讲义

Science Funding

科学事业资助

Time to experiment

开启实验吧

Too much of researchers' time is spent filling in forms. There are better ways to fund their work

研究人员在填表格上花的时间太多了。有更好的方法资助科研

选自：The Economist November 18ᵗʰ 2023 edition Leaders

The transformation unleashed by increased funding for science during the 20th century is nothing short of remarkable. In the early 1900s research was a cottage industry mostly funded by private firms and philanthropy. Thomas Edison electrified the world from his industrial lab at Menlo Park, and the Carnegie Foundation was the principal backer of Edwin Hubble. Advances in science during the second world war—from the development of radar to the atom bomb—led governments and companies to scale things up. By the mid-1960s America's federal government was spending 0.6% of GDP on research funding and the share of overall investment in research and development rose to nearly 3%. Inventions including the internet, GPS and space telescopes followed.	20 世纪科研资金增加，由此带来的社会变革可谓是举世瞩目。20 世纪初，科研还是一项家庭小工业，主要由私人企业和慈善机构资助。托马斯·爱迪生（Thomas Edison）的实验室位于门洛帕克，他正是在这间实验室里为世界带来了电能。卡内基基金会是埃德温·哈勃（Edwin Hubble）的主要资助者。第二次世界大战期间，科技的进步——从开发雷达到研制原子弹——壮大政府和公司规模。到 20 世纪 60 年代中期，美国联邦政府的科研经费占国民生产总值的 0.6%，研发投资占总投资的比例上升到近 3%。互联网、全球定位系统和太空望远镜等发明随之而来。

【词汇】

1. **funding** /ˈfʌndɪŋ/ n. money for a particular purpose; the act of providing money for such a purpose 基金；资金；提

供基金；提供资金

例：There have been large cuts in government funding for scientific research.

政府提供的科研资金已大幅度削减。

2. **unleash** /ʌnˈliːʃ/ v. 专八 to suddenly let a strong force, emotion, etc. be felt or have an effect 发泄；突然释放；使爆发

例：The government's proposals unleashed a storm of protest in the press.

政府的提案引发了新闻界的抗议浪潮。

3. **philanthropy** /fɪˈlænθrəpi/ n. the practice of helping the poor and those in need, especially by giving money 博爱；慈善；乐善好施

例：a retired banker well known for his philanthropy.

以乐善好施著称的退休银行家

4. **electrify** /ɪˈlektrɪfaɪ/ v. to make something work by using electricity; to pass an electrical current through something 使电气化；使通电；使带电

例：The railway line was electrified in the 1950s.

这条铁路线在 20 世纪 50 年代实现了电气化。

5. **backer** /ˈbækər/ n. a person or company that gives support to somebody/something, especially financial support 支持者；资助者；赞助人

例：The project receives its money from European backers.

该项目所需款项由欧洲赞助人提供。

<同义替换> sponsor

6. **radar** /ˈreɪdɑːr/ n. a system that uses radio waves to find the position and movement of objects, for example planes and ships, when they cannot be seen 雷达

例：a radar screen

雷达显示屏

【短语】

1. **be nothing/little short of something** : used to emphasize that something is very good, very surprising etc 毫不逊于...，简 直就是...〔用于强调〕

例：The results are little short of astonishing.

结果太令人惊讶了。

2. **cottage industry** : a small business in which the work is done by people in their homes 家庭手工业

例：Weaving and knitting are traditional cottage industries.

编织和针织是传统的家庭手工业。

That dynamism is fizzling out. A growing body of work shows that even as the world spends more on research, the bang for each extra buck has fallen. One explanation for this is that the way science is funded is out of date. Researchers must now contend with a daunting amount of bureaucracy. The rate at which grant applications are accepted has fallen, meaning more of them must be made. Two-fifths of a top scientist's time is spent on things other than research, such as looking for money. One study found that researchers spent a combined 614 years applying for grants from a single funding body in Australia in 2014 alone. Risky ideas are often put aside.

但目前，这种活力正在逐渐消失。越来越多的研究表明，尽管世界各国在科研上投入越来越多，但所产出效益却在减弱。其中一个原因是科研资助的方式已经过时。现在，研究人员必须面对令人生畏的官僚主义。资助申请的受理率下降，这意味着研究人员要想获得资助，就必须提交更多的申请。顶尖科学家把五分之二的时间都花在了研究以外的事情上，比如寻求资助。一项研究发现，仅在 2014 年，澳大利亚的研究人员就一共花费了约合614年的时间向一家资助机构申请资助。有风险的科研想法往往被搁置一旁。

【词汇】

1. **daunting** /ˈdɔːntɪŋ/ adj. making somebody feel nervous and less confident about doing something; likely to make somebody feel this way 使胆怯；使气馁；使失去信心

例：Starting a new job can be a daunting prospect.

