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一个数学家的辩白（双语版）

[英] 戈弗雷·哈代 著
何生 译

A Mathematician's Apology

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哈代是一位大数学家，传奇人物华罗庚和拉马努金都得益于哈代的领导。哈代写的辩白必然极具特色，读者可以从中各取所需。他强调合作给他带来的好处是：他所有良好的作品都与两位合作者有关，这些合作使他为数学贡献了许多意料之外的成果。

他最具争议的一个论点：真正的数学是无用的，有用的数学是平凡的，相对论、量子力学几乎和数论一样毫无用处。不过他也留有余地：时间或许会改变一切。一般人觉得陈省身的论点比较靠谱，他在上海科技出版社的名家讲演录中说："数学是什么？一个严格的定义会引我们进入死胡同。大致说来，数学和其他科学一样，它的发展基于两个原因，一是奇怪的现象，二是数学结果的应用。"

—— 中国科学院院士　林群

《一个数学家的辩白》向读者展示了大数学家哈代对数学的思考和洞见，被称为是"用优雅的语言对数学真谛进行的完美揭示"。此书自面世以来畅销不衰，八十余年来再版数十次，是全世界数学爱好者宝贵的精神财富。此次图灵新知用中英文双语再版此书，让读者能够更全面地体会到哈代的数学思想，将有助于读者更准确地领会这部科普经典的精髓。在此向广大数学爱好者郑重推荐此书。

—— 中国科学院院士、《数学文化》杂志主编　汤涛

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内 容 提 要

本书是哈代于1940年写成的心得之作，展现了数学之美、数学的持久性和数学的重要性三大主题。作者从自己的角度谈论了数学中的美学，给众多数学“门外汉”一个机会，洞察数学家的内心。作者还讨论了数学的本质与特点、数学的历史及其社会功能等诸多话题。该书被称为是“用优雅的语言对数学真谛进行了完美的揭示”，原汁原味地向读者展示了一位真正、纯粹的数学家的数学思想，是不可多得的经典读物。

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献给约翰·洛马斯[1]，本书受他之约而作

Preface

I am indebted for many valuable criticisms to Professor C. D. Broad and Dr C. P. Snow, each of whom read my original manuscript. I have incorporated the substance of nearly all of their suggestions in my text, and have so removed a good many crudities and obscurities.

In one case I have dealt with them differently. My §28 is based on a short article which I contributed to *Eureka* (the journal of the Cambridge Archimedean Society) early in the year, and I found it impossible to remodel what I had written so recently and with so much care. Also, if I had tried to meet such important criticisms seriously, I should have had to expand this section so much as to destroy the whole balance of my essay. I have therefore left it unaltered, but have added a short statement of the chief points made by my critics in a note at the end.

G. H. H

18 July 1940

序

我非常感谢查理·布罗德[2]教授和查尔斯·斯诺[3]博士对本书提出了许多有价值的批评意见，他们都读过我的手稿。他们提出的几乎所有建议的精髓都已被我采纳，我借此改正了书中许多经不起推敲或是令人费解的地方。

在处理那些建议时，我对书中的第 28 节采取了不同的做法，它是基于我年初发表在《顿悟》杂志（剑桥阿基米德协会的期刊）上的一篇短文[4]写成的。我发现自己几乎没有办法去改写这篇文章，它是我精心写就的新作。倘若我认真回复那些重要批评，就会把那一节无限扩写，乃至于会破坏随笔的总体平衡。因此，我保留了第 28 节的原貌，只在注记中补充了一小段文字，探讨他们提出的主要观点。

戈弗雷·哈代

1940 年 7 月 18 日

1

It is a melancholy experience for a professional mathematician to find himself writing about mathematics. The function of a mathematician is to do something, to prove new theorems, to add to mathematics, and not to talk about what he or other mathematicians have done. Statesmen despise publicists, painters despise art-critics, and physiologists, physicists, or mathematicians have usually similar feelings; there is no scorn more profound, or on the whole more justifiable, than that of the men who make for the men who explain. Exposition, criticism, appreciation, is work for second-rate minds.

I can remember arguing this point once in one of the few serious conversations that I ever had with Housman. Housman, in his Leslie Stephen lecture *The Name and Nature of Poetry*, had denied very emphatically that he was a 'critic'; but he had denied it in what seemed to me a singularly perverse way, and had expressed an admiration for literary criticism which startled and scandalized me.

