Using emotional scripts to generate and validate a set of emotion verbs

Emma Portch, Jelena Havelka, Charity Brown, Roger Giner-Sorolla

Information about everyday emotional experiences is integrated into internal scripts (e.g. Shaver et al., 1987). Script content provides a context within which to compare and subsequently interpret newly experienced, emotional stimuli, such as facial expressions and behaviours. We explore whether this internal context may also be used to interpret emotional words. In particular, we argue that the 'meaning' of emotional verbs may be strongly context-dependent (e.g. Schacht & Sommer, 2009). Harnessing previous context-based methods, we define verb meaning by the degree of association between the behaviours to which they refer and discrete emotional states (e.g. 'fear'), within emotional scripts (Stevenson, Mikels & James, 2007). We used a self-generation method to derive a set of verbs that participants associated with six universal, emotional states (study 1; see full list in appendix A). Emotion labels acted as script anchors. For each verb, degree of emotionality and discrete association were measured by the number of participants who generated that word. As expected, a different modal exemplar was generated for each discrete emotion. In study 2 we used a rating task to assess the stability of the relationship between modal, or typical, verbs and the emotion label to which they had been generated. Verbs and labels were embedded in a sentence and participants were invited to reflect on their emotional attributions in everyday life to rate the association ('If you are feeling 'sad' how likely would you be to act in the following way?' e.g. 'cry'). Findings suggest that typical relationships were robust. Participants always gave higher ratings to typical vs. atypical verb and label pairings even when (a) rating direction was manipulated (the label or verb appeared first in the sentence), and (b) the typical behaviours were to be performed by themselves or others ('If someone is sad, how likely are they to act in the following way?' e.g. 'cry'). Our findings suggest that emotion scripts create verb meaning, and therefore provide a context within which to interpret emotional words. We provide a set of emotion verbs that are robustly associated with discrete, emotional labels/states. This resource may be used by a variety of researchers, including those interested in categorical processing of emotional words and language-mediated facial mimicry.
"c Fs ����}

Emma Portch, School of Psychology, University of Leeds, Leeds, UK.

Jelena Havelka, School of Psychology, University of Leeds, Leeds, UK

Charity Brown, School of Psychology, University of Leeds, Leeds, UK

Roger Giner-Sorolla, School of Psychology, Keynes College, University of Kent, Canterbury, UK

Corresponding Author: Emma Portch. A: School of Psychology, Lifton Place, University of Leeds, Leeds, LS2 9JT. T: +44 (0)113 343 2275, E: e.s.portch@leeds.ac.uk

Introduction

Emotional 'scripts' are built through individual experience. When we encounter emotion-relevant scenarios, we store salient information in an internal repository. According to both construction and componential theories of emotional attribution, this information facilitates our interpretation of subsequent emotional events that we observe or experience (e.g. Scherer, 1984; Smith & Ellsworth, 1985; Barrett, Lindquist & Gendron, 2007). Scripts are likely diagnostic because information is structured around 'hubs' that correspond to discrete, basic emotion states (e.g. 'sadness', Fehr & Russell, 1984; Shaver et al., 1987; Russell, 1991). Providing an external analogue, researchers find that the categorisation of emotional faces is skewed when participants are presented with explicit, semantic information about the actor (e.g. Fernandez-Dols, Wallbott & Sanchez, 1991; Carroll & Russell, 1996). For example, when participants are told that 'Sally is due to attend a funeral' they are more likely to provide a scenario-congruent categorisation for her facial expression e.g. 'sad'. These trends also emerge when participants draw directly on their personal emotional scripts to generate their own explanation for why the actor might be feeling a particular emotion (e.g. Halberstadt & Niedenthal, 2001, Halberstadt, 2005).

Together, these findings demonstrate that interpretation of emotion stimuli (e.g. faces) may be driven by a comparison process, between the current emotion-relevant information a person holds about a situation and their existing script content e.g. 'Sally is going to a funeral; when I went to a funeral I experienced sadness'. In this case, the individual behaviour derives emotional meaning via the strength of connection between that behaviour and linked, discrete emotional states (e.g. 'sadness'). Connection strength is dictated by the number of times we have witnessed or experienced this particular behaviour in conjunction with each discrete emotion state. Given inevitable variability in individuals' experience of emotion, the same behaviour may be tied to several discrete emotions; in addition to 'sadness',

attending a funeral might also make us feel 'anger', 'relief' or 'fear', dependent on the present circumstances (e.g. Pavlenko, 2008; Lindquist & Gendron, 2013).

We may also use our scripts as an internal context to interpret other forms of emotional stimuli, for example, emotional words. Characterising emotional words in this way differs from standard, dimensional methods, where emotionality is measured via valence and arousal ratings (e.g. how positive/negative or emotionally charged a word is e.g. Lang, Bradley & Cuthbert, 1990; Bradley & Lang, 1999). However, adopting a context-based approach makes theoretical sense as words arguably underpin conceptual knowledge (Pavlenko, 2008). In particular, constructionist's suggest that words act as referents or counterparts for individuals' script components, constructing, organising and re-activating content (e.g. Lindquist et al., 2006; Barrett, Lindquist & Gendron, 2007; see also Vigliocco et al., 2009).

Some researchers already provide 'contextualised', or categorical ratings for emotion words (e.g. Stevenson, Mikels & James, 2007; Briesemeister, Kuchinke & Jacobs., 2011a). In Stevenson, Mikels & James' (2007) study participants were asked to rate each word in the ANEW database (adjectives, verbs and nouns; Bradley & Lang, 1999), based on extent of association with the basic states of happiness, sadness, anger, fear and disgust. Here discrete emotional states, denoted by a label, provides a script anchor and participant ratings indicate the strength of association between script components (emotion labels and script referents/ANEW words). Ratings demonstrated that 44.54% of the 1,034 words were strongly related to one or several discrete emotion labels of a similar valence. Briesemeister, Kuchinke & Jacobs, (2011a, 'Discrete Emotion Norms for Nouns') produced similar findings when using the same rating method with German nouns included in the Berlin Affective Word List (Võ, Jacobs & Conrad, 2006; Võ et al., 2009). When Stevenson, Mikels and James (2007) criterion was applied, 25.18% of the words within DENN-BAWL could be discretely categorised.

Importantly, subsequent work shows that discrete ratings for both English and German words could be used to predict lexical decision latencies (e.g. Briesemeister Kuchinke & Jacobs, 2011a; 2011b; 2014). In particular, words strongly related to the discrete state of happiness were processed faster than neutral words and words associated with negative discrete categories, like disgust, fear (Briesemeister, Kuchinke & Jacobs, 2011a) and anger (Briesemeister, Kuchinke & Jacobs 2011b). Briesemeister, Kuchinke & Jacobs, (2014) confirmed that facilitation was not simply related to the positive valence of these stimuli. Temporally dissociable ERP components were found when participants processed positively valenced, arousal-matched words that were rated as high or low in happiness association. Consistent with our predictions then, ratings based on connection strengths between components in emotion scripts may provide an alternative way to assess the emotional meaning of words (Briesemeister, Kuchinke & Jacobs, 2011a; Silva et al., 2012). In addition, various researchers advocate a combined method (e.g. Russell, 2005; Stevenson & James, 2008), showing more accurate prediction of lexical decision latencies when they have both categorical and dimensional ratings for emotional word stimuli (e.g. Briesemeister, Kuchinke & Jacobs, 2011b, 2014).

We argue that these context-based, or categorical methods may be particularly useful for characterising the meaning of emotional verbs. Emotion verbs, or emotion-related words, are defined by Pavlenko (2008) as words which describe behaviours related to a particular emotional state, without naming the emotion itself. It is not yet possible to test this proposal as investigations using the DENN-BAWL focus exclusively on emotional nouns (Briesemeister, Kuchinke & Jacobs 2011a, Briesemeister, Kuckinke & Jacobs 2014) and it is unclear whether Briesemeister, Kuchinke and Jacobs (2011b) equally sampled nouns, verbs and adjectives from Stevenson, Mikels and James' (2007) categorisation of the ANEW. However, various findings suggest that verb meaning is context-dependent. Researchers commonly observe that the intended meaning of a verb is only extracted when that verb is inserted in a

92 'sentence-based context', which provides additional details e.g. agent and object information, (Schacht
93 & Sommer, 2009; Ferstl, Garnham & Manouilido, 2011). To provide a relevant example, the verb
94 'jump' might have positive or negative connotations, as someone might 'jump for joy' but could
95 equally jump in reaction to a surprising or fearful stimulus. Emotional meaning is easier to interpret
96 when we know that the actor jumped because 'the car crashed into the nearby lamppost.' In this case,
97 the 'jump(ing)' behaviour is likely related to 'fear'. In contrast, emotional nouns, like 'cancer', 'death'
98 and 'funeral' all hold unambiguous, negative connotations, even when presented in isolation (e.g.
99 Pavlenko, 2008).

