

Algorithm definition

“ *An **algorithm** is a finite, definite, effective procedure, with some input and some output.* ”

— *Donald Knuth*



高德纳 (Donald Ervin Knuth, 1938年1月10日-)，出生于美国，著名计算机科学家，斯坦福大学计算机系荣誉退休教授。现代计算机科学的先驱人物，创造了算法分析的领域，在数个理论计算机科学的分支做出基石一般的贡献。

1974年图灵奖得主。

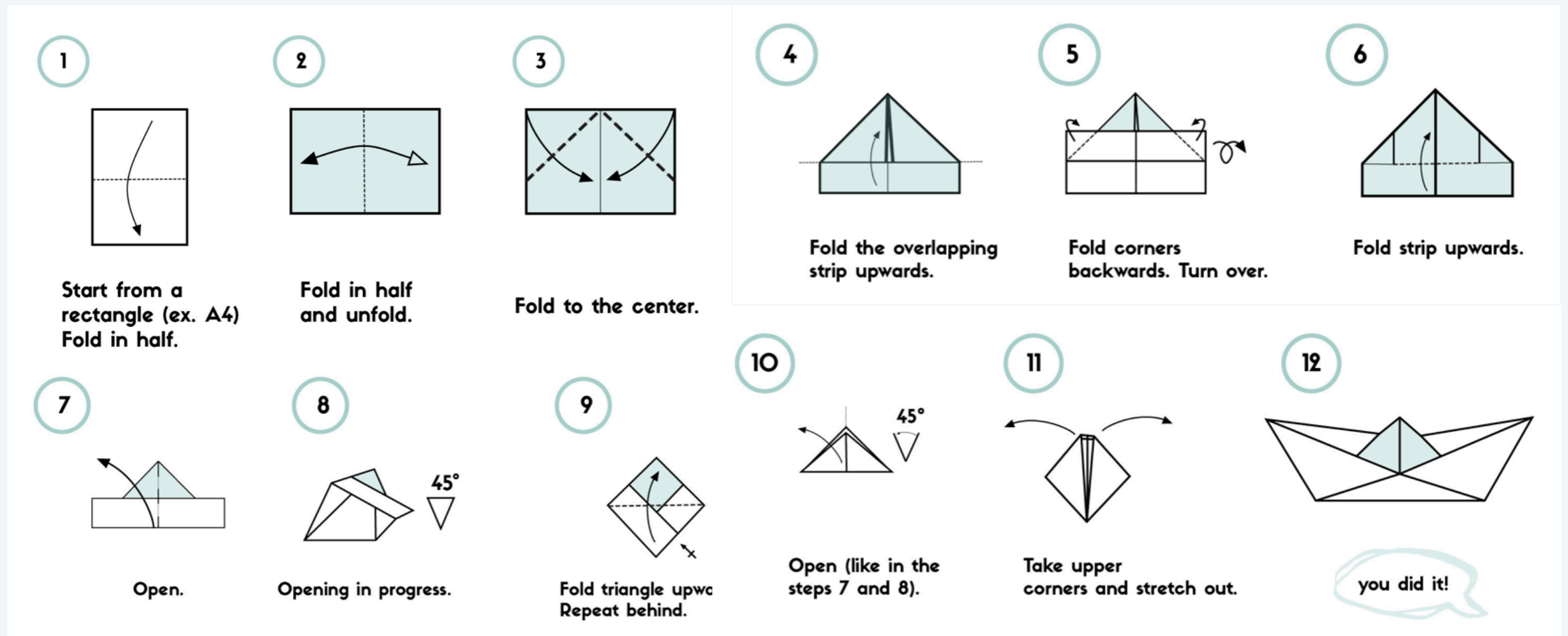
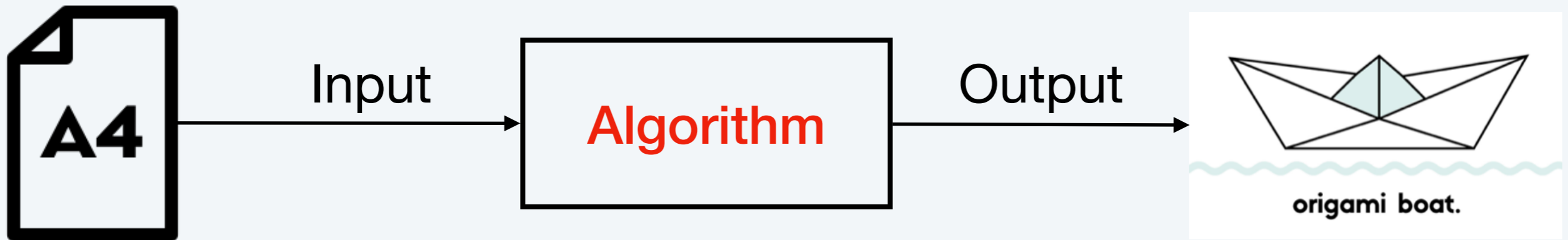
他所写的《计算机程序设计艺术》 (The Art of Computer Programming) 是计算机科学界最受高度敬重的参考书籍之一。

