

不同冥想类型对创造性思维的影响及作用机制*

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摘要 冥想与创造性的关系正逐渐被关注, 澄清冥想练习对创造性思维的影响效果和作用机制对个体创新潜能的培养与提升具有重要意义。不同冥想类型对创造性思维的影响具有特异性, 专注冥想主要通过注意聚焦和提升自上而下的执行控制能力来对聚合思维产生积极影响; 正念冥想引起的离焦的注意状态, 以及对认知灵活性和积极情绪的促进, 有助于发散思维。未来应加强不同冥想类型与创造性思维的整合研究, 探讨冥想影响创造性思维的脑机制与构建相关的心脑模型, 以及冥想与其他干预训练对创造性思维的不同作用机制等。

关键词 冥想 创造性 发散思维 聚合思维 正念

1 引言

与许多冥想者一样, 苹果创始人乔布斯经常提到冥想是他创造性的主要来源 (Isaacson, 2012)。冥想作为一种通过调节注意和情绪使练习者放松身心、获得愉悦的综合性心理与行为训练 (Tang, Hölzel, & Posner, 2015), 其与创造性思维关系密切 (Agnoli, Vanucci, Pelagatti, & Corazza, 2018; Berkovich-Ohana, Glicksohn, Ben-Soussan, & Goldstein, 2017; Colzato, Szapora, Lippelt, & Hommel, 2017)。创造性思维作为创造性的核心, 是产生独创且适用的观点或产品的思维形式 (Sternberg & Lubart, 1996), 主要包括聚合思维和发散思维 (Guilford, 1967)。在认知层面, 冥想训练要求个体觉察当下的一切, 这种注意方式有助于实现问题情景的有效重组, 加深对当前问题的理解; 冥想训练还强调以开放的态度接纳当下的体验, 可避免惯性反应和思维定势, 有助于产生新颖的想法 (Agnoli et al., 2018)。在情绪调节层面, 较差的情绪调节能力往往伴随着较多的负性情绪, 使个体的注意范围受限 (Huntsinger, 2013; Pérez-Edgar et al., 2017), 不利于创造性思维 (Baas, De Dreu, & Nijstad, 2008; Huntsinger & Ray, 2016; Montani, Dagenais-Desmarais,

Giorgi, & Grégoire, 2018), 而冥想训练则有助于情绪调节能力的提升, 使个体免受消极情绪的干扰 (Hanley & Garland, 2014; Jazaieri et al., 2018; Wheeler, Arnkoff, & Glass, 2017)。可见冥想很可能对个体创造性思维的培养有促进作用。

冥想练习方式较多较杂, 不同训练方式差异较大, 对创造性思维的影响可能具有特异性 (Baas, Nevicka, & Ten Velden, 2014; Colzato, Ozturk, & Hommel, 2012)。大体而言, 可根据注意的朝向可将冥想分为专注冥想 (concentrative meditation, CM) 和正念冥想 (mindfulness meditation, MM) (Cahn & Polich, 2006; Lippelt, Hommel, & Colzato, 2014)。CM 强调把注意聚焦于某个选定的对象, 并保持注意避免分心 (Müller, Gerasimova, & Ritter, 2016; Tops, Boksem, Quirin, IJzerman, & Koole, 2014)。MM 不需要进行注意聚焦, 只强调对当下每时每刻的体验做不评判的觉察 (Kabat-Zinn, 2003)。两类冥想在注意聚焦和自上而下的认知控制上似乎处于对立的两极 (Lutz, Slagter, Dunne, & Davidson, 2008), 对创造性思维可能有不同的影响。基于此, 本文总结梳理了 CM 和 MM 对发散思维和聚合思维的影响效果, 并探讨分析了其中的作用机制, 最后就未来的研究方向进行了展望。

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2 不同冥想类型对创造性思维的影响效果

2.1 CM 对创造性思维的影响效果

Ren 等 (2011) 采用实验组控制组的前后测设计考察了短期的专注呼吸冥想 (CM 的一种) 训练对顿悟问题解决的影响, 结果发现前测中未解决的问题在 CM 后成功解决的数量显著高于控制组; 另外, CM 期间的 alpha 波百分比显著低于控制组, alpha 波作为一种放松状态的脑指标, 表明 CM 往往伴随着警觉或聚焦的注意状态, 而非放松, 这有助于顿悟问题的解决 (Ren et al., 2011)。在另一项持续 6~12 个月的 CM 研究中, 相比于控制组, CM 组显著提高了几种主要的认知能力, 包括流体智力、实用智力、信息加工速度以及发散思维和聚合思维 (So & Orme-Johnson, 2001)。早期的研究也同样发现 5 个月的 CM 训练提高了冥想者在托兰斯创造性思维 (torrance tests of creative thinking, TTCT) 图画测验上的表现, 与 So 等人的研究结果相吻合 (Travis, 1979)。

