A brief, but nuanced, review of emotional granularity and emotion differentiation research

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Emotional granularity (EG) and emotion differentiation (ED) both refer to the specificity of representations/experiences of emotion, or, in other words, the ability to make fine-grained, nuanced distinctions between similar emotions. Research on EG and ED is in its infancy; however, as reviewed in this paper, accumulating evidence suggests that EG and ED are associated with psychosocial adjustment. Studies have demonstrated that schizophrenia, borderline personality disorder, major depression, autism, and alcohol problems are associated with lower levels of EG/ED. This evidence strongly suggests that EG/ED may represent emotion regulation resources that buffer against the deleterious consequences of negative emotions. Research more clearly establishing the nature and construct validity of EG/ED and more clearly specifying their role in the development of psychosocial adjustment problems is needed.

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Background

A substantial increase in social complexity over the past 10 000 years has facilitated the development of cultural, social, and moral matrices that require humans to cooperate and live in harmony to adapt to environmental challenges (e.g. [1,2]). Emotions represent one mechanism used to attend and respond to social cues and respond to threats in the environment. Nesse [3] suggested that, 'Natural selection may have gradually and partially differentiated a generic state of inhibition into sub-types specialized to cope with particular kinds of situations' (p. 15) and 'that natural selection has partially differentiated several kinds of negative affects to deal with different kinds of unpropitious situations, and predicts substantial overlap for the characteristics of low mood, depression, anxiety, guilt, and grief (p. 15).' Thus,

being able to make distinctions among similar emotional states may help successfully navigate the increasing complex social environment of modern humans.

Emotional granularity (EG) refers to individual differences in the specificity of one's emotional experiences and representations or an individual's ability to make fine-grained, nuanced distinctions between similar emotional states (e.g. [4]). Differentiating feeling 'happy' from feeling 'sad' is relatively easy. Feeling happy is a positive emotion associated with moderate to high levels of activation, while feeling sad is negatively valenced and associated with moderate to low levels of activation. On the other hand, distinguishing between two emotions that are of similar valence (e.g. angry versus frustrated) by attending to information concerning arousal (i.e. anger is typically associated with more arousal than frustration) requires a higher degree of EG. Pond *et al.* [5••] stated that, 'Emotion differentiation (ED), also known as EG, refers to how much a person is aware of and able to classify experiences into discrete emotional categories' (p. 327). Barrett [6], who coined the term 'EG', has used the term 'ED' to refer to the same construct [7•]; however, she operationalizes EG slightly differently than ED (i.e. different procedures used to summarize correlations among different emotions across multiple contexts, see below). Thus, EG and ED will be considered synonymous for the following review until a slight difference in how they are typically operationalized is articulated.

Development and construct validity of EG

Barrett (e.g. [8,9]) developed EG to account for individual differences in the valence-arousal circumplex model. This model purports that affective phenomena can be described as the combination of two dimensions: valence refers to hedonic tone (pleasure or displeasure), while arousal refers to the felt activation (activated or deactivated). Although the parsimony, utility, and robustness of the valence-arousal circumplex model are generally agreed upon, meaningful differences across individuals have been documented.

Barrett (e.g. [4]) developed two individual difference variables that capture differences in the valence-arousal circumplex model. Valence focus (VF) refers to the degree to which individuals incorporate information regarding hedonic tone in their representations and experiences of emotion, while arousal focus (AF) refers to the degree to which individuals incorporate information about activation. Making nuanced, fined-grained distinctions among

emotional states (i.e. high EG) requires being able to incorporate adequate information about both valence and arousal.

Barrett and colleagues also provided empirical support for the construct validity of EG demonstrating: (a) substantial variability in VF and AF across individuals [9,10], (b) this variability is only slightly related to differences in language-based representations of emotion [4], (c) individuals with higher levels of VF tend to more readily detect valenced information in faces than individuals with lower levels of VF [11] and (d) AF is positively associated with the ability to accurately perceive internal body cues [12]. Thus, VF appears to be related to the degree to which individuals are sensitive to valence cues in the environment, and AF appears to be related to the degree to which individuals can accurately incorporate information about the body.

