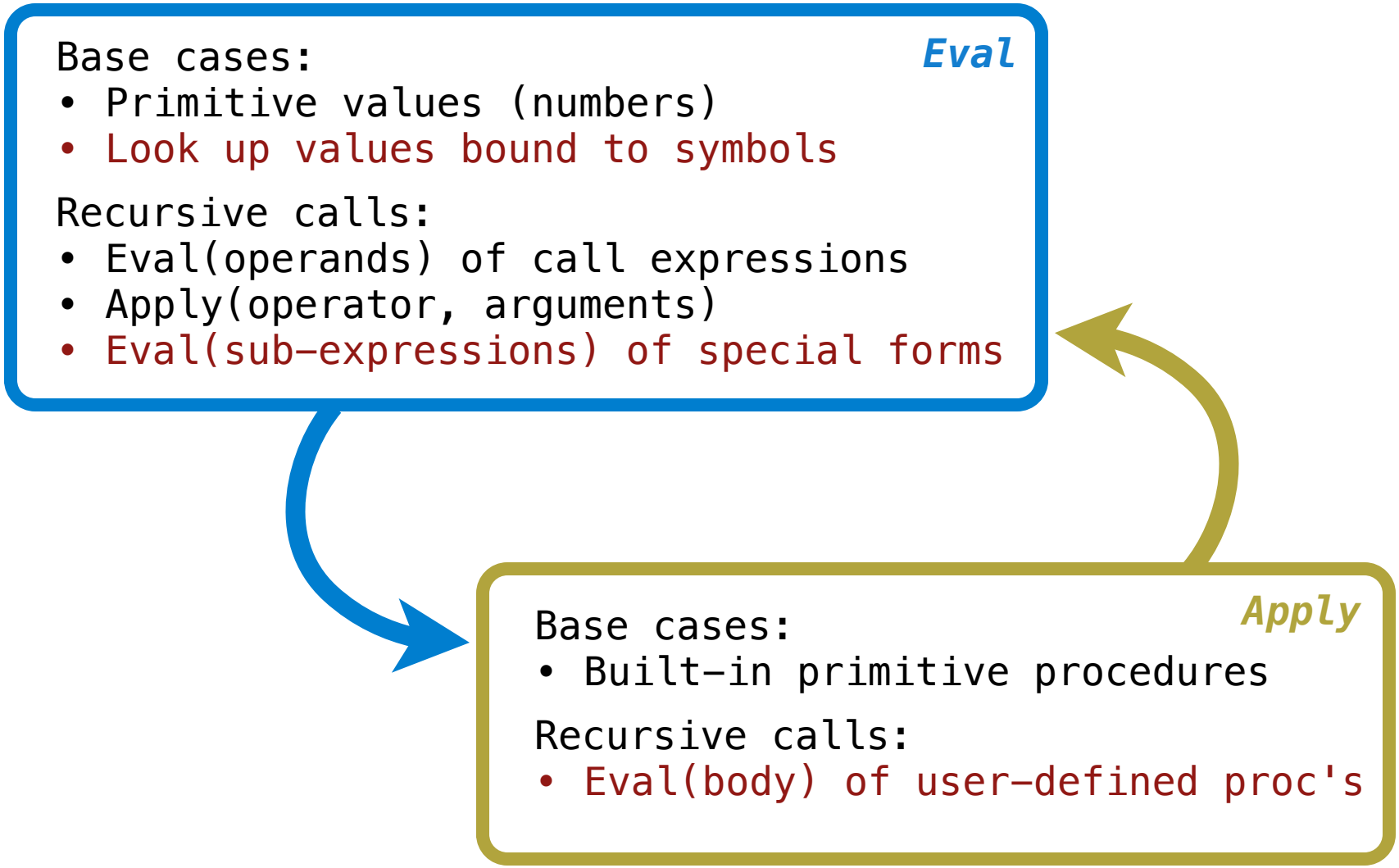

