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artificial intelligence：Your move

人工智能：该你行动了

How AI can make board games better

人工智能将如何改善桌游

【1】Board games have long fascinated **artificial**-intelligence (AI) researchers. They have clear rules, well-**defined** playing fields and objective winners and losers. This makes them perfect "sandpits" for training AI software. Sometimes, though, their rules contain **glitches**. Aficionados of Go will be familiar with ko fights—**situations** in which the basic rule set would **permit** a game to carry on for ever, and for which an exception had to be created. Avoiding similar problems in newly invented games is something AI can help with.

一直以来，桌游都吸引着人工智能研究人员的注意。由于有着明确的规则、界定清晰的游戏场地以及客观的胜负标准，桌游成为了训练人工智能软件的理想"沙盒"。但有时，这些规则也存在漏洞。比如，围棋爱好者都很熟悉的"劫争"———在基本规则之下，游戏会无限进行下去，所以必须创造一个例外规则来解决此类问题。而AI就能在此时派上用场，防止新设计的

artificial /ɑːtɪˈfɪʃ(ə)l/ adj.人造的,人工的,人为的,假的,非自然的,虚假的,假装的 Their cheerfulness seemed rather strained and **artificial**.他们的快乐表情看上去很勉强而做作。

1

defined /dɪˈfaɪnd/ v.定义,界定,明确,解释(词语)的含义,给(词语)下定义,阐明,画出…的线条,描出…的外形adj.轮廓分明的,外形清晰的define的过去分词和过去式 Leisure is usually **defined** in opposition to work.休闲常被定义为工作的反面。

glitches /glɪtʃ/ n.小故障,小毛病,小差错glitch的复数 There is a glitch in the computer program somewhere.这个计算机程序中的某个部分有点小问题。

situations /ˌsɪtʃʊˈeɪʃnz/ n.情况,状况,形势,局面,(建筑物或城镇的)地理位置，环境特点,职业,工作岗位situation的复数 We have all been in similar embarrassing situations. 我们都遇到过类似的尴尬局面。

permit /pəˈmɪt/ n.许可证,特许证(尤指限期的)v.允许,准许,使有可能 The law **permits** (not **permits** of) camping on the beach.法律允许（不能用 permits of) 在海滩上宿营。

2

designer /dɪˈzaɪnə/ n.设计师,设计者,构思者adj.由著名设计师设计的,标有设计师姓名的,名牌的 The **designer** has chosen the complementary colours blue and orange. 设计师选取了蓝和橙黄两种对比色。

interstellar /ˌɪntəˈstelə/ adj.星际的 Also, as our sun orbits the galactic center it may sweep through areas of **interstellar** dustiness.同样，因为太阳位于重力中心，它可能会清除有星际尘埃区域。

merchants /ˈmɜːtʃənts/ n.商人,批发商,(尤指)进出口批发商,(某活动的)爱好者,热衷于…的人merchant的复数

illicit /ɪˈlɪsɪt/ adj.非法的,违法的,违背社会常规的,不正当的 She slipped outside for an **illicit** cigarette.她溜出去违禁吸烟。

checking /ˈtʃekɪŋ/ v.检查,审查,核查,检验,查明,查看,核实,弄确实,控制,抑制,阻止check的现在分词 Inspectors checked that there was adequate ventilation.检查员已检查过，通风良好。

involved /ɪnˈvɒlvd/ adj.卷入的,参与,作为一部分,有关联,耗费很多时间,关注,关系密切,复杂难解的v.牵涉,包含,需要,使成为必然部分(或结果),牵连,影响,(使)参加，加入involve的过去分词和过去式 It all sounds terribly **involved** and complicated.这事听起来非常错综复杂。

3

游戏出现这种问题。

【2】That, at least, is the experience of Alan Wallat, a board-game **designer** from London. His latest offering is Sirius Smugglers, in which **interstellar merchants** try to make an **illicit** profit. In the olden days, **checking** its rules would have **involved** lots of tests by human players, who would probably have wanted to be paid—in beer, perhaps, if not in cash.Panda Foreign Magazine intensive Reading:Respect for Originality, Piracy Must Be Punished

