Language and Cognition (2026), 18, e74, 1–32
doi:10.1017/langcog.2026.10101

ARTICLE

Cross-cultural comparison of fear, sadness and anger: British English versus Polish

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(Received 15 October 2024 UTC; Revised 22 April 2025 UTC; Accepted 18 March 2026 UTC)

Abstract

A major novel focus of our investigation was to employ three complementary methodological paradigms—GRID, online emotions sorting and corpus linguistics—to investigate previous findings that *sadness* was rated higher than its Polish equivalent, *smutek*, on the AROUSAL and POWER dimensions (Lewandowska-Tomaszczyk & Wilson, 2024) and that *fear* was rated higher than its Polish equivalent, *strach*, on the POWER dimension (Lewandowska-Tomaszczyk, Wilson & Niiya, 2013). Convergent evidence from all three methodologies supported hypothesis two, showing that *smutek* and *strach* are conceptualised as having greater conceptual proximity than their British English equivalents, *sadness* and *fear*. The salience of sadness in Polish culture suggests that the relatively lower POWER of *strach* may reflect the low POWER associated with *smutek*. Corpus findings also revealed a strong association between British English *fear* and *anger*, suggesting that the high POWER of *anger* may contribute to the salience of high POWER in *fear*. Online emotions data showing stronger co-occurrences between *sadness* and British English ANGER-cluster concepts than between *smutek* and Polish ANGER-cluster concepts support hypothesis three. However, hypothesis one was not supported: British English *anger* was not rated higher than Polish *złość* 'anger 1' and *gniew* 'anger 2' on AROUSAL and POWER.

Keywords: anger; corpora; co-occurrence; culture; fear; *gniew*; iconicity (form-meaning); power; sadness; *smutek*; *strach*; *złość*

1. Introduction

A central question with respect to the relationship between sadness, fear and anger concerns the structure of conceptual space. Opposing the position that emotions are separate, discrete entities, we alternatively support the viewpoint that the conceptual structure of emotions comprises clusters of emotions that have a closer or more distant proximity within conceptual space. For example, we have shown that the British English concept *hurt* is characterised more by ANGER cluster emotion concepts, while SADNESS cluster emotion concepts are relatively more salient in the Polish

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equivalent of hurt, *poczucie krzywdy* (Lewandowska-Tomaszczyk & Wilson, 2021). With respect to this cluster perspective, we support the proposal advanced by Berenbaum et al. (1995) regarding the need to determine both differences and similarities in associations between negative emotions. In findings directly relevant to the focus of the present study, they showed covariation as well as differences between fear, sadness and anger.

Anger, sadness and fear are three distinct but fundamental emotions, each characterised by specific triggers, responses and psychological features. Anger is typically evoked when an individual's goal is blocked by an obstacle that must be overcome (Karnaze & Levine, 2018), with its intensity increasing when the obstruction is perceived as intentional, unjustified, preventable or violating one's values, expectations, promises or rights (Levine, 1995). Berkowitz (1990) observes that anger often emerges from an undifferentiated state of negative affect, while Harmon-Jones et al. (2003) emphasise its prosocial potential, particularly when it arises to defend moral principles. Furthermore, anger is commonly associated with feelings of hot-headedness, frustration and irritation (Özkarar-Gradwohl et al., 2020).

In contrast, sadness arises primarily from the inability to achieve or maintain a valued aim or state, often triggered by loss, separation, social rejection or failure (Carnelley et al., 2006; Sbarra, 2006). Its intensity is linked to perceptions of low power and helplessness following unsuccessful attempts to obtain a desired reward (Siemer et al., 2007), and it is often accompanied by crying, longing for absent loved ones and reflections on previous relationships (Özkarar-Gradwohl et al., 2020).

Fear, unlike anger and sadness, functions primarily as a survival mechanism when facing physical threats (Beck et al., 2005; Öhman, 2008), and is often marked by worry, tension, insomnia, indecision and rumination (Özkarar-Gradwohl et al., 2020). Fear responses fall into three categories: *fight*, *flight* and *fright*. The *fight* response, first coined by Cannon (1929), involves active confrontation of a threat, allowing individuals to feel powerful and in control (Eilam, 2005; LeDoux & Gorman, 2001). In contrast, the *fright* response is an involuntary reaction characterised by motor inhibition, immobility and heightened environmental awareness, serving to reduce the likelihood of further attack (Fiszman et al., 2008; Monassi et al., 1999) and often results in withdrawal, avoidance and feelings of helplessness (LeDoux & Gorman, 2001). The *flight* response, by comparison, involves escaping from danger, as frequently seen in responses to natural disasters such as earthquakes (Misslin, 2003).

Given the focus on the conceptual proximity between sadness, fear and anger, it is essential to explore their possible interrelationships. Research suggests that the frequency of anger experiences may influence the experience of both fear and sadness (Berenbaum et al., 1995). Anger and sadness appear linked through shared attributes such as stable and global attributions (Abramson et al., 1989), and their association is further supported by evidence linking anger with depression (Berenbaum, 1992) and findings that suppressed anger is related to sadness (Vansteelandt & Van Mechelen, 2006). Moreover, anger and depression can mutually reinforce each other (Dutton & Karakanta, 2013), although neurological evidence indicates that sadness may suppress anger (Zhan et al., 2018). Sadness and fear are connected through heightened threat perception and lack of control

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(Lerner & Keltner, 2001) and fear of sadness itself may arise from concerns over its effects (Taylor & Rachman, 1991). Fear and anger also overlap, particularly in risk-avoidant contexts (Javela et al., 2008), and anger has been shown to intensify following fear induction (Zhan et al., 2015). Overall, these studies point to the complex and dynamic interconnections between sadness, fear and anger. Empirical findings that are relevant to our aims, hypotheses and contrastive analyses of the British English cluster concepts of SADNESS, FEAR and ANGER versus the equivalent, respective Polish cluster concepts of SMUTEK, STRACH, ZŁOŚĆ 'anger 1' and GNIEW 'anger 2' are discussed in Section 1.3.

1.1. Culture

Culture is a central feature of our study as the overarching aim is to compare conceptualisations of the relationships between sadness, fear and anger in British English and Polish. Hofstede (1980) proposed that cultural differences can be understood on the basis of a number of cultural dimensions. The two that are relevant to our study are individualism-collectivism (IDV) and the power distance index (PDI), with the former offering a strong theoretical framework for a plethora of cross-cultural emotions studies including emotional arousal level (Lim, 2016), concerns, appraisals and social sharing (Mesquita, 2001) and pride and luck appraisals (Imada & Ellsworth, 2011). PDI also provides a sound theoretical basis for many studies in this field that focus on, for example, shame and guilt (Velayutham & Perera, 2004), empathic emotions (Sadri et al., 2011) and fear of authority (Dai et al., 2022).

PDI corresponds to the extent of acceptance of unequal power distribution in a society by the less powerful members. A higher PDI value indicates acceptance of inequality in society, while a lower one indicates degrees of unacceptance by society members. PDI has a direct relevance to our study as Poland, with a score of 68, is more of a hierarchical society than Britain, which has a score of 35 (The Culture Factor Group, n.d.).

The large difference between Britain and Poland on the IDV scale also means that this cultural dimension is directly relevant to our study. In individualistic cultures one perceives oneself as an individual, autonomous entity with individualised goal construal designed to gain personal optimal achievement, self-fulfilment and accomplishments that differ from those of the in-group. In contrast, the fundamental feature of collectivism comprises closer interpersonal relationships that are present within groups, which result in these groups being more cohesive with emphasis being placed on the maintenance of harmony. In the light of the comparison between sadness, fear and anger in British English and Polish in the present study, it is important to narrow our focus to these two cultures. In cross-cultural research, Poland is often described as a collectivistic culture (e.g., Szarota et al., 2015). However, despite a score of 60 on the IDV scale, which shows that Poland is clearly more collectivistic in relative terms than individualistic Britain with a score of 89, it can be questioned whether Poland should be deemed to have a collectivistic status that is on a par with countries typically considered in such terms, such as China with an IDV score of 20 (The Culture Factor Group, n.d.). However, the point to note here is that the individualism-collectivism scale allows the relative comparison of

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countries on this dimension and Poland is clearly more collectivistic in comparison to Britain on this scale.

1.2. Cross-linguistic asymmetries in emotion expression

While the methodology applied in the first part of our study relies on a questionnaire (GRID), the corpus data are samples of naturally occurring language in various contexts. The GRID questionnaire exploited reactions to noun-expressed emotion concepts in both languages, which can, apart from naming things, generally convey a more abstract type of sense expression than, for example, verbs or adjectives. Verbs are considered forms of event-builders, and adjectives add various types of descriptive and specific properties to nominal concepts. In naturally occurring language the frequencies of occurrence of the parts of speech can vary, partly depending on the typological properties of language. Nouns or adjectives, as carriers of emotions, are more frequently used in English than in Polish (e.g., Wierzbicka, 1999), particularly in spontaneous language. In Polish, a preference for more verb-based, emotion event-type expression was observed by Dziwirek and Lewandowska-Tomaszczyk (2010, part 2), in which the authors discussed the emotion-event contexts in which Polish uses verbs, nouns and adverbs, while the corresponding English constructions employ primarily adjectives. Therefore, a comparison of raw frequency data of nominal emotion terms can be partly misleading. However, the relative frequency of use as presented in the Dice statistics, showing a relationship between the frequency of co-occurring emotion sequences of words as opposed to sums of the frequencies of the individual words used in the search questions, provides a more objective comparison method.

In the last part of our study we present examples of corpus verbal strings using forms of the concept of *fear* in English and *strach* in Polish. Their co-occurring preferences are also analysed with regard to the use of the forms *anger* and *sadness* in English and *złość* and *gniew* as lexicographic equivalents of *anger*, on the one hand, and *smutek* – an equivalent of *sadness*, on the other. Consideration of other related forms from the same emotion cluster, for example *hate* in the English ANGER cluster or *sorrow* in the SADNESS one, and their corresponding similar Polish concepts *nienawiść* 'hate' and *rozpacz* 'despair' or *depresja* 'depression', will also be considered when needed.

