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Effects of achievement contexts on the meaning structure of emotion words

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Emotion words such as joy, anger, and sadness play a central role in the affective sciences. Based on emotion words, humans recognise and communicate emotions, and researchers select stimuli for experiments. Moreover, emotion words are used as items in questionnaires and response scales. It is typically assumed that the meaning of emotion words is largely independent of context (i.e. the setting or the situation where the word is used). In the present study, we examined the impact of context on emotion word meaning to investigate this untested assumption.

The notion of word meaning or lexical meaning can be understood in different ways. This paper focuses on what is commonly referred to as *denotative meaning*, that is, the concept behind the word. Denotative meaning can be described in terms of features, sometimes just a few. Theories on word meaning like those found in cognitive linguistics (cf. Croft & Cruse, 2004; e.g. Lakoff, 1987) and in psychological models like Barsalou's and constructionism (Barrett & Russell, 2015) would claim that a word's meaning encompasses much of our world knowledge about the kind of thing designated by the word. For example, the meaning of "fear" would not only be "an emotion caused by the perception of threat", but would also include features pertaining to accumulated knowledge of the emotion's typical elicitation, physiological changes, expressions, associated behaviours, etc.

Although semantic content can be described in terms of feature profiles, the meaning of a word is unlikely to be stored in long-term memory in the form of a fixed profile. It can be argued that meaning is constructed online each and every time a word is used, by combining stored information and contextual cues (Barsalou, 1999). In this process, contextual cues can affect the features that will be recruited for the online construction of meaning. In this perspective, the *contextualised meaning* of a word can be defined as the word meaning a speaker assumes based on the contextual information in a given situation. When asked for the meaning of the word out of context, a speaker is typically forced to default on the most prototypical features associated with it (i.e. those most frequently applicable across all events labelled that way, generally used to differentiate the category from neighbouring ones (cf. Rosch, 1978). Although context effects on word meaning have been investigated from different angles (Miller, 1999; Osgood, 1952), they were not systematically examined for *emotion words*. Since emotion words are used to measure emotional reactions, it is important to know to what extent context affects their meaning.

To study the meaning profiles of emotion words, the GRID instrument was used in the present research. The GRID is an established psycholinguistic instrument for the reliable measurement of semantic profiles for emotion words (Fontaine, Scherer, Roesch, & Ellsworth, 2007; Fontaine, Scherer, & Soriano, 2013, see Chapter 5) based on the Component Process Model of emotion (Scherer, 2005). The model assumes that emotions are episodes during which different subsystems of an organism become synchronised to enable optimal adaptation to environmental contingencies. Each of the subsystems represents one of the components of emotion (i.e. appraisal, bodily reaction, action tendencies, expressive behaviour, and subjective feeling) and fulfils a specific function. To operationalise these components in the GRID, 144 features were selected from a broad range of emotion theories (Fontaine et al., 2013, see Chapter 5). They allow for a decomposition of emotion words into meaning units that are more differentiated than broad summary concepts such as valence, arousal, and power.

In the GRID, participants are asked to imagine a person who describes his/her emotional experience with a particular word (e.g. joy), and to make inferences about associated features. The typicality (likelihood) of each feature is rated and averaged feature profiles are calculated for each emotion word. Such quantification renders the meaning of emotion words explicit, allowing reliable comparisons among emotion words in different languages and cultures (Fontaine et al., 2013). However, so far the effect of context on meaning profiles of emotion words as measured by the GRID has not been investigated.

In the present study, we compare the rated features of emotion words presented in a generic (unspecified) context with those presented in a specified one. To this end, we use data collected with the original GRID instrument (henceforth FullGRID) that measured word meaning without context information (FullGRID sample, Fontaine et al., 2013, see Chapter 6), and data that were obtained with a specifically adapted GRID instrument (Achievement Emotion CoreGRID, henceforth AECG, Loderer et al., 2015). In the AECG, participants were asked to imagine a person who experiences an emotion after having failed or succeeded in an achievement situation (i.e. where the person's performance is being evaluated, for example, during exams, work, or sports).

