Can Some Programming Languages Be Considered Harmful?

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Meet the ones responsible:

Edsger W. Dijkstra
Computing pioneer and CS professor known for “his sandals, his beard and his ‘arrogance’ (whatever that may be).”
(quotes)

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MSc in clinical psychology, postgraduate studies in solution-focused cognitive and systemic therapy and coaching.
(homepage)

Ulrik Pagh Schultz
Associate prof at U Southern Denmark, interested in programming languages for self-rebuilding / industrial / agricultural / flying robots.
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CSO at Raincode Labs, expert in compilers, grammars and languages. Interests in language design.
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Motivation and objectives

● Psychology and computer programming... a useful combination?
● Design affects user behaviour
  ○ cf. Design with Intent for non-software design
  ○ cf. MoDELS/SPLASH-I, DSLs supporting domain-specific ways of thinking
● But: can it “damage the mind”?
● Our interest: mental harm of any kind
  ○ beyond fleeting scares, frustrations and anxiety
● Current goal: outline of possible research questions
  ○ not yet practical implementation & operationalisation
Plenty of cases

- [http://phpsadness.com](http://phpsadness.com)
- [http://depressedprogrammer.wordpress.com](http://depressedprogrammer.wordpress.com)
- “impossible to teach programming to students [exposed to] BASIC”
- “teaching of BASIC [...] mutilates the mind beyond recovery”
- “the use of COBOL cripples the mind”
- “I’ve tried a few times to give back to the [OSS] community [...] but my brain reminds me that I’m worthless and I end up giving up and slinking back into the dark matter.”
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- “I’ve tried a few times to give back to the [OSS] community [...] but my brain reminds me that I’m worthless and I end up giving up and slinking back into the dark matter.”
- “I have come to realize that I'm a terrible programmer. [...] I have tried to study and practice after work, but I am just way too exhausted after work to do anything productive. I am beginning to have nightmares”
RQ0: Does using a language make you bad?

- Question: does using a particular software language make programmers write bad programs?
- Feasible experimentally? Yes!

Not the kind of question we’re looking for!
**RQ1: What changes in the code with mental state**

- **Question:** *what are noticeable differences between the code written by programmers in different mental states?*
  - The use of language changes according to the mental state
  - Example: depressed people use more negative words and "I"*

- **Feasible experimentally?**
  - Setup: mood priming and construct activation**
  - Task: write a piece of code
  - Threats to validity: unknown initial state of mind
    - mitigate using standardised writing assignments
RQ2: Can a language change your mental state?

● Question: is working in a particular language capable of making a programmer less happy or even depressed?
  ○ Direct effect: use of idioms has effect on mental state *
  ○ Focus determines perception: “what is red?”**
  ○ Elements that resemble natural language are bound to the same rules
  ○ More resemblance with natural languages implies stronger effect
  ○ Indirect/ long term effects of a language: career, ability to learn*

● Feasible experimentally?
  ○ Mining software repositories for text + natural language processing
  ○ Collect representative texts (documentation, libraries, discussions,... )
  ○ Look for patterns that indicate certain mental states in the use of natural languages

Illustration: Klaas Van de Moortel, from the book “De Kracht van Stress”
**RQ3: Does knowing a language cause direct harm?**

- **Question:** *does knowing a particular language cause direct harm in the sense of making a person a worse programmer?*
  - Does knowledge of one language impede further learning
  - Conditioning principles:
    - learned helplessness (Martin Seligman) *
    - harder to unlearn than to learn for the first time**

- **Feasible experimentally?**
  - Use a large body of code: FLOSS
  - Collect information about open source developers (language + analysis of code)
  - This method has worked for gender diversity, social diversity, developer turnover, etc
RQ4: Does knowing a language cause indirect harm?

- **Question:** does knowing a particular language make a person worse in communicating ideas and collaborating with others in the context of software creation?
  - Programming is a social activity
  - Isolation and perfectionism lead to depression
  - Do not think about what you will have for lunch*

- **Feasible experimentally?**
  - Similar design as for RQ3
  - Search patterns and habits in collaboration
  - More negativity towards close coworkers, less negativity to outsiders (prior research).
RQ5: Does the first language matter?

● **Question:** *can the first programming language learnt by a programmer, have any long-term effects like preventing the programmer to learn and effectively use new constructions and abstractions?*
  ○ Similarly to the importance of “the first” for relationship satisfaction & career?

● **Feasible experimentally?**
  ○ Use questionnaires to find out first language
  ○ Analysis of code and information about career
  ○ Measure inter-assessor reliability of blind judges to rule out possible biases
Future plans

● Defining the confounding factors
  ○ For instance, what if being depressed or having in a particular state of mind, has direct influence on the choice of the language?
  ○ Analysis of relevant research in the domain of psychology will help to identify these
● Pilot studies
  ○ in-depth interviews to refine interviews, test tools and identify relevant domains*
● Refine and operationalize research questions
● Conduct experiments and analyze results**

Credit: