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The Conceptual Structure of Negative Emotions Revealed by Shocking, Annoying, and Scary Examples of Lexical Processing

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Abstract

Emotions can be viewed as abstract cognitive events without an external reference object. They are cognitive relations in the sense that they consist of two or more primarily autonomous events, which are set in relation to each other. Accordingly, their conceptual structure is relatively complex, and it can be of diverse nature. This is reflected in a broad variety of lexicalisation patterns, both within and across languages. The significance of emotions for human interaction and their complexity is reflected in the rich inventory of emotion terms in many cultures. Their processing in a second or foreign language requires conceptual restructuring, making high demands on the learner's cognitive abilities. The processing of emotion terminology can therefore provide interesting information about the cognitive organisation of conceptual and linguistic knowledge.

1 Introduction

The present paper is concerned with the conceptual structure of negative emotions, their lexicalisation patterns, and the processing of their terminology in language production. It aims to link a psycholinguistic perspective on lexical processing to a cognitive view of conceptual organisation. Starting point is the hypothesis that conceptual structure is mirrored in lexico-semantic organization and can be traced by analysing lexical processing activity. The investigation is centred on the organisation of shock-related emotion concepts, both theoretically and in the light of an empirical investigation of productive processing in L1-L2 translation. Its main focus is on the structure of lexico-semantic networks and the processing of emotion words. Another issue of interest are the general mechanisms involved in verbalising a conceptual content in a given communicative situation.
2 Theoretical Considerations

2.1 Conceptualising and Verbalising Emotions

2.1.1 The Cognitive Structure of Emotions

Emotions as basic conceptual domains (Langacker 1987:151) may at first sight appear to have a relatively simple cognitive structure. On closer scrutiny, however, it becomes clear that they cannot be accounted for adequately without reference to their experiencer and his evaluation of a certain event or situation. This view is supported by their lexicalisation structures, which give evidence of a range of possible different perspectives on one and the same emotional state, depending on the grammatical category chosen to express this state (cf. below). Emotions are also interesting in that they can be conceptualised differently across cultures, which is reflected in diverging lexicalisation patterns.

“Feelings are the meeting place of mind, body and behaviour“ (Johnson-Laird 1988:380). Emotions belong to the wider domain of internal states, or feelings, but as opposed to bodily sensations, such as pain, emotions are mental states, originated from the cognitive interpretation of a physiological state (e.g., Schachter/Singer 1962; Johnson-Laird 1988). As such, they are highly complex bio-psychological events with a physiological as well as mental dimension. They are associated with autonomous bodily reactions, such as typical facial expressions, differences in heart rate, skin temperature, or muscle tension (cf., e.g., Johnson-Laird 1988:372).

A widely accepted perspective distinguishes five basic emotions, or emotion categories, namely HAPPINESS, SADNESS, ANGER, FEAR, and DISGUST\(^{18}\), which can take a variety of shapes, depending, for example, on their intensity or the object they are directed at (ibid.:379). They can be defined along the lines of a number of classifying dimensions, the most basic of which would be the positive-negative continuum (Langacker 1987:151). With a view to the

\(^{18}\) For the sake of lucidity in the following discussion and later data analysis, I will formally distinguish conceptual entities, lexical items, and real-life objects in the following way: Concepts will be capitalised, lexical items written in italic script, and reference objects in normal font.
later data analysis, I will here concentrate on the discussion of negative emotions.

Following Johnson-Laird (1988), the four negative states can tentatively be distinguished in the following way: ANGER can be seen as a precursor to aggressive behaviour, FEAR to submissive behaviour or flight, and DISGUST as a precursor to rejection, SADNESS determines an inner withdrawal to overcome a loss. Despite this variety of reactions, all negative emotions are thought to relate to essentially the same state of arousal, i.e., they are emotions of the same valency (cf., e.g., Bamberg 1997b; Schachter/Singer 1962). They are differentiated from one another only by the experiencer's perceptions and beliefs about the context and her position with regard to it (ibid.).

In addition to the basic emotions, SURPRISE is an interesting inner state. It could be characterised as a pre-emotional reaction to something unexpected, and “can play a part in the genesis of any emotion“ (Johnson-Laird 1988:372). SHOCK as a more violent variant of surprise is described by Wierzbicka (1992:565) as a state of confusion, which leaves the experiencer lost for words, thoughts, and actions. Contrary to SURPRISE, which is a primarily neutral reaction, its cause is always something experienced as negative. Consequently, SHOCK is a precursor to negative emotions.

Similar to other members of a category, emotion concepts have been found to overlap to a considerable extent (cf., e.g., Wierzbicka 1992; Bamberg 1997b). They can be contrasted, for example, with reference to semantic primitives, or by scrutinising their usage contexts. Wierzbicka (1992:558ff) defines a series of emotions, or rather, their lexical expressions, in reaction to bad experiences, by homing in on semantic primitives. This enables her to structure the continuum of emotion concepts, and at the same time contrast the meaning of related terms and trace their underlying similarities. SHOCK, for example, as described above, is characterised by the inability to react, and can give way to a range of aversive emotional states ranging from DISMAY to ANGER after the shocking event has been conceptually evaluated. DISMAY involves a particular strong element of rejection along with passiveness,
while ANGER has an air of active aggressiveness. Another example would be species of the category SADNESS, including, for example, DISTRESS and also SADNESS in a more restricted sense. While SADNESS portrays a present state of mind in reaction to a past event, DISTRESS includes an anxious outlook to the future. It may even be regarded as a variant of FEAR, foregrounding concern about possible consequences, rather than the upsetting effect of the experience.

The examples show that emotions are highly differentiated concepts, but that their boundaries are anything but clearcut. Depending on the perspective taken on a given event, i.e., the evaluation of it, an experiencer (or onlooker) may develop rather different emotions about it.

The results of Wierzbicka’s corpus linguistic analysis are supported by Bamberg’s (1997a) investigation of verbalisation patterns in children’s narratives. Bamberg focused on the use of opposing terms, such as anger and fear, or even happiness and sadness in the description of one and the same situation. He discovered that this verbal behaviour does not reflect the simultaneous experiencing of two more or less distinct feeling states, “but that it is the product of the linguistic ability to view a situation for two discursive purposes“ (ibid.:219). “What at first sight looked to be a description of an internal state of the protagonist, turned out on closer scrutiny the expression of a particular perspective“ on the given situation (ibid.:214).