The corresponding concept asymmetry between the English *anger* and its two main Polish equivalents, *złość* 'anger 1' and *gniew* 'anger 2', plays a role in such a comparison. The Polish meanings, which correspond to a single one in English, represent two, albeit equally polysemous, distinct concepts, in which one of the key functions of *anger* is to remove obstacles (Rozin et al., 1999), and therefore its co-occurrence with *fear* indicates an active – *fight* rather than *fright* – attitude to fear (Lewandowska-Tomaszczyk & Wilson, 2022). This active approach to fear was observed in our first analysis on fear (Lewandowska-Tomaszczyk et al., 2013), where we presented a higher frequency of *fight*-related metaphors in selected samples of English corpora, with prevailing numbers of *fright*-linked metaphorical expressions in the comparable Polish data. The Polish texts did not foreground an active attitude to fear, but often a resignation, inactivity cognate that corresponds with the SADNESS cluster. When the two Polish equivalents of British English *anger*, that is, *złość* and

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gniew are compared, it is also rather in the latter 'anger 2' that one can identify a less expressive manifestation of the emotion marker of anger than in the case of fully externalised *złość* 'anger 1'. While they both share properties with the English concept of *anger*, they differ significantly in intensity and outward expression (Lewandowska-Tomaszczyk & Wilson, 2022):

- *Złość:* Characterised by higher arousal and greater behavioural and verbal expressivity. It is the more active or explosive form of the emotion.
- *Gniew:* More likely to contain an element of sadness or moral indignation. It is often less about immediate arousal and more about a deep-seated feeling. It is also less active and related to disillusionment, sorrow and sadness.

Consequently, while English *anger* can take many forms, it is generally more intense and likely to align conceptually more closely with the Polish *złość* than with *gniew*.

1.3. British English versus Polish emotion concepts: Aims and hypotheses

The GRID, online emotions sorting and the corpus methodologies were employed to provide contrastive analyses of the emotion concepts sadness, fear and anger in British English and Polish. Whereas some of the hypotheses pertain to novel aspects of the investigation that are grounded in analyses that attempt to uncover the relevance of the relationships between these emotion concepts to our previous studies, other hypotheses relate to new avenues of academic pursuit.

1.3.1. Fear, sadness and anger

The dearth of studies comparing conceptualisations of English *fear* and Polish *strach* brings our study comparing these two emotion concepts into sharper focus, in which we showed the relative salience of high POWER in the concept of *fear* compared with the lower POWER that characterises that of *strach* (Lewandowska-Tomaszczyk et al., 2013). The novelty that is inherent in our present endeavour is largely based on analyses focusing on the relationship between the *fear* and *sadness* concepts (see Section 1.3.2.) that allow the exploration of possible reasons for the effects of POWER in these two variants of fear concepts that have hitherto eluded us. Contrastive analyses on these two fear concepts are extended in the present study to additionally include the VALENCE, AROUSAL and NOVELTY dimensions.

Additional novelty value emerges in the present study by identifying the influences (see Section 1.3.2.) arising from our previous study (Lewandowska-Tomaszczyk & Wilson, 2024) that demonstrated that the concept *smutek* is characterised as a relatively more negative, weaker, deeper, more profound and more long-lasting emotion than that of *sadness* and is therefore consistent with a range of empirical evidence (e.g., Doherty & Kelly, 2010; Helliwell et al., 2015; Inglehart, 1990; Mikolajczyk et al., 2008; Sebena et al., 2012; Steptoe & Wardle, 2001; Wardle et al., 2004).

The difference in the emphasis placed on the maintenance of social harmony in individualistic versus collectivistic cultures is a key element in differences in the

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conceptual representation of anger between British English and Polish. Whereas the expression of anger is viewed more negatively by collectivistic individuals as it is seen as a threat to the quality of interpersonal relations (Cheung & Park, 2010), in more individualistic societies, which place relatively more importance on the self as opposed to social relationships, outward manifestations of anger are more accepted. Results consistent with this were demonstrated by Ogarkova et al. (2012) in a study in which participants from two relatively more collectivistic cultures, Russia and Spain, were compared with those from three more individualistic cultures, Britain, Germany and France, in their labelling of different emotional experiences pertaining to four emotion categories (anger, shame, guilt and pride). The specific results for anger showed that the most frequent label used by the Russian sample to label the anger situations was the lower-intensity emotion, *rozdrażninie* 'irritation', and that similarly there was a high usage of the label *impotencia* 'impotence' / 'powerlessness' by the Spanish sample for the anger situations. A possible conclusion arising from this is that low intensity and power are salient features of anger in more collectivistic cultures. This restriction of anger has also been observed in more collectivistic Asian cultures by Cole et al. (2002) who note the threat it poses to relationship harmony. The intermediate position of Poland between Asian and Western cultures in terms of aggression has been shown by Forbes et al. (2009). Consistent with its intermediate position in terms of IDV, the Polish sample had lower aggression than the US sample, but higher aggression than the Chinese sample. Crucially, the important point to be noted with regard to the present study is that the Polish participants had lower aggression than the more individualistic US participants and as aggression is characterised by POWER and AROUSAL, it is directly relevant to these dimensions in our study. These results have a similar pattern to those of a study by Soriano (2013), which showed that the Spanish equivalent of anger, *ira*, was associated more with powerlessness than *anger* by the relatively more collectivistic Spanish participants versus the more individualistic American participants, respectively. On the basis of the lower aggression that has been observed for Polish participants (Forbes et al., 2009) and lower power for collectivistic participants (e.g., Ogarkova et al., 2012; Soriano, 2013), we hypothesised that the Polish conceptual variants of *anger* – *złość* 'anger 1' and *gniew* 'anger 2' – would be rated lower than the British English concept *anger* on the POWER and AROUSAL dimensions (*hypothesis one*).

1.3.2. Relationships between fear, sadness and anger

Our aim is to determine the possible specific reasons for the differences in the conceptual proximity between the concepts sadness, fear and anger in British English and Polish and therefore what they can tell us about how these emotion concepts differ in these two cultures.

One possible reason for the effect of POWER we observed in our previous study comparing the fear concept in British English versus Polish (Lewandowska-Tomaszczyk et al., 2013) is that the relatively lower POWER that we have identified as being salient in the concept of *smutek* (Lewandowska-Tomaszczyk & Wilson, 2024) might be a possible cause for the relatively lower POWER that we have also identified in *strach* (Lewandowska-Tomaszczyk et al., 2013). This would be consistent with the salience of sadness that has been reported in Polish culture. Based on this

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possibility, we hypothesised that there would be a closer conceptual proximity between the SMUTEK and STRACH clusters than between the SADNESS and FEAR clusters (*hypothesis two*).

The relatively lower aggression in the Polish participants in the study by Forbes et al. (2009) and the powerlessness with respect to anger that has been observed for other, similar collectivistic participants (Ogarkova et al., 2012; Soriano, 2013) suggest that the Polish variants of anger, that is, *złość* and *gniew*, are conceptualised as having relatively lower POWER than the more individualistic British English *anger*. Following this, it is possible that the relatively higher POWER in the *fear* concept is due to the influence of the higher POWER in the *anger* concept. Similarly, the relatively lower POWER in the *strach* 'fear' concept might be a consequence of the lower POWER in the *złość* 'anger 1' and *gniew* 'anger 2' concepts. However, it is difficult to predict how such a bilateral effect might translate into differences in the relationship between the conceptual clusters of FEAR and ANGER in the two languages.

Evidence suggests a possible greater association between SADNESS cluster emotions and anger in individualistic cultures. Specifically, Berenbaum et al. (1995) showed that there is a greater likelihood of autonomous depressives eliciting anger. This is directly relevant to British culture as autonomy is a feature of individualism. Furthermore, it has been shown that the link between the suppression of anger and depression is weaker for more interdependent individuals (Cheung & Park, 2010). On the basis of this, we hypothesised that there would be a closer conceptual proximity between British English ANGER and SADNESS cluster concepts than the corresponding variants in Polish (*hypothesis three*).

2. GRID

2.1. Methodology

The GRID instrument comprises a web-based questionnaire in which 24 prototypical emotion terms are evaluated on 144 emotion features (Fontaine et al., 2013). These features represent activity in all six of the major components of emotion. Thirty-one features relate to appraisals of events, 18 to psychophysiological changes, 26 to facial, vocal or gestural expressions, 40 to action tendencies, 22 to subjective experiences and four to emotion regulation. An additional three features refer to other qualities, such as frequency and social acceptability of the emotion.

The four dimensions of VALENCE, POWER, AROUSAL and NOVELTY are a central element of the GRID analyses. Fontaine et al. (2013) propose that the VALENCE dimension is characterised by appraisals of intrinsic pleasure and goal conduciveness. POWER includes appraisals of control, with the feelings of power and weakness being particularly salient. The AROUSAL dimension is mainly characterised by sympathetic arousal (e.g., rapid heartbeat and readiness for action). The fourth dimension is represented by NOVELTY. On this dimension, appraisals of novelty and unpredictability are compared with expectedness or familiarity.

2.1.1. Procedure

British English and Polish participants completed the GRID instrument in a controlled web study (Reips, 2002) in which each participant was randomly presented with four emotion terms, which were randomly chosen from the complete set of

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24 emotion terms, in their respective language and asked to rate them on the 144 emotion features. This procedure meant that all 24 emotion terms were rated on the 144 emotion features. The specific emotions analysed in the present study are fear, sadness and anger. Each of the 144 emotion features was presented separately. Participants rated the likelihood that each of the 144 emotion features can be inferred when a person from their cultural group uses one of the emotion terms to describe an emotional experience. A 9-point scale was employed that ranged from extremely unlikely (1) to extremely likely (9) – the numbers 2 to 8 were placed at equidistant intervals between the two ends of the scale, with 5 'neither unlikely, nor likely' in the middle, and participants typed their ratings on the keyboard. It was clearly stated that the participants needed to rate the likelihood of occurrence of each of the features when somebody who speaks their language describes an emotional experience associated with that particular emotion term.