他也是排版软件TEX和字体设计系统Metafont的发明人。

In olden times when wishing still helped one, there lived a king whose daughters were all beautiful, but the youngest was so beautiful that the sun itself, which has seen so much, was astonished whenever it shone in her face. Close by the king's castle lay a great dark forest, and under an old lime-tree in the forest was a well, and when the day was very warm, the king's child went out into the forest and sat down by the side of the cool fountain, and when she was bored she took a golden ball, and threw it up on high and caught it, and this ball was her favorite plaything.

(a) A paragraph broken into lines. (b) A paragraph broken into lines, better.

Algorithm definition



A set of rules for transforming an input into an output.

Algorithm definition - Bad example

BEAMILLIONAIREANDNEVERPAYTAXES ()

Get a million dollars.

If the tax man comes to your door and says, “You have never paid taxes!”

Say “I forgot.”

Why study algorithms?

*“ Algorithms are the life-blood of computer science...
the common denominator that underlies and unifies the
different branches. ” — Donald Knuth*



Why study algorithms?

Internet. Web search, packet routing, distributed file sharing, ...

Biology. Human genome project, protein folding, ...

Computers. Circuit layout, databases, caching, networking, compilers, ...

Computer graphics. Movies, video games, virtual reality, ...

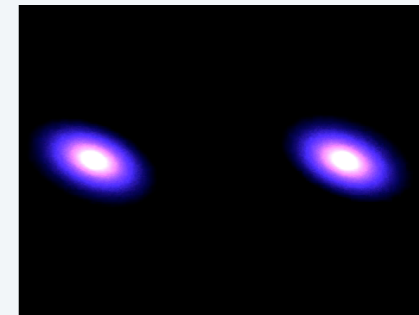
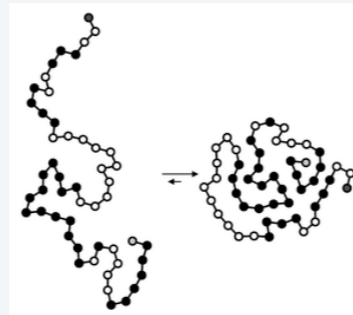
Security. Cell phones, e-commerce, voting machines, ...

Multimedia. MP3, JPG, DivX, HDTV, face recognition, ...

Social networks. Recommendations, news feeds, advertisements, ...

Physics. Particle collision simulation, n -body simulation, ...

⋮



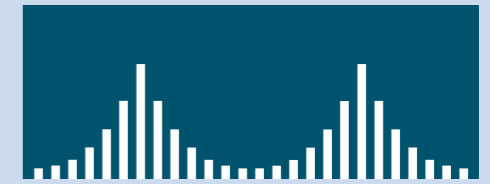
We emphasize **algorithms** and **techniques** that are **useful in practice**.

TECHNICAL JOB INTERVIEW QUESTIONS



facebook

CISCO SYSTEMS



Nintendo



Morgan Stanley

NETFLIX



RSA
SECURITY™

DE Shaw & Co

ORACLE



YAHOO!