至少，这是伦敦桌游设计师艾伦·沃拉特（Alan Wallat）的经验之谈。他的新作《天狼走私者》（Sirius Smugglers）讲述了一群星际商人通过非法交易谋取暴利的故事。如果放在以前，检查规则需要大量真人玩家进行测试，他们大多希望获得报酬，就算不是现金，至少也要几杯啤酒。

【3】Instead, he took his **brainchild** to Tabletop R&D, an AI **startup**, where a game-playing algorithm allowed him to play thousands of times in the **blink** of an eye. He was then able to **scan** the results for irregularities, **statistical** biases and any features that were under- or over-used.

但这次，艾伦·沃拉特将自己的创意之作带到了Tabletop R&D，一家人工智能初创公司。

在那里，游戏算法让他可以在瞬间进行数千次游戏。他随后分析这些数据，寻找规则漏洞、统计偏差，以及使用不足或过度使用的游戏机制。

【4】It was here he discovered a problem. A **quirk** in the rules meant the decision to end the game could rest with the losing players. Whoever was ahead, and therefore had the greatest **incentive** to bring matters to a close, was sometimes unable, alone, to **trigger** the

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brainchild /'breɪntʃaɪld/ n.(个人或小群体的)主意，发明 the statue is the **brainchild** of a local landscape artist.这座雕像是当地一位风景画家的作品。

startup /'stɑːt̩ʌp/ n. 启动；新兴公司（尤指新兴网络公司）Yesterday, Rimula experienced a solid start-up course.昨天，劲霸经历了坚实的创业历程。

blink /blɪŋk/ v.眨眼,闪烁n.眨眼睛 A little lantern **blink**ed in the darkness.一盏小灯笼在黑暗中微微闪光。

scan /skæn/ v.(X射线、超声波、电磁波等)扫描,浏览,审视,细看,察看,端详,粗略地读,翻阅,（为搜索病毒而）扫描（文件），(用扫描设备)扫描（图像或文件等),符合韵律n.浏览,扫描检查,胎儿扫描检查,快速查阅 I **scan**ned through the reference materials.我浏览了一遍参考资料。

statistical /stə'tɪstɪk(ə)l/ adj.统计的,统计数据的;统计学的 He showed the price fluctuations in a **statistical** table.他用统计表显示价格的波动。

4

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quirk /kwɜːk/ n.怪癖,怪异的性格(或行为),(尤指偶发的)怪事，奇事 All men have their own **quirk**s and twists.人人都有他们自己的怪癖和奇想。

incentive /ɪn'sentɪv/ n.激励,刺激,鼓励 Money is still a major **incentive** to most people.对于大多数人来说, 金钱仍是主要的刺激物。

trigger /'trɪɡə/ vt.引发，触发,引起,发动,开动,起动n.触发器,(枪的)扳机,(尤指引发不良反应或发展的)起因，诱因,引爆器 A six pulse trigging module is used for **trigger**.上述两块电路板构成的控制单元可以实现恒流变速锯切。

condition /kən'dɪʃ(ə)n/ n.条件,状态,状况,健康状况,(因不可能治愈而长期患有的)疾病,环境，境况，条件,物质环境，状态，条件,（先决）条件,（某群体的）生存状态,处境vt.训练,使习惯于,使适应,对…具有重要影响,影响(某事发生的方式),保持(头发或皮肤等)的健康,养护 He ascribed his failure to objective **condition**s.他把失败归咎于客观条件。

indefinitely /ɪn'defɪnətli/ adv.无限期地 Might it be possible to prolong life **indefinitely**?有可能无限延长寿命吗？