开始一项新工作有时会让人望而却步。

2. **bureaucracy** /bjʊˈrɑːkrəsi/ n. 六级/雅思/GRE/考研/专八 a system of government in which there are a large number of state officials who are not elected; a country with such a system 官僚体制；实行官僚体制的国家

例：the power of the state bureaucracy

国家官僚体制的权力

【短语】

1. **fizzle out** : to gradually become less successful and end in a disappointing way（顺利开始）结果失败，终成泡影；虎头蛇尾

例：Their romance just fizzled out.

他们的恋情就这么不了了之。

2. **bang for your buck** : if you get more, better, etc. bang for your buck, you get better value for the money you spend

or the effort you put in to something 钱花得合算；所作的努力值得

例：The big focus around short, sharp exercise sessions is you get more bang for your buck.

短时剧烈锻炼的重点在于，同等付出，你得到的回报更多。

3. **out of date** : old-fashioned or without the most recent information and therefore no longer useful 过时的；缺乏新信息的；陈腐的

例：These figures are very out of date.

这些数字早已过时。

4. **contend with** : to have to deal with a problem or with a difficult situation or person（不得不）应付，处理，对付

例：Nurses often have to contend with violent or drunken patients.

护士经常不得不应付粗暴的或喝醉酒的病人。

5. **put aside** : to ignore or forget something, usually a feeling or difference of opinion 忽视；不理睬；忘记

例：They decided to put aside their differences.

他们决定搁置双方的分歧。

【长难句】

A growing body of work shows that even as the world spends more on research, the bang for each extra buck has fallen.

句子的**主干部分**为：A growing body of work shows that the bang for each extra buck has fallen.其中 the bang for each extra buck has fallen 为**宾语从句**，意思是：越来越多的研究表明科研产出效益在减弱

even as the world spends more on research 为**条件状语从句**，意思是：尽管世界各国在科研上投入越来越多

The current system is also monolithic. Western scientific systems are dominated by handouts of project grants and peer review. Most money flows to universities, and the academic career ladder is such that researchers face incentives to pursue incremental advances, in order to boost citations and gain tenure, rather than breakthrough work. It is time for another shake-up.	当前的体系也是单一的。西方科研资助体系以项目拨款和同行评审为主。大部分资金都流向了高校，而学术界升职竞争激烈，科研人员们为此追求学术发展，以提高论文引用率和获得终身教授职位，却不研究具有突破性意义的科研工作。是时候进行另一次改革了。

【词汇】

1. **monolithic** /ˌmɑːnəˈlɪθɪk/ adj. GRE used to describe single, very large organizations that are very slow to change and not interested in individual people（少有变化，不关心个人的）单一庞大的组织

例：the monolithic structure of the state

统一庞大的国家结构

2. **handout** /ˈhændaʊt/ n. money that is given to a person or an organization by the government, etc., for example to encourage commercial activity 政府拨款（为促进商业活动）

例：a handout from the government 来自政府的救济

<同义替换> subsidy

3. **incremental** /ˌɪŋkrəˈmentl/ adj. increasing in regular amounts 增量；增加

例：incremental costs

增长的费用

4. **citation** /saɪˈteɪʃn/ n. words or lines taken from a book or a speech 引语；引文；引述

例：The report contained several citations taken from her PhD thesis.

该报告载有几处取自她的博士论文的引文。

5. **tenure** /ˈtenjər/ n. GRE/专八 the right to stay permanently in your job, especially as a teacher at a university（尤指大学教师的）终身职位，长期聘用

例：It's still extremely difficult to get tenure.

要取得终身职位仍然极其困难。

6. **shake-up** /ˈʃeɪk ʌp/ n. a situation in which a lot of changes are made to a company, an organization, etc. in order to improve the way in which it works（机构的）重大调整，重组

例：a management shake-up

管理层的大调整

【短语】

1. **peer review** : a judgement on a piece of scientific or other professional work by others working in the same area（对科研、专业成果等作出的）同行评议，同行评估，同侪审查

例：All research proposals are subject to peer review before selection.