amazon

Microsoft



Lectures

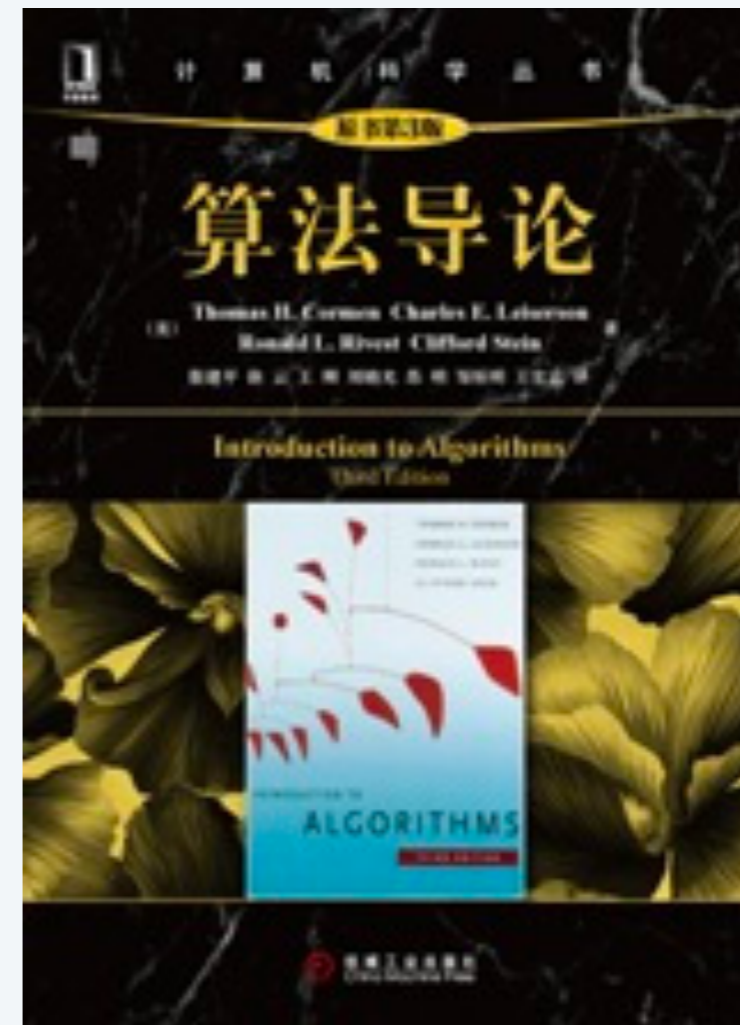
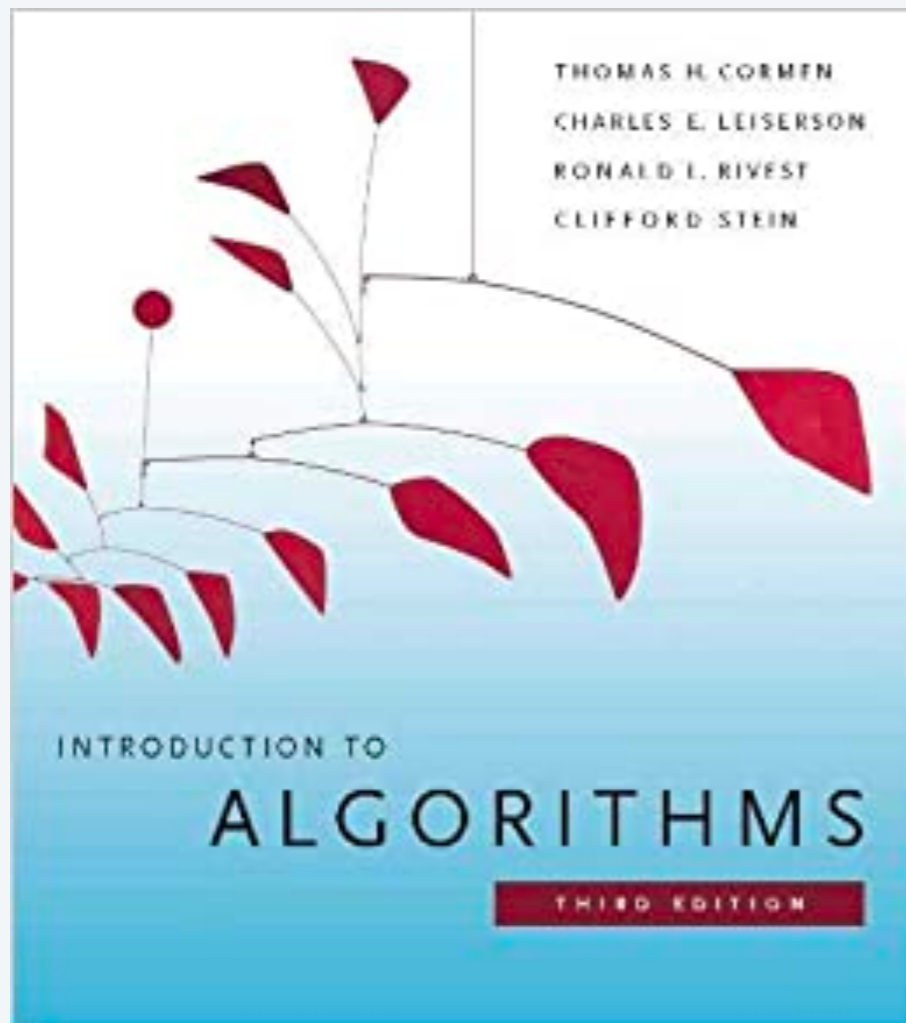
- Thursday 08:00 – 09:50.
- Attendance is required.
- No electronic devices except to aid in learning.

