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The Deficit of Emotional Recognition to Facial Expression in Bipolar Disorders

—Future Research Directions and Intervention Enlightenments

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Abstract

Numerous studies have indicated that patients with bipolar disorder (BD) have difficulty in recognizing facial expression, leading to BD's social dysfunction. Attention is a basic cognitive processing. Abnormal visual attention to emotional stimuli can often reflect the mechanism behind emotional disorder. This review focused on the abnormal attention processing in BD, and summarized the previous findings on the deficit of emotional recognition to facial expression in bipolar disorder groups. The future research direction and the intervention enlightenments were discussed.

Keywords

Affective Disorder, Bipolar Disorder, Facial Expression, Attention, Visual Scanning

双相情感障碍患者的情绪面孔识别障碍

——从注意加工层面进行探讨，并提出未来研究方向及干预启示

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摘　要

已有的许多研究都证明，双相情感障碍患者(BD)对情绪面孔存在识别障碍，从而影响该群体的正常社会

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活动。注意是一种基础的认知加工，对情绪刺激的视觉注意异常往往能反映情绪紊乱背后的机制。本综述从注意加工的角度，总结了以往关于双相情感障碍群体对情绪面孔存在的情绪识别障碍相关的研究，并根据不同的研究方法对相关结果进行了归纳讨论。据此，提出了未来的研究方向以及临床干预的设想。

关键词

情感障碍，双相情感障碍，情绪面孔，注意，视觉扫描

1. 引言

双相情感障碍(Bipolar Disorder, BD)是心境障碍(mood disorder)的一种，并伴有不同程度的社会功能障碍(Fagiolini et al., 2015; Michalak, Yatham, Maxwell, Hale, & Lam, 2007)。其临床表现为阶段性循环出现的持续情绪高涨、观念飞跃及活动异常增多的双相躁狂发作或情绪低落、兴趣缺乏及负性思维的双相抑郁发作或情绪稳定期(Goodwin & Jamison, 2007)。情绪控制和情绪认知异常是双相情感障碍患者典型的症状(Abrams, Redfield, & Taylor, 1981; Goodwin & Goodwin, 2007)。双相障碍患者对情绪或情感的调节能力受损，并且通常伴有一系列额外的神经认知障碍，包括面部情绪的识别和分类能力受损(Addington & Addington, 1998; Getz, Shear, & Strakowski, 2003; Malhi et al., 2007)。面孔表情是人类沟通和表达情绪的方式之一，也是传达个体情绪情感状态的一个重要信号。对他人面部表情的准确识别和理解是个体进行社会活动和获取社会信息的来源，也是维持正常的社会功能的一个重要因素(Getz et al., 2003)。

2. BD 群体对面孔情绪识别存在障碍的证据

许多研究表明，不同阶段的 BD 人群在进行面孔情绪识别(facial affect recognition)时表现出不同的情绪识别障碍以及大脑情绪加工区域的激活异常。Lawlor-Savage 等人(2014)通过控制情绪面孔呈现时间是否受限来研究双相躁狂患者面孔情绪识别受损的情况，他们发现在不限制时间的情况下，BD 被试与健康被试之间的识别准确率没有显著差异，但在限定时间内进行识别时，BD 患者出现对愉快面孔的识别障碍，而在其他情绪面孔的识别上与健康组没有显著差异(Lawlor-Savage, Sponheim, & Goghari, 2014)。大量研究发现，与健康个体相比，BD 患者在识别与自身心境状态一致的(mood-congruent)面孔情绪时，负责情绪加工的重要脑区杏仁核(amygdala)会出现过度激活，而与认知控制和行为监测有关的背外侧前额叶的激活则相较健康被试显著更低，同时眶额叶皮层(对杏仁核的激活进行调节)与杏仁核的联结也会出现减弱的现象(Adolphs, 2002; Fusar-Poli et al., 2009; Jennifer et al., 2008; Yurgelun-Todd et al., 2000)。而对与自身心境状态不一致的(mood-incongruent)情绪面孔，不同阶段的 BD 患者则表现出不同的认知偏差(cognition bias)。例如，处于双相躁狂阶段的患者在进行面孔情绪识别时存在积极偏差(positive bias)，即将表达负性情绪的面部表情识别为正性，且难以识别恐惧和厌恶表情，会将恐惧表情知觉为惊讶从而可能促使患者的持续接近行为，而显然此时回避行为更具适应性；处于双相抑郁阶段的患者则存在消极偏差(negative bias)，即将表达正性情绪的面部表情识别为负性，难以识别中性和积极情绪面孔，会将这类情绪面孔识别为消极(Calder, Keane, Manes, Antoun, & Young, 2000; Lembke & Ketter, 2002; Murphy et al., 1999)。

