

It's the Brain Stupid

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Introduction

My interests

Return on investment

Prospering in the Stone age

My Interest

Finding faults in source code

Commercial languages

i.e., people willing to pay for tool/service

Return on Investment

Tool vendor

Invest in tool production and support
Income from sales

Tool user

Legal backup
Customer requirement
Cheapest method of locating faults

Cost/Benefit Trade-off

Identifiers chosen such that:

\sum Benefit correct info * probability correct

> \sum Cost incorrect info * probability incorrect

> \sum Cost no info * probability no info

The Production of Programs

Mostly written & maintained by people

Formal methods solve the problem → Soap powder advert

Need support tools/practices to fit people

e.g., one solution to accidents on stairs is to provide hand rails at
the appropriate height

Evolution has adopted brain/mind for stone age
living

May not be the right tool for the job, but still the best one available

Stone Age Computing Requirements

Memory

STM - sound based

LTM - semantics & episodic based

Existing knowledge & skills

Word recognition, associated information recall, transformation

Comprehension skills

Category formation & analysis

Different people → Different knowledge & skills

Not a serious problem/may be an advantage

Human Failure Modes

Failure modes

- O/S believed to be optimized for common human activities
- Poor control over memory storage & retrieval operations
- Poor metacognitive abilities

Need to analyze developer characteristics

- Almost no statistically reliable experiments have been performed

Developer Experiments

Experience affects performance

Students have approximately zero experience

Experiments I have run

Meaning assigned to identifiers

Short term memory for sequences of assignments

Designing data structures

Experimental materials can be downloaded

Economic & Cultural Analysis

The New C Standard

Analyzes C usage in detail

Measurements of C source

Attempt to base guidelines on results from cognitive psychology

Interesting Idea

Order statements to minimize STM requirements

Minimize Forgetability

Forgetability \approx 'distance' between uses of an identifier

Forgetability \approx probability of forgetting identifier information

a = 1;

b = 2;

c = a + 1;

d = b - 1;

e = c + d;

f = d / c;