← viewing lecture slides
taking notes



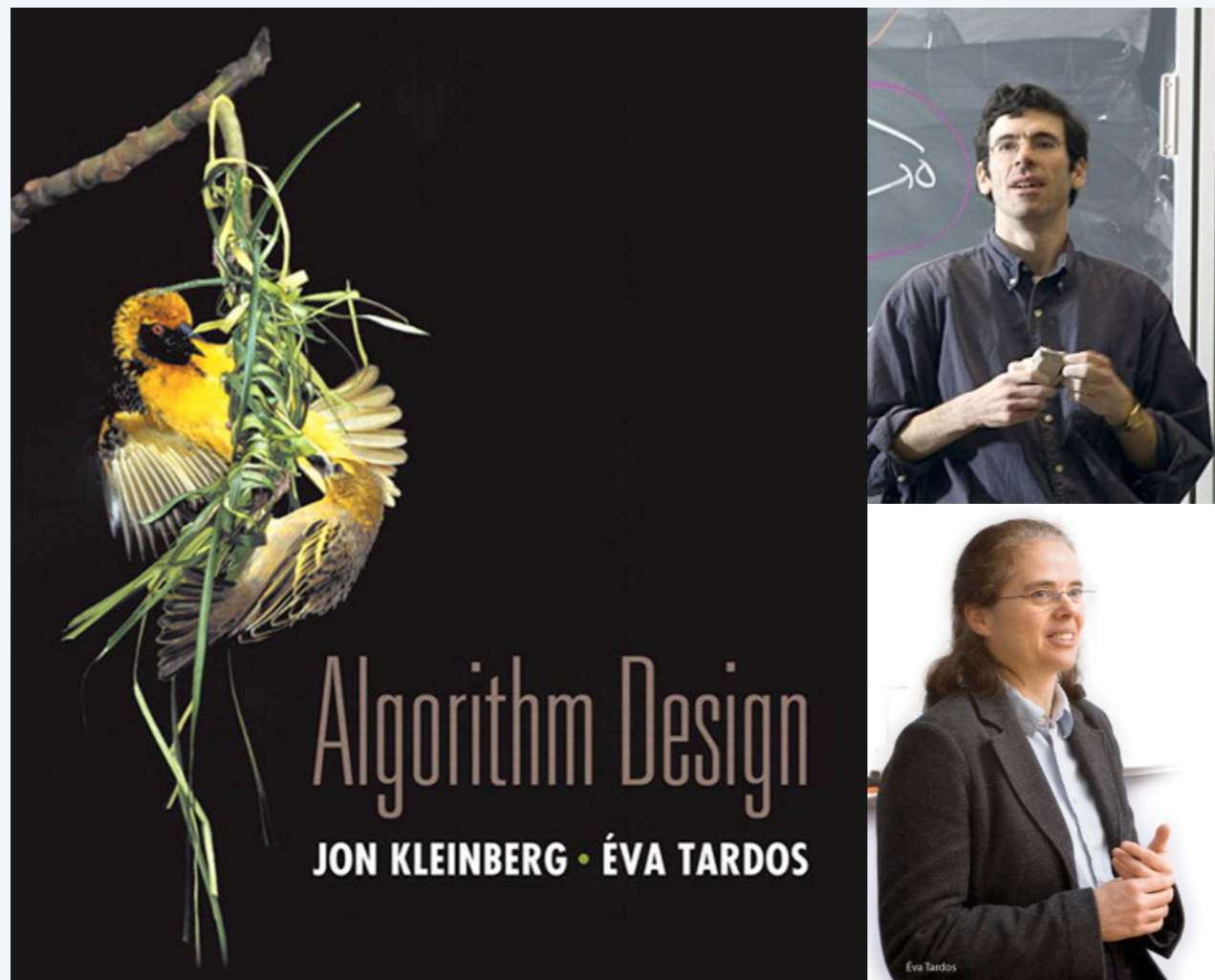
Textbook

Required reading. *Introduction to Algorithms*, Third Edition by Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein, MIT Press, 2009.



Textbook

Required reading. *Algorithm Design* by Jon Kleinberg and Éva Tardos. Addison-Wesley 2005, ISBN 978-0321295354.



Textbook

[Suggested reading.](#) *Algorithm Illuminated* by Tim Roughgarden. Soundlikeyourself Publishing 2017, 2018, 2019, 2020.