Interpreted from a slightly different angle, it seems that the fact that emotional situations do allow for different perspectives could be seen as an indication of the overlap of emotion concepts. ANGER and FEAR may be considered a pithy example of the phenomenon of having ‘mixed feelings’ about something: a person may experience a certain situation in a way that it arouses both ANGER in her, for example with a given offender, and a FEAR of possible consequences. A foregrounding of either ANGER or FEAR in the very situation, could then be seen as indicating the experiencer’s temporal orientation more than the overall quality of her inner state.
In conclusion, emotion concepts must be seen as highly complex cognitive structures with considerably more variables than may be obvious at first sight. They are bound up in a continuous domain, definable along a number of quality dimensions which can be delineated in terms of semantic primitives. The conceptual field of emotions appears to bear some resemblance with the colour spectrum, in that its concepts merge into each other, and more so in that ‘opposite’ emotions (such as fear and anger) like ‘opposite’ colours (such as green and red) might be more appropriately regarded as complementary rather than antagonistic. An important aspect of emotional conceptualisation appears to be the perspective taken in respect of evaluating and/or reporting on a given situation or experience.

The following section investigates the different ways in which emotions are lexicalised, using as an example expressions for fear.

2.1.2 Lexicalisation Patterns

To explain the lexicalisation patterns of emotions, I will use the example of FEAR. FEAR could very generally be described as a negative emotional state caused by a situation perceived as threatening, whereby the intensity of this feeling can vary considerably. It is accompanied by specific bodily reactions ranging from a fearful facial expression via sweating to an increased heart rate or blood pressure. Resulting behavioural patterns in the natural world include species of avoidance, such as flight, ‘freezing’, or submission (Johnson-Laird 1988:373), which usually become manifest in the form of more moderate and subtle responses in human behaviour. The variety of descriptive viewpoints on a person in FEAR is reflected in the variety of verbalisation possibilities for her feeling. Two overall perspectives can be distinguished: her experience can be described with reference either to her internal state, or to her outwardly observable physiological or behavioural reactions. Accordingly, different linguistic means will be employed to express the situation. In more abstract terms, we may say that the perspective taken on a scene is important to both semantic and grammatical structure (Langacker 1987:120). This hypothesis will be scrutinised in what follows.
One of the most striking features of the emotional domain is its extremely rich lexicalisation. Several different shades of FEAR, for example, which relate to the intensity of the feeling and to other variables, are identified lexically (e.g., APPREHENSION, ANXIETY, WORRY, FRIGHT, TERROR, or PANIC, to name just a few). This clearly indicates the significance of the domain for human interaction. More interesting in relation to the present study, however, is a different aspect of emotion terminology. The terminology associated with emotional states or reactions is spread across all semantic word classes, ranging from nouns and verbs to adjectives and adverbials (cf. Langacker 1987:189). Each type of category denotes a particular perspective on an emotional state. Adjectives, like afraid or anxious identify the feeling as a qualitative state of the experiencer, while nouns like fear or anxiety appear to view it in a more abstract way, almost as a disembodied entity. Verbs, like worry or fear seem to emphasise the development of the feeling, accentuating its persistence over time. A participle like worried could be described as combining the qualities of verb and adjective, characterising the inner state of a worried individual as a persistent quality.

The examples show that the lexico-semantic field of fear is a rich inventory of expressions not only for different species of FEAR, but also for different ways of viewing these species. Beside these immediate lexicalisations of the conceptual category, a second set of lexical items, again covering all major grammatical categories, are associated with FEAR. It includes expressions depicting physiological reactions like wide(ned) eyes or shivering, non-verbal behaviour like cowering, and peculiarities in verbal behaviour like whispering or stammering. The lexico-semantic field could now be illustrated as in figure 1, as a network of connections organised around the relatively general item fear, with lexicalisations of the emotional state as central members, and lexicalisations of bodily expressions of fear distributed towards the periphery.
In sum, the conceptual complexity of emotions as exemplified by the notion of FEAR is documented by a rich inventory of referring expressions, which reflects the complex structure of the cognitive domain.

2.1.3 Emotion across Languages

Crosslinguistic and cross-cultural studies suggest that the conceptualisation of emotions is socio-culturally shaped (cf., e.g., Kitayama/Markus 1994; Wierzbicka 1999). Accordingly, lexicalisation patterns vary. Many emotion terms do not have exact translation equivalents, owing to the fact that they relate to culture-specific emotion scripts (ibid.). Lexical asymmetries across languages include lexical gaps in one language where in another language certain concepts are lexicalised. However, they not only vary in relation to whether or not they are lexicalised, but also in relation to the semantic and formal structures by which they are represented. Such differences reflect different ways of conceptualising certain events, in particular different perspectives on a scene (cf. Langacker 1987:120). A simple example, comparing English and German, can be given from the field of emotional states. Here, the two languages differ, for instance, in their most general way of expressing the concept of FEAR. While English avails of an adjectival construction (*be afraid (of something)*), which expresses the affective state of the experiencer, German employs a nominal construction (*Angst haben (vor etwas)* – ‘have fear (of something)’), which seems to model the emotion more as an impersonal entity that has ‘taken possession’ of the experiencer. Other, more subtle differences manifest themselves in divergent valency structures.
of related expressions. These, however, are not relevant for the present discussion.

