

Neuro



Neuro 发布

通过游戏化和 脑电图提升认知健康

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认知训练研究

研究发现，大脑有控制多种功能思维的能力，包括计划、组织、做出理性的决策、记忆任务等等。我们在这些认知方面的能力表明我们是否能很好的完成日常任务，以及是否能够独立生活。

然而，随着年龄的增长，身体和精神方面都会发生渐进性变化[1-2]，认知能力的下降早在30多岁时就已开始[94]。大脑的某些部位会缩小，并可能影响学习和其他复杂的心理活动[95]突触结构（神经元之间的通信）可能不再有效[96]，大脑中的血液流量可能会减少或减慢[97]。

然而，通过采取健康的生活方式和认知干预措施，如心理刺激和认知训练，减缓或预防认知能力下降的发生是可能的[98]。这也得到了美国国立卫生研究院（NIH）的支持，该研究院基于250份高质量出版物进行了一项元研究，发现认知训练是预防认知能力下降的一个非常有效的保护因素[29]。

认知训练已证明对所有年龄组都有好处，从幼儿到老年人[33-44]。它已被证明在改善流体智力和晶态智力方面发挥了积极作用[3-7]，同时也是可持续的[8-10]，并可转移到日常任务中[11-26]。同时，它也被证明是一种有效的非药物解决方案，适用于有心理健康问题的人[45-64]。

随着医学的进步，功能性磁共振成像（fMRI）和神经影像技术使研究人员能够观察到认知训练对大脑特定区域的直接影响。这些进步也催生了新的研究领域--神经可塑性领域（大脑适应新刺激的可塑性），使人们相信，通过对大脑的训练和刺激，可以使我们的生活得到改善[30-32]。总之，认知训练有效性的证实对于抵抗认知能力下降提供了强大的科学依据。

大脑游戏



参与刺激性和有目的的活动对人们提高生活质量至关重要。对于那些身体受限或活动机会有限的人来说，数字游戏可以为他们提供一种持续投入和精神活跃的方式。在美国国家科学基金会（NSF）的推动下，神经科学家和娱乐专家发起了合作[68]，开发数字游戏，以更深入地了解大脑功能，并提供新的工具来提升注意力和幸福感。

比如基于计算机的认知训练，它被发现可以提升老年人的记忆力和在日常任务中的表现[66-67]。

展望未来，健康和科技行业正在将更多的治疗游戏推向市场[69]，这可能会对那些追求认知健康和身心健康的人产生更大的影响。



基于 EEG 的认知训练

研究人员在数字游戏中使用脑电图 (EEG) 是神经科学领域的最新进展。许多研究已经证实了脑电图在数字游戏中的作用，并发现它在提高参与者的认知能力方面是有效的 [1]。脑电生物标志物与认知功能之间有许多联系。例如， θ 脑电波活动性 (4-8Hz) 与人的工作记忆之间存在高度相关性 [70-71]，而 β 脑电波 (14-30 Hz) 通常与一个人注意力水平相关 [72-73]。对于需要视觉空间能力的任务，激活 α 脑电波活动 (9-13Hz) 的参与者在经过基于脑电图的认知训练后，在心理旋转方面表现更好 [77]。让人参与诱发这些脑电波的任务，有助于显著提高他们的认知能力 [75]。

在训练过程中，可能对于认知超负荷而导致认知增益减少的可能性会存在一些疑问，但这可以通过使用基于脑电图生物标志物的自适应实时监测系统来克服。使用这样的方法，可以测量并有效控制心理疲劳，从而使参与者在游戏过程中拥有定制化的体验，以发挥最佳效果 [74]。

总之，在认知训练中使用脑电图技术提供了实时的脑电波测量，并准确地显示了参与者的精神状态。认知训练计划中的自适应成分也增强了体验，从而有效地获得了最大的收益。

NEEURO MEMORIE 游戏

Neuro 的 Memorie 移动应用程序适配 Neuro 脑电图头环，SenzeBand 2 为大脑训练提供了一个独特的解决方案，可以随时随地以有趣的方式进行。





寿司回想

寿司回想游戏是一个有趣的 n-back 任务，最常用于测量工作记忆的认知评估[84]。使用 n-back 任务也被证明可以增加大脑皮层的厚度和表面积，将在语言理解、学习和推理等复杂认知任务中获得更好的表现[85]。

在游戏过程中，玩家必须记住在传送带上出现的各种寿司类型。当一个或多个寿司消失时，玩家必须回忆消失的寿司。当玩家进入下一个级别，寿司消失的数量会逐渐增加，任务的难度也会随之增加。因此，为了在每一关都获得成功，玩家需要不断激活和

使用他们的工作记忆。

寿司回想游戏的目的是让玩家练习暂时保存对执行各种日常任务至关重要的信息。这种保存信息的能力可以更好地进行日常推理和决策，例如拨打新的电话号码或回忆您可能放置物品的位置，如书籍或手机。