2.1.2. Participants

The mean ages and gender ratios of the participants for each of the emotion terms were as follows: *sadness* (32 British English-speaking participants; mean age 21.5 years; 18 females); *smutek* (21 Polish-speaking participants; mean age 23.8 years; 13 females); *fear* (34 British English-speaking participants; mean age 21.5 years; 19 females); *strach* (21 Polish-speaking participants; mean age 23 years; 19 females); *anger* (32 British English-speaking participants; mean age 20.8 years; 20 females); *złość* (16 Polish-speaking participants; mean age 22.4 years; 10 females); *gniew* (30 Polish-speaking participants; mean age 27.4 years; 17 females).

2.2. Results

The means of the low-value GRID features were subtracted from the means of the high-value GRID features for each participant for each of the VALENCE, POWER, AROUSAL and NOVELTY GRID dimensions. This created four dependent variables, the higher the value of which denoted more positive VALENCE and greater POWER, AROUSAL and NOVELTY. Two sets of four separate 2 x 3 ANOVAs were performed, one on each of these sets of means. Both sets of analyses had two between-subjects variables (*language group*: British English versus Polish; and *emotion*: sadness versus fear versus anger). In one set of analyses the Polish term for anger was *złość* 'anger 1' and in the other set of analyses the Polish term for anger was *gniew* 'anger 2'.

The analyses performed on the VALENCE and NOVELTY dimensions did not produce statistically significant results.

2.2.1. Power

The analysis including *złość* 'anger 1' that was performed on the POWER dimension produced a significant interaction between *language group* and *emotion* (F (2, 150) = 4.05, $P < 0.05$). Contrasts were performed to break down this interaction. Figure 1 shows that *anger* ($M = 2.87$) was rated higher than *fear* ($M = 0.14$) and *sadness* ($M = -1.71$), and that *fear* was rated higher than *sadness* ($P < 0.001$ for all comparisons). It can also be seen that *złość* 'anger 1' ($M = 2.63$) was rated higher than *strach* 'fear' ($M = -0.93$) and *smutek* 'sadness' ($M = -3.86$), and that *strach* was rated higher than *smutek* 'sadness' ($P < 0.001$ for all comparisons). Additionally,

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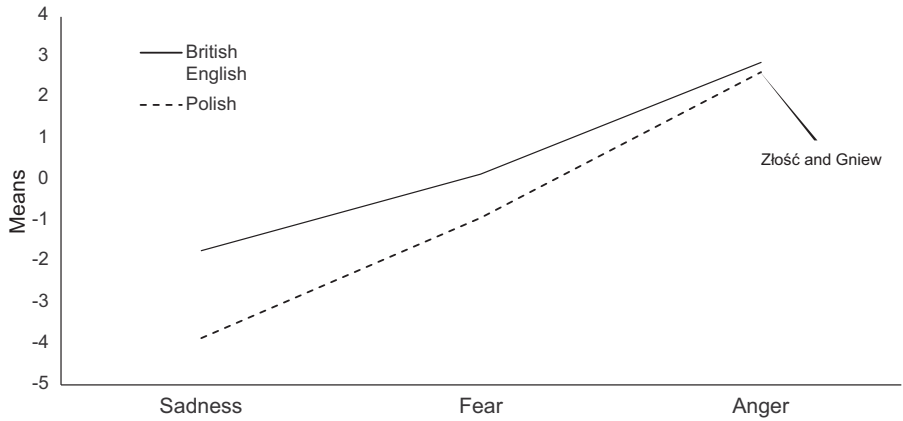


Figure 1. Means of British English versus Polish sadness, fear and anger concepts on the POWER dimension.

sadness was rated higher than *smutek* 'sadness' ($P < 0.001$) and *fear* was rated higher than *strach* ($P < 0.05$), but there was no significant difference between *anger* and *złość* 'anger 1' ($P > 0.05$). The interaction between *language group* and *emotion* was also significant in the analysis including *gniew* 'anger 2' (F (2, 164) = 5.01, $P < 0.01$). Contrasts were performed to break down this interaction. It can be seen in Figure 1 that *gniew* 'anger 2' ($M = 2.66$) was rated higher than *strach* 'fear' ($M = -0.93$) and *smutek* 'sadness' ($M = -3.86$), and that *strach* was rated higher than *smutek* 'sadness' ($P < 0.001$ for all comparisons). Additionally, *sadness* was rated higher than *smutek* 'sadness' ($P < 0.001$) and *fear* was rated higher than *strach* ($P < 0.05$), but there was no significant difference between *anger* and *gniew* 'anger 2' ($P > 0.05$).

2.2.2. AROUSAL

The analysis including *złość* 'anger 1' that was performed on the AROUSAL dimension produced a significant interaction between *language group* and *emotion* (F (2, 150) = 4.03, $P < 0.05$). Contrasts were performed to break down this interaction. Figure 2 shows that *anger* ($M = 4.74$) was rated higher than *sadness* ($M = 0.56$), and that *fear* ($M = 4.86$) was rated higher than *sadness* ($P < 0.001$ for both comparisons). However, there was no significant difference between *anger* and *fear* ($P > 0.05$). It can also be seen that *złość* 'anger 1' ($M = 5.29$) was rated higher than *smutek* 'sadness' ($M = -0.77$), and that *strach* 'fear' ($M = 5.32$) was rated higher than *smutek* 'sadness' ($P < 0.001$ for both comparisons). However, there was no significant difference between *złość* 'anger 1' and *strach* 'fear' ($P > 0.05$). Additionally, *sadness* was rated higher than *smutek* 'sadness' ($P < 0.05$), but there was no significant difference between *fear* and *strach* 'fear' ($P > 0.05$), and between *anger* and *złość* 'anger1' ($P > 0.05$). The interaction between *language group* and *emotion* was not statistically significant in the analysis including *gniew* 'anger 2' (F (2, 164) = 2.59, $P > 0.05$).

2.2.3. Correlations between fear, sadness and anger

Pearson correlations were performed between sadness and fear (Table 1), fear and anger (Table 2) and sadness and anger GRID terms (Table 3) on the mean values of

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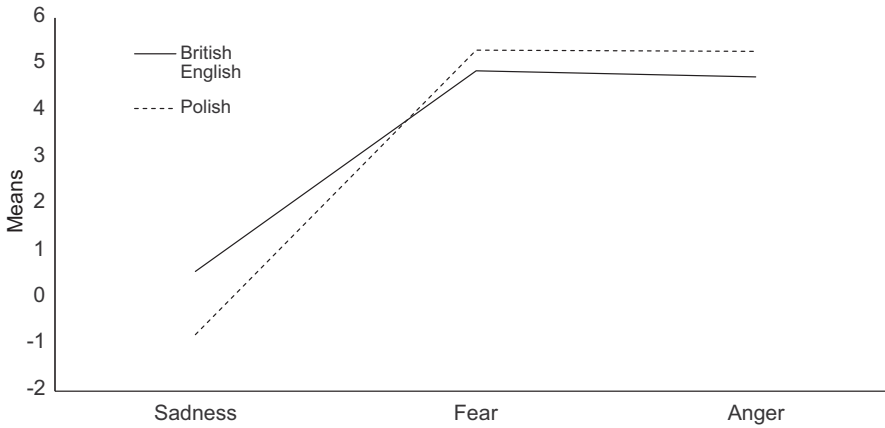


Figure 2. Means of British English versus Polish sadness, fear and anger concepts on the AROUSAL dimension (with *złość* as the Polish anger concept).

Table 1. Correlations between Polish versus British English sadness and fear concepts

	sadness–fear	*smutek–strach*
VALENCE features	0.85**	0.82**
POWER features	0.003	0.46*
AROUSAL features	0.38	–0.17
NOVELTY features	–0.05	0.009

Note: *Correlation is significant at the 0.05 level (two-tailed). **Correlation is significant at the 0.01 level (two-tailed).

Table 2. Correlations between Polish versus British English fear and anger concepts

	fear–anger	*strach–złość*	*strach–gniew*
VALENCE features	0.67**	0.72**	0.65**
POWER features	0.3	0.1	0.07
AROUSAL features	0.92**	0.94**	0.94**
NOVELTY features	0.8*	0.28	0.74*

Note: *Correlation is significant at the 0.05 level (two-tailed). **Correlation is significant at the 0.01 level (two-tailed).

Table 3. Correlations between Polish versus British English sadness and anger concepts

	sadness-anger	*smutek – złość*	*smutek–gniew*
VALENCE features	0.57**	0.54**	0.52**
POWER features	–0.78**	–0.63**	–0.65**
AROUSAL features	0.34	–0.3	–0.22
NOVELTY features	–0.11	0.54	0.45

Note: **Correlation is significant at the 0.01 level (two-tailed).

the GRID emotion features in British English versus Polish that loaded on the VALENCE, POWER, AROUSAL and NOVELTY dimensions.

2.2.4. Conclusions

The results of the analyses examining between-language effects of the emotion concepts showed that *sadness* was rated higher than *smutek* on the POWER and AROUSAL

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dimensions and *fear* was rated higher than *strach* on the POWER dimension. There were no significant differences between *fear* and *strach* on the AROUSAL dimension, between *anger* and *złość*/*gniew* on the POWER dimension, and between *anger* and *złość* on the AROUSAL dimension.

