Hygienic Macros

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  - Extensible: By the user

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  - A language should be so designed that one is encouraged to use a construct if, and only if, it is appropriate; it must also provide enough constructs to cover all reasonable programming constructs.
  - A PL designer can not get it perfect for every case.

03: A syntax-rules

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      (lambda (x) (display (format "~a~n" x))))
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    (define-syntax from
      (syntax-rules (upto)
        ([from x upto y fn]
         [let ([finish (+ y 1)]
               [add1 (lambda (n) (+ n 1))])
           (let loop ([cur x])
             (if (not (= cur finish))
                 (begin
                   (fn cur)
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04: Scoping Concerns

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- Integrity of template bindings
- Integrity of (pattern) input bindings
- "Hygiene" maintains lexical scoping for macros

05: Dynamic Scoping with Elisp. Do you really like it?

```
(defvar x 42)
(defun sample ()
  (message "%s" x))
(defun dynamic-scope-sample ()
  (let ((x 666))
    (sample)))
(sample)
"42"
(dynamic-scope-sample)
"666"
```

06: Dynamic Scoping in the Small

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- Manageable in simple cases
  - ... but do we only care about simple cases?

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- Our goal is to support programming in the large
- Can we manage scoping issues past 2 steps?
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  - 100?
- If we want macros to be first class citizens in large scale development, hygiene seems more likely to succeed (computer vs. human)

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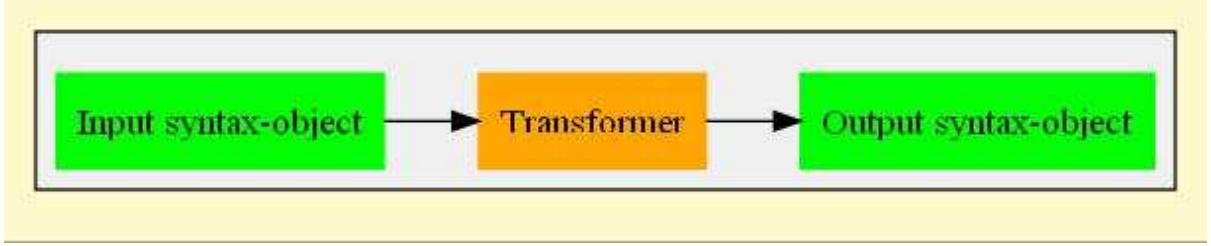
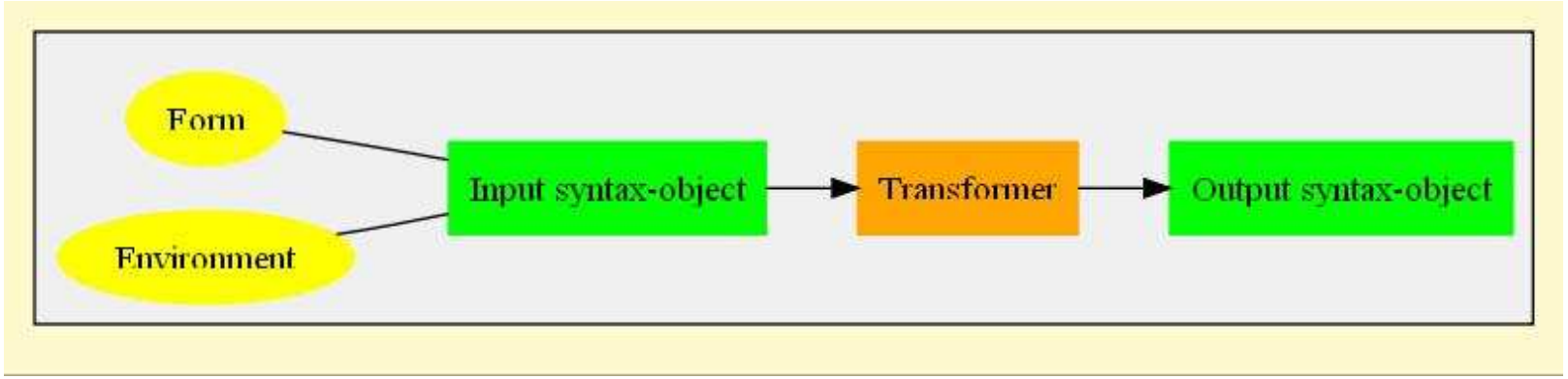
```
(aif (+ 10 10) it -1)
```