所有研究建议均须经过同行评议后再行筛选。

A growing cadre of scientists, policymakers and philanthropists hopes to revamp science funding. In 2022 America's CHIPs Act reformed the National Science Foundation (NSF) to focus it more on	越来越多的科学家、政策制定者和慈善家希望对科学资助进行改革。2022 年，《美国芯片法案》（America's CHIPs Act）对美国国家科学基金会（NSF）进行了改革，使其更

technology. America's famed Advanced Research Projects Agency (today called DARPA)—which was founded in 1958 and seeded the modern internet—has inspired copycats in Britain and Germany. Tech billionaires' plans to fund pet projects come thick and fast. On November 1st Eric Schmidt, a former boss of Google, announced he was funding a moonshot to build an "artificial-intelligence scientist" to speed up biology.

加注重科技本身。美国著名的国防部高级研究计划局（现称为 DARPA）成立于 1958 年，是现代互联网的奠基者，该机构的成立给了英国和德国人灵感。科技界亿万富翁们大力资助他们偏好的科研项目。11 月 1 日，谷歌前老板埃里克·施密特（Eric Schmidt）宣布，他将资助一项大胆的计划，即建立一个 "人工智能科学家库"，以推动生物学的发展。

【词汇】

1. **cadre** /ˈkɑːdreɪ/ n. a small group of specially trained people in a profession, political party, or military force 骨干队伍

例：a cadre of highly trained scientists

一支训练有素的科学家骨干队伍

2. **philanthropist** /fɪˈlænθrəpɪst/ n. GRE a rich person who helps the poor and those in need, especially by giving money 慈善家；乐善好施的人

例：The trust was set up by an American philanthropist.

该信托基金是由美国慈善家建立的。

3. **revamp** /ˌriːˈvæmp/ v. GRE/专八 to make changes to the form of something, usually to improve its appearance 改变；修改；（通常指）改进外观，翻新

例：The company is attempting to revamp its image.

公司正试图重塑形象。

4. **seed** /siːd/ v. to plant seeds in an area of ground 在…播种

例：The site has been seeded with prairie grasses and wildflowers.

该地点已播种了草原草和野花。

5. **copycat** /ˈkɑːpikæt/ n. used especially by children about and to a person who copies what somebody else does because they have no ideas of their own （尤为儿童用语，指无主见的）模仿者，抄袭者，好跟人学的人

6. **pet** /pet/ adj. that you are very interested in 很喜欢的；钟爱的；很感兴趣的

例：his pet subject/theory/project, etc.

他所喜爱的学科、理论、项目等

7. **moonshot** /ˈmuːnʃɒt/ n. the act of sending a spacecraft to the moon 月球探测

【长难句】

America's famed Advanced Research Projects Agency (today called DARPA)—which was founded in 1958 and seeded the modern internet—has inspired copycats in Britain and Germany.

句子的**主干部分**为：America's famed Advanced Research Projects Agency (today called DARPA) has inspired copycats in Britain and Germany.意思是：美国著名的国防部高级研究计划局（现称为 DARPA）给了英国和德国人灵感。

which was founded in 1958 and seeded the modern internet 为**定语从句**，修饰国防部高级研究计划局，意思是：成立于 1958 年，是现代互联网的奠基者

The problem is that no one really knows which approaches work best. For example, many great scientific discoveries have come not from funding basic science but from the pursuit of commercial technology. The transistor, for instance, emerged from AT&T's Bell Labs. That is why governments should start treating the search for the best ways to fund science as though it were itself a scientific problem.	问题是，没有人真正知道哪种方法最有效。例如，许多伟大的科学发现并非来自对基础科学的资助，而是来自对商业科技的追求。例如，晶体管就诞生于美国电话电报公司（American Telephone and Telegraph）的贝尔实验室。这就是为什么政府应该开始把寻找资助科学的最佳方式当作一个科学问题来对待的原因。

【词汇】

1. **transistor** /trænˈzɪstər/ n. a small electronic device used in computers, radios, televisions, etc. for controlling an electric current as it passes along a circuit 晶体管

The first step is to try new things. More money could fund promising people rather than specific projects, encouraging researchers to take risks. Funders could move faster and bypass peer review entirely, for example by using lotteries. Countries should also learn from the best practices of others. American philanthropists give over three times more to science than do their European counterparts. Europeans might benefit from changing that.	第一步是尝试新事物。更多的资金可以资助有潜力的人，而不是具体的项目，鼓励研究人员承担风险。资助者可以加快流程，略过同行评审，例如采用抽签的方式。各国还应互相学习彼此的最佳方法。美国慈善家对科学的捐赠是欧洲慈善家的三倍多。欧洲人如果调整好现状，可能会从中受益。

【词汇】

1. **bypass** /ˈbaɪpæs/ v. 六级/雅思/GRE/考研/专八 to ignore a rule, an official system or somebody in authority, especially in order to get something done quickly 不顾（规章制度）；不请示

例：They let us bypass the usual admissions procedure.