2.2 Lexical Selection in Language Production

Language production is generally thought of as including a variety of component processes on the way from prelinguistic conceptualisation to articulation. Following Garrett (1988:71), the first step towards expressing a concept in words is **lexical selection**. As Singleton (1999:29) observes, “there is, of course, no doubt that lexical choice and meaning are intimately linked“. Lexical selection can thus be regarded as a choice of meaning. It is here used to refer to the process of accessing the semantic items required for verbalising a given conceptual content. Following Aitchison (1994:230), it involves “first a broad sweep through the general area, in which numerous words which fulfil certain outline specifications are activated“, eventually resulting in the selection of a situationally appropriate one. This processing activity is related to the principle of **spreading activation**, which assumes that activation fans out from a given centre - in this case a conceptual content - stimulating adjacent structures (ibid.; cf. Also, e.g., Bierwisch/Schreuder 1992; Dell 1986; Dell/O'Sheaghdha 1992; Roelofs 1992; Zimmermann 1994). Aitchison points out that humans are thought to “automatically consider words that are inappropriate, provided they are in some way connected to the topic concerned“ (1994.:199). Usually, only the most adequate solution is finally verbalised. These suggestions agree with Baars’ (1980) **Competing-Plans-Hypothesis**, which assumes that a speaker/writer often has a number of possibilities for realising a communicative intention, whereby alternative plans convey different shades of meaning (ibid.:41). It is important to note, however, that the process of lexical selection usually happens automatically and does not demand conscious awareness, and that, according to Aitchison (1994:198), “In everyday conversation [i.e., unreflecting language use], words are selected relatively randomly, as opposed to special occasions where they must be selected carefully“.

2.3 Translation

In L1-L2 translation, which provides the source of data for the following empirical investigation, both languages are inevitably active, and L2
production is immediately influenced by the given L1 structures. Interactive activation and crosslinguistic consultation happens consciously as well as unconsciously following the principle of spreading activation. Corresponding processing activity is reflective of intra- and crosslinguistic connectivity and will be used for the reconstruction of lexico-semantic networks.

3 Empirical Investigation

The above findings are supported by data collected in a research project on lexical processing in L1-L2 (English-German) translation. The study focussed on a range of aspects of productive processing, among them and relevant for the present discussion, lexical search activity in cases of an unavailability of required target language items. Here, the study set out to investigate the relationship of general conceptual and lexico-semantic structure as becoming evident from the informants’ processing activity.

3.1 Data Collection

3.1.1 Subjects

The informants involved in the study were 30 English-speaking university students not specialising in a foreign language but taking German as an additional 2-year module during their undergraduate courses. All of them had attended Irish secondary schools, where they had had German up to School Leaving Certificate level. They constituted a relatively homogeneous group insofar as they all had a similar general educational and language learning background and a similar level of L2 competence.

3.1.2 Methodology

The data collection covered two broad categories: elicited language and introspective data and information on the subjects’ linguistic background. The former comprised three sets of data, namely, the composition of a story on the basis of a series of pictures in the subjects’ mother tongue, a translation of the same story into German, and think-aloud verbal protocols relative to the performance of the translation task. The personal information included responses to a questionnaire on the subjects’ language learning
background and previous linguistic experience and information on their performance in the language modules’ examinations.

3.1.3 Task

An important concern of the wider research project was to design a study which would be capable of yielding data on as many aspects of bilingual processing as possible, in order to arrive at a comprehensive view of linguistic organisation. An instrumentation that lends itself most readily to such an investigation is a combined application of written translation and concurrent think-aloud-protocols (cf., e.g., Dechert 1987; Hölscher/Möhle 1987; Krings 1987; Zimmermann 1994). Translation, by definition, requires a reproduction of the source language message in terms of meaning and structure (Bassnett-McGuire 1980:2). With the content of the utterance given, the performer will be engaged in a search for translation equivalents, aiming at accuracy and precision of expression, which, it was hoped, would trigger a high degree of linguistic, in particular lexical processing. In order to reduce the cognitive load on the informants and to ensure that the source text was well understood, the comprehension dimension, normally inherent to translation, was eliminated by having the subjects produce their own translation sources. The advantage of having subjects do this immediately before the act of translating is that the conceptual content has recently received focal attention and is therefore still available in short-term-memory.

The study thus set a first task of composing in their mother tongue a story on the basis of a series of pictures, which was then to be translated. The cartoon, an episode of *Calvin and Hobbes*, in which Calvin gets his hair cut by Hobbes, resulting in a bald head and emotional uproar, featured a number of key situations and elements which were expected to be verbalised. These later provided the basis for a comparison of the students’ performance. The informants were not aware that their compositions would be their later translation source, since this might have lead to prior back-translation and avoidance of difficulties.

Of particular interest for the present discussion are situations of non-accessibility of required lexical items. Here, the think-aloud protocols trace
the routes taken in lexical retrieval or search by documenting the informants’
chain-of-thought. Think-aloud protocols have been established as a valid
instrument of investigation, being widely acknowledged as providing most
genuine information without corrupting the thought process (Ericsson
1990:195). Their value lies in their potential to reveal processing activity
underlying linguistic behaviour which goes beyond the informative value of
the translation product, and possibly even beyond the level of awareness of
the informant.

Think-aloud protocols appear to be especially fruitful in relation to the
organisation of the (plurilingual) mental lexicon, allowing for conclusions
about the cognitive architecture of lexical knowledge. Zimmermann (e.g.
1994) used the method of written translation along with concurrent think-
aloud protocols to investigate the mechanisms involved in lexical selection.
His findings show that the analysis of productive processing can provide
useful information on several issues in relation to lexical organisation and the
relationship of L1 and L2. Especially relevant in the present context are
findings concerning the relationship between lexical and conceptual
organisation. Zimmermann’s data suggest that lexico-semantic search activity
is indicative of the conceptual frame associated with the semantic content of
a given source item.

3.2 Results

The data obtained were analysed with specific focus on issues of lexical
processing and the cognitive organisation of linguistic and conceptual
knowledge. I will here discuss the informants’ processing activity in relation
to the verbalisation of emotion concepts, in particular scrutinising
mechanisms of lexical selection. For this purpose, two situations which
feature related emotional reactions were singled out from the stories, and the
corresponding data – an L1 lexicalisation, its L2 rendition, and the
documented translation process – will be set in relation to each other. More
specifically, the informants’ choice of words in both L1 and L2 and their
intermediate processing activity will be analysed with reference to the
conceptual content to be verbalised. Particular attention will be given to
semantic processing, with the objective of gaining information about
conceptual organisation. The associative chains documented by the think-aloud protocols are expected to render possible the reconstruction of lexical networks and an identification of the processing mechanisms at work in lexical selection. The situations selected for investigation both feature the concept of SHOCK. They are (1) the scene where Calvin is confronted with the outcome of the haircut by looking in a mirror, being horrified, angry with his friend, and afraid of his mother; and (2) his mother’s reaction, shock and anger, upon seeing his bald head. The two situations, which resemble each other in many ways, will first be considered separately and then set in relation to each other.

