

本期追问

类比只是修辞手法，还是思维本身赖以运转的引擎？

我们脱口而出的每个词，是否都是一次无意识的类比跳跃？

如果概念的边界永远模糊，人如何还能可靠地思考？

视频精读 VIDEO STUDY

Analogy as the Core of Cognition

来源：YouTube 视频 (<https://www.youtube.com/watch?v=n8m7lFQ3njk>)

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01 讲座背景与总统讲座介绍

0:05

Stanford University

斯坦福大学

0:27 主持人（斯坦福人文中心）

Thank you for your help with the seating. we very much appreciate it. With a lecturer of the fame and stature of Douglas Hofstadter we get a fantastic turnout and it's a marvelous. Don't worry if someone who was coming to meet you here hasn't arrived. They will at least hear the lecture out in the lobby. So there's a chance to get some small part of the action out there and we're just very happy you all came. This is a presidential lecture sponsored by the president and administered by the Stanford Humanities Center.

谢谢你们帮忙安排座位。嗯，我们非常感谢。有道格拉斯·霍夫施塔特这样声名卓著的演讲者，我们才能有这么好的出席率，真是太棒了。如果有约好在这里跟你碰面的人还没到，别担心。他们至少能在大厅里听到演讲。所以在外面也有机会感受到一部分现场的气氛。我们非常高兴大家都来了。这是一场校长讲座，由校长赞助，斯坦福人文中心承办。

斯坦福「总统讲座」

（Presidential Lecture）由校长出资、人文中心（Stanford Humanities Center）承办，专门邀请人文与艺术领域顶尖学者，是该校最高规格的公开讲座系列之一。

stature /'stætʃər/ *n.*

（崇高的）声望，地位

turnout /'tɜːnaʊt/ *n.*

出席人数，到场率

1:06

And we're very happy to have been able to invite Douglas Hofstadter and even more happy that he has accepted. Do take a look at the presidential lecture website which is accessible through the Stanford Humanities Center website shc.stanford.edu Glen Worthy who's here tonight has invested a lot of time and attention in presenting Doug's work in the most complete and analytic possible way. It's a it's a real publication on Hofstadter and worthy of attention. Should you need to learn more about the Humanities Center, that's also the place to go shc.stanford.edu.edu.

侯世达 (Douglas Hofstadter), 美国认知科学家, 以1979年出版的《哥德尔、埃舍尔、巴赫》(GEB) 闻名, 该书获1980年普利策非虚构奖, 是认知科学最有影响的普及著作之一。

我们非常高兴能够邀请到道格拉斯·霍夫施塔特, 更高兴的是他接受了邀请。呃, 请一定看看校长讲座的网站, 可以通过斯坦福人文中心的网站访问, 即 shc.stanford.edu。今晚在场的格伦·沃西投入了大量时间和精力, 以尽可能完整、有分析性的方式呈现道格的作品。那是一份关于霍夫施塔特的真正的出版物, 值得关注。如果你想更多了解人文中心, 也可以去那个网址, shc.stanford.edu。

1:56

That would include learning more if you've become deeply curious about the publications and materials that are out front and would like to see more about us, you can do it on that website. Also, the tradition at the presidential lectures is not to have Q&A this evening, but to have a real discussion seminar tomorrow afternoon at 4:00. That seminar will be at the Humanities Center and the directions, if you don't know how to get there, are on that same website shc.stanford.edu.

这也包括, 如果你对外面陈列的出版物和资料产生了浓厚兴趣, 想进一步了解我们, 都可以在那个网站上找到。另外, 校长讲座的传统是今晚不设问答环节, 而是在明天下午四点举行一场真正的讨论研讨会。研讨会将在人文中心举行, 如果你不知道怎么去, 路线指引也在同一个网站 shc.stanford.edu 上。

2:37

So, I'm happy to turn now to an introducer who truly needs no introduction, Donald Kennedy, the former president of Stanford University, the editor of Science, a reasonably well-known magazine, and of course a scholar of great distinction in biology and environmental studies. So, I will now, with no further ado, turn to Donald Kennedy.

那么，我现在很高兴请出一位真正无需介绍的介绍人，唐纳德·肯尼迪，斯坦福大学前校长，《科学》——一本相当知名的杂志——的主编，当然，他也是生物学和环境研究领域一位卓有建树的学者。那么，我现在就不多说了，有请唐纳德·肯尼迪。

唐纳德·肯尼迪 (Donald Kennedy, 1931–2020)，斯坦福第八任校长 (1980–1992)，生物学家，时任顶级期刊《科学》(Science) 主编——介绍词里「一本还算有名的杂志」是自谦式幽默。

with no further ado *phr.*

闲话少说，立即开始 (ado /əˈduː/ 忙乱、啰嗦)

02 肯尼迪致辞：侯世达其人其书

3:18 唐纳德·肯尼迪

This is a fantastic turnout, and I hope Doug knows how much of a tribute it is to the influence he's had on the thinking of a large number of people, not only on this campus, but everywhere. It's a great privilege to introduce him. his family and mine were neighbors on San Juan Hill for a time. Doug left his house before I got into Hoover House, but we had met on several occasions and actually became colleagues for a while at a time during which I had persuaded him to do some teaching in the human biology program to the benefit of our students.

呃，今天的出席人数非常惊人，我希望道格知道，这是对他的影响力的一种致敬——他影响了非常多人的思考方式，不仅是在这个校园里，而是在各个地方。能介绍他是我莫大的荣幸。呃，他家和我家曾经有一段时间是圣胡安山上的邻居。道格在我搬进胡佛楼之前就搬走了，但我们在好几个场合见过面，而且有一阵子实际上成了同事，那段时间我说服他在人类生物学项目里教一些课，这让我们的学生受益匪浅。

tribute /ˈtribjʊt/ *n.*

敬意；致敬之举 (a tribute to 是对...的褒奖)

3:56

And I saw a great deal of Lorie as she moved from bio major at Stanford to science writer, and I'm glad that she and some members of her family could be here. In Doug's human bio period, he was working on Gödel, Escher, Bach, hereafter GEB. When the book came out, I not only thought it was a stirring accomplishment, I experienced that voyeuristic feeling of having some association, however transient and tenuous with a great literary triumph. Nowadays, I get the occasional additional dose of that by getting David Kennedy's misdelivered mail, but fortunately, Doug also keeps me going with more achievements of his own. And indeed, so much has been said of Doug and the power and luster of his intellect in that splendid piece by Glenn Worthy.

我也常常见到洛里，看着她从斯坦福的生物学专业学生成长为科普作家，我很高兴她和她家里的一些成员今天能到场。在道格教人类生物学的那段时期，他正在写《哥德尔、埃舍尔、巴赫》，以下简称 GEB。这本书出版时，我不仅觉得这是一项激动人心的成就，还体验到那种偷窥般的感觉——自己似乎和一场伟大的文学胜利有了某种关联，哪怕这关联短暂而微弱。如今，我偶尔还能再获得一点这种感觉，比如收到本该寄给 David Kennedy 的错投邮件；不过幸运的是，Doug 也一直用他自己新的成就让我保持这种感觉。的确，关于 Doug 以及他智识的力量与光彩，Glenn Worthy 在那篇精彩的文章里已经说了太多。

GEB借数学家哥德尔的不完备定理、版画家埃舍尔的怪圈图形、作曲家巴赫的赋格，探讨意识与自指如何涌现。肯尼迪自嘲因认识作者而「沾光」于这部文学成就。

stirring /'stɜːrɪŋ/ *adj.*
激动人心的，震撼的

voyeuristic /ˌvɔɪə'rɪstɪk/ *adj.*
窥视者般的（此处自嘲：沾光旁观他人成就的）

tenuous /'tenjuəs/ *adj.*
微弱的，牵强的（tenuous association 牵强的关联）

luster /'lʌstər/ *n.*
光彩，光辉

4:51

There's not much that can be added to it, but there's a question. And the question is, what kind of linguist, mathematician, cognitive scientist hybrid does it take to think up ambigrams, the carinian, metamagical, and so on? Answer: a charismatic imagination and an extraordinary gift for exploring how we think by substitution and analogy as he explores in fluid concepts and creative analogies, a work product that has grown out of a group he has relabeled as the fluid analogies research group, FARG, one O short of North Dakota.

能补充的其实不多，但有一个问题。问题是：得是怎样一种语言学家、数学家和认知科学家的混合体，才能想出双向图（ambigram）、卡罗尔式的文字游戏、元魔法（metamagical）这些东西？答案是：一种富有魅力的想象力，以及一种非凡的天赋——探究我们如何通过替换和类比来思考，正如他在《流动的概念与创造性类比》中所探索的那样。这项成果出自他重新命名的一个团队，即流动类比研究组（Fluid Analogies Research Group, FARG）——离北达科他州的 Fargo 只差一个 O。

ambigram（双向图）是侯世达推广命名的文字设计：一个词旋转或镜像后仍可读。FARG是他创立的「流体类比研究组」；玩笑「比北达科他少一个O」指FARG加O即Fargo——北达科他州名城。

charismatic /ˌkærɪz'mætɪk/ *adj.*
有超凡魅力的

5:37

The catalog, more formal than playful like Doug, lists him as director of Indiana University's Center for Research on Concepts and Cognition. My friend Bill Kaufmann was one of those whom Doug asked about publishers and other practical matters in the early days of pre-GEB. Bill's company W.H. Freeman had merged for a while with Scientific American of the Piel Flanagan era. Longtime admirers of Martin Gardner's wonderful Lewis Carrollian mathematical games column in that magazine were devastated about Gardner's announced retirement. But when Doug was announced as his replacement in 1981, everyone who knew him said, simply, "How perfect."

目录上的说法比爱玩的 Doug 本人正式得多，把他列为印第安纳大学概念与认知研究中心的主任。我的朋友 Bill Kaufmann 是 GEB 出版之前那段日子里，Doug 咨询出版社和其他实际事务的对象之一。Bill 的公司 W.H. Freeman 曾一度与 Piel、Flanagan 时代的《科学美国人》合并。那本杂志上 Martin Gardner 那个精彩的、充满刘易斯·卡罗尔味道的数学游戏专栏，长期以来的拥趸们因 Gardner 宣布退休而备受打击。但当 1981 年宣布由 Doug 接任时，所有认识他的人都只说了一句：“太合适了。”

6:28

His incorrigible playfulness with language and anagrams led him to redo the title to Metamagical Themas. He didn't disappoint us in a tenure that lasted 2 and 1/2 years. Doug and I talked earlier today about the shared experience of being edited by Dennis Flanagan at Scientific American, one of the truly persistent, ego-restructuring, and capable editors of all time. I hope he won't mind my telling a bridging story that has some personal meaning for me. Doug is deeply interested in language, how we use it, and what it tells us about how we think.

他对语言和字谜那种改不掉的爱玩，让他把专栏名字重新组合成了 Metamagical Themas（元魔法主题）。在长达两年半的任期里，他没有让我们失望。今天早些时候，Doug 和我聊到了一个共同的经历：被《科学美国人》的 Dennis Flanagan 编辑过——他是有史以来最执着、最能重塑人自我认知、也最有能力的编辑之一。希望他不介意我讲一个串起这一切、对我个人有些意义的故事。Doug 对语言有着深切的兴趣：我们如何使用语言，以及语言告诉了我们什么关于自己如何思考。

马丁·加德纳 (Martin Gardner) 在《科学美国人》执笔「数学游戏」专栏25年，启蒙了几代科学爱好者；1981年宣布退休令读者沮丧，而侯世达被宣布为接班人时，众人皆称「完美人选」。

devastated /ˈdevəsteɪtɪd/ *adj.*
极度震惊悲伤的

侯世达把专栏改名为 Metamagical Themas——它是原栏目名 Mathematical Games 的变位词 (anagram)，字母完全相同，体现他对文字游戏的痴迷。他执笔了两年半。

incorrigible /ɪnˈkɔːrɪdʒəbl/ *adj.*
积习难改的（常作诙谐褒义，如「无可救药地爱玩」）

anagrams /ˈænəɡræmz/ *n.*
变位词（重排字母构成的新词）

tenure /ˈtenjər/ *n.*
任职期；（大学）终身教职

7:08

He had an early experience at the University of Oregon while doing a PhD in physics that had followed a good experience with math at a Stanford as a Stanford undergraduate and a disappointing one in a math graduate program at Berkeley. And at Oregon he at Oregon he happened to develop to develop a sidelong sideways interest in the question how gender is used in language. E.g., how is it that many of us in that day were saying men when we meant everybody. Now we say guys when we mean everybody, and that's just and that's just as dumb a mistake. So, anyway, his interest in linguistic sexism, for some reason, linked him to a talk I had given in the very early '80s at, of all things, a senior athletes dinner at Stanford.

侯世达的学术轨迹：斯坦福数学本科（1965）→伯克利数学研究生受挫→俄勒冈大学物理学博士。他旁涉语言中的性别歧视问题，如用men或guys泛指所有人这类「以男代全」的语言习惯。

他在俄勒冈大学读物理学博士时有过一段早年的经历。在那之前，他在斯坦福读本科时的数学经历很不错，而在伯克利数学研究生项目里的经历则令人失望。在俄勒冈，他碰巧发展出了一种旁支的兴趣，关注语言中性别是如何被使用的这个问题。比如说，为什么那个年代我们很多人想说“所有人”的时候，说的却是“men（男人们）”。现在我们想说“所有人”时又说“guys（伙计们）”，这同样是个愚蠢的错误。所以，总之，他对语言中性别歧视的兴趣，不知怎么就把他引向了我在八十年代初做的一次演讲，而那居然是在斯坦福的一次毕业班运动员晚宴上。

7:59

I used some data about women's times in events like swimming and the marathon and how rapidly the performance gap between women and men had narrowed. As an example, I compared the Stanford women's 400-meter freestyle relay time in 1981 with the best men's college time of my undergraduate years and discovered that the women were 10 whole seconds faster than the fastest men. 10 10 seconds is a long time if you count it out, and that's what I did at the senior athletes dinner. It was quite a good talk, actually. And Doug put a snippet of that in his column in Scientific American, and I was I was totally thrilled. It was a far more interesting take on that subject than the snippet in Sports Illustrated at about the same time.

肯尼迪的数据：1981年斯坦福女子400米自由泳接力成绩比他本科年代最快的男子大学纪录还快整整10秒——用以说明女子运动成绩与男子的差距在迅速缩小。

snippet /'snɪpɪt/ *n.*

(文章、信息的) 小片段

我用了一些数据，关于女性在游泳、马拉松等项目上的成绩，以及男女之间的成绩差距缩小得有多快。举个例子，我把斯坦福女队 1981 年的 400 米自由泳接力成绩，和我读本科那些年男子大学生的最好成绩做了比较，结果发现女队比最快的男队还快了整整 10 秒。如果你一秒一秒数出来，10 秒是很长的一段时间，而我在那次毕业班运动员晚宴上就是这么数的。那其实是一次相当不错的演讲。后来 Doug 把其中一小段放进了他在《科学美国人》的专栏里，我简直高兴坏了。相比《体育画报》大约同期刊登的那一小段，他对这个话题的解读要有意思得多。(同一时期。)

8:53

That suggests a lot about the exceptional range of connections that Doug is prepared to trace and analyze. The essence of his work has been to understand cognition, how we construct our knowledge of our world. The notion of some core essential to the way in which we link the features and structures of thinking and language is brought out in G B G E B in the features and structures of three very different creative and intellectual accomplishments. And that speaks to the use he makes of computers and artificial intelligence notions or the problem of translation which has interested him or perhaps as a way to explore for some underlying formal structure.

这很能说明 Doug 愿意去追溯和分析的那些关联，其广度有多么非同寻常。他工作的核心，一直是理解认知——我们如何构建起对这个世界的知识。关于某种核心的东西，某种对我们如何连接思维与语言的特征和结构而言至关重要的东西，这个想法在 GEB 中通过三种截然不同的创造性与智识成就的特征和结构被呈现出来。这也说明了他为何要使用计算机和人工智能的概念，或者关注一直令他着迷的翻译问题，又或许是把这些当作一种途径，去探寻某种深层的形式结构。

9:45

In the preface to the 25th anniversary edition of GEB, he chided some critics who had seen it as a book about three men. That's a little like saying Moby Dick is a book about whaling. GEB is about how animacy arises and in subsequent work Doug has explored a variety of connections or braids with that theme between cognition and language, between what is written in one language and then translated into another, between what is left life and what remains. Not only does he navigate those boundaries, he does so with a kind of loving respect that is perhaps best captured by the fact that he and his children, Danny and Monica, now teenagers, maintain an Italian only household conversation rule as a custom of honoring Doug's beloved late wife Carol, a fellow explorer of the translation universe.