Our central aim was to examine how semantic profiles change when raters are provided with a specific context, here achievement situations, as compared to decontextualised ratings (which are expected to reflect only the most prototypical features). We formulated hypotheses about potential context effects on the basis of different emotion theories. As most emotion theorists have not directly addressed the issue of semantic structure in emotion words, we extrapolate our predictions from prior work about emotional experience assuming the latter to be also informative for the semantic structure. By investigating emotion words, we learn about "average experience". The specific predictions we are examining are the following.

(a) Context effects on discrete emotions: According to basic emotion theory (e.g. Ekman, 1992; Izard, 1992), feature profiles of words denoting hypothesised basic emotions (they are expected to be stable across languages and cultures, i.e. in the present article, joy, sadness, anxiety, and anger) will show a relatively high degree of cross-contextual stability irrespective of the context of their presentation. In contrast, feature profiles of words denoting hypothesised non-basic emotions (i.e. in the present article, pride, guilt, shame, contentment, disappointment, and despair) would more likely vary as a function of context. Here, we investigate whether potential context effects are indeed specific to certain emotions.
(b) Context effects on emotion components: According to appraisal theories (e.g. Ellsworth & Scherer,

2003; Pekrun, 2006; Roseman & Smith, 2001; Scherer, 2009; Smith, 1989), to the extent that different types of contexts imply specific appraisal patterns, one would expect context effects in the feature profile of the appraisal component. According to Frijda, Kuipers, and Terschure (1989), contextual changes should also be expected in the action component, which is partly driven by appraisal. Whether appraisal modifications also involve changes in the other emotion components (largely driven by appraisal configuration) remains to be investigated, but is likely to be the case. Conceptual act theory (with its emphasis on situated word meanings that define the emotional reaction) would predict contextual effects in the basic psychological components (Lindquist & Barrett, 2008). We investigate which components are specifically affected by context.

(c) Context effects on the number of dimensions: Dimensional theories (cf. Fontaine, 2009; Yik, Russell, & Barrett, 1999) assume two or three stable higher order dimensions for emotion words – valence, arousal, and dominance/power – for which robust empirical support was demonstrated. Psychological constructionism (Barrett & Russell, 2015; Russell, 2003) has postulated two dimensions – valence and arousal – as the fundamental constituents of "core affect". In contrast, previous empirical evidence obtained with the GRID instrument (e.g. Fontaine et al., 2007, 2013) revealed four cross-culturally stable dimensions: valence, power, arousal, and novelty. We explore how many (and which) dimensions emerge in an achievement context and to what extent the dimensionality remains stable with added contextual information.

Method

Participants

The AECG sample (Loderer et al., 2015) consisted of 29 students (26 females, $M_{age} = 21.07$, $SD_{age} = 3.68$) from a German university. All participants were native German speakers. The FullGRID sample (Fontaine et al., 2013, see Chapter 6) comprised 120 students (92 female, $M_{age} = 24.47$, $SD_{age} = 6.15$) of another German university. All participants received course credit for their participation.

Measures

Fullgrid

The FullGRID comparison data set consists of 24 emotion words (Fontaine et al., 2013, see Chapter 5). Participants rated four of the emotion words on the basis of 142 features. These features cover the appraisal (31 features), bodily reaction (18 features), expression (26 features), action tendencies (40 features), and feeling (22 features) components, and two additional ones (regulation [4 features] and frequency [1 feature]).

AECG

Given the length of the FullGRID, a shorter version (CoreGRID) was developed based on FullGRID results from 34 samples in 25 countries (Fontaine et al., 2013, see Chapter 44). The CoreGRID comprises 68 features operationalising the five emotion components (appraisal [21 features], bodily reactions [11 features], expression [12 features], action tendencies [14 features], and feeling [10 features]). A comparison between these two GRID instruments indicated that the CoreGRID accurately reproduces both the emotion feature structure and the characteristic overall four-dimensional structure of the FullGRID (Fontaine et al., 2013, see Chapter 44).