1.1. Measuring EG and ED

Measuring ED and EG requires having participants report on their emotional experiences several times across a variety of circumstances. Experiential sampling (ES), or ecological momentary assessment, which involves reporting on emotional state on several occasions throughout the day for several days, has been most frequently used to investigate EG/ED (e.g. [4,5••]). Operationalizing EG and ED involves summarizing the correlations among the use of emotion terms across situations, contexts, or reactions [4,13•]. One who always reports identical levels of anger and sadness will produce a correlation of +1.0 between these states indicating that no distinction is being made between these emotions (i.e. low granularity). The quantitative procedure used to summarize these correlations differs slightly across EG and ED studies. Barrett (e.g. [4]) developed a procedure that computes the degree to which the correlation of emotion terms across multiple assessments is accounted for by the valence-based or arousal-based properties of words producing estimates of VF and AF (described above). ED studies typically compute intra-class correlations producing an estimate of the overall correlation among emotion terms across occasions. Separate estimates are often calculated for negative and positive emotion terms. Unfortunately, no studies examining the consequences of using estimates of granularity (i.e. VF and AF) versus estimates of differentiation (positive and negative) exist. One potential advantage of deriving estimates of EG is that they provide some information about the mechanism contributing to reduce granularity — whether this is due to smaller VF or AF, or the combination of both. However, specific guidance about what type of estimate to use when awaits future research. The operationalization of EG and ED represents a strength of this research. While many self-report measures of closely related constructs exist (e.g. emotional complexity, emotional clarity, emotional awareness, and alexithymia), the measurement of EG/ED does not involve having individuals describe themselves on an attribute or characteristic. Estimates of EG/ED are derived from correlations among self-reports of emotions across time, which overcomes some of the threats to validity associated with self-report methodology.

EG, ED, and psychosocial functioning

Accumulating evidence indicates that EG and ED are positively associated with adaptive emotion regulation and psychosocial functioning. Barrett et al. [6] derived estimates of positive and negative ED from participants' ratings of their most intense emotional experience of the day for 14 days using nine emotion labels (four positive and five negative). Individuals with higher levels of negative ED tended to utilize a wider range of negative emotion regulation strategies, particularly when they experienced their emotions at greater intensity, compared to individuals with lower levels of negative ED. Positive ED was not associated with the use of emotion regulation strategies. This was the first study to demonstrate that how individuals regulate their emotions depends partly on the specificity in which they experience and represent emotions.

The interaction of a variety of implicit and explicit processes [14] involving the combination of information from the body (e.g. increase in heart rate), information from the external environment, information from the past via episodic memories, and semantic knowledge, via a variety of attentional processes shape an emotional experience [15]. Differences in granularity, or differentiation, in any of these processes could impact psychological functioning. Kring et al. [16] investigated differences between individuals diagnosed with schizophrenia or schizoaffective disorder and healthy controls in the conceptual representation of emotion knowledge by having participants rate the similarity of pairs of emotion terms based on their understanding of the meaning of words. Similarity judgments can be used to index mental structure anchored in semantic knowledge (e.g. [4,17–19]). Multidimensional scaling applied to the similarity ratings revealed that participants diagnosed with schizophrenia or schizoaffective disorder exhibited less EG on a conceptual level than healthy controls because they tended to emphasize arousal less in their representations than healthy controls.

Building on the seminal work of Barrett and colleagues, research examining associations among EG/ED, emotion regulation, and psychosocial functioning has flourished. Suvak et al. [20] applied the EG framework to understanding affective dysregulation of borderline personality disorder (BPD). Forty-six females who met DSM-IV criteria for BPD and 51 females who did not meet BPD or any Axis I criteria rated their emotional reactions to 16 images representing all combinations of valence (pleasant–unpleasant) and arousal (low–high) using

16 emotion labels. Participants diagnosed with BPD exhibited smaller experiential AF than controls. A more recent ES study demonstrated that among individuals diagnosed with BPD, ED moderated the relationship between rumination and the urge to engage in nonsuicidal self-injury (NSSI) [21]. The relationship between rumination and the urge to engage in NSSI was significantly weaker for individuals exhibiting high ED than those exhibiting low ED, providing more evidence for the role of EG/ED in the affective dysregulation component of BPD.

Using a similar image viewing procedure as Suvak *et al.* [20], Erbas *et al.* [22] showed that individuals diagnosed with autism spectrum disorder were less able to differentiate than typically developing individuals. Erbas *et al.* [22,23••] also developed a card-sorting task and a task involving describing a number of individuals using a variety of emotion terms to assess ED on a conceptual level. They used these tasks in a series of studies documenting associations between negative ED and several indicators of adjustment including negative affect, self-esteem, neuroticism, depression and meta-knowledge about one's emotions.

Demiralp *et al.* [7•] compared ED in individuals with major depressive disorder (MDD) to ED in healthy controls. Participants rated their mood eight times per day for approximately a week using seven negative and four positive emotions. Individuals diagnosed with MDD experienced negative emotions in a less differentiated (less granular) manner, with no differences between groups in positive ED.