3.2.1 Overview of the Data

3.2.1.1 Situation 1

The scene in which Calvin reacts upon the discovery of his bald head involves various aspects and allows for adopting different viewpoints in describing it. Most generally, an intrinsic perspective accounting for Calvin’s feelings and an extrinsic one describing his behavioural reactions can be distinguished. His emotional state involves a moment of perplexity, dismay with his looks and with his friend, and fear of his mother. This variety of foci is reflected in the informants’ choice of verbalisations for describing the scene. They activated a relatively wide range of lexical items, representing a few central concepts.

The situation is verbalised by 28 subjects, involving a total of 79 English and 61 German lexical activations, which relate to 33 different English and 30 different German items. Lexical activations include L1 source items, L2 written translation products, and L1 and L2 approximations. The latter relate to intermediate or temporary solutions as disclosed by the think-aloud protocols. They are of particular interest as they document the fanning out of activation in various directions. Table 2 displays L1 source item, the sequence of lexical activations and a selection of relevant comments, and the L2 written solution as reported by the think-aloud protocols. For reasons of transparency, the associative chains have been simplified in the sense that they show the stages of lexical access without taking account of immediate
repetitions, grammatical processing, or metalinguistic comments and other remarks, unless they are specifically referred to in the data analysis.

<table>
<thead>
<tr>
<th>L1 source items</th>
<th>L1 approximations</th>
<th>L2 approximations</th>
<th>L2 written solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shocked</td>
<td>10</td>
<td>surprised</td>
<td>5</td>
</tr>
<tr>
<td>Shock</td>
<td>2</td>
<td>surprise</td>
<td>1</td>
</tr>
<tr>
<td>worried (a)</td>
<td>4</td>
<td>shocked</td>
<td>7</td>
</tr>
<tr>
<td>worry (v)</td>
<td>4</td>
<td>shock</td>
<td>1</td>
</tr>
<tr>
<td>freak (out)</td>
<td>3</td>
<td>afraid</td>
<td>4</td>
</tr>
<tr>
<td>fear (v)</td>
<td>2</td>
<td>panic (v)</td>
<td>1</td>
</tr>
<tr>
<td>horrified</td>
<td>2</td>
<td>fear (n)</td>
<td>2</td>
</tr>
<tr>
<td>horror</td>
<td>2</td>
<td>fear (v)</td>
<td>1</td>
</tr>
<tr>
<td>disbelief</td>
<td>1</td>
<td>angry</td>
<td>2</td>
</tr>
<tr>
<td>go mad</td>
<td>1</td>
<td>annoyed</td>
<td>1</td>
</tr>
<tr>
<td>scream</td>
<td>1</td>
<td>furious</td>
<td>1</td>
</tr>
<tr>
<td>petrified</td>
<td>1</td>
<td>horror</td>
<td>1</td>
</tr>
<tr>
<td>not happy</td>
<td>1</td>
<td>scary</td>
<td>1</td>
</tr>
<tr>
<td>fearful</td>
<td>1</td>
<td>bad</td>
<td>1</td>
</tr>
<tr>
<td>panic (v)</td>
<td>1</td>
<td>worried</td>
<td>1</td>
</tr>
<tr>
<td>afraid</td>
<td>1</td>
<td>sad</td>
<td>1</td>
</tr>
<tr>
<td>terrifying</td>
<td>1</td>
<td>unhappy</td>
<td>1</td>
</tr>
<tr>
<td>panic-attack</td>
<td>1</td>
<td>impatient</td>
<td>1</td>
</tr>
<tr>
<td>astonished</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>incredulously</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>damage</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>awful</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>angry</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>think of</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Distribution of activated items relating to the notion of SHOCK/Situation 1

(The asterisk (*) denotes interlanguage forms, i.e., non existing items. The table does not account for misspellings.)
The lexicalisations relate to the following activation sequences:

