

“Looking Up” and “Feeling Down”: Measuring Emotion Perception in Language
 Kelly E. Grob, Emily D. Anderson, Paul M. Kirsch, Elizabeth A. Craun, & Kimberly A. Barchard
 University of Nevada, Las Vegas

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Contact information: Kimberly A. Barchard, Department of Psychology, University of Nevada, Las Vegas, 4505 Maryland Parkway, P.O. Box 455030, Las Vegas, NV, 89154-5030, USA, barchard@unlv.nevada.edu

ABSTRACT

Today, social success requires the ability to decipher the emotional connotations of written language, such as emails, blogs, and facebook pages. Two tests have been designed to measure this ability: the Metaphors Test (Barchard, Anderson, Hensley, & Walker, 2011) and Gregory and Waggoner’s test (1996). Both use atheoretical test stimuli, making it impossible to create scoring keys before data were collected. Therefore, items were scored using consensus scoring, in which the score is based on the proportion of the norm group who gave each possible response. Consensus scoring has several problems (Barchard, Hensley, & Anderson, 2011; Barchard & Russell, 2006; Maul, 2011). These problems can be avoided by using established psychological theory to create test stimuli and scoring keys.

We therefore wanted to design a new test of the ability to perceive emotions in language, where the items and scoring key are based upon established theory. Theory does not allow us to determine the emotional connotations of arbitrary stimuli: Are “car” and “pebble” happy? Angry? Theory does not tell us. Instead, we had to start from the emotion and then find the stimuli. Specifically, we used research on conceptual metaphors to find stimuli with known emotional connotations. A conceptual metaphor involves two concepts, in which one concept (the source) provides information about the other (the target) (Lakoff & Johnson, 1980). For example, “Happiness is up” is a conceptual metaphor in which “up” provides information about “happiness.” Conceptual metaphors are the basis for much of what we say about emotions: When someone is sad, we say they are “down” or “blue” (Shweder, 1991), and when someone is angry, we say they are “boiling” or “hot-headed” (Lakoff & Johnson, 1980; Shweder, 1991). We derived a list of conceptual metaphors for each of four emotions: anger, sadness, fear, and happiness. Next, we created stimuli that were associated with each of those sources. For example, happy is “up” and “balloons” are up, and so balloons are happy. The purpose of this paper is to share the Measure of Emotional Connotations with other researchers and to solicit feedback on its format and content.

Happiness is...	Culture	Examples	Evidence
Up	American	“We had to cheer him up.” “Lighten up.”	Lakoff & Johnson (1980) Kovecses (1991) Ruben (1985) Strauss & Allen (2008) Waggoner & Palermo (1991)
	Chinese	“In high spirits.” “Tails up.” “Filled with spirits.”	Yu (1995) Chen (2010) Li (2008)
	Hungarian	“This film gave me a high.” “He is on cloud nine.”	Kovecses (2005)
Bright or Light	German		Barcelona (2000; 2002; 2003)
	American	“Look on the bright side.” “She lit up.” “You are the sunshine in my life.” “He was beaming with joy.” “She brightened up.”	Lakoff & Johnson (1980) Strauss & Allen (2008) Kovecses (1991)
	Chinese	“He smiled, which caused his face to beam.” “They’re in high spirits with a strong glow.” “They’re all in great delight.”	Yu (1995) Li (2010)
	British English	“Look on the bright side.”	Deignan (2005)
	Hungarian	“His face brightened up.” “He has a sunny personality.” “Brightness of eyes”	Kovecses (2005) Kovecses (2008)

INTRODUCTION

Our social world is increasingly dependent on text-based media such as email, text messaging, and social networking sites such as Facebook. Individuals often misinterpret emails or text messages and may perceive them as more negative than they were intended (Byron, 2008). People need to perceive emotions accurately, even when they do not have access to traditional non-verbal cues, such as tone of voice, posture, and facial expressions. Therefore, we want to design a measure of the ability to perceive the emotional connotations of language.

Language contains both denotative and connotative information (Lyons, 1977). Denotative information is the type of information one would find in the dictionary, or information that is literally expressed by the words themselves. Connotative information is information that is implied, and may include emotional content. For example, when people say, “I feel down,” they are using connotations to express the emotion of sadness. Several tests exist to measure the ability to decipher the emotional meanings of language. Some of these tests are influenced by both denotative and connotative information. For example, the Mayer-Salovey-Caruso Emotional Intelligence Test Changes task (Mayer, Salovey, & Caruso, 2002) and the Multifactor Emotional Intelligence Scale Stories task (Mayer, Caruso, & Salovey, 2000) both include explicit emotion words in the item stems.

