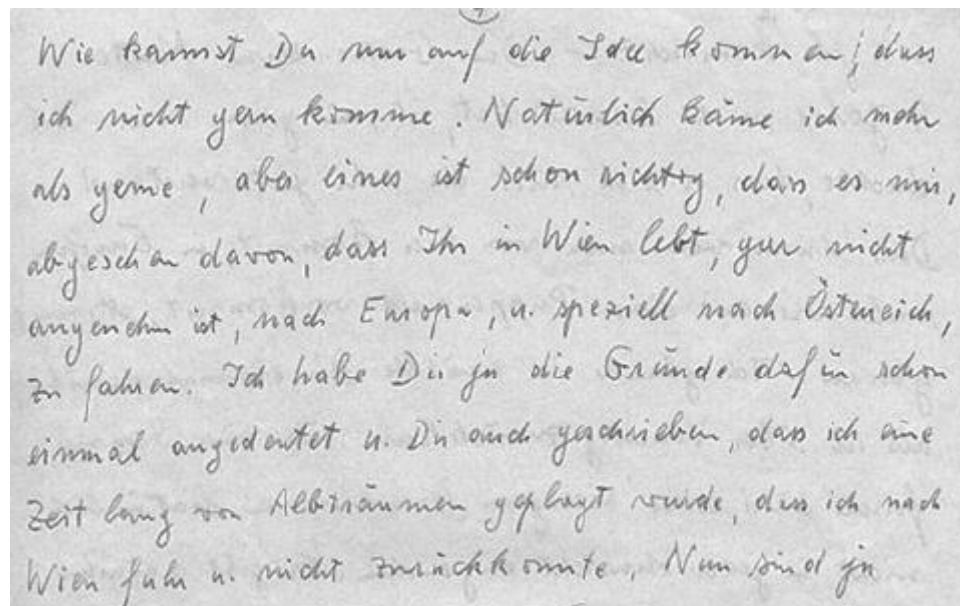


天才数学家-哥德尔

生平

- 哥德尔 (Kurt Friedrich Gödel) 1906年出生于奥匈帝国的布尔诺 (Brünn, 现属于捷克)。哥德尔的父亲是个商人, 母亲受过很好的教育。在哥德尔一生中, 与母亲的书信联系从未间断。



引自: Dawson, J.W., Sigmund, K. Gödel's Vienna. The Mathematical Intelligencer 28, 44-55 (2006).

- 哥德尔小时候身体不好，但表现出特别的好奇心，是家里的“Mr. Why”小先生。1916-1924，哥德尔在德意志国立中学（Deutsches Staats-Realgymnasium）学习，各科成绩都第一，在数学、语言和宗教方面特别优异。

Gödel's special intellectual talents emerged early. In the family, Kurt was called Herr Warum (Mr. Why) because of his constant inquisitiveness. At the age of six, he was enrolled in the Evangelische Volksschule, a Lutheran school in Brünn. From 1916 to 1924, Kurt carried on his

引自：Srivastava, S.M. Life and work of Kurt Gödel - A brief sketch. Reson 6, 2-3 (2001).

- 中学毕业后，哥德尔进入维也纳大学（University of Vienna）。在那里，哥德尔学过理论物理和数论，哈恩（Hans Hahn、逻辑学家）、卡纳普（Rudolph Carnap、逻辑学家）、富特文格勒（Philipp Furtwängler，数学家）都是哥德尔的老师。

same year, incidentally, Gödel's sixty-year-old professor, Philipp Furtwängler, succeeded in proving Hilbert's *Hauptidealsatz* [principal ideal theorem]).

After he received his doctorate, life for Gödel did not change much. His mother had moved to Vienna after her husband's death, and she now lived with her two

引自：Dawson, J.W., Sigmund, K. Gödel's Vienna. *The Mathematical Intelligencer* 28, 44-55 (2006).

