
How to be a Winner in Research?

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(Some parts abridged from

<http://www.cs.caltech.edu/~weixl/research/experience/winner.htm>)

What is research?

- RESEARCH = **Re** + **Search**
= Search again, Search once more
 - Research **INTO** (something)!
 - How to be a **winner** in research???
 - Who will be a **loser** in research???
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Advices

- Don't get hung up trying to understand **everything** at the outset
 - Communicate and **Synchronize** Often
 - **Decompose**
 - Be **Organized**
 - **Prioritize**
 - Realize that your supervisor is **busy**
 - **Deliver**
 - Demonstrate **progress**
 - Target Stable **Intermediates**
 - Don't turn problems (**subtasks**) into research problems unnecessarily
 - Learn to **solve** your own problems
 - Don't stray away too much from what your supervisor **knows**
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Advice (1)

- Don't get hung up trying to understand everything at the outset
 - **Prioritize** (what do I need to know most?)
 - **Read** (but not months before starting!)
 - **Multithread** (productivity!)
 - **Pursue multiple solutions** (easy, hard)
 - **Wishful thinking** (assume subproblem solved)
 - **Pester people for information** (pointers, follow up on resources, ...)
 - **Propose working models** (concrete, compare)
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Losers vs. Winners

- Losers will **stop** the first time
 - Run into something unknown
 - Cannot solve a problem
 - Trouble out of “their part” of the problem
 - Winners consider the **whole** problem theirs and **look for paths around** every hangup.
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Losers vs. Winners

- Losers make sure there is someone or something to **blame** for their lack of progress.
 - Winners **find ways to make progress** despite complications.
 - Losers know **all the reasons** it cannot be done.
 - Winners **find a way to do it.**
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Advice (2)

- Communicate and Synchronize Often
 - With your fellow **researchers**
 - Different **models**?
 - Learn from others' models, **assumptions**
 - Let them know
 - What you're **thinking**
 - Where you're **stuck**
 - How you're trying to **get around** the problem
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Advice (3)

- Decompose

- Whole problem often seems **overwhelming**
 - **Decompose** it into manageable parts (stable intermediate)
 - **Tackle** the pieces one at a time
 - **Divide and conquer**
 - E.g.: **1~2 day tasks**
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Advice (4)

■ Be Organized

- ❑ Complexity!
 - ❑ **Structure** the problem
 - ❑ **Understand** the problem
 - ❑ Keep track of what you **have done**
 - ❑ Keep track of what you **need to do**
 - ❑ Make **lists**, write it down, don't rely on your memory (or worse, yet, your **supervisor's memory!**)
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Advice (5)

■ Prioritize

- Make **priorities** in your efforts
 - **Check** your priorities with your **supervisor**
 - Typical situation
 - **Supervisor asks you to do A**
 - **Forgets about A and asks you to do B**
 - **If uncertain on B over A, ask!**
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Advise (6)

- Realize that your supervisor is busy
 - You are here to help him get more accomplished than he could have on his own
 - Biggest benefit to him is when you can be
 - **Self moving and motivating**
 - Do not expect your supervisor to solve all your problems!
 - Found out what he has thought about and suggestions for a starting point & work from there!
 - Supervisor gives you the **seed + some directions**, and **goes off to think about other problems**
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Advice (7)

■ Deliver

- Once you've signed up, you have to **deliver!**
 - But, not the final solution to everything at once!
 - **Losers keep promising** a great thing in the future but have nothing to show now
 - **Winners can show workable/usable results** along the way to the solution
 - Solutions to **simplified models**
 - Pieces of a **flow**
 - Intermediate **output/data**
 - Measurements of **problem characteristics**
 - Stable **intermediates**
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Advice (8)

- Demonstrate progress
 - ❑ Allows supervisor to **feedback earlier**
 - ❑ Helps you **prioritize your attention**
 - ❑ Helps you make **mid-course corrections**
 - ❑ Increase **likelihood** of successful interesting end results
 - ❑ Requirements and understanding invariably **EVOLVE!!!**
 - ❑ Incrementally **grow** your solutions
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Advice (9)

- Target Stable Intermediates
 - ❑ Points where some **clear pieces** of your problem has been **solved**
 - ❑ Things you can **build upon**
 - ❑ Things you can **spin-out**
 - ❑ Things you can **share** with team members (allow them to help)
 - ❑ **Points of accomplishment**
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Advice (10)

- Don't turn problems (subtasks) into research problems unnecessarily
 - A subtask with **no single, obviously right solution**
 - Keep focused on the overall goals of the project
 - Adequate solution to the said problem
 - Weak link? **Revisit! Explore again!**
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Advice (11)

- Learn to solve your own problems
 - Use your supervisor as a **crutch** or **scaffolding** only to get yourself **started!**
 - **Watch them** and
 - **learn not just the answers** they help you find, but
 - **How they find the answers** you were unable to find
 - Strive for **independence!**
 - **Learn techniques and gain confidence** in your own ability to solve problems now.
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Advice (12)

- Don't stray away too much from what your supervisor knows
 - Otherwise, then just **change your supervisor**
 - Or, **change your research topic**

