What can Programming Language Research learn from the Philosophy of Science?

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Programming Language Research

What we speak about?

Implement & experiment

Model & prove things

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(prev(x) + x) / 2.0
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$$\frac{\Gamma \mathbin{@} n \vdash e : \tau}{\Gamma \mathbin{@} n + 1 \vdash \mathbf{prev}\ e : \tau}$$

When we remain silent?

Is it easier to use? What does the industry use?

How can we compare languages?

Where to start?

The undoubted success of physics (...) is to be attributed to the application of (...) 'the scientific method'.

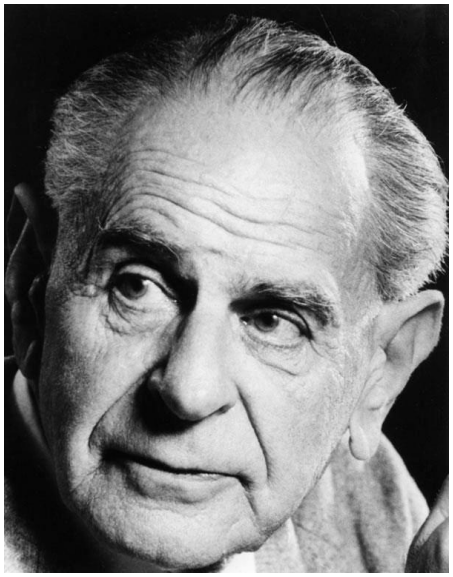
If (other disciplines) are to emulate the success of physics then that is to be achieved by (understanding and applying this method).

Alan Chalmers
What Is This Thing Called Science? (1999)

Is Programming Language Research a Science?

Falsificationism

(I shall) admit a system as scientific only if it is capable of being tested by experience. These considerations suggest that not the verifiability but the falsifiability of a system is to be taken as a criterion of demarcation.



Karl Popper
The Logic of Scientific Discovery (1934)

New Experimentalism

Experimentation has a life of its own, interacting with speculation, calculation, model building, invention and technology in numerous ways.

Ian Hacking
Representing and Intervening (1983)

Structures of Programming Language Research

Research Programmes

Scientists can seek to solve problems by modifying the more peripheral assumptions (...).

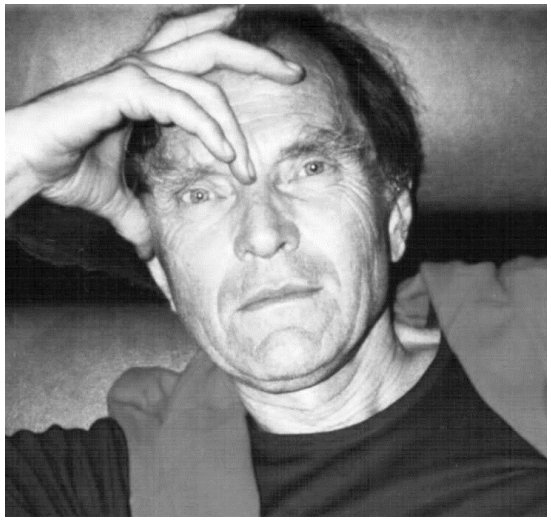
(They) will be contributing to the development of the same research program however different their attempts (...).

Imre Lakatos
(as quoted by A. Chalmers)

Theoretical Anarchism

To those who look at the rich material provided by history (...) it will become clear that there is only one principle that can be defended under all circumstances and in all stages of human development.

It is the principle: anything goes

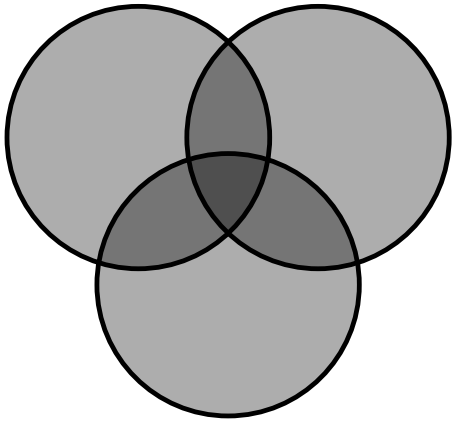


Paul Feyerabend
Against Method

Learning from Philosophy of Science

A case for plurality

The methodological unit to which we must refer (is a) set of partly overlapping, (...) but mutually inconsistent theories.



Paul Feyerabend
Against Method

A case for inexactness

Logically perfect versions usually arrive long after imperfect versions have enriched science.

(Requiring exactness) deflects the investigation into the narrow channels of things already understood and the possibility of fundamental conceptual discovery (is) reduced.

Paul Feyerabend
Against Method

A case for experiments

We find prejudices in favor of theory, as far back as there is institutionalized science.

One can conduct an experiment simply out of curiosity to see what will happen.

Ian Hacking
Representing and Intervening (1983)

Conclusions

Philosophy of PL Research

What can we learn

Is it a good science? A good methodology?

What are we doing

Not the same kind of science as physics

Engineering? Math? Economics?