On the basis of the CoreGRID, the AECG was developed (for details, see Loderer et al., 2015), from which 68 features were selected and 16 achievement-related features were added with respect to the control-value theory (CVT, Pekrun, 2006). The CVT is a componential theory specifically designed to model achievement emotions. It conceptualises the phenomenology of individuals' achievement-related emotions concerning their affective, cognitive, motivational-behavioural, physiological, and expressive aspects. As a result, the AECG comprises 84 features, grouped into the five emotion components (appraisal [28 features], bodily reactions [12 features], expression [16 features], action tendencies [18 features], and feeling [10 features]). Additionally, it consists of 16 emotion words (see below). Achievement situations were defined in the instructions and sample achievement situations were described as illustration (e.g. "Achievement situations are situations in which a person believes that his/her performance is evaluated, for example, during an exam, work or sports.").

The two data sets had in total 11 emotion words (anxiety, anger, disappointment, sadness, despair, shame, guilt, surprise, pride, joy, and contentment) and 65 features in common. The number of shared features in each emotion component was: appraisal 18 features, bodily reactions 12 features, expression 12 features, action tendencies 14 features, and feeling 9 features (see Table S1 in the supplementary materials published online).

Procedure

In both studies, the GRID was administered in a computerised form with the same procedure. Participants rated the typicality (likelihood) that a feature would apply for each emotion word, if a native speaker of their language used the word to describe an emotional episode. They gave their response on a nine-point scale (ranging from 1 "Extremely unlikely", through 5 "Neither unlikely, nor likely" to 9 "Extremely likely"). The only difference in the procedure concerns the number of emotion words rated by a participant. In the FullGRID, each participant was randomly assigned four of the 24 emotion words (anger, surprise, joy, pride, guilt, shame, contentment, disappointment, despair, sadness, anxiety, being hurt, compassion, love, happiness, pleasure, interest, stress, fear, jealousy, hate, irritation, disgust, and contempt) to be rated in one session. Thus, in the FullGRID, on average 20 participants rated an emotion word. In the AECG, each participant ($n = 29$) rated all 16 emotion words (anger, surprise, joy, pride, guilt, shame, contentment, disappointment, despair, sadness, hope, relief, anxiety, frustration, hopelessness, and boredom) in two sessions.

Analyses

Prior to the context analyses, for each data set, the reliabilities of the ratings across participants were calculated separately for each emotion word. As sufficient rater agreement is of the issue for semantic analyses (Fontaine et al., 2007, 2013, see Chapter 5), the data for an emotion word of a participant were removed when the corrected item-total correlation for that word was lower than .20 for that participant. Moreover, ratings of an emotion word that showed the same response (in at least 100 features in the FullGRID sample and in at least 58 features in the AECG sample) were removed, as one might suspect a faulty rating strategy. Once the data were cleaned in this manner, mean centring was applied for each data set and emotion word individually (i.e. across all features and participants of a data set an average score was calculated for each emotion word; that score was subtracted from all feature scores of the respective word).

Predictions a and b were addressed for each emotion component in each word separately. The feature profiles stemming from both data sets were compared. Therefore, all shared features of an emotion component of an emotion word (see Table S1 online) were analysed in a mixed-design multivariate analysis of variance (MANOVA). Context (general vs. achievement) was the between-subject variable and features of an emotion component were the within-subject variable. Whenever the MANOVA for an emotion word revealed a significant interaction of context and features, *post hoc* independent sample *t*-tests (two-tailed) were conducted. Bonferroni correction was applied to consider the possibility of an increased Type I error due to multiple testing in the overall (five MANOVAs were calculated for each emotion word) and the *post hoc* analyses (the number of *post hoc* tests depended on the number of features in an emotion component). Effect sizes are reported as partial eta squared (η^2).