The non-significant interaction between *language group* and *emotion* on the VALENCE dimension and the similar British English versus Polish correlation values on this dimension are expected on the basis of the negativity of sadness, fear and anger in these two languages. The non-significant interaction between *language group* and *emotion* on the NOVELTY dimension and the pattern of correlation values on this dimension suggest that NOVELTY is not a major distinguishing feature between the British versus Polish emotion concepts of sadness, fear and anger. The higher ratings of fear and anger than sadness for both British English and Polish in analyses involving *złość* on the AROUSAL dimension is what is expected on the basis of the relatively low AROUSAL of sadness. This is further shown by the non-significant correlations in both languages on this dimension involving sadness (see Tables 1 and 3) compared with the strong, significant correlations between fear and anger (see Table 2). The lack of statistical significance for the analyses that included *gniew* is likely a consequence of the relatively lower intensity and arousal of this emotion concept that, as outlined above, means that it is more related to sadness. Finally, the higher POWER ratings for British English *anger*, followed by *fear* and then *sadness* was similar in the Polish analyses involving both *złość* and *gniew*. The strong, significant negative correlations between sadness and anger on the POWER dimension in both languages show the discrepancy in POWER between these two emotion concepts (see Table 3). Also, the lack of a relationship between the fear and anger concepts in both languages in terms of POWER is underscored by the weak, non-significant correlations on this dimension (see Table 2). However, a notable difference between British English and Polish in the correlations conducted on the POWER dimension is the significant correlation between *smutek* and *strach* (0.46) compared with the zero correlation between *sadness* and *fear* (see Table 1).

3. Online emotions sorting task

3.1. Methodology

In the emotions sorting methodology, emotion terms are typically presented simultaneously on a desk in front of participants who are free to categorise them into as many or as few groups as they wish. In the online version, the sorting takes place in an experimental GUI on a computer. We adapted the NodeXL (Smith et al., 2010) tool to provide information pertaining to the relationships between the British English versus Polish conceptual clusters FEAR, SADNESS and ANGER. Although the most common use of NodeXL is to analyse relationships between individuals using online social media networks, we employ NodeXL to create graphical representations of the Polish and British English co-occurrence emotion matrices. The graphs created are like those produced by the synonyms rating methodology employed by Heider (1991) to compare and contrast emotion terms across three Indonesian languages. Whereas for Heider connection strength refers to the between-subjects frequency with which an emotion term is given as the synonym for another, the connection strength in our NodeXL graphs represents the co-occurring frequency of the emotion terms in the

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online emotions sorting data and are hence sometimes referred to as co-occurrence values or interconnections.

3.1.1. Procedure

Participants volunteered to take part in the study either through direct contact by one of the authors or in response to adverts placed on internet forums. The participants were given the following instructions:

> You will be presented with 135 emotions on the computer screen. We'd like you to sort these emotions into categories representing your best judgement about which emotions are similar to each other and which are different from each other. There is no one correct way to sort the emotions – make as few or as many categories as you wish and put as few or as many emotions in each group as you see fit. This study requires careful thought and you therefore need to carefully think about which category each emotion belongs rather than just quickly putting emotions in categories without much thought.

3.1.2. Participants

There were 58 British English participants (27 females, mean age = 42.7 years) and 58 Polish participants (27 females, mean age = 35.8 years).

3.2. Results

It can be seen in Figure 3 that the co-occurrences between *sadness* and British English ANGER cluster emotions (e.g., *sadness–anger* (8), *sadness–rage* (8), *sadness–fury* (8)) are higher than those between *smutek* 'sadness' and Polish ANGER cluster emotions (e.g., *smutek–złość* 'anger 1' (4), *smutek–gniew* 'anger 2 (ire)' (2), *smutek–wściekłość* 'rage' (1), *smutek–furia* 'fury' (2)).

Figure 4 also shows that the interconnections between *smutek* 'sadness' and Polish FEAR cluster emotions (e.g., *smutek–strach* 'fear' (22), *smutek–trwoga* 'alarm' (25), *smutek–przestrach* 'fright' (22)) are higher than those between *sadness* and British English FEAR cluster emotions (e.g., *sadness–fear* (10), *sadness–alarm* (11), *sadness–fright* (14)).

The co-occurrences between *fear* and British English ANGER cluster emotions (e.g., *fear–anger* (11), *fear–rage* (8), *fear–fury* (9)) are similar to those between *strach* 'fear' and Polish ANGER cluster emotions (e.g., *strach–złość* 'anger 1' (10), *strach–wściekłość* 'rage' (9), *strach–furia* 'fury' (10)).

4. Corpus data

The corpora selected for scrutiny in the present study are primarily monitor corpora, precisely MONCO media corpora of English and Polish, publicly available for English and for Polish. Reference to the British National Corpus and the National Corpus of Polish will also be made in the sections that follow.[1]

[1]The corpus data was retrieved from the British National Corpus (https://www.english-corpora.org/bnc/), the National Corpus of Polish (https://nkjp.pl, current URL: https://pelcra-nkjp.clarin-pl.eu/) and the Monitor English (monco.frazeo.com) and Polish corpora (monco.frazeo.pl, present URL: https://monco-pl.clarin-pl.eu/)

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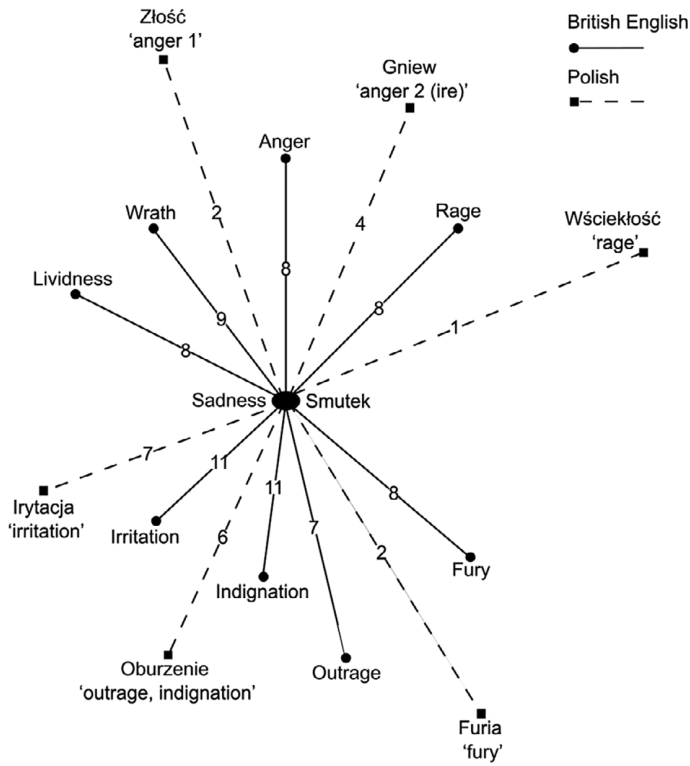


Figure 3. Co-occurrences between *sadness* / *smutek* concepts and ANGER cluster concepts.

The data we want to identify here are not only *collocations* in the strict sense of the term, referring to two-word combinations co-occurring above chance, but also such co-occurring strings of emotion terms which span from 0 to 3, thereby releasing the condition towards three intervening words. We believe (following Lemaire & Denhiere, 2006) that "operationalizing similarity as a frequency of co-occurrence probably introduces a bias: first, there are cases in which there is similarity without co-occurrence and, second, the frequency of co-occurrence overestimates similarity" (p. 1). This can be particularly true when it comes to synonyms, that is, words typically of the same part of speech, which would not form collocational strings in English; for example, *road* and *street*, which would almost never co-occur (Lund & Burgess, 1996). In this part of our study, we will present the co-occurrence corpus data to analyse the extent to which the emotion terms *fear*, *anger* and *sorrow* in English and *strach*, *złość*, *gniew* and *smutek* in Polish appear in the co-occurrence of up to three spans in the corpus materials.

between 2016 and 2021. Due to subsequent website updates and/or data restatements (above and collocations: monco.frazeo.pl/hask, present URL: http://monco.frazeo.com/collo), the current live URLs may display different values. To ensure consistency with national corpora, this study also uses archived data dates rather than the daily-expanding monitor (Monco) corpora. All URLs are quoted in the Bibliography.

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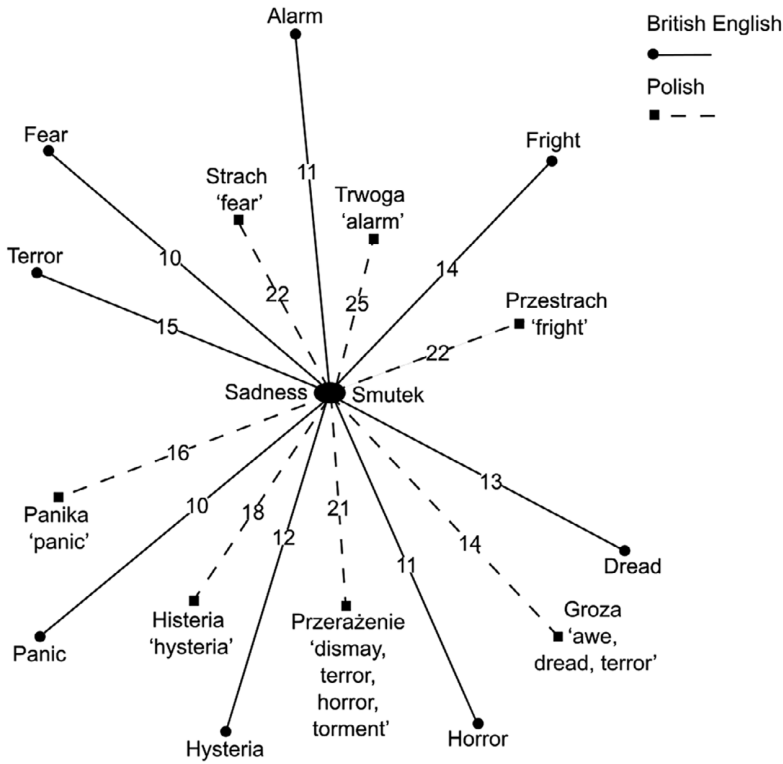


Figure 4. Co-occurrences between *sadness* / *smutek* concepts and FEAR cluster concepts.