Schlick, a central figure in the Viennese philosophical culture at the time, was, together with Hans Hahn, the leader of the so-called Vienna Circle, also called the Schlick Circle, a discussion group Gödel attended that quickly became identified with the doctrine of “logical positivism” (a term coined by Feigl and Blumberg in their 1931 “Logical positivism: A new movement in European philosophy” [1]). Gödel was never drawn to logical positivism himself, but the exposure to the discussions that took place at those meetings must have been crucial to his development as a logician. Otto Neurath, Karl

引自：
Kennedy, J.
Kurt gödel.
das album—the
album. The
Mathematical
Intelligencer
29, 73-76
(2007).

- 哈恩曾把哥德尔介绍给当时的哲学大师石里克（Moritz Schlick, 维也纳学派的奠基人）。不过，哥德尔自己的哲学观点与石里克的学说几乎对立。

- 1927年，哥德尔认识了比自己大6岁的女朋友阿黛尔（Adele Nimbursky）。



Adele Nimbursky, 1932.

引自：Dawson, J.W., Sigmund, K.
Gödel's Vienna. The Mathematical
Intelligencer 28, 44-55 (2006).

- 1929年，希尔伯特提出的开放问题：“是否所有逻辑为真的一阶命题都可以被推导出来？”对哥德尔产生重要影响。哥德尔解答了这个问题，并因此开启了自己的研究生涯，成为新星。



Kurtesy Gödel

The completeness theorem of Kurt Gödel shows consistent theory has a model (pronounce the last word – if you are able – the rhyme would still be reasonable) – Let's sing its praise, let's all yodel !

If you think this ends it, wait!
We still need to decide the fate
of statements not denied right out;
indeed, are true without a doubt
but impossible to demonstrate!

..Kanakku Puly..

引自: Srivastava, S.M. The completeness theorem of Gödel. Reson 6, 60-71 (2001).

- 之后哥德尔全力研究，在逻辑和集合论方面取得重大成就。1931年，哥德尔发表了震惊学术界的“非完备性定理”，次年因此获得特许任教资格（Habilitation）和维也纳大学的讲师资格（Privatdozentur）。

1. Gödel's Theorems and Artificial Intelligence

Gödel's incompleteness theorems¹ have been used as arguments in various discussions of mathematical and metamathematical as well as philosophical problems. Recently they have also appeared in discussions of problems connected with computer science, especially with artificial intelligence.

引自：Murawski, R. Gödel's Incompleteness Theorems and Computer Science. Foundations of Science 2, 123-135 (1997).

- 1933-1940年，哥德尔在逻辑和集合论方面成果显著。比如，1937年，哥德尔给出了关于选择公理（Axiom of Choice）和连续统假设（Continuum Hypothesis）在策梅洛公理（Zermelo-Fraenkel Axioms）前提下的一致性证明。

result by Shepherdson from 1953 made it clear that it is actually impossible to use the method of inner models for $\neg CH$ (or $\neg AC$).³⁷

In 1938, Gödel claims that

the consistency proof for $A [V=L]$ does not break down if stronger axioms of infinity (e.g., the existence of inaccessible numbers) are adjoined to T [or to ZF]. Hence the consistency of A seems to be absolute in some sense, although it is not possible in the present state of affairs to give a precise meaning to this phrase.³⁸

引自: van Atten M., Kennedy J. (2009) "Gödel's Modernism: On Set-Theoretic Incompleteness, Revisited. In: Lindström S., Palmgren E., Segerberg K., Stoltenberg-Hansen V. (eds) Logicism, Intuitionism, and Formalism. Synthese Library (Studies In Epistemology, Logic, Methodology, and Philosophy of Science), vol 341. Springer, Dordrecht.