<table>
<thead>
<tr>
<th>Subj ect</th>
<th>Source item</th>
<th>associative chain</th>
<th>written translation product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. shocked</td>
<td>1. surprise – surprised - erstaunt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. (he) fears</td>
<td>2. er hat Angst über – he's afraid of</td>
<td>1. ---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. (er) hat Angst über</td>
</tr>
<tr>
<td>2</td>
<td>1. disbelief</td>
<td>1. ---</td>
<td>1. ---</td>
</tr>
<tr>
<td></td>
<td>2. horror</td>
<td>2. angry – horror – angry – annoyed – ungeduldig</td>
<td>2. ungeduldig</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>that could be impatient – I think it's unhappy</td>
</tr>
<tr>
<td>3</td>
<td>1. shocked</td>
<td>1. enttäuscht is not the word - go for enttäuscht – that's surprised</td>
<td>1. enttausched</td>
</tr>
<tr>
<td></td>
<td>2. worried</td>
<td>2. ---</td>
<td>2. ---</td>
</tr>
<tr>
<td>4</td>
<td>1. has a minor panic-attack</td>
<td>Calvin panics - making a literal translation replacing a &lt;c&gt; with a &lt;k&gt;</td>
<td>1. panikt</td>
</tr>
<tr>
<td></td>
<td>2. worrying</td>
<td>2. ---</td>
<td>2. (er) besorgt sich über</td>
</tr>
<tr>
<td>5</td>
<td>(Calvin) goes mad</td>
<td>Calvin is like mad</td>
<td>(Calvin) ist wie verrückt</td>
</tr>
<tr>
<td>6</td>
<td>1. angry</td>
<td>1. very sad</td>
<td>1. “angry”</td>
</tr>
<tr>
<td></td>
<td>2. fearful</td>
<td>2. ich habe Angst vor is I’m afraid</td>
<td>2. (er) hat Angst vor</td>
</tr>
<tr>
<td>7</td>
<td>panics</td>
<td>no idea</td>
<td>panikt</td>
</tr>
<tr>
<td>8</td>
<td>horrified</td>
<td>---</td>
<td>(er) ist angst</td>
</tr>
<tr>
<td>9</td>
<td>freaks out</td>
<td>---</td>
<td>(Calvin) ist Lärm</td>
</tr>
<tr>
<td>10</td>
<td>1. freaks</td>
<td>1. böse – no – böse? okay I wanna say he’s furious so I think that’s böse</td>
<td>1. böse</td>
</tr>
<tr>
<td></td>
<td>2. worries</td>
<td>2. ---</td>
<td>2. hat Angst</td>
</tr>
<tr>
<td>11</td>
<td>1. shocked</td>
<td>1. schockiert – schockiert? – shocked</td>
<td>1. shockiert</td>
</tr>
<tr>
<td></td>
<td>2. worries</td>
<td>2. ---</td>
<td>2. (er) sorgt über</td>
</tr>
<tr>
<td></td>
<td>about</td>
<td>3. ---</td>
<td>3. (er) ärgert sich</td>
</tr>
<tr>
<td></td>
<td>3. afraid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>(he) surveys the damage</td>
<td>---</td>
<td>(er) sieht sein Haar</td>
</tr>
<tr>
<td>13</td>
<td>shocked</td>
<td>---</td>
<td>1. nicht zufrieden</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. verschockt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. hat Angst</td>
</tr>
<tr>
<td>14</td>
<td>astonished</td>
<td>---</td>
<td>erstaunt</td>
</tr>
<tr>
<td>15</td>
<td>(he) screams</td>
<td>schreit</td>
<td>(er) schriet</td>
</tr>
<tr>
<td>16</td>
<td>awful</td>
<td>---</td>
<td>schlecht</td>
</tr>
<tr>
<td>17</td>
<td>1. he is shocked</td>
<td>1. er sieht schockiert aus - to appear shocked</td>
<td>1. (er) sieht shockiert aus</td>
</tr>
<tr>
<td></td>
<td>2. worried</td>
<td>2. ---</td>
<td>2. (er) macht sich viele Sorge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>no English text</td>
<td>---</td>
<td>(er) hat Angst</td>
</tr>
<tr>
<td>19</td>
<td>shocked</td>
<td>---</td>
<td>erschrocken</td>
</tr>
<tr>
<td></td>
<td>2. terrifying</td>
<td>2. scary - bad</td>
<td>2. schlecht</td>
</tr>
</tbody>
</table>
### Table 2 Associative chains relating to the processing of Situation 1

#### 3.2.1.2 Situation 2

Situation 2 is in many ways similar to Situation 1. Calvin’s mother is aghast at the discovery of the bald facts, followed by anger with her son. The subjects’ processing again involves a broad variety of lexical activations, considered indicative of a few descriptive viewpoints and the structure of the conceptual frame of SHOCK, in this case, however, associated only with the notion of FEAR.

The situation is verbalised by 22 subjects, involving a total of 57 English and 49 German lexical activations, which relate to 29 different English and 25 different German items.
The lexicalisations relate to the following activation sequences:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Source item</th>
<th>activation sequence/chain-of thought</th>
<th>written translation product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>shocked</td>
<td>---</td>
<td>böse und nicht glücklich</td>
</tr>
<tr>
<td>2</td>
<td>goes berserk</td>
<td>annoyed – nicht zufrieden – not happy</td>
<td>nicht zufrieden</td>
</tr>
<tr>
<td>6</td>
<td>goes wild</td>
<td>angry</td>
<td>&quot;angry&quot;</td>
</tr>
<tr>
<td>7</td>
<td>furious</td>
<td>---</td>
<td>böse</td>
</tr>
<tr>
<td>8</td>
<td>screams</td>
<td>sie ist nicht – sie ist blöd mit Calvin</td>
<td>böld</td>
</tr>
<tr>
<td>9</td>
<td>goes mad</td>
<td>sie gehen mad – sie gehen rot – she goes mad – she goes red</td>
<td>sie gehen rot</td>
</tr>
<tr>
<td>10</td>
<td>(gets) a shock</td>
<td>I think Schock is there the same as in English</td>
<td>(sie kriegt) eine Schock</td>
</tr>
<tr>
<td></td>
<td>reacts strongly</td>
<td>---</td>
<td>seine Mutter starke reagiert</td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>-----</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>11</td>
<td>outraged</td>
<td>---</td>
<td>böse!</td>
</tr>
<tr>
<td>13</td>
<td>she gasped</td>
<td>überrascht – erstaunt und wütend – surprised and angry</td>
<td>überrascht und wutend</td>
</tr>
<tr>
<td>14</td>
<td>not happy</td>
<td>---</td>
<td>nicht glücklich</td>
</tr>
<tr>
<td>15</td>
<td>aghast</td>
<td>---</td>
<td>sie hat eine große Überraschung</td>
</tr>
<tr>
<td>16</td>
<td>shocked</td>
<td>---</td>
<td>shockiert</td>
</tr>
<tr>
<td>17</td>
<td>no English text</td>
<td>she screams</td>
<td>(sie) hat Angst</td>
</tr>
<tr>
<td>18</td>
<td>shocked</td>
<td>---</td>
<td>erschrocken</td>
</tr>
<tr>
<td>19</td>
<td>no English text</td>
<td>sie hat große anger – she screamed</td>
<td>(sie hat) große anger</td>
</tr>
<tr>
<td>20</td>
<td>1. in the shock 2. (they both) argue</td>
<td>1. surprise – spring is to jump – I jump 2. ---</td>
<td>1. (sie) bekommt eine Spring 2. sie arger miteinander</td>
</tr>
<tr>
<td>21</td>
<td>very upset</td>
<td>angered – sich ängern – this is a long shot</td>
<td>(seine Mutter) ängert sich</td>
</tr>
<tr>
<td>22</td>
<td>1. (she)reacts 2. (with) shock 3. and horror</td>
<td>1. sie schreit 2. --- 3. ---</td>
<td>1. sie schriet 2. mit Schock 3. und Horror</td>
</tr>
<tr>
<td>23</td>
<td>1. starts at 2. sceptical 3. and angry</td>
<td>1. to get a surprise 2. --- 3. ---</td>
<td>1. ärgert sie sich 2. --- 3. ganz wütend</td>
</tr>
<tr>
<td>28</td>
<td>shocked</td>
<td>surprised - gets a shock</td>
<td>(sie) bekommt ein Schock</td>
</tr>
</tbody>
</table>

**Table 4  Associative chains relating to the processing of Situation 2**
3.3 Discussion of the results

The data will now be discussed in the light of the above considerations about cognitive organisation. Of focal interest will be the subjects processing activity, in particular the dimensions of lexical search, as well as some lexical errors, which will be scrutinised for their informational value concerning aspects of conceptual-semantic organisation.