Kashdan *et al.* [24] asked participants to self-monitor alcohol intake following an experience sampling task for 21 days. Participants were prompted to rate their intensity of six negative emotions before and after consuming alcohol. Participants also reported on their alcohol intake over the past 30-days. Negative ED moderated the association between intensity of negative emotions and alcohol consumption. The relationship between intensity of negative emotions and alcohol consumption was significantly weaker for participants exhibiting high ED compared to those exhibiting low ED. This weaker relationship between intensity of negative emotions and alcohol consumption may indicate that individuals who exhibit high ED were able to draw upon more effective coping skills to deal with negative emotions leading to less alcohol consumption, while for individuals with low ED who were not able to draw upon effective coping skills, alcohol consumption is more directly determined by intensity of negative emotion.

A more recent ES study documented significant negative associations between both positive and negative ED and alcohol-related problems in undergraduate students reporting heavy to moderate alcohol consumption [13•]. Results showed that the association between negative ED and alcohol related problems was accounted for by negative urgency, or impulsive action in response to intense negative emotion. However, the association between positive ED and alcohol problems was not accounted for by positive urgency (i.e., impulsive action in response to positive emotion). Thus, poor negative ED appeared to be associated with alcohol-related problems because of higher levels of disinhibited behaviors associated with poor ED when emotionally aroused, whereas the negative association between positive ED and alcohol related problems is likely accounted for by other factors.

Three ES studies demonstrated that ED was an important intervening variable in the relationship between anger and aggression [5••]. Participants who exhibited higher levels of ED were less likely to report aggressive tendencies when angry compared to participants with lower ED (study 1), and high differentiators reported lower levels of daily provocation when experiencing anger compared to low differentiators (study 2). Study 3 demonstrated that emotional control mediated the interaction between ED and anger predicting aggression. These studies further demonstrated that the ability to distinguish between similarly valenced states can be a resource that facilitates adaptive coping.

The studies reviewed above strongly suggest that EG/ED may represent emotion regulation resources that buffer against the deleterious consequences of negative emotions. However, research on EG/ED is still in its infancy, and more research is needed on the nature and importance of these constructs. Several measurement issues need to be clarified such as what is the best way of measuring these constructs (e.g. ES procedures, using standardized stimuli to evoke a range of emotional reactions) as well as the best way to quantitatively operationalize the constructs. A comprehensive model articulating the biological and psychological processes that contribute to ED/EG needs to be developed and tested. This would include identifying and empirically investigating the mechanisms that account for the finding that EG/ED are associated with healthier emotion regulation and psychosocial adjustment. For instance, it may be that different emotion regulation strategies differently impact different types of emotional experiences, and the ability to precisely represent emotions may help recruit the most appropriate emotion regulation strategy for a particular emotional state. It is also possible that higher levels of EG/ED are not beneficial in all situations. For instance, when quick decisions need to be made to ensure safety, a quick very crude emotional representation might be most adaptive. Thus, future research needs to more clearly identify when higher levels of ED/EG are more adaptive. Whether deficits in ED/EG represent a non-specific vulnerability to psychosocial adjustment

problems or specific patterns of ED/EG (e.g. adequate AF, high VF, or vice versa) or particular mechanisms that contribute to deficits related to ED/EG varies across different types of adjustment problems needs to be explored. Finally, a very interesting unexplored question is whether EG/ED can be learned, in other words can interventions be developed to successfully increase EG/ED? More specifically, it would be interesting to investigate whether some sort of biofeedback would increase arousal focus producing higher levels of EG/ED. The findings reviewed above suggest that these represent fruitful avenues for future research endeavors.

Conflict of interest

The authors have no conflicts of interest.

References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- •• of outstanding interest

1. Haidt J: *The Righteous Mind: Why Good People are Divided by Politics and Religion*. Random House LLC; 2013.

2. Churchland PS (Ed): *What Neuroscience Tells Us about Morality: Braintrust*. Princeton University Press; 2011.

3. Nesse RM: **Is depression an adaptation?** *Arch. Gen. Psychiatry* 2000, **57**:14-20.

4. Barrett LF: **Feelings or words? Understanding the content in self-report ratings of emotional experience**. *J. Pers. Soc. Psychol.* 2004, **87**:266-281.

5. Pond RS, Kashdan TB, DeWall CN, Savostyanova AL, Nathaniel M,
•• Fincham FD: **Emotion differentiation moderates aggressive tendencies in angry people: a daily diary analysis**. *Emotion* 2012, **12**:326-337.
Using experiential sampling methodology, three studies demonstrated that ED (or EG) affects one's ability to cope with anger. Results indicated that participants who exhibited high levels of ED are less likely to act in an aggressive manner when angry compared to individuals exhibiting low levels of ED. These findings suggest that in some situations the ability to distinguish between similarly valenced states (i.e. ED or EG) is a resource that facilitates adaptive coping.