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champions /'tʃæmpiənz/ n.冠军,第一名,优胜者,斗争者,捍卫者,声援者,拥护者v.为…而斗争,捍卫,声援champion的第三人称单数和复数

superhuman /ˌsuːpə'hjuːmən/ adj.超出常人的,非凡的 Angels are **superhuman** beings.天使是超人。

potential /pə(ʊ)'tenʃ(ə)l/ adj.潜在的,可能的n.可能性,潜在性,潜力,潜质,电位,电势,电压 It was a **potential**ly lethal mixture of drugs.这种混合药物有很大的潜在危险。

6

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resource /rɪ'sɔːs/ n.资源,财力,有助于实现目标的东西,资料,勇气,才智,谋略vt.向…提供资金(或设备) Mutual Exclusion–not required for sharable **resource**s; must hold

condition which would finish the game. Like Go without the ko-fight exception, Sirius Smugglers could thus go on **indefinitely**.

在测试中，他发现了一个漏洞。规则中的一个小漏洞导致，决定游戏结束的权利可能掌握在输家手中。而游戏中领先的玩家，也是最想结束游戏的一方，有时却无法单方面触发结束游戏的条件。就像没有"劫争"这一例外规则的围棋一样，《天狼走私者》也因而可能无限进行下去。

【5】The minds behind Tabletop, Diego Perez-Liebana and Raluca Gaina, are computer scientists at Queen Mary, a college of the University of London, who wanted to build a general games-playing AI platform on the cheap. The approach which built the AI models that could play Go well enough to beat world **champions involved** a system playing itself, over and over again, and learning from its victories and defeats until it reached **superhuman potential**.

Tabletop的两位创始人，迭戈·佩雷斯·利埃巴纳（Diego Perez-Liebana）和拉露卡·盖纳（Raluca Gaina），是伦敦大学女王玛丽学院的计算机科学家。他们希望以低成本构建一个通用的AI游戏平台。那些能在围棋中战胜世界冠军的AI，正是通过不断与自己对弈，在胜负中学习，最终达到超越人类的水平。

【6】But that requires a lot of computing time. Instead, they chose to use a less **resource-intensive** approach called a Monte Carlo tree search, to look forward to possible future positions and choose **appropriate** play from among them. It was intended as an academic exercise, says Dr Perez-Liebana, but in doing it they realised they had **accidentally** developed a tool that had value in its own right as an aid for game **designers seeking** to perfect their **creations**.Panda

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for nonsharable **resources**.一个进程因请求资源而阻塞时，对已获得的资源保持不放。

intensive /ɪn'tensɪv/ adj.短时间内集中紧张进行的,密集的,彻底的,十分细致的,集约的n.加强器,[语]强义词,强调成份 I'll make an **intensive** study of a subject.我将集中学一门课程。

appropriate /ə'prəʊprɪət/ adj.适当的,合适的,恰当的vt.盗用,挪用,占用,侵吞,拨(专款等) This hall is **appropriate**d to silent reading.这个大厅专供阅览之用。

accidentally /ˌæksɪ'dentəlɪ/ adv. 意外地；出其不意地；不知不觉地；不知道为什么恰巧 The abortion arose from an accidental fall.流产是由于(孕妇)不慎摔倒所致。

designers /dɪ'zaɪnəz/ n.设计者,构思者designer的复数

seeking /si:k/ v.寻找,寻求,谋求,争取,(向人)请求seek的现在分词 We are earnestly **seeking** after the truth.我们热切地追求真理。

creations /kri(ː)'eɪʃənz/ n.创造,创建,作品,创作,(尤指《圣经》所述由上帝)创造天地creation的复数

liable /'laɪəb(ə)l/ adj.有责任的,(法律上)负有偿付责任,可能(做某事),可能受…影响,可能受法律惩处,必须按法律做（某事） Wage earners are **liable** to income tax.劳动者应交纳所得税。

chase /tʃeɪs/ v.追赶,追逐,追捕,努力获得,争取得到,追求,求爱,催促,急奔,镂刻n.追赶,追捕,追逐,努力获得,争取,打猎 She ran in **chase** of the pram.她跑着追那婴儿车。