To address prediction c, a PCA was conducted for each mean-centred data set to investigate its underlying dimensions. In the PCA, emotion words were treated as observations and the centred mean scores of the features as variables. Subsequently, Tucker's congruence coefficients were calculated (for details, see the supplementary material section published online) to assess the similarity of their dimensions. As the results of a PCA component rotation largely depends on the nature of the rotation chosen and as we had a clear expectation about the structure, we used the following standard procedure: the obtained four-dimensional AECG structure was orthogonally Procrustes rotated towards the four-dimensional FullGRID structure on the basis of the 65 overlapping features (see Table S1). After orthogonal Procrustes rotation, a congruence measure for each principal component was computed by means of Tucker's phi. The Tucker's phi ranges from −1 (perfect opposite pattern of loadings) over 0 (no congruence) to 1 (perfect congruence) with values of .85 and higher pointing to a fair congruence in the loading pattern (Lorenzo-Seva & ten Berge, 2006).

Results

Reliability

Following the reliability criterion, ten single ratings (4.8% of the total data) were a priori removed from the FullGRID data set (three for guilt and one for compassion, pride, joy, interest, fear, jealousy, and irritation). From the AECG data set, five ratings (1.1% of the total data) were removed (one for contentment, pride, joy, hopelessness, and frustration). Cronbach's alphas for each word ranged from .91 to .98 in each data set.

Context-dependent feature differences per emotion word

The significant interaction effects of context and feature in the MANOVA on each emotion word and emotion component are presented in Table 1. All results are documented in Table S2 (supplementary material published online). Table 2 presents the significant results of the *post hoc* analyses as well as the centred means and standard deviations (*SDs*) of the respective features. The more negative a mean value, the more the feature was considered to be unlikely for the given emotion word and context. On the contrary, the more positive a mean value, the more the feature was rated to be likely.

Context affected a comparable number of features across all emotion components in both hypothesised basic (joy: five features; sadness: four features; anger: three features) and non-basic emotion words (anxiety: fourteen features; shame: four features; guilt: three; disappointment, despair, surprise, and pride: one feature; contentment: no features).

Context changed features of the appraisal component for the majority of investigated emotion words (all but contentment, surprise, pride and joy). Furthermore, if appraisal features showed context effects, subjective feeling features also changed for anxiety (feeling "tired"), anger (feeling "restless" and "strong"), sadness (feeling "good"), and shame (feeling "restless").

Dimensional structure

Four dimensions emerged from the PCA in each data set (see Tables S3 and S4, and sections *PCA results FullGRID* and *PCA results AECG* in the supplementary materials published online). Regarding their similarity of the common features, Tucker's phi values for the four components (valence = .92, power = .94, arousal = .87, and novelty = .86) suggest a fair similarity between the two data sets, largely independent of context (for details on their computation, see the supplementary materials).

Discussion

In the present study, we investigated context effects on the meaning profiles (features) and the underlying dimensionality of emotion words. We, therefore,

Table 1. Significant context × feature interaction effects of the repeated measures MANOVAs calculated for each emotion word and emotion component separately.

Emotion word	Emotion component (df)	*F*	Wilk's Λ	η^2
Anxiety	Appraisal (17, 33)	6.29**	0.24	.76
	Bodily reaction (11, 39)	5.08**	0.41	.59
	Expression (11, 39)	9.13**	0.28	.72
	Action tendencies (13, 37)	4.07**	0.41	.59
	Subjective feeling (8, 42)	4.39**	0.54	.46
Anger	Appraisal (17, 28)	8.32**	0.17	.84
	Subjective feeling (8, 37)	5.00*	0.48	.52
Disappointment	Appraisal (17, 32)	3.94**	0.32	.68
Sadness	Appraisal (17, 30)	7.66**	0.19	.81
	Subjective feeling (8, 39)	3.28*	0.60	.40
Despair	Appraisal (17, 33)	5.30**	0.27	.73
Shame	Appraisal (17, 32)	5.29**	0.26	.74
	Expression (11, 38)	3.17*	0.52	.48
	Subjective feeling (8, 41)	4.55**	0.53	.47
Guilt	Appraisal (17, 29)	2.66*	0.39	.61
Surprise	Bodily reaction (11, 37)	3.58*	0.49	.52
	Subjective feeling (8, 40)	4.02**	0.55	.45
Pride	Bodily reaction (11, 37)	2.91*	0.54	.46
Joy	Bodily reaction (11, 35)	3.39*	0.48	.52
	Expression (11, 35)	5.61**	0.36	.64