100

101 Physiological evidence supports the notion that emotional meaning is extracted slower from emotional
102 verbs, than other types of word, when presented in isolation. Comparing across paradigms, the event-
103 related potentials commonly associated with early and late semantic processing of single emotional
104 words (e.g. Herbert et al., 2006) are commonly evidenced at a later onset for emotional verbs (Schacht
105 & Sommer, 2009; Palazova et al., 2011) than for emotional nouns (e.g. Kanske & Kotz, 2007; Kissler
106 et al., 2007) or adjectives (Herbert et al., 2006; Herbert, Junghöfer & Kissler, 2008). However, Schacht
107 and Sommer (2009) reported Early Posterior Negative (EPN) and Late Positive Complex (LPC) onsets
108 comparable to those for emotional nouns and adjectives when a contextual manipulation was applied
109 for verbs. Here participants responded to a verb preceded by a noun (e.g. 'lover-kiss'). Schacht and
110 Sommer (2009) argue that the preceding noun improved participants' ability to extract the intended
111 meaning from test verbs during a lexical decision task. Applying a similar manipulation, Palazova,
112 Sommer and Schacht (2013) found comparable EPN onsets when emotional verbs referred to more
113 concrete (vs. abstract), context-invariant behaviours (e.g. to dance/sleep vs. to like/hope, Palazova,
114 Sommer & Schacht, 2013).

115 Last, verbs may hold particularly strong or multi-faceted relationships with their behavioural script
116 components. While emotion verbs may accrue meaning in ways similar to other abstract words e.g. via
117 their experiential script links (Vigliocco et al., 2009); understanding may also be driven by sensory-
118 motor activations (e.g. Halberstadt et al., 2009; Foroni & Semin, 2009). Various findings suggest that
119 similar brain areas become active when processing concrete verbs and their referent actions (e.g. areas
120 of the visual, premotor and motor cortices, Pulvermüller, 1999). Observed activations are specific
121 (Hauk, Johnsrude & Pulvermüller, 2004); the word 'smile' activates face-specific regions responsible
122 for performing that expression (e.g. Niedenthal et al., 2009) and this mimicry helps us to understand
123 these expressions when shown by other actors (e.g. Foroni & Semin, 2009; Halberstadt et al., 2009) In
124 sum, in contrast to other types of emotion word, verbs may exhibit two types of connection with script
125 components, making the script-based context more important for construction and extraction of verb
126 meaning.

127 The aim of the present work is to explore how a script-based context contributes to emotional verb
128 meaning and interpretation. During a self-generation task we assessed whether emotion labels (e.g.
129 'sad') could act as script-anchors to elicit verbs representative of the actions that we would normally
130 associate with these emotional states (study 1). As such, emotional meaning is captured by the strength
131 of connection between labels and verbs, mirroring the way meaning is inferred from the connection
132 between behaviours and emotional states. In our second study we used a rating task to assess the
133 robustness of the typical verb-to-label connections, generated during study 1.

134 This work provides relevant research communities (e.g. researchers interested in both emotion and
135 language processing) with a database of verbs related to each discrete emotion label (study 1). This
136 database will be supplemented with ratings to show how robust these script-based associations remain
137 when further contextual manipulations are applied (study 2).

138 **Study 1- Identifying verbs within the emotional script**

139 In study 1 we use emotion labels as script anchors to identify relevant verbs. Following Stevenson,
140 Mikels and James., (2007) and Briesemeister, Kuchinke and Jacobs, (2011a), we present the universal,
141 basic emotion labels introduced by Ekman (1992; ('happiness', 'sadness', fear', 'anger', 'disgust' and
142 'surprise'). We reason that these states should hold the strongest relationships with diagnostic
143 behavioural components (e.g. Shaver et al., 1987).

144

145 Rather than use a rating task, we asked participants to self-generate all the single-word actions that they
146 associated with each discrete emotional state (see Cree & McRae, 2003 and Vigliocco et al., 2004 for
147 similar methods). By encouraging participants to engage separately with each emotion label we hoped
148 to widen the breadth of the stimulus set. Rating methods can be criticised for producing a 'happiness
149 asymmetry', wherein a large number of words are associated with happiness, but far fewer words are
150 associated with discrete, negative states (e.g. Stevenson, Mikels & James, 2007; Briesemeister,
151 Kuchinke & Jacobs, 2011a). In the present task we measure the strength of association between labels
152 and verbs based on the frequency of participants who endorse the pair (e.g. Vigliocco et al., 2004).

153 We acknowledge that similar methods have been used to elicit related emotional script components,
154 such as action-readiness and tendency items (Smith & Ellsworth, 1985; Frijda, 1986; Frijda, Kuipers &
155 Ter Schure, 1989). However, these items usually refer to a general anticipatory state that the individual
156 enters after appraising an emotionally salient event (Frijda, 1986). Therefore these items are generally
157 dissociable from the concrete, overt behaviours derived in the present study, which may be viewed as
158 the eventual behavioural consequence of experiencing such states. We argue that the single-word
159 behaviours elicited here are more compatible for use in future word processing studies, such as lexical
160 decision tasks.

Method

Ethics

This research is subject to ethical guidelines set out by the British Psychological Society (1993) and was approved by the School of Psychology's ethics committee, at the University of Leeds (reference number: 13-0032, date of approval: 24/02/2013).

Participants

Twenty-five participants (17 female, 8 male) generated emotional verbs. Participants had a mean age of 27.24 (SD=7.63) and all reported themselves to be native English speakers (7 participants spoke a second language, though did not consider themselves fluent). An opportunity recruitment method was used. Participants responded to links posted on research recruitment websites and completed the study online (e.g. www.psych.hanover.edu/research/exponnet.html; www.onlinepsychresearch.co.uk; www.in-mind.org/content/online-research; www.reddit.com/r/SampleSize).

Procedure

All materials, including informed consent items, were presented using the Survey Monkey platform (www.surveymonkey.com, Survey Monkey Inc. Palo Alto, California, USA). Participants were required to tick boxes to confirm that they understood task instructions and gave their informed consent to take part. Participants were then asked to carefully read the definition of an emotion-related word, or verb (taken from Pavlenko, 2008). Definitions were edited to include relevant examples.

'*Emotion-related' words are used to describe behaviours related to a particular emotional state, without naming the actual emotion. For example, the word 'cry' might describe the behaviour of someone feeling sad while the word 'laugh' may describe behaviour of somebody who is happy.*'

Participants were directed to six basic emotion labels, listed below the definition ('sad', 'happy', 'anger', 'disgust', 'surprise' and 'fear', Ekman, 1992). They were asked to generate as many emotion verbs as they could which were related to each basic label. Separate boxes were provided for participants to type their examples. Participants were instructed to provide single-word answers and to avoid label synonyms or adverbs (e.g. 'sadness', 'sadly'). They were also discouraged from using the internet to generate responses. Participants were asked to work on the basic labels sequentially and labels were presented in a randomised order across participants. There was no time limit imposed on word generation.

Results: Data modifications and modal exemplars

In total, participants generated 362 unique words in response to all six emotion labels. On average, participants generated 27.32 words each during the task (SD = 15.18). We parsed the data in various ways to produce a set of emotion verbs that were modally associated with one or more emotional labels. The Cambridge Online English Dictionary and Thesaurus (http://dictionary.cambridge.org/) were used to make these modifications (see McEvoy & Nelson, 1982 and Doost et al., 1999 for similar methods). First, words were omitted from the set if (a) they were not classified as verbs (e.g. tearful), or (b) were synonyms for the emotion label itself (e.g. confused). Second, multiple-word responses or phrases were only retained if they could be simplified to a single word with the same or similar meaning, for example, 'sharp intake or breath' was replaced with 'gasp'. Third, merging techniques were used either when participants provided grammatical derivatives or plurals of the same word (e.g. 'ran', 'run', 'runs', 'running', 'ran away') or generated synonyms for verbs that had already been provided by themselves or others (e.g. 'shout' or 'yell'). In the former case, plurals were changed to their singular form and grammatical derivatives were merged and represented by the simplest version, provided their meaning did not change (e.g. 'run').

For non-derivative words, stricter criteria were imposed. Verbs were only classed as synonymous if there was evidence of forward and backward association e.g. when 'laugh' was entered into the thesaurus 'giggle' was given as a synonym, and when 'giggle' was entered into the thesaurus, 'laugh' was given as a synonym. We were mindful that some verbs could have multiple meanings when presented in isolation (e.g. Schacht & Sommer, 2009). For example, the verb 'jump' could mean 'to leap, spring or skip', to 'recoil' or 'to avoid'. In these cases participants' intended meaning was discerned by considering the emotion label to which the word had most frequently been given. As the word 'jump' was frequently generated in response to the labels 'surprise' and 'fear' it went unmerged with 'skip', which although a synonym, was only given in response to the label 'happy'. Here we considered that the two words likely had a different intended meaning, each congruent with the core emotion concept to which they had been modally generated.

Where merging occurred, frequencies for both/all verbs were added together. For non-derivative synonyms the dominant response was retained, based on existing frequencies (i.e. the verb given by the highest number of participants).This exemplar became the 'core' verb and non-dominant responses were subsumed and became 'subsidiary' verbs. For example, in response to the label 'sad', 'cry' became a dominant, core verb, and the synonyms 'weep' and 'sob' became subsidiaries. The number of participants who generated the verbs 'cry', 'weep' and 'sob' were added together to provide a frequency total for the core verb ('cry'). Note that frequencies could exceed 25 if participants had provided both core and subsidiary verbs in response to the same emotion label.