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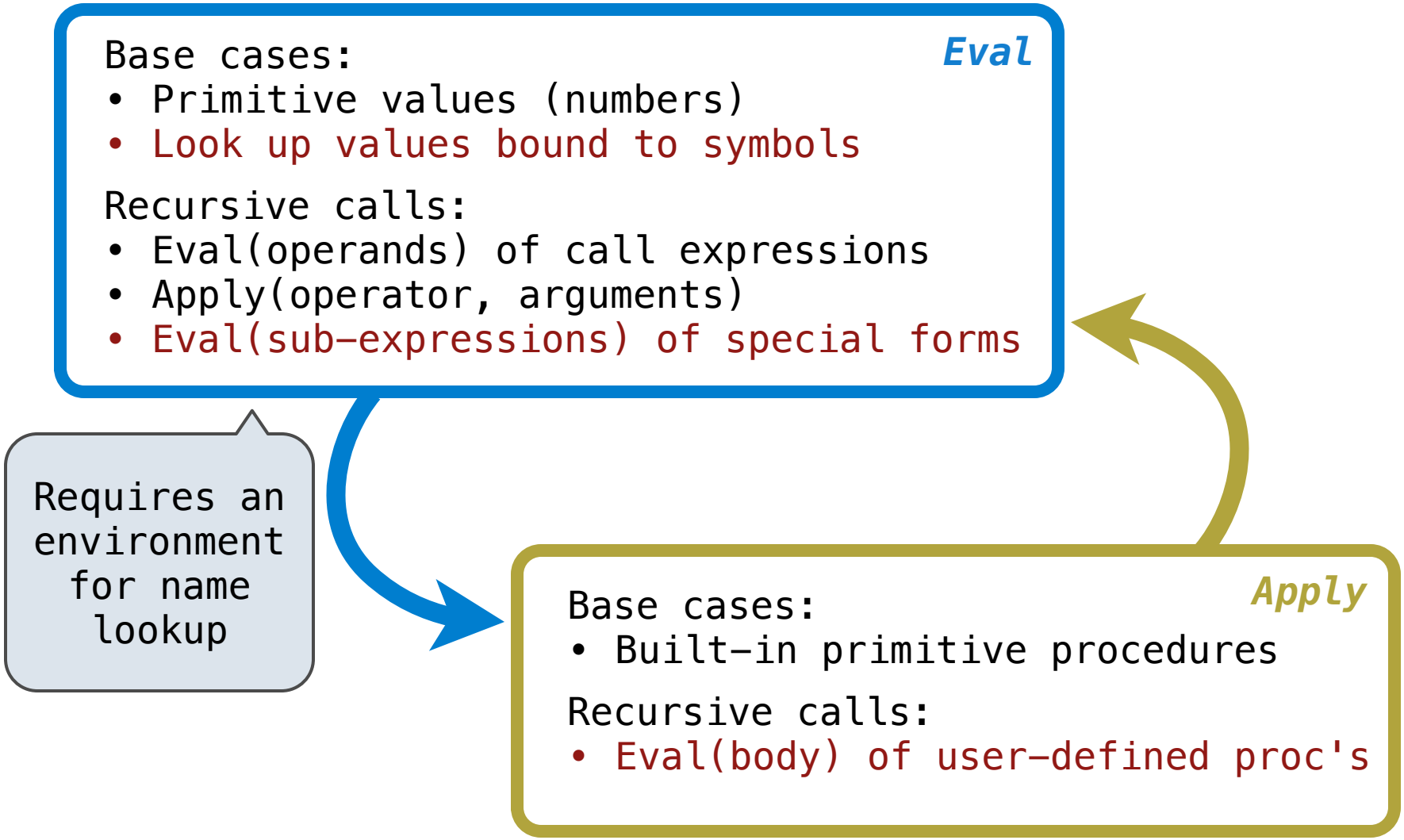