EXISTING TESTS

Two are only two existing tests that focus on the ability to decipher the emotional connotations of language. The first of these is the Metaphors Test (Barchard, Anderson, Hensley, & Walker, 2011). It includes 10 emotionally evocative metaphors. For each, participants rate the extent to which the speaker was feeling each of three associated emotions, using a five point scale, where 1 = not at all and 5 = extreme. The total test score is calculated as the sum of the item-level scores for each of the 30 items. Three studies (totaling 457 participants) were used in the development and psychometric evaluation of the Metaphors Test. These studies demonstrate that the Metaphors Test is reliable and has strong convergent validity.

The second test that measures the ability to decipher the emotional connotations of language was designed by Gregory and Waggoner (1996). It includes a total of 12 emotional metaphors, each of which is followed by a list of the four basic emotions: anger, fear, happiness, and sorrow. Respondents are asked to select the emotion that the metaphor is trying to communicate. These metaphors were created in a previous study (Waggoner & Palermo, 1991), and Gregory and Waggoner used the ones that had the most consistent

Sadness is...	Culture	Examples	Main evidence
Down/ Falling	American	“I’m feeling down.” “My spirits sank.” “Her face fell.” “They are down in the dumps.”	Lakoff & Johnson (1980) Kovecses, Benczes, & Csábi (2009) Barcelona (2003) Tolass (1991) Waggoner & Palermo (1991) Dor-Shav & Dor-Shav (1978) Shweder (1991)
	Mayan Indians		Shweder (1991)
	German	“She is in the pits.” “I’m in low spirits.”	Barcelona (1997) Barcelona (2000)
	Nepalese		Dor-Shav & Dor-Shav (1978)
	Japanese		Dor-Shav & Dor-Shav (1978)
	Israeli		Dor-Shav & Dor-Shav (1978)
	Chinese	“He’s feeling low and down.”	Hong-mei (2010) Pritzker (2003) Yu (1998)
	Russian	“The feeling drops” “His spirits are sinking”	Luodonpää-Manni & Viimaraanta (2010)
	French	“The feeling drops” “His spirits are sinking”	Luodonpää-Manni & Viimaraanta (2010)
	Dark	American	
Chinese			Pritzker (2003) Tao, Tan, & Picard (2005) Hong-Mei (2010)
Empty	American	“My life is empty.”	Shweder (1991)
	Mayan Indian		Shweder (1991)
	Persian		Kaviani, H., Hamed, R. (2011)

interpretations. This test showed the expected differences between young and old participants, thus supporting its construct validity.

Both of these tests demonstrate the feasibility of measuring the ability to decode the emotional connotations of language. However, none of the test stimuli were based upon known relationships between the stimuli and emotional connotations. For example, Barchard et al. (2011) used the metaphor “Hard work is the father of fame,” but no previous research or theory has suggested that this metaphor would be strongly and consistently associated with one particular emotion. Therefore, there were not any pre-established correct answers to the items. Since there were no definite correct answers, they had to rely on proportion consensus scoring to determine how to score the items. In proportion consensus scoring, a person’s score on an item is equal to the proportion of the norm group who gave the same response. Proportion consensus scoring has several problems (Maul, 2011), but the most relevant issue is that it cannot identify the correct answers accurately when the items are difficult (Barchard, Hensley, & Anderson, 2011).

CREATING TEST ITEMS

The purpose of the current paper was to design a test of the ability to decipher the emotional connotations of language. Unlike the two existing tests, we used previous empirical research to inform the creation of the test stimuli so that a veridical scoring key could be created, and so that the items could potentially be translated into other languages and still be valid.

There are many ways we could find stimuli for which there is an established empirical record that would justify a particular veridical scoring key. One approach would be to use single words as our stimuli. Strauss and Allen (2008) identified many words that were closely associated with just one emotion. However, they found many words that were associated with happiness and very few words associated with anger, fear, or sadness that were not simply synonyms of those emotion words. Because we wanted to measure the ability to decode connotative information, this produced few associations. We therefore decided that we need to use stimuli that consist of more than one word, and we needed some other justification for the association between those stimuli and particular emotions. We noted that people often use figurative language to express emotions and thought that we could use this as the basis for our test stimuli.