strategic /strə'tiːdʒɪk/ adj.战略的,战略性的,根据全局而安排的,战略上的 The bridge is of **strategic** importance to us.这座桥对我们至关重要。

refuses /rɪ'fjuːzɪz/ v.拒绝,回绝,推却,拒绝给(所需之物)refuse的第三人称单数

sacrifice /'sækrɪfaɪs/ n.牺牲,舍弃,祭献,祭祀,祭献的牲畜,祭品v.牺牲,献出,以(人或动物)作祭献 They **sacrifice**d a lamb to the gods.他们以羔羊祭祀众神。

pieces /piːs/ n.片,块,段,截,标准的量,碎片,碎块,零件,部件v.修补,接合,凑合piece的第三人称单数和复数 I gave her a piece of candy in trade for a piece of gum.我给她一块糖换她一块口香糖。

subtle /'sʌt(ə)l/ adj.不易察觉的,不明显的,微妙的,机智的,机巧的,狡猾的,巧妙的,敏锐的 Her whole attitude had undergone a **subtle** change.她的整个态度发生了微妙的变化。

assigned /ə'saɪnd/ v.分配(某物),分派，布置(工作、任务等),指定,指派,委派,派遣assign的过去分词和过去式 They have **assigned** me a small room.他们已给我分配了一个小房间。

hidden /'hɪdn/ adj.隐藏的,难以看见(或发现)的,(地方)隐秘的v.藏,隐蔽,躲避,隐匿,遮住,遮挡hide的过去分词n.（观看野生动物的）隐蔽处,毛皮,（困境中的）生命 They must be **hidden** among the trees.他们准是藏在树林里了。

Foreign Magazine intensive Reading:Respect for Originality, Piracy Must Be Punished

然而，这种方法需要大量计算资源。于是他们转而选择了一种资源消耗较少的方法——蒙特卡洛树搜索。这种方法能够预测未来可能出现的游戏局面，并以此从中选择合适的玩法。佩雷斯·利巴纳博士表示，这原本只是一次学术练习，但在过程中，他们意识到自己意外开发了一种工具。这种工具本身就极有价值，可以帮助游戏设计师完善他们的作品。

【7】Thinking caps on

For this to happen, the AI must be taught to play like a human. Unless told otherwise, AIs are **liable** to **chase** victory single-mindedly but without **strategic** vision, like a chess player who **refuses** to **sacrifice pieces** for a stronger long-term position. This training can be **subtle**. In games where players are **assigned** information **hidden** from their **opponents** (for example, in card games like bridge or **poker**, where others cannot see a player's hand), **designers** must decide whether to give the AI the ability to memorise play so far and to count the pack perfectly, or else to act in a sloppier—and more humanlike—manner.

深度思考

但要实现这一点，AI必须学会像人类一样下棋。默认情况下，AI 可能会不顾一切地追求胜利，却缺乏长远策略，就像一个不懂得弃子换取更大利益的棋手。因此，训练 AI 需要一定的技巧。在一些游戏中，玩家的某些信息无法为对手所知（如桥牌或扑克等纸牌游戏中，其他人无法看到玩家的手牌），这就需要设计者做出权衡——是让 AI 具备完美记忆与精准计算，还是让它表现得更"随性"，更贴近人类的思维方式。

【8】Giving the AI more time to think, and so plan for a **wider** range of outcomes, is equivalent to

opponents /ə'pəʊnənts/ n.对手,竞争者,反对者,阻止者 opponent的复数

poker /'pəʊkə/ n.扑克,扑克牌游戏,通条,拨火棍 you'd be no good at **poker**—you're too transparent.你扑克牌打得不会很好——你太容易被别人看出心思了。

wider /waidə/ adv.尽可能远地,充分地adj.宽的,宽阔的,…宽的,宽度为…的,大量的,广泛的,范围大的wide的比较级 The proposal carried by a wide margin.提案获得多数通过