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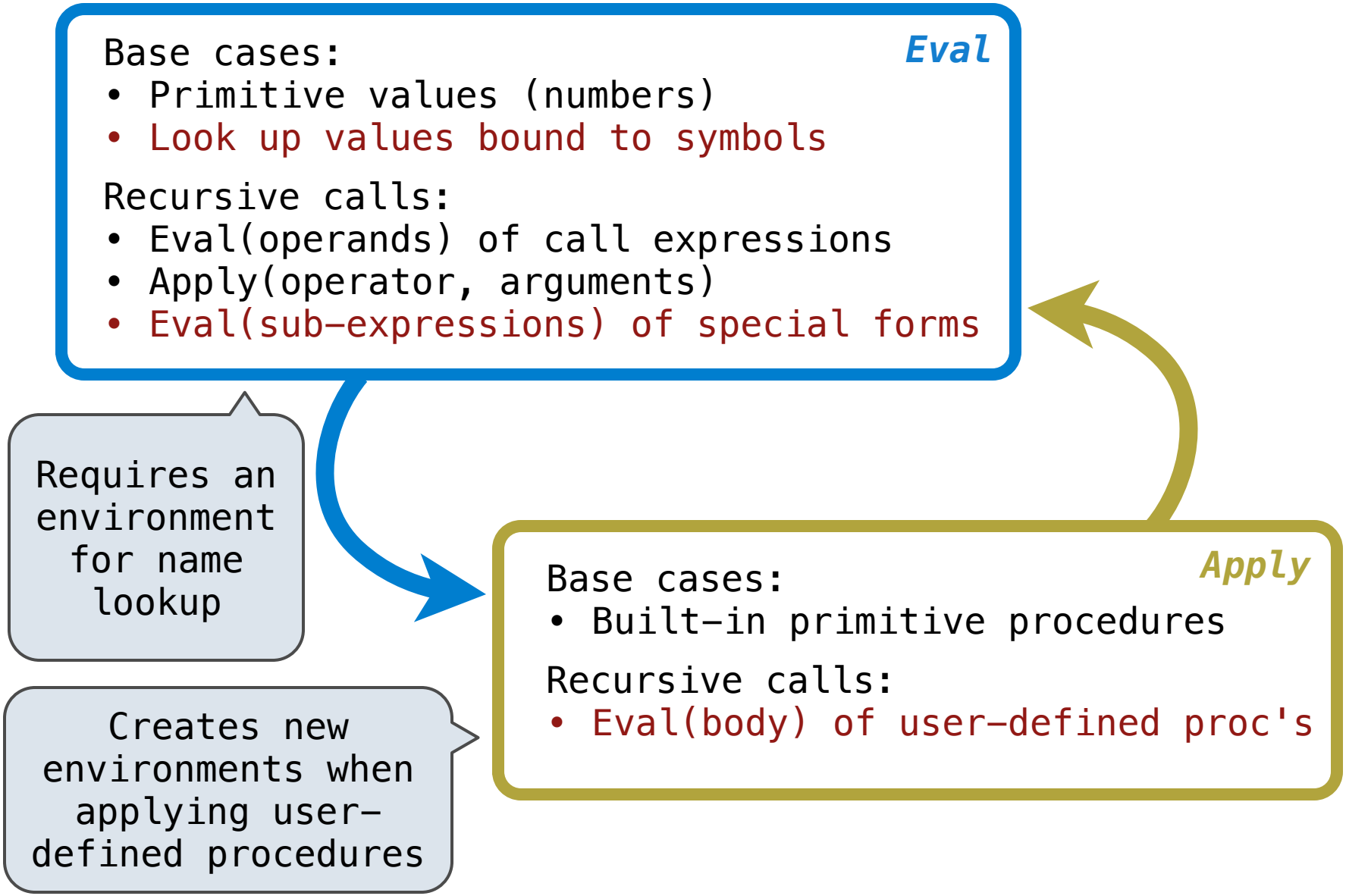

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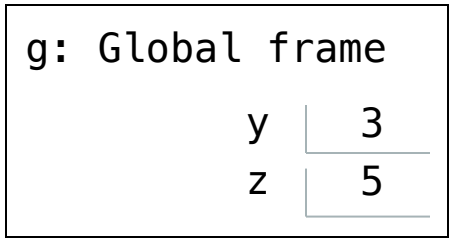