3.3.1 Situation 1

3.3.1.1 Associogramme

I will begin with a graphic illustration of the aggregated processing activity of the 28 informants. It displays the activated lexical items and the links between them as evidenced by the subjects’ activation sequences. The number of lines drawn between items correspond to the number of times these items were associated in sequence.

![Figure 2 Aggregated search activity in the field of SHOCK/Situation 1](image-url)
Figure 2 displays the 63 items activated by the subjects in their efforts to verbalise Calvin's emotional reaction in Situation 1 in English and German. (Dotted lines and items in brackets indicate additional links relevant for the understanding of lexical errors.) What is most striking is the fact that together the informants activate a considerable number of items spread across a relatively wide conceptual area with a concentration on a range of apparently central items. Is the illustration a mere collection of individual associations, or can it be interpreted beyond that? Following Zimmermann (e.g., 1994), I will suggest viewing it as a representation of (part of) the subjects' collective conceptual frame associated with the notion of SHOCK, as represented by their aggregated search activity.

In order to approach this hypothesis, we must ask whether the production and translation of these different source items is comparable, and what it can tell us about lexical and conceptual organisation. Investigating this question, I will not exclusively focus on the process of translating, but consider the subjects' choice of words in both their English compositions and in the translation processes and results in a more global perspective. The discussion will build on the overview of the conceptual domain of emotions and its lexicalisation patterns presented above.

3.3.1.2 Conceptual Organisation, Lexical Processing, and Bilingual Connectivity

The verbalisation of Situation 2 gives rise to the question if the multitude of lexical choices employed to verbalise the scene is reflective of a multiplicity of distinct perceptions of it. Do 24 different English lexicalisations in the compositions, and 27 different German translation products across 28 subjects of a relatively homogeneous group represent highly individual conceptualisations of the same situation? This appears to be unlikely, and the data suggest that, in fact, the opposite is the case; namely that the variety of lexicalisations reflect the informants' focal attention on specific aspects of the scene, which include either a description of Calvin's inner state or of his behaviour. The former relates to the notion of PERPLEXITY expressed by items denoting SURPRISE or SHOCK, to the notion of FEAR or WORRY, and to the notion of DISMAY or ANGER. The latter involve verbalisations reflecting an outside perspective, accounting for Calvin's reactions either
neutrally (e.g. Calvin surveys the damage) or indicating his inner uproar (Calvin screams, goes mad, etc.).

Of interest here is not so much the mere identification of these conceptual realms, but the direction the subjects’ processing takes in translating their English verbalisations. It was suggested above that casual language production is characterised by a relatively random and unconscious selection of lexical items, as opposed to more thorough processing in reflecting production (cf. Aitchison 1994). The informants’ processing of the present situation is seen as furnishing support for this hypothesis. The composition of the English source text is seen as representing unreflecting language use, given the fact that the tight time frame did not leave much room for contemplation, and also because the subjects were under the impression that the task was relatively insignificant. The performance of the translation task would then, of course, involve careful reflection.

As was mentioned above, the situation allows for different perspectives. They can be divided into specific accounts of Calvin’s anger and fear and emotion-unspecific descriptions either of the pre-emotional state of shock or surprise, or of Calvin’s behavioural reactions. A range of compositions (cf. subjects 2, 3, 4, 6, 10, 11, 17, 21, 22) include two perspectives, usually an emotion-unspecific and an emotion-specific one; one composition (subject 30) even takes account of Calvin’s shock, his discontent with Hobbes and the fear of his mother. Interesting in this connection is a change of focus between the English and the German versions across the informants (cf. table 3). In English, 26 verbalisations avail of lexical items expressing SHOCK and related notions or representing an observer’s perspective, i.e., they are neutral in terms of specifying Calvin’s state of emotion. 18 specify his emotional reaction in terms of ANGER or FEAR. In German, this distribution of lexical choices is reverse: there are 13 ‘neutral’ as opposed to 28 ‘emotional’ lexicalisations (including a few errors which can be identified as being intended to belong to one of the categories; cf. later discussion).
The increase of emotion-specific lexical items is seen as a specification of meaning upon careful reflection. Many pre-emotional or descriptive verbalisations were qualified in the direction of either ANGER or FEAR or both. This suggests that the informant’s initial choice of words in these cases started from relatively general conceptualisations and an observer’s perspective which availed of emotion-unspecific lexical items, and that the second time they were confronted with the situation, they seemed to develop a more differentiated view and to feel the need for specifying their perspective, or rather, for adopting Calvin’s perspective more explicitly.

An impressive example of such processing is given by subject 10. From her English phrase ”he freaks”, she immediately associates the German item böse (‘angry, annoyed’), then hesitates and, contemplating her choice of words, arrives at the interpretation ”okay, I want to say he’s furious, so I think that’s böse”. This comment suggests that, indeed, her lexical activations were unconscious and arbitrary in the first place, and that upon reflecting upon them she realises, however, what she actually had in mind using both the phrases he freaked and er war böse. Without hesitation, she accepts böse as equivalent to freak, having identified the latter as representative of the concept of FURY. In other words, freak is viewed as a way of expressing FURY, and so is böse: her prelinguistic conceptualisation of Calvin’s feeling allows for different lexicalisations. These lexicalisations, in turn, involve a modification of her prelinguistic conceptual representation.

A similar example of specifying the verb freak is given by subject 22. His chain-of-thought reads as follows: (source phrase: Calvin freaks; translation product: Calvin hat Angst)
"Calvin – has fear – gets worried – zu – sorgen – sorgt – daß Calvin – Angst – it's no surprise that Calvin has – uh – fear”

In this case it remains speculative whether the informant specifies the meaning of freak because he lacks a translation equivalent or because he feels the need to do so. More likely, however, is that he cannot translate freak and therefore scans the semantic environment for a suitable substitute. As opposed to the previous case, however, his interpretation goes in the direction of FEAR. Across the two informants, this shows that freak represents a relatively wide conceptual content which allows for different specifications. It depicts a level of conceptual representation at which the notions of ANGER and FEAR meet.

