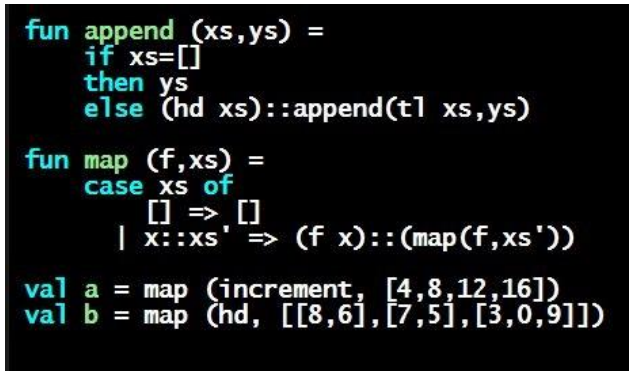

```
fun append (xs,ys) =
    if xs=[]
    then ys
    else (hd xs)::append(tl xs,ys)

fun map (f,xs) =
    case xs of
        [] => []
      | x::xs' => (f x)::(map(f,xs'))

val a = map (increment, [4,8,12,16])
val b = map (hd, [[8,6],[7,5],[3,0,9]])
```

Programming Languages

Dan Grossman

Parentheses Matter! (Debugging Practice)

Parentheses matter

You must break yourself of one habit for Racket:

- Do not add/remove parens because you feel like it
  - Parens are never optional or meaningless!!!
- In most places `(e)` means call `e` with zero arguments
- So `((e))` means call `e` with zero arguments and call the result with zero arguments

Without static typing, often get hard-to-diagnose run-time errors

Examples (more in code)

Correct:

```
(define (fact n)(if (= n 0) 1 (* n (fact (- n 1)))))
```

Treats 1 as a zero-argument function (run-time error):

```
(define (fact n)(if (= n 0) (1)(* n (fact (- n 1)))))
```

Gives **`if`** 5 arguments (syntax error)

```
(define (fact n)(if = n 0 1 (* n (fact (- n 1)))))
```

3 arguments to define (including **`(n)`**) (syntax error)

```
(define fact (n)(if (= n 0) 1 (* n (fact (- n 1)))))
```

Treats **`n`** as a function, passing it **`*`** (run-time error)

```
(define (fact n)(if (= n 0) 1 (n * (fact (- n 1)))))
```