Note. The present table presents only the significant results. All results are provided in the supplementary material section (Table S2). Due to multiple testing for the five emotion components of each emotion word, Bonferroni adjustment was applied accordingly. The Bonferroni adjusted (.05/5) *p*-values are $^*p_{adj} < .01$, $^{**}p_{adj} < .002$.

Table 2. *Post hoc t*-test results and means (SD) of the significant features whose typicality differs in general and achievement contexts.

Emotion word	Emotion component	Feature	General context	Achievement context	t	df	p_{adj}
Anxiety	Appraisal	Confirmed the expectations of the person	0.93 (1.76)	−1.79 (1.55)	5.75***	42.1	.000
		Could live with the consequences	−0.02 (1.71)	−2.00 (1.36)	4.45**	39.3	.001
	Bodily reaction	Heartbeat getting faster	1.57 (1.48)	3.07 (1.20)	−3.90**	40.0	.004
		Breathing getting faster	1.34 (1.45)	3.24 (0.76)	−5.60***	30.0	.000
	Expression	Frowned	2.43 (2.03)	−0.10 (1.75)	4.68***	42.0	.000
		Trembling voice	0.93 (1.76)	2.80 (0.88)	−4.60**	29.0	.001
		Speech disturbances	0.48 (1.66)	1.93 (1.06)	−3.60*	34.0	.014
		Spoke faster	−0.61 (2.28)	1.76 (1.39)	−4.30**	33.0	.002
		Spoke slower	0.57 (1.57)	−1.45 (1.72)	4.34**	47.0	.001
	Action tendencies	Lacked the motivation to pay attention to what was happening	−2.48 (1.96)	−0.45 (1.98)	−3.70**	46.0	.008
		Wanted to disappear or hide from others	0.30 (1.86)	2.52 (1.59)	−4.50**	41.0	.001
		Wanted to tackle the situation	0.43 (1.78)	−1.69 (1.64)	4.35**	43.0	.001
		Wanted to run away in any direction	0.07 (1.60)	2.86 (1.45)	−6.50***	43.0	.000
	Subjective feeling	Tired	0.39 (2.77)	−1.69 (1.53)	3.16*	31.0	.032
Anger	Appraisal	Was caused intentionally	1.45 (1.62)	−2.54 (1.30)	8.65***	28.0	.000
	Subjective feeling	Restless	0.21 (2.39)	2.19 (1.49)	−3.08*	23.5	.024
		Strong	1.68 (1.52)	−0.92 (2.16)	4.77***	42.4	.000
Disappointment	Appraisal	Was caused intentionally	0.66 (2.12)	−2.50 (1.27)	6.08***	30.2	.000
Sadness	Appraisal	Was pleasant for the person	−3.74 (0.96)	−2.83 (0.82)	−3.42*	34.4	.047
		Was important for and relevant to the person's goals or need	−0.48 (2.75)	2.00 (1.43)	−3.80*	23.9	.015
		Was caused intentionally	−0.11 (2.59)	−2.45 (1.32)	3.59*	24.6	.025
	Subjective feeling	Good	−3.90 (0.45)	−2.90 (1.40)	−3.60*	36.2	.009
Despair	Appraisal	Was caused intentionally	−0.46 (2.29)	−2.96 (1.25)	4.39**	31.7	.002
Shame	Appraisal	Was caused intentionally	−0.22 (1.79)	−2.23 (1.71)	3.99**	42.2	.005
	Expression	Smiled	0.06 (2.18)	−2.46 (1.43)	4.60**	32.4	.001
		Speech disturbances	2.97 (0.83)	2.04 (1.23)	3.13*	46.6	.036
	Subjective feeling	Restless	−1.18 (2.25)	1.22 (1.18)	−4.45**	28.2	.001
Guilt	Appraisal	Was caused intentionally	0.53 (2.48)	−1.95 (1.79)	3.68*	28.0	.018
		Was inconsistent with the person's own standards and ideals	2.64 (1.11)	0.74 (2.46)	3.61*	42.0	.018
Surprise	Bodily reaction	Felt weak limbs	0.67 (2.16)	−1.46 (1.50)	3.82**	31.7	.007
Pride	Bodily reaction	Blushed	2.12 (1.99)	0.47 (1.86)	3.13*	41.1	.038
Joy	Bodily reaction	Heartbeat slowing down	−2.86 (1.41)	−1.58 (1.39)	−3.05*	38.4	.049
		Heartbeat getting faster	3.19 (0.97)	2.13 (1.05)	3.56*	40.8	.012
		Felt warm	3.24 (0.81)	2.27 (1.32)	3.13*	44.7	.037
	Expression	Closed eyes	0.35 (1.75)	−1.76 (1.54)	4.26**	35.4	.002
		Trembling voice	1.35 (1.93)	−1.87 (1.46)	6.16***	31.6	.000

