TED

演奏乐器对大脑的好处

题目：How playing an instrument benefits your brain

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Did you know that every time musicians pick up their instruments, there are fireworks going off all over their brain? On the outside, they may look calm and focused, reading the music and making the precise and practiced movements required. But inside their brains, there's a party going on.

你知道吗？ 每当音乐家们举起他们的乐器， 他们的脑海便炸起了一朵朵烟花？ 他们表面看来， 也许镇定且聚精会神地， 读着乐谱并按要求 进行着精准熟练的演奏。 但是在他们大脑内部， 有一场狂欢正在上演。

How do we know this? Well, in the last few decades, neuroscientists have made enormous breakthroughs in understanding how our brains work by monitoring them in real time with instruments like fMRI and PET scanners. When people are hooked up to these machines, tasks, such as reading or doing math problems, each have corresponding areas of the brain where activity can be observed. But when researchers got the participants to listen to music, they saw fireworks. Multiple areas of their brains were lighting up at once, as they processed the sound, took it apart to understand elements like melody and rhythm, and then put it all back together into unified musical experience.

我们是如何知道这一切的呢？ 嗯，在过去的几十年里， 通过核磁共振成像 和正子放射断层扫描仪等 对大脑的实时监测， 神经科学家对我们的大脑如何运作 已经有了巨大的突破。 当人们连着这些仪器， 开始活动， 例如阅读或是完成数学习题， 大脑中每一个被激活的相应区域， 都能被观测到。 但是当研究人员让实验者听音乐时， 他们看到了烟花。 大脑的多个区域被同时唤起， 当大脑处理声音的时候， 会把它拆分开来去理解音乐元素 像旋律和节奏，然后再把他们放回到一起 合成统一的音乐体验

instruments
n.乐器

neuroscientist
n.神经科学家

enormous breakthroughs
巨大的突破

monitoring
n.监视

melody and rhythm
旋律和节奏

And our brains do all this work in the split second between when we first hear the music and when our foot starts to tap along.
我们的大脑完成这项工作，仅在我们刚听到音乐 和脚开始跟着打拍子的瞬息之间。

But when scientists turned from observing the brains of music listeners to those of musicians, the little backyard fireworks became a jubilee. It turns out that while listening to music engages the brain in some pretty interesting activities, playing music is the brain's equivalent of a full-body workout. The neuroscientists saw multiple areas of the brain light up, simultaneously processing different information in intricate, interrelated, and astonishingly fast sequences.
但是当科学家开始将 观测对象 从音乐听众转移到音乐家的大脑时，这场后院的小烟火变成了嘉年华。 事实证明听音乐的时候 大脑进行了一场非常有趣的活动， 演奏音乐的大脑活动 相当于进行了一次全身运动。 神经科学家观察到大脑多个区域被激发， 以复杂并相互关联且快速惊人的次序 同步处理不同的信息。

backyard
n.后院

multiple areas
多个区域

simultaneously
adv.同时

But what is it about making music that sets the brain alight? The research is still fairly new, but neuroscientists have a pretty good idea. Playing a musical instrument engages practically every area of the brain at once, especially the visual, auditory, and motor cortices. As with any other workout, disciplined, structured practice in playing music strengthens those brain functions, allowing us to apply that strength to other activities.
但音乐能激发大脑功能的原因是什么呢？ 相关研究才刚刚起步， 但神经科学家已经有了相当好的想法。 演奏一件乐器 能几乎同时把大脑所有区域都唤醒， 尤其是视觉，听觉和运动皮层。 与其他运动相比，规律的， 结构性的演奏练习 加强了这些大脑机能， 让我们能将这些优势 运用到其他活动中。

disciplined
adj.遵守纪律的

The most obvious difference between listening to music and playing it is that the latter requires fine motor skills, which are controlled in both hemispheres of the brain. It also combines the linguistic and mathematical precision, in which the left hemisphere is more involved, with the novel and creative content that the right excels in.
欣赏音乐和演奏音乐最明显的区别在于 后者需要较好的动作技能，需要同时运用到大脑左右半球 它同时结合了语言和数学精度 这些多由大脑左半球参与， 而新奇有创意的内容则由右脑参与。

hemispheres
n.半球

For these reasons, playing music has been found to increase the volume and activity in the brain's corpus callosum, the bridge between the two hemispheres, allowing messages to get across the brain faster and through more diverse routes. This may allow musicians to solve problems more effectively and creatively, in both academic and social settings.
鉴于这些原因， 演奏音乐 对于提高脑胼胝体其容量及活跃度， 胼胝体是连接两个大脑半球的桥梁， 能使信息在大脑内 通过多样的路径更快的传输， 这可能使音乐家在学术和社交环境中 更有效和独具创意的解决问题。

Because making music also involves crafting and understanding its emotional content and message, musicians often have higher levels of executive function, a category of interlinked tasks that includes planning, strategizing, and attention to detail and requires simultaneous analysis of both cognitive and emotional aspects. This ability also has an impact on how our memory systems work. And, indeed, musicians exhibit enhanced memory functions, creating, storing, and retrieving memories more quickly and efficiently.
由于创造音乐也涵盖制作和理解 其中的情感化的内容和信息， 所以音乐家们通常 具有高级别的执行能力， 一类相互关联的任务， 涵盖了计划，策略，注意细节， 以及需要针对认知和情感进行同步分析 这种能力也影响着记忆系统的工作。 并且，事实上， 音乐家展现了更加高超的记忆能力， 他们具备更快更有效的 创造，储存，恢复记忆功能。

a category of
一类

interlinked
互连的

simultaneous
同时

Studies have found that musicians appear to use their highly connected brains to give each memory multiple tags, such as a conceptual tag, an emotional tag, an audio tag, and a contextual tag, like a good Internet search engine.
研究发现音乐家们 能运用他们高度连结的大脑 来给每段记忆赋予多个标签， 比如概念标签，情绪标签， 声音标签，和语境标签 就像一个强大的互联网搜索引擎一样。

How do we know that all these benefits are unique to music, as opposed to, say, sports or painting? Or could it be that people who go into music were already smarter to begin with?
那我们如何得知这些好处 是音乐特有的呢？ 它与运动或绘画有何区别呢？或者说喜欢音乐的人 本身即是非常聪明的人？

Neuroscientists have explored these issues, but so far, they have found that the artistic and aesthetic aspects of learning to play a musical instrument are different from any other activity studied, including other arts. And several randomized studies of participants, who showed the same levels of cognitive function and neural processing at the start, found that those who were exposed to a period of music learning showed enhancement in multiple brain areas, compared to the others.
神经科学家已经研究过这些问题， 但是目前， 他们发现从艺术和美学方面看 学习演奏乐器 是和其他已研究的活动有着不同， 包括其他的艺术。 并且在若干随机研究的参与者中 在一开始 有着同样认知和神经处理水平的人 那些经过一段时间音乐学习 与其他人相比， 大脑内多个区域得到提升

This recent research about the mental benefits of playing music has advanced our understanding of mental function, revealing the inner rhythms and complex interplay that make up the amazing orchestra of our brain.
这项音乐演奏对于大脑有益的最新研究， 让我们进一步了解了大脑的功能， 揭示了那些内在节奏和复杂的旋律 在我们的大脑中所上演的美妙乐章。

conceptual tag
概念标签

contextual tag
语境标签

randomized
随机法

cognitive function
认知功能

enhancement
n.增强

interplay
n.相互作用