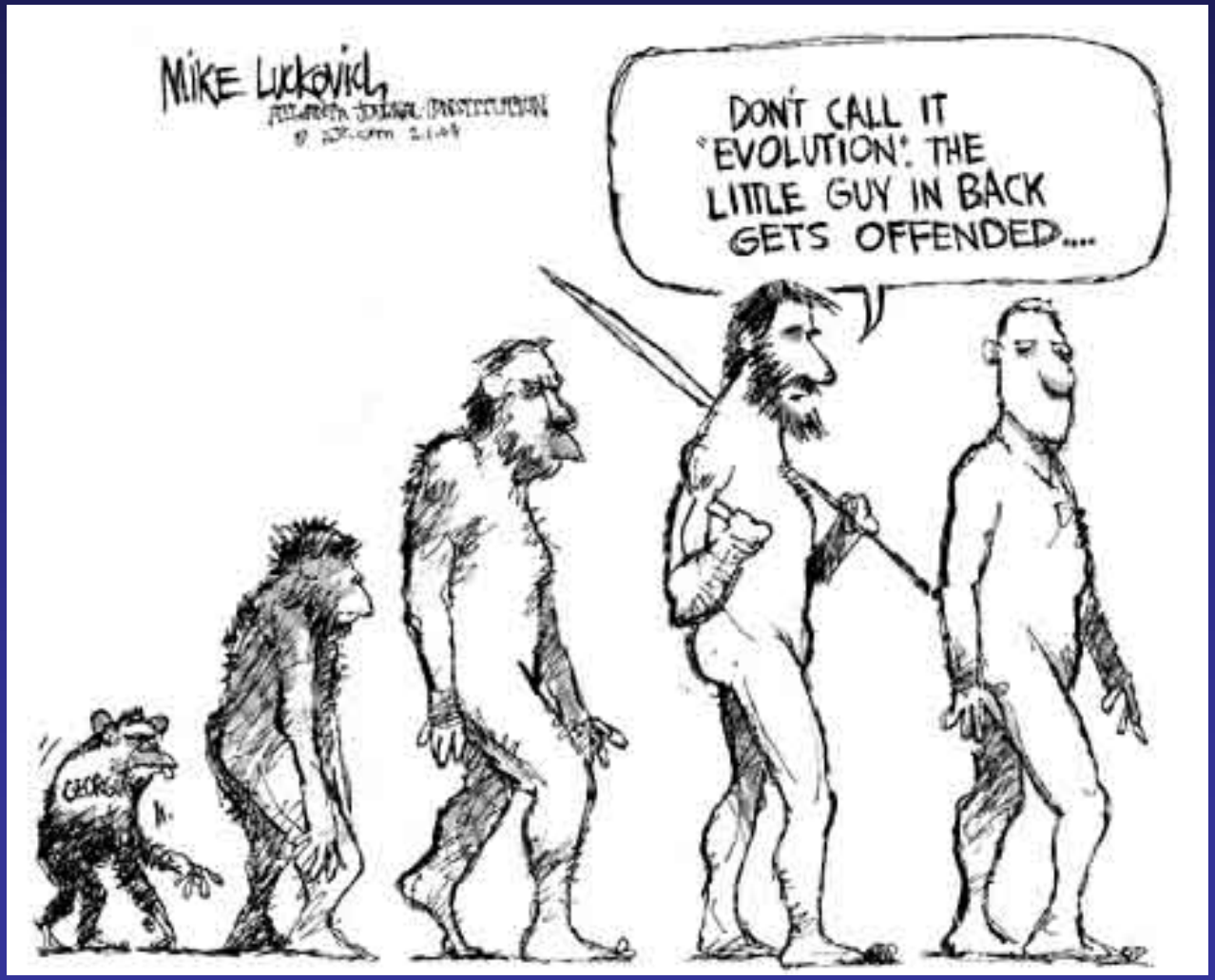
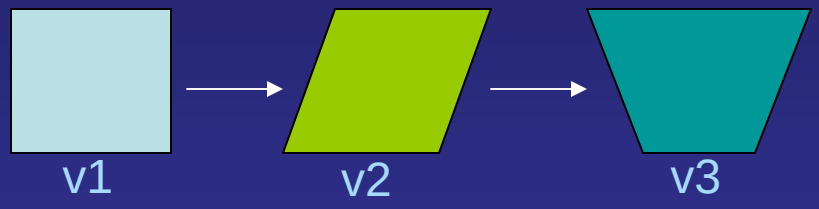
Signature Change Analysis