3. BD 群体对情绪面孔的视觉注意相关的研究

“注意”长期以来被认为是促使情绪产生并会受到情绪影响的一种认知加工(Schwarz, 2000; Shimojo, Simion, Shimojo, & Scheier, 2003)，“视觉注意”则会影响个体的情绪反应(Cacioppo, Klein, Berntson, & Hatfield, 1993)，对情绪刺激的注意偏向被认为可以解释情绪紊乱背后的机制(Beck, 1976; Mathews & MacLeod, 2005)。Murphy 等(1999)对 manic 期和 depressed 期的 BD 患者的行为抑制能力进行研究，发现抑郁相和躁狂相的 BD 患者分别对负性刺激和正性刺激表现出行为抑制困难，即这两类人群对情绪刺激分别存在负性注意偏向和正性注意偏向(Murphy et al., 1999)。有研究者采用 GO/NOGO 范式发现，当要求被试看到愉快面孔时做出相应按键反应，对悲伤面孔不做反应时，处于 manic 期的 BD 患者对愉快面孔相较悲伤面孔反应更快，表现出对积极情绪面孔的注意偏向，对消极情绪面孔则表现出情绪敏感性缺陷，而在健康被试组没有发现此类差异(Degabriele, Lagopoulos, & Malhi, 2011)。

3.1. 视觉追踪研究(Eye-Tracking)

除了基于反应时和准确率对注意偏向进行研究外，还一种非常适合用来研究个体对情绪事件的视觉注意的方法则是眼球追踪技术(eye-tracking)，通过这个技术，研究者可以观察心境障碍群体在某个注意点的注意时长以及注意的捕捉区域(Keith, 2009)，还可以研究该群体对各类情绪刺激不同的视觉注意模式和视觉扫描轨迹(Gotlib & Joormann, 2010; Gotlib, Krasnoperova, Yue, & Joormann, 2004; Klin, Jones, Schultz, Volkmar, & Cohen, 2002; Mathews & MacLeod, 2005; Pelphrey et al., 2002)，从而更好地探索心境障碍背后的机制和完善相应的临床干预手段。有研究者采用眼球追踪技术，通过“最初的注视倾向”和“注视点平均停留时间”这两个指标对 BD 患者的注意偏向进行研究。Garcia-Blanco 等人对各阶段的 BD 患者加工非面孔情绪图片时的注意偏向进行了研究，他们发现在自由观看非面孔情绪场景时：1) 处于抑郁阶段的 BD 患者对愉悦图片较其他图片的注意显著减少，表现出对愉悦刺激的愉快敏感性缺失；2) 处于躁狂阶段的 BD 患者最初的注意更多地指向愉悦场景，表现出该类人群对愉悦刺激的注意抑制困难；3) 躁狂阶段和抑郁阶段的 BD 患者对威胁刺激较其他刺激出现更多注视点(即对威胁刺激出现注意偏向)，反映出 BD 患者对威胁刺激的易感性，但只有躁狂相的 BD 患者表现出对威胁场景的注意抑制困难(Garcia-Blanco, Salmeron, & Perea, 2017; Garcia-Blanco, Salmeron, Perea, & Livianos, 2014)。Peckham 等(2016)对情绪稳定期的 BD 患者进行研究发现，自由观看情绪面孔时，该阶段的患者与健康组在注意的最初方向、平均停留时间以及在各类情绪面孔上的注视点数均没有显著差异(Peckham, Johnson, & Tharp, 2016)；Purcell 等(2018)通过比较感兴趣区域(Area of Interest，AOI，即面孔的情绪特征区域)的注视点总数，发现在自由观看正性、负性和中性的面孔图片时，躁狂期的 BD 患者、不在症状期的 BD 患者与健康个体在注意偏好上没有显著差异(Purcell et al., 2018)，但该研究只比较了被试在 AOI 上的注视总数，对视觉路径、早期注意偏好和情绪面孔敏感性等问题并没有进行深入研究。另外，在 BD 患者注意偏向的研究中，研究对象很少包含全部阶段的 BD 患者，这也是今后研究需要关注的一点。