在 GEB 二十五周年纪念版的序言里，他批评了一些把它看作是讲三个人的书的评论者。那有点像说《白鲸》是一本关于捕鲸的书。GEB 讲的是生命性（animacy）如何产生。在后来的工作中，Doug 探索了围绕这一主题的各种关联或“辫结”：认知与语言之间，用一种语言写下的东西与翻译成另一种语言之后的东西之间，以及逝去的生命与留存下来的东西之间。他不仅穿行于这些边界，而且带着一种充满爱意的敬重。也许最能体现这一点的是：他和如今已是青少年的两个孩子 Danny 与 Monica，在家中一直保持着只说意大利语的规矩，以此纪念 Doug 深爱的、已故的妻子 Carol——她也是翻译世界的一位探索者。

侯世达反驳「GEB是写三个人的书」：「这就像说《白鲸》是一本讲捕鲸的书」。GEB真正的主题是 animacy（生命性、心智）如何从无生命物质中产生。

侯世达与一双儿女在家只说意大利语，以此纪念1993年病逝的妻子Carol——她也是翻译研究的同好。这一家规呼应他对语言与翻译的毕生兴趣。

chided /'tʃaɪdɪd/ v.

责备，数落（chide的过去式）

animacy /'ænɪməsi/ n.

生命性，有生性（语言学与认知科学术语）

10:45

At a time when the university, this one, is on a crash course to embrace and support interdisciplinary work, it is especially wonderful to hear from someone who has been there and who has set out new benchmarks for thinking that loops around cognitive science, machine intelligence, art, literature, perhaps eventually neurobiology. You get a picture of his agility and playfulness from some of the titles of his presentations. The architecture of Jumbo, that one's about machine learning. The slippable alphabet, hinge points of thought, speech stuff and thought stuff.

在这所大学正全力以赴地拥抱并支持跨学科研究的时候，能听到一位早已身在其中、并为思考树立了新标杆的人来讲话，就格外美好——这种思考回环于认知科学、机器智能、艺术、文学，也许最终还有神经生物学。从他一些演讲的标题里，你就能感受到他的敏捷和玩心。《Jumbo 的架构》——那一篇是关于机器学习的。《可滑动的字母表》《思维的枢纽点》《言语之物与思维之物》。

agility /ə'dʒɪləti/ n.

（思维或身手的）敏捷

11:27

His biography will break the spell check feature on your computer. Finally, my favorite from his recent passion for translation. you'll need to absorb this slowly. Ma mignonne cutie pie pretty dear fairest friend pitting human against computers in poetry translation and guess who wins. Just think of what we could learn by examining Doug's brain with functional magnetic resonance imaging. Absolutely non-invasive for those of you who aren't kept to this. while he's pursuing a thought experiment about the relationship between art and music.

他的个人简介能把你电脑上的拼写检查功能给整崩溃。最后是最喜欢的，出自他近来对翻译的热情。这个你得慢慢消化。《Ma mignonne：小可爱、俏佳人、最亲爱的、最美的朋友——让人类与计算机在诗歌翻译上一较高下，猜猜谁赢了》。想想看，如果用功能性磁共振成像来检查 Doug 的大脑，我们能学到多少东西。完全无创的，跟不上这个梗的各位放心。比如在他思考艺术与音乐之间关系的思想实验时。

12:19

Phrenology would be never be the same afterward. I will close by noting that not only has he done some remarkably novel and intellectually challenging work in the world. He has also always been a gracious and kindly and humanistic guide for those who want to explore it. I'm happy to introduce Doug Hofstadter, Stanford BS in mathematics, class of 1965. The College of Arts and Sciences Professor of Cognitive Science at Indiana University. As well as the director of the program I just described earlier on under a different name.

那之后颅相学可就再也不是原来那个样子了。最后我想说，他不仅在这个领域做出了极为新颖、极具智识挑战性的工作，他也一直是一位亲切、和善、充满人文关怀的向导，引领那些想要探索这个领域的人。我很高兴为大家介绍 Doug Hofstadter，斯坦福数学学士，1965 届。他是印第安纳大学文理学院认知科学教授，也是我刚才所描述的那个项目的主任。更早的时候，只是用了另一个名字。

「Ma Mignonne」指侯世达1997年著作《Le Ton beau de Marot》：围绕16世纪法国诗人马罗的一首短诗收集数十种英译，比较人类与机器翻译——「猜猜谁赢」暗示人类完胜。

颅相学 (phrenology) 是19世纪伪科学，声称头骨隆起对应心智能力。此处是玩笑：若能扫描侯世达的大脑，颅相学将被彻底改写——夸赞其头脑非同寻常。

phrenology /frəˈnɑːlədʒi/ *n.*
颅相学 (19世纪伪科学)

gracious /ˈɡreɪʃəs/ *adj.*
亲切宽厚的，有风度的

12:57

In his own biography, he thanks Indiana University, in some respects Stanford's institutional parent for {quote} the fresh winds of freedom generously afforded him by his truly open-minded university. His presidential lecture in the humanities and arts is entitled Analogy as the core of cognition. Please join me in welcoming Doug back to Stanford.

在他自己的传记里，他感谢印第安纳大学——某种程度上算是斯坦福的母校——他说是那里“自由的清新之风”，是他那所真正思想开明的大学慷慨给予他的。他的这场人文与艺术校长讲座题为《类比作为认知的核心》。请和我一起欢迎 Doug 重回斯坦福。

03 开场：从一台计算机到认知之问

13:43

侯世达

I guess I'm a little bit on the spot here. after an introduction like that, it was I have to say also Don didn't mention that we used to do a little running together. He used to go up to the dish from the Hoover house and I remember well, I shouldn't say we used to. That suggests more than once. I joined him one time. I was a pretty good runner. in fact, I still run and I just ran this evening, but it was hard to keep up with Don. In fact, I don't know if I did. And do you still run, Don?

on the spot *phr.*

被置于尴尬或受考验的境地
(put sb on the spot)

我想我现在有点被架在这儿了。呃，听完这样一段介绍之后……我还得说，Don 没有提到我们以前还一起跑过步。他以前会从胡佛楼那边跑上 dish 那条路。我记得很清楚，我不该说“我们以前经常”，那听起来像是不止一次。我只跟他跑过一次。我当时跑得还挺不错的。呃，事实上，我现在还在跑，今天傍晚就刚跑过，不过不过要跟上 Don 很难。事实上，我不知道我到底跟上没有。呃，你现在还跑步吗，Don？

14:21

Well, I guess that's what happens to us all. anyway, we've had a lot of experiences together of various sorts and he certainly did outdid himself in that wonderful wonderfully kind and broad introduction. what when I was here as at as an undergraduate in the early '60s, I was very interested in understanding what the mind was. I think I had always been interested in what minds did and what creativity was and I had the experience of learning to program in the early '60s before Well, Stanford one computer. It was a Burroughs 220 located in the basement of Encina. How many people here remember that?

Burroughs 220是1950年代末的电子管计算机；当时斯坦福全校只有这一台，放在Encina楼地下室。侯世达1960年代初在此学会编程——现场只有一人记得它，可见年代久远。

嗯，我想这就是我们所有人都会遇到的情况吧。呃，总之，我们一起经历过各种各样的事情，而他在那段美好而又非常友善、非常全面的介绍里，确实是超常发挥了。嗯，我在 60 年代初作为本科生在这里读书的时候，我非常有兴趣去理解心智究竟是什么。我想我一直都对心智在做什么、创造力是什么感兴趣，而且我有过在60年代初学习编程的经历。当时，斯坦福只有一台计算机，是一台Burroughs 220，放在Encina楼的地下室里。这里有多少人还记得那个？

15:05

About one person. Well, anyway, I programmed that Burroughs 220 and then I went on to other programming, but the point is that I got interested in how language worked and in certain rules for language and I don't want to go into that very much. My model for producing sentences was amusing, and it had a lot of amusing things, but it what it really inspired me to do was to think about what cognition is. It certainly was not a model of cognition, but it was an amusing attempt, and over the years then I devoted a great deal of my life to thinking about what cognition is, and I guess tonight I'm going to be telling you some of the important conclusions that I've come to, and I don't know if I can convince anybody, but I will do my best. I have I will begin with a sort of a complaint, and Everything is in Everything is in focus.

关键的自我定位：早年的造句程序并不是认知模型，只是有趣的尝试，但它引出了他毕生的问题「认知是什么」。本讲就是他几十年思考得出的结论。

大概有一个人。好吧，无论如何，我给那台Burroughs 220编过程，后来又做了别的编程工作，但重点是我开始对语言是如何运作的产生了兴趣，还有语言的某些规则，这个我不想讲太多。我那个生成句子的模型很有意思，里面有很多有趣的东西，但它真正启发我去做的，是思考认知究竟是什么。它当然不是一个认知模型，但它是一次有趣的尝试，而且，这些年来我把我人生中很大一部分精力都投入到思考认知是什么这个问题上，我想今晚我要跟大家讲的是我得出的一些重要结论，我不知道自己能不能说服任何人，但我会尽力而为。我先从一点抱怨开始，呃，全都在焦点内了吧。

04 核心论点：类比是认知的高速公路

16:06

Good, that's great. by the way, I don't use PowerPoint, for better or for worse. I don't know what that means, but So, you'll have to put up with my handwriting and with sloppiness and things like that. and so in cognitive science, the cognitive science conferences and journals and so forth, they always have they divide cognition up into all sorts of different pieces, and one of the pieces is always called analogical reasoning, and it's usually put together with problem solving. And it's sort of one little teeny part of thinking, and I sort of decided that I would put it this way, that analogical reasoning, they sort of is the Delaware of cognition.

很好，太好了。呃顺便说一句，我不用PowerPoint，不管这是好事还是坏事。我也不知道这意味着什么，但是所以，你们得忍受我的字迹，忍受潦草之类的东西。嗯，所以，呃，在认知科学里，认知科学的会议、期刊等等，他们总是把认知划分成各种各样不同的部分，其中总有一个部分叫做类比推理，呃，还有呃，它通常和问题求解放在一起讲。而且它算是思维中一个很小很小的部分，我后来觉得我想这么说吧，类比推理，它大概算是认知领域的特拉华州。

主流认知科学把「类比推理」列为与问题求解并置的小分支。侯世达讽刺其地位如「认知中的特拉华州」——美国面积最小的州之一，边缘、不起眼。他还坚持用手写透明胶片而非PPT。

16:57

So, I kind of feel that shunts it off a little bit. It doesn't make it very central. Now, you might think that Indiana would be a better name for an analogical reasoning, but I'm going to be a little bit more daring than that. I'm I and it doesn't mean California either, or Texas, or Alaska. First of all, we're going to get rid of the word reasoning. I don't want reasoning. An analogy has nothing to do with reasoning, or it does a little bit, but not much. I mean, it's just a misnomer, and it's a misconception of what analogy is, and that's what I really want you to understand. And I suppose that's sort of the bottom line of this talk. If we are going to make any connection between analogy and a geographical situation, we're going to liken it to the interstate freeway system. And it links everything together. Analogy is the interstate freeway system of cognition. It is not one little tiny zone somewhere off in the side. It's So, that's a kind of a way of that I think about it. I mean, I don't

所以我觉得那样就把它给边缘化了一点，让它显得不那么核心。当然，你可能会觉得用印第安纳州来比喻类比推理更合适，但我打算比那再大胆一点。我要说的不是加利福尼亚，也不是得克萨斯或者阿拉斯加。首先，我们要把“推理”这个词去掉。我不要推理。类比跟推理没什么关系，或者说有那么一点点关系，但不多。我是说，这就是个用词不当，是对类比是什么的一种误解，而这正是我真正希望你们理解的。我想这大概也就是这场演讲的核心结论。如果我们非要在类比和地理概念之间建立某种联系，那我们应该把它比作州际高速公路系统。它把一切都连接在一起。类比就是认知的州际高速公路系统。它不是躲在角落里的某个小小区域。它是——所以，这差不多就是我思考它的一种方式。我是说，我平常其实也不太这么想。

全讲核心论断：①「类比推理」是误称，类比与推理关系不大；②类比不是认知版图上的一小块，而是像州际高速公路系统那样把一切连接起来的东西。

misnomer /mɪsˈnɒmə/ n.

误称，名不副实的名称

shunts /ʃʌnts/ v.

把...推到一边，使靠边 (shunt off)

18:00

Really usually think about it that way. I made that up yesterday, so but it gives you the flavor. so, one of my rules, which I'm sure I will disobey tonight, is don't cover your transparencies. let everybody see everything, but I may not do that. we'll see if I'm if I'm true to my own principles. So, as it says here, I think of categorization I mean, the story about analogy making, of course, has to be a little bit more than just analogy making. So, I want to sort of show you how things fit together. Categorization is the name of the cognition game, but analogy is the mechanism that creates or that allows categorization to happen. By categorization, I mean, deciding what something is, what the essence of something is.

本讲的理论框架一句话：范畴化（判断某物是什么、抓住其本质）是认知这场游戏的名字，而类比是使范畴化得以发生的机制。二者是一体两面。

这是我昨天临时编出来的，不过它能让你体会到那个味道。呃，我有一条规矩，今晚我肯定会违反它，那就是：别遮住你的投影片。呃，让所有人都能看到全部内容，但我可能做不到。呃，我们看看我能不能忠于自己的原则吧。就像这里写的，我认为范畴化——我是说，关于类比的故事，当然不能只是关于类比本身，它得比单纯的类比多那么一点点。所以我想给你们看看这些东西是怎么串起来的。范畴化是认知这场游戏的核心，而类比则是造就范畴化、或者说让范畴化得以发生的机制。我说的范畴化，是指判定某个东西是什么，判定某个东西的本质是什么。

18:51

Now, one could sort of summarize this in a corny little analogy. Again, analogy is the motor of the car of thought, and then we then can even write it down as this little thing, analogy is to thinking as a motor is to a car. A is to B as C is to D. And this sort of reduces it down to the old standard, you know, A is to B as C is to D, proportional analogy looks like a fraction. And that's very nice. It's the kind of thing, you know, like shoe is to foot as glove is to hand. And these kinds of things that maybe they put on IQ tests and SATs and things like that. but that's not how I think of analogy, either. I mean, that's again putting it into a little tiny box and saying that all of analogy is A is to B as C is to D. And it And it again it misses the point.

现在，我们可以用一个有点俗气的小类比来概括这一点。还是那句话，类比是思维这辆车的发动机，然后我们甚至可以把它写成这么个小式子：类比之于思维，就如同发动机之于汽车。A 之于 B，如同 C 之于 D。这样就把它归结成了老一套，你懂的，A 之于 B 如同 C 之于 D，这种比例式类比看上去就像个分数。这挺好的。就是那种，比如说，鞋之于脚，如同手套之于手。这类东西可能会出现在智商测试、SAT 考试之类的地方。但我心目中的类比也不是这样的。我是说，那又是把它塞进一个小盒子里，说所有的类比都是 A 之于 B 如同 C 之于 D。这同样没抓住要点。

A:B::C:D的比例式类比（鞋之于脚如手套之于手）是IQ测试和SAT的标准题型。侯世达认为这恰恰把类比装进了小盒子，完全错过了类比的真正本质。

corny /'kɔ:ni/ *adj.*

老套的，陈腐的

19:44

So, I don't know. I can't define anything and I kind of hate definitions, but I will at least sort of give you a sense. Analogy making is the perception of common essence between two things. And then a couple of footnotes to sort of hedge. I mean, things don't have essences, but what I mean I'm not a, you know, I'm not talking about some kind of abstract glowing philosophical essence. I'm talking about the essence that you perceive at the particular time in the frame of mind that you happen to be in.