4.1. MONCO emotion terms

The MONCO project, which was launched in 2015 by Pęzik (2016) and the Łódź University team, is regularly growing by a few million words every day. The list of monitored sources has been extended, which makes its index unbalanced; however, it functions in a truly referential manner. Direct links to the original web pages are indicated with each of the listed occurrences and mechanisms excluding duplicated uses are provided.

Sources of the corpus data indexed in MONCO are RSS4 channels shared by over 1,500 news, industry and blog platforms, and, as reported in Pęzik (2012, 2016), of which around 600 were active in July 2019 with the largest corpus sources identified in the Tools → Statistics view → Index. As the data contain both anonymous media comments, media articles and TV interviews, their analysis is likely to provide adequate verification materials to compare with the results obtained from our GRID-based results and online emotions sorting task.

In the Collocation positions[2] field, we defined the maximum positional distance of potential collocations from the collocation centre as three. These kinds of restrictions

[2]In corpus linguistics, a *span* refers to the specific measurement of distance between a *node* (the target emotion word) and its *collocates* (the words surrounding it) to the left and right of the node. The *window* of words to analyse is the span. In the context of a span, *positions* refer to the specific, numbered slots occupied by words relative to the central node. The *slope* acts as a *strength threshold* or a *decay factor*, showing

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increase the probability of occurrence of syntactic relations between the collocation centre and the words associated with it. Paths present all identified syntactic combinations in which the given form appears in the corpora. The Dice metrics visible in the columns represent a relationship between the frequency of occurrence of the searched combination against the joint frequencies of individual combination forms in the corpora. A Dice result '1' means that the number of occurrences of the combined form searched is equal to the joint frequencies of these forms when used as individual linguistic forms in the MONITOR corpus. The Lemma column indicates the linguistic form intervening between the parts of the combined form as, for example, in (1) in List (2) the item *and* is a form between *fear* and *anger* in the English MONITOR corpus and can be treated as an indication of the co-occurring emotions. *Paths* information gives detailed information with regard to particular instances of each of the combinations. Paths typically contain forms listed in the table above them – therefore, no additional translation from Polish to English is provided for them. For the sake of manuscript limitations regarding paper length, we provide only the first instances of such combinations. All other relevant, detailed combinations can be generated from the Polish and English MONITOR corpora.

4.1.1. Co-occurrence MONITOR corpus materials of English fear

List (1) presents *anger* as the main collocate of *fear* in the MONCO British English data. The relatively closer co-occurrence between *fear* and *anger* than between *fear* and *sadness* in List (2) suggests a higher perceived similarity between *fear* and *anger* in British English. In discussing the significance of such results, we might recall the familiar *Form-Meaning* Iconicity, most precisely the *Proximity Principle.* The principle proposes that conceptual distance tends to match linguistic distance; in other words, stimuli presented closer together are judged to be more similar than stimuli presented farther apart. This is consistent with Lakoff and Johnson's *Conceptual Metaphor Theory* (Casasanto, 2008; Lakoff & Johnson, 1980, 1999). We might therefore conjecture that *fear* in British English, co-occurring with *anger* more closely than with *sadness*, is considered more similar to anger than to other emotions in co-occurring segments.

4.1.2. Fear-sadness

List (3) shows that the lemma *sadness* appears with a low frequency of 9 and a score of 0.0019, indicating a much weaker direct collocational link than *fear-anger* in English,

LIST 1. *Fear-anger* collocations (English MONCO).

Analysed: 9338 non-duplicated spans. Total spans for this query: 768 814. Generated on 2023-05-18						
#	Lemma	Frequency	Positions	Score	Paths	PoS
	anger	70	{2=32, 4=8, –5=1, –2=16, 3=6, 5=2, –4=2, –3=3}	0.015	{fear and anger=22}, {anger, fear=7}, {fear, anger=6}	{nn=69, nnp=1}

collocates that have a particular preference for a specific position. A *Path* represents a *multi-word sequence* (often 3 or more words) that occurs with statistical regularity.

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LIST 2. *Fear-anger* co-occurrences (English MONCO)

Criteria: Slope -3, Spans – 10000, Positions: –5 to +5

Analysed: 3065 non-duplicated spans. Total spans for this query: 3878. Generated on 2023-06-01

Lp	Lemma	Freq	Dice
1	and	1239	0.8085
2	the	1073	0.7002
3	of	935	0.6101
4	be	668	0.4359
5	to	645	0.4209
6	in	380	0.248
7	that	334	0.2179
8	have	222	0.1449
9	with	187	0.122
10	emotion	178	0.1162
11	as	177	0.1155
12	on	177	0.1155
13	by	171	0.1116
14	sadness	169	0.1103
15	or	146	0.0953

… 14 – sadness, 29 – frustration, 42 – joy, 49 – disgust

Paths

fear and *anger* {fear and anger that=58}, {that fear and anger=23}, {that fear, anger=6},

fear or anger {fear or anxiety or anger or joy or = 1}

LIST 3. *Fear-sadness* collocations (English MONCO)

#	Lemma	Frequency	Positions	Score	Paths	PoS
	sadness	**9**	**{–4=1, 3=1, 2=4, –2=3}**	**0.0019**	**{fear, sadness=2}, {fear and sadness=2}, {sadness, fear=2}**	**{nn=9}**

while List (4) notes that the *fear-sadness* co-occurrences are less frequent and often involve more distant *slopes* or intervening words compared to the *fear-anger* pairing.

4.1.3. Fear-anger/sadness – summing up

The concepts *fear* and *anger* present a strong and particularly frequent co-occurrence combination, both in the collocational and co-occurrence profiles as shown above. They indicate especially strong conceptual and affective links between *fear* and *anger* in English.

4.2. MONITOR Corpus co-occurrence materials of Polish strach

General MONITOR data collocations for *strach***

List (5) shows collocations for the Polish word *strach* 'fear' across 7,932 contexts. Top collocates include *pomyśleć* ('think', frequency 195), *Lach* (part of an idiom, 130), *lęk* ('anxiety', 113) and *niepewność* ('uncertainty', 109).

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LIST 4. *Fear-sadness* co-occurrences (English MONCO)

Analysed: 649 non-duplicated spans. Total spans for this query: 825. Generated on 2023-06-01 09:33:08.245 results.

Lp	Lemma	freq	Dice
1	and	254	0.7827
2	of	207	0.6379
3	the	190	0.5855
4	be	155	0.4777
5	anger	148	0.4561
6	to	89	0.2743
7	in	83	0.2558
8	that	59	0.1818
9	as	56	0.1726
10	with	56	0.1726
11	emotion	54	0.1664
12	or	51	0.1572
13	disgust	42	0.1294
14	feeling	40	0.1233
15	such	35	0.1079

…. 19 anxiety, 20 surprise

Paths (selection)

fear (and) sadness {fear, sadness and = 44}, {fear, sadness, and = 17}

4.2.1. *Strach–złość*

List (6) shows Polish *strach* 'fear' co-occurring with *złość* 'anger 1' with a frequency of 26, while its Path indicates complex emotional strings which include adjacent emotion concepts *smutek, wstręt, strach, zaskoczenie i złość* 'sadness, disgust, fear, astonishment and anger 1'.

Conclusions. There are 185 unique Polish *strach-złość* 'fear-anger 1' combinations generated from the corpus. However, the next characteristic emotive combinatorial elements include *obrzydzenie* 'disgust (revulsion)', *smutek* 'sadness', *bezradność* 'helplessness', *bezsilność* 'powerlessness' and *lęk* 'anxiety'. All five show a decreased power element in the *strach* 'fear' concept when it co-occurs with *złość* 'anger 1'.

4.2.2. *Strach–gniew*

List (7) shows Polish *strach* 'fear' co-occurring with *gniew* 'anger 2' with a frequency of 23 in varying positions in a five-word span. Its Paths often include *disgust* 'wstręt' and other related terms, such as *strach, gniew and odraza* 'fear, anger 2, loathing'.

4.2.3. *Strach–smutek 'fear–sadness'*

List (8) for *strach* 'fear' and *smutek* 'sadness' co-occurrences, shows a frequency of 23 and a score of 0.005, while their Paths show these terms appearing in lists of basic emotions, such as *złość* 'anger 1' and *smutek* 'sadness' often alongside *radość* 'joy' or *odraza/wstręt* 'disgust'.

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LIST 5. Collocations of Polish *strach* 'fear' across 7,932 contexts