Note: The present table presents only the significant results. All results are provided in the supplementary material section. Due to multiple testing of the features of an emotion component for each emotion word, Bonferroni adjustment was applied for each emotion component individually based on the number of features. The Bonferroni adjusted p-values for each emotion component are as follows: appraisal (.05/18) $*p_{adj} < .003$, bodily reactions (.05/12) $*p_{adj} < .004$, expression (.05/12) $*p_{adj} < .004$, action tendencies (.05/14) $*p_{adj} < .004$, and feeling (.05/9) $*p_{adj} < .006$.

analysed in a new way data sets of two GRID studies[1] in which emotion words were presented with and without context information. The meaning of emotion words was quantified through typicality (likelihood) ratings of selected features.

Context effects on discrete emotions

Following basic emotion theory, we predicted that hypothesised basic emotion words (e.g. joy, sadness, and anger) would be less prone to influences from context, in contrast to hypothesised non-basic emotion words (i.e. pride, guilt, shame, contentment, disappointment, despair, surprise, and anxiety). Contrary to our expectations, the results showed that context affected the feature profiles of both types of emotion words (Tables 1 and 2). Our results do not support the notion of a universal, context-independent meaning of hypothesised basic emotion words. Rather, they are congruent with Barsalou's general claim (1999) that meaning is constructed by combining stored information and contextual cues.

We propose the following mechanism to account for our results: According to some appraisal theories of emotion, there is a virtually infinite number of different emotion episodes due to the complex non-linear interactions among many appraisal checks and consequent action tendencies (Scherer, 2009, p. 1316; see also Fontaine et al., 2013, pp. 19–21). As the number of emotion words in most languages is limited, the modal, prototypical combinations of appraisal outcomes will determine abstract semantic feature profiles for the emotion words representing the central tendencies in fuzzy meaning space (Barsalou's stored information) and will be modulated by the specific nature of the respective emotion episode (Barsalou's contextual cues). This modulation seems to consist of different weights given to particular appraisal checks or to different action tendencies depending on the context, as shown in our data. These results will now be discussed in greater detail.