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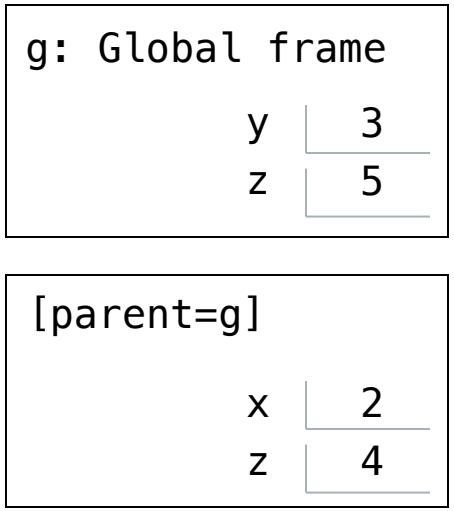

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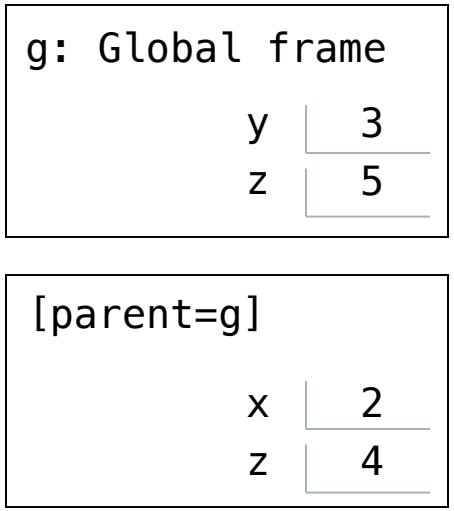

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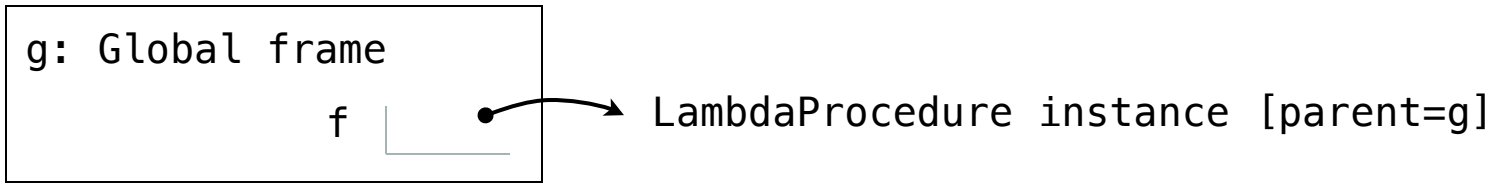

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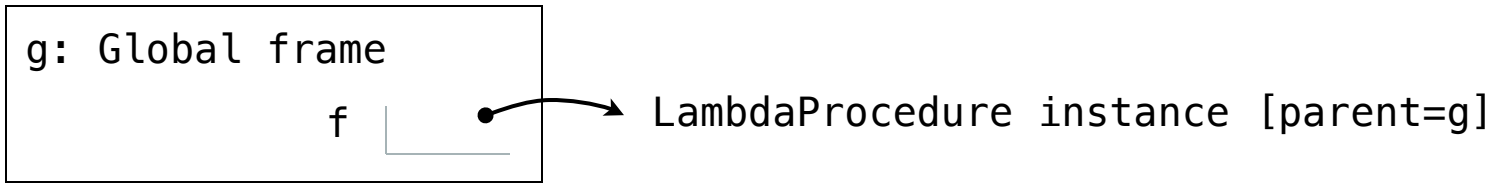