他们让我们绕过通常的招生程序。

2. **lottery** /ˈlɑːtəri/ n. a way of raising money for a government, charity, etc. by selling tickets that have different numbers on them that people have chosen. Numbers are then chosen by chance and the people who have those numbers on their tickets win prizes.（用发行彩票为政府、慈善机构等集资的）抽彩给奖法

例：a lottery ticket

彩票

More important still is to find ways to measure what is working and what is not, and then adapt accordingly. Governments might consider appointing "meta-scientists" or "chief economists" to do the number-crunching across their various scientific agencies. One intriguing idea is to keep tabs on an "anti-portfolio", or a list of projects that they do not fund, and track how they perform.

None of this will be easy. In some cases more money may be the only solution. Still, the economic returns to research are so large—at least ten times the original investment, by one estimate—that fixing the system is well worth the effort. Like science itself, the way of funding it must also progress.

更重要的是找到衡量哪些有效、哪些无效的方法，然后做出相应调整。各国政府可以考虑任命"元科学家"或"首席经济学家"，来统筹各个科学机构。一个不错的想法是建立一个"不投资清单"，即一份他们不会资助的项目清单，并跟进这些项目的情况。

说起来简单做起来难。在某些情况下，更多的资金可能是唯一的解决办法。尽管如此，科研的有高额的经济效益--据估计至少是原投资的十倍--因此，优化这一体系是非常值得的。与科学本身一样，资助科学的方式也必须进步。

【词汇】

1. **adapt** /əˈdæpt/ v. 四级/雅思/托福/考研 to change your behaviour in order to deal more successfully with a new situation 适应（新情况）

例：It's amazing how soon you adapt.

你这么快就适应了，真是令人惊奇。

2. **number-crunching** /ˈnʌmbər krʌntʃɪŋ/ n. the process of calculating numbers, especially when a large amount of

data is involved and the data is processed in a short space of time 数字密集运算

3. **intriguing** /ɪnˈtriːgɪŋ/ adj. GRE/专八 very interesting because of being unusual or not having an obvious answer 非

常有趣的；引人入胜的；神秘的

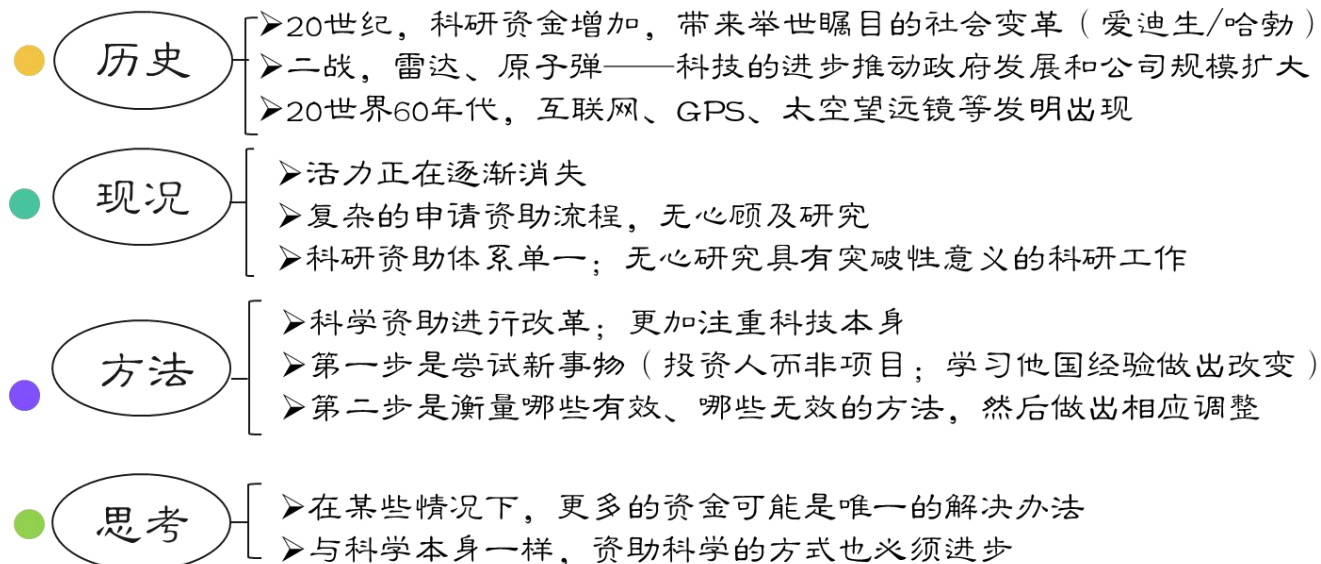例：These discoveries raise intriguing questions.