As a final step we removed any remaining, unmerged idiosyncratic verbs, generated by only one participant during the task (159 words). These idiosyncratic responses accounted for 69.43% of the remaining responses (idiosyncratic + core + subsidiary + 'modal'). Here 'modal' refers to a verb that was generated by two or more participants, but was not synonymous with other responses and did not

undergo merging procedures. Therefore, they differ from 'core' and 'subsidiary' verbs. Following removal of idiosyncratic responses, there were 51 unique modal verbs (15 of which were core verbs), and 19 subsidiary verbs. This final selection represents 21.82% of the total number of unique words originally generated.

The top three most frequently given verbs, per emotion label, are shown in Table 1. Response frequencies are shown in parenthesis, in the second column. For core verbs this frequency also includes the number of participants who generated subsidiary verbs (listed in the table). Frequencies above 25 occur when a majority of participants gave both the core exemplar and a synonym (subsidiary verb) in response to the emotion label. The full set of emotion verbs (core, subsidiary and modal), are provided in the Appendix A.

[Insert Table 1 here]

Analyzing by exemplar, 78.43% of all core, subsidiary and modal verbs were generated in response to one emotion label only, leaving 21.57% that were generated for multiple labels. This distinction was present even for the most frequently generated verbs, displayed in Table 1. When only these exemplars were considered, 15.79% represented the most frequent responses for more than one emotion label and 68.75% were generated by at least two participants in response to one of more other emotion labels. These findings support the work of Stevenson, Mikels and James, (2007). In their study, although 44.54% of ANEW words obtained ratings to suggest that they could be categorised according to

discrete emotions, 22.70% of these words were associated with two or more emotion labels, representing an analogue to the 'overlapping' exemplars in the present study.

Discussion

In the present study we explored the idea that 'context', in the form of an emotional script, is an important determinant of meaning for emotional verbs and behaviours (e.g. Vigliocco et al., 2009). In both cases the emotional meaning of a particular verb or behaviour is determined by its relative connection strength with the discrete emotional states/labels that act as script hubs. We harnessed 'connection strength' by measuring the degree to which discrete emotion labels (e.g. 'sad') cued generation of emotion verbs. Using this method we have developed a set of emotion verbs that participants associated with one or more discrete emotion labels. We suggest possible uses for our stimuli in the general discussion.

Finding that participants generated a moderate proportion of overlapping verbs supports the suggestion that people view a select number of behaviours as stereotypically emotional, and that the same verbs are linked to emotional states by a matter of degree (e.g. Lindquist & Gendron, 2013). However, in some cases a similar number of participants endorsed the same verb for multiple emotion labels; the verb 'frown' was associated with the labels 'sad' and 'disgust' with similar frequency. Here, the relative strength of connection between label and verb is insufficient for driving discrete categorisation of 'frowning' behaviours. Building on a previous argument, behaviours and verbs may not simply accrue emotional meaning via their direct connection to an emotional state, but as a result of a constellation of connections with other elements within the emotional script, and the power of these linked elements to provide cumulative evidence for the experience of a discrete emotional state (e.g. precipitating events, Scherer, 1984). This parallels the argument made for interpreting experiences of

generic, physiological emotional arousal, or 'core affect' (e.g. Russell & Barrett, 1999; Lindquist & Barrett, 2008) and extends the proposal to include more specific behaviours.

Findings suggest that additional knowledge, or script activation, may be particularly important for interpreting crying behaviours (e.g. sobbing and weeping). These synonymous responses were frequently given as exemplars in response to the 'sad', 'anger' and 'fear' labels, and also by a smaller number of participants in response to the 'happy' and 'surprise' labels. However, we cannot be sure whether frequent endorsement reflects context-dependence or the explicit use of the example 'cry' in task instructions. To aid understanding, participants were shown the verbs 'cry' and 'smile' as valid behavioural examples of 'sadness' and 'happiness', respectively. As both of these verb-to-label pairings were frequently endorsed it is unclear whether they were spontaneously delivered. Study 2 will explicitly address this issue. Here we use a rating task to assess the robustness of the most frequent verb-to-label associations generated during study 1.

292

293 **Study 2- Examining emotion category and behaviour associations under conditions of contextual**
294 **variability**

295 In study 2 we assess (a) the typicality of self-generated verbs, and (b) the stability of the verb-to-label
296 associations. We adopt a rating task, similar to Stevenson, Mikels and James, (2007), in which
297 participants rate the relationship between the six most frequently generated verbs, and each discrete,
298 emotion label. However, in our task participants were provided with meaningful sentences, which
299 invited them to engage their own script knowledge to rate the association (e.g. 'if you see someone
300 'recoil' how likely are you to think that they are feeling the following emotion?...'disgust'). Primarily,
301 we would expect ratings to indicate a closer conceptual relationship between verbs and the discrete
302 label to which they have (most frequently) been generated. However, we apply two further
303 manipulations to assess the robustness of these associations.

304 First, we varied rating direction (i.e. whether participants made a verb-to-category, or category-to-verb
305 association). The following is an example of a verb to category rating: 'if you see someone cry, how
306 likely are you to think that they feel sad?'. Researchers commonly evaluate semantic relationships by
307 measuring both the 'forward' and 'backward' associations between category labels and exemplars (e.g.
308 Nelson, McEvoy & Schreiber, 2004).

309 Second, we asked participants to rate verb/category pairings from both a first person perspective (e.g.,
310 "If you are crying, how likely is it that you are feeling sad?") and a third person perspective. (e.g., "'if
311 someone is crying, how likely are they to be feeling sad?'). Previous research suggests that language
312 use differs when participants predict the likelihood to which a stable trait applies to in-group vs. out-
313 group members (Maas, Salvi, Arcuri & Semin, 1989). Specifically, participants use concrete language
314 to infer stronger associations between traits in out-group members. Similarly, participants may view

stronger associations between emotional states and overt behaviours when they adopt a third person perspective. This may reflect participants' inclination to view a simpler mapping between behaviours and emotions for other people, than for themselves. Self-knowledge about script content may complicate the mapping when participants use first-person instructions (e.g. 'people tend to act this way when they are feeling a certain emotion, but when I was feeling happy I didn't act that way'). Therefore, we predicted that participants would show more variability in their ratings, in both directions, when taking their own perspectives rather than someone else's.

Method

Ethics

This research is subject to ethical guidelines set out by the British Psychological Society (1993) and was approved by the School of Psychology's ethics committee, at the University of Leeds (reference number: 13-0032, date of approval: 24/02/2013). As before, informed consent items were embedded in the online survey and participants gave their consent by ticking a series of boxes.

Design

A 2 (instruction perspective: first or third person, between) x 2 (rating direction: category to verb or verb to category, between) x 2 (Typicality: typical or atypical label/verb pairing, within) mixed factorial design was employed. The instruction perspective factor manipulated whether participants received first-person perspective instructions ('if you are feeling__, how likely are you to act in the following way?' e.g. 'cry') or third person perspective instructions ('if someone is feeling___, how likely are they to act in the following way?' e.g. 'cry'). The rating direction factor manipulated whether participants rated associations in a verb-to-category direction ('if you are crying, how likely are you to be feeling the following emotion?' e.g. 'sad') or a category-to-verb direction ('if you are sad, how

likely are you to act in the following way' e.g. 'cry'). Participants each made 36 ratings, based on all combinations of six discrete emotion labels and the verbs nominated most frequently in response to each of these labels during study 1. Self-generation data from study 1 were used to determine whether emotion label / verb pairings were typical (e.g. six pairs, 'Happy' and 'Smile'), or atypical (30 pairs, e.g. 'Sad' and 'Smile').

Participants were presented with an open-ended sentence for each rating, which included either an emotion label or verb e.g. 'if you are feeling *sad*, how likely are you to act in the following way?'. Participants were invited to substitute each of the six verbs (or labels) into the end of this sentence (e.g. 'cry'), and to provide a likelihood rating for each label/verb pairing. After all six ratings were submitted, participants were presented with the next open-ended sentence, which included a new label (or verb). Overall, participants made ratings in six, separate label or verb-driven blocks. Block order was counterbalanced across participants. Within a particular block, participants encountered each of the six ratings in a fixed order that was randomly assigned. Therefore, rating order was the same for all participants who completed that particular task.

Participants

Forty participants each completed the task using first-person perspective instructions (25 female, Mean age = 26.48, SD = 8.97) and third-person perspective instructions (29 female, Mean age = 27.53, SD = 9.47). Forty participants completed tasks that required category-to-verb ratings (31 female, Mean age = 25.65, SD = 9.56) and forty completed tasks that required verb-to-category ratings (29 female, Mean age = 28.35, SD = 8.70).

Participants indicated whether they spoke any languages in addition to English and estimated how many years they had been able to do so. Those judged to be fluent bilinguals or multi-linguals were omitted from the sample. An opportunity recruitment method was used; participants responded online,

to links posted on social media sites (see Study 1 method). The study was presented using the Survey Monkey platform (www.surveymonkey.com, Survey Monkey Inc. Palo Alto, California, USA). There was no time limit imposed.