2.2 MM 对创造性思维的影响效果

MM 对创造性思维的影响得到了较多的关注, Ding, Tang, Tang 和 Posner (2014) 考察了短期的 MM 和放松训练分别对个体发散思维的影响, 结果证实了相比于放松训练, MM 可有效提高 TTCT 图画和言语测验成绩, MM 组还表现出更好的情绪调节能力; 另外, 交叉滞后模型还显示积极和消极情绪均可正向或负向地影响 MM 组的创造性表现, 表明 MM 还可能通过有效的情绪调节间接地影响个体的发散思维 (Ding et al., 2014)。另有研究将个体的行为表现与生理指标相结合, 考察长期 MM 对发散思维的影响, 结果发现长期 MM 练习者比短期练习者在一物多用任务 (alternative uses task) 中有更高的灵活性和流畅性得分, 而且该分数与默认网络 (default mode network) 的 gamma 波活动呈负相关, 可能是长期的 MM 训练降低了默认网络的活动, 使个体易于产生思维漫游或自发性的自我参照加工, 这有助于发散思维的提升 (Berkovich-Ohana et al., 2017)。

2.3 CM 与 MM 影响创造性思维的效果比较

除了单独考察某种冥想类型对创造性思维的影响外, 还有研究者将两类冥想一起纳入研究中, 直接对两类冥想的影响效果进行比较。Baas 等 (2014) 关注了两类冥想者在发散思维表现上的组间差异,

CM 与 MM 组在一物多用任务中的流畅性得分差异不显著, 但在独创性和罕见性得分上, MM 组显著高于 CM 组 (Baas et al., 2014)。Müller 等 (2016) 在研究中选择了多个发散性思维测验, 并增加了前测, 较全面地考察了冥想者在冥想前后的发散性思维表现, 结果发现 CM 组与 MM 组在一物多用任务和 TTCT 图画测验上的得分差异均不显著。但与前测相比, 后测中两类冥想者在一物多用任务中的独创性和流畅性得分都显著提高了, 而前-后测的 TTCT 得分并未发生显著变化 (Müller et al., 2016)。另有研究者同时考察了 CM 与 MM 对发散思维与聚合思维的影响效果 (Colzato et al., 2012), CM 与 MM 的注意方式迥异, CM 强调对某一特定目标的注意聚焦, 与聚合思维所要求的针对特定问题产生最佳答案的思维方式联系密切, 可能 CM 有助于聚合思维的提高; MM 强调保持离焦的注意状态 (defocused attentional states), 体验当下的每时每刻, 关注事物的各个方面, 这与发散思维要求个体产生多种多样的新奇想法联系紧密, 可能 MM 有助于发散思维的提高。研究结果证实了有经验的冥想者在 MM 练习后, 在测量发散思维的一物多用任务上的独创性、灵活性、流畅性得分均高于 CM 组。在测量聚合思维的远距离联想任务 (remote association task) 中, 虽然 CM 组得分略高于 MM 组, 但差异不显著 (Colzato et al., 2012)。该结果表明不同冥想类型对发散思维和聚合思维的影响具有特异性, 尤其是 MM 对发散思维的提高效果更明显。在已有研究的基础上, Colzato 等人 (2017) 的另一项研究还重点关注了先前的 CM 和 MM 经验对发散思维和聚合思维的影响, 结果发现与 CM 相比, MM 提高发散思维能力与个体先前是否有 MM 经验无关, 无论是 MM 经验组还是 MM 新手组, 分别与 CM 经验组和 CM 新手组相比, 在冥想练习后均能够表现出更好的发散思维能力。在测量聚合思维的远距离联想任务中, 研究者区分了顿悟式和分析式两种解决问题的策略, 发现在经验组中存在冥想类型与问题解决策略之间的交互作用, 有经验的 CM 组采用分析式方法解决问题的能力要优于 MM 组, 但差异不显著; MM 组则更擅长使用顿悟的方式来解决问题, 类似的交互作用没有在新手组中观察到 (Colzato et al., 2017)。该研究不仅考虑到两类冥想对发散思维和聚合思维的不同影响, 还进一步强调了先前的冥想经验在即时的冥想练习对创造性思