adjusting /ə'dʒʌstɪŋ/ v.调整,调节,适应,习惯,整理adjust的现在分词 He quickly adjusts to the unfamiliar environment.他能很快适应陌生的环境。

simulate /'sɪmjʊleɪt/ vt.(用计算机或模型等)模拟,模仿,假装,冒充,装作adj.同"simulated" The pilot's skills are tested through simulation.飞行员的技术是通过模拟飞行来检测的。

beginners /bɪ'gɪnəz/ n.初学者,新手·beginner的复数

instinct /'ɪnstɪŋ(k)t/ n.本能,天性,直觉adj.充满的 The nesting **instinct** is proper to birds.筑巢是鸟类的本能。

mimic /'mɪmɪk/ v.模仿(人的言行举止),(外表或行为举止)像n.会模仿的人(或动物)adj.模仿的,拟态的 One of my brothers is a wonderful **mimic**.我的一个兄弟很善于模仿。

competence /'kɒmpɪt(ə)ns/ n.能力,胜任,(法庭、机构或人的)权限,管辖权,技能,本领 We knew her **competence** in solving problems.我们都知道她解决问题的能力。

resulting /rɪ'zʌlt/ v.(因…)发生,(随…)产生result的现在分词 The results of this experiment don't correlate with the results of earlier ones.这次试验的结果与以往试验的结果毫不相干。

weighty /'weɪtɪ/ adj. 重要的;沉重的;重大的;重的;严重的 比较级: weightier, weightiest 副 词: weightily 名 词: weightiness a **weighty** tome.一本甸甸的大部头书。

strategy /'strætɪdʒɪ/ n.策略,计策,行动计划,策划,规划,部署,统筹安排,战略,战略部署 The nation's geopolitical **strategy** is yet uncharted.该国的地缘政治的策略还不被人所知

admits /əd'mɪts/ v.承认(过错、罪行),招认,招供,准许…进入(某处)admit的第三人称单数

capable /'keɪpəb(ə)l/ adj.有能力,有才能,能力强的,足以胜任的 His wife, Electra, was a **capable** helpmeet.他的妻子爱勒克特是个能干的内助。

defeating /dɪ'fiːtɪŋ/ v.击败,战胜,使困惑,难住,使失败,阻挠,挫败defeat的现在分词

detailed /'diːteɪld/ adj.详细的,细致的,精细的v.详细列举,详细说明,详述,派遣,选派,分遣,彻底清洗(汽车)detail的过

adjusting the skill with which it plays. To **simulate beginners**, it can be set to act as if on **instinct**, after less than a tenth of a second. To **mimic competence** it is allowed to think for as long as five seconds per move, and is therefore able to plan many moves ahead.

给AI更多时间思考，让它规划更广泛的结果，相当于在调整它的下棋技巧。在模拟新手棋手时，AI可设置在不到十分之一秒的时间内做出下意识的决策。

而如果要模仿熟练棋手，则可以让它每步思考长达 5 秒，以便制定更深远的策略。

【9】When they're good, they're good, says Dr Gaina of the **resulting** models. Testing the approach with a copy of Terraforming Mars, a famously **weighty strategy** title, she **admits** she found the system was more than **capable** of **defeating** her.

"AI在表现良好时的确很出色。"盖娜博士这样评价生成的模型。在测试一款名为《火星改造》的著名重量级策略游戏时，她坦言系统已经完全有能力战胜她。

【10】A game-run provides enough **detailed** data to let **designers tweak** the **parameters** they care about, from ensuring **proceedings** are fair to avoiding long **periods** of **dull gameplay**. At least, that is the plan. Mr Wallat is Tabletop's first customer. More may soon be **tempted**. Fun is hard to measure, says Dr Gaina, but things that make a game bad, never-endingness among them, are easier to spot.