所以，我也说不好。我没法给任何东西下定义，而且我有点讨厌定义，但我至少可以让你们有个感觉。类比就是在两个事物之间感知到共同的本质。然后再加几个脚注，稍微留点余地。我是说，事物并没有什么本质，但我的意思是——我不是在说某种抽象的、闪着光的哲学意义上的本质。我说的是你在某个特定时刻、以你当时恰好所处的心态所感知到的那个本质。

他给出的工作定义：类比=感知两个事物之间的共同本质。但此「本质」不是抽象的哲学本质，而是你在特定时刻、特定心境下感知到的本质——主观且随情境变化。

hedge /hedʒ/ *v.*

含糊其辞，留有余地

20:16

And by when I say things, it's tempting to think that the analogies are between the things in the external world, but I really want to say that analogies happen inside your head, so that they're connections between two mental representations. They're connections between things inside your head. which we project to the outside world and we say these things outside out there are analogous and that's very reasonable to do, but I wanted to emphasize how they go on inside the head and they are between mental representations.

反直觉要点：类比并不发生在外部事物之间，而发生在头脑内部的两个心理表征（mental representations）之间，再被我们投射到外部世界。

还有，当我说“事物”的时候，人们很容易以为类比是发生在外部世界的事物之间，但我真正想说的是，类比发生在你的脑袋里，所以它们是两个心理表征之间的连接。它们是你脑袋里的东西之间的连接。然后我们把它投射到外部世界，说外面那些东西是类似的，这么说也很合理，但我想强调的是它们其实是在头脑内部发生的，是心理表征之间的关系。

05 三个亲历故事：类比自发降临

20:46

Now, I'm going to give you a couple of analogies, some of my favorite analogies. they're all, you know, analogies I could give you forever, but I'm going to give you a few that I think are very interesting and kind of provocative. So, I'll begin with when I was a kid, I was 8 years old as I recall when I found out about exponents. And I was in love with math, and I was fascinated with any new mathematical concept, and I made tables of not integers to various powers. I filled notebooks with these kinds of things.

现在，我要给你们讲几个类比，我最喜欢的几个类比。这些都是，你懂的，类比我永远可以讲下去，但我打算讲几个我觉得非常有趣、也挺发人深省的。我先从这个开始：我小时候，我记得大概八岁的时候，第一次知道了指数。我当时爱数学爱得不行，任何新的数学概念都让我着迷，于是我做了各种整数各次幂的表格。我写满了好几个本子，全是这类东西。

21:22

So, one day I was walking through the house and I saw a paper that my dad was reading, and he was a physicist, and it had math notation galore, and I couldn't make head or tail of it. But what I did notice was that there was there little things that said, you know, like X sub 1, X sub 2, and stuff like that. And I thought, "Ooh, look at that. These little subscripts." So, here's my Here's my little transparency. the red You can get the idea that I saw that I My guess was, "What in the world What operation on numbers does this subscripting thing do if the superscripting thing, you know, puts it to a power? What does it subscripting do?" I was really interested. And my dad told me, he said, "Oh, that doesn't do anything. It's just the way of naming variables."

有一天我在家里走来走去，看到我爸在看一篇论文——他是个物理学家——上面全是密密麻麻的数学符号，我完全看不懂。但我确实注意到，上面有一些小东西，比如写着 X 下标 1、X 下标 2 之类的。我心想：“哇，你看这些小下标。”所以，这就是我做的小投影片。红色的那个……你们大概能想象我看到的東西。我当时的猜想是：“这到底是什么？这个下标对数字做了什么运算？既然上标是把它变成幂，那下标又是干什么的呢？”我真的特别好奇。然后我爸告诉我：“哦，那什么都不做。那只是给变量起名字的一种方式。”

22:12

And I was so disappointed, completely flattened. Okay. Fast forward 40 years. Fast forward 40 years. now I'm a father of a 1-year-old daughter named Monica, and Monica is sitting in our playroom pushing the button of the Dustbuster. Having time of her life. And then what does she see? She sees another button. And she pushes it, and nothing happens. And I'm watching her. And I go over there. I'm sitting, you know, on the floor, and I get up, and I go over next to Monica, and I push the button, and I open it up, and I show her, "This is just where the garbage is, you know."

我当时特别特别失望，整个人彻底垮掉了。好。快进四十年。快进四十年。现在我是个一岁女儿的父亲，她叫莫妮卡。莫妮卡坐在我们的游戏室里，按着手持吸尘器的按钮。玩得不亦乐乎。然后她看到了什么？她看到了另一个按钮。她按下去，什么都没发生。我在旁边看着她。于是我走过去。我本来坐在地板上，我站起来，走到莫妮卡旁边，按下那个按钮，把它打开，然后给她看：“这只是装垃圾的地方而已。”

8岁的侯世达由上标（乘方运算）类推：下标应该也是某种数字运算——这个期待本身就是一次类比。父亲（物理学家）告知下标只是给变量命名，不「做」任何事。

galore /gəˈlɔːr/ *adj.*

大量的（后置修饰：notation galore 满是符号）

make head or tail of *phr.*

看懂，弄明白（常用否定式 couldn't make head or tail of）

subscripts /ˈsʌbskripts/ *n.*

下标（对应 superscript 上标）

40年后：1岁的女儿Monica按Dustbuster（手持吸尘器）的第二个按钮期待有反应，父亲打开示范那只是垃圾仓开关——她的期待同样被「揭穿」。两个失望瞬间结构完全同构。

flattened /ˈflætnd/ *v.*

压扁；（引申）使彻底泄气、击垮

22:58

And Monica is, of course, completely destroyed. And at that moment, you have to understand, I hadn't thought about this thing with my dad for probably 40 years. At that moment, the whole thing of the exponents and the subscripts comes rushing to my to my head. And I want you to I just want to, you know, kind of spell out this analogy. It's a pretty complicated one. I mean

莫妮卡当然彻底崩溃了。而在那一刻，你们要知道，我大概有四十年没想起过我跟我爸的那件事了。就在那一刻，指数和下标的整件事一下子涌上了我的脑海。我想把这个类比稍微展开讲讲。这个类比还挺复杂的。我是说.....

23:28

Somebody said to me, I guess it was Don today, he said, "Oh, people make the mistake of reading out loud their transparencies." So, I don't know. I don't know if I can avoid reading this out loud though, cuz it's kind of fun. But I've already told it to you, so maybe I won't. I mean, I think it's interesting though that if you if you I mean, you know, here is me and all my love of mathematics and the subscripts. And this is an interesting line here because I'm making an analogy. Part of this analogy is an analogy. I make an analogy between superscripts and subscripts. And I think, "Ah, there's something there." And then I get flattened by my father. Okay. And so, here's Monica, and she comes along and she makes an analogy between one button and another. And she's hoping, and then she gets flattened by her father. who happens to be me, but that's just a just a coincidence. But anyway, there you go.

此例的精妙处：类比中套着类比——小侯世达在上下标之间做类比，Monica在两个按钮之间做类比，而这两次「被父亲打击的类比尝试」又构成一个高阶类比，使40年前的记忆瞬间复活。

今天有人跟我说，我想是唐吧，他说：“大家常犯的错误就是照着投影片念。”所以我也不知道，我不知道我能不能忍住不把这个念出来，因为念起来还挺好玩的。但我已经讲给你们听过了，那也许就不念了。不过我觉得挺有意思的，如果你.....我是说，你看，这边是我，还有我对数学和下标的全部热爱。这里这条线很有意思，因为我在做一个类比。这个类比的一部分本身就是个类比。我在上标和下标之间做了个类比。我想：“啊，这里面有点门道。”然后我就被我父亲一句话打垮了。好。然后，这边是莫妮卡，她出场了，她在一个按钮和另一个按钮之间做了个类比。她满怀期待，然后她被她父亲打垮了。而她父亲碰巧就是我，不过那只是个巧合。总之，就是这样。

24:20

I mean, it's a pretty a pretty complicated analogy. Now, the next one That one's That one is what you might call a reminding event. And a lot of analogies are reminding events. And I And I want to say something immediately, which is that a lot of people think analogies are there to serve purposes. They're not there to serve purposes at all. They just happen. That's all. There's no purpose. There's no purpose at all. They just happen. sure, they're in a certain sense, they're serving evolution, but that's about the only purpose that there is, you think. and I want to give you a an analogy that occurred to me a few months ago. I was reading a book that my mother had loaned me by Jonathan Raban called I don't remember exactly, something about Voyage to America or Discovering America, something. Anyway, he's traveling across his first chapter, he's traveling across the Atlantic Ocean. I was in an airplane. I was flying back from California to Indiana, and I we're

重要论点：许多类比是「提醒事件」(reminding events)，无目的、自发出现——这直接反驳「类比是为解决问题服务的工具」这一主流观点。Jonathan Raban 是英国旅行文学作家。

这真是个相当复杂的类比。那么，下一个……那个可以叫做一次“被唤起回忆”的事件。很多类比都是这种唤起回忆的事件。我想马上说一点，那就是很多人以为类比是为了服务于某种目的而存在的。它们根本不是为了服务什么目的。它们就是发生了，仅此而已。没有目的。完全没有目的。它们就是发生了。当然，从某种意义上说，它们服务于进化，但大概也就只有这一个目的了。我想给你们讲一个几个月前我脑子里冒出来的类比。我当时在读我妈借给我的一本书，作者是乔纳森·拉班，书名我记不太清了，大概是《驶向美国》还是《发现美国》之类的，反正差不多。总之，他在第一章里正横渡大西洋。而我当时在飞机上，我从加州飞回印第安纳，我们第一段航程要飞到丹佛。

25:25

Flying on our first leg, we're going to Denver. And which is perhaps a United hub, I don't know. Anyway, we were we were going to Denver, and so, I was reading this first chapter in which he Jonathan Raban goes from England from Liverpool to somewhere in Canada, and he was in a boat called the Atlantic Conveyor, and the they he was very impressed by the size of this boat and thought that surely nothing could rock it, but the captain told him, "No, it's a you know, it's a boat is very vulnerable." And then what do you know, but they discovered a hurricane that was, you know, in their pathway, or it was actually coming up the Atlantic, and it was and it was going to be right in their way. And so, well, I mean, not very complicated thinking, but here's what they did. There's the Atlantic Conveyor, and there's Hurricane Helene, and I've drawn this a little bit off because I don't know if they went quite that far south, but I didn't want to put in time and

hub /hʌb/ *n.*

轮毂；（航空、活动的）枢纽、中心

丹佛大概是联合航空的枢纽吧，我也不确定。总之我们要飞去丹佛，然后我在读这第一章，乔纳森·拉班从英国利物浦出发，前往加拿大的某个地方。他坐的那条船叫“大西洋输送者号”，他对这条船的体量印象非常深刻，觉得肯定没什么能撼动它，但船长告诉他：“不，船是非常脆弱的。”然后你猜怎么着，他们发现有一场飓风正好在他们的航线上，其实它是沿着大西洋北上，正要挡在他们前面。所以，嗯，这也不是什么特别复杂的思路，但他们是这么做的。这边是“大西洋输送者号”，那边是飓风海伦，我画得有点不准，因为我不确定他们是不是真往南绕了那么远，而且我也没想把时间之类的都画进去。你们明白大意就行。

26:29

Everything. You get the basic idea here. I mean, the hurricane went up, and they went to the south, they deviated a little bit, and missed it, and then went up and then turned back up. Okay, so, I've just read this thing. Well, I've just, you know, I'm thinking about the Atlantic Ocean and this big hurricane, which was curiously enough called a Whirly Girl by the captain. And I'm thinking about this, you know, but I mean it's just part of the first chapter. It's not a major part of the first chapter. It's just something that happens. The first chapter is all about this trip across the Atlantic and so forth and so on. And then I get out at Denver. And I'm walking down the corridor and as one does in airports and here's a here's a picture of me and this is this is a woman with a suitcase.

飓风一路北上，他们往南走，稍微偏离了一点航线，避开了它，然后继续北上，再折回原来的方向。好，我刚读完这段。我当时脑子里想的就是大西洋和这场大飓风——有意思的是，船长管它叫“旋转小妞”。我在想这件事，但我是说，这只是第一章里的一小部分。它甚至不是第一章的重点。它只是顺带发生的一件事。整个第一章讲的都是这趟横渡大西洋的旅程等等等等。然后我在丹佛下了飞机。我走在廊桥通道里，就像人们在机场那样，然后……这边是我，这边是一位拉着行李箱的女士。

27:21

And she's crossing the corridor. And I was swerved a little bit to the left and all of a sudden bang I said, "Hey, I'm the boat. She's the hurricane or if you wish the whirly girl." And this corridor is the Atlantic Ocean. And you know, 2 seconds is 2 days or whatever it may be. and now I have to explain to you also this event inside my head happens so quickly and so fleetingly that I would not have even noticed it if I weren't kind of an inveterate observer of my own thinking. I mean I caught it, you know, it would have disappeared in a flash and it to have no to leave no effect on the world at all. But here it is leaving an effect on all of you now.

她正在横穿这条通道。然后我稍微往左边闪了一下，突然“砰”的一下，我心想：“嘿，我就是那条船。她就是那场飓风，或者你愿意的话，那个‘旋转小妞’。”而这条通道就是大西洋。你懂的，两秒钟就相当于两天什么的。另外我还得跟你们解释一下，我脑子里的这个事件发生得那么快、那么转瞬即逝，如果我不是一个顽固的自我思维观察者，我根本不会注意到它。我是说我把它抓住了，否则它一闪就消失了，对这个世界不会留下任何影响。但现在它却对在座的各位产生了影响。

书中场景：巨轮Atlantic

Conveyor向南绕行，避开沿大西洋北上的飓风Helene。这一「移动者避让移动者」的空间结构，成为下文机场类比的原材料。

机场走廊里，侯世达侧身避让横穿的拖箱女士，脑中闪过「我是船，她是飓风，走廊是大西洋，2秒相当于2天」。若非他是惯于观察自身思维的人，这个瞬间类比根本不会被记录下来。

swerved /swɜːrvd/ *v.*

突然转向，急拐

inveterate /ɪnˈvetərət/ *adj.*

根深蒂固的，惯常的

(inveterate observer 成癖的观察者)

28:13

My point is analogies happen all the time for no purpose. They're fleeting. They just they're transient. They just appear and go away. Okay? It just your mind is filled with them. now to get you know, the poster that was made used these two photographs which were taken at my parents' ranch back in the '80s I believe. Now various people may have thought various things about them and I'm just going to tell you what is here. The upper one is in the summer and there's this lovely oak tree that I know very well she's casting its shadow under the you know noonday sun more or less. The lower one is in the winter and there is no sun at all.

我想说的是，类比一直在发生，毫无目的。它们转瞬即逝。它们就是一闪而过的。它们出现，然后消失。好吗？你的头脑里塞满了这样的东西。接下来，那张海报用了这两张照片，是在我父母的农场拍的，我想是八十年代拍的。大家看了可能会有各种各样的联想，我就直接告诉你们这里是什么。上面那张是夏天拍的，有一棵可爱的橡树，我对它非常非常熟悉，它把自己的影子投在地上，大概是正午的太阳底下。下面那张是冬天拍的，完全没有太阳。

方法论启示：心智中随时充满转瞬即逝、毫无目的的类比，绝大多数从未进入意识。侯世达几十年坚持收集此类思维闪念和口误，作为研究认知的第一手数据。

fleeting /'fli:tɪŋ/ *adj.*
转瞬即逝的

transient /'trænzjənt/ *adj.*
短暂的，倏忽的

28:57

It's a cloudy day. What is that pat pattern that dark thing under? That is a snow shadow if you wish. That is the absence of snow. the snow has fallen but it didn't go through the tree. it got caught by the tree and so no snow was on the ground and that dark patch is the absence of snow. And it's a kind of a generalization of a shadow. I you know to me it was just a sort of a trivial connection but I it joined in many other kinds of shadows that I've thought about over the course of my life. I mean I know that in eastern Oregon and maybe other places there is what they call a rain shadow which is to the east of the Cascade Mountains for some hundred or two hundred or some miles there's a desert. In other words the Cascade Mountains basically stop the clouds from moving and so there's no rain to the east of the Cascades and that's called a rain shadow.