另一方面，面孔情绪识别准确率与面部关键特征的注意以及更不受限的视觉扫描有关(Carmel, Leanne, & Evian, 2002)。有研究者认为，BD 患者对面孔刺激进行视觉扫描时存在困难，从而导致了对情绪面孔分类的困难(Cristiana Castanho et al., 2008)。尽管已经有很多研究者对 BD 群体的面孔情绪识别障碍进行了不同程度的探究，但使用眼动技术进行视觉追踪的研究相对较少，并且关于各个时期的 BD 患者对各类面孔情绪的视觉注意的研究更少，研究对象更多的是其他类型的精神疾病群体。例如，Carmel M 等(2002)将 BD 患者与重度抑郁患者统归为情感障碍被试组，结果发现，该组被试相较健康被试表现出对面孔特征(眼睛、鼻子和嘴巴等)的注意分配困难，并且对面部特征部位的视觉回避显著更多(Carmel et al., 2002) (见图 1)。Bestelmeyer 等(2006)发现，在自由观看下，BD 患者在对情绪面孔进行扫描时，其视觉路

径的异常程度小于精神分裂患者，但与正常健康被试相比差异仍然显著；相比健康被试，精神分裂患者对愉快面孔比悲伤面孔表现出更大的视觉扫描局限，BD 患者对情绪面孔也存在明显的视觉扫描局限(Bestelmeyer et al., 2006) (见图 2)。因此，BD 患者与健康个体在加工不同的面孔情绪时，其视觉扫描路径和注视偏好是否存在差异？不同阶段的 BD 患者对不同情绪面孔的识别障碍是否与视觉扫描路径存在某种关系呢？关于 BD 群体面孔情绪识别障碍的视觉追踪研究仍需进一步探索。

Figure 1. (A) Scanpath to degraded and non degraded neutral face for control (the first column), schizophrenia (the second column) and affective disorder subjects (the third column); (B) Scanpath to happy and sad face for control (the first column), schizophrenia (the second column) and affective disorder subjects (the third column)
图 1. (A) 健康被试(第一列)、精神分裂患者(第二列)和 BD 患者(第三列)分别观看模糊的中性面孔和清晰的中性面孔时的视觉扫描路径；(B) 健康被试(第一列)、精神分裂患者(第二列)和 BD 患者(第三列)分别观看愉快面孔和悲伤面孔时的视觉扫描路径(Carmel et al., 2002)