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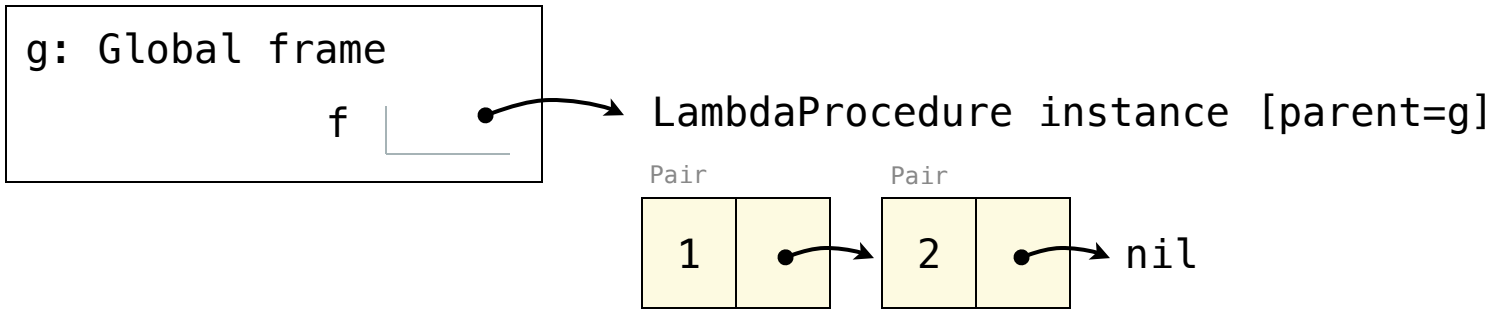

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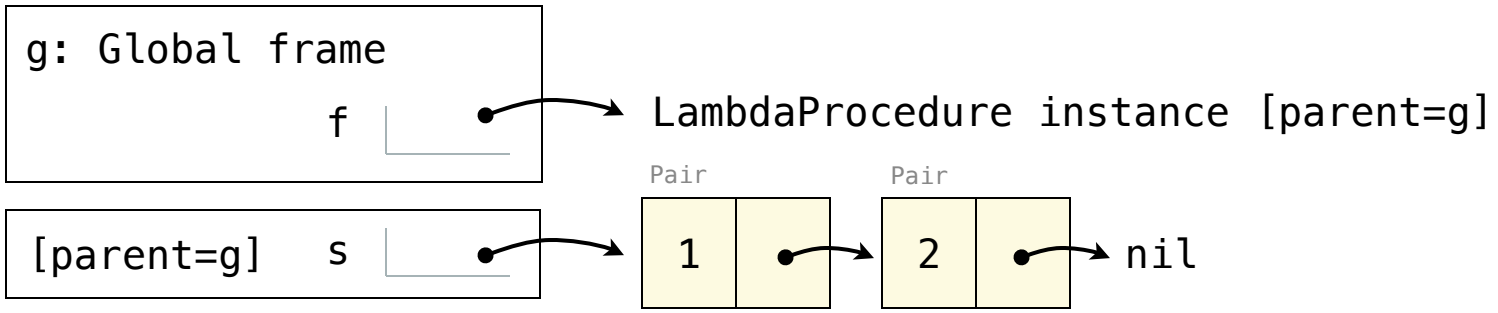

Applying User-Defined Procedures

Create a new frame in which formal parameters are bound to argument values, whose parent is the **env** of the procedure.

Evaluate the body of the procedure in the environment that starts with this new frame.

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(define (f s) (if (null? s) '(3) (cons (car s) (f (cdr s)))))