Analysed: 7932 unique contexts. All relevant contexts:236 226, 2023-05-18					
C-collocate; F-frequency, Po-positions, S-score, paths					
#	C	F	Po	S	Paths
1	pomyśleć 'think'	195	{1=189, 2=5, 3=1}	0.0333	{*strach* pomyśleć=189},{*strach* nawet pomyśleć=3},{*strach* jednak pomyśleć=2} 'it's scary to think'
2	Lach 'a Polish person' (archaic), strachy na lachy – 'idle threats'	130	{2=128, 5=1, 4=1}	0.0313	{strachy na lachy=113},{*strach*ów na lachy=12},{strachy na & gt; lachy=1}
3	lęk 'anxiety'	113	{5=9, 2=34, –2=46, –4=8, 4=8, –5=4, 3=2, –1=1, –3=1}	0.0238	{lęk, *strach*=19},{*strach* i lęk=10},{lęku i strachu=8}
4	niepewność'uncertainty'	109	{–2=26, 2=63, –5=1, 4=8, –3=3, 3=3, 5=3, –4=2}	0.0224	{*strach* i niepewność=26},{strachu i niepewności=13},{*strach*, niepewność=10}
5	blady 'pale'	84	{–1=79, –2=4, –5=1}	0.0199	{blady *strach*=79},{blady ze strachu=4},{bladej twarzy widać przerażenie i *strach*=1} 'pale fear' – pale with fear
6	odczuwać 'feel'	103	{–1=55, –3=10, –2=16, 3=7, 4=2, –5=4, 1=2, 5=2, –4=3, 2=2}	0.0196	{odczuwa *strach*=13},{odczuwają *strach*=11},{odczuwać *strach*=5}
7	przed 'before, against'	1539	{–2=13, 1=1304, 2=70, –5=19, 5=27, –3=26, –4=22, 3=32, –1=6, 4=20}	0.0193	{*strach* przed=767},{strachu przed=469},{strachem przed=66}
8	ból 'pain'	106	{2=62, –3=5, –4=7, 3=4, –2=21, 4=4, –5=2, 5=1}	0.017	{strachu, bólu=24},{*strach* i ból=14},{*strach*, ból=8}
9	strach 'fear'	94	{4=21, –4=16, –1=6, 3=6, –3=5, 5=12, –5=11, 2=6, –2=6, 1=5}	0.0156	{*strach*, ten sam *strach*=6},{*strach strach*=4},{*strach* strachem=4}
10	paraliżować 'paralyse'	65	{3=9, –2=11, 2=6, –1=21, 4=4, 1=8, –3=3, 5=3}	0.0156	{paraliżuje *strach*=15},{*strach* paraliżuje=7},{paraliżować 'fear paralyses'
złość					
złość	'anger 1' 26		{–5=1, 2=11, 3=2, – 2=3, 4=5, –4=3, –3=1}	0.0058	{*strach*, *złość*=3},{*strach* czy *złość*=2},{*złość*, zdenerwowanie 'nervousness'
gniew					
gniew	'anger 2' 23		{–2=5, 3=5, –4=4, 2=5, 5=1, 4=2, –3=1}	0.0051	{*strachu* przed jego gniewem=2},{*gniew*, *strach*=1}, 'fear for his anger 2'
smutek					
smutek	'sadness' 23		{–2=14, 4=3, –3=2, 2=2, –4=1, 3=1}	0.005	{smutku, strachu=4},{*smutek*, strach=4},{smutkiem i strachem=4}

LIST 6. *Strach-złość* (fear-'anger 1') co-occurrences (Polish MONCO)

185 unique contexts 2023-06-01			
Lp	Lemma	Freq	Dice
1	obrzydzenie 'disgust'	5	0.0027
2	smutek 'sadness'	35	0.0023
3	bezradność 'helplessness'	6	0.0012
4	bezsilność 'powerlessness'	3	0.0011
5	lęk 'anxiety'	12	0.0006
6	gniew 'anger 2'	6	0.0004
7	rozpacz 'despair'	3	0.0004
8	radość 'joy'	27	0.0003
9	odczuwać 'feel'	9	0.0003
10	emocja 'emotion'	32	0.0003
11	agresja 'aggression'	7	0.0002
12	wstyd 'shame'	6	0.0002
13	niepewność 'uncertainty'	4	0.0002
14	panika 'panic'	3	0.0002
15	uczucie 'feeling'	7	0.0002

… 18 – smutny 'sad', 19 – zaskoczenie 'astonishment', 20 – ból 'pain', 21 – stres 'stress', 22 – nienawiść 'hate'

Paths (selection)

{smutek, wstręt, strach, zaskoczenie i złość=1} 'sadness, disgust, fear, astonishment and anger 1', {strach, złość, radość jak i smutek=1}; 'fear, anger 1, joy, as well as sadness',

{strach, smutek, złość, bezradność=2} 'fear, sadness, anger 1, powerlessness', {strach, złość, bezradność=2} 'fear, anger1, powerlessness'

4.3. Conclusions: MONITOR corpus data

A complex pattern emerges from the co-occurrences between *strach* and the Polish equivalents of anger and sadness. As discussed earlier, Polish has two basic equivalents of anger – *złość* 'anger 1' and *gniew* 'anger 2'. These represent two separate basic emotion concepts that overlap in some semantic properties to a certain extent. Mikołajczuk (2000, 143) aptly summarised the differences in her detailed analysis of English 'anger 1' and 'anger 2' (*wrath*) and the Polish equivalents *złość* and *gniew*, respectively. She proposes that *gniew* 'anger 2' is typically elicited by the behaviour of a person who breaks rules accepted by another, while *złość* 'anger 1' arises most often

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LIST 7. *Strach-gniew* (fear-'anger 2') co-occurrences (Polish MONCO)

Lp	Lemma	Freq	Dice
1	odraza 'disgust'	13	0.0153
2	zażenowanie 'embarrassment'	3	0.0021
3	obrzydzenie 'disgust'	3	0.0021
4	smutek 'sadness'	20	0.0017
5	złość 'anger 1'	7	0.0007
6	pogarda 'contempt'	4	0.0006
7	rozczarowanie 'disappointment'	4	0.0003
8	radość 'joy'	17	0.0003
9	emocja 'emotion'	22	0.0002
10	lęk 'anxiety'	3	0.0002
11	zaskoczenie 'astonishment'	5	0.0002
12	odczuwać 'feel'	4	0.0002
13	wstyd 'shame'	3	0.0001
14	wywoływać 'call forth'	4	0.0001
15	budzić 'wake up'	7	0.0001

… 16 – nienawiść 'hate', 23 – miłość 'love', 28 – nadzieja 'hope'

Paths (selection)

{strach, gniew, odraza=12}, {strach, gniew, odrazę=1} 'fear, anger 2, disgust (revulsion)'

{strach, gniew, zażenowanie=2}, {strach, gniew, śmieszność czy zażenowanie=1} 'fear, anger 2, (ridiculousness), embarrassment'

{strach, gniew, zaskoczenie i obrzydzenie=1} 'fear, anger 2, astonishment and disgust' {strach, gniew i obrzydzenie=1} 'fear, anger 2, disgust'

when an obstacle is placed in the path of the experiencer's activity or plans. An experiencer's evaluation of such reasons does not require any reflection or conscious decision; it may be fully spontaneous. Moreover, the obstacle does not have to have any human involvement. In the light of this, both *anger* and *wrath* seem to be more similar to *gniew* than to *złość*; however, obstacles also occur in situations characterised by *ang*er, but they are extremely unusual in situations typically associated with *wrath*. Mikołajczuk also makes reference to Anna Wierzbicka's Russian concept of *gnev* (compare Polish *gniew*), which necessarily involves basic ethical principles, unlike English *anger* (Wierzbicka, 1998, 19–20).

In the light of such differences, it is interesting to note that although Polish fear does quite often co-occur with the Polish equivalent of *anger*, it is in fact the

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LIST 8. *Strach-smutek* (fear-sadness) co-occurrences (Polish MONCO)

167 unique contexts All contexts: 213 2023-06-01			
Lp	Lemma	Freq	Dice
1	wstręt 'disgust'	14	0.014
2	złość 'anger 1'	32	0.0026
3	obrzydzenie 'disgust'	4	0.0023
4	gniew 'anger 2'	25	0.0019
5	niesmak 'disgust'	3	0.001
6	bezradność 'helplessness'	4	0.0009
7	radość 'joy'	37	0.0005
8	rozpacz 'despair'	3	0.0004
9	zaskoczenie 'astonishment'	10	0.0003
10	lęk 'anxiety'	5	0.0003
11	uczucie 'feeling'	10	0.0002
12	identyfikować 'identify'	3	0.0002
13	wstyd 'shame'	5	0.0002
14	odczuwać 'feel'	4	0.0001
15	stress 'stress'	3	0.0001

19 rezygnacja 'resignation', 21- ból 'pain'

Paths (selection)

{strach, złość, smutek, radość, wstręt=9} 'fear, anger 1, sadness, joy, disgust (revulsion)', {strach, zaskoczenie, smutek, wstręt=2} 'fear, astonishment, sadness, disgust (revulsion)', {strach, złość, smutek, radość i wstręt=1} 'fear, anger 1, sadness, joy, disgust, revulsion', {wstręt, strach, szczęście, smutek=1} 'disgust (revulsion), fear, happiness, sadness', {strach, smutek, wstręt=1} 'fear, sadness, disgust (revulsion)'

{złość, strach, smutek=12} 'anger 1, fear, sadness'

{obrzydzenie, strach, radość, smutek=2} 'disgust, (revulsion), fear, joy, sadness', {obrzydzenie, strach, szczęście, smutek=1} 'disgust (revulsion), fear, happiness, sadness', {strach, szczęście, smutek, zaskoczenie i obrzydzenie=1} 'fear, happiness, sadness, astonishment, disgust (revulsion)'

{gniew, strach, smutek=9}, {strach, smutek i gniew=2} 'anger 2, fear, sadness', {gniew, niesmak, strach lub smutek=2} 'anger, disgust, fear or sadness', {strach, zaskoczenie, smutek, wstręt, gniew=2} 'fear, astonishment, sadness, disgust (revulsion), anger 2', {strach, smutek, złość, gniew=1} 'fear, sadness, anger 1, anger 2', {strach, złość, smutek, gniew=1}, k=1} 'fear, anger 1, sadness, anger 2'

{strach, smutek, rozpacz=2} 'fear, sadness, despair', {strach, smutek i rozpacz=1} 'fear, sadness and despair'

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emotion of *gniew* and not *złość*, which is present in such cases, as seen in the Paths and statistics above.

Gniew in Polish is often felt as a reaction to another person's mistreatment, experienced as an unjust opinion or action. It is more often associated with *depression*, a sense of *hurt* or *humiliation*, which are not primarily clustered with *złość* 'anger 1'. Therefore, even if in certain contexts the co-occurrences of Polish equivalents of English *fear* and *anger* are observed, such cases often involve *gniew* 'anger 2' rather than *złość* 'anger 1', the former of which possesses elements of *melancholy*, *depression* and *humiliation* that are members of the SADNESS cluster and are less likely in *złość*.

In comparison to the case of English, it might also be observed that there are more frequent co-occurrences between Polish *strach* 'fear' and numerous Polish emotion equivalents of DISGUST cluster members, such as *wstręt* 'repulsion', *obrzydzenie* 'disgust', *odraza* 'loathing' and *niesmak* 'distaste'.