运行一场游戏能够提供足够详细的数据供设计者分析，让他们以此调整自己关心的各项参数，以此确保游戏公平，同时也能避免长时间无聊的游戏过程。至少，这是他们的初衷。沃拉特先生是Tabletop的第一位客户，而很快也许会有更多人被吸

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①短语：
1. 原文：their rules contain glitches. Aficionados of Go will be familiar with ko fights
词典：be familiar with：To have a good knowledge or understanding of something.
熟悉；通晓；精通
例句：She is familiar with the company's procedures.
她熟悉公司的流程。
Are you familiar with this software?
你熟悉这个软件吗？
He is not familiar with local customs.
他不熟悉当地的习俗。

2、 原文：situations in which the basic rule set would permit a game to carry on for ever,
词典：carry on：To continue doing something.
继续；坚持
例句：Despite the interruption, she carried on with her presentation.
尽管受到干扰，她还是继续了她的演讲。
Carry on with your work while I am away.
我不在时，你们继续工作。
He told us to carry on without him.
他让我们在没有他的情况下继续。

3、 原文：who would probably have wanted to be paid—in beer, perhaps, if not in cash.

引。盖娜博士说，虽然游戏的乐趣难以量化，但毁掉一款游戏的因素则很容易被发现，无穷无尽的游戏时间就是其中之一。

②长难句
1、原文：In the olden days,checking its rules would have involved lots of tests by human players,who would probably have wanted to be paid—in beer, perhaps, if not in cash.
2、分析：本句话中In the olden days为时间状语，动名词checking its rules作主语，would have involved为谓语，lots of tests为宾语，by human players为介词短语，后为定语从句。从句中would probably have wanted为谓语，to be paid为不定式作宾语，破折号后为插入信息，对支付方式进行详细说明。
3、译文：如果放在以前，检查规则需要大量真人玩家进行测试，他们大多希望获得报酬，就算不是现金，至少也要几杯啤酒。

1、原文：The minds behind Tabletop,Diego Perez-Liebana and Raluca Gaina,are computer scientists at Queen Mary, a college of the University of London,who wanted to builda general games-playing AI platform on the cheap.
2、分析：The minds behind Tabletop为主语，Diego Perez-Liebana and Raluca Gaina为主语的同位语，are为系动词，computer scientists为表语，at Queen Mary, a college of the University of London为地点状语，后为定语从句。wanted to build为谓语，a general games-playing AI platform为宾语，on the cheap为介词短语。
3、译文：Tabletop的两位创始人，迭戈·佩雷斯·利埃巴纳（Diego Perez-Liebana）和拉露卡·盖纳（Raluca Gaina），是伦敦大学女王玛丽学院的计算机科学家。

③**写作技巧**：
This makes them perfect"sandpits" for training AI software. Sometimes, though, their rules contain glitches.
表达："Sandpits for…" 是一个常见的比喻表达，通常用于描述一个安全的、实验性质的环境，用来进行尝试、测试或开发。这个表达来源于实际的"沙坑"（sandpit），沙坑是孩子们用来玩耍的地方，它提供了一个无风险的环境，孩子们可以在这里尽情探索和试验，而不必担心会破坏什么。这种表达通常带有一种轻松、容错的意味，适用于需要尝试、失败和改进的情况。在技术和AI等领域，

词典：in cash：Using physical money such as coins or banknotes.
以现金形式
例句：Do you prefer to pay in cash or by card?
你更喜欢用现金还是刷卡支付？
He bought the car in cash.
他用现金买了这辆车。
Please bring the exact amount in cash.
请携带准确金额的现金。

4、 原文：where a game-playing algorithm allowed him to play thousands of times in the blink of an eye.
词典：in the blink of an eye：Very quickly; in an extremely short time.
转瞬之间；一眨眼的功夫
例句：The thief disappeared in the blink of an eye.
小偷转瞬之间就消失了。
Life can change in the blink of an eye.
生活可能在一眨眼的功夫就发生变化。
The event was over in the blink of an eye.
活动在转瞬之间就结束了。

5、 原文：A quirk in the rules meant the decision to end the game could rest with the losing players.
词典：rest with：To be the responsibility of someone.
取决于；在于
例句：The final decision rests with the committee.
最终决定权在于委员会。
It rests with you to make the next move.
下一步行动取决于你。
The responsibility rests with the manager.
责任在于经理。