这些发现带来了非常有趣的问题。

【短语】

1. **keep (close) tabs on somebody/something**：to watch somebody/something carefully in order to know what is

happening so that you can control a particular situation 监视；密切注视

例：It's not always possible to keep tabs on everyone's movements.

监视每个人的行动并不总是能办得到的。

总结

1) 文章架构

历史
➤ 20世纪，科研资金增加，带来举世瞩目的社会变革（爱迪生/哈勃）
➤ 二战，雷达、原子弹——科技的进步推动政府发展和公司规模扩大
➤ 20世界60年代，互联网、GPS、太空望远镜等发明出现

现况
➤ 活力正在逐渐消失
➤ 复杂的申请资助流程，无心顾及研究
➤ 科研资助体系单一；无心研究具有突破性意义的科研工作

方法
➤ 科学资助进行改革；更加注重科技本身
➤ 第一步是尝试新事物（投资人而非项目；学习他国经验做出改变）
➤ 第二步是衡量哪些有效、哪些无效的方法，然后做出相应调整

思考
➤ 在某些情况下，更多的资金可能是唯一的解决办法
➤ 与科学本身一样，资助科学的方式也必须进步

2) 同义替换

✓ **发展；进展**

advance

Advances in science during the second world war...

第二次世界大战期间，科技的进步...

progress

Like science itself, the way of funding it must also progress.

与科学本身一样，资助科学的方式也必须进步。

其他： development

例：　The company can offer a number of opportunities for career development.

该公司能提供一些职业发展的机会。

✓ **方式；方法**

approach

The problem is that no one really knows which approaches work best.

问题是，没有人真正知道哪种方法最有效。

solution

In some cases more money may be the only solution.

在某些情况下，更多的资金可能是唯一的解决办法。

其他：method

例: Which method is the most effective?

哪种方法最有效？

3) 一词多义

✓ **pet**

✓ 文章原句：Tech billionaires' plans to fund pet projects come thick and fast. 科技界亿万富翁们大力资助他们偏好的科研项目。

✓ 释义：

①**that you are very interested in** 很喜欢的；钟爱的；很感兴趣的

his ~ subject/theory/project, etc.

他所喜爱的学科、理论、项目等

②**to touch or move your hand gently over an animal or a child in a kind and loving way** 抚摸；（爱抚地）摩挲

He ~ the dog and ruffled its fur.

他抚摩着那条狗，拨弄着它的软毛。

③ **a person who is given special attention by somebody, especially in a way that seems unfair to other people** 宠儿；宝贝；红人

She's the teacher's ~.

她是老师的宠儿。

✓ **citation**

✓ 文章原句： ...in order to boost citations and gain tenure... ...以提高论文引用率和获得终身教授职位...

✓ 释义：

① **words or lines taken from a book or a speech** 引语；引文；引述

The report contained several ~ taken from her PhD thesis.

该报告载有几处取自她的博士论文的引文。

② **an official statement about something special that somebody has done, especially about acts of courage in a war** 表彰；表扬；（尤指对战争中英勇表现的）嘉奖令

a ~ for bravery

因勇敢而受到的嘉奖

③ **an official order for someone to appear in court or pay a fine for doing something illegal** 传讯，传票；罚单

Turner was issued a traffic ~ for reckless driving.

特纳因鲁莽驾驶收到了交通违章罚单。

4) 仿写训练

✓ **描述事物的退步**

✓ **文章原句：**

That dynamism is fizzling out. A growing body of work shows that even as the world spends more on research, the bang for each extra buck has fallen. One explanation for this is that the way science is funded is out of date.

✓ **句型及表达：**

The dynamism of...is fizzling out. ...的活力正在逐渐消失。

A growing body of work shows that even as the...spends more on..., the bang for each extra buck has fallen. 越来越多的研究表明，尽管...在宣传上投入了更多，但效果却越来越差。

One explanation for this is that the way...is...is out of date. 一种解释是...的方式过时了

✓ **仿写示例：**

The dynamism of traditional music is fizzling out. A growing body of work shows that even as the government spends more on its development, the bang for each extra buck has fallen. One explanation for this is that the way traditional music is developed is out of date.

✓ **仿写作业——描述方言的消失**

当地方言的活力正在逐渐消失。越来越多的研究表明，尽管政府在宣传上投入了更多，但效果却越来越差。其中一个解释是学习该语言的方式已经过时了。

5) 主题词总结

今日主题——科研	
1. cottage industry	家庭手工业
2. research and development	研发
3. grant	拨款
4. peer review	同行评议
5. science funding	科学事业资助