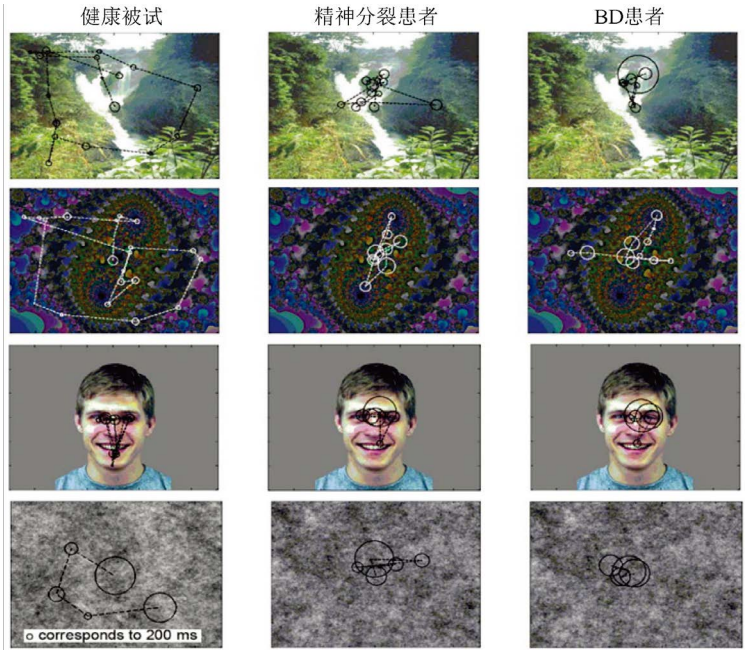

Figure 2. Scanpath to different emotional stimuli for control, schizophrenia and BD subjects
图 2. 健康被试、精神分裂患者和 BD 患者分别观看不同的情绪刺激时的视觉扫描路径(Bestelmeyer et al., 2006)

3.2. ERP 研究(Event-Related Potential)

个体对情绪面孔加工的过程是由大脑迅速完成的，因此，对面孔情绪识别障碍背后的时间特征的研究也是非常有意义的(Degabriele et al., 2011)。事件相关电位(event-related potentials, ERPs)则是一种能实时反映大脑加工情绪面孔时的脑部活动(Greg, Annmarie, & Olvet, 2010)，各成分的潜伏期(latency)和振幅(amplitude)分别是对某一刺激进行认知加工的速度和质量指标。涉及视觉注意的主要成分是早期 P100 成分，该成分能反映早期情绪识别机制，已有不少研究显示这一成分会受到面孔识别的影响(Halit, Haan, & Johnson, 2000; Herrmann, Ehlis, Ellgring, & Fallgatter, 2005; Itier & Taylor, 2002)，甚至会受到面孔情绪的影响(Batty & Taylor, 2003; Eger, Jedynak, Iwaki, & Skrandies, 2003)，但加工不同情绪面孔时的差异还有待进一步探究；N170 则是对面孔进一步加工的 ERP 成分，被认为是面孔加工中最主要的成分，与面孔结构编码和面孔特征知觉相关(Bentin, Allison, Puce, Perez, & McCarthy, 1996; Carretié & Iglesias, 1995; Eimer, 2000; Rossion & Gauthier, 2002)；还有一个与面孔情绪加工有关的晚期 P3 成分与较高级的心理过程相关，能反映个体对面孔的朝向以及注意分配的过程(Polich, 2007)。但纵观已有的研究发现，结论并没有达成一致。Degabriele 等(2011)的研究发现躁狂期的 BD 患者在加工愉快面孔时较悲伤面孔会诱发更强的 P100 波幅，而在加工所有情绪面孔时，躁狂相被试诱发的 N170 波幅相较健康被试要显著更小，说明该群体能对积极刺激产生正常甚至较高的知觉反应，但其认知控制能力降低，从而导致但该群体的病症扩大(即情绪过度高涨)，但其 P100 和 N170 的潜伏期相较健康个体并没有显著延长，研究者认为该结果证明了 BD 患者对面孔的识别速度和情绪的准确识别没有受到影响(Degabriele et al., 2011)。然而，Wynn 等(2013)却发现，BD 患者在加工情绪面孔时相较健康患者表现出更长的 N1 潜伏期(Wynn, Jahshan, Altshuler, Glahn, & Green, 2013)；最近一项研究也发现 depressed 期的 BD 患者在加工中性和愉快面孔时，N1 潜伏期相对健康被试有显著延长(Zhang et al., 2018)。