Not only freak, but also shock and related items present themselves as relatively unspecific verbalisations which allow for and lead to specification upon reconsideration. This is evidenced impressively by three subjects, who interpret their initial choice of words in more than one way. Species of SHOCK are differentiated as relating to either ANGER or FEAR, depending on the perspective adopted.

Informant 13 translates her original sentence

He’s shocked by the result and by the reaction he anticipates from his mother.

as

Er sieht sein Haar und mit es ist er gar nicht zufrieden. Er ist verschrockt. Er hat auch Angst vor seiner Mutter.19

(‘He sees his hair and with it he is not happy/content at all. He is shocked. He is also afraid of his mother.’)

She interprets the notion of SHOCK as relating to both Calvin’s haircut and to his mother’s anticipated reaction in terms of DISCONTENT and FEAR, and

19 The grammatical errors contained in the sentences are irrelevant for the present discussion and will not be analysed here.
even retains the element shock as a linking concept. Its placement between
the verbalisation of DISMAY AND FEAR may suggest that both these feelings
are regarded as species of SHOCK. This would imply that the state of shock
(and similarly that of surprise) is not necessarily just a precursor to more
specific emotional states as proposed by Johnson-Laird (1988) and
Wierzbicka (1992) (cf. above), but that it can, indeed, be perceived as
appearing simultaneously with emotions like FEAR and ANGER.

Informant 23 describes Calvin as being horrified by the outcome of the
haircut and petrified by the thought of his mother. In the German version, he
finds his hair furchtbar (‘awful’) and hat große angst (‘is very much afraid’)
thinking of his mother.

In informant 26’s story, Calvin looks incredulously in the mirror and gets a
terrible shock thinking of his mother. DISBELIEF and SHOCK are specified as
FURY and FEAR in German: seeing his short hair, Calvin is wütend, and
thinking of his mother, er hat angst of her fury.

3.3.2. Situation 2

3.3.2.1 Associogramme

The informants’ aggregated search activity represented in figure 3 shows that
the subjects again activated a large variety of different items, associated with
a range of conceptual perspectives and centred on a few key items. I will
again focus on the implications of semantic processing for conceptual
organisation and then approach the question whether the aggregated
processing activity of the informants can be related to a collective
conceptualisation of the given situation(s).
3.3.2.2 Conceptual Organisation and Lexical Selection

In the previous section, the tendency towards modifying a descriptive viewpoint in the direction of adopting the protagonist’s perspective was discussed. It involved an increase in emotion-specific terminology in accounting for Calvin’s reaction. A similar tendency can be found in Situation 2, the translation of which involves a range of qualifications of emotion-unspecific terms. The most interesting ones are the following:

1. (subject 1) shocked translated as böse und nicht glücklich (‘angry and not happy’)

Here, the informant seems to opt for emphasising the mother’s negative reaction by specifying both ANGER and DISCONTENT. A speculative interpretation of this double qualification would be to relate it to her reaction upon the sight of Calvin’s head on the one hand, and to her anger with her son on the other. In this view, it would resemble Calvin’s earlier
double perspective which depicted his dissatisfaction with, or anger about his friend and the outcome of the haircut, and his fear of his mother.

2 (subject 14) she gasped translated as sie war überrascht und wütend (‘she was surprised and angry’)
The example resembles the previous one, in this case specifying the description of the mother’s physical reaction in terms of its underlying emotional state.

Further instances specify an extrinsic perspective in terms of ANGER (involving a few errors):

3 (subject 6) go wild transposed as ”angry”
Subject 6 obviously associates go wild with angry, but gives up on the attempt to retrieve a translation equivalent.

4 (subject 7) she screams translated as sie ist böld (pronounced as blöd)
The target item here was presumably böse; the erroneously triggered form blöd (‘stupid’) is misspelt as böld.

5 (subject 22) upset translated as ängert sich
Here, a transfer of the formal quality of angry (*ängert instead of ärgert).

6 (subject 26) she starts at translated as ärgert sie sich
Finally, the rendition of start at as sich ärgern results in a correct German utterance.

As in Situation 1, the modification of the narrative viewpoint is seen as a specification of meaning upon reflection. The relatively frequent occurrence of this process is interpreted as furnishing support for the hypothesis that reflecting language production involves more careful lexical selection than casual production.

3.3.3. A Collective Mental Representation of Emotion Concepts and Terminology?

I will conclude the discussion with a look at the question of whether the above illustrations of the aggregated processing activity of the subjects could
be viewed as the collective mental representation of their conceptualisation of Situations 1 and 2. Following Zimmermann (1994), such a hypothesis would be supported if the processing activity of the informants overlaps to a considerable extent and if some subjects alone activate larger parts of the lexical field.

Figures 2 and 3 show that the overlap of lexical activations across the informants is more extensive than may be assumed in the light of the multitude of items used. Not surprisingly, it is stronger between central items of the fields, which are frequently activated and appear to serve as a point of orientation in the processing activity.

Detecting extensive and connected processing activity within individual informants across the different conceptual domains is a more difficult task. Subject 28 provides an impressive account of mental connections holding between the different emotional domains and of possible perspectives in accounting for them. Moreover, his processing activity represents a fairly wide range of processing phenomena found across the informants. I will discuss his processing of Situations 1 and 2, beginning with his attempt to account for Calvin’s mother’s shock upon the sight of Calvin’s head.