Materials

We re-used the six basic emotion labels from study one ('Fear', 'Happy', 'Sad', 'Disgust', 'Anger' and 'Surprise', e.g. Ekman, 1992). The most frequently generated verbs for each emotion label were selected from the self-generation data. They were as follows: Scream (matched with Anger); Smile (Happy), Cry (Sad), Recoil (Disgust), Hide (Fear) and Jump (Surprise).

Procedure

Each participant was randomly assigned to one of the four between-participants conditions of the 2 (instruction perspective) x 2 (rating direction) design. Ratings to each question were made on a five-point Likert-style scale, anchored 'Very Unlikely' (1) to 'Very Likely' (5). All participants were presented with the same combination of emotion label and verb pairings and made 36 ratings in total.

Results

Data preparation

For each emotion label, two mean ratings were calculated per participant. The 'typical' mean was the rating given to the most typical label and verb pairing, derived from the self-generation data (e.g. 'cry' and 'sad'). The five remaining ratings given by the participant were averaged to produce an 'atypical' score (mean scores for the full set of 36 label/verb ratings are shown in Appendix B).

Analysis

A 2 (instruction perspective: first or third) x 2 (rating direction: category to verb or verb to category) x 6 (category: sad, anger, happy, disgust, surprise, fear) x 2 (typicality: typical or non-atypical) mixed factorial ANOVA was performed. Instruction perspective and rating direction were between-subjects factors. Main effects and interactions are displayed in Table 2. We focus on interactions with the typicality factor for the remainder of the results section. 'Typicality' reflects the strength of relationship between emotion verbs/behaviours and emotion labels/states (operationalised here as high or low), and therefore, the script-based emotional meaning of verbs.

[Insert Table 2 here]

Validation of self-generation data:

Participants gave significantly higher likelihood ratings to typical pairings (M = 4.31, SD =0.56), than summed atypical, pairings (M = 2.56, SD = 0.49), on a scale from 1-5. This finding provides further support for the label-verb associations derived from the self-generation data (study 1). The effect was qualified by a significant interaction with emotion category; therefore the effect of typicality was investigated separately for each discrete, emotion category (see Table 3). All six paired samples t-tests were significant and in the anticipated direction (typical category/verb pairings were regarded as significantly more likely than summed, atypical pairings), so the interaction likely reflects general differences between emotions in strength of association with verbs, all effects being conventionally large ($d > 0.8$). The fact that typicality predictions were supported for the 'happy' / 'laugh' and 'sad' /

403 'cry' pairings indicate that these associations were not generated simply as a result of their inclusion in
404 task instructions for study 1.

405

406 [Insert Table 3 here]

407

408 *Further manipulations and typicality ratings.*

409 *Rating Direction*

410 There was a significant three way interaction between typicality, rating direction and emotion category.
411 The two way interaction between typicality and rating direction was explored for each emotion
412 category in turn (see Table 4).

413

414 [Insert Table 4 here]

415

416 The interaction between typicality and direction rating was only significant for the 'Sad' and 'Fear'
417 categories.

418 Interactions followed a similar pattern for both emotion categories. As predicted, paired samples t-tests
419 showed that participants gave significantly higher likelihood ratings to typical vs. atypical pairs, for
420 both verb-to-category pairings [$t_{sad}(39) = 24.12$, $p < 0.001$, $d = 5.33$; $t_{fear}(39) = 12.74$, $p < 0.001$, $d =$
421 2.30], and category-to-verb pairings [t_{sad} (38) = 13.34, $p < 0.001$, $d = 2.51$; t_{fear} (38) = 6.98, $p < 0.001$, d
422 = 1.10]. Independent samples t-tests showed that participants rated atypical pairs similarly, independent
423 of rating direction, [$t_{sad}(74) = -0.079$, $p = 0.94$; t_{fear} (84) = -0.16, $p = 0.88$], but gave significantly higher

ratings to typical exemplars following verb-to-category pairings than category-to-verb pairings, [$t_{sad}(84) = -2.06$, $p = 0.043$, $d = 0.68$; $t_{fear}(84) = -2.004$, $p = 0.048$, $d = 0.59$]. In sum, for 'Fear' and 'Sad' categories, typical pairings were given comparatively higher likelihood ratings following verb-to-category vs. category-to-verb instructions.

Instruction perspective

Critically, there were no significant interactions between instruction perspective and typicality, or instruction perspective, typicality and category ($p > 0.10$).

However, the overall interaction between instruction perspective, rating direction, typicality and category was significant (see descriptive statistics in Table 5).

[Insert Table 5 here]

To explore this interaction separate 2 (Instruction perspective: first; third) by 2 (Typicality: typical; atypical) by 2 (Direction Rating: category-to-verb; verb-to-category) mixed analyses of variance were conducted for each emotion category, separately. There was a marginal interaction for one category only: Disgust , $F(1,82) = 8.71$, MSe = 0.79, $p = 0.004$, $\eta_p^2 = 0.097$[1].

[1] To explore this marginal interaction, separate 2(direction rating: category-to-verb; verb-to-category) by 2(Typicality: typical; atypical) mixed analyses of variance were conducted for disgust ratings, for participants who received first and third person instructions, respectively. This interaction was significant for participants who received first-person instructions, $F(1, 37) = 13.06$, MSE = 0.65, $p = 0.001$, $\eta_p^2 = 0.26$, but not for those who received third person instructions, $F(1, 37) = 0.45$, MSE = 0.93, $p = 0.51$, $\eta_p^2 = 0.012$.

Paired samples t-tests revealed that, independent of direction rating, participants who had received first person instructions always suggested that they would be more likely to display the typical behaviour of 'recoiling' as opposed to summed, atypical behaviours, [$t_{category\text{-}to\text{-}verb}(18) = 3.90$, $p = 0.001$, $d = 1.20$; $t_{verb\text{-}to\text{-}category}(19) = 12.13$, $p < 0.001$, $d = 3.37$.] While independent t-tests showed that these participants rated atypical behaviours similarly in both rating directions [$t(37) = 1.84$, $p = 0.074$], they gave significantly higher ratings to the typical behaviour when embedded in verb-to-category versus category-to-verb sentences, $t(37) = 2.70$, $p = 0.010$, $d = 0.89$.

441

442 ***Discussion***

443 Findings suggest that the current manipulations had little impact on the way emotional scripts were
444 used to infer verb meaning. In general, participants were still more likely to associate verbs, or
445 behaviours, with the emotional state to which they had been typically associated, independent of
446 instruction perspective and rating direction. These findings validate the verb-to-label pairings
447 generated during study one, supporting the notion that the self-generation task effectively probed script
448 content. They also suggest that there is stability in the way we use internal scripts to infer meaning
449 from emotional verbs, and therefore, their referent behaviours, in everyday situations. Interestingly,
450 scripts were used similarly for emotional attribution in the self and others.

451 One further finding should be highlighted. When participants adopted a verb-to-category vs. a
452 category-to-verb rating direction, there was a higher likelihood that they would view stronger
453 associations between typical behaviours and the emotional states of sadness and fear. This trend was
454 also present for the label 'disgust' and typical behaviour of 'recoiling', but only when the pairing was
455 considered from a first-person perspective (see footnote 2). This is suggestive of the wider influence of
456 culture on script construction and use (e.g. Wierzbicka, 1994; Barrett, Mesquita & Gendron, 2011). In
457 Western societies, at least, people are often encouraged to mask or attempt to regulate emotional states
458 that may cause them to be perceived as weak in public e.g. sadness and fear (e.g. Wierzbicka, 1994). If
459 people see clear signs of these emotional behaviours then the attribution process may be more
460 automatic. A justification may follow: 'I/they must be feeling very sad if they/I feel the need to
461 cry/hide away in public.' In sum, while the present data robustly confirm that there is stability in the
462 way we use 'internal scripts' to infer meaning from emotional behaviours, they also suggest that script
463 construction and use are susceptible to the influence of a wider context (e.g. cultural norms, Barrett,

Mesquita & Gendron, 2011). Alike the internal 'context', the external context also aids our interpretation of emotional behaviours, bringing our expectations in line with societal norms (e.g. Lindquist, 2009).

General Discussion

We harnessed the emotional script to generate a set of emotional verbs that participants associated with six basic emotion labels. The relationship between linguistic components (e.g. basic labels and verbs) should reflect the way emotional behaviours and states are linked in an individuals' emotional script (e.g. Vigliocco et al., 2009). Verbs were elicited from participants using a self-generation task (study 1, see also Smith & Ellsworth, 1985; Frijda., 1986).This method allowed us to assess 'verb meaning' as a function of connection strength between those verbs and the basic emotion labels to which they were generated (e.g. 'sad'). Via this conceptualisation, verbs provided by a larger number of participants may be viewed as stronger in discrete emotional meaning. Using a rating task (study 2) we confirmed that verbs most frequently elicited in study 1 were more likely to be associated with the emotion label to which they had been generated (typical exemplar), than to other emotion labels (non-typical exemplars). This rating task was constructed to mimic real-world situations in which participants would use scripts to make emotional attribution, demonstrating that the self-generation task effectively tapped script content. Typical pairs also retained rating dominance when two further sentence-based manipulations were applied (rating direction and person perspective). This suggests a degree of robustness in the way emotional scripts are used.