那是个阴天。树下那块深色的图案是什么？那是一个“雪影”，如果你愿意这么叫的话。那是雪的缺席。雪落下来了，但没能穿过树。它被树挡住了，所以地面上那块没有雪，那块深色的斑就是雪的缺席。这算是“影子”这个概念的一种推广。对我来说这只是一个挺平常的联想，但它加入了我这辈子想过的许多其他种类的影子。我知道在俄勒冈州东部，也许还有别的地方，有一种叫“雨影”的东西，就是在喀斯喀特山脉以东，绵延一两百英里都是沙漠。换句话说，喀斯喀特山脉基本上挡住了云的移动，所以喀斯喀特以东就不下雨，这就叫雨影。

「雪影」：雪被树冠拦住，树下无雪的深色地面是「雪的影子」——影子概念的推广。「雨影」（rain shadow）是真实地理学术语：喀斯喀特山脉拦截云雨，山脉以东形成沙漠。

rain shadow *phr.*
雨影区（山脉背风面的少雨干燥地带，地理学术语）

29:57

And there are all sorts of other kinds of shadows that I'm not going to go into. Shadow is a very common metaphor people being in the shadow of their parents or the in the shadow of World War II and so forth and so on. but I wanted to just make a curious little analogy that may be a new insight into the world which is that well firstly this idea that we're expanding the word shadow. We're expanding the word shadow. That in itself is part of what I wanted to tell you that by seeing new instances of shadow we're expanding our sense of what the word shadow means. This happens to be maybe my personal sense as opposed to a public sense but it mean it's no less valid. But I wanted to say that we could look at the picture of snow and maybe deduce something about light. We know that snow is made out of flakes and we might just guess that because there's an analogy between light and snow, maybe light is made out of flakes. It's kind of a crazy idea, but we'll call it the

核心机制：每见到shadow的新实例，shadow概念就被类比扩张一次；个人化的语义扩张与公共语义同样有效。顺势玩笑推出「光由雪花构成」的light flake假说——为结尾爱因斯坦一节埋下伏笔。

还有各种各样别的影子，我就不一一展开了。“影子”是个非常常见的隐喻——某人活在父母的阴影下，或者活在二战的阴影下，等等等等。但我想讲一个有点奇怪的小类比，它也许算是对世界的一种新洞见。首先是这么个想法：我们正在扩展“影子”这个词。我们在扩展“影子”这个词。这件事本身就是我想告诉你们的一部分——通过看到影子的新实例，我们在扩展自己对“影子”这个词含义的感觉。这也许只是我个人的语感，而不是公共的语感，但它并不因此就不那么有效。不过我想说的是，我们可以看着这张雪的照片，从中推出一点关于光的结论。我们知道雪是由雪片组成的，我们也许可以猜想：既然光和雪之间存在类比，那也许光也是由“片”组成的。这想法有点疯狂，但我们就叫它

31:04

Light flake hypothesis. I suppose it's it is a fairly light and flaky hypothesis. But Hofstadter 2005. Maybe we'll come back to that. another shadow. This is one of my favorites. and we'll stop shadows at that point. I was talking with a friend who's who's Italian and his brother is a professor at some university in northern Norway and I said, "Oh my god, it must be awfully cold up there." And he said, "No, actually it's pretty warm." And I said, "How can that be?" And he said, "Well, you know, the Gulf Stream the Gulf Stream is warm." And I said, "Yeah, but you know, it's very far north." He said, "Yeah, but it goes north." And I said, "But he's he says that the interesting thing is that it where it's cold is southern Norway." And I said, "How is that?" He said, "Because the Gulf Stream is blocked by England."

“光片假说”吧。我想这确实是个相当轻飘飘、不太靠谱的假说。不过嘛，侯世达，2005 年。也许我们回头再说这个。再讲一个影子。这是我最喜欢的一个。讲完这个我们就不讲影子了。我当时在跟一个意大利朋友聊天，他哥哥在挪威北部的某所大学当教授。我说：“天哪，那边一定冷得要命。”他说：“不，其实那儿挺暖和的。”我说：“这怎么可能？”他说：“你知道的，墨西哥湾流嘛，墨西哥湾流是暖的。”我说：“是啊，可那地方非常靠北啊。”他说……“是啊，可它是往北流的。”然后我说：“可是呃，他说有意思的地方在于，冷的地方是——”“——挪威南部。”我说：“怎么会这样？”他说：“因为墨西哥湾流被英国挡住了。”

31:58

And so I had this picture in my mind. There's I don't know if you can see the Gulf Stream which is supposed to be red here and it gets blocked by England. And so the shadow of England is on the coast of southern Norway and the Gulf Stream hits the up upper part of Norway. So we have a shadow thrown by England of the of the of the Gulf Stream. So it's again a wonderful abstraction of shadow. This is the kind of thing that analogy does to our concepts. Now, so here is just you know, this simple idea that repeated analogies expand concepts.

于是我脑子里就有了这么一幅画面。这里有——我不知道你们能不能看见墨西哥湾流，本来应该是红色的这条，呃，然后它被英国挡住了。所以英国的影子就落在挪威南部的海岸上，而墨西哥湾流打在挪威更靠北的部分。所以我们就有了英国投下的一个影子，呃，是墨西哥湾流的影子。所以这又是一次对“影子”这个概念的绝妙抽象。这就是类比对我们的概念所做的事情。那么，这里就是呃，你们知道的，这个简单的想法：反复的类比会扩展概念。

湾流（墨西哥湾暖流）北上使挪威北部反而温暖，南部较冷——因为暖流被英格兰「挡住」，英格兰在挪威南岸投下一道「湾流之影」。shadow概念再一次被抽象化。

06 概念因类比而不断扩张

32:38

I've taken as an the concept of number here and I'm not going to go into it in any detail. I just simply want to say that anybody who's done any math knows that we begin with the positive integers. We learn to count, then we learn about things like a half and a quarter and so forth and eventually we learn about zero and the negative numbers and then after many and all of these are analogies. These are all generalizations that are made through analogy. And as we as we progress and go further and further, we get more and more abstract and so I've indicated some things here e and π and e to the $i\pi$ and aleph sub omega, different kinds of infinities and I could include matrices in there and on and on.

呃，我这里拿“数”这个概念当例子，我不打算讲得多细，我只是想说，任何学过一点数学的人都知道，我们是从正整数开始的。我们先学数数，然后学到二分之一、四分之一之类的东西，最后学到零和负数，再往后还有很多——而所有这些都是在类比。这些全都是通过类比做出的推广。随着我们不断往前走、走得越来越远，我们就变得越来越抽象。所以我在这里列了一些东西： e 、 π 、 e 的 $i\pi$ 次方、阿列夫下标 ω ，各种不同类型的无穷，我还可以把矩阵放进去，等等等等。

数系的扩张史就是类比史：正整数→分数→零与负数→ e 、 π 、复数（ $e^{i\pi}$ ）→阿列夫数（不同大小的无穷）→矩阵。每一步推广都由类比驱动，概念在个人与文化两个层面终生扩张。

integers /ˈɪntɪdʒəz/ *n.*

整数

33:23

And so we have all sorts of numbers and they could keep on going. concepts expand over our lifetime and they expand for each one of us and they expand for our culture. one of the key points that I want to make here though is that although concepts expand by seeing new instances, sometimes we have a concept that has only got one instance. But even there, it starts to spread and leak. So let's talk about that a little bit. The basic idea here is there is no fundamental difference between a single memory trace and a category by which I mean a concept. No difference category concept, same thing.

所以我们有各式各样的数，而且还可以一直增加下去。呃，概念会在我们一生当中不断扩展，对我们每个人都在扩展，对我们的文化也在扩展。呃，不过我想在这里讲的一个关键点是：虽然概念是通过看到新的实例而扩展的，但有时候我们有一个概念只有一个实例。可即便如此，它也会开始蔓延、渗漏。我们来稍微谈谈这个。这里的基本想法是：单个记忆痕迹和一个范畴之间没有本质区别——我说的范畴指的就是概念。没有区别，范畴、概念，是一回事。

本讲最重要的命题之一：单条记忆痕迹（memory trace）与范畴（即概念）之间没有本质区别。哪怕只有一个实例的概念，也会开始「扩散渗漏」。

34:06

Okay, that's a very important idea of this talk and I'm just going to give you thing I call pluralization. So I'll read these out loud because I think that they're amusing. So there may be two or three young Einsteins among us tonight. Okay, what is a young Einstein? That's a pluralization of Einstein. Clearly, Milton Babbitt is no Mozart. If you happen to know Milton Babbitt is. If another Chopin was born in Lompoc, what would happen? it's the next Catcher in the Rye or the Soviet Union's Vietnam, the Paris of the Middle East, which was once the name of Beirut.

好，这是这次演讲一个非常重要的想法。我接下来要给你们看呢，一个我称之为“复数化”的东西。我会把这些念出来，因为我觉得它们挺有意思的。比如：今晚我们当中可能有两三个年轻的爱因斯坦。好，什么叫“一个年轻的爱因斯坦”？这显然是把爱因斯坦复数化了。米尔顿·巴比特可算不上什么莫扎特。——如果你正好知道米尔顿·巴比特是谁的话。如果又一个肖邦出生在隆波克，会发生什么？呃，“这是下一部《麦田里的守望者》”，或者“苏联的越南”，“中东的巴黎”——这曾经是贝鲁特的称号。

34:44

Some place can be Actually, I once heard Jerusalem being described as a Mecca for tourists.

呃，某个地方可以是——其实我有一次听人说耶路撒冷是“游客的麦加”。

34:55

A bunch of treacherous quislings. notice I've gone to the lower case here. Mecca with lower case, even though it comes from originally one thing, it's it gets pluralized. And Quisling was a Norwegian foreign minister or prime minister or something who I think collaborated with the Nazis. I don't remember the details. But it became a lower case word for basically a traitor. and then Galileo I don't know the details of this, but I have to assume that it was Galileo who actually used the word luna in the plural and with a lower case m.

“一群叛国的吉斯林。”呃，注意我这里用的是小写。呃，麦加（Mecca）用小写，虽然它原本指的是一个特定的地方，但它被复数化了。吉斯林是挪威的一位外交部长还是首相什么的，我记得他跟纳粹合作过。细节我记不清了。细节。但这个词变成了小写的普通词，基本上就是“叛徒”的意思。呃，还有伽利略——这个的细节我不清楚，但我猜想应该就是伽利略最早把 luna（月亮）这个词用作复数，而且用了小写字母。

「复数化」举例：young

Einsteins（在座的小爱因斯坦们）；Milton Babbitt是美国序列主义作曲家，「不是莫扎特」；「苏联的越南」指阿富汗战争；「中东的巴黎」是贝鲁特的旧称。

pluralization /ˌplʊərəlɪˈzeɪʃn/ *n.*

复数化（本讲术语：单一实体扩张为范畴）

Quisling原是二战期间与纳粹合作的挪威傀儡政府首脑Vidkun Quisling的姓氏，如今小写化为「卖国贼」的通用名词；Mecca（麦加）也小写化为「胜地」——专名变普通名词是复数化的极致。

treacherous /ˈtreɪʃərəs/ *adj.*

背信弃义的；暗藏危险的

quislings /ˈkwɪzliŋz/ *n.*

卖国贼，通敌者（源自挪威通敌者Quisling的姓氏）

35:35

In other words, talking about what he saw, he equated our moon with those things, those dots that he saw through his telescope, and called those moons. That was an a magnificent leap that pluralized something that nobody had ever considered to be other than one unique thing in the world. So, pluralization is a way in which a single entity becomes a wide category. And there really is no difference between a single entity and a category. Okay. so, I guess I'm just saying this again.

伽利略1610年用望远镜发现木星的卫星，把它们与「我们的月亮」等同并以复数、小写称为moons——把宇宙中被视为独一无二之物复数化，是概念史上的伟大一跃。

呃，换句话说，在谈论他所看到的東西時，他把我們的月亮和那些東西等同起來——就是他透過望遠鏡看到的那些小點，並把它們叫做“衛星（moons）”。這是一次了不起的飛躍，把一個從來沒人認為它不是世上独一无二之物的東西復數化了。所以，復數化是單個實體變成一個寬泛範疇的一種方式。而單個實體和範疇之間其實並沒有區別。好。呃，我想我又要把這一點說一遍。

07 组块：概念的层级嵌套

36:15

There's a no fundamental difference between seeing something as a category member and seeing something as analogous to something else. In one case, something evokes a concept which has one instance, and another case, something that evokes a concept which has many instances and which has blurred together. now, we come to another very special thing about human minds. Our minds are constructed Oh, this is no not new to anybody. That with a an unlimited quality for chunking. By that, what I mean is that primordial concepts in some interrelationship become a larger unit, a larger conceptual unit like, you know, a family or something like that. And then, a family can get incorporated into something larger. And we build our concepts by taking several concepts, putting them together, putting a membrane around them, and then, sort of miraculously, the internal components sort of disappear. And we're left with just this new concept, which is kind of like a black box. We don't think

chunking (组块): 多个概念组合、包上一层「膜」形成新概念, 内部构件随即像黑箱一样隐形。组块是认知心理学经典概念, 侯世达强调人类的组块能力没有上限, 可无限叠加层级。

primordial /praɪ'mɔːrdiəl/ *adj.*
原初的, 最初形成的

chunking /ˈtʃʌŋkɪŋ/ *n.*
组块 (认知心理学术语: 把多个单元打包成一个整体)

membrane /ˈmembrem/ *n.*
膜 (此处比喻概念的外包裹层)

把某个东西看成是一个范畴的成员, 和把某个东西看成是与另一个东西类似, 这两者之间没有本质区别。在一种情况下, 某个东西唤起了一个只有一个实例的概念; 在另一种情况下, 某个东西唤起的概念有很多实例, 而这些实例已经模糊地融合在一起了。呃, 现在我们要讲人类心智另一个非常特别的地方。我们的心智被构造成——哦, 这对谁来说都不新鲜——具有无限的“组块化”能力。我的意思是, 一些原始的概念在某种相互关系中结合起来, 成为一个更大的单元、一个更大的概念单元, 比如说“家庭”之类的东西。然后, 家庭又可以被并入更大的东西里。我们建构概念的方式, 就是把好几个概念拿来, 把它们放在一起, 在外面套上一层膜, 然后, 某种奇迹般地, 里面的组成部分就消失了。我们剩下的就只是这个新概念, 它有点像一个黑箱。我们不太会去想里面那些东西, 它们变得半可见。

37:23

It's so much about the these things become semi-visible. They're sort of lurking in the background. But, if it's structured at many levels of a hierarchy, the concepts inside the concepts inside the concepts are certainly just about invisible, and it really takes some unpacking to get there. So, as we build up concepts, they get hierarchically larger and larger and larger and more and more complex. And I wanted to just give you one example that I thought was really very interesting. And I haven't even touched scratched the surface of this one, but I but take a look at it anyway. Take a look at this.

它们只是隐隐潜伏在背景里。但是，如果它是分好多层级构建起来的，那么概念里面的概念里面的概念就几乎完全不可见了，真得费一番功夫拆解才能看到。所以，嗯，随着我们不断建构概念，它们在层级上越来越大、越来越大、越来越复杂。我想给你们举一个我觉得非常有意思的例子。这个例子我连皮毛都还没碰到，但还是请你们看一看。看看这个。

38:00

This is the notion of a hub for an airlines. I mean, it's just an attempt to show you how we begin with concepts that we acquire when we're very, very young. And I've put here things like ball goes to roll, roll to wheel, wheel gives you spokes and hub, and gives you the notion of centrality. I'm not saying these arrows are not necessarily analogy arrows. These arrows sort of represent the idea that this thing is sort of part of that concept. It's sort of gotten incorporated, a glommed into that concept. They're not precisely I'm not I don't have time to spell it out, but I want you to see this as a series of higher concepts that are glomming together lower ones. These are the lower ones at the top.