6. Barrett LF, Gross J, Conner T, Benvenuto M: **Knowing what you're feeling and knowing what to do about it: mapping the relation between emotion differentiation and emotion regulation**. *Cognit. Emot.* 2001, **15**:713-724.

7. Demiralp E, Thompson RJ, Mata J, Jaeggi SM, Buschkuehl M,
• Barrett LF, Ellsworth PC, Demiralp M, Hernandez-Garcia L, Deldin PJ, Gotlib IH, Jonides J: **Feeling blue or turquoise? Emotional differentiation in major depressive disorder**. *Psychol. Sci.* 2012, **1**:1-7.
An experiential sampling study showed that participants diagnosed with major depressive disorder were less granular when experiencing negative emotions than healthy controls.

8. Feldman LA: **Variations in the circumplex structure of emotion**. *Pers. Soc. Bull.* 1995, **21**:806-817.

9. Feldman LA: **Valence focus and arousal focus: individual differences in the structure of affective experience**. *J. Pers. Soc. Psychol.* 1995, **69**:153-166.

10. Barrett LF: **Discrete emotions or dimensions? The role of valence focus and arousal focus**. *Cognit. Emot.* 1998, **12**:579-599.

11. Barrett LF, Niedenthal PM: **Valence focus and the perception of facial affect**. *Emotion* 2004, **4**:266-274.

12. Barrett LF, Quigley K, Bliss-Moreau E, Aronson KR: **Interoceptive sensitivity and reports of emotional experience**. *J. Pers. Soc. Psychol.* 2004, **87**:684-697.

13. Emery NN, Simmons JS, Clarke CJ, Gaher RM: **Emotion
• differentiation and alcohol-related problems: the mediating role of urgency**. *Addict. Behav.* 2014, **39**:1459-1463.
An experiential sampling study examined negative effects of undergraduate alcohol consumption. The results demonstrated that alcohol-related problems may be associated with poor emotion differentiation, and the relationship between negative emotion differentiation and alcohol problems was accounted for by negative urgency, or impulsive action in response to intense negative emotion.

14. Barrett LF, Gross JJ: **Emotion representation and regulation: a process model of emotional intelligence**. In *Emotion: Current Issues and Future Directions*. Edited by Mayne T, Bonnano G. Guildford Press; 2001:286-310.

15. Lindquist KA, Wager TD, Kober H, Bliss-Moreau E, Barrett LF: **The brain basis of emotion: a meta-analytic review**. *Behav. Brain Sci.* 2012, **35**:121-143.

16. Kring AM, Barrett LF, Gard D: **On the broad application of the affective circumplex. Representations of affective knowledge among schizophrenia patients**. *Psychol. Sci.* 2003, **14**:207-214.

17. Barrett LF, Fossum T: **Mental representations of affect knowledge**. *Cognit. Emot.* 2001, **15**:333-364.

18. Shepard RN: **Toward a universal law of generalization for psychological science**. *Science* 1987, **237**:1317-1323.

19. Tversky A: **Features of similarity**. *Psychol. Rev.* 1977, **84**:327-351.

20. Suvak MK, Litz BT, Sloan DM, Zanarini MC, Barrett LF, Hofmann SG: **Emotional granularity and borderline personality disorder**. *J. Abnorm. Psychol.* 2011, **120**:414-426.

21. Zaki LF, Coifman KG, Rafaeli E, Berenson KR, Downey G: **Emotion differentiation as a protective factor against nonsuicidal self-injury in borderline personality disorder**. *Behav. Therapy* 2013, **44**:529-540.

22. Erbas Y, Ceulemans E, Boonen J, Noens I, Kuppens P: **Emotion differentiation in autism spectrum disorder**. *Res. Autism Spectr. Disord.* 2013, **1**:1221-1227.

23. Erbas Y, Ceulemans E, Lee Pe M, Koval P, Kuppens P: **Negative
•• emotion differentiation: its personality and well-being correlates and a comparison of different assessment methods**. *Cognit. Emot.* 2014:1-18. (Epub ahead-of-print).
Presented the findings of three studies that used multiple methods to measure negative ED including experiential sampling, an image viewing procedure, and a task involving describing a number of individuals using a variety of emotion terms to assess ED. These studies documented associations between negative ED and several indicators of adjustment including negative affect, self-esteem, neuroticism, depression and meta-knowledge about one's emotions.

24. Kashdan PF, Collins RL, Muraven M: **Emotion differentiation as resilience against excessive alcohol use: an ecological momentary assessment in underage social drinkers**. *Psychol. Sci.* 2010, **21**:1241-1347.