Sunghun Kim, Jim Whitehead, Jennifer Bevan
{hunkim, ejw, jbevan}@cs.ucsc.edu
University of California, Santa Cruz

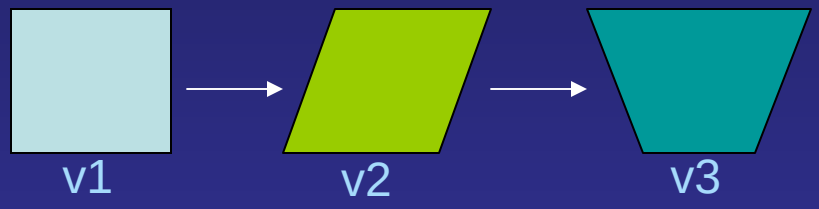
Biological and Software Evolution



Biological and Software Evolution



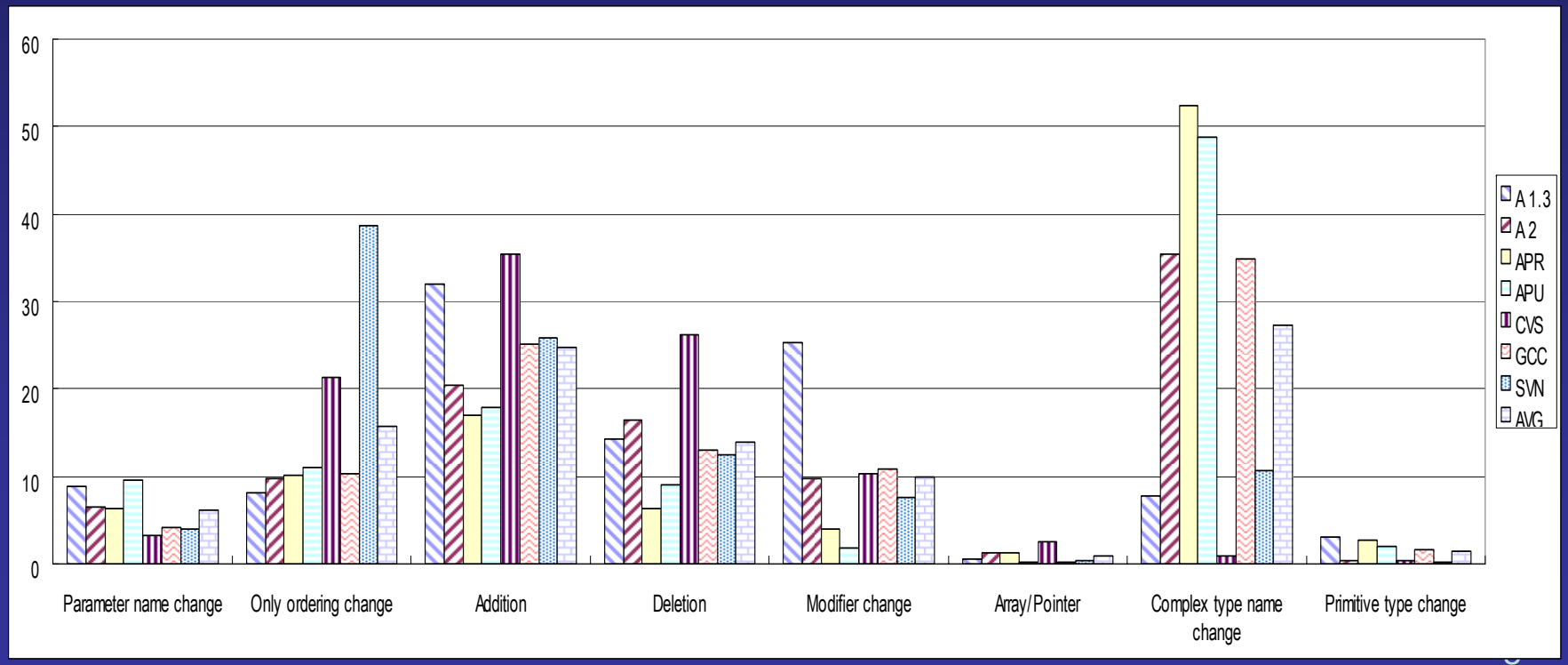
Biological and Software Evolution



- Can we shape software evolution path?
  - LOC
  - Number of Changes
  - Structural Changes
  - **Signature Changes**

Found Signature Change properties

- The most common signature change kinds are **complex data type**, **parameter addition, parameter ordering, and parameter deletion**.