He had begun with a quotation from his inaugural lecture, delivered twenty-two years before—

> Whether the faculty of literary criticism is the best gift that Heaven has in its treasures, I cannot say; but Heaven seems to think so, for assuredly it is the gift most charily bestowed. Orators and poets..., if rare in comparison with blackberries, are commoner than returns of Halley's comet: literary critics are less common... .

1

让职业数学家去写一本关于数学的书，他一定会很发愁。数学家的工作应该是去证明新定理、发现新数学，不该谈论自己或其他数学家做了什么。政治家看不起时事评论家，画家轻视艺术评论家，生理学家、物理学家、数学家们通常也有类似的感觉：这是实干家对评论家的藐视，没有比这种藐视更深刻，或总体来说更无可非议的了。解说、评论、品鉴，都是二等人才从事的工作。

我记得，在和豪斯曼[5]为数不多的几次认真谈话里，就有一次对这个话题展开过辩论。豪斯曼在他的莱斯利·斯蒂芬[6]讲座《诗歌的名与实》上，坚决不承认自己是一个“批评家”。在我看来，他表达的方式很荒谬，其对文学批评表示的赞赏，也让我非常震惊。

他以 22 年前就职演说中的一段话作为开头：

> 我不能说，文学批评能力是否是上天赐予我们的最好礼物。但上天似乎是这样认为的，毫无疑问，它是一份最谨慎的馈赠。演说家和诗人……虽然不像随处可见的黑莓，但他们可比哈雷彗星的回归来得常见，而文学批评家则更稀缺……

And he had continued—

In these twenty-two years I have improved in some respects and deteriorated in others, but I have not so much improved as to become a literary critic, nor so much deteriorated as to fancy that I have become one.

It had seemed to me deplorable that a great scholar and a fine poet should write like this, and, finding myself next to him in Hall a few weeks later, I plunged in and said so. Did he really mean what he had said to be taken very seriously? Would the life of the best of critics really have seemed to him comparable with that of a scholar and a poet? We argued these questions all through dinner, and I think that finally he agreed with me. I must not seem to claim a dialectical triumph over a man who can no longer contradict me; but 'Perhaps not entirely' was, in the end, his reply to the first question, and 'Probably no' to the second.

There may have been some doubt about Housman's feelings, and I do not wish to claim him as on my side; but there is no doubt at all about the feelings of men of science, and I share them fully. If then I find myself writing, not mathematics but 'about' mathematics, it is a confession of weakness, for which I may rightly be scorned or pitied by younger and more vigorous mathematicians. I write about mathematics because, like any other mathematician who has passed sixty, I have no longer the freshness of mind, the energy, or the patience to carry on effectively with my proper job.

他继续说道：

在这22年里，我在某些方面有所进步，不过在另一些方面退步了。但我还没有进步到足以成为一名文学批评家；同样，我也没有退步到幻想自己已经是一名文学批评家。

一位伟大的学者和优秀的诗人竟然这样认为，在我看来是很可悲的。几个星期后，当我在大厅里发现旁边坐的是豪斯曼时，便单刀直入地和他聊起了以下话题：他的话当真吗？在他看来，最好的评论家真的能与学者和诗人相提并论吗？整个晚餐，我们都在辩论这些问题，我想他最终同意了我的观点。对一个再也无法反驳我的人[7]，我似乎并不能宣布这次辩论取得了胜利。不过，最终他对第一个问题的回答是“也许不能完全当真”，对第二个问题的回答是“或许不能相提并论”。

人们对豪斯曼的感受可能还有些不解，我也不指望他和我的想法是一致的。但科学家的感受是毋庸置疑的，我和他们有完全相同的体会。当我发现自己的创作只不过与数学“有关”，而并不是数学本身时，那就是在承认自己不行了，我很可能会因此而遭受更年轻、更有活力的数学家的轻视或怜悯。就像其他任何一位年逾花甲的数学家一样，我围绕着数学写作，是因为头脑已经老化，不再有足够的精力和耐心去有效地从事数学本职工作了。

2

I propose to put forward an apology for mathematics; and I may be told that it needs none, since there are now few studies more generally recognized, for good reasons or bad, as profitable and praiseworthy. This may be true; indeed it is probable, since the sensational triumphs of Einstein, that stellar astronomy and atomic physics are the only sciences which stand higher in popular estimation. A mathematician need not now consider himself on the defensive. He does not have to meet the sort of opposition described by Bradley in the admirable defence of metaphysics which forms the introduction to *Appearance and Reality*.

