Quote of the Day

"First solve the problem. Then, write the code." - John Johnson

"A language that doesn't affect the way you think about programming, is not worth knowing." - Alan Perlis

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- This course: functional programming in OCaml
- Recursion, recursion, recursion
- Types and Abstractions

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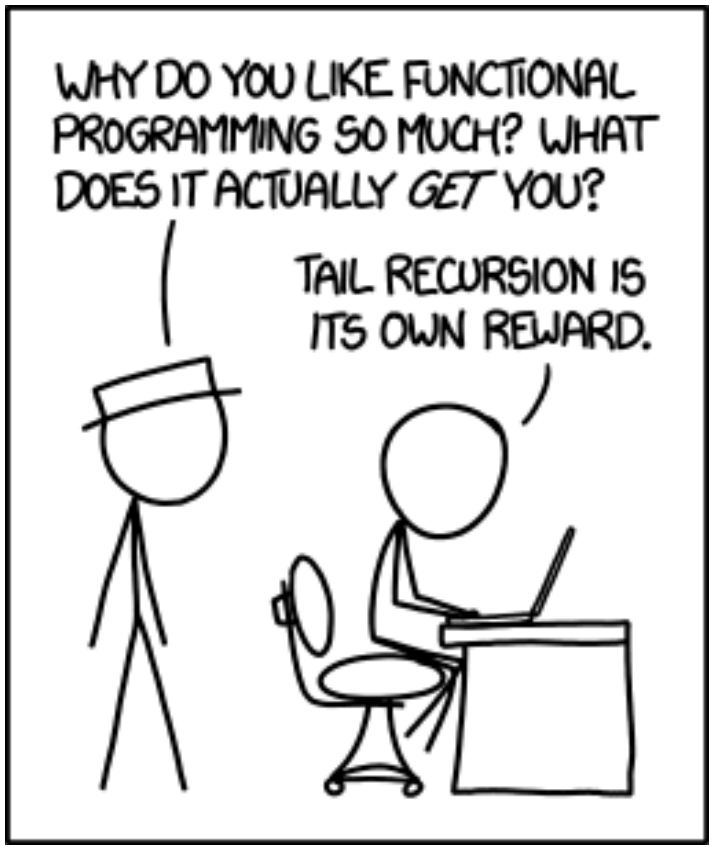

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Understanding these concepts will make it easier, quicker, and more effective for you to pick up new languages. - E. Dijkstra

Let's practice ...

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- Types systems provide a simple, static, lightweight tool to reason about programs approximating run-time behavior.

  $\Longrightarrow$ Be able to infer the most general type
- Subtyping, polymorphism
- Evaluation (Environment diagrams, Operational semantics)

Typed functional programming enforces disciplined programming, ultimately making you a better all-round programmer.

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- Be able to design your own little language
- Be able to implement compilers

Let's practice ...

A glimpse to the past (www.tiobe.com)

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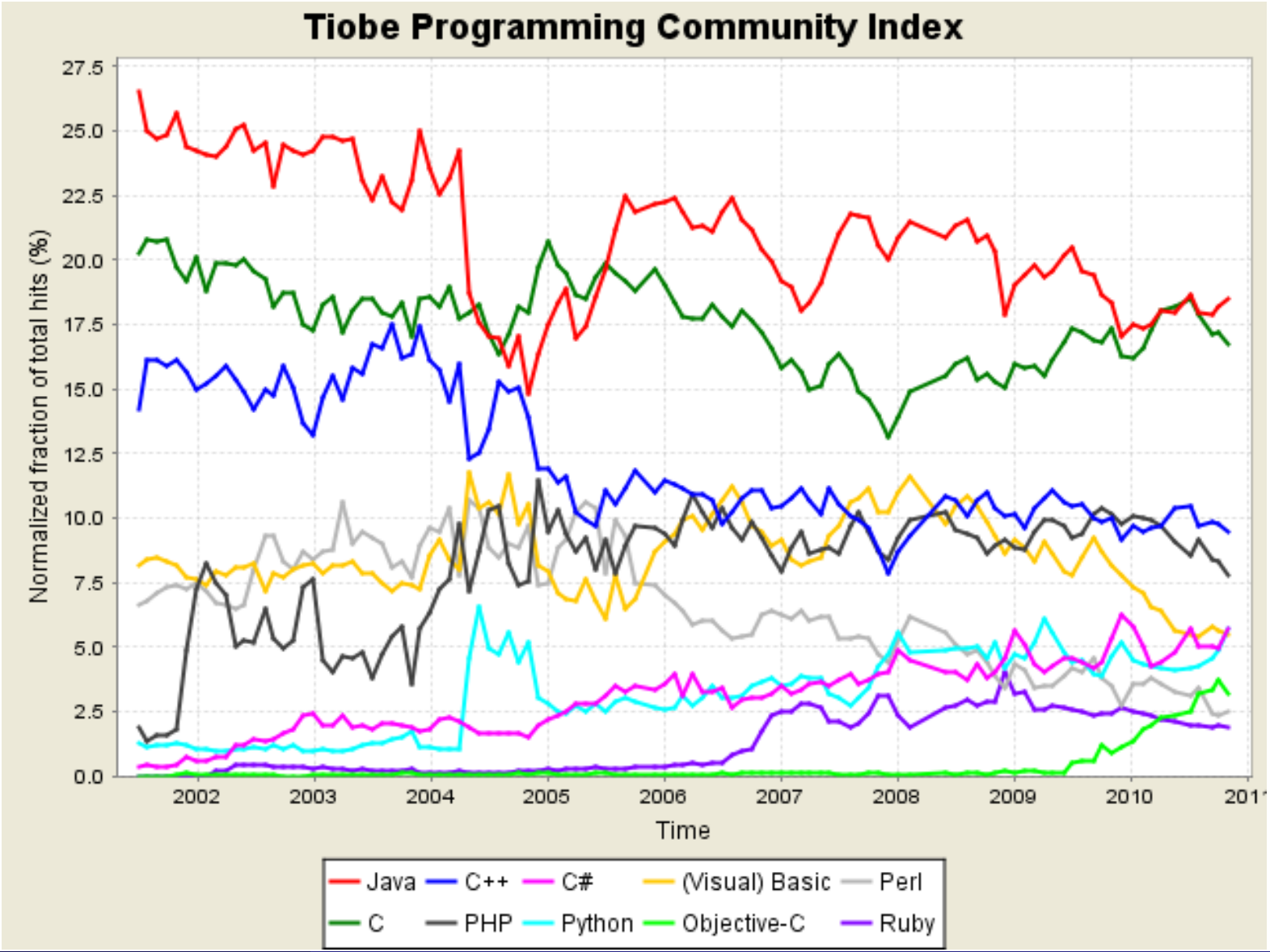
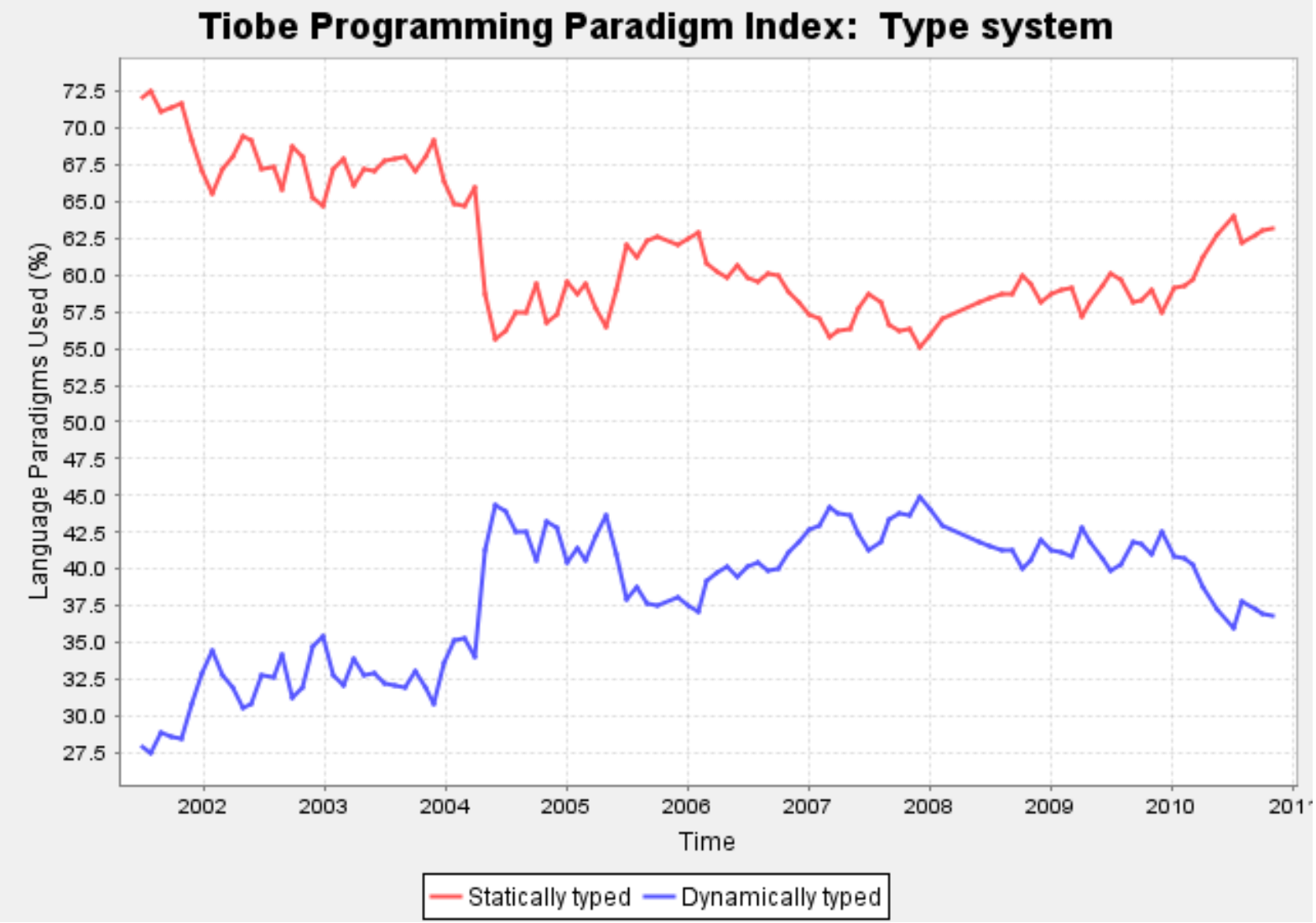
Programming Language	2015	2010	2005	2000	1995	1990	1985
Java	1	1	2	3	31	-	-
C	2	2	1	1	2	1	1
C++	3	3	3	2	1	2	9
C#	4	5	6	10	-	-	-
Objective-C	5	8	42	-	-	-	-
Python	6	6	7	25	9	-	-
PHP	7	4	4	21	-	-	-
JavaScript	8	10	10	7	-	-	-
Visual Basic .NET	9	192	-	-	-	-	-
Perl	10	7	5	4	5	17	-
Pascal	17	14	17	18	3	7	6
Fortran	25	25	14	17	18	3	5
Lisp	28	15	13	8	10	6	2
Ada	29	22	16	19	4	9	3

A glimpse to the past and current



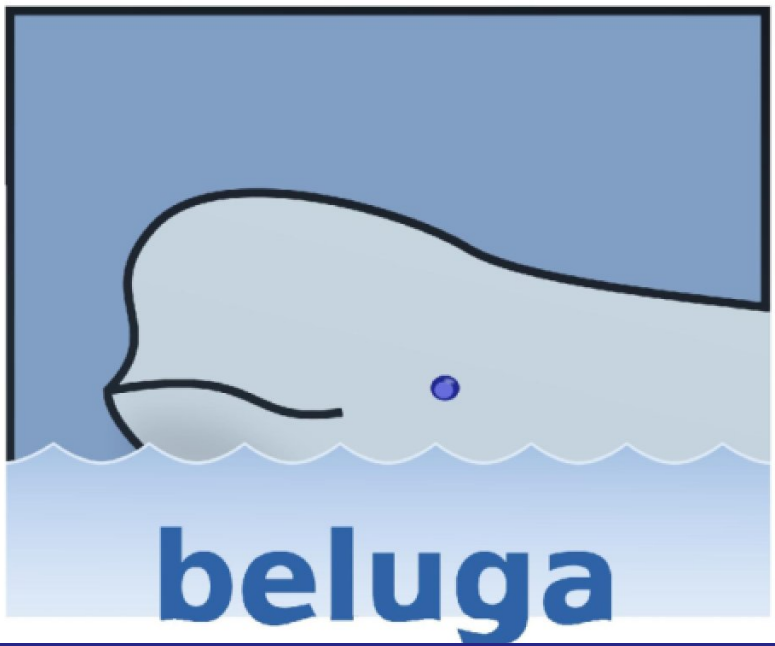
Static vs dynamically typed



A glimpse of the future

Beluga : Programming with proofs

- One of the most advanced languages to program with proofs
- Dependent types to express and track safety policies
- Designed on paper ; Implemented in OCaml



Want more?

- COMP 230: Logic and Computability
- COMP 523: Language-based security
  (really about Types and Programming Languages)
- COMP 527: Logic and computation
  (relationship between Types, Logic, and Programs)
- COMP 396, COMP 400 Projects

Last but not least

Go to Vincent's review lecture!

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Thank you!

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Thank you!

. . . And good luck with the final!