Figure 4 illustrates his search sequence, starting from the source item horrified. His first association is horror, which he selects as the pivot of his search in different directions, together with horrified. The two items could be seen as representing the central notion of his concept. From there, he activates Wut, but seemingly dissatisfied, returns to horror and to the source item horrified. He begins his search again, this time arriving at Angst, presumably erroneously activated in confusion with anger/Ärger, since Angst is conceptually inadequate. He returns to horrified, trying his luck again in the direction of ANGER, this time associating wütend and the close equivalent raging, which he discards as “not the same”. He leaves the problem for a while and, returning to it later, starts again from horrified and horror, this time with a German pronunciation, followed by a new strategy, the retrieval of the required German form through a context of use, namely that of horror films, first with a German, then with an English pronunciation.
Back at horror, he muses that it could be the same word in German and tries a German pronunciation again. Apparently not trusting this thought, he returns to horrified and scans the more immediate semantic environment, which takes him to geschockt (‘shocked’, colloquially) and finally to the incorrectly derived form *geschocken, which he selects as a solution.

**Informant 28: Lexical search sequences and conceptual structure**

![Diagram of associative chain](image)

*Figure 4 Associative chain of subject 28 in search of a translation equivalent of horrified*

Unlike many others, the informant is not prepared to accept a modification or change of meaning in his German translation, presumably due to the task instruction to translate as closely as possible, which is not followed by all the subjects in the same way, as can be seen from the data. His repeated and apparently automatic search in the direction of ANGER (erroneously triggering Angst) and RAGE (Wut, wütend) indicates, however, that he also tends to interpret his initial choice of words in terms of ANGER. His think-aloud protocol provides an impressive account of the systematic scanning of the semantic environment of his source concept. His retrieval of German forms appears to be predominantly conceptually driven, as he triggers them immediately, associating their English equivalents only afterwards, which
seems to provide him with feedback about their meaning. The sequence "horror – wütend – raging – it’s not the same” suggests that the English item raging mediates the insight that wütend is unsuitable as a solution. Unsuccessful with his strategy of semantic approximation, he approaches the problem in a different way, trying to retrieve the missing form in association with a specific context of use. His activation of Horrorfilm reflects his contemplation of the possibility of cognates across English and German, but he does not seem to trust this idea. Unsuccessful in his previous attempts, he finally activates the concept of SHOCK as closely synonymous with that of HORROR, which then takes him to his final (though morphologically incorrect) solution. On the whole, his search for HORROR is seen as evidencing the spread of activation in various directions, both uncontrolled (cf. Angst) and controlled. He uses a range of processing strategies activating different domains of knowledge, and he also evidences different types of errors. His chain-of-thought may be seen as representative of the aggregated processing activity of the 22 subjects – which, in turn, could be interpreted as their collective mental representation of the different facets of the situation.

A further look at informant 28’s processing activity of emotion concepts and items across the two situations, suggests that his data can, indeed, be regarded as representative of the overall processing activity of the 30 subjects in terms of lexical activations, processing strategies, and lexical organisation. Verbalising Situation 2, he continues accounting for Calvin’s mother’s reaction by writing that she gives out to him but eventually gives up arguing, translated into German as *sie beklagt ihn and later *ärgert sie nicht mehr.

The use of beklagen (sich beklagen = ‘complain’) is a semantic error, indicating that the German item is associated with the conceptual content of give out, presumably derived from a specific context of use and generalised, in ignorance of distributional differences. In terms of his choice of words, the use of the items give out/*beklagen and argue/*ärgern represents an extrinsic perspective on the scene, implying without explicitly labelling the mother’s emotional state.
In total, subject 28’s verbalisation of the two situations involves 12 English and 11 German items (plus one morphologically incorrect form), relating to 6 source and target items each, and another 12 lexical approximations. These lexicalisations represent the variety of conceptual perspectives evidenced across the 30 subjects and identify the three basic emotional domains of SHOCK/HORROR, ANGER, and FEAR with a range of lexicalisation possibilities, and their interconnectivity (cf. figure 6.9). Their processing documents a range of organisational principles with regard to both conceptual structure and bilingual connectivity.

On the whole, the processing activity of subject 28 can be said to mirror the aggregated processing of the 30 informants and to identify a range of central principles of (bilingual) lexical organisation. It appears justified to say that his cognitive activity provides an insight into the architecture of the three featured emotion concepts and their lexicalisation patterns. What follows is the question of whether the aggregated processing of the 30 subjects can then be seen as a collective mental representation of the two emotional situations and of the interconnectivity of the concepts of SHOCK, FEAR, and ANGER. The overall distribution of activation peaks and of lexical connections and their representation in a single individual appears to support such a
hypothesis, but it cannot be regarded as sufficient evidence for it. The results, however, constitute encouragement to follow up this question in perhaps more specifically designed data elicitation tasks.

4 Conclusion

The study investigated the conceptual structure of a group of related emotions with reference to lexical processing activity in L1-L2 translation. It scrutinised the mechanisms of lexical selection, giving particular attention to semantic processing and its implications for conceptual organization. The associative chains documented by the think-aloud-protocols rendered possible the reconstruction of lexical networks, which were found to mirror the conceptual frame associated with the emotions in question. It was argued that the informants’ aggregated semantic processing activity could be seen as representing their collective conceptualisation of the featured situations, or, more precisely, of the emotional aspects of those situations. The identified conceptual frames were found to include a range of key items representative of certain central concepts, and further lexicalisation possibilities representing specific perspectives on those concepts.

The data analysis also compared the semantic quality of the informants’ lexical choices in their L1 compositions to that of their L2 translations. This resulted in an interesting observation: It appeared that in their L1 accounts, which are seen as representing relatively casual, unreflecting language use, the subjects’ choice of words was relatively random, often emotionally unspecific and/or depicting an observer’s perspective. In their L2 translations, which are characterised by carefully reflected processing, many of them opted for interpreting their initial lexical choices in terms of specifying the protagonists’ emotional reaction.

It appeared that being confronted with the same situation a second time, they developed a more specific understanding of it, which is reflected in more specific lexicalisations and also documented by some explicit comments. At the same time, the overall variety of lexical choices suggested that different
individuals have their own preferred way of verbalising the same conceptual content, provided that the associated lexical field allows for such variation.

The empirical data on which this study is based are also revealing about other dimensions of linguistic organisation, in particular the relationship between two languages in the mind. For a more differentiated analysis of such aspects, also relating to the processing of other scenes from the picture story, cf. Herwig 2004.

Concerning possible future research directions relating to the above discussion, more specifically designed semantic processing tasks could be used for a comprehensive investigation of the conceptual structure of emotions and other complex conceptual fields.

5 References