Using a context-based method to define the emotionality of single-word stimuli complements previous work (Stevenson, Mikels & James, 2007; Briesemeister, Kunchinke & Jacobs, 2011a). This approach, and the data produced, provides an alternative way to select emotional stimuli, in contrast to the

dominant method of using widely available, decontextualized valence and arousal ratings (e.g. Bradley & Lang, 1999). All emotion verbs generated in study 1 are included in the appendix A, alongside raw frequencies to indicate the number of participants who generated the verb in response to each emotion label. We also indicate whether the verb can be considered a 'core' exemplar, a 'subsidiary' exemplar (i.e. a synonym for the selected 'core' exemplar) or a modal exemplar (a unique, non-synonymous response). Similar to the databases provided by Stevenson, James and Mikels (2007) and Briesemeister, Kuchinke and Jacobs (2011a) this set contains both category discrete verbs (generated in response to one emotion label, only) and overlapping exemplars (generated in response to multiple emotion labels). These words can be used by researchers in various ways. Discrete exemplars are useful when researchers want to prime or activate script-knowledge relevant to one particular emotional state. Using the frequencies we provide, researchers may chose discrete exemplars that are weakly or strongly related to this emotion (see Briesemeister, Kuchinke & Jacobs, 2011a; Briesemeister, Kuchinke & Jacobs, 2014). In contrast, overlapping exemplars may be used to prime undifferentiated script knowledge, relevant to emotional states that share positive or negative valence. Researchers also have the potential to widen the set of discrete exemplars available to them. In order to ensure that the verb 'cry' activates knowledge relevant to the concept of 'sadness', researchers could adopt Schacht and Sommers (2009) methodology. Here the word pair 'sad' and 'cry' would be presented and participants would only respond to the verb in the pair. Our data can be used to identify congruent label/verb pairs for this type of paradigm.

In contrast to action readiness/tendency items (e.g. Frijda, 1986), our single-word stimuli are compatible for use in lexical decision tasks. This paradigm has been used in previous attempts to validate categorical, or context-based characterisation of emotional words (e.g. Briesemeister, Kuchinke & Jacobs 2011a; Briesemeister, Kuchinke & Jacobs., 2014). This type of task has also been

used frequently to compare processing of different types of emotional word (e.g. adjectives, nouns and verbs, Palazova et al., 2011). Various other paradigms have also been used for this purpose, for example, De Houwer's (2003) affective Simon task (Altarriba & Basnight-Brown, 2010) and the rapid serial visual presentation task (Knickbocker & Altarriba, 2013). These tasks have predominantly compared emotionality effects for emotional nouns and adjectives (Pavlenko, 2008); therefore, our stimulus set provides a way to extend such investigations to include a third class of emotional word.

The present stimuli will also be useful for those interested in language-mediated facial mimicry (e.g. Foroni & Semin, 2009; Halberstadt et al., 2009). Researchers report that participants simulate facial expressions of emotion when they encounter emotion words (e.g. Foroni & Semin, 2009). Crucially, facial mimicry has been associated with enhanced processing of subsequently presented emotional stimuli e.g. valence-congruent sentences (e.g. Havas, Glenberg & Rinck, 2006) and facial expressions, displayed by another actor (e.g.Halberstadt et al., 2009). Based on an 'embodiment' argument, we might expect emotion verbs to more strongly elicit congruent facial mimicry, given the strong pairing between action words and their sensory-motor representations (e.g. Hauk, Johnsrude & Pulvermüller, 2004). However, few studies incorporate verbs and those that do find inconsistent evidence for a verb (vs. adjective) advantage (Foroni & Semin, 2009; Halberstadt et al., 2009). These findings may reflect inconsistent use of linguistic stimuli. Our database will provide researchers with a larger set of verbs from which to select stimuli. As our stimuli are parsed according to discrete emotional states, careful selection will allow researchers to assess whether language-mediated facial mimicry is 'category-specific' (e.g. reading a verb associated with 'fear' specifically induces mimicry in features category-diagnostic of 'fear', Ponari et al., 2012), as opposed to valence-congruent (e.g. reading any negatively valenced emotional word induces a similar pattern of negative mimicry). In sum, our database will

allow tighter control of emotional verb selection for use with English speaking participants, across a range of paradigms.

As well as practical implications, our findings have theoretical relevance. They support several facets of construction and componential models of emotional interpretation; both of which emphasise use of the emotional script to interpret emotional stimuli (e.g. Scherer, 1984; Smith & Ellsworth, 1985; Barrett, Lindquist & Gendron, 2007). First, finding a combination of unique and overlapping verbs in study 1 is consistent with both accounts. Each theory acknowledges that the majority of behaviours will be more strongly associated with one discrete emotion as a matter of degree (e.g. Lindquist, 2009; Frijda, Kuipers & Ter Schure, 1989). However, they also highlight the multi-faceted and intra-individual nature of script content (e.g. Scherer, 1984; Pavlenko, 2008; Lindquist & Gendron, 2013). For example, scripts contain knowledge of previously-experienced precipitating events and consequences of experiencing a particular emotional state, as well as cognitive appraisal of those events (Smith & Ellsworth, 1985). Supporting our observations in study 2, these components will often be shaped by the societal or cultural norms applicable to the individual (e.g. Barrett, Mesquita & Gendron, 2011). As a result, emotional interpretation relies on the summation of various cues available at the time of perception, meaning that behavioural cues alone are often insufficient for discrete categorisation (e.g. Smith & Ellsworth, 1985). Utilising findings from the present study, these additional cues are likely necessary when we need to discretely categorise quintessential or 'frequent' emotional behaviours, such as crying (e.g. Lindquist & Gendron, 2013).

In conclusion, we provide a set of verbs representative of behaviours that people associate with six, discrete emotion states. We methodologically harnessed the emotional script as a 'context' for both the generation of verbs (study 1) and the validation of typical exemplars, per emotion category (study 2). Our stimulus set is similar to other word databases that contain categorical or context-based norms (e.g.

556 Stevenson, Mikels & James, 2007). Therefore our words may similarly be used to explore categorical
557 processing of emotional stimuli. In addition, use of emotion verbs may be particularly appealing for
558 those who wish to compare emotionality effects across different classes of word, or explore language-
559 mediated facial mimicry.

560

561

562 **References**

563 Altarriba, J., & Basnight-Brown, D. M. (2010). The representation of emotion vs. emotion-laden words
564 in English and Spanish in the Affective Simon Task. *International Journal of Bilingualism*,
565 *15*:310-328.

566 Barrett, L. F., Lindquist, K. A., & Gendron, M. (2007). Language as context for the perception of
567 emotion. *Trends in Cognitive Sciences*, *11*(8):327-332.

568 Barrett, L. F., Mesquita, B., & Gendron, M. (2011). Context in emotion perception. *Current Directions*
569 *in Psychological Science*, *20*(5):286-290.

570 Bradley, M. M., & Lang, P. J. (1999). *Affective Norms for English Words (ANEW): Instruction manual*
571 *and affective ratings* (Technical Report C-1) The Center for Research in Psychophysiology.
572 Gainesville: University of Florida.

573 Briesemeister, B. B., Kuchinke, L., & Jacobs, A. M. (2011a). Discrete emotion norms for nouns: Berlin
574 affective word list (DENN–BAWL). *Behavior Research Methods*, *43*(2):441-448.

575 Briesemeister, B. B., Kuchinke, L., & Jacobs, A. M. (2011b). Discrete emotion effects on lexical
576 decision response times. *PloS one*, *6(*8*):*e23743.

577 Briesemeister, B. B., Kuchinke, L., & Jacobs, A. M. (2014). Emotion word recognition: Discrete
578 information effects first, continuous later?. *Brain research*,*1564*:62-71.

579 Carroll, J. M., & Russell, J. A. (1996). Do facial expressions signal specific emotions? Judging
580 emotion from the face in context. *Journal of Personality and Social Psychology*, *70*(2):205-218.

581 De Houwer, J. (2003). The extrinsic affective Simon task. *Experimental Psychology*, *50*(2):77-85.

582 Doost, H. T. N., Moradi, A. R., Taghavi, M. R., Yule, W., & Dalgleish, T. (1999). The development of
583 a corpus of emotional words produced by children and adolescents. *Personality and Individual*
584 *Differences*, *27(3)*:433-451.

585 Ekman, P. (1992). An argument for basic emotions. *Cognition & Emotion*, *6*(3-4):169-200.

586 Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of*
587 *Experimental Psychology: General*, *113*(3):464-486.

588 Fernández-Dols, J. M., Wallbott, H., & Sanchez, F. (1991). Emotion category accessibility and the
589 decoding of emotion from facial expression and context.*Journal of Nonverbal*
590 *Behavior*, *15(2):*107-123.

591 Ferstl, E. C., Garnham, A., & Manouilidou, C. (2011). Implicit causality bias in English: A corpus of
592 300 verbs. *Behavior Research Methods*, *43*(1):124-135.

593 Foroni, F., & Semin, G. R. (2009). Language that puts you in touch with your bodily feelings: The
594 multimodal responsiveness of affective expressions. *Psychological Science*, *20*(8*)*:74-980.