维的影响中扮演着重要角色。

结合已有的研究结果,不难发现 MM 对发散思维的提升效果往往好于 CM 或控制组,尤其体现在独创性、灵活性、流畅性三个维度上。CM 对创造性思维的影响多表现在聚合思维上,CM 对聚合思维水平的提升显著高于控制组,但与 MM 相比,并不具有明显的优势。

3 不同冥想类型对创造性思维的作用机制

近年来的实证研究在不同程度上证实了冥想练习对创造性思维的积极作用,但必须指出的是:冥想引起了什么成分的改变,从而导致创造性思维的提升?同时 CM 与 MM 练习方式不同,在促进创造性思维的不同方面(发散思维与聚合思维)各自又是通过何种机制在起作用?要深入理解冥想对创造性思维的作用机制,必须回到冥想练习本身上来。对于前一个问题,大量研究均证实了冥想主要引起认知和情绪的改变(Tang & Posner, 2013; Tang et al., 2015),这两方面的变化同样对创造性思维有重要影响(Baas et al., 2008; Hennessey & Amabile, 2010),因此下文将视野聚焦在认知和情绪两个角度开展探讨。对于后一个问题,CM 与 MM 练习方式迥异,因而在认知和情绪上的改变并不具有完全一致的效果,甚至在认知控制上出现了相反的结果(Lutz et al., 2008),这也可能导致对创造性思维的影响具有特异性。

在认知层面,CM 强调对特定对象的注意聚焦,冥想者往往处于较高的认知控制状态以免受外界其他刺激干扰,注意范围较窄,CM 训练有助于提高个体自上而下的执行控制能力(Colzato, Sellaro, Samara, Baas, & Hommel, 2015; Lippelt et al., 2014; Tsai & Chou, 2016)。这也体现在 CM 的脑结构研究中,研究者发现 CM 练习者在双侧脑岛、腹内侧眶额叶、颞下回、腹外侧前额叶等脑区的灰质体积显著高于控制组,表明在持续注意、执行控制等功能上 CM 组要优于控制组(Hernández, Suero, Barros, Luis González-Mora, & Rubia, 2016)。对聚合思维而言,需要在给定的问题情景中寻找一个最佳答案,要求个体将注意聚焦于该情景并利用已有知识经验解决该问题(Lee & Theriault, 2013)。聚合思维可能受益于自上而下的认知控制状态(Benedek, Bergner, Könen, Fink, & Neubauer, 2011; Colzato et al., 2017),在较高强度的认知控制状态下,个体不仅

能够对该问题进行注意聚焦,还能排除无关信息的干扰(Fischer & Hommel, 2012)。CM 通过不断的注意聚焦练习无疑增强了这种自上而下的认知控制能力,这有助于聚合思维水平的提升。与 CM 不同的是,MM 强调对当下体验不做评判的觉察,注意并不停留在某个特定对象上(Kabat-Zinn, 2003; Tang et al., 2015)。MM 往往会激活离焦的注意状态(Müller et al., 2016),使得自上而下的注意控制功能减弱,可以较容易的从这个念头“跳跃”到另一个念头,进而增强个体的认知灵活性(Fabio & Towey, 2018; Lao, Kissane, & Meadows, 2016; Moore & Malinowski, 2009)。脑影像研究也进一步证实了 MM 对认知灵活性的积极影响,尤其体现在前扣带回的结构和功能的可塑性变化上(Tang et al., 2015)。前扣带回作为认知控制的一个 hub 区域,在冲突信息加工过程中得到显著激活,而且还涉及到与较远的大脑区域的功能耦合,这有助于促进灵活的认知表现(Tang, Rothbart, & Posner, 2012)。对于发散思维,需要根据当前情景与记忆中的信息,以不依常规的方式沿着不同方向思考,要求个体同时关注事物的多个方面,并能够在其中灵活切换,较高水平的认知灵活性无疑有助于发散思维(De Dreu, Nijstad, & Baas, 2011)。MM 练习引起的神经可塑性变化为认知灵活性的提升提供了帮助(Tang et al., 2015),另外离焦的注意状态本身也使得冥想者能够觉察事物更多的属性,将远距离概念连接起来进而产生更多的新奇想法(Colzato et al., 2017; Müller et al., 2016)。