4. 任务性质的影响

此外，在面孔情绪识别任务中，注意参与的水平对情绪加工有较大的影响，个体对情绪刺激的神经反应取决于任务的性质(见图 3)。有一些对抑郁症、创伤后应激障碍和孤独症群体的研究结果发现，在被试加工情绪面孔时，相比外显的情绪识别任务，患者在内隐任务下会出现更高的杏仁核激活(Batty, Meaux, Wittemeyer, Rogé, & Taylor, 2011; Fu et al., 2004; Monk et al., 2010; Rauch et al., 2000; Rubinsztein et al., 2001)，甚至出现对心境不一致的情绪面孔的过度激活(即内隐任务下，躁狂相的 BD 患者在观看悲伤面孔时，与情绪唤醒和知觉相关的脑区－杏仁核、脑岛等以及与情绪调节相关的脑区－背侧前扣带回、额中回等相比在外显任务下都有过度激活) (Chen et al., 2006; Lawrence et al., 2004)；但关于任务性质影响 BD 群体的面孔情绪识别相关研究仍然很少，在未来还需进一步对六种基本情绪面孔(愤怒、厌恶、恐惧、惊讶、快乐和悲伤)进行系统的内隐任务研究。比如通过执行意图的自动化自我调控(Gallo, Keil, McCulloch, Rockstroh, & Gollwitzer, 2009)或句子整理任务的启动(Mauss, Cook, & Gross, 2007)等等，探究 BD 群体在这类内隐的、自动化的任务下相较外显情绪识别任务是否表现出不同面孔情绪识别能力和神经生理反应。

5. 干预设想

目前已有的对面孔情绪识别障碍的干预研究中，研究对象主要是精神分裂患者，相应的干预方法已被证明能显著提高该人群的面孔情绪识别能力(Frommann, Streit, & Wölwer, 2003; Silver et al., 2004; Tsotsi, Kosmidis, & Bozikas, 2017; Wölwer et al., 2005)。较近的一项研究表明，相比健康被试，BD 患者在对完整的面孔结构信息(configural face processing)进行情绪分类时，其准确率显著更低，而在仅仅观看面孔的部分特征信息(featural face processing)时，BD 患者与健康被试在情绪识别准确率上没有显著差异(Van

Rheenen, Joshua, Castle, & Rossell, 2017)，这提示我们，BD 患者的面孔情绪识别障碍可能是由于对情绪面孔整体空间信息的识别受损，因此对 BD 患者进行情绪面孔空间整合能力的训练可能会改善该人群的情绪面孔识别能力，例如用统一的典型脸型和典型发型的面孔模板，训练被试通过在模板中添加不同情绪面部特征信息构成指定的各类情绪，并给出相应反馈(钟鸣，王哲，孙宇浩等，2014)。也可在 BD 患者观看情绪面孔时，在面孔图片上呈现健康被试观看该情绪面孔时的动态扫描路径，让 BD 被试随着该路径进行面孔加工训练。

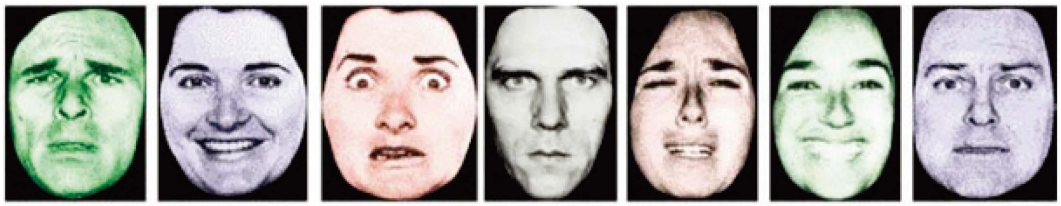

Figure 3. Examples of emotional face stimuli. For the explicit version of the facial affect recognition task, faces of one emotional type were presented with the prompt, "How happy/sad/fearful?" For the incidental version, faces of one emotional type were presented with prompt, "How green/ red/ blue?"
图 3. 在外显面孔情绪识别任务中，被试需要对某一情绪面孔做出如下判断"有多愉快/悲伤/恐惧？"；在内隐任务中，被试需要判断"有多绿/多红/多蓝？" (Chen et al., 2006)

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