595 Frijda, N. H. (1986). *The Emotions*. Cambridge, UK: Cambridge University Press.

596 Frijda, N. H., Kuipers, P., & Ter Schure, E. (1989). Relations among emotion, appraisal, and emotional
597 action readiness. *Journal of Personality and Social Psychology*, *57*(2):212-228.

598 Halberstadt, J. (2005). Featural shift in explanation-biased memory for emotional faces. *Journal of*
599 *Personality and Social Psychology*, *88*(1):38-49.

600 Halberstadt, J. B., & Niedenthal, P. M. (2001). Effects of emotion concepts on perceptual memory for
601 emotional expressions. *Journal of Personality and Social Psychology*, *81*(4):587-598.

602 Halberstadt, J., Winkielman, P., Niedenthal, P. M., & Dalle, N. (2009). Emotional conception how
603 embodied emotion concepts guide perception and facial action. *Psychological*
604 *Science*, *20*(10):1254-1261.

605 Hauk, O., I. Johnsrude & F. Pulvermüller. 2004. Somatotopic representation of actions words in human
606 motor and premotor cortex. *Neuron*, 41:301–307

607 Havas, D. A., Glenberg, A. M., & Rinck, M. (2007). Emotion simulation during language
608 comprehension. *Psychonomic Bulletin & Review*, *14*(3):436-441.

609 Herbert, C., Junghöfer, M., & Kissler, J. (2008). Event related potentials to emotional adjectives during
610 reading. *Psychophysiology*, *45*(3):487–498.

611 Herbert, C., Kissler, J., Junghöfer, M., Peyk, P., & Rockstroh, B. (2006). Processing of emotional
612 adjectives: Evidence from startle EMG and ERPs. *Psychophysiology*, *43*:197-206.

613 Kanske, P., & Kotz, S. A. (2007). Concreteness in emotional words: ERP evidence from a hemifield
614 study. *Brain Research*, *1148*:138-148.

615 Kissler, J., Herbert, C., Peyk, P., & Junghöfer, M. (2007). Buzzwords—Early cortical responses to
616 emotional words during reading. *Psychological Science*, *18*(6):475–480.

617 Knickerbocker, H., & Altarriba, J. (2013). Differential repetition blindness with emotion and emotion-
618 laden word types. *Visual Cognition*, *21*(5):599-627.

619 Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1990). Emotion, attention, and the startle
620 reflex. *Psychological Review*, *97*(3):377-395

621 Lindquist, K. A. (2009). Language is powerful. *Emotion Review*, *1*(1):16-18.

622 Lindquist, K. A., & Barrett, L. F. (2008). Constructing Emotion: The Experience of Fear as a
623 Conceptual Act. *Psychological Science*, *19*(9):898-903.

624 Lindquist, K. A., Barrett, L. F., Bliss-Moreau, E., & Russell, J. A. (2006). Language and the perception
625 of emotion. *Emotion*, *6*(1):125-138.

626 Lindquist, K. A., & Gendron, M. (2013). What's in a word? Language constructs emotion
627 perception. *Emotion Review*, *5*(1):66-71.

628 Maass, A., Salvi, D., Arcuri, L., & Semin, G. R. (1989). Language use in intergroup contexts: the
629 linguistic intergroup bias. *Journal of Personality and Social Psychology*, *57*(6):981-993.

630 McEvoy, C. L., & Nelson, D. L. (1982). Category name and instance norms for 106 categories of
631 various sizes. *The American Journal of Psychology*, *95*(4): 581-634.

632 Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (2004). The University of South Florida free
633 association, rhyme, and word fragment norms. *Behavior Research Methods, Instruments, &*
634 *Computers*, *36*(3):402-407.

635 Niedenthal, P. M., Winkielman, P., Mondillon, L., & Vermeulen, N. (2009). Embodiment of emotion
636 concepts. *Journal of Personality and Social Psychology*, *96*(6), 1120-1136.

637 Palazova, M., Mantwill, K., Sommer, W., & Schacht, A. (2011). Are effects of emotion in single words
638 non-lexical? Evidence from event-related brain potentials. *Neuropsychologia*, *49(*9): 2766-
639 2775.

640 Palazova, M., Sommer, W., & Schacht, A. (2013). Interplay of emotional valence and concreteness in
641 word processing: An event-related potential study with verbs. *Brain and Language*, *125*(3):
642 264-271.

643 Pavlenko, A. (2008). Emotion and emotion-laden words in the bilingual lexicon. *Bilingualism:*
644 *Language and Cognition*, *11(*2*):*147-164.

645 Ponari, M., Conson, M., D'Amico, N. P., Grossi, D., & Trojano, L. (2012). Mapping correspondence
646 between facial mimicry and emotion recognition in healthy subjects. *Emotion*, *12*(6):1398-1403

647 Pulvermüller, F. (1999). Words in the brain's language. *Behavioral and Brain Sciences*, *22*(2):253-279.

648 Russell, J. A. (1991). In defense of a prototype approach to emotion concepts. *Journal of Personality*
649 *and Social Psychology*, *60(*1):37-47.

650 Russell, J. A. (2005). Emotion in human consciousness is built on core affect. *Journal of*
651 *Consciousness Studies*, *12*(8-10):26-42.

652 Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things
653 called emotion: dissecting the elephant. *Journal of Personality and Social Psychology*, *76*(5):
654 805-819.

655 Schacht, A., & Sommer, W. (2009). Time course and task dependence of emotion effects in word
656 processing. *Cognitive, Affective, & Behavioral Neuroscience*, *9*(1):28-43.

657 Scherer, K. R. (1984) On the nature and function of emotion: a component process approach. In K. R.
658 Scherer & P. Ekman (Eds.). *Approaches to Emotion* (pp. 293-317). Hillsdale, NJ: Erlbaum.

659 Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: further exploration
660 of a prototype approach. *Journal of Personality and Social Psychology*, *52*(6):1061-1086.

661 Silva, C., Montant, M., Ponz, A., & Ziegler, J. C. (2012). Emotions in reading: Disgust, empathy and
662 the contextual learning hypothesis. *Cognition*, *125*(2):333-338.

663 Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of*
664 *Personality and Social Psychology*, *48*(4):813-838.

665 Stevenson, R. A., & James, T. W. (2008). Affective auditory stimuli: Characterization of the
666 International Affective Digitized Sounds (IADS) by discrete emotional categories. *Behavior*
667 *research methods*, *40*(1):315-321.

668 Stevenson, R. A., Mikels, J. A., & James, T. W. (2007). Characterization of the affective norms for
669 English words by discrete emotional categories. *Behavior Research Methods*, *39*(4):1020-1024.

670 Vigliocco, G., Meteyard, L., Andrews, M., & Kousta, S. (2009). Toward a theory of semantic
671 representation. *Language and Cognition*, *1*(2):219-247.

672 Vigliocco, G., Vinson, D. P., Lewis, W., & Garrett, M. F. (2004). Representing the meanings of object
673 and action words: The featural and unitary semantic space hypothesis. *Cognitive*
674 *Psychology*, *48*(4):422-488.

675 Võ, M. L., Jacobs, A. M., & Conrad, M. (2006). Cross-validating the Berlin affective word
676 list. *Behavior Research Methods*, *38*(4):606-609.

677 Võ, M. L., Conrad, M., Kuchinke, L., Urton, K., Hofmann, M. J., & Jacobs, A. M. (2009). The Berlin
678 affective word list reloaded (BAWL-R). *Behavior Research Methods*, *41*(2):534-538.

679 Wierzbicka, A. (1994) Emotion, language and cultural scripts. In S. Kitayama & H. R. Markus (Eds.).
680 Emotion and Culture: Empirical studies of mutual influence (pp. 133-196). Washington, DC:
681 American Psychological Association.

683 *Table 1: Top three, most frequently generated verbs for each emotion label, presented alongside subsidiary responses. Response frequencies for the most*
684 *frequent verbs are presented within parenthesis in the second column.*

685

Emotion Label	Most frequent Verbs (response frequency)	Corresponding, subsidiary verbs (core verb)
Anger	Scream (34); Hit (13); Cry (7)	Shout/Yell/Shriek (scream); punch (hit); sob/weep (cry)
Happy	Smile (27); Laugh (20); Dance (10)	Grin (smile); Giggle (laugh); Skip (dance)
Sad	Cry (23); Frown (9), Withdraw (7)	Sob/Weep (cry); Grimace (Frown);
Disgust	Recoil (7); Frown (6); Gag/Vomit (5 each)	Cringe (Recoil); Grimace (Frown); Retch (Gag)
Fear	Hide/Run (13 each); Shiver (11); Cry (9)	Avoid (Hide); Shake (Shiver); Sob/Weep (cry)
Surprise	Jump (15); Gasp (13); Scream (12)	Inhale/Sharp Intake (Gasp); Shout/Yell/Shriek (Scream)

686

687

688

689

690

691

692 Table 2: Main effects and interactions for the mixed factor ANOVA (italics denote significant and marginal results $p < 0.1$). Greenhouse-Geisser
693 corrections were applied for 'Category' and 'Category*Typicality' effects.

