so, the last lesson is about serendipity and about how to find unique and interesting constructions for puzzles

那么，最后一课是关于偶然幸运的发现以及如何为谜题找到独特而有趣的构造

and that is that “serendipity occurs when you are actively searching for good ideas”

那就是「当你主动寻找好想法时，缘分自然会到来」

um you know one thing that is common is that great puzzles are often discovered not invented

你知道，有件事是很常见的，那就是“伟大的谜题往往是被发现出来的而不是被发明出来的”

but you have to be looking out for those discoveries constantly when you're sort of working on puzzles

但当你在创作谜题的时候，你必须不断地去寻找这些发现

I will show you one example this is from our upcoming game

我给你们看一个例子，这是我们即将推出的游戏中的例子

and it was uh you know I would say created

而这个，我说它是创作出来的

but almost I would say it was discovered by one of our puzzle authors

但也几乎可以说它是由我们一个谜题作者发现的

when they were working with a new type of clue that we had just added to the game

这是他们在尝试一种我们刚刚在游戏中加入新的线索时发现的

and I’ll show you what the puzzle is

我来告诉你这个谜题是什么

basically uh whoops let's see if we can open this

基本上说…让我看看是否能打开它

um the way this puzzle system works is there are sort of different types of clues that can go into it

这个谜题网站的工作方式是，下面有很多种不同的线索可以选择加进去

um and you can color the cells in the grid either dark or light colored

这个谜题中，你可以给网格中的格子涂色，可以涂成深色或浅色

um but there are a couple of rules one is that the white cells have to be connected orthogonally

但有几条规则，一是浅色格子必须是直角边连通的

meaning that you know if these are light-colored cells and we make dark cells like this

也就是说，如果这些是浅色的格子，而我们把深色的格子做成这样

then this would disconnect the light-colored part of the grid so that is not allowed

这样浅色部分就不连通了，所以这是不允许的

it's similar to um some other puzzles like uh I don't know nurikabe puzzles

这跟其他一些谜题类似，比如…我不知道…可能《数墙》（Nurikabe）谜题吧

the dark cells all have to be connected here the light cells have to be connected

在那个谜题里面深色格子必须连通，而这里是浅色格子要连通

the other rules are there certain patterns that you have to avoid

其他的规则是，你必须避免某些特定的模式

you cannot have two dark cells adjacent and you cannot have four light cells adjacent

两个深色格不能相邻，也不能有连续四个浅色格子

and then finally this one in a region means exactly one cell in that area is darkened

最后，这个区域中的1意味着这里面有且只有一个格子被涂黑

so this one could be dark and then the rest could be light or this one could be dark and the rest could be light

所以这一格可能是深色，然后剩下这些就得是浅色的，或者这个是深色其它是浅色

and it turns out from just this there is a unique solution to this puzzle

而最后我们可以看到，从这条规则出发，这个谜题有一个唯一的解法

-

and I’ll show you the start of the solution

我给你们展示下这个解法的开头

and basically you look at this region and you think well

基本上来说，你看到这个区域，你会想

okay let's try putting a dark cell there and then these all have to be light

让我们试试在这里放个深色格子，那么这些都得是浅色的

well because of the no four in a row rule these two then have to be dark

因为要求不能有4个连续浅色格子，所以这两个必须是深色

but we said that the dark cells can't be adjacent to one another so that's impossible

但深色格子不能相邻，所以这是不可能的

therefore that one can't be the dark cell

所以这一格不能涂成深色

and similarly none of these other outer ones on the periphery can be dark

同样地，外围这一圈都不能涂成深色

so in fact the middle one is the dark cell

所以事实上，中间那个得涂成深色

and then you get a lot of three in a row

然后这里有很多连续三个浅色格子

so you have to block off all of the possible four in a rows

所以你必须把所有可能的连续四个都阻挡掉

and then you can't have two dark cells adjacent to one another so these ones all have to be light

然后不能有两个相邻的深色格子，所以这些格子都必须是浅色的

and then I mean the light cells all have to be connected

然后，由于浅色格子必须是连通的

so you this light cell has to move upwards,

所以这个浅色格子必须通过上方与外面连通

if this was dark then this light cell would be disconnected for everything so that's light

如果这是深色的，那么就会把它断开，所以这里得是浅色的

and then this cell here you know if there was four in a row here then that would violate the rule so this cell has to be dark

然后这个格子，如果这里有四个连在一起，那就违反了规则，所以这个必须是深色

and then this light area has to escape so it's got to go out here

然后这个浅色区域必须和外面连通，所以它必须从这里出去

and then there's three in a row here so that one has to be dark

然后这里有三个连续的，所以这一格必须是深色

and we just keep going

就这样继续下去

there's three in a row here

这里有三个连在一起

this puzzle doesn't stop the logic of how you solve this thing

这个谜题不会阻断你解决这个谜题的逻辑

just keeps flowing and it turns out that from this initial just you know one in a square in the corner there's a unique solution to this puzzle

你会一直持续这个过程，从最初角落那个1一直到最后唯一的解

and it's quite remarkable uh and I asked the creator of this his name is Jeffrey Barton

这很了不起，我问过这个谜题的创作者，他叫Jeffrey Barton（音）

how he came upon this and he says I don't know I just got lucky I just found it

他说：“我不知道，我只是很幸运，我就是发现了它

I was just kind of I put this one region in because I thought the one region was kind of interesting and was very forcing

我只是想把这个1的区域放进去，因为我觉得这个区域很有趣，能迫使很多结果出现

and then I realized that you could really get a lot from it

然后我意识到你真的可以从那里面得到很多东西

and I found a place to put it where there was just one single unique solution

然后我找了个地方，把它放到一个只会出现一个唯一解的地方”

and that was remarkable it was amazing

这是很了不起的，很令人惊叹的

and everybody who test solved this puzzle remarked that like this is a fantastic puzzle this is very exciting

每个测试过这个谜题的人都说这是一个神奇的谜题，非常令人兴奋

-

there's another example called “The Miracle” sudoku which was done by Mitchell lee

另一例子是一个叫做“The Miracle”的数独，由Mitchell Lee创作的

you can look it up on YouTube it's one of the most famous sudoku puzzles on YouTube

你可以在YouTube上找到它，它是YouTube上最著名的数独谜题之一

it has only two givens and it has some extra rules

它里面只给了两个数，以及有一些额外的规则

like for example uh numbers that are knights move away from each other cannot be the same

比如像马一样走日字的两个格子的数字不能是相同的

there's some additional extra rules but using only two givens the whole puzzle can be solved

还有一些额外的规则，但是只给了两个数，这整个谜题就能被解出来

and the YouTube video the solver uh he's a guy named Simon on Cracking the Cryptic

在这个YouTube视频中，解谜者是油管频道Cracking the Cryptic的Simon

he can't believe that this thing has a solution

他不相信这东西能解出来

he thinks that somebody's joking with him that somebody has pranked him

他以为有人在和他开玩笑，有人在搞恶作剧

and when he finally realizes that this puzzle actually works his jaw hits the floor

而当他最终意识到这个谜题真的可以解出来时，他的下巴都快掉到地上了

fantastic video highly encourage you to watch it

很精彩的视频，强烈建议你去看看

（译者注：youtube.com/watch?v=yKf9aUIxdb4）

but you know the question again how do you make these discoveries

但你知道问题又来了，你要如何才能做出这些发现？

one thing is to notice your own eureka moments and turn them into puzzles

一是要注意你自己感受到的尤里卡时刻，并把它们变成谜题

uh but another thing is just be actively searching for things that seem like there might be more there than you expect

另一方面，去积极寻找那些看起来会超出你预期的东西

another example Jonathan blow was talking about this puzzle from the witness

另一个例子是Jonathan blow在谈论《见证者》中的这个谜题的时候

and somebody asked him how did you get it to work

有人问他，你是怎么做到的？

and this particular puzzle is quite remarkable

这个谜题相当了不起

essentially you're solving a grid puzzle which simultaneously is making paths on the floor that you can walk on

从本质上讲，你要解决的是一个网格谜题，你画的线会同时在前面的地上产生出你可以行走的道路

and you can only edit the blue part of the grid from one side and you can only edit the orange part of the grid from the other side

并且你站在这边只能编辑网格中蓝色部分，你只能到另一边去编辑橙色部分

and you actually have to physically walk on the path to get to the other side to be able to edit the other one

你实际上得从这个道路上走过去才能编辑另一个

and you have to go back and forth like five times in order to actually get to the final state of this puzzle

你必须来回走大概五次，才能真正达到这个谜题的最终状态

um but the sort of journey you're taking when doing that is remarkable

但你在解这个谜题的时候所经历的那种旅程是很了不起的

and the fact that it works at all seems outlandish outstanding like somebody must have been a genius to put this thing together