A metaphysician, says Bradley, will be told that 'metaphysical knowledge is wholly impossible', or that 'even if possible to a certain degree, it is practically no knowledge worth the name'. 'The same problems,' he will hear, 'the same disputes, the same sheer failure. Why not abandon it and come out? Is there nothing else more worth your labour?' There is no one so stupid as to use this sort of language about mathematics. The mass of mathematical truth is obvious and imposing; its practical applications, the bridges and steam-engines and dynamos, obtrude themselves on the dullest imagination. The public does not need to be convinced that there is something in mathematics.

All this is in its way very comforting to mathematicians, but it is

2

我打算替数学做一次辩白。也许有人会和我说，数学根本不需要这些，因为当下很少有研究工作能像数学一样，无论出于什么原因，都能被公认为是有益的，并且也值得称道。这也许是真的。事实上，由于爱因斯坦[8]激动人心的成果，在大众眼里，可能只有恒星天文学和原子物理学的地位会比数学高。数学家不必认为自己正处于守势，也不需要面对像布拉德利[9]在维护形而上学时所做的辩白里描述的那种敌意，那份令人钦佩的辩白就是《现象与实在》的引言。

据布拉德利说，人们会对形而上学家说，“形而上学的知识是根本不存在的”，或是“即便在某种情况下它们是存在的，但实际上它们还是没有什么名副其实的内容”。还有人会说：“同样的问题，同样的争论，同样的彻底溃败。为什么不另起炉灶呢？难道没有别的事情值得去做了吗？”没有人会愚蠢到对数学说这种话。大量数学真理的权威性是明摆着的。它的实际应用随处可见，桥梁、蒸汽机和发电机都是例子。不用唠叨，人们就知道数学很有用。

在某种程度上，所有这些都能让数学家感到欣慰，但真正的数

hardly possible for a genuine mathematician to be content with it. Any genuine mathematician must feel that it is not on these crude achievements that the real case for mathematics rests, that the popular reputation of mathematics is based largely on ignorance and confusion, and that there is room for a more rational defence. At any rate, I am disposed to try to make one. It should be a simpler task than Bradley's difficult apology.

I shall ask, then, why is it really worth while to make a serious study of mathematics? What is the proper justification of a mathematician's life? And my answers will be, for the most part, such as are to be expected from a mathematician: I think that it is worth while, that there is ample justification. But I should say at once that my defence of mathematics will be a defence of myself, and that my apology is bound to be to some extent egotistical. I should not think it worth while to apologize for my subject if I regarded myself as one of its failures.

Some egotism of this sort is inevitable, and I do not feel that it really needs justification. Good work is not done by 'humble' men. It is one of the first duties of a professor, for example, in any subject, to exaggerate a little both the importance of his subject and his own importance in it. A man who is always asking 'Is what I do worth while?' and 'Am I the right person to do it?' will always be ineffective himself and a discouragement to others. He must shut his eyes a little and think a little more of his subject and himself than they deserve. This is not too difficult: it is harder not to make his subject and himself ridiculous by shutting his eyes too tightly.

学家几乎不可能会对此感到满意。任何一位真正的数学家一定会认为，数学的口碑所仰仗的并不是这些朴素的实际应用成果，它在很大程度上是出于人们的无知和不解，所以还有更合理的辩词。无论如何，我打算试一试。相较于布拉德利艰难地为形而上学辩白，这应该会简单些。

那么我得问，为什么认真研究数学的确是值得的呢？数学家存在的意义又是什么呢？在很大程度上，我的答案就是数学家的答案：我认为数学研究是值得的，数学家的存在也是有充分理由的。但同时我还要说明，我为数学的辩白也是在为自己说话，这份辩白在某种程度上必然会很本位。如果我认为自己在数学上很失败，那就不会认为有必要为它辩白。

这种本位主义是不可避免的，我不认为真的需要为此辩解。优秀的成果不是由那些“谦虚”的人做出来的。无论什么学科，教授的首要职责之一，便是把他教的课程以及自己在其中的重要性稍作夸大。一个人若总是问自己“我做的事值得吗？”“我是研究这个的合适人选吗？”，那就永远做不好自己，也会让别人情绪低落。他必须不要太在意，稍微拔高一下学科和自身。这点并不难做到，不盲目把它们吹嘘得荒唐可笑才是更难的。