这是航空公司的“枢纽（hub）”这个概念。我的意思是，这只是想向你们展示，我们是怎么从很小很小的时候获得的概念出发的。我在这里放了这样一些东西：球通向滚动，滚动通向轮子，轮子给你辐条和轮毂，也给你“中心性”这个概念。我并不是说这些箭头都是类比箭头。这些箭头大致表示“这个东西算是那个概念的一部分”，被并入、被黏合进了那个概念里。它们并不精确——我没时间细讲，但我想让你们把它看成一系列更高层的概念把低层的概念黏合起来。低层的在最上面。

lurking /'lɜːrkiŋ/ v.

潜伏，隐藏在暗处

「航空枢纽（hub）」的概念谱系：球→滚动→轮子→辐条与轮毂→中心性；自行车→汽车→飞机→客机→航空公司……一个hub竟需要几十个从幼年习得的底层概念层层组装。

spokes /spəʊks/ n.

（车轮的）辐条

glommed /glɑːmd/ v.

黏附并入（glom into，美式俚语）

38:46

Excuse for that reversal of directions, but it Anyway, so bike is a vehicle, a bike has wheels, car is a vehicle, a bus is a vehicle, vehicle another type of vehicle is a plane, then that a plane can lead you to an airliner, a bus is kind of like an airliner, airliner leads you to the most more abstract notion of an airline. Then we have names, which we learn when we're very small. Names suggest that there are things that come in different types, then we learn about brands, then we learn about companies, and airline is a particular type of company.

抱歉方向反了，不过——总之，自行车是一种交通工具，自行车有轮子，汽车是交通工具，公共汽车是交通工具，另一种交通工具是飞机，飞机又引出客机，公共汽车有点像客机，客机又引出更抽象的“航空公司”这个概念。然后我们有“名字”，这是我们很小的时候就学会的。名字暗示东西是分不同类型的，接着我们学到品牌，再学到公司，而航空公司是一种特定类型的公司。

39:23

Moving, then we have the idea of a trip, and then a trip can be broken up into legs, and legs can be sort of formalized into routes. And that's attached to airline. It's also attached to a network, time, appointment, timetable, chart, network, and then this notion is abstract notion of network goes to node, and then we have to get gets, and that's something pretty primordial. Get, and then when we're very small, we also learn about buy. Please buy me, you know, money we learn about, and then later we learn about economizing and saving money, and then we learn about sort of downsizing and how companies have to downsize.

downsizing /ˈdaʊnsaɪzɪŋ/ *n.*

(公司) 裁员缩编

再往下，我们有“旅程”这个想法，旅程可以拆成一段一段的航段，航段又可以正式化为“航线”。这又连到航空公司。它也连到网络、时间、约定、时刻表、图表、网络，然后“网络”这个抽象概念又通向“节点”，然后我们得到“拿到、获得”，这是相当原始的东西。“获得”——而且我们很小的时候还会学到“买”。“求你给我买——”，我们学到钱，后来我们学到精打细算、省钱，再后来我们学到“缩编”，学到公司必须裁员缩编。

40:01

By the way, notice I didn't even put I forgot the whole notion of city and the whole notion of airport. I didn't even put that here. I mean, just imagine all the concepts here that are that are all required to go into the concept of hub. And yet, when we say, you know, Denver is United hub, do you think about all this stuff? It's you don't think at all. I mean it's you know this as a chunked concept. And so that's a very important part of how we think. so I another point is that there is no fundamental difference though between thinking with very basic concepts and thinking with these very large concepts because the very large concepts become as familiar and we don't see inside them.

顺便说一句，注意我甚至没放进去——我漏掉了“城市”这个概念，还有“机场”这个概念。我根本没有把它们放在这里。你想想看，要构成“枢纽”这个概念，这里需要多少概念。然而，当我们说“丹佛是联合航空的枢纽”时，你会想到所有这些东西吗？完全不会去想。我的意思是，你是把它当作一个组块化的概念来理解的。呃，所以这是我们思考方式中非常重要的一部分。呃，另一点是：用非常非常基本的概念思考和用这些非常庞大的概念思考，两者之间并没有本质区别，因为那些庞大的概念会变得同样熟悉，我们看不到它们内部。

反直觉之处：说「丹佛是联合航空的枢纽」时没有人会想到这几十层结构——概念一经组块，再复杂也变得和「球」「滚」一样使用起来毫不费力。这正是人类思维的关键特性。

40:43

We don't deal with all the stuff that's inside them. so some of the primordial concepts are these and some of the more sophisticated concepts are a soap opera, hub, sleazeball, wilderness protection legislation or scientific break even for laser fusion. complicated things. But if you're familiar with them, they're just a very ordinary. They're as familiar as the back of your hand. I thought I'd illustrate some rather complex concepts just for my amusement and yours to show you how amazing our human conceptual system is. so indulge me with my reading this slide out loud. I'll go down vertically. So we have the solar system, the concept of a slam dunk, a beltway, plagiarism, Jazzercise, laissez-faire economics, ethnic cleansing, the domino theory of condense of communism the next line, Bose-Einstein condensation or Bose-Einstein the Wikipedia.

我们不会去处理它们里面装着的所有东西。呃，所以有些原始概念是这些，而一些更复杂的概念是：肥皂剧、枢纽、下三滥、荒野保护立法，或者激光聚变的科学能量得失相当。嗯，都是复杂的东西。但如果你熟悉它们，它们就再平常不过了。它们熟悉得就像你自己的手背。我想举一些相当复杂的概念，纯粹为了我自己和你们的乐趣，向你们展示我们人类的概念系统有多么惊人。嗯，那就请容我把这张幻灯片念出来。我竖着往下念。我们有太阳系、“灌篮”这个概念、环城高速、剽窃、爵士健身操、自由放任经济学、种族清洗、共产主义的多米诺骨牌理论，下一行，玻色-爱因斯坦凝聚，或者玻色-爱因斯坦——维基百科。

复杂概念清单的用意：肥皂剧、灌篮、环城公路、剽窃、自由放任经济、种族清洗、多米诺理论、玻色-爱因斯坦凝聚——只要熟悉，它们都成为「像手背一样熟」的单个思维单元。

sleazeball /'sli:zbɔ:l/ *n.*

卑鄙下流的人（俚语）

laissez-faire /,leseɪ 'fer/ *adj.*

自由放任的（源自法语，laissez-faire economics 自由放任经济）

plagiarism /'pleɪdʒərɪzəm/ *n.*

剽窃，抄袭

beltway /'beltweɪ/ *n.*

环城公路（the Beltway 常代指华盛顿政治圈）

slam dunk /slæm 'dʌŋk/ *n.*

灌篮；（引申）十拿九稳的事

41:45

Now I want you to think to yourself how many levels of structure to explain the Wikipedia would you have to you know if you were to try to explain that to somebody from 2,000 years ago, what would you have to tell them in order to get across the idea of the Wikipedia? I mean you have to explain computers and networks and the web and an encyclopedia and publishing and who knows what all. Okay. dot bubble, spam. This is another It's hard enough to understand what a Republican and a Democrat are. That's a very complex concept. Gas war, the Final Four, Y2K, the genetic code, quantum cryptography, a baby boomer, chick flick, WASP, the Fed. I have no idea what the Fed is. I have no concept.

现在我想请你们自己想一想，要解释维基百科需要多少层结构？如果你要向一个两千年前的人解释这个，你得告诉他们些什么，才能让他们明白维基百科是什么？呃，我是说，你得解释计算机、网络、万维网、百科全书、出版，还有天知道多少东西。呃，好。互联网泡沫、垃圾邮件。这是另一个——光是理解“共和党人”和“民主党人”是什么就已经够难了。那是一个非常复杂的概念。价格战、四强赛、千年虫、遗传密码、量子密码学、婴儿潮一代、少女片、WASP（白人盎格鲁-撒克逊新教徒）、美联储。我完全不知道美联储是什么，我对它没有概念。

42:40

A gravitino, I also have no concept of that. I know it's supposed to be sort of some sort of super symmetric partner to the graviton. pork belly futures, that's a great one. Phishing with a cat with a ph. Radar trap, affirmative action, grocery store checkout stand, presidential lecture, and wacky walk. These are concepts that we deal with very easily, very fluently, and they are so far removed from the concept network that an ant might have, or that a mouse might have, or that a dog might have, or that a four-year-old might have, or that even a 12-year-old might have. So, you have to think how many levels there are.

引力微子，我对这个也没有概念。我知道它应该是引力子的某种超对称伙伴。引力子。呃，猪腩期货，这个很棒。用 ph 拼写的 Phishing（网络钓鱼）。雷达测速陷阱、平权行动、杂货店收银台、总统讲座，还有搞怪走路。这些概念我们处理起来非常轻松、非常流畅，而它们离一只蚂蚁可能拥有的概念网络实在太远了——离一只老鼠、一条狗、一个四岁小孩，甚至一个十二岁孩子可能拥有的概念网络都太远了。所以你得想想这里有多少层。

思想实验：向2000年前的人解释 Wikipedia需要多少层铺垫？计算机、网络、万维网、百科全书、出版……直观展示概念的层级深度。the Fed指美国联邦储备系统（美联储）。

chick flick /ˈtʃɪk flɪk/ *n.*

面向女性观众的爱情轻喜剧（俚语）

人类概念网络与蚂蚁、老鼠、狗乃至4岁儿童的差距在于层级数量。gravitino（引力微子）是引力子的假想超对称伙伴粒子；pork belly futures（猪腩期货）曾是芝加哥商品交易所的著名品种。

phishing /ˈfɪʃɪŋ/ *n.*

网络钓鱼诈骗（fishing 的变体拼写）

affirmative action *phr.*

平权行动（美国照顾少数群体的政策）

pork belly futures *phr.*

猪腩期货（芝加哥商品交易所著名品种）

43:24

Now, we're talking about concepts at many, many levels. primordial words, simple words, some compound words, phrases, proverbs. I'm going to come to this. I'm going to sort of illustrate these. and then and then a lot of our concepts are totally unlabeled. Like, for example, my concept, whatever it was, of what happened to me when my dad told me they don't do anything. They're just names of variables. That was stored in my brain, and it was waiting there to be triggered by some event in the future.

现在，我们谈的是许许多多层级上的概念。呃，原始的词、简单的词、一些复合词、短语、谚语。我等会儿会讲到这些，我会举例说明。呃，然后——我们还有很多概念是完全没有名称的。比如说，我那个概念，不管它是什么，就是当我爸爸告诉我下标什么也不是、它们只是变量的名字时，我心里发生的那件事。那被存在我的大脑里，等在那儿，等着将来某个事件把它触发。

关键补充：大量概念完全没有语言标签。「被父亲告知下标不做任何事的那次失望」作为无名概念在脑中存放40年，静静等待被某个同构事件触发。

44:01

What was the event? Monica on the floor with the Dustbuster. I mean, and you know, that was a concept. It didn't have a name. There's no name for Doug being disillusioned by his father about subscripts not being analogous to superscripts in mathematics. I mean that was a thing in my brain. It was a node. It was there in some sense or I don't know if node is the right word, but it was there. It was retrievable under the right circumstances. It shared essence. I hope you will agree with me there. It shared essence with Monica's disillusionment.

那个事件是什么？是莫妮卡趴在地上拿着吸尘器。我是说，呃，你知道，那就是一个概念。它没有名字。“道格因为父亲点破数学中下标和上标并不类似而幻灭”——这件事没有名字。我的意思是，那是我脑子里的一个东西。它是一个节点。它在某种意义上就在那儿——我不知道“节点”是不是合适的词，但它就在那儿。在合适的情境下它是可以被提取出来的。它共享某种本质。我希望你们在这一点上会同意我。它和莫妮卡的幻灭共享同样的本质。

无名概念同样「可检索」：
Monica的失望与它共享本质（shared essence），因此瞬间将其唤醒。这说明记忆检索本身就是一次类比匹配——检索即类比。

08 词语皆范畴，情境唤起词语

44:38

Now, then so we have a lot of different kinds of things. I'm going to talk about these other things, me toos in particular and scientific leaps. I want to go through this a little bit talking about how analogy making retrieves one thing at each of these levels. I'm not going to go through them all. But I just want to, you know, name some primordial concepts. I won't read these out loud, but notice by the way in this list that I am not favoring nouns. I want you to understand that when I talk about categories, I do not think that categories are always visual things like you know, overhead projector or shoe or you know, even audience.

那么，我们有很多不同种类的东西。我接下来要讲这些别的东西，比如“我也是”式的——特定的科学飞跃。我想稍微讲一讲，类比是如何在这些层级中检索到每一层各取一个例子。我不会把它们全部讲一遍。但我只是想，你知道，列举一些最原始的概念。我不会把它们念出来，但顺便请注意，在这个清单里我并没有偏向名词。我希望你们明白，当我谈论范畴的时候，我并不认为范畴总是视觉性的东西，比如说投影仪、鞋子，或者甚至是听众。

45:21

Categories can be things like as I said, please. Please. What that means is there are certain circumstances where that word is evoked. The circumstance evokes that mental concept. It's a please circumstance. There are certain circumstances. If I said please to you now, it wouldn't make any sense. Makes no sense at all. But if I, you know, if I'm a little 3-year-old and I want something and I say please, it makes sense. There are certain circumstances where it is appropriate. And I'm trying to point out here that words of all sorts, whether they're adverbs or prepositions or pronouns or verbs or nouns, they are all categories and they're all equally good and most of them are not visual.

范畴也可以是我刚才说的那种，比如 please（请）。please。这意味着，在某些特定的情境下，这个词会被唤起。是情境唤起了那个心理概念。那是一个「please 情境」。确实存在某些情境。如果我现在对你们说 please，那毫无意义。完全说不通。但如果我，你知道，如果我是个三岁的小孩，我想要什么东西，然后我说 please，那就说得通了。确实存在某些恰当的情境。我在这里想指出的是，各种各样的词，无论是副词、介词、代词、动词还是名词，它们都是范畴，而且都同样有资格，而其中大多数并不是视觉性的。

「please」也是范畴：它由特定情境唤起（幼儿想要东西时的恳求情境）。副词、介词、代词、动词与名词一样都是范畴，且大多数范畴并非视觉性的。

evoked /ɪˈvəʊkt/ v.

唤起，激起（记忆、概念、情感）

46:06

Most of them a lot of them are not sensory whatsoever. And theories of categorization mostly are involved with visual categories, visual objects. It's so mistaken. That is not where the action is. And one of my colleagues who I respect very greatly said that he thought that categorization at this kind of level was very straightforward. It's just a matter of feature detectors. And I think, "Oh my goodness, what we are not on from the same planet." I don't think categorization at that level is anything to do with feature detectors. I mean maybe they play a little role, but it's not it's really That's another thing. That's for tomorrow. That's not for today.

它们中的大多数——很多——根本就不涉及任何感官。而关于范畴化的理论，大多都在处理视觉范畴、视觉对象。这太错了。真正的关键根本不在那里。我有一位我非常敬重的同事说，他认为这种层面上的范畴化非常非常直截了当。无非就是特征检测器的问题。我心想：「我的天哪，我们简直不在同一个星球上。」我不认为那个层面上的范畴化跟特征检测器有什么关系。嗯，我是说，它们也许起一点作用，但那真的不是……那是另一回事了。那是明天的话题，不是今天的。

46:50

Okay, simple concepts. Be you know, those are primordial. Here are some, you know, they're getting a little more sophisticated. Chair, I remember there was an exhibit of chairs at the San Francisco International Airport some years ago. Wonderful exhibit of crazy chairs. And then I got books of chairs. You can buy books of thousands of different kinds of chairs and the variety is mind-boggling. The same for the letter A. And tell me the tell me the features of a mess. If we're talking about visual categories, what are the features of a mess? I would like to know which neurons, which feature detectors in my brain fire when I see a mess.

