



How to become an independent researcher?

独立科研能力的培养

Jianli Chen

Ph.D., Senior Research Scientist

Center for Space Research, University of Texas at Austin

<http://www.csr.utexas.edu/personal/chen/>

E-mail: chen@csr.utexas.edu

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独立科研的能力应包括：

- 追踪并把握学科发展方向
- 收集并判断待选题目的能力
- 获取和利用各种科研文献的能力
- 获取和搜集各种数据和资料的能力
- 确定正确的科研技术线路，形成明确科研课题的能力
- 与外部合作和交流的能力和一定的组织协调能力
- 学术论文和基金申请书撰写能力

How to become a good researcher?

Passion

Initiative vs. Passive

Goal-Oriented

Patient & Persistent

How to become a good researcher?

Team Work

Personal Skills

Analytical Skills

Programming & Tool Utilizing Skills

Presentation Skills

Essential Skills of a Good Scientist

■ A good communicator

- Serious listener, clear speaker, simple writer & keep your network

■ Master several topics

- Carefully choose your focused topics based on interest & resource
- 90% energy for 10% issues (your topics)
- Persistently follow your topics throughout your career

■ Know basics of most of your area-related issues

- 10% energy for 90% general issues
- Pay attention to commonalities and principles

■ Be organized

- Make plans, check plans & update plans
- Complete expected works in time

The Process of a Research Project

☐ Pre-project issues

- **Keep reading, re-reading classic and new literature**
- **Compile potential topics from regular reading of interested info**
- **Prioritize possible topics based on impact & feasibility**
- **Decide to pursue the topic based on priority & resource**

☐ Project issues

- **Have objectives, hypothesis, and means of delivery & verification**
- **Plan, re-plan & follow the plan: Link each step with the objectives**
- **Keep writing throughout each project: To compile, sort & re-think**

☐ Post-project issues

- **Persist in publishing your project results**
- **Maximize project benefits to your career & knowledge**
- **Each project is a realization of your own knowledge tree**

Critical Thinking (明思)

- 区分事实与看法,认真倾听别人,挖掘自己的无知;
- 收集事实与证据来检验自己的隐含前提是否成立和信念是否正确;
- 消除一切故意的或不自觉的虚伪、自欺和逻辑错误,追问真相,正视问题;
- 做任何事,目标和效果的衡量标准要清晰化、准确化、定量化;
- 遇事要追问多层的为什么、错误何以如是发生、做事该怎样才是真正有效;
- 对自己的决定与行动要充分考虑后面会产生影响;
- 以开放的心态及时总结与反思,不断形成新的认识。

这七条明思基本原则也是七项能力,看似容易做到难,要经过学习与练习才能成为习惯。

Where creativity comes from?

- 1) Curiosity;
- 2) Ability of imagination;
- 3) Fundamental knowledge;
- 4) Critical thinking.