Effect	*DF*	*MSE*	*F*	*P*	η_p^2
Category	*(4.34, 325.24)*	*0.53*	*18.93*	*< 0.001**	*0.20*
Typicality	*(1,75)*	*1.04*	*696.35*	*< 0.001**	*0.90*
Instruction Perspective	*(1,75)*	*2.05*	*6.19*	*< 0.015**	*0.08*
Rating Direction	*(1,75)*	*2.05*	*5.50*	*< 0.022**	*0.07*
Category*Instruction Perspective	(4.34, 325.54)	0.53	1.42	0.23	0.02
Category*Rating Direction	(4.34, 325.54)	0.53	0.28	0.90	0.004
Typicality*Instruction Perspective	(1,75)	1.04	0.08	0.77	0.001
Typicality*Rating Direction	(1,75)	1.04	1.25	0.27	0.016
*Category*Typicality*	*(4.25, 318.60)*	*0.45*	*26.79*	*< 0.001**	*0.34*
Instruction perspective*Rating Direction	(1,75)	2.05	0.37	0.55	0.005
Category*Instruction Perspective*Rating Direction	(4.34, 325.24)	0.45	0.90	0.47	0.012
Typicality*Instruction Perspectives*Rating Direction	(1, 75)	1.04	1.37	0.25	0.018
Category*Typicality*Instruction Perspective	(4.25, 318.60)	0.45	0.90	0.47	0.0012
*Category*Typicality*Rating Direction*	*(4.25, 318.60)*	*0.45*	*3.84*	*0.004**	*0.049*
*Category*Typicality*Instruction Perspective*Rating Direction*	*(4.25, 318.60)*	*0.45*	*3.43*	*0.008**	*0.044*

694

695

696 *Table 3: Mean typical and atypical ratings, t, p and d statistics for each emotion category. Degrees of Freedom were always (1,78).*

697

Emotion Category	Typical Mean (SD)	Atypical Mean (SD)	*t*	*p*	*d*
Happy	4.78 (0.47)	2.29 (0.75)	24.24	< 0.001	4.0
Surprise	4.08 (1.11)	3.03 (0.66)	9.06	< 0.001	1.58
Sad	4.47 (0.81)	2.19 (0.55)	23.86	< 0.001	3.31
Fear	4.35 (0.80)	3.22 (0.70)	13.04	< 0.001	1.51
Anger	3.96 (1.02)	2.37 (0.67)	13.22	< 0.001	1.85
Disgust	4.20 (1.03)	2.25 (0.72)	13.12	< 0.001	2.21
Totals	**4.31 (0.87)**	**2.56 (0.68)**	**-**	**-**	**-**

698

699

700

701

702

703 *Table 4: Mean verb-to-category (v-to-c) and category-to-verb ratings (c-to-v), by typicality and emotion category. F, p and η_p^2 statistics are displayed for*
704 *each interaction. Significant interactions are starred ($p < 0.05$). Degrees of Freedom were always (1,77).*

Category	Mean C-to-V rating (SD)		Mean V-to-C rating (SD)		*F*	*MSE*	*p*	η_p^2
	Typical	Atypical	Typical	Atypical				
Happy	4.77 (0.54)	2.10 (0.77)	4.80 (0.41)	2.47 (0.70)	2.73	0.41	0.10	0.034
Surprise	3.97 (1.18)	2.97 (0.79)	4.18 (1.03)	3.08 (0.51)	0.18	0.54	0.67	0.002
Sad	4.21 (1.00)	2.18 (0.59)	4.73 (0.45)	2.20 (0.51)	7.40	0.33	0.008*	0.088
Fear	4.13 (0.98)	3.19 (0.74)	4.58 (0.50)	3.25 (0.66)	5.32	0.29	0.024*	0.065
Anger	3.90 (0.97)	2.17 (0.67)	4.03 (1.07)	2.58 (0.61)	1.37	0.57	0.25	0.017
Disgust	4.00 (1.03)	2.30 (0.66)	4.40 (1.01)	2.20 (0.78)	2.91	0.86	0.092	0.036
Totals	**4.16 (0.95)**	**2.49 (0.70)**	**4.45 (0.75)**	**2.63 (0.63)**	**-**	**-**	**-**	**-**

Table 5: Mean third-person and first-person perspective ratings, by rating direction, typicality and emotion category (standard deviations in parenthesis).

Emotion Category	First person ratings (SD)				Third person ratings (SD)			
	Category-to-Verb		Verb-to-Category		Category-to-Verb		Verb-to-Category	
	Typical	Atypical	Typical	Atypical	Typical	Atypical	Typical	Atypical
Happy	4.70 (0.66)	1.98 (0.84)	4.73 (0.45)	2.22 (0.70)	4.85 (0.37)	2.20 (0.68)	4.85 (0.37)	2.70 (0.67)
Surprise	3.95 (1.23)	2.74 (0.95)	4.00 (1.17)	2.98 (0.61)	4.00 (1.12)	3.19 (0.51)	4.25 (0.97)	3.09 (0.42)
Sad	4.05 (1.31)	1.96 (0.60)	4.58 (1.03)	2.15 (0.56)	4.40 (0.52)	2.36 (0.54)	4.70 (0.47)	2.19 (0.50)
Fear	3.80 (1.20)	3.02 (0.89)	4.27 (0.72)	2.98 (0.79)	4.45 (0.51)	3.35 (0.48)	4.75 (0.44)	3.50 (0.38)
Anger	3.97 (1.18)	2.17 (0.80)	3.92 (1.09)	2.60 (0.75)	4.00 (0.73)	2.16 (0.53)	4.15 (0.93)	2.53 (0.47)
Disgust	3.58 (1.22)	2.39 (0.76)	4.42 (0.99)	1.90 (0.75)	4.40 (0.60)	2.21 (0.55)	4.35 (1.23)	2.45 (0.73)
Totals	**4.01 (1.13)**	**2.38 (0.81)**	**4.32 (0.91)**	**2.47 (0.69)**	**4.35 (0.61)**	**2.58 (0.55)**	**4.51 (0.74)**	**2.74 (0.53)**

Appendix A.

716 *Table 6: Alphabetised, full set of valid verbs, generated by two of more participants during study 1 (N=25). Response frequencies, per emotion label, are*
717 *shown within parenthesis. Synonymous responses are labelled as 'core' or 'subsidiary' and corresponding core or subsidiary verbs are provided in the*
718 *final column.*

719

	Sad	Happy	Anger	Disgust	Fear	Surprise	Core/Subsidiary	Synonymous core/subsidiary exemplar(s)
Attack	*0*	*0*	*2*	*0*	*0*	*0*		
Avoid	*0*	*0*	*0*	*4*	*2*	*0*	*Subsidiary*	*Hide*
Beat	*0*	*0*	*2*	*0*	*0*	*0*		
Break	*0*	*0*	*2*	*0*	*0*	*0*		
Cheer	*0*	*3*	*0*	*0*	*0*	*0*	*Subsidiary*	*Clap*
Clap	*0*	*4*	*0*	*0*	*0*	*0*	*Core*	*Cheer*
Clench	*0*	*0*	*3*	*0*	*0*	*0*		
Cower	*0*	*0*	*0*	*0*	*2*	*0*		
Cringe	*0*	*0*	*0*	*2*	*0*	*0*	*Subsidiary*	*Recoil*
Cry	*18*	*6*	*7*	*0*	*9*	*3*	*Core*	*Sob; Weep*
Dance	*0*	*6*	*0*	*0*	*0*	*0*	*Core*	*Skip*
Exclaim	*0*	*0*	*0*	*0*	*0*	*2*		
Fight	*0*	*0*	*4*	*0*	*0*	*0*		
Frown	*9*	*0*	*3*	*4*	*0*	*0*	*Core*	*Grimace*
Gag	*0*	*0*	*0*	*3*	*0*	*0*	*Core*	*Retch*
Gape (originally 'open mouth')	*0*	*0*	*0*	*0*	*0*	*2*		
Gasp	*0*	*0*	*0*	*0*	*2*	*8*	*Core*	*Inhale; Sharp Intake*

	Sad	Happy	Anger	Disgust	Fear	Surprise	Core/Subsidiary	Synonymous Core/Subsidiary Exemplar(s)
Giggle	*0*	*2*	*0*	*0*	*0*	*0*	*Subsidiary*	*Laugh*
Grimace	*0*	*0*	*0*	*2*	*0*	*0*	*Subsidiary*	*Frown*
Grin	*0*	*6*	*0*	*0*	*0*	*2*	*Subsidiary*	*Smile*

