The Art of Inventing Things

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An Inventor is an Artist!

- Conceiving a new invention or visualizing the potential of a discovery requires use of the “creative faculties.”

- “Creativity” is the ability to transcend traditional ideas, rules, patterns, relationships, or the like, and to create meaningful new ideas, forms, methods interpretations, etc.: originality, progressiveness, or imagination.
Is Edison’s light bulb any less creative than Mozart’s 5th Symphony?
Is Margaret Knight’s paper bag machine less creative than Picasso’s self-portrait?
How Do You Learn “Inventing?”

• Surely Mozart had to learn to read music, and Picasso had to learn to draw and paint!
• There are skills an aspiring inventor can develop too, but they are rarely taught
• If you develop these skills and practices, you may become a great inventor
• Just like an aspiring artist, it will take time and effort, but can be very rewarding
How to Become a Great Inventor

1. Learn about legendary inventors
2. Make patents part of your everyday world
3. Treat what is known with irreverence
4. Cultivate an open and curious mind
5. Consider strange and unusual combinations
6. Play around with ideas and things
7. Doggedly follow questions, doubts and hunches
8. Make questions and problems bigger
9. Ask for help from those who know nothing
10. Believe in your own creative vision
1. Learn About Legendary Inventors

• Edison invented the phonograph while trying to invent a machine that could send fast telegrams.

• Grace Hopper invented the compiler, which translates English into computer language, because she “was lazy” and wanted to spend more time on mathematics.

• The Wright brothers invented the flying machine by rejecting all that was known about flight, and studying bird wings instead.
Stephanie Kwolek, Kevlar
U.S. Patent 3,063,966
Chester Carlton, 
The Photocopy Machine 
U.S. 2,357,809
Elijah McCoy,
Automatic Train Engine Lubricator
U.S. Patent 129,843
Nikola Tesla,
Alternating Current
U.S. Patent 447,921
Mary Anderson,
Windshield Wiper
U.S. Patent 743,801
Lois Miramontes
Norethisterone (first oral contraceptive)
U.S. Patent 2,774,777
Dr. Patricia Bath
Cataract Laser Ablation
U.S. Patent 743,801
2. Make Patents Part of Your World

- Could you do basic research without reading science journals? Of course not!
- It is said 70% of the world’s technology is described ONLY in patents
- [www.google.com/patents](http://www.google.com/patents) has full-text searching for every patent since the first one in 1790
- Start with some simple mechanical patents, such as sports equipment, e.g. snowshoes
- Food patents are a little more complex
- Once you get the basic structure and content, patents in your field will make more sense
Understanding Patents

- The *Specification*: The written text of the patent, which must (a) prove that the inventor is in “full possession” of the invention, and (b) provide an *enabling* description
  - Background
  - Brief description of the invention
  - Description of the figures
  - Detailed description of the invention
  - The *Claims*: At the very end of the “spec,” these numbered statements define the scope of the patent
3. Treat What is Known With Irreverence

- Just because there was a great invention doesn’t mean yours won’t be better
  - E.g., many great writing tools since the pencil!
- Brilliant people can miss simple solutions
- Try imagining that what is known has become impossible, what would you do?
- The Supreme Court says encouraging “inventing around” is a primary purpose of the patent system
4. Cultivate an Open and Curious Mind

- Wikihow.com, “How to Exercise an Open Mind”
  - Listen to music you don’t like
  - Visit random art galleries
  - Watch movies you usually don’t choose
  - Join clubs about things your are ignorant of
  - Build ridiculous things, e.g. a trebuchet
  - Learn to juggle
  - Play chess or Go
- Invent Random Stuff!
5. Consider Strange and Unusual Combinations

- Many great inventions come from combining “non-analogous arts”
  - In 1450, Gutenberg combined a coin punch with a wine press to make the printing press
- Avoid “obviousness” – peanut butter and jelly – NO!- peanut butter and concrete – YES!
- Practice, e.g. by going to Home Depot and looking for something to make your lunch
- Reading random patents will help expose you to those arts.
Microsoft offered its spam software to the Ragon Institute, an effort by MIT, Harvard and Mass General to make an HIV vaccine.

Hackers mutate their strategies to beat spam filters at about the same rate as HIV mutates.

They developed PhyloD, which analyzed an entire year of HIV data in 2 days!

Identified 6 times as many attack points in the virus than were previously known.
Along the way we all gave up playing and started focusing on goals – try to go back!

Playfulness releases us from the shackles of expectations, and opens our creativity

“Brainstorming” works best when all agree in advance that absurdities are welcome!

“Tinkering” is a useful kind of play, like brainstorming with physical objects

See: Inventionatplay.org Lemelson Center
7. Doggedly Follow Questions, Doubts and Hunches

- If someone asks an off-the-wall question, take it seriously! It may lead somewhere.
- If you get an odd experimental result, don’t brush it off as bad technique.
  - Negative results can have meaning far beyond your hypothesis.
- If you have a hunch that something might work, give it a try; exhaust the possibilities.
8. Make Questions and Problems Bigger

- The “Inventor’s Paradox:”
  - A general problem may have a simpler solution
  - You “invent” a general problem that includes your concrete one, then apply the solution back
- Very effective in computer programming
- Analytical methods are invented this way
- If you can find a way to orally deliver your peptide drug, great. If it works for all peptides, you will be a trillionaire!
9. Ask for Help From Those Who Know Nothing

- They may know many non-analogous arts!
- They may ask a dumb question that will lead you to a brilliant answer
- They may see if more generally that you; the general problem may be solvable
- You may be “stuck” on some “best” ideas, like writer’s block; they can unstick you
- They may realize you solved it already!
10. Believe in Your Own Creative Vision

- When you focus on solving a problem and never give up, you will be an inventor
- It takes courage to throw off the bonds of the known and forage in the unknown
- Some inventions hit like lightning, some slowly emerge from the shadows
- You have to BELIEVE your brain can find the solution in order to think creatively, persevere and recognize it when you find it
One Last Piece of Advice:

- Picasso’s first painting wasn’t his best
- Your first invention may not be your best
- The most successful inventors are those who make a habit of it!
- Once you have been through the patenting process you will have more perspective
- Be a generalist, not just an inventor in your own field, and you will get more practice
- Edison had many great inventions, you can too!
Thanks!

Questions?

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