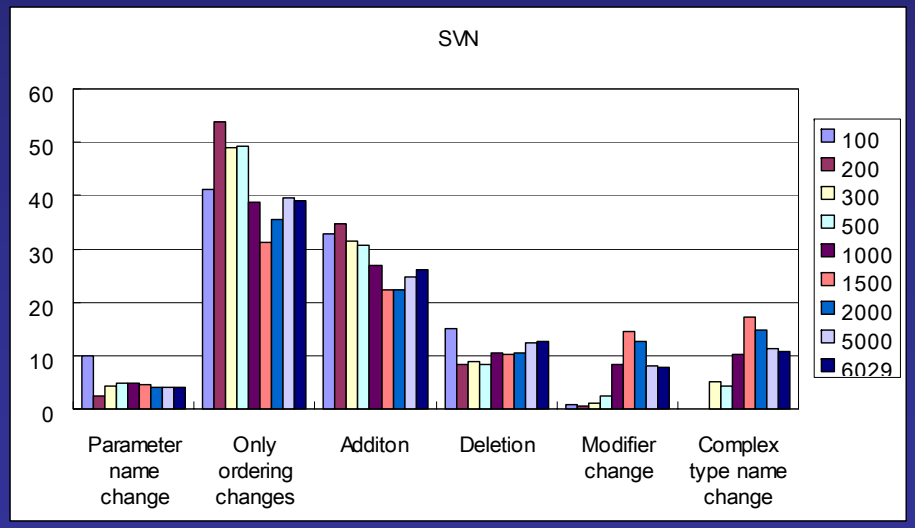


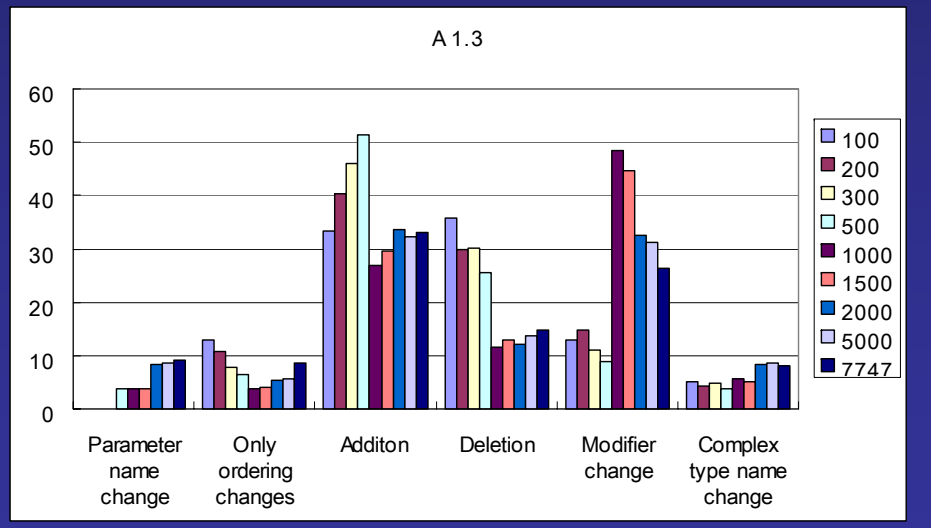
Found Signature Change properties

- More than **half of function signatures never change**. About 90% of function signatures change less than three times.
- **A function's signature changes after every 5-15 function body changes**.
- A project's average number of parameters per function **remains relatively constant** over time.
- Functions typically have parameter lists with **1, 2, or 3 parameters**.