而这做出来是非常奇特非常出色的，就像是个天才把这些东西组合到一起

and no doubt this is a very clever and very uh beautifully crafted puzzle

毫无疑问，这是个非常聪明的谜题，而且做得非常漂亮

but when john was asked how he was able to figure this out

但当吹哥被问到他是如何想出这么做的时候

he kind of said well you know I started putting stuff together and then towards the end he kind of just got a bit lucky

他说，我最开始就把这些东西放到一起，然后到最后有点幸运，就弄出来了

um you know the fact that you had to go back and forth five times the fact that that kind of just worked out you know he was just able to make it work

你知道…这样来回走五次…这样能够做出来…

um and it's kind of difficult sometimes to learn why you were able to make it work it just turned out that way

有时很难知道为什么你能成功构造出来，它最后就是突然就成了

and this type of serendipity happens a lot when you're creating puzzles

这种机缘巧合在你创作谜题时经常发生

sometimes you will just find that you're able to do something a little bit remarkable or even more remarkable than you thought

有时你会发现你能做一些非常了不起的事情，或者比你想象中的还要出色的事情

every puzzle creator has had moments in their life or in their career of creating puzzles

每个谜题创作者在他们的生活中，或者在他们的谜题创作生涯中，都有过这样的时刻

where for whatever reason they were able to like obtain an unexpectedly exciting or fantastic result because it just happened to work out

无论什么原因，他们能够获得一个意想不到的奇妙结果，因为它碰巧就能够实现

and as a puzzle creator I think that one of the most important lessons is to be actively looking for these opportunities and seize them

而作为一个谜题创作者，我认为最重要的经验之一就是要积极寻找这些机会并抓住它们

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I will give you a quote from Raf Peeters

我引用Raf Peeters的一段话

who's I think he's the founder of Smart Games or he's one of the guys who's created a lot of puzzle for Smart Games

我想他应该是SmartGames的创始人，或者说他为SmartGames制作了很多谜题

um this is one of his puzzles “penguins on ice”

这是他的一个谜题《Penguins On Ice》

and in describing this puzzle he talked about uh how he came upon the theme for it

在描述这个谜题时，他谈到了他是如何想到这个主题的

why it was sort of these penguins on ice as sort of a pentomino puzzle

以及为什么是冰上企鹅这样的五格骨牌的谜题

and there's a unique mechanic where these pentominos can slide next to each other

这里面有个独特的机制，这些五格骨牌内部可以滑动

so that polyamino can go from an F pentomino to a P pentomino to a W pentomino as sort of these two blocks up top slide over here and over here

所以这个骨牌可以变成F型再到P型再到W型，因为上面这两个块可以在这里和这里滑动

and this one as well this block sort of slides up and down so it could be a Y pentomino or an L pentomino

这块也是，这块可以上下滑动，所以它可以变成Y型或L型

and you know this is the quote “the most important idea is: you don't find good ideas by luck

这段话是“最重要的一点是：你不能光靠运气找到好的想法，

you find them by actively searching for them and actively trying hard to recognize the potential in the things you discover

你要通过积极寻找他们并积极努力去认识你所发现的事物的潜力，来找到好的想法

often one small innovation isn't that valuable

通常情况下，一个小创新并不那么有价值

but a combination of many small things may produce something that brings your creation to a whole new level”

但许多小东西组合起来就能产生一些东西，就能使你的创造达到一个全新的水平。”

and he was referencing um the theme of the puzzle and why he chose to make it penguins and ice

他指的是......这个谜题的主题，以及他为什么选择企鹅和冰。

他谈到了这个谜题的主题，以及他为什么选择企鹅和冰来做主题

one thing is that the penguins uh made it clear that there was a top and a bottom

一是，上面的企鹅能清楚地表示这个谜题有顶部和底部

so, it made clear that the puzzles could not be flipped

所以，它清楚地表明了这个谜题是不能翻转的

the sliding allowed the pieces to reach more configurations which made a more possible instances of the puzzle

而滑动则允许每个部件有更多的构造，这使得谜题中有更多的可能的情况

the way the puzzle works by the way is you get a card that shows you where the penguins ultimately have to be in the finished puzzle

顺便说下这个谜题的玩法是，你有一张卡片，上面写着企鹅在完成的谜题中的最终位置

and then you have to find a way to slide the ice blocks and build the puzzle so that the penguins lie in the right spots

然后你必须找到一种方式滑动这些部件，然后放入到里面使得企鹅位于正确的位置上

but like there's a lot of pentomino puzzles out there

但是市面上有很多这种五格骨牌的谜题

and he wanted to make one that had fewer moving parts so that it was easier to manufacture and less frightening