好，简单概念。嗯，你知道，那些是最原始的。这里还有一些，稍微复杂一点了。椅子——我记得几年前旧金山国际机场有过一个椅子展览。一个精彩的、全是稀奇古怪椅子的展览。后来我还买了关于椅子的书。你可以买到收录成千上万种不同椅子的书，那种多样性简直让人瞠目结舌。字母A也一样。那你告诉我，告诉我，嗯，「一团乱」的特征是什么？如果我们谈的是视觉范畴，那「一团乱」的特征是什么？我很想知道，当我看到一团乱的时候，我脑子里是哪些神经元、哪些特征检测器在放电。

对主流理论的批评：范畴化研究大多只处理视觉物体、依赖「特征检测器」(feature detectors)解释。侯世达认为这完全找错了方向——「我们不是同一个星球的人」。

挑战特征论的反例：椅子的形态千奇百怪（旧金山机场的怪椅展）；字母A的变体无穷；「一团糟」(mess)有什么视觉特征？大脑里哪个神经元专门负责检测「糟」？

mind-boggling /'maɪndˌbɔːɡlɪŋ/
adj.

多到或复杂到难以想象的

47:30

What about the feature detectors for the word probably or for probably situations? And how about for probably which we say sometimes and other times we don't. What are the probably situations as opposed to the probably situations? And it's a subtle distinction. Come on. I mean well My point is here. With a word like well, I don't know what part of speech that is. It might be an interjection or a I think it's something like an interjection. Maybe it's an adverb. It's a little blurry what it is. But that's not my point.

interjection /ˌɪntərˈdʒekʃn/ *n.*
感叹词（语法术语）

呃，那 probably 这个词的特征检测器呢？或者说「probably 情境」的特征检测器呢？那 probably——我们有时候会这么说，有时候不说——又该怎么办？「probably 情境」跟「probably 情境」到底有什么不同？这是个很微妙的区别。拜托。我是说 well……我的意思是，像 well 这样的词，我都不知道它算哪种词性。它可能是感叹词，或者我觉得它类似感叹词。也许是副词。它到底是什么有点模糊。但那不是我的重点。

48:04

My point is that these words that have nothing to do with visual categories, visual objects, these are evoked by circumstances. There are well situations and you know how to use them. And if you saw a well in an essay written by a foreigner and or in an email written by a foreigner, you'd say, "Ah, they don't know how to use it right." Or they would put some other word in there. They should have put in well. You know, you know where the word well goes if you're a native speaker of English because there are well dot situations. And the same for high, kind of, but anyway, no kidding, and so forth and so on.

「well」的用法只能由情境定义：母语者一眼就能看出外国人在邮件里把well放错了位置。所谓语感，就是海量「well情境」类比经验的沉淀。

呃，我的重点是，这些跟视觉范畴、视觉对象毫无关系的词，是由情境唤起的。存在着「well情境」，而你知道该怎么用它们。如果你在一个外国人写的文章里，或者外国人写的邮件里看到一个 well，你会说：「啊，他们没用对。」或者他们会在那里放上别的词，而其实应该放 well。你知道，如果你是英语母语者，你就知道 well这个词该放在哪里，因为确实存在「well……」这样的情境。high 也一样，还有 kind of、but anyway、no kidding，等等等等。

48:43

Compound words. getting a little bit more complicated. Again, I'm not going to read you this list, but just giving you a sense of compound words that are typical that we use all the time. some of them have two components, some of them three, four, five, six. It's a little blurry. It doesn't matter. they get bigger and bigger and bigger and they sort of know no limit. phrases. so let me just give you a few phrases that I happen to think of today at random. We all know these and I'm not going to read them out loud. There but for the grace of God go I. Pretty please with sugar on top. I think that's a nice one. Been there, done that. well, I can't help but read well, excuse me.

嗯，复合词。呃，稍微再复杂一点。同样，我不会把这个清单念给你们听，只是让你们感受一下我们天天在用的那些典型复合词。呃，有些由两个成分组成，有些三个、四个、五个、六个。这有点模糊。不过没关系。呃，它们可以越来越长，长到几乎没有上限。呃，短语。呃，那么，我随便举几个今天碰巧想到的短语。这些我们都知道，我就不念出来了。「若非上帝恩典，我也会落到那步田地。」「求求你了，再加个糖。」我觉得这个挺不错。「那事儿我早经历了。」呃，well，我忍不住又念了 well，抱歉。

There but for the grace of God go I *phr.*

若非上帝恩典，遭殃的就是我
(感慨自己侥幸逃过他人的不幸)

49:27

Put your money where your mouth is. blah. That's for sure. And those these are evoked by situations. These are categories. These are categories. And I want you to understand that all these things are mental categories. And how do we judge whether the category make the situation that we're facing is a member of this category? Guess. Analogy. Proverbs. Okay, so I've listed a few proverbs random. What's sauce for the goose is sauce for the gander. I don't say that one very often, but I do say speaking of the devil all the time. Damned if I do and damned if I don't. I say that all the time. Go directly to jail.

呃，「光说不练不算数。」呃，「blah blah blah。」「那是肯定的。」这些都是由情境唤起的。它们都是范畴。它们都是范畴。我希望你们明白，所有这些东西都是心理范畴。嗯，那我们怎么判断我们面对的这个情境是不是属于这个范畴呢？猜猜看。靠类比。谚语。好，我随便列了几条谚语。「适用于母鹅的酱汁也适用于公鹅。」这句我不太常说，但「说曹操曹操到」我倒是天天说。「怎么做都不对，横竖都挨骂。」这句我也天天说。「直接进监狱。」

Put your money where your mouth is *phr.*

拿行动（或钱）证明你说的话，
别光说不练

speaking of the devil *phr.*

说曹操，曹操到

50:16

Do not pass go. Do not collect \$200. I don't I called that a proverb, but you know, it's maybe it's not exactly a proverb. maybe I miscategorized that. Maybe I made a bad analogy here. it's all Greek to me. Back to square one. We'll cross that bridge when we come to it and so forth and so on. Okay, I got some of these ideas. In fact, I was deeply influenced by an article that I read in around 1975 by Joe Becker, who's here tonight, called the phrasal lexicon. And Joe pointed out that what we have in our head is far, far richer than a set of words when we talk about our mental lexicon. And I can't possibly do justice to his delightful and stimulating article. I mean, very inspiring article. and one of his principles was that the article should apply to itself. And he took a lot of the idioms that he used throughout the article and talked about them and listed them in his lists.

不得经过起点，不得领取 200 美元。」我把它叫作谚语，不过，你知道，也许它并不完全算谚语。呃，也许我归错类了。也许我在这里做了个糟糕的类比。呃，「这对我来说完全像天书。」「回到原点。」「船到桥头自然直。」等等等等。好，呃，我这些想法有些是从别处来的。事实上，我深受一篇文章的影响，那是我大约 1975 年读到的，作者是乔·贝克尔（Joe Becker），他今晚也在场，文章叫《短语词库》（the phrasal lexicon）。乔指出，当我们谈论心理词库时，我们头脑里装的东西远比一堆词丰富得多。我实在没办法充分转述他那篇令人愉快又极富启发的文章。我是说，非常非常有启发性的文章。嗯，他的原则之一是这篇文章应当适用于它自身。于是他把自己在文章里用到的许多习语挑出来，加以讨论，并列进他的清单里。

Joe Becker 1975年的论文《The Phrasal Lexicon》（短语词库）提出：心理词库远不止单词，还包括海量成语与套语。该文奉行「自我适用」原则——通篇使用并逐条分析自己讨论的习语。

it's all Greek to me *phr.*
完全看不懂，一窍不通

Back to square one *phr.*
退回起点，前功尽弃从头再来

do justice to *phr.*
公正对待；充分展现...的价值
（常用否定：can't do justice to）

51:11

I've always followed that example. but proverbs, this is something that Roger Schank pointed out. Proverbs are situation labels. We use them to We In fact, sometimes proverbs are boiled down into just a single word like sour grapes. I know that sounds like two words, but I see it with a hyphen. sour grapes. You know, somebody's didn't get a job that they said they wanted and then they said, "Oh, it probably wasn't wouldn't have been interesting to live in, you know, in Edmonton, Alberta." Or whatever that Is it Alberta?

我一直都在效仿这个做法。嗯，不过说到谚语，这一点是罗杰·尚克（Roger Schank）指出的。谚语是情境的标签。我们用它们来……我们事实上，有时候谚语会被浓缩成一个词，比如「酸葡萄」。我知道听上去像是两个词，但我心里是把它看成带连字符的一个词。嗯，呃，酸葡萄。你知道，某人没得到一份他说自己想要的工作，然后他就说：「哦，住在那种地方大概也没什么意思，你知道，比如阿尔伯塔省的埃德蒙顿。」或者随便哪儿——那是阿尔伯塔省吧？

Roger Schank（案例推理与脚本理论的代表人物）指出：谚语是「情境标签」。「酸葡萄」（源自伊索寓言）就是被压缩成一个词的谚语——落选后贬低目标即触发这个范畴。

sour grapes *phr.*

酸葡萄心理（得不到就贬低，源自伊索寓言）

09 问候语与选词背后的类比之战

51:46

Yeah. I wouldn't want to live in Edmonton. Sour grapes, you know, it's sort of one word. now, I'm going to go down to the really one word level, and I want to talk about the analogies that I had to make when I went to Italy to the well, it's a research institute in Trento. I spent a year there. It was a very austere place, a very nice place, but rather austere. And there were people at many levels, bureaucrats, scientists, students, people walking the corridors. And I never quite knew who people were. They would say hello to me, and I couldn't quite figure. And so, the question that I had to face at you know, from the very beginning was what do you say to these people when you run into them in the corridor?

对。我可不想住在埃德蒙顿。酸葡萄，你知道，它差不多就是一个词。呃，现在我要下降到真正的单个词的层面，我想谈谈我去意大利时不得不做的那些类比——我去的是，呃，嗯，特伦托的一家研究所。呃，我在那里待了一年。那是个非常清简的地方，很不错的地方，但相当清简。那里有各种层级的人，有官僚，有科学家，有学生，呃，还有在走廊里走来走去的人。我一直搞不太清楚谁是谁。他们会跟我打招呼，而我就是弄不明白。所以，从一开始我就得面对的问题是：当你在走廊里碰到这些人时，你该跟他们说什么？

austere /ɔːˈstɪr/ *adj.*

朴素严肃的，简朴冷峻的

52:33

And you don't even know quite who they are. You recognize them, and you sort of know who they are. You have spoken to them, and you know definitely who they are. You know their name, or you know them pretty well. They're kind of a friend. You've eaten lunch with them once, or you've you are a friend. And naively being American, I would say ciao. that was wrong. You don't say ciao to people that you are not on familiar terms with. I mean, ciao is something that you can say to somebody that you say tu, but you don't say ciao to, you know, to the director of the institute. you that just doesn't it just doesn't work. You say buongiorno, or you say salve. And salve is sort of intermediary. And I learned this.

而你甚至都不太清楚他们是谁。你认得他们，也大概知道他们是谁。你跟他们说过话，你很确定他们是谁。你知道他们的名字，或者你跟他们挺熟。他们算是朋友。你跟他们一起吃过一次午饭，或者你们本来就是朋友。而呃，作为一个天真的美国人，我会说 ciao。呃，那是错的。对于关系不熟的人你不能说 ciao。我是说，ciao 是你可以对那些你用 tu（你）称呼的人说的，但你会不对，你知道，研究所所长说 ciao。呃，那就是行不通。你得说 buongiorno，或者说 salve。salve 算是介于两者之间。嗯，我学会了这一点。

意大利语问候的敬语层级：ciao 只用于能以tu（你）相称的熟人；对所长、生人须用 buongiorno；salve居中。美国人见谁都说ciao会失礼——问候语的选择本身就是一次范畴化。

53:15

And but I nonetheless was not a native speaker. And every time at every moment as I was walking down the corridors, I had to be doing these on-the-spot categorizations. Is this a ciao person, a salve person, or a buongiorno person? And you know, and sometimes I would mix them up, and I would get them confused. I would blend them. but it was it was, you know, gradually it kind of got clearer, and I got and I was following the what I saw other people doing. I was making analogies. and I met not only analogies to what other people did, but analogies between, you know, people I this person is like that person to me. And so I said, "Okay, if I say saluted that person, I'll say saluted this person."

呃，但我毕竟不是母语者。每一次，每一刻，当我走在走廊里的时候，我都得做这种当场的范畴化判断。这个人是「ciao 型」的、「salve 型」的，还是「buongiorno 型」的人？你知道，呃，有时候我会弄混，会搞错。我会把它们混在一起。嗯，但随着时间推移，你知道，慢慢就清楚一些了，而我是在照着我看到别人怎么做去做。我在做类比。嗯，而且不只是对别人的做法做类比，还有你知道，人与人之间的类比——对我来说这个人像那个人。于是我就想：「好，如果我对那个人说 salve，我就对这个人也说 salve。」

在特伦托研究所的走廊里，每次擦肩而过都要即时完成范畴判断：这是ciao型、salve型还是 buongiorno型的人？判断依据是与他人做法的类比、与既有 interpersonal 关系的类比。

54:00

So words, individual words, are the locus of a fight. Every time you try to figure out what word to use, there's a subterranean fight going on, mostly hidden. And I want to just give you a little example of this. my friends Kelly and Dick were visiting my house and they kept on referring to my office. And I kept on thinking, "What does my office have to do with my house? It's over, you know, across campus." And then I realized, of course, they were talking about my study. and so we talked about this. I said, "Why do you always call it my office when I call it my study?" And they said, "I don't know. It's your seems like your office."

嗯，所以说，词语，一个个单独的词，是一场争斗的所在。每当你试图想清楚该用哪个词，背后就有一场暗中的争斗在进行，大多是隐藏着的。我想给你们举个小例子。嗯，呃，我的朋友凯莉和迪克来我家做客，嗯呢，他们一直在提我的 office（办公室）。我一直在想：「我的办公室跟我家有什么关系？它在，你知道，校园那头呢。」然后我才反应过来，他们当然说的是我的 study（书房）。嗯，于是呢我们聊起了这件事。我说：「为什么我管它叫 study，你们却总叫它 office？」他们说：「不知道啊。它看起来就像你的办公室。」

核心命题：每个词都是一场「地下战争」的战场。office与study之争：朋友夫妇按自家顶层「家庭办公室」的原型，坚持把侯世达家的书房叫作office。

locus /'ləʊkəs/ *n.*

中心点，发生地（正式用语，the locus of 之所在）

subterranean /ˌsʌbtə'reɪniən/ *adj.*

地下的；（引申）隐秘的、意识之下的

54:44

I said, "It doesn't seem like my office. it seems like my study. And my office is across campus." And so then we talked a little more and they said, "Well, you know, in our house, on our top floor, where we do our work, where we have our books and our computers, that's where our office. we have a home office. That's where we do our work. And you have on your top floor, which is not your third floor, but your second floor, you have computers, you have books, and you do your work there."

我说：「它看起来不像我的办公室。呃，它看起来像我的书房。我的办公室在校园那头。」然后我们又聊了一会儿，他们说：「你知道，在我们家，顶层是我们干活的地方，我们的书和电脑都在那儿，呃，那就是我们的办公室。呃，我们有个家庭办公室。我们就在那儿工作。而你在你家顶层——不是三楼，是二楼——也有电脑，也有书，你也在那儿工作。」

55:14

And it maps perfectly. So, to them it was totally obvious that this was my office. And to me it was totally obvious that it was my study because I took my dad as my prime as my prototype. He on the upper floor of our house up on Moraga, he had a study in which he had his Friden calculator and his books and his things. And it was just like what I did. And his office was down on campus. And so to me it was a I guess you'd say a no-brainer. and it was very interesting to see that both behind both of our visions there were analogies. And it showed that word choice is guided by analogy. And I'm going to skip a couple of transparencies here.

这完全对应得上。」所以，对他们来说，这地方是我的办公室是再明显不过的事。而对我来说，它是我的书房也是再明显不过的事，因为我拿我爸爸当作我的原型。他在我家莫拉加那栋房子的楼上有一间书房，里面放着他的 Friden 计算器、他的书和他的东西。那跟我做的事一模一样。而他的办公室在校园里。所以对我来说，这，我想你们会说，根本不用动脑子。呃，很有意思的是，可以看到我们双方的看法背后都各有一个类比。这说明词语的选择是由类比引导的。这里我要跳过几张幻灯片。

侯世达则以父亲为原型

(prototype)：父亲家中楼上是 study、校园里才是 office，映射完美，所以「study」对他是不假思索的选择。双方各自的「显然」背后都是一条类比链。

no-brainer /ˌnoʊˈbreɪnər/ n.