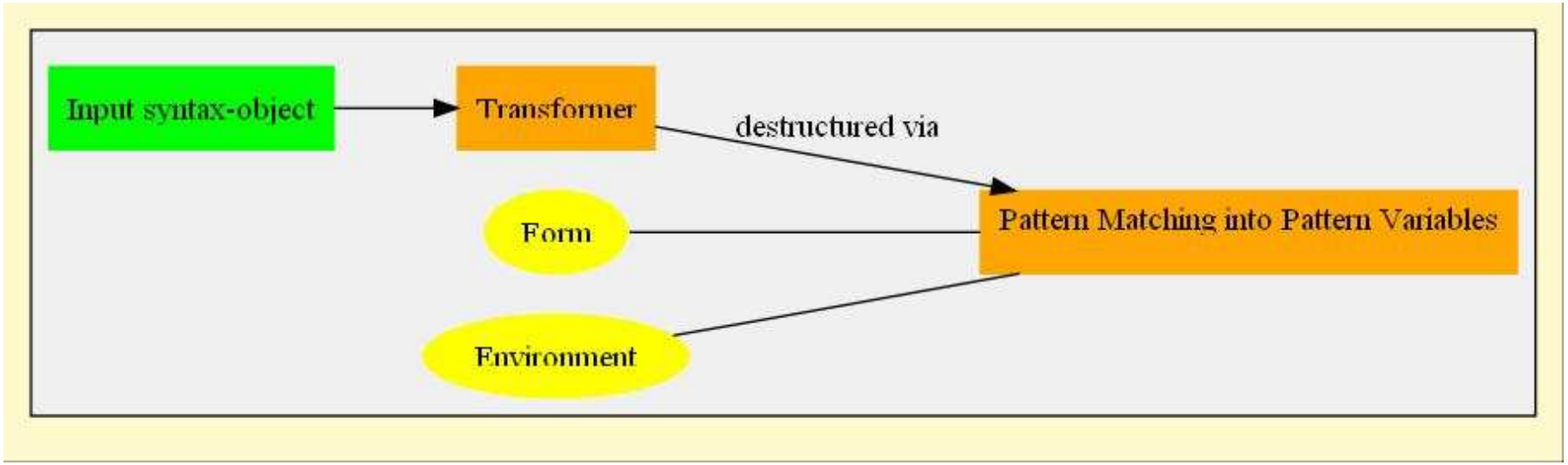
08.2: syntax-case



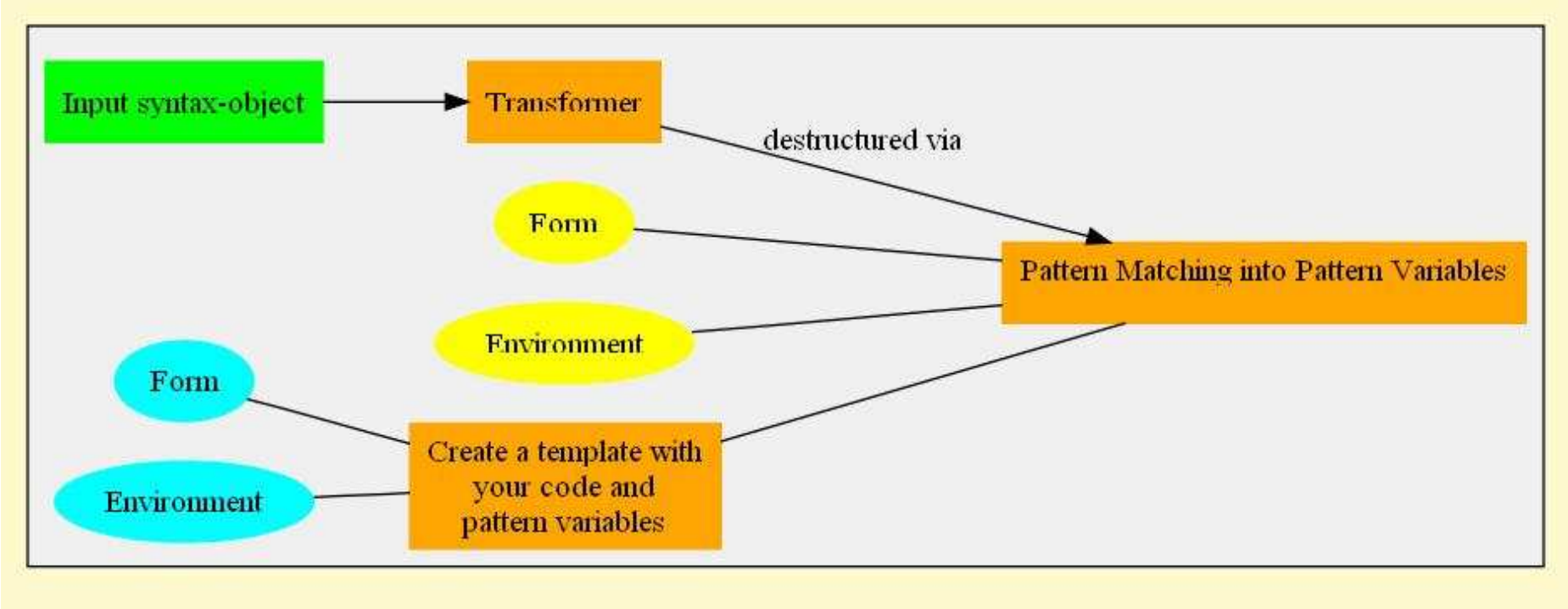
08.3: syntax-case



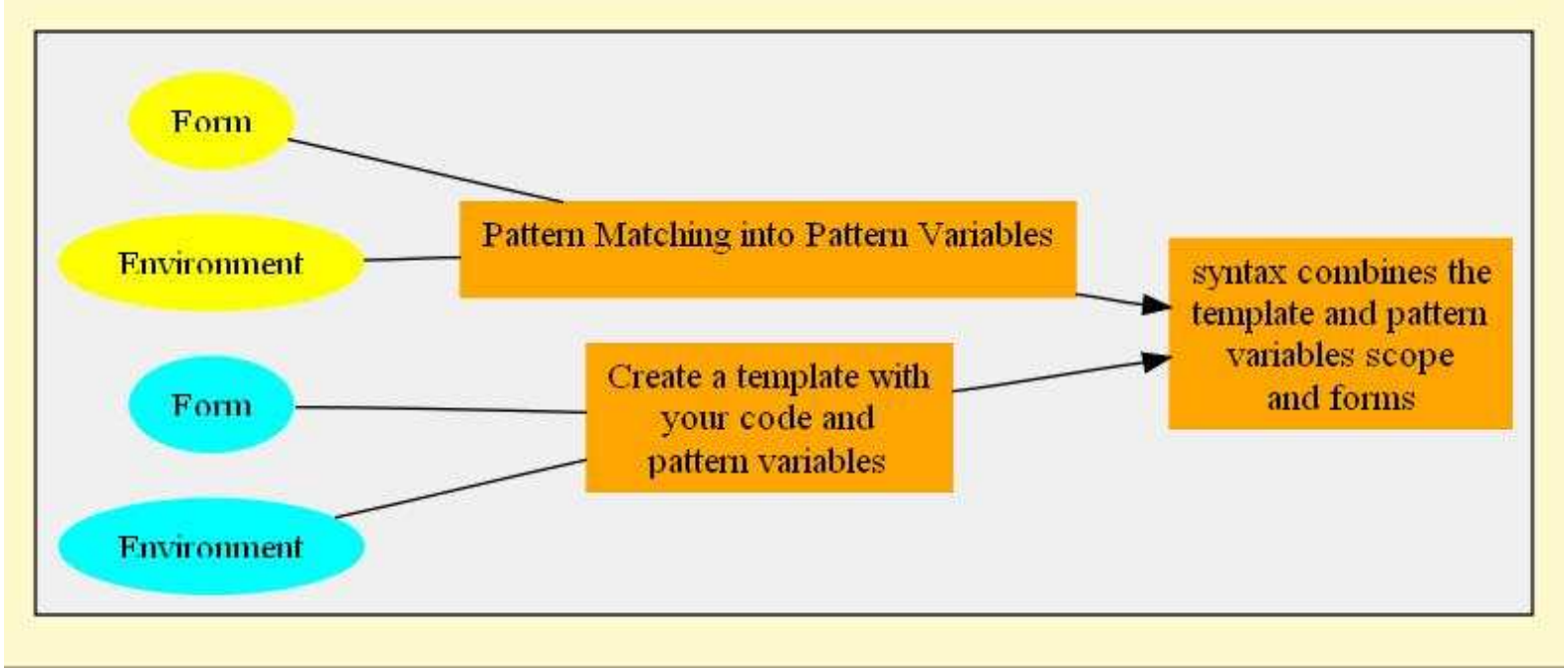
08.4: syntax-case



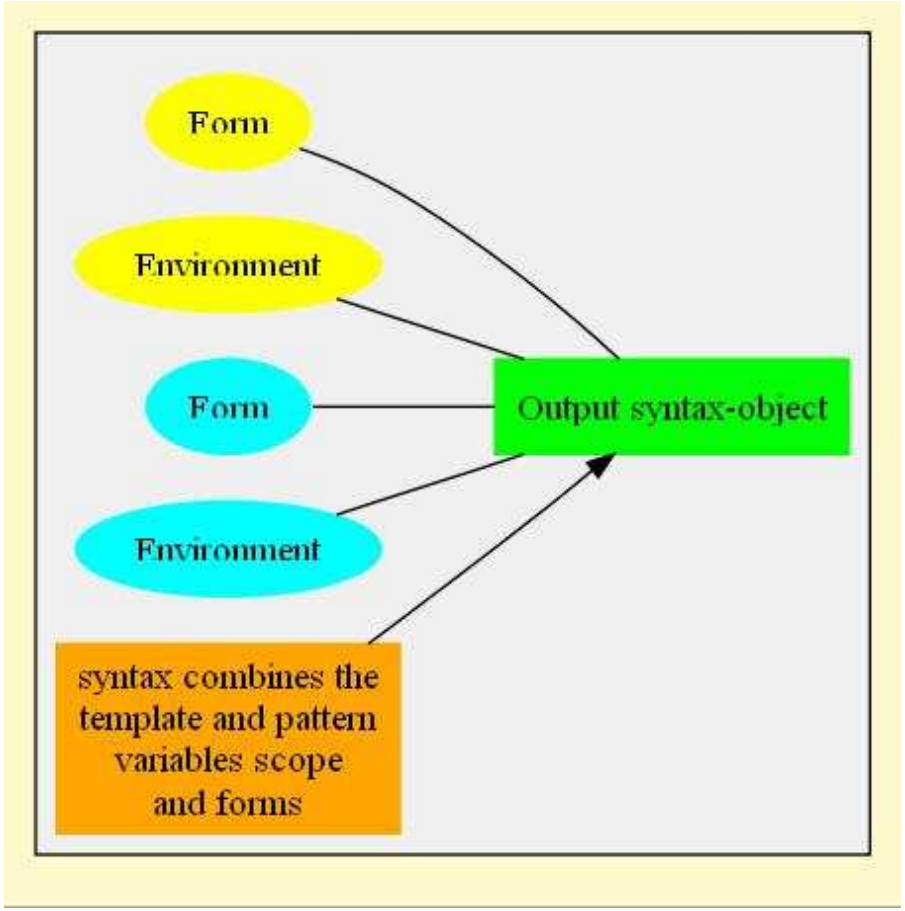
08.5: syntax-case



08.6: syntax-case



08.7: syntax-case



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```
(define-syntax aif
  (lambda (stx)
    (syntax-case stx ()
      ([aif test-form then-form else-form]
       [with-syntax ([it (datum->syntax #'aif 'it)])
         #'(let ((it test-form))
             (if it
                 then-form
                 else-form))]))))
```

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- Many folks prefer defmacro
- syntax-case is a superset of syntax-rules; can do anything defmacro allows
- Respect macros; it is easy to get burned even with hygiene

10: Fun

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```
(define-syntax sequencing
  (syntax-rules ()
    [(_ expression) expression]
    [(_ expression expressions ...)
     ((lambda (ignored)
        (sequencing expressions ...))
      expression)]))
```