6、 原文：to look forward to possible future positions and choose appropriate play from among them.
词典：look forward to：To anticipate something with pleasure.
期待；盼望
例句：I look forward to meeting you.
我期待与你见面。
She is looking forward to her vacation.
她期待着她的假期。
They look forward to the upcoming concert.
他们期待着即将到来的音乐会。

7、 原文：AIs are liable to chase victory single-mindedly but without strategic vision,
词典：be liable to：Likely to do something or to happen.
易于；可能
例句：He is liable to make mistakes when tired.
他在疲倦时容易犯错。
This area is liable to flooding.
这个地区容易发生洪水。
Children are liable to catch colds in winter.
孩子们在冬天容易感冒。

8、 原文：Giving the AI more time to think, and so plan for a wider range of outcomes, is equivalent to adjusting the skill with which it plays.
词典：be equivalent to：To be equal in value, amount, function, meaning, etc.

它常用来形容一个用来进行测试、开发或训练的空间。
例句：These virtual environments act as sandpits for developing and testing AI algorithms.
这些虚拟环境充当了开发和测试AI算法的沙坑。

④背景知识：
Tabletop R&D:
Tabletop R&D是一家位于英国伦敦的公司，致力于为桌面游戏设计师提供自动化测试和优化服务。该公司通过数字化桌面游戏的创建，利用计算智能技术对游戏进行数千次自动模拟，从而深入分析游戏机制，帮助设计师优化游戏设计。
Tabletop R&D的服务旨在补充传统的人工游戏测试，使得游戏开发者能够更加高效地识别和解决游戏中的问题，尤其是在游戏的视觉效果、趣味性和互动性方面。
该公司在业内受到了广泛的关注与好评，特别是其AI辅助测试技术被认为是未来游戏开发的重要趋势。Tabletop R&D的客户表示，这种创新的测试方式能够大大提高开发效率，减少不必要的重复工作。未来，Tabletop R&D计划在各种游戏展会中展示其平台，并希望与更多游戏设计师和开发者建立合作关系。通过这一平台，Tabletop R&D旨在推动游戏行业的技术创新和发展。

⑤段落大意：
【1】桌游是AI训练的理想"沙盒"，但规则漏洞可通过AI解决
【2】过去检查桌游规则需大量玩家测试，且可能需要报酬
【3】艾伦·沃拉特通过Tabletop R&D的AI算法快速测试游戏，找出问题
【4】艾伦发现规则中漏洞可能使游戏无限进行下去
【5】Tabletop的创始人希望以低成本构建一个通用AI游戏平台，让AI自我博弈
【6】Tabletop的创始人外开发出了一种有助于游戏设计师优化作品的工具
【7】设计师需决定让AI具备完美计算能力或更随意地行动
【8】AI可以模拟不同水平的棋手
【9】AI已有能力击败人类
【10】通过游戏数据分析，设计者可以调整参数确保游戏公平并避免无聊

相当于；等同于
例句：One dollar is equivalent to 6.5 yuan.
一美元相当于6.5元人民币。
His silence is equivalent to an admission of guilt.
他的沉默等同于承认罪行。
This qualification is equivalent to a degree.
这个资格相当于一个学位。

9、 原文：it can be set to act as if on instinct,
词典：on instinct：Based on innate inclination or natural tendency.
凭直觉
例句：She acted on instinct and saved the child.
她凭直觉行事，救了孩子。
He reached out on instinct to catch the falling vase.
他本能地伸手。

10、 原文：she admits she found the system was more than capable of defeating her.
词典：capable of：Having the ability, fitness, or quality necessary to do or achieve a specified thing.
有能力的；能够
例句：She is capable of handling the situation.
她有能力处理这种情况。
He is capable of running a mile in under four minutes.
他能在四分钟内跑完一英里。
They are capable of achieving great things.
他们有能力取得伟大的成就。