4.4. Fear, sadness and anger in English and Polish national corpora

In this section, relevant examples in English and Polish will be presented from two comparable sources – the British National Corpus and the National Corpus of Polish (*Narodowy Korpus Języka Polskiego* www.nkjp.pl), released in 2012 (Przepiórkowski et al., 2012). The search data slope was three, similar to the MONCO data search.

4.4.1. BNC http://pelcra.clarin-pl.eu/SlopeqBNC/ fear-anger

List (9) notes a statistically high number of co-occurrences between *fear* and *anger* in British English compared to other pairings.

LIST 9. *Fear-anger* co-occurrences (British National Corpus)

#	Left	Match	Right	Source
1	Then Jack voiced his real	**fear , and the anger**	returned , bubbling up inside …	Traffic.
2	in a room with someone in a state of	**fear , anxiety , anger**	or grief for nine months !	Learn to live.
3	They trembled not from	**fear , but from anger**	and resentment which had b…	Foxbat.
4	xpressions to denote the emotions of	**fear , loathing , anger**	, surprise , and happiness ; v…	Evolution fro
5	ss experienced the tiniest moment of	**fear , then savage anger**	, and was about to go down f…	Walking on g
6	sing , and her voice was a mixture of	**fear and anger**	.	Esquire.
7	rience of negative emotions such as	**fear and anger**	.	Learn to live.
8	e country , you sense an enormous '	**fear and anger**	at the present reforms ; in we…	Esquire.
9	tent fear their subordinates ; this is a	**fear of the unleashed anger**	of those who have reason to …	Feminism an
10	atens our security we feel things like	**fear or anger**	.	Looking up t
11	he snake raised its head , hissing in	**fear or anger**	, tongue darting .	Alistair MacL
12	dled out , their faces full of tears and	**fear and pain and anger**	and shouting .	The Buddha
13	Once we have arrived at peace , joy	**fear or anger**	, etc , we have somewhat of …	Looking up t
14	nt , rational planning , choice , desire	**fear , anger**	, and some beliefs , where o…	Against liber
15	ast three of the five basic emotions '	**fear , anger**	, sadness , joy and love (in s…	Managing th
16	ny involve the experience of anxiety	**fear , guilt , anger**	or embarrassment within you ?	Facing confli
17	, Have anxiety	**fear , guilt , anger**	, personal embarrassment or…	Facing confli

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LIST 10. *Fear-sadness* co-occurrences (British National Corpus)

You learn quickly that to show your feelings – whether **anger, fear or sadness** – leaves you open to ridicule and it is difficult to shake the habit in later life.

4.4.2. BNC fear-sadness

The rare co-occurrences of *anger* and *sadness* in the English BNC, as in List (10) or example (15) in List (9), can be considered an argument against a strong cognitive co-occurrence link between *anger* and *sadness*, as in both the cases *fear* is used as one of a number of emotions listed, including *anger* and *sadness*, compared to a statistically high number of co-occurrences between *fear* and *anger*, as in List (9).

4.4.3. NKJP 'National corpus of Polish'

NKJP *strach-złość* 'fear-'anger 1"

List (11) shows 14 segments from a 240-million-word corpus where *strach* and *złość* co-occur. Many instances involve negation or listing multiple negative passive emotions such as *upokorzenie* 'humiliation' or *wina* 'guilt'.

LIST 11. *Strach-złość* co-occurrences (Polish National Corpus – NKJP)

Search words *strach-złość*			
(In 240,192,461 words. **14** segments were identified)			
1.	Nie	**strach, nie złość** 'Not fear, not anger 1'	, lecz właśnie rozpacz 'but just despair'.
2.	następujące emocje 'the following emotions': szczęście, 'happiness', zdziwienie 'astonishment',	**strach, smutek, złość** 'fear, sadness, anger 1'	, wstręt 'disgust' lub pogardę, 'or contempt'
3.	koszmary 'nightmare',	**strach, upokorzenie, złość** 'fear, humiliation, anger 1'	, poczucie winy, bezradność, myśli samobójcze. 'sense of guilt, helplessness, suicidal thoughts'
4.	Pogrążałem się w grzęzawisku emocji, gdzie mieszkały 'I was plunging into a quagmire of emotions inhabited by'	**strach, wina, złość** 'fear, guilt. anger 1'	
5.	często dużo ważniejsze jest 'cierpienie duszy' 'sometimes more important is the 'suffering of soul''	**strach, złość** 'fear, anger 1'	, żal, 'Pol. regret, sorrow', rozpacz 'despair', uczucia, które nie pozwalają mu walczyć 'the emotions that don't let him fight'
6.	wyzdrowieję, umrę – to przekonanie pociąga za sobą rozpacz 'whether I recover or die – this conviction brings only despair'	**strach, złość** 'fear, anger 1'	znika nadzieja 'hope vanishes', znika motywacja do robienia czegokolwiek – 'and with it, the motivation to do anything'

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4.4.4. NKJP strach-gniew 'fear-'anger 2''

LIST 12. *Strach-gniew* co-occurrences (Polish National Corpus - NKJP)

21 segments			
1.	Efekt psychologiczny był ten sam – 'The psychological effect was the same –'	**szok, strach, gniew** 'shock, fear, anger 2'	, oburzenie 'indignation'.
2.	uczucia, emocje takie jak 'feelings, emotions, such as'	**strach, gniew** 'fear, anger 2'	, miłość 'love'.
3.	Trzeba uczyć podstawowych słów – 'One needs to teach the basic words –'	**strach, gniew** 'fear, anger 2'	, zadowolenie 'satisfaction', żal 'regret, sorrow'.
4.	negatywne postawy chorego człowieka: zwątpienie, 'negative attitudes of the sick person –,'	**strach, gniew** 'fear, anger 2'	itp. 'etc.'
5.	wyzwala w nas negatywne uczucia: '(it) triggers negative emotions in us:'	**strach, gniew** 'fear, anger 2'	, smutek, żal 'sadness, regret, sorrow'
6.	a zarazem wyzwalają wzruszenie, jak 'and, at the same time, (they) evoke'	**strach, lęk, gniew** 'fear, anxiety, anger 2'	, radość 'joy'.
7.		**strach, niedowierzanie, gniew** 'fear, disbelief, anger 2'	, potrzebę oparcia się w drugim człowieku 'the need to find support in another person'

4.4.5. NKJP strach-smutek 'fear-sadness'

LIST 13. *Strach-smutek* co-occurrences (Polish National Corpus - NKJP)

15 segments			
1.	tekstu piosenki, a za chwilę zauważysz jak złość, '(one hears) the lyrics and notice how'	**strach, czy smutek** 'the fear, or sadness'	mijają bezpowrotnie. 'fade away forever'
2.	wyzwala w nas negatywne uczucia: 'triggers negative feelings in us'	**strach, gniew, smutek, żal** 'fear, anger 2, sadness, longing'	Mało kto radzi sobie z tymi uczuciami. 'Only few people can cope with such feelings'
3.	odcienie poszczególnych fraz – 'shades of particular phrases' -	**strach, grozę, miłość, radość, smutek** 'fear, threat, love, joy, sadness'	
4.	(…) radzi sobie rewelacyjnie. '(He) is doing amazingly well, despite the'	**strach, niepewność, smutek i żal** 'fear, uncertainty, sadness and regret/grief'	po odrzuceniu przez starszą siostrę 'of being rejected by his older sister'
5.		**zdziwienie, szczęście, złość, strach, odraza i smutek** 'surprise, happiness, anger 1, fear, disgust, sadness'	
6.	wyrażających następujące emocje: 'expressing the following emotions'	**szczęście, zdziwienie, strach, smutek,** złość, wstręt lub pogardę 'happiness, astonishment, fear, sadness, anger 1, disgust or contempt'	

(*Continued*)

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LIST 13. (*Continued*)

15 segments			
7.	poczuł, że wyśpiewują tu wszystkie jego wędrówki, ucieczki, 'he was feeling they sing all his wanders, his escapes,'	**strach, smutek** 'fear, sadness'	, wysiadywanie na Zielonym Moście. 'and his long hours sitting on the Green Bridge'

4.5. Conclusions from corpus findings

Both in the English MONCO data and BNC findings, there is a fairly frequent co-occurrence relation between the forms *fear* and *anger*. The lexical item *sadness* appears mostly integrated with *fear* rather via indirect paths.

The frequency of the Polish form *strach* 'fear', followed by *gniew* 'anger 2' or *złość* 'anger 1' in the Polish MONCO corpus is higher than in the context of *smutek* 'sadness'. However, the qualitative context of the three (distant) collocates (slope 3, positions from −5 to +5), shows that the intervening concepts (e.g., List 12, examples 6 and 7) or *niepewność*, *smutek* i *żal* 'uncertainty, sadness and regret/grief' (List 13, example 4) as identified in the respective PATHS lists are associated with the concepts of SADNESS rather than ANGER emotion clusters (see Lists 12–13). Some additional indication of the same occurrence can be observed in the Polish National Corpus data as, for example, in the sample below:

strach, nie złość	, lecz właśnie rozpacz. Jakby coś tak po kawałku
'fear, not anger 1'	'but despair' As if one bit after another…'

Złość in this text only nominally co-occurs with *strach*. It is negated and a corrected co-occurring emotion is labelled, that is, by the author, and a different accompanying emotion *rozpacz* 'despair' – a member of the SADNESS emotion cluster - is substituted for *złość* in: *strach nie złość, lecz właśnie rozpacz* 'fear, not anger 2, but just despair', as in an act of self-correction.

Similarly, in both *złość* and *gniew* emotion scenarios, the co-occurring contexts contain emotion concepts that indicate emotion words referring to feelings of weaker arousal or indicating a lower willingness to act by experiencers than in the case of both Polish main lexicographic equivalents of *anger* – *złość* or *gniew*. Additionally, such forms as *znika nadzieja, znika motywacja* 'hope and motivation are vanishing', or the Polish culture-bound polysemous emotive term *żal* 'regret', a cluster member of SMUTEK 'sadness', indicating low arousal and hopelessness, tend to co-occur with the Polish equivalents of *anger*.