近年 Beaty, Benedek, Silvia 和 Schacter (2016)提出了创造性思维的脑网络动力学观点,认为创意思想的产生与默认网络的活动有关,而对创意思想的评估则是执行控制网络在起主要作用,突破了以往认为默认网络和执行控制网络在认知任务中起拮抗作用的观点,指出默认网络和执行控制网络的协同有助于产生新颖且适用的想法。创造性思维的双加工模型也指出创造性思维涉及到两个相互作用的过程:想法的产生与评价(Ellamil, Dobson, Beeman, & Christoff, 2012; Finke, Ward, & Smith, 1996)。个体不仅要有产生丰富想法的能力而且还需要有判断这些想法的适用价值的能力,想法产生依赖自发性的思维活动,评价阶段则需要自上而下的认知控制。这些观点得到了近期研究的支持(Beaty, Benedek, Kaufman, & Silvia, 2015; Sun et al., 2018)。冥想练习也往往引起默认网络和额顶网络的可塑性变化,相

比于控制组, 经验丰富的各类冥想者的默认网络关键区域如内侧前额叶和后扣带回在冥想期和静息状态下均出现了显著的负激活, 功能连接分析显示后扣带回与背侧前扣带回和背外侧前额叶的耦合显著高于控制组, 表明冥想练习引起了默认网络和额顶网络关键节点的功能连接强度的增加 (Brewer et al., 2011; Creswell et al., 2016), 这有助于创造性思维的提升。另有研究直接考察了 MM 练习者在远距离联想任务中的大脑激活模式, 相比于控制组, 冥想者在任务中激活的区域广泛分布在右扣带回、额下/中回、顶下小叶、脑岛、壳核等区域, 这些区域在功能表征上涉及到冲突监控、注意控制、问题表征与重构以及“啊哈”体验, 为冥想促进创造性思维提供了潜在的神经机制解释 (Ding, Tang, Cao et al., 2015)。

冥想练习还可以通过情绪调节对创造性思维产生影响。两类冥想都能降低消极的情绪反应, 且 MM 在积极情绪的培养上效果更明显 (Hanley & Garland, 2014), CM 则倾向于使情绪趋于平和 (任俊, 黄璐, 张振新, 2012), 这尤其体现在情绪体验的关键脑区 (如杏仁核、前脑岛、眶额叶等) 的活动上 (Tang et al., 2015)。当面对消极情绪刺激时, MM 练习者的杏仁核激活水平显著低于控制组, 冥想者的情绪唤醒度更低, 体现出以一种接纳的态度面对当下的消极情绪体验 (Lutz et al., 2014; Taylor et al., 2011), 同时也会受到冥想经验的影响, 长期冥想者在该区域的激活程度更低; 但面对积极情绪刺激时, 长期 MM 练习者的杏仁核激活水平并未受到限制, 而且显著高于初学者, 表明长期 MM 练习者拥有更佳的积极情绪体验 (Taylor et al., 2011)。发散思维的提升有赖于积极的情绪状态, 如个体处于积极情绪状态下能够产生更为丰富的联想, 更具独创性和灵活性 (Chen, Hu, & Plucker, 2016); 而且积极情绪往往还会促进个体参与创造性活动的动机强度 (Fredrickson & Branigan, 2005), 拓宽注意广度, 减弱对无关信息的抑制程度 (Rowe, Hirsh, & Anderson, 2007), 有利于提高发散思维水平。可见 MM 可以通过积极情绪的提升来对发散思维产生正向影响 (Ding, Tang, Deng, Tang, & Posner, 2015), 但积极与消极情绪对聚合思维的影响颇具争议 (Lin, Tsai, Lin, & Chen, 2014; Ritter & Ferguson, 2017), 另外相比于其他情绪效价, 还尚不清楚平和的情绪状态是否更有利于聚合思维。因此, CM 与 MM 能否

通过情绪调节产生平和的或积极的情绪状态来对聚合思维施加影响, 还需要研究的证实。

4 小结与展望

综上所述, 已有研究在不同程度上证实了冥想练习对创造性思维的积极影响, 而且两类冥想的影响效果颇具特异性, CM 主要通过注意聚焦和提升自上而下的执行控制能力来促进个体的聚合思维; MM 引起的离焦的注意状态以及对认知灵活性的提升, 使发散思维从中受益。同时 MM 在积极情绪培养上效果明显, 有助于拓宽注意广度, 减弱对无关刺激的抑制, 易于将远距离语义概念联系起来, 进而对发散思维产生积极影响。虽然两类冥想对创造性思维均有一定的积极效果, 但大多研究仅关注了短期的冥想功效, 同时个体差异也未得到重视, 在脑机制上的探索也还较为欠缺, 因此未来的研究可在以下几方面深入。