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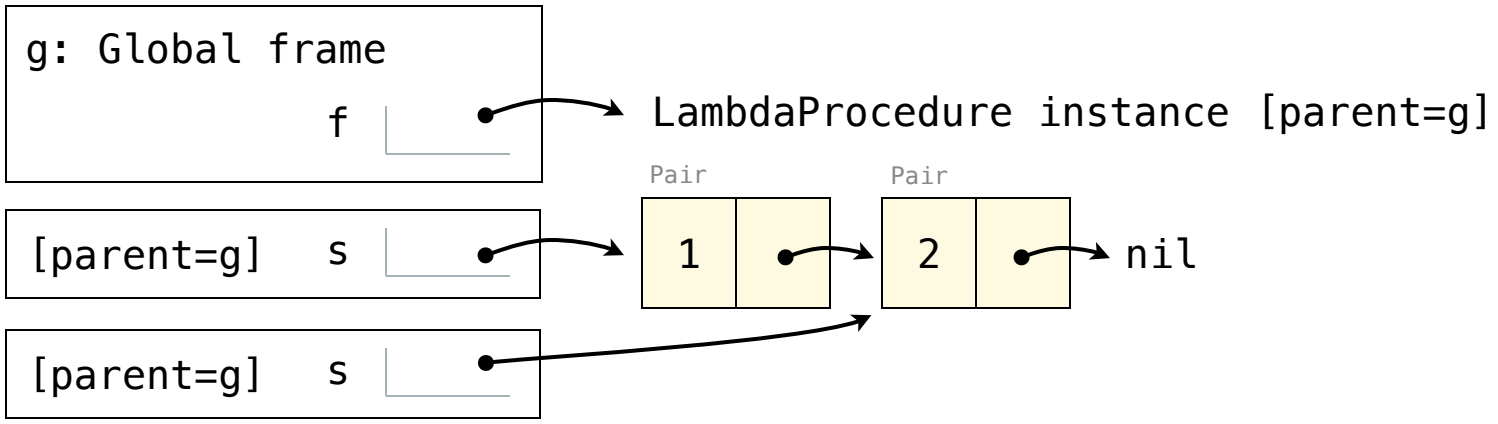

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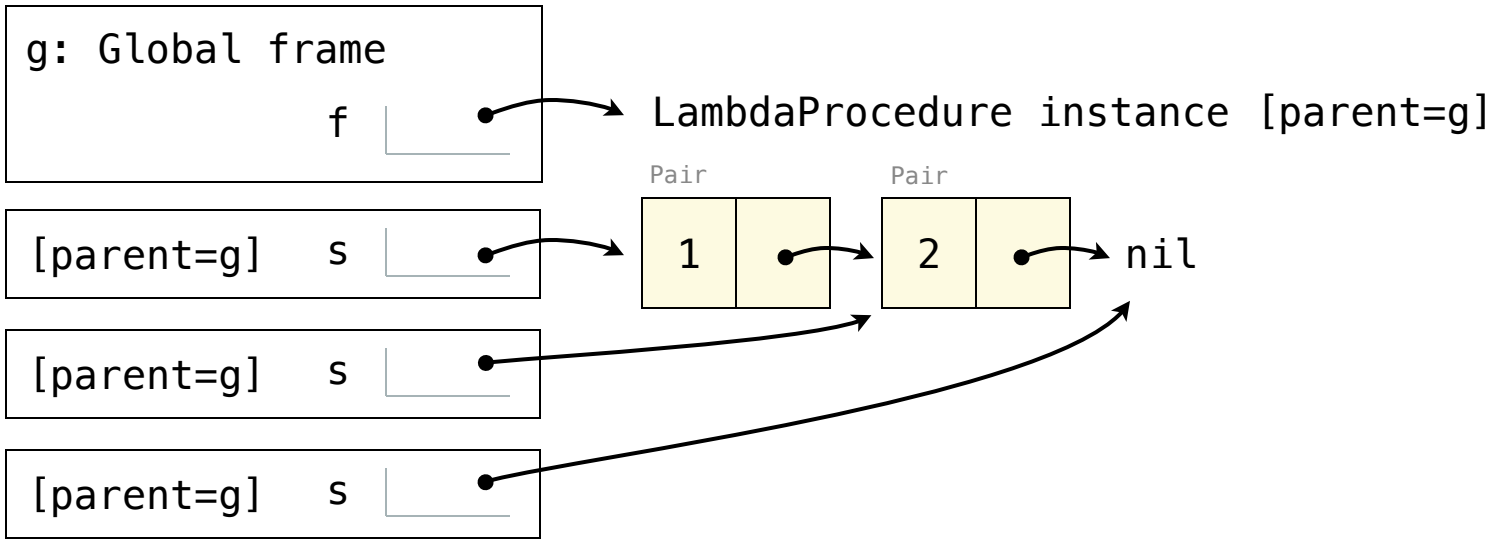