无需动脑的事，显而易见的选择

prototype /ˈprɒtətaɪp/ n.

原型（认知科学中范畴的典型样本）

55:58

And I can see I have so many things here I'm not going to be able to really go through them all. But I want you to see this picture which illustrates what goes on in word choice. I have not labeled the x-axis. But the x-axis in these bar graphs is sort of it's a one-dimensional reduction of what you might call semantic space. Semantic space is a multi-dimensional space of concepts. And I've reduced it down to one dimension. I've pretended that there's just concepts along one dimension. And so here I'm facing a situation which might evoke, you know, a word like dog. And so dog is the big winner. It's very activated. And maybe fox is a little bit activated. I don't know. I'm just making this up. And maybe cat is a little bit activated and so forth. And so there we have it. And it there it's a big dog is so it towers above the others enough that it's a big winner and there's no visible or audible, I should say, competition.

语义空间 (semantic space) 指全部概念构成的多维空间；选词是空间中多个候选词的激活竞争，最活跃者胜出。此处降为一维柱状图演示：dog高高胜出，fox、cat微弱激活。

呃呃，我看得出来我这儿东西太多，恐怕没法全部讲完。不过呃，我想让你们看看这张图，它展示了词语选择过程中发生了什么。我没有给横轴标注。但这些柱状图的横轴，嗯，算是把所谓的语义空间做了一维的压缩。语义空间是一个多维的概念空间。我把它压缩成了一维。我假装所有概念都排在一条维度上。所以在这里，我面对一个情境，它可能唤起，你知道，像 dog（狗）这样的词。于是 dog 是大赢家。它被高度激活了。而且也许，呃，fox（狐狸）被激活了一点点。我也不知道，我只是随口编的。也许 cat（猫）也被激活了一点点，等等。于是就成了这样。而 dog 高高地压过其他所有词，差距大到它成了明显的赢家，没有任何看得见的——我该说听得见的——竞争。

10 口误与词语混合：竞争的证据

57:02

But a lot of the time when we speak there is audible competition. And I want to talk about the audible competition that we hear when we are making when we are speaking. And so I'm going to talk about word blends. here's just a few. And maybe these I will read to you because I think they're all nice examples. I have collection of literally hundreds and hundreds, maybe thousands, of word blends. I just picked a few at random today. and these are these are ones that I just listened to. I picked them up. this was me at the Somebody calls on the phone, "Is Danny there?"

但我们说话时，很多时候都存在一种能听得出来的竞争。我想谈的就是这种能听出来的竞争，就是我们在说话的时候听到的那种竞争。所以呃，我要讲的是词语混合（word blends）。呃，这里只是几个例子。也许这些我会念给你们听，因为我觉得它们都是很好的例子。我收集了字面上成百上千、也许上千个词语混合的例子。我我今天只是随便挑了几个。呃这些都是我亲耳听到的，我把它记下来了。呃呃这个是我自己说的——有人打电话来问："Danny 在吗？"

57:42

That's my son. I don't know. I'll go sec. They'll end of see and check. Trivial. Everyday ordinary thing. It reveals competition. It reveals subterranean competition. Okay. don't leave your car there, I say to somebody. You might get a ticket. May or might. Now, this is the kind of thing nobody would hear. I mean, I pay attention to these things. It's sort of my profession. And so, I do hear them. But, most people just don't hear these things. Danny, my son, I love this one. I can't keep all these things in my bread at the same time. I thought that was wonderful. Brain and head. he also said, "Hey, wait up. I'll gum with you."

那是我儿子。我说："我不知道，我去 sec 一下（I'll go sec）。"那就是 see 和 check 混在一起了。微不足道的小事。日常再普通不过的事。可它揭示了竞争，揭示了潜藏在底下的竞争。好。呃"别把你的车停在那儿，"我对某人说，"你你可能会被开罚单。"May 和 might 混在了一起。那么，这种事一般人会听出来。我是说，我会留意这些东西，这差不多算是我的职业。所以我确实能听出来。但大多数人根本听不出这些。呃我儿子 Danny，我特别喜欢这个例子。他说："我没法同时把这么多事都装在我的 bread 里。"我觉得这太妙了。是 brain 和 head 混在一起。嗯，呃他还说过："嘿，等等，我跟你一起 gum。"

word blends（词语混合）是竞争外泄的直接证据：「I'll go sec」是see与check相撞，「in my bread」是brain与head相撞——两个候选词势均力敌，同时挤出口腔。

58:23

That was to his sister. She was about to go to the grocery store. "Hey, wait up. I'll gum with you." Gum is come and go. Just a nice blend of two different ideas. And my administrative assistant, Helga, said, "Every morning I took a capsy ride." Beautiful. Beautiful. And the mayor of Bloomington was on the radio and he talked He was talking about how it we have to be vigilant in putting in bike paths and other kinds of things in the town. And I thought that was a wonderful blend because it's vigilant and it's diligent. And it also has a little bit of village in it. And this is a fascinating kind of thing. Now, I don't want you to think that blends are always that obvious. I want you to understand that blends can be extremely subtle. here's some examples just two but I these were in the course that I was giving last semester called something like analogy and words and concepts. And I was talking to the class and at one point I just I mean I

市长口中的「vigilant」混合了 diligent 甚至 village——混合可以多词叠加且极其隐蔽。侯世达收集了数以千计的此类口误，作为研究思维竞争的语料库。

vigilant /'vɪdʒɪlənt/ *adj.*

警觉的，时刻留心的

diligent /'dɪlɪdʒənt/ *adj.*

勤勉的，孜孜不倦的

那是对他姐姐说的。她正要去杂货店。"嘿，等等，我跟你一起 gum。" Gum 就是 come 和 go 混在一起。就是两个不同想法漂亮地混在了一起。还有呃我的行政助理 Helga 说："每天早上我都坐 capsy (cab + taxi) 去上班。"太妙了，太妙了。还有布卢明顿的市长上台，他谈到我们必须要有 vigilant，呃要在城里修自行车道之类的事情上保持警觉。我觉得那是个很棒的混合，因为它既是 vigilant 又是 diligent，而且里面还带了一点 village 的味道。呃这是一件很迷人的事。那么，我不希望你们以为混合总是这么明显。我想让你们明白混合可以非常非常微妙。呃这里有几个例子，呃就两个，呃这些出自我上学期开的一门课，好像叫"类比与词语和概念"之类的。呃我在给全班讲课，有一次我——我是说我

59:33

Must have made 500 errors per class session, you know. I mean, today who knows how many errors I've made. They're not discrete things cuz they come sort of in different levels of strength. But maybe major blend maybe major errors today I've made 50 and maybe I don't maybe I've made 200. I don't know. But anyway, every day there I was making 500 and I noticed about three because you can't spend all your time monitoring yourself. But I did notice at one point I said as it says here I was having trouble finding. The F was a little too lengthy. And I said did anybody hear that? Nobody even heard it. And I said, well, okay, but it was a little long and you want to know why? And they I mean I guess they were captive audience. So, anyway, I said, I know there was competition in my head and I happen to know what it was.

数据点：他估计自己每堂课产生约500个强度不等的言语错误，本人也只能察觉其中两三个——错误是言语生产的常态而非例外，只是绝大多数低于觉察阈值。

captive audience *phr.*

被动听众（走不开、只好听下去的人，常带幽默意味）

每节课大概要犯 500 个错误，你知道吧。我是说，今天我犯了多少错谁知道呢。这些错误不是离散的东西，因为它们的强度是分层次的。也许明显的混合、也许明显的错误今天我犯了 50 个，也许我没有，也许我犯了 200 个。我也不知道。反正呢，每天我都在犯 500 个错，而我只注意到大概三个，因为你不可能把全部时间都花在监控自己上。但我确实注意到有一次，就像这里写的，我说我遇到了麻烦，"finding、finding"——那个 F 拖得有点太长了。我就说，有人听出来了吗？根本没人听出来。我又说，好吧，但它确实有点长，你们想知道为什么吗？他们——我是说我猜他们也没法不听。所以所以，反正呢，我说，我知道我脑子里有竞争，而且我碰巧知道那是什么。

60:25

At least part of it. I don't know the whole story, but at least I know one of the words was find and the other was figure out. And I couldn't quite decide. Now how much else was going on inside my head I don't know. Inside. Okay. It was it was poised on the banister. It was poised on the banister. It was posed and it was poised. It was just a slightly wrong vowel. Slight distortion of the vowel. Now you see these kinds of things these kinds of things every word that I'm saying probably has a slight error in it. And that's my point.

poised /pɔɪzd/ *adj.*

悬停蓄势的；泰然自若的

banister /ˈbænɪstər/ *n.*

楼梯扶手

至少知道一部分。我不知道全部的来龙去脉，但我至少知道其中一个词是 find，另一个是 figure out。我一时决定不下来。至于我脑子里 inside inside 还有多少别的东西在活动，我就知道了。Inside inside。好。那是“它 poised 在楼梯扶手上”。它 poised 在扶手上。既是 posed 又是 poised。那只是一个稍微错了的元音，元音的轻微变形。你看，这类事情——这类事情，我说的每一个词大概都带着一点小错误。这正是我的意思。

61:04

Every word has a subterranean fight going on inside it. You don't know you don't hear it even I don't hear it. I'm not privy to what's going on underneath the surface. But sometimes I can feel it and sometimes you can hear little hesitations. It may be a hesitation before the word starts. It may be the lengthening of a consonant, may be the distortion of a vowel. It may be a funny intonation. All of those are revelatory of the fight between words, the analogies that are struggling to take over and to beat the other ones out. phrase blends. I hope I'm coming to an end.

竞争的微观证据：开口前的迟疑、辅音被拉长（f-finding）、元音变形（poised/posed）、语调异常——这些都是词与词、类比与类比在表面之下搏斗时的「泄漏」。

revelatory /ˈrevələtɔːri/ *adj.*

揭示性的，能暴露真相的

intonation /ˌɪntəˈneɪʃn/ *n.*

语调

privy /ˈprɪvi/ *adj.*

知情的（be privy to 得以知晓内情）

每一个词内部都有一场潜藏的争斗在进行。你不知道，你听不出来，连我自己都听不出来。我没法直接看到水面之下发生了什么。但有时候我能感觉到，有时候你能听到一些小小的迟疑。可能是词开口之前的一个停顿，可能是某个辅音被拉长，可能是元音的变形，可能是一个奇怪的语调。所有这些都泄露了词与词之间的争斗，泄露了那些争着要占上风、要把对方挤掉的类比。嗯，短语混合。我希望我快要讲完了。

61:44

Phrase blends. I won't read these out loud, but I think well, maybe I These are funny. Cuz I mean And phrase blends are not always funny. I'm not, you know, one of these people who collect errors because it's funny and you publish it, you know, they say kids say the darndest things or whatever. That's not my reason I think errors are wonderfully funny at times, but I don't collect them for that purpose. I collect them because I'm interested in understanding what goes on in the minds of human beings. So, here's in an email. This is typed. This is not spoken. This is typed. I have it still.

呃，短语混合。呃我就不念出声了，不过我觉得呃——好吧，也许我还是念吧，这些挺好笑的。因为我是说，短语混合并不总是好笑的。我不是那种，你知道的，因为好笑才去收集错误然后拿去出版的人，就是那种“孩子们说的话最逗了”之类的书。那不是我的目的。我确实觉得错误有时候特别好笑，但我收集它们不是为了这个。我收集它们是因为我想弄明白人类心智里到底发生了什么。所以，呃这是一封邮件里的。这是打出来的，不是说出来的，是打字打出来的。我现在还留着。

62:17

You know, I hope the package got there in one shape. Okay. from a native speaker. Okay. native speakers talking two of them talking in a restaurant. Neither of them noticed this comment. I mean, it just went by. Nobody heard anything. he was a real easy-go-lucky guy. Easy going and happy-go-lucky. This one I said, I should count my lucky stars. I said it on the phone and then I said, "What? Is that right?" Something Count my lucky stars. Count my blessings, thank my lucky stars. Okay? I mean, just these kinds of things are a dime a dozen. And that was a dime a dozen situation, by the way. Categorized I put my finger right on the essence there.

a dime a dozen *phr.*

多得不值钱，司空见惯

"你知道，我希望包裹完好无损地（in one shape）送到了。"好。呃，出自一个母语者。好。呃两个母语者在餐厅里聊天。他们俩谁都没注意到这句话，我是说它就这么过去了，没人听出任何异样。呃"他是个特别 easy-go-lucky 的家伙。"是 easy going 和 happy-go-lucky 混在一起。这一个是我自己说的，我说"我该数数我的幸运星（count my lucky stars）"，我在电话里这么说，然后我又说，“什么？是这样吗？”之类的。谢天谢地。数数我的幸运，感谢我的幸运星。好吧？我是说，这类东西多得是，一抓一大把。顺便说一句，那就是个「多得是」的情形。归类完毕，我一下就点中了那里的本质。

62:57

This one I typed in an email when I was very tired and I wanted to hit the sack. And I said, "I'm worried that my editor is going to hit the stack." And I thought that was a marvelous blend of hit the ceiling, blow his stack, and my own feeling that I wanted to hit the sack. Okay. And then my dean at one time at Indiana University was trying to lure a person to be in cognitive science, and he made this marvelous, marvelous statement that will pull no stops unturned to get him. I mean, this is amazing.

呃这一个是我有次很累的时候打的一封邮件，我当时想赶紧上床睡觉。我写道：“我担心我的编辑会大发雷霆（hit the stack）。”我觉得那是个绝妙的混合体，混合了 hit the ceiling（暴跳如雷）、blow his stack（火冒三丈），还有我自己想去 hit the sack（上床睡觉）的心情。好。还有我在印第安纳大学时的院长，有一次想招揽一个人来做认知科学，他说了一句非常非常绝妙的话：为了把他弄到手，我们会「不遗余力地不留下任何一块石头没翻过来」。我是说，这真是太妙了。

系主任的「will pull no stops unturned」糅合了 pull out all the stops（全力以赴）与 leave no stone unturned（不遗余力）——两个习语级范畴同时被情境激活后的完美混合。

hit the sack *phr.*

上床睡觉（俚语）

blow his stack *phr.*

大发雷霆（blow one's stack）

lure /lʊər/ *v.*

引诱；（企业、院校）延揽（人才）

11 爱因斯坦光量子的类比起源

63:40

All right. So, I've already said this, but I just say it again because I want you to see it in writing. Every effortless category assignment is actually a seething subterranean battle of analogies. When the battle is a landslide, there's no evidence. When the battle is close, there's evidence galore. Okay. So, we're coming really to the end here. Thought is the highest level of abstraction seeking, I'm sorry, the highest level of abstraction. Putting one's finger on the essence of a situation, and then bouncing back and forth between the actual situation and the essence that one found in one's memories. In one's memory. I'm going to give you an example that I think is quite charming, and it's actually something I found out about last year. I spent a long time in the year 2005 working on in a talk called Well, it wasn't called, but it was about Einstein's analogy making. I wanted to do something for the Annus Mirabilis 2005 and what the 100th anniversary, and I had the great pleasure of giving this

总结句：每一次毫不费力的范畴判定，实际都是一场沸腾的地下类比之战。战况一边倒时不留痕迹；势均力敌时，证据（口误、迟疑、混合）比比皆是。

seething /'si:ðɪŋ/ *adj.*
沸腾的，暗流汹涌的

landslide /'lændslaɪd/ *n.*
山体滑坡；（引申）一边倒的压倒性胜利

嗯，好。这一点我已经说过了，但我要再说一遍，因为我想让你们看到它写成文字的样子。每一次毫不费力的归类实际上都是一场翻腾汹涌的地下类比之战。当这场战斗是一边倒的时候，就看不到任何痕迹。当战斗势均力敌时，痕迹就比比皆是。好。那么，呃我们真的快讲到结尾了。思维是最高层次的寻求抽象，抱歉，是最高层次的抽象。点中一个情境的本质，然后在实际情境和你在记忆中找到那个本质之间来回穿梭。在你的记忆里。我要给你们举一个我觉得相当有趣的例子，这其实是我去年才了解到的事情。我在 2005 年花了很长时间准备一个演讲，叫做嗯，其实它不叫这个名字，但内容是关于爱因斯坦的类比思维。我想为 2005 年的「奇迹年」做点什么，也就是那个 100 周年纪念，我有幸在几个地方的物理系做了这个演讲，讲的是爱因斯坦所做的类比，

64:47

Talk in physics departments in a few places about the analogies that Einstein made not only in 1905, but in other years. And what I was really astounded was I had never known how Einstein created the concept of that we now know as the photon. And it was what he thought of as his most revolutionary ever idea. And I want to give you a sense of how he did it, and I can't, obviously, give you much of a sense of it, but let me at least just give you a slight sense. So, we begin with something that was known this is the basically what's called the black body spectrum. What it basically says is if you have radiation bouncing around inside a cavity at a certain temperature, there's different amounts of different energies and there's sort of a most amount at a certain peak energy you know, that's the sort of the wavelength the wave that wavelength or that frequency is sort of the most predominant and then there's less and less on either side of it. Longer wavelengths are less, shorter wavelengths are less.