连线

连线游戏的灵感来自心理旋转任务[86]，玩家必须通过识别给定的 2D 线段来激活他们的空间想象能力，按照游戏中的指示，复制、翻转和旋转独立的线段。在研究认知衰退时，我们经常讨论短时记忆的下降，很少讨论空间能力，但是空间能力也是我们一般智力的重要组成部分[87]。这个能力普遍应用于各种日常任务中，如阅读地图、驾驶[88]和数学能力[89]。

在连线游戏的初级关卡中，玩家只需要在脑海中顺时针或逆时针旋转

棋盘90度或180度。早期阶段会提供颜色指南，帮助玩家熟悉游戏规则，进入后期随着玩家变得越来越有能力后，颜色指南将被删除。此外，我们 SenzeBand 的传感器将评估玩家的视觉空间注意力和专注力[90]而且提供准确的测量数据跟踪其总体进展。



心灵直升机

心灵直升机游戏利用脑电图生物标志物关联研究以促进注意力的训练 [72, 73]。SenseBand 可以实时测量玩家的注意力水平，这不仅为游戏得分提供了额外的维度，还可以定制自适应的训练计划，以提高他们的选择性注意力和注意力的释放能力。这些认知能力对于应对分心很重要，这样不重要的细节就可以被排除在外，人们最终可以专注于重要的事情[91]。这也有助于在一项任务或事件中长时间集中注意力。

玩家将扮演飞行员的角色，需要调动

他们的注意力，让直升机升空，并为受困的幸存者执行救援任务。玩家需要保持他们的注意力，为幸存者投放包裹，并且释放注意力，以便直升机能够降落并营救幸存者。随着游戏的进行，直升机变得“更重”，更难控制，并将遇到更多的障碍物。



金字塔纸牌

金字塔纸牌游戏是经典纸牌游戏的修改版本，其中的游戏性已被证明可以改善认知功能，如短时记忆[78]。利用神经可塑性的概念，当玩家必须频繁激活他们的工作记忆来回忆纸牌的数值[79]时，大脑将创建或加强新的神经通路，因此即使在阿尔茨海默病（AD）的情况下也有改善的可能性[82]。

游戏要求玩家匹配两张加起来等于13的纸牌。玩家将激活他们的决策能力，因为他们决定首先采取哪种

策略或途径，取决于他们的手头上的牌和金字塔中可用的牌。有了正确的战略决策，他们就不会遇到解锁新等级后没有牌可匹配的情况。与经典的金字塔纸牌不同，金字塔纸牌允许玩家将未使用的牌藏起来以备日后使用。然而，在纸牌是正面朝下的，因此他们需要记住存放的纸牌的数值。这需要记忆，任何错误的猜测都会导致分数惩罚。



多任务之王

多任务之王游戏是基于任务转换范式的构想[92]为了培养认知灵活性，帮助人们执行复杂的任务，如高效的解决问题和创造力[93]。

游戏独特地分为两个屏幕，两边都有任务要完成。当任务逐屏完成时，将授予积分。这意味着玩家必须完成屏幕1，然后转到屏幕2，然后返回屏幕1。要完成的任务性质不同，因此鼓励玩家快速有效地使用各种认知功能。例如，屏幕1可以显示需要心理计算的数学求和，而屏幕2显示需要玩家识别和分析不同图形形状的图形

识别问题。随着玩家的进步，玩家在每个屏幕上解决问题的时间也会相应减少。

总结

我们正处于一个信息急剧增长的世界，充满注意力危机的时代。随着寿命的不断延长，人们认知衰退的时间比预期的要早。这些因素对于我们期望保持终身认知健康提出了巨大挑战。为了增强我们的认知能力，防止认知衰退，在坚持健康的生活方式的同时，进行有效的大脑训练同样重要。

近几十年来的科学研究一直倡导大脑训练的有效性。随着移动应用程序和电脑游戏在当今世界变得越来越普遍，关于健康、技术和游戏的融合也是如此。手机游戏与轻便的脑电波传感器相结合，让日常生活中的闭环认知训练成为可能，为每个人提供自适应的、方便的和强大的解决方案，随时随地进行有效的大脑训练。

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Neeuro 是一家全球性公司，专注于利用脑机接口技术以最大限度地提升用户的神经系统灵活性和大脑健康。自公司于2013年成立以来，Neeuro 提供一系列的数字治疗和大脑健康解决方案并获得新加坡科技最大的科研机构 A*STAR 的临床研究的验证。

NeeuroOS 作为公司核心的技术，为医疗保健专业人员、科研人员 and 第三方开发者提供了一个开放的平台，利用人工智能驱力，分析用户的大脑信号，测量多种心理状态，包括但不限于注意力、放松、心理负荷和疲劳等。Neeuro 的技术对于应对儿童多动症、中风、认知康复等多种神经系统挑战探索更多的可能性。

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