Growl	*0*	*0*	*4*	*0*	*0*	*0*		
Hide	*2*	*0*	*0*	*0*	*11*	*0*	*Core*	*Avoid*
Hit	*0*	*0*	*9*	*0*	*0*	*0*	*Core*	*Punch*
Hug	*0*	*8*	*0*	*0*	*0*	*0*		
Hum	*0*	*2*	*0*	*0*	*0*	*0*		
Hurt	*2*	*0*	*0*	*0*	*0*	*0*		
Ignore	*0*	*0*	*0*	*2*	*0*	*0*		
Inhale	*0*	*0*	*0*	*0*	*0*	*2*	*Subsidiary*	*Gasp*
Isolate	*2*	*0*	*0*	*0*	*0*	*0*		
Joke	*0*	*2*	*0*	*0*	*0*	*0*	*Core*	*Play*
Jump	*0*	*2*	*0*	*0*	*5*	*15*		
Kick	*0*	*0*	*5*	*0*	*0*	*0*		
Laugh	*0*	*20*	*0*	*0*	*0*	*11*	*Core*	*Giggle*
Mope	*2*	*0*	*0*	*0*	*0*	*0*		
Panic	*0*	*0*	*0*	*0*	*7*	*0*		
Play	*0*	*2*	*0*	*0*	*0*	*0*	*Subsidiary*	*Joke*
Punch	*0*	*0*	*4*	*0*	*0*	*0*	*Subsidiary*	*Hit*
Rage	*0*	*0*	*2*	*0*	*0*	*0*	*Subsidiary*	*Rant*
Raise Eyebrow	*0*	*0*	*0*	*0*	*0*	*3*		
Rant	*0*	*0*	*4*	*0*	*0*	*0*	*Core*	*Rage*
Recoil	*0*	*0*	*0*	*5*	*0*	*0*	*Core*	*Cringe*
Retch	*0*	*0*	*0*	*2*	*0*	*0*	*Subsidiary*	*Gag*
Run	*0*	*0*	*0*	*0*	*13*	*0*		
Scream	*0*	*0*	*13*	*0*	*7*	*4*	*Core*	*Shout; Shriek, Yell*
Shake	*0*	*0*	*6*	*0*	*8*	*0*	*Core*	*Shiver*

Sharp intake	*0*	*0*	*0*	*0*	*0*	*3*	*Subsidiary*	*Inhale*
Shiver	*0*	*0*	*0*	*0*	*3*	*0*	*Subsidiary*	*Shake*
Shout	*0*	*0*	*17*	*0*	*0*	*4*	*Subsidiary*	*Scream*
Shriek	*0*	*0*	*0*	*0*	*0*	*2*	*Subsidiary*	*Scream*
Shudder	*0*	*0*	*0*	*2*	*0*	*0*		
Sigh	*2*	*0*	*0*	*0*	*0*	*0*		
Sing	*0*	*5*	*0*	*0*	*0*	*0*		
Skip	*0*	*4*	*0*	*0*	*0*	*0*	*Subsidiary*	*Dance*
Sleep	*3*	*0*	*0*	*0*	*0*	*0*		
Slow	*2*	*0*	*0*	*0*	*0*	*0*		
Smile	*0*	*21*	*0*	*0*	*0*	*4*	*Core*	*Grin*
Sneer	*0*	*0*	*0*	*3*	*0*	*0*		
Sob	*3*	*0*	*0*	*0*	*0*	*0*		
Socialise	*0*	*2*	*0*	*0*	*0*	*0*		
Squeal	*0*	*0*	*0*	*0*	*0*	*2*		
Stomp	*0*	*0*	*2*	*0*	*0*	*0*		
Stutter	*0*	*0*	*0*	*0*	*2*	*0*		
Swear	*0*	*0*	*3*	*0*	*0*	*0*		
Sweat	*0*	*0*	*0*	*0*	*4*	*0*		

	Sad	***Happy***	***Anger***	***Disgust***	***Fear***	***Surprise***	***Core/Subsidiary***	***Synonymous Core/Subsidiary Exemplar(s)***
Tense	*0*	*0*	*2*	*0*	*4*	*0*		
Throw	*0*	*0*	*4*	*0*	*0*	*0*		
Vomit	*0*	*0*	*0*	*5*	*0*	*0*		
Wallow	*2*	*0*	*0*	*0*	*0*	*0*		
Weep	*2*	*0*	*0*	*0*	*0*	*0*		
Withdraw	*7*	*0*	*0*	*4*	*2*	*0*		

Yell	*0*	*0*	*4*	*0*	*0*	*2*	*Subsidiary*	*Scream*
Yelp	*0*	*0*	*0*	*0*	*0*	*2*		

Appendix B:

Table 7: Mean ratings (SD) for verb and label pairings, by direction rating and instruction perspective. Category-to-verb (C-to-V), Verb-to-Category (V-to-C). Modal pairings in bold.

		Scream		**Smile**		**Jump**		**Cry**		**Recoil**		**Hide**		**Totals**
		C-to-V	V-to-C	C-to-V	V-to-C	C-to-V	V-to-C	C-to-V	V-to-C	C-to-V	V-to-C	C-to-V	V-to-C	
First Person Perspective	**Anger**	***3.79 (1.18)***	***3.90 (1.21)***	1.37 (0.60)	2.00 (0.79)	1.79 (0.98)	2.10 (1.12)	3.11 (1.45)	3.35 (1.46)	2.11 (1.10)	2.75 (1.29)	2.47 (1.31)	2.90 (1.21)	2.64 (1.41)
	Happy	2.32 (1.20)	2.75 (1.16)	***4.68 (0.67)***	***4.75 (0.44)***	2.63 (1.37)	3.10 (1.17)	2.26 (1.33)	2.15 (1.18)	1.42 (0.77)	1.45 (0.60)	1.53 (1.07)	1.75 (0.85)	2.57 (0.98)

	Surprise	3.53 (1.31)	3.75 (1.12)	2.89 (1.27)	3.60 (0.99)	***3.95 (1.27)***	***4.10 (1.12)***	2.42 (1.17)	2.30 (1.22)	2.79 (1.13)	3.85 (0.88)	2.12 (1.10)	1.80 (0.83)	3.09 (1.12)
	Sad	1.63 (0.68)	2.00 (1.12)	1.42 (0.69)	2.05 (1.00)	1.26 (0.45)	1.45 (0.69)	***4.00 (1.33)***	***4.75 (0.44)***	2.26 (1.19)	2.05 (1.00)	3.37 (1.46)	3.50 (1.43)	2.48 (0.96)
	Disgust	3.11 (1.24)	2.30 (1.34)	1.53 (0.90)	1.25 (0.55)	2.58 (1.17)	1.75 (1.02)	2.37 (1.30)	2.40 (1.23)	***3.58 (1.22)***	***4.45 (0.77)***	2.37 (1.07)	2.00 (1.07)	2.47 (1.07)
	Fear	3.63 (1.21)	3.60 (1.23)	1.63 (0.68)	1.45 (0.69)	3.21 (1.55)	3.05 (1.61)	3.16 (1.34)	2.90 (1.37)	3.47 (1.12)	3.95 (0.94)	***3.79 (1.23)***	***4.40 (0.50)***	3.19 (1.12)
	Totals	3.00 (1.14)	3.05 (1.20)	2.51 (0.80)	2.52 (0.74)	2.57 (0.13)	2.59 (1.12)	2.89 (1.32)	2.98 (1.15)	2.61 (1.26)	3.08 (0.91)	2.61 (1.21)	2.73 (0.98)	-
Third Person Perspective	**Anger**	**4.00 (0.73)**	**4.15 (0.93)**	1.60 (0.88)	1.50 (0.61)	1.90 (0.85)	2.50 (1.15)	3.20 (0.89)	3.05 (1.23)	1.95 (0.83)	2.95 (1.10)	2.15 (1.04)	2.65 (0.99)	2.63 (0.94)
	Happy	2.65 (1.35)	3.55 (1.10)	**4.85 (0.37)**	**4.84 (0.37)**	3.00 (1.30)	3.40 (1.23)	2.75 (1.33)	3.20 (1.01)	1.30 (0.57)	1.55 (0.83)	1.30 (0.47)	1.80 (0.83)	2.85 (0.90)
	Surprise	3.65 (0.81)	3.95 (0.76)	3.30 (1.08)	3.30 (1.08)	**4.00 (1.12)**	**4.25 (0.97)**	3.00 (0.92)	2.75 (0.97)	3.45 (0.88)	3.40 (1.43)	2.55 (1.23)	2.05 (0.76)	3.31 (1.00)
	Sad	2.55 (1.19)	2.15 (0.99)	1.40 (0.50)	1.55 (0.76)	1.45 (0.60)	1.80 (0.95)	**4.40 (0.50)**	**4.70 (0.47)**	2.60 (1.19)	1.65 (0.93)	3.80 (0.83)	3.80 (0.77)	2.65 (0.81)
	Disgust	2.80 (0.95)	3.15 (1.23)	1.20 (0.41)	1.45 (0.76)	2.15 (0.99)	2.50 (1.19)	2.30 (0.86)	2.70 (1.13)	**4.40 (0.60)**	**4.35 (1.23)**	2.60 (1.10)	2.45 (1.10)	2.67 (0.96)
	Fear	3.95 (0.60)	4.15 (0.81)	1.45 (0.51)	1.60 (0.75)	3.45 (1.15)	3.75 (1.29)	4.00 (0.73)	3.80 (0.77)	3.90 (0.85)	4.20 (1.06)	**4.45 (0.51)**	**4.75 (0.44)**	3.62 (0.79)
	Totals	2.93 (0.94)	3.52 (0.97)	2.30 (0.63)	2.54 (0.72)	2.66 (1.00)	3.03 (1.13)	3.28 (0.87)	3.37 (0.93)	2.93 (0.82)	3.02 (1.10)	2.81 (0.86)	2.92 (0.82)	

738

739

740

741

742

743

744

745

746

747

748

749

750

751