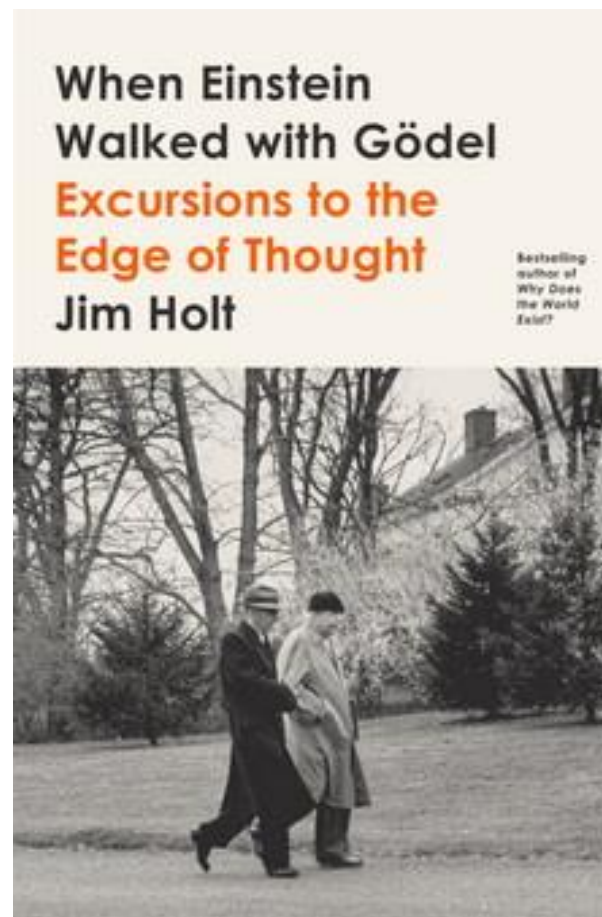
- 期间，哥德尔三次访问过普林斯顿大学，并于1940年落户到那里。其原因包括：哈恩和石里克相继去世，哥德尔的讲师资格被取消，以及符合纳粹服兵役的条件。哥德尔再也没有回欧洲。



Towards new shores. Gödel and his wife, Adele, on shipboard.

引自: Dawson, J.W., Sigmund, K. Gödel's Vienna. *The Mathematical Intelligencer* 28, 44-55 (2006).

- 哥德尔在普林斯顿与爱因斯坦交往密切，尽管爱因斯坦比哥德尔大27岁，但他们每天相伴散步的事实被传为佳话。



- 1949年，哥德尔在相对宇宙学（Relativistic Cosmology）方面又做出重要贡献，推导出爱因斯坦关于旋转宇宙方程的新解。

An Example of a New Type of Cosmological Solutions of Einstein's Field Equations of Gravitation[†]

Kurt Gödel

Institute for Advanced Study, Princeton, New Jersey.

引自: Gödel, K. An Example of a New Type of Cosmological Solutions of Einstein's Field Equations of Gravitation. *General Relativity and Gravitation* 32, 1409-1417 (2000).

- 哥德尔晚年偏执，并伴有精神障碍，他不信医生的建议，害怕被下毒。1978年，哥德尔死于营养不良，留下世人很难超越的成就。

The official VIP list, issued by the cemetery, contains the following names. Each name is follo

- [John N. Bahcall](#) [E-15]
[here are pictures of the [front](#) and [back](#)]
- [Kurt Gödel](#) [Y-25] who wrote this [seminal paper](#) [related work was done by Alan Turing,
[here is a [picture](#) of his and his wife Adele's grave, and [here](#) is a picture of his mother-in
- [Solomon Lefschetz](#) [D-5]
- [John von Neumann](#) [X-26] [here is a [picture](#) of his and his mother's grave]

哥德尔在普林斯顿大学里的墓，可通过链接访问。

引自：<https://sites.math.rutgers.edu/~zeilberg/geonimmetim.html>

评价

- 国家科技奖章（National Medal of Science），表彰作为数理逻辑的奠基人的哥德尔（“For laying the foundation for today’s flourishing study of mathematical logic”）。



- 南卡罗莱纳大学的迈克尔（Michael Stóeltzner）教授的文章：“哥德尔和一切的理论”（“Gödel and the theory of everything”）是对哥德尔的极高评价。

No matter how far mathematics progresses and no matter how many problems are solved, there will always be, thanks to Gödel, fresh questions to ask and fresh ideas to discover. It is my hope that we may be able to prove the world of physics as inexhaustible as the world of mathematics. . . If it should turn out that the whole of physical reality can be described by a finite set of equations, I would feel disappointed. ([5], p.53)

引自：Michael Stóltzner, Lecture Notes in Logic Vol. 6, 291-306 (1996).