Found Signature Change properties

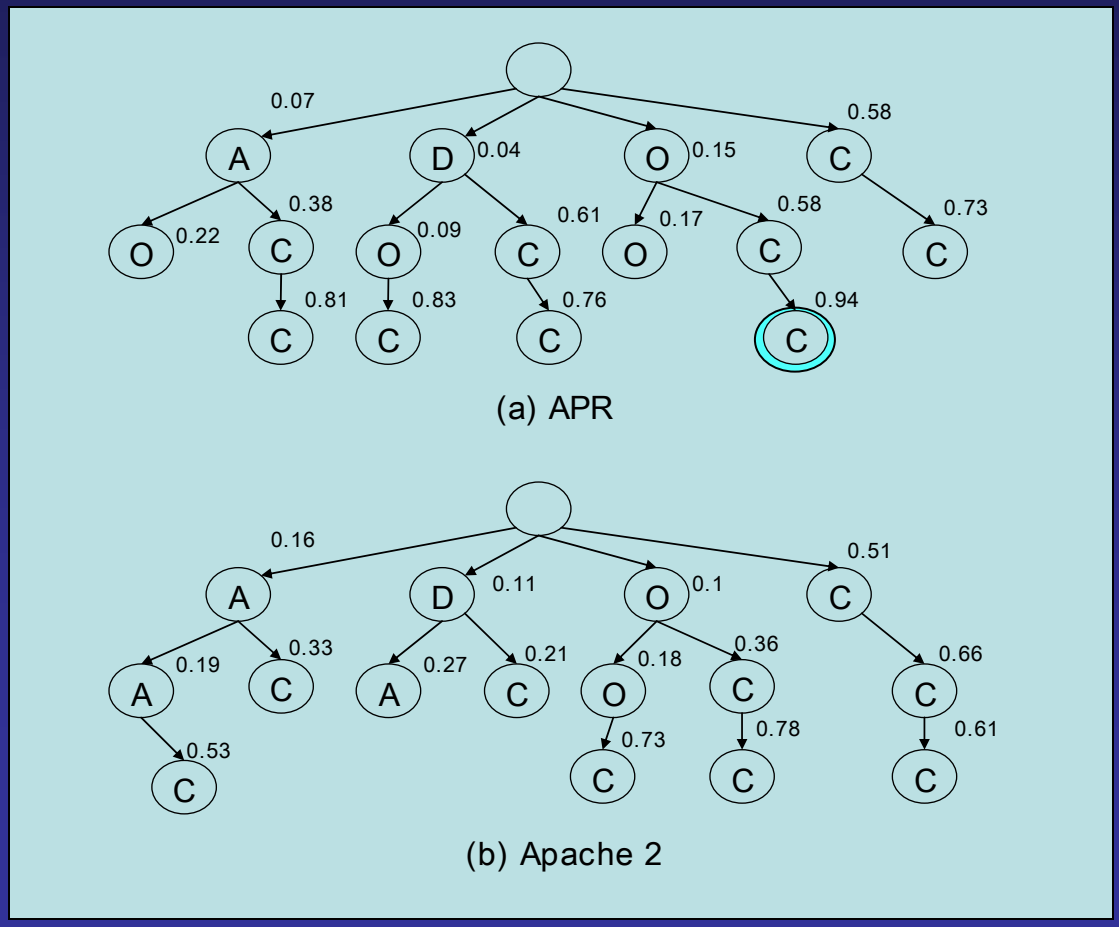
- Weak **correlations between signature change and other changes** including LOC and function body changes.
- Each project has its **own signature change patterns**, and the pattern can be discovered after analyzing the first 1000 to 1500 revisions.





Found Signature Change properties

- Probability of a change kind **depends on previous changes**.



Future Work

- Signature change analysis on OOP (Java)
  - The results presented here are based on a procedural programming language (C) open source projects: Apache HTTP 1.3, Apache HTTP 2.0 , Apache Portable Runtime, APR utility, CVS, GCC, and Subversion
  - Find OOP signature change properties and compare the with those from a procedural language
- Changes inside Struct/Class
  - Variable addition/deletion
  - Variable renaming
  - Method addition/deletion

Signature Change Analysis

Sunghun Kim, Jim Whitehead, Jennifer Bevan
{hunkim, ejw, jbevan}@cs.ucsc.edu
University of California, Santa Cruz