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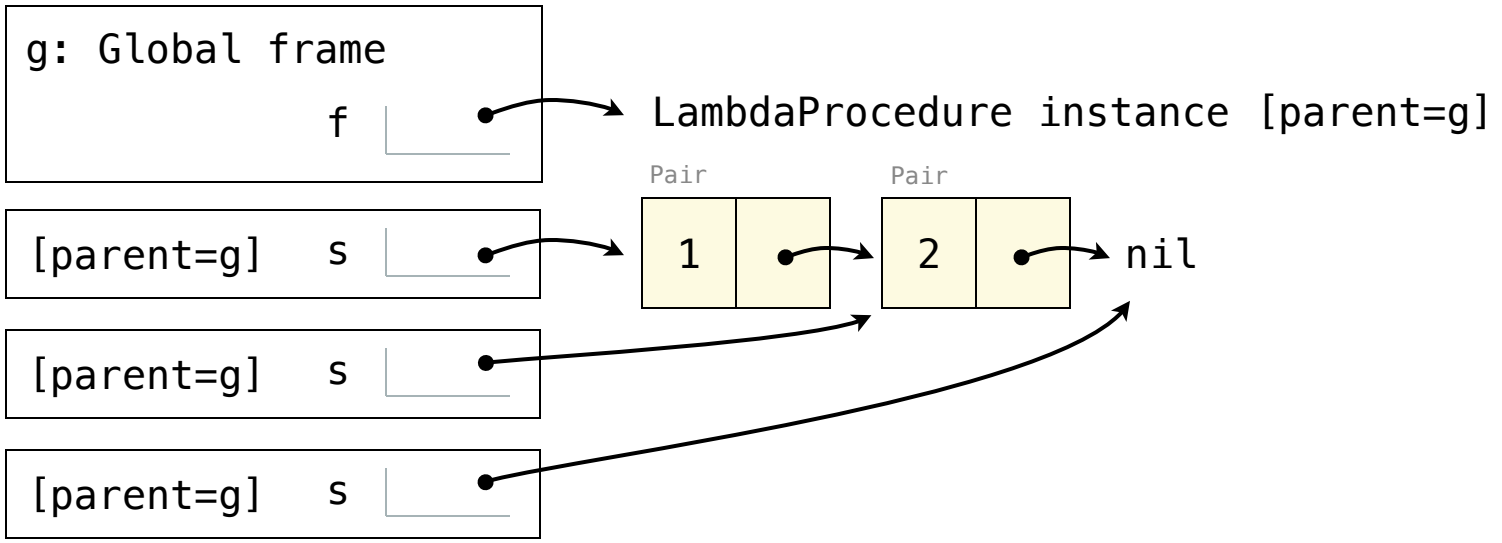

Demo

Eval/Apply in Lisp 1.5

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```
apply[fn;x;a] =
      [atom[fn] → [eq[fn;CAR] → caar[x];
                   eq[fn;CDR] → cdar[x];
                   eq[fn;CONS] → cons[car[x];cadr[x]];
                   eq[fn;ATOM] → atom[car[x]];
                   eq[fn;EQ] → eq[car[x];cadr[x]];
                   T → apply[eval[fn;a];x;a]];
       eq[car[fn];LAMBDA] → eval[caddr[fn];pairlis[cadr[fn];x;a]];
       eq[car[fn];LABEL] → apply[caddr[fn];x;cons[cons[cadr[fn];
                                                     caddr[fn]];a]]]
eval[e;a] = [atom[e] → cdr[assoc[e;a]];
       atom[car[e]] →
                [eq[car[e],QUOTE] → cadr[e];
                eq[car[e];COND] → evcon[cdr[e];a];
                T → apply[car[e];evlis[cdr[e];a];a]];
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Special form to create dynamically scoped procedures

mu

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