而他想做这样一个谜题，其中活动部件较少，这样更容易制造，也不太劝退

and didn't seem like a really complicated puzzle

并且不会看起来使一个非常复杂的谜题

he wanted it to look simple and be more elegant

他想让它看起来更简单，更优雅

and the sliding added back the interestingness that was lost when the number of puzzles were removed

而这些滑动的部分又把因为减少部件数量而失去的有趣性给弥补了回来

um and sort of the theme made it less abstract and sort of more fun and playful

而这个主题让它不那么抽象，而且更有趣味性和游戏性

and by putting all of these things together

通过把所有这些东西放到一起

he was able to create something that was far more exciting and compelling and interesting than just a pentomino puzzle where you're putting blocks in a grit

他能够创造出比起一般的五格骨牌更刺激、更引人注目、更有趣的谜题

and the sort of synergy of the theme with the idea that you can't flip them over with the playfulness

而这个主题和你不能将其翻转这个想法，以及整个谜题的乐趣

and the sliding of the puzzle and somehow ice sliding into different configurations

还有谜题中的滑动操作以及这些冰能够通过滑动组合出不同的结构

feels like it makes sense

这些一起协同作用，让这个谜题感觉起来有意义

um it just ends up being more than the sum of its parts

最终，它比其各部分的总和拥有更多东西

and that idea was a combination of many small things that each in and of themselves wasn't that valuable

而这个想法是由许多小东西组合起来的，每个东西本身并不那么有价值

but somehow added up to a really great result

但以某种方式把这些加起来就有了一个非常棒的结果

and the way he was able to do this you know he chalks it all down to

而他能够做到这一切的原因，他把这一切归结为

just being alert and looking for those things uh trying really hard to recognize the potential in every little possible innovation you might see

警觉地去寻找这些东西，努力去认识你能看到的每一个小创新的潜力

um and that's something that as a puzzle creator you're constantly doing for your whole career

作为一个谜题创作者，这就是你在整个职业生涯中一直做的事

you're trying to notice the little eureka moments that you're having when playing around with the parts

你要注意到你在玩这些部件时所出现的尤里卡时刻

and uh trying to find ways to cultivate more depth from those eureka moments

并试图找到方法从这些尤里卡时刻中培养出更多的深度

-

so that's the end of the talk

那么这个讲座就结束了

this is the sort of summary slide where we show all of the uh the tips or the lessons or the rules um

这是一张总结的幻灯片，上面是我们之前讲的所有这些小诀窍、经验以及规则

you know we've been here a while this is the extended sort of director's cut version of this talk there's a lot there um

你知道，我们已经讲了好一会了，这是讲座的扩展版本，类似于导演剪辑版，有很多内容

you know if you if you came from the GDC talk uh i knew it was a bit rushed

如果你是从当时GDC讲座中来过来的，我知道当时有点仓促

I apologize it's hard to cram all this stuff into an hour

我很抱歉，要把这些东西都塞进一个小时里是很难的

uh here it feels like I’ve had a bit more room to breathe and more to give a bit more nuance and discussion to the topics uh

而在这次讲座就不这么赶了，我有更多空间发挥，可以对这些主题进行更多细节上的探讨

if you like this stuff I will probably be making more videos on it in the future

如果你喜欢这些东西，我可能会在之后制作更多相关内容的视频

although I don't know how soon because game number three is very uh demanding of my time right now

虽然近期可能不行，因为我们现在第三个游戏的开发很花时间

but um yeah that's sort of the puzzle design uh GDC talk or extended version of it uh

那么，这就是我们谜题设计GDC研究的扩展版了

I hope this was useful uh

我希望这对你有帮助

I love talking about any and all things puzzle related

我很细探讨所有与谜题有关的事情

uh please contact me I love playing demos of puzzle games or betas or early access games

请和我联系，我很喜欢玩解谜游戏的Demo或者测试版或者抢先体验版

I love giving feedback on them so please share them with me and i would love to share with you my thoughts

我喜欢给予一些反馈，所以请和我分享你的游戏，我很乐意和你分享我的想法

if you are a puzzle designer and you are looking for a job in video games

如果你是一个谜题设计师，并且正在寻找一份电子游戏方面的工作

talk to me I’ve gotten lots of puzzle designers jobs in video games

请联系我，我这里有很多电子游戏谜题设计师的职位

I’ve also hired many of them myself um either way talk to me

我也已经雇用了很多人，不管怎样，请联系我把

and yeah that's the end of the talk

那么这次讲座就结束了

have a good one

祝你过得愉快，玩得开心