Figurative language is well suited to express emotional experiences for two reasons. First, figurative language is used to communicate ideas that cannot be captured by literal language (Fainsilber & Ortony, 1987). For example, someone might say, “Love is a whirlwind of rose petals.” Second, figurative language can be used to capture the vividness of an experience that otherwise would be difficult or impossible to describe (Fainsilber & Ortony, 1987). An example of this can be found in times of intense stress: an individual might say, “I felt like the world was falling down around me.”

Thus, the first step was to find well-established conceptual metaphors for emotions. A conceptual metaphor is an idea that involves two concepts in which one concept displays a certain aspect about the concept of interest (Lakoff & Johnson, 1980). For example, “Happiness is up” is a conceptual metaphor in which the concept of “up” displays information about the concept of “happiness.” Conceptual metaphors are the foundation for many other metaphors and figurative phrases: For example: “We had to cheer him up,” “Lighten up” (Kovecses, 1986), “I’m feeling up,” and “That boosted my spirits” (Lakoff & Johnson, 1980).

We used two types of research to identify conceptual metaphors for emotions. First, we relied extensively upon the work of Kovecses (1986) and Lakoff and Johnson (1980). They used a lexical approach, which assumes that language reflects our conceptual system and thus uses ordinary language to discover the subtle internal structure of concepts (Kovecses, 1986). Second, we identified words that were associated with each emotion. Strauss and Allen (2008) asked participants to rate words according to how emotional they were: from “not very emotional” to “very emotional.” Participants also sorted these words into eight emotional categories: happiness, sadness, anger, anxiety, fear, disgust, surprise, and neutral. Some of their findings supported the conceptual metaphors that we had identified from the lexical analyses. For example, “sunny” and “rainbow” both received high scores for happiness, and we interpreted this to support the conceptual metaphor “Happiness is bright.”

Similarly, Dor-shav and Dor-shav (1978) asked participants to indicate which of two opposing characteristics (e.g., hot-cold) matched each of four emotions: anger, fear, sadness, and pride. For example, they found anger was more associated with hot than cold, providing support for the conceptual metaphor “Anger is hot.” Finally, Waggoner (2010) asked both children and adults to rate eight emotions according to their metonymic temperature. He showed that participants above age nine perceive anger as hot, participants above age seven perceive fear as cold, and only adults perceive happiness as warm.

Finally, we wanted to focus upon conceptual metaphors for each emotion that are used in multiple cultures. This way, if our test is translated into other languages, the veridical scoring key is more likely to still be valid. Many metaphors for each emotion are used across cultures worldwide. One reason for this is that our bodily experience structures our cognitive activity: mental functioning is often explained in terms of bodily functioning, such as “that man is sick in the head” (Fesmire, 1994). In addition, different cultures may have similar emotion metaphors because emotional experiences have typical physiological reactions (Kovecses, 2005). For example, when people are happy, they tend to be more active, and may either jump up and down or move around more than usual. In contrast, when people are sad, they tend to be inactive and have downwards posture. Given the large number of conceptual metaphors, we decided to limit test stimuli to ones that are congruent with conceptual metaphors that have been established across multiple cultures. Combining the results of our analyses, we found cross-cultural support for 9 conceptual metaphors, which are listed in Tables 1, 2, 3, and 4.