首先, 加强各类冥想与聚合思维和发散思维的整合研究。以往研究多集中于考察 CM 或 MM 对创造性思维某方面的影响, 使得各类冥想在提升发散思维和聚合思维的效果上缺乏可比性。另外还需重视冥想与其他干预训练对创造性思维影响效果的比较。新近研究发现认知激励法不仅在行为层面有效促进了个体的发散思维表现, 还对大脑的功能可塑性和结构可塑性产生影响 (Sun et al., 2016); 短暂的头脑风暴训练法也提升了个体的创造性测验成绩, 并增强了颞中回与内侧前额叶的功能连接强度 (Wei et al., 2014)。虽然这些干预训练法都被证明有助于个体创造性的提升, 然而冥想是否具有独特的优势? 当前还缺乏研究证据。

其次, 通过纵向追踪研究, 结合冥想者个体差异来揭示其对创造性思维的作用机制。当前研究多在组水平上比较冥想组与控制组的创造性思维表现, 而忽视了个体差异。比如个体的特质正念水平、人格特征以及冥想练习引起的情绪变化等因素都有可能对实验结果产生影响 (Ding, Tang, Deng et al., 2015; Ostafin & Kassman, 2012)。同时冥想练习是一个日积月累的过程, 当前研究多采用横断设计, 或是针对即时冥想练习的前后测设计, 无法捕捉长期冥想练习对创造性思维的影响效果的发展轨迹, 这也是需要细化的问题。

最后, 深入揭示冥想影响创造性的大脑机制与大脑可塑性, 构建相关的心脑模型。当前对冥想影

响创造性思维的作用机制研究多局限在行为层面的探索,较少直接考察冥想者在创造性任务中的大脑动态变化,这在很大程度上限制了对冥想作用机制的解释力度,也较难构建相关的心脑模型以及证实理论设想。另外,该领域脑机制研究的深入,无疑也可以进一步确定冥想练习中何种成分的改变导致了创造性思维的变化,为创造性思维的培养和提升提供依据。

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The Impact of Different Types of Meditation on Creative Thinking and the Underlying Mechanism

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Abstract Meditation practices are embedded in different cultures, worldviews, and traditions, which can be conceptualized as a family of complex emotional and attentional regulatory practices, involving different attentional, cognitive monitoring, and awareness processes. A great deal of research has demonstrated that meditation is beneficial to the development of cognitive function and the improvement of the ability of emotional regulation. Meanwhile, cognitive function and positive emotion have also played a crucial role in the creative performance. Several studies support that meditation contributes to solving the problem creatively, and meditators have a better level of creative thinking than the control group. However, different types of meditation can have different effects on divergent thinking and convergent thinking. Given that the regulation of attention is the central commonality across the many different meditation methods, meditation practices can be usefully classified into two main styles: Concentrative Meditation (CM) and Mindfulness Meditation (MM), depending on how the attentional processes are directed. CM entails the capacities of monitoring the focus of attention and detecting distraction, disengaging attention from the source of distraction, and redirecting and engaging attention to the intended object. MM involves an attentive set that is characterized by an open presence and a non-judgemental awareness of sensory, cognitive, and affective fields of experience in the present moment, and relates to a higher-order awareness or observation of the ongoing mental processes. This study summarized the different effects of CM and MM on divergent thinking and convergent thinking, and explored the underlying mechanisms. Previous research showed that CM groups successfully solved significantly more failed problems from the pre-test session. EEG analysis showed that the less percentage of alpha waves in CM session, which contributed to maintaining an alert and mindful state during CM, which provided direct evidence for the role of CM in promoting insight. MM had also received great attention from researchers. It improved creativity performance on the Torrance Tests of Creative Thinking, and yielded better emotional regulation. Meanwhile, long-term mindfulness meditators exhibited better divergent thinking scores (flexibility and fluency) using the Alternative Uses task and demonstrated a negative connection between divergent thinking and resting-state DMN activity. In addition, there were some studies compared the effects of two types of meditation on divergent thinking and convergent thinking. On the one hand, MM group usually behaved better on divergent thinking tests than CM and control groups, but not convergent thinking; On the other hand, although CM group exhibited better performance on convergent thinking, as assessed by Remote Association Task, than MM group and control groups, the effect was weak. The impact of meditation on creative thinking could be explained by changes in cognitive function and emotional regulation. CM exerted a positive influence on convergent thinking, primarily by focused attentional states and top-down executive control; MM induced defocused attentional states, and promoted the enhancement of cognitive flexibility and positive emotions, which contributed to divergent thinking. However, these explanations were mainly based on behavior research and theoretical discussions, which required to deepen the brain mechanisms of the effect of meditation on creativity. Furthermore, future studies should also strengthen the integration of various types of meditation and creative thinking, with focuses on individual differences among meditators, and comparison with other interventions.

Key words meditation, creativity, divergent thinking, convergent thinking, mindfulness