Context effects on emotion components

Based on appraisal theories, we predicted that with differing context information the appraisal component will be the most instable emotion component in comparison to the others. Compatible with this prediction, feature profiles along this component changed for most of the emotion words. In particular, changes were observed for all negative emotion words (i.e. anxiety, anger, disappointment, sadness, despair, shame, and guilt), but no positive emotion word. The most stable emotion components were expression and action tendency showing context effects each only in two emotion words (i.e. expression: anxiety and joy; action tendency: anxiety and shame). Our data do not provide evidence for the prediction that contextual changes should also be expected in the action tendency component, partly driven by appraisal (Frijda et al., 1989). They rather suggest that appraisal changes involve variations in the subjective feeling component (largely driven by appraisal configuration) which is discussed below.

Context information affected most frequently the appraisal feature "[the emotion eliciting event] was caused intentionally" (Table 2). This was consensually rated as more atypical in the achievement than in the general context for anger, sadness, disappointment, despair, and guilt. Assuming that in achievement situations (e.g. an oral presentation, exam or sports) success is the intended outcome, these negative emotions are elicited in the event of failure. Thus, in line with our findings, an agent that wants to cause intentionally a failure in an achievement situation should be very atypical.

Moreover, when context effects were found in the appraisal component, they also emerged in the subjective feeling component for anxiety, anger, sadness, and shame. However, the relation was not always the same. The change in one appraisal feature (e.g. "[the eliciting event] was caused intentionally") was not consistently associated with changes in the same feeling features (e.g. "feeling good"). This result points to the possibility that appraisal and feeling features may not have a direct linear connection. Nonetheless, the finding indicates that contextual information has an impact on both components. In other words, when individuals appraise an event differently because of additional contextual information, their feelings also change qualitatively. This finding is important for the assessment of emotional experience with emotion words. It implies that emotional experience described by the same emotion word is not identical when compared across different contexts. This seems to be particularly important for negative emotion words since they showed more feature alteration depending on context than positive emotion words.

Context did not lead to different appraisal profiles of the positive emotion words (i.e. contentment, surprise, pride, and joy). Context-driven feature patterns emerged for these words only in the bodily reaction and the action tendency components. That the appraisal component did not reveal context effects for these words may be because their prototypical meanings are already very close to those of achievement contexts. Surprise, and pride only showed context effects in the bodily reaction component. For surprise, "felt weak limbs" was less likely in the achievement than in the general context; and for pride, "blushed" was less likely in the achievement than in the general context. Joy revealed context effects in both the bodily reaction and the expression components ("closed eyes" and "trembling voice"). In particular, "heartbeat slowing down" and "felt warm" was less unlikely in the achievement than in the general context, and "heartbeat getting faster" was more likely in the achievement than in the general context. The expression features "closed eyes" and "trembling voice" were more typical in the general than in the achievement context. For these positive emotion words, context may predominantly influence the level of arousal suggesting less arousal in the achievement than in the general context. In addition, context seems to influence facial expressions of joy, with larger expressivity in the general than in the achievement context. This finding could be explained by differing display rules associated with achievement situations. This variation in arousal and expressivity could be important for research on surprise, pride, and joy that compares emotional experience across different contexts. For contentment, no context effects emerged which suggest that its meaning may be very stable and independent of context.

In terms of the quantity of affected emotion components, the meaning of anxiety seems to be more sensitive to contextual information than the other emotion words. Furthermore, it is the only emotion word showing context effects in the action tendencies component. Perhaps, this is due to the fact that anxiety is one of the most frequently experienced emotion in high-stakes achievement environments. Therefore, people might have more differentiated conceptual representations of it. This finding is of importance because it suggests that the emotional experience of anxiety changes as a function of context and that the facets of anxiety that matter in one situation (e.g. achievement) are different in another situation (e.g. general context).