Fear is...	Culture	Examples	Main evidence
Cold	American	“Make one’s blood run cold.”	Kovecses (1990)
		“Frozen in one’s tracks.”	Omori (2008)
		“Cold shivers running down one’s spine.”	Dobrovol’skii, Dobrovol’skij, & Piirainen (2005) Dor-Shav & Dor-Shav (1978)
	British English	“cold chill of fear”	Omori (2008)
		“icy fear”	
	Chinese	“cold steely horror”	
		“the cold knives of fear”	
	Nepalese	“Fear makes the gallbladder frigid and trembling.”	Yu (2002)
		“The heart was frigid and throbbing.”	
	Japanese	“A cold shiver went up someone’s spine.”	Dor-Shav & Dor-Shav (1978)
“To get goose pimples with fear.”		Dor-Shav & Dor-Shav (1978)	
Israeli	“With fear and trembling.”	Dobrovol’skii, Dobrovol’skij, & Piirainen (2005)	
	“Make one’s blood run cold”		
Russian	“I was rooted to the spot.”	Kovecses (1990)	
	“She was frozen in her boots.”	Kovecses (1990)	
German	“My whole body is tense.”	Davitz (1969)	
	“I’m momentarily paralyzed.”		
Dutch	“to become paralyzed by fear”	Apresjan (1997)	
	“his soul was bound by fear”		
Hungarian	“I had no control over my movements.”	Maalej (2007)	
	“Blood froze in my veins with fear.”		
American	“My heart stopped beating.”		
	“be paralyzed by fear”	Strugielska & Alonso-Alonso (2005)	
Polish	“be petrified with fear”		
		Strugielska & Alonso-Alonso (2005)	

Inability to
move/ function

Anger is...	Culture	Examples	Main evidence
Hot	American	“Don’t get hot under the collar.”	Lakoff & Kovecses (1986)
		“I’m boiling over.”	Kovecses (1990)
			Dor-Shav & Dor-Shav (1978) Waggoner (2010)
	British English		Gibbs (1994)
			Yu (1995)
	Chinese	“Don’t set me on fire.”	Kovecses (2000)
		“He’s at the height of his fire.”	Dor-Shav & Dor-Shav (1978) Dor-Shav & Dor-Shav (1978)
	Nepalese		Kovecses (2005)
	Israeli	“He was hot-headed.”	Kovecses (2005)
“They had a heated argument.”			
Hungarian	“My head got hot.”	Kovecses (2005)	
		Dor-Shav & Dor-Shav (1978) Matsuki (1995)	
Japanese	“You should cool down.”		
	“One’s intestines are boiled.”		
Zulu	“Anger seethes inside the body.”		
	“Steam rises up from the head.”		
Wolof	“That boy is red hot.”	Kovecses (2005)	
	“He heated my heart.”	Kovecses (2005)	
Spanish	“to boil”	Munro (1991)	
	“Martin was simmering.”		
Red	American	“I feel the embers of his anger.”	
		“You have me fried.”	Lakoff & Kovecses (1986)
Chinese	“He got red with anger.”		
	“She was scarlet with rage.”	Waggoner & Palermo (1989)	
Hungarian		Kovecses (2005)	
		Yu (1995)	
Japanese	“His face turned red.”	Kovecses (2005)	
	“His eyes emit fire.”	Kovecses (1995)	
Zulu	“His head turned red.”	Kovecses (2005)	
	“He turned red with anger.”	Kovecses (2005)	
Polish		Matsuki (1995)	
	“That boy is red hot.”	Kovecses (2005)	
		Mikolajczuk (1998)	

OUR FOUR ITEM FORMATS

All items ask respondents to match verbal stimuli to one of four emotions: anger, sadness, fear, and happiness. To avoid invoking non-perceptual skills, certain types of content were avoided. Specifically...

- All stimuli are realistic descriptions rather than metaphorical. We avoided “echoing footprints.”
- Stimuli involve no people or animals. We avoided “leaping kitten.”
- Stimuli do not describe the appearance of people or animals. We avoided “flushed face.”
- Stimuli do not include actions and behaviors that are closely associated with specific emotions. We avoided “Smiling sun” and “crying statue.”
- Stimuli do not describe situations that would cause the emotions. We avoided “echoing footsteps.”
- Stimuli include no explicit emotion words. We avoided “furious volcano.”

We have created four item formats.

- Figure 1 shows the Sentences format. The sentences were loaded as heavily as possible with the conceptual metaphors.
- Figure 2 shows the Two-Word Phrases format. Each of the two words was loaded with the conceptual metaphors.
- Figure 3 shows the Imagine Yourself As... format. It uses the same types of stimuli as the Two-Word Phrases format. The purpose of using this format is to force a particular perspective upon the reader.
- Figure 4 shows the Choose between Two-Word Phrases format. Each item includes four phrases: one for each of the four emotions.

Figure 1

Sentences

Select the emotion that is conveyed by each of the following sentences.

	Happiness	Sadness	Fear	Anger
The brilliant rays of the rising sun shone brightly through the sparkling rainbow.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The bