

Machine Problems

- ▶ Machine Problems – collectively worth 25%
- ▶ Designed to help you study for the exams, and to achieve major course objectives
- ▶ You are allowed one partner for the programming part, but **you must cite your sources!** (Place partner netids in a comment at the top.)
- ▶ Don't use the "perturbation method" of solving machine problems! We expect you to *understand* the solution and the process very well.
- ▶ See the syllabus for more details.

Why Study Languages?

- ▶ *Pai sei*
- ▶ Blub – see *Beating the Averages* by Paul Graham. [Gra03]
- ▶ Language families

Exams/Quizzes

- ▶ The purpose of an exam is to measure mastery of material.
 - ▶ Exams are subdivided into proficiency units.
 - ▶ The final exam will retest many of the proficiency units. If you improve your score, we update your midterm score with it!
- ▶ Four midterms: 10% each
- ▶ Final exam: 25%

Pai Sei

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- ▶ Languages and cultures grow together to shape each other.
- ▶ It's difficult to reason about something without vocabulary!

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- ▶ A story from human languages: *pai sei*
- ▶ Languages and cultures grow together to shape each other.
- ▶ It's difficult to reason about something without vocabulary!
- ▶ See *Politics and the English Language* by George Orwell. [Orw46]

Blubs

- ▶ From *Beating the Averages* by Paul Graham
- ▶ The difference between a known powerful language to a less powerful language is easy to see.

Themes

The course has four major parts:

1. Functional Programming
You will learn functional programming by learning how to build interpreters in HASKELL.

Blubs

- ▶ From *Beating the Averages* by Paul Graham
- ▶ The difference between a known powerful language to a less powerful language is easy to see.
- ▶ The difference between a known less powerful language to a more powerful language is not easy to see!

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3. Mathematical Foundations
You will learn some of the mathematical theory that lets us reason about programming languages and the programs written in them.

So, what should you learn?

- ▶ Understand major classes of programming languages: techniques, features, styles.
- ▶ How to select an appropriate language for a given task.
- ▶ How to read a formal specification of a language and implement it.
- ▶ How to write a formal specification of a language.
- ▶ Some Powerful Ideas:
 1. Recursion
 2. Abstraction
 3. Transformation
 4. Unification

The emphasis is on learning the theory, knowing why the theory is valuable, and using it to implement a language.

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You will learn some of the mathematical theory that lets us reason about programming languages and the programs written in them.
4. Pragmatics
You will learn some of the design decisions available to you when choosing (or creating!) a language.

Bibliography

- [Bac97] [John Backus](#). "Can Programming Be Liberated from the von Neumann Style? A functional Style and Its Algebra of Programs." In: [ACM Turing Award Lecture \(1997\)](#).
- [Gra03] [Paul Graham](#). *Beating the Averages*. Apr. 2003. URL: <http://www.paulgraham.com/avg.html>.
- [Orw46] [George Orwell](#). "Politics and the English Language." In: *Horizon* 13.76 (Apr. 1946), pp. 252–265. URL: <http://www.resort.com/~prime8/Orwell/patee.html>.