5. Parallela data

To provide a more in-depth verification of the thesis concerning the semantic differences between the English polysemous senses of anger (*złość* or *gniew* in Polish) and their differing equivalence patterns between English and Polish translation, we also analysed the co-occurrence equivalence results in Polish–English and English–Polish *Paralela* corpus data. The *Paralela* corpus is available at https://paralela.clarin-pl.eu/#. It was developed by the CLARIN-PL project research group for a large collection of annotated Polish–English parallel texts (Pęzik, 2016) and contains over

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LIST 14. English '*anger*' translation equivalents (Paralela)

#	Lemma	Word forms	Freq	Dice	C
1	gniew 'anger 2'	[gniewu, gniew, gniew, gniewem, gniewie, gniewowi, gniewy, gniewy]	1570	0.439	0.439
2	złość 'anger 1'	[złości, złość, złość, złością, złości]	532	0.182	0.182
3	agresja 'aggression'	[agresji, agresja]	70	0.036	0.036
4	wściekłość 'rage'	[wściekłości, wściekłość, wściekłość]	56	0.027	0.027
5	samobójczy 'suicidal'	[samobójcze, samobójczych]	40	0.019	0.019
6	nienawiść 'hate'	[nienawiść, nienawiści, nienawiść]	52	0.018	0.018
7	przejaw 'manifestation'	[przejawy, przejawów]	28	0.016	0.016
8	smutek 'sadness'	[smutku, smutek, smutek, smutkiem]	37	0.014	0.014
9	*gniew* 'anger 2'	[anger, anger]	19	0.012	0.012
10	frustracja 'frustration'	[frustracji, frustrację, frustracja]	21	0.012	0.012

250 million words presented in terms of parallel segments of translated texts (Paralela Web (clarin-pl.eu)).

The Dice column in the equivalence tables below is sorted from the highest to the lowest values, irrespective of the frequency of segment occurrences in the parallel texts (column A).

5.1. English anger translation data

English *fear* and the manifestation of the ANGER emotion cluster collocating with *fear* are recognised in the Polish translations (List 14). Both Polish direct equivalents of *anger*, in the forms of *złość* and *gniew*, as well as the co-occurring cluster members *agresja* 'aggression', *wściekłość* 'rage' and *nienawiść* 'hate' are present in Polish. *Smutek* 'sadness, sorrow' occupies a significantly lower position (Dice 0.014 versus 0.439 for *gniew* 'anger 2'). Compare also *smutek* 'sadness, sorrow' and its cluster member *przygnębienie* 'depression' (see below).

5.2. Polish sadness translation data

List (15) presents English translations for the Polish *złość* 'anger 1'. The top result is *anger* (Freq: 294, Dice: 0.123), followed by *angry*, *malice* and *spite*. Path texts include *rage*, *mad* and *temper*.

LIST 15. English '*sadness*' translation equivalents (Paralela)

1. Smutek 'sadness' [smutku, smutek, smutkiem, smutku, smutkowi], freq 590, Dice – 0,323
2. Przygnębienie 'depression' freq 27, Dice – 0,050

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LIST 16. Polish '*złość*' translation equivalents (Paralela)

#	Lemma	Word forms	Freq	Dice
1	anger	[anger, anger, angered]	294	0.123
2	angry	[angry, angry]	206	0.046
3	malice	[malice]	36	0.041
4	spite	[spite]	63	0.033
5	rage	[rage, rage]	47	0.030
6	mad	[mad, mad]	155	0.025
7	temper	[temper]	16	0.011
8	frustration	[frustration, frustrations]	9	0.009
9	hatred	[hatred]	13	0.009
10	vexation	[vexation]	7	0.009

5.3. Polish złość 'anger 1' and gniew 'anger 2' co-occurrence equivalents in English

List (16) for the Polish lemma *złość* 'anger 1' shows *anger* as its primary equivalent, followed by 'malice', 'spite', 'mad', while List (17) presents English translational equivalents of Polish *gniew* 'anger 2', as 'angry', 'grief' and also 'fury', 'hatred' or 'indignation'.

5.4. Polish smutek 'sadness' co-occurrence equivalents in English

e.g.,

Najpierw rodzi się *smutek, potem gniew.*	[Out of the ashes of Buenos Aires] comes first *sorrow, then anger 1*

The example above presents prototypical lexicographic Polish to English translational equivalents: Pol. *smutek* > Eng. *sadness*, and Pol. *gniew* - Eng. anger 2. The last List (18) shows more variety in the translational equivalents of Polish *smutek* in English, presenting the top ten English translation equivalents in the parallel corpus. The list is topped by 'sadness' with 280 occurrences and a Dice coefficient of 0.262, followed closely by 'sorrow' (233 occurrences, 0.158 Dice) and 'grief' (138 occurrences, 0.092 Dice). It also includes a high frequency of descriptive or situational terms like 'profound' and 'despair' from the SADNESS cluster, but also *anger*, which, in that context and relevant to our analysis, might have been considered rather semantically close to Polish *gniew* 'anger 2'.

6. General conclusions

The GRID, online emotions sorting, and corpus methodologies were employed to perform analyses on the concepts sadness, fear and anger to test three hypotheses.

LIST 17. Polish '*gniew*' translation equivalents (Paralela)

#	Lemma	Word forms	Freq	Dice
1	anger	[anger, anger]	784	0.305
2	wrath	[wrath]	185	0.145
3	rage	[rage, raging]	160	0.083
4	angry	[angry, angry]	140	0.030
5	fury	[fury]	31	0.024
6	grief	[grief]	28	0.015
7	temper	[temper]	23	0.014
8	seize	[seized, seized]	21	0.011
9	hatred	[hatred]	17	0.010
10	indignation	[indignation]	11	0.009

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LIST 18. Polish '*smutek*' translation equivalents (Paralela)

#	Lemma	Word forms	Freq	Dice
1	sadness	[sadness]	280	0.262
2	sorrow	[sorrow, sorrows]	233	0.158
3	grief	[grief, grieves]	138	0.092
4	sad	[sad]	116	0.027
5	melancholy	[melancholy]	14	0.016
6	joy	[joy]	34	0.013
7	profound	[profound]	13	0.010
8	despair	[despair]	12	0.009
9	anger	[anger]	19	0.009
10	parting	[parting]	5	0.008

Although there was no clear support for *hypothesis one* that the British English concept *anger* would be rated higher than the corresponding Polish concepts of anger – *złość* 'anger 1' and *gniew* 'anger 2' – on the POWER and AROUSAL dimensions, the results supported *hypothesis two* in showing a closer relationship between the SMUTEK and STRACH cluster concepts than between the SADNESS and FEAR clusters, as well as *hypothesis three* in the demonstration of a closer relationship between the British English ANGER and SADNESS cluster concepts than the corresponding conceptual variants in Polish.

The results supporting *hypothesis two* are novel in the sense that they not only replicate but extend the results of our previous studies (Lewandowska-Tomaszczyk et al., 2013; Lewandowska-Tomaszczyk & Wilson, 2024) that showed a higher rating of the concept *sadness* than that of *smutek* on the POWER and AROUSAL dimensions, and a higher rating of the concept *fear* than that of *strach* on the POWER dimension, suggesting the salience of *fight* in the conceptualisation of the former and *fright* in the latter. Specifically, the evidence from the three methodologies supports the prediction of a relatively closer conceptual proximity between the SMUTEK and STRACH cluster concepts than between the SADNESS and FEAR cluster concepts. This is shown by higher co-occurrences between the concepts *smutek* and *strach* than between those of *sadness* and *fear* in the online emotions sorting results, and corroborates the GRID results demonstrating a significant correlation between the concepts *smutek* and *strach* (0.46) on the POWER dimension (see Table 1). The corpus results are generally consistent with this, suggesting that there is some preference to introduce elements of weakness and/or inactivity in senses of *strach* 'fear', which make it closer to the expression of sadness rather than to the overtly visible anger. In addition, the English co-occurrence patterns of *fear* and *sadness* are much less numerous in all types of corpus data. The weight of evidence showing the salience of sadness in Polish culture (e.g., Doherty & Kelly, 2010; Helliwell et al., 2015; Inglehart, 1990; Sebena et al., 2012) offers a compelling case in favour of the low POWER in the *smutek* concept exerting an influence on the salience of POWER in the concept of *strach* in contrast to the lack of a theoretical basis for the opposite influence of the concept *strach* on that of *smutek*. We can therefore conclude the results provide evidence that suggests a reason for the relatively lower POWER in the concept *strach* that has hitherto alluded us. The major finding that emerged from the corpus data showing a relatively strong link between British English *fear* and *anger* has obvious relevance to the POWER effects we have observed for *fear*, namely that the POWER in the British English concept *anger* might be a reason for the salience of high POWER in the concept *fear*.

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The higher interconnections in the online emotions task between the concepts of *sadness* and British English ANGER cluster emotions than between those of *smutek* and Polish ANGER cluster emotions offer support for *hypothesis three.* As autonomy is a feature of individualism, this finding is consistent with the association that Berenbaum et al. (1995) showed between autonomous depressives and anger. It also corroborates the weaker link between anger suppression and depression for more interdependent individuals (Cheung & Park, 2010).

The results should be viewed in the light of the complexity of the relationships between the concepts of fear, sadness and anger. The differing degrees of consistency in the results from our three methodologies reflect the intricate conceptual structure of these three emotions. Our findings show that there is a clear need to employ a wide range of other methodologies to explore the underlying influences on the interrelationships between these emotion concepts in British English and Polish as well as other languages.

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Cite this article: Wilson, P. A., & Lewandowska-Tomaszczyk, B. (2026). Cross-cultural comparison of fear, sadness and anger: British English versus Polish, *Language and Cognition*, 18, e74, 1–32. https://doi.org/10.1017/langcog.2026.10101

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