不只是 1905 年的，还有其他年份的。嗯让我真正震惊的是，我以前从来不知道爱因斯坦是怎么创造出我们今天称为光子的那个概念的。而那是他自认为有史以来最革命性的想法。我想让你们感受一下他是怎么做到的，显然我没法让你们感受太多，但至少让我给你们一点点感觉。那么，我们从一个当时已知的东西说起，这基本上就是所谓的黑体谱。它基本上说的是，如果你有辐射在一个处于某个温度的空腔里来回反弹，不同能量的量是不一样的，在某个峰值能量处的量是最多的，你知道，就是那个波长——那个波，那个波长或者那个频率是最主导的，然后在它两侧的量越来越少。更长的波长少一些，更短的波长也少一些。

Annus Mirabilis (奇迹年) 指 1905 年：爱因斯坦连发狭义相对论、光电效应、布朗运动等论文；2005 年为百年纪念。黑体辐射谱描述空腔内辐射能量随波长的分布，在某一峰值波长处最强。

cavity /'kævəti/ *n.*

腔，空腔（物理学：黑体辐射空腔）

65:51

And now there was another situation that was the situation that people didn't understand. People did understand the situation of thanks to Maxwell and Boltzmann of an ideal gas, an ideal gas inside a cavity where people knew that actually they didn't really know for sure, but they thought that the behavior of an ideal gas was due to molecules bouncing around inside and if they assumed that it was molecules, they could make some mathematical calculations and figure out what the curve should be and they figured out the formula for a bell-shaped curve that looked like that said that for all the different kinetic energies that you have and you can replace kinetic energy if you don't like that word with velocity. So, for all the different velocities or speeds that the molecules could have, you know, at low speeds there weren't very many, high speeds there weren't very many, but at some intermediate speed there were a lot and this was the distribution and it looked kind of like that. Now, not this was around for

麦克斯韦-玻尔兹曼分布：假设理想气体由分子构成，即可推出分子速度呈钟形分布。这条曲线当时物理学界人人皆知，但没有人想到把它与黑体辐射谱放在一起看。

那么当时还有另一种情形，那是人们当时并不理解的情形。人们确实理解那种情形——多亏了麦克斯韦和玻尔兹曼——理想气体的情形，一个空腔里的理想气体，人们知道其实他们并不真的确定，但他们认为理想气体的行为是由分子在里面来回碰撞造成的，而如果他们假定它是分子，就可以做一些数学计算，算出曲线应该是什么样，然后他们推出了一个钟形曲线的公式，看起来就像那样，说的是对于所有你可能有的不同动能——如果你不喜欢「动能」这个词，也可以把它换成速度。所以，对于分子可能具有的所有不同速度或速率，你知道，在低速时数量不多，高速时数量也不多，但在某个中间速度上就有很多，这就是分布，看起来大概就是那样。要知道，这些东西当时都摆在那儿，谁都能看到，

66:47

Anybody to see, you have to understand, but nobody thought about it. Nobody connected these two ideas until Einstein. And Einstein said this looks similar to me. And so, I think that, you know, maybe it's possible these things this thing over here the ideal gas we think as being made of corpuscles, particles, molecules. And so maybe it's possible that light is also made of particles. And he did a lot of elegant mathematical calculation to check this out. And he calculated the entropy of these systems and I won't go into any of the details. Basically, a bell-shaped curve and a bell-shaped curve, the analogy between those two, like the analogy between my two shadows, the light shadow and the snow shadow, I decided that light may be made of flakes. Einstein decided 100 years before me that I that light might be made out of particles. And that was the what nowadays we call the light quantum hypothesis. And that was the most revolutionary discovery Einstein ever made. It came directly out of a

爱因斯坦的关键一跃：两条钟形曲线「长得像」→既然气体由粒子构成，光或许也由粒子构成。经熵的计算验证后提出光量子（光子）假说——他自认一生最革命性的思想，并因此获1921年诺贝尔物理学奖。

corpuscles /'kɔːrpəsəlz/ *n.*

微粒（旧时物理学用语，光的微粒说）

entropy /'entrəpi/ *n.*

熵（热力学中衡量无序度的量）

但没人往那方面想。在爱因斯坦之前没有人把这两个想法联系起来。而爱因斯坦说，这在我看来很相似。于是我想，你知道，也许有可能——这些东西，这边这个东西，理想气体，我们认为它是由微粒、粒子、分子构成的。那么也许光也有可能是由粒子构成的。他做了大量优雅的数学计算来验证这一点。他计算了这些系统的熵，具体细节我就不展开了。基本上就是一条钟形曲线和另一条钟形曲线，这两者之间的类比，就像我那两个影子之间的类比——光的影子和雪的影子——我由此认定，光也许是由雪片构成的。爱因斯坦比我早 100 年认定光可能是由粒子构成的。而那就是我们今天所说的光量子假说。那是爱因斯坦有史以来做出的最革命性的发现。它直接来自于

12 结论：认知核心假说

67:52

Simple connection between two bell-shaped curves, essentially. All right. Well, I guess I am coming to the end and all I need to say is on my last transparency. So, if strokes of genius are made of analogies and personal insights and political decisions and dinner table conversations and me too comments, which I didn't cover unfortunately, and random reminders and instantaneous categorization and blends of all sorts are all made of analogies, might not all of cognition also be made of analogies? That's the cognition core hypothesis. Remember, you heard it first here.

两条钟形曲线之间一个简单的联系，本质上就是这样。好，我想我快讲完了，我要说的都在我最后一张投影片上。所以，如果天才之举是由类比构成的，个人洞见、政治决策、餐桌谈话，还有「我也是」式的插话——很遗憾我没能讲到——以及随机的回忆联想、瞬间的归类，还有各种各样的混合体，全都是由类比构成的，那么会不会所有的认知也都是由类比构成的呢？这就是「认知核心假说」。记住，你们是在这儿最先听到的。

68:26

Thank you. For more, please visit us at stanford.edu.

谢谢大家。了解更多，请访问 stanford.edu。

收束论证：天才的突破、个人顿悟、政治决策、餐桌闲聊、随机联想、瞬时范畴化、词语混合——既然全都由类比构成，那么整个认知是否也由类比构成？这就是「认知核心假说」，即讲座标题的含义。

strokes of genius *phr.*

天才之举，神来之笔 (stroke of genius 的复数)

第二部分 生词总表 · 复习用

词汇	音标	词性	释义	出现
a dime a dozen	—	phr.	多得不值钱，司空见惯	62:17
affirmative action	—	phr.	平权行动（美国照顾少数群体的政策）	42:40
agility	/əˈdʒɪləti/	n.	（思维或身手的）敏捷	10:45
anagrams	/ˈænəgræmz/	n.	变位词（重排字母构成的新词）	6:28
animacy	/ˈæniməsi/	n.	生命性，有生性（语言学与认知科学术语）	9:45
austere	/ɔːˈstɪr/	adj.	朴素严肃的，简朴冷峻的	51:46
Back to square one	—	phr.	退回起点，前功尽弃从头再来	50:16
banister	/ˈbænɪstər/	n.	楼梯扶手	60:25
beltway	/ˈbeltweɪ/	n.	环城公路（the Beltway 常代指华盛顿政治圈）	40:43
blow his stack	—	phr.	大发雷霆（blow one's stack）	62:57
captive audience	—	phr.	被动听众（走不开、只好听下去的人，常带幽默意味）	59:33
cavity	/ˈkævəti/	n.	腔，空腔（物理学：黑体辐射空腔）	64:47
charismatic	/ˌkærɪzˈmætɪk/	adj.	有超凡魅力的	4:51
chick flick	/ˈtʃɪk flɪk/	n.	面向女性观众的爱情轻喜剧（俚语）	41:45
chided	/ˈtʃaɪdɪd/	v.	责备，数落（chide的过去式）	9:45
chunking	/ˈtʃʌŋkɪŋ/	n.	组块（认知心理学术语：把多个单元打包成一个整体）	36:15
corny	/ˈkɔːrni/	adj.	老套的，陈腐的	18:51
corpuscles	/ˈkɔːrpəsəlz/	n.	微粒（旧时物理学用语，光的微粒说）	66:47
devastated	/ˈdevəstetɪd/	adj.	极度震惊悲伤的	5:37
diligent	/ˈdɪlɪdʒənt/	adj.	勤勉的，孜孜不倦的	58:23
do justice to	—	phr.	公正对待；充分展现...的价值（常用否定：can't do justice to）	50:16
downsizing	/ˈdaʊnsaɪzɪŋ/	n.	（公司）裁员缩编	39:23
entropy	/ˈentrəpi/	n.	熵（热力学中衡量无序度的量）	66:47
evoked	/ɪˈvəʊkt/	v.	唤起，激起（记忆、概念、情感）	45:21

flattened	/ˈflætnd/	v.	压扁；（引申）使彻底泄气、击垮	22:12
fleeting	/ˈfli:tɪŋ/	adj.	转瞬即逝的	28:13
galore	/gəˈlɔ:r/	adj.	大量的（后置修饰：notation galore 满是符号）	21:22
glommed	/glɑ:md/	v.	黏附并入（glom into, 美式俚语）	38:00
gracious	/ˈɡreɪʃəs/	adj.	亲切宽厚的，有风度的	12:19
hedge	/hedʒ/	v.	含糊其辞，留有余地	19:44
hit the sack	—	phr.	上床睡觉（俚语）	62:57
hub	/hʌb/	n.	轮毂；（航空、活动的）枢纽、中心	25:25
incorrigible	/ɪnˈkɔ:rɪdʒəbl/	adj.	积习难改的（常作诙谐褒义，如「无可救药地爱玩」）	6:28
integers	/ˈɪntɪdʒərz/	n.	整数	32:38
interjection	/ˌɪntərˈdʒekʃn/	n.	感叹词（语法术语）	47:30
intonation	/ˌɪntəˈneɪʃn/	n.	语调	61:04
inveterate	/ɪnˈvetərət/	adj.	根深蒂固的，惯常的（inveterate observer 成癖的观察者）	27:21
it's all Greek to me	—	phr.	完全看不懂，一窍不通	50:16
laissez-faire	/ˌleseɪˈfer/	adj.	自由放任的（源自法语，laissez-faire economics 自由放任经济）	40:43
landslide	/ˈlændslaid/	n.	山体滑坡；（引申）一边倒的压倒性胜利	63:40
locus	/ˈləʊkəs/	n.	中心点，发生地（正式用语，the locus of 之所在）	54:00
lure	/lʊr/	v.	引诱；（企业、院校）延揽（人才）	62:57
lurking	/ˈlɜ:rkɪŋ/	v.	潜伏，隐藏在暗处	37:23
luster	/ˈlʌstər/	n.	光彩，光辉	3:56
make head or tail of	—	phr.	看懂，弄明白（常用否定式 couldn't make head or tail of）	21:22
membrane	/ˈmembrein/	n.	膜（此处比喻概念的外包裹层）	36:15
mind-boggling	/ˈmaɪndˌbɔ:ɡlɪŋ/	adj.	多到或复杂到难以想象的	46:50
misnomer	/mɪsˈnoʊməɹ/	n.	误称，名不副实的名称	16:57
no-brainer	/ˌnoʊˈbreɪnər/	n.	无需动脑的事，显而易见的选择	55:14
on the spot	—	phr.	被置于尴尬或受考验的境地（put sb on the spot）	13:43
phishing	/ˈfɪʃɪŋ/	n.	网络钓鱼诈骗（fishing 的变体拼写）	42:40

phrenology	/frəˈnɑ:lədʒi/	n.	颅相学（19世纪伪科学）	12:19
plagiarism	/'pleɪdʒəriːzəm/	n.	剽窃，抄袭	40:43
pluralization	/ˌplʊərələˈzeɪʃn/	n.	复数化（本讲术语：单一实体扩张为范畴）	34:06
poised	/pɔɪzd/	adj.	悬停蓄势的；泰然自若的	60:25
pork belly futures	—	phr.	猪腩期货（芝加哥商品交易所著名品种）	42:40
primordial	/praɪˈmɔ:riəl/	adj.	原初的，最初形成的	36:15
privy	/'prɪvi/	adj.	知情的（be privy to 得以知晓内情）	61:04
prototype	/'prɒtətaɪp/	n.	原型（认知科学中范畴的典型样本）	55:14
Put your money where your mouth is	—	phr.	拿行动（或钱）证明你说的话，别光说不练	49:27
quislings	/'kwɪzɪŋz/	n.	卖国贼，通敌者（源自挪威通敌者Quisling的姓氏）	34:55
rain shadow	—	phr.	雨影区（山脉背风面的少雨干燥地带，地理学术语）	28:57
revelatory	/'revələtɔ:ri/	adj.	揭示性的，能暴露真相的	61:04
seething	/'si:ðɪŋ/	adj.	沸腾的，暗流汹涌的	63:40
shunts	/ʃʌnts/	v.	把...推到一边，使靠边（shunt off）	16:57
slam dunk	/ˌslæm ˈdʌŋk/	n.	灌篮；（引申）十拿九稳的事	40:43
sleazeball	/'sli:zbɔ:l/	n.	卑鄙下流的人（俚语）	40:43
snippet	/'snɪpɪt/	n.	（文章、信息的）小片段	7:59
sour grapes	—	phr.	酸葡萄心理（得不到就贬低，源自伊索寓言）	51:11
speak of the devil	—	phr.	说曹操，曹操到	49:27
spokes	/spʊks/	n.	（车轮的）辐条	38:00
stature	/'stætʃər/	n.	（崇高的）声望，地位	0:27
stirring	/'stɜ:rɪŋ/	adj.	激动人心的，震撼的	3:56
strokes of genius	—	phr.	天才之举，神来之笔（stroke of genius 的复数）	67:52
subscripts	/'sʌbskrɪpts/	n.	下标（对应 superscript 上标）	21:22
subterranean	/ˌsʌbtə'reɪniən/	adj.	地下的；（引申）隐秘的、意识之下的	54:00
swerved	/swɜ:rvd/	v.	突然转向，急拐	27:21
tenuous	/'tenjuəs/	adj.	微弱的，牵强的（tenuous association 牵强的关联）	3:56
tenure	/'tenjər/	n.	任职期；（大学）终身教职	6:28

There but for the grace of God go I	—	phr.	若非上帝恩典，遭殃的就是我（感慨自己侥幸逃过他人的不幸）	48:43
transient	/ˈtrænjənt/	adj.	短暂的，倏忽的	28:13
treacherous	/ˈtreɪʃərəs/	adj.	背信弃义的；暗藏危险的	34:55
tribute	/ˈtribju:t/	n.	敬意；致敬之举（a tribute to 是对...的褒奖）	3:18
turnout	/ˈtɜːrnaʊt/	n.	出席人数，到场率	0:27
vigilant	/ˈvɪdʒɪlənt/	adj.	警觉的，时刻留心的	58:23
voyeuristic	/ˌvɔɪəˈrɪstɪk/	adj.	窥视者般的（此处自嘲：沾光旁观他人成就的）	3:56
with no further ado	—	phr.	闲话少说，立即开始（ado /əˈduː/ 忙乱、啰嗦）	2:37