With respect to conceptual act theory (e.g. Wilson-Mendenhall, Feldman Barrett, Simmons, & Barsalou, 2011), one would predict context effects especially in the basic psychological components of sympathetic arousal (bodily reaction) and mental events (appraisal). Effects on the appraisal component were only found for the negative emotion words; however, only for anxiety, there were context effects on both components. Furthermore, context effects in the bodily reaction component were obtained for the positive emotion words without accompanying context effects in the appraisal component. Contentment did not show context effects, which could indicate that it is constructed largely independent of the situation. These findings might indicate that the construction of situated conceptualisation works at least partly differently for negative and positive emotion words. Future studies should further investigate this possibility.

Context effects on the number of dimensions

A four-dimensional structure was found in both data sets with a differing fourth dimension (FullGRID: novelty; ACEG: opposition). However, the congruence analysis on the common features revealed that the underlying dimensions are largely similar (i.e. valence, power, arousal, and novelty). Thus, when comparing the underlying structure of the common features, context does not seem to influence the overall dimensionality of the emotion words investigated.

To summarise, the contextualised presentation of emotion words predominantly affected features of the appraisal component, supporting a central notion of appraisal theories. Interestingly, this effect occurred exclusively for the negative words. Overall, the appraisal of *intentional agency* and of whether *pleasant consequences are likely* became more unlikely in an achievement context than in a general context. Changing facets of the meaning of these words should be considered when they are used to describe emotional experiences in different situations. The results for surprise, pride, and joy suggest that context affected especially their perceived physiological experience, but not their appraisal, action tendency, and feeling profiles. Contentment was the only emotion word that did not reveal context effects. It seems that this emotional experience may be largely independent of context. However, this finding could have also resulted because only two contexts were compared with only a few features in each emotion component. An alternative explanation of the present findings could be that contentment, surprise, pride, and joy are very stable because their meaning in achievement contexts is very similar to the prototype in a general context. Interestingly, for anxiety all emotion components were affected: the meaning of anxiety seems to be more sensitive to contextual information than the other emotion words. This is an important finding to bear in mind when anxiety is investigated in different contexts. Future work is still needed (e.g. a meta-analysis) to quantify context effects in emotional experience assessed through emotion words in different situations.

Some limitations of this study have to be considered. One pertains to the samples used for both studies. The impact of the between-subject variable was addressed through group centring of the ratings of the emotion words, which reduced varying response tendencies within each sample. A future study could investigate the impact of context using a within-subject design. Another limitation may be related to the fact that we only investigated context effects in German-speaking samples. It is possible that in other languages and cultures contextual information changes word meaning differently. Furthermore, the feature profiles of emotion words may change in a different manner when other types of contexts are made salient (e.g. leisure vs. work place). As to the number of dimensions identified, one cannot exclude that the materials and the methods used for similarity assessment can affect the number of dimensions extracted.

Conclusion

The present study provides new insight on the impact of context on the underlying meaning structure and dimensionality of emotion words based on typicality ratings of features in five emotion components. Context may activate stored long-term knowledge of distinct situational representations. It therefore renders some features more significant or characteristic than others. Without contextual information, an averaging of the stored knowledge presumably takes place on which basis the meaning of emotion words is defined. Future studies should investigate the underlying mechanisms leading to context effects on word meaning, for example, by using neuroscientific measures to capture brain activity which can offer insights into the involved brain networks. Researchers measuring emotional reactions via emotion words should take into consideration that contextual information can influence significant parts of the meaning of emotion words, particularly of negative emotion words, but leaves the underlying dimensionality of valence, power, arousal, and novelty largely similar. Future studies (e.g. a meta-analysis) should focus on these potential context effects in order to quantify them. Context affected meaning features in different emotion components, which suggests that the quality of the emotional experiences themselves may also be different as a function of context. Overall, the present study adds knowledge on the features of emotion words that were affected by contextualised information.

Note

1. Loderer and collaborators analysed the AECG data solely to examine predictions of the CVT theory (Loderer *et al.*, 2015). The data of the FullGRID have been used only in a cultural comparative analysis (Fontaine et al., 2013). Those data were analysed in a new way in the present article in order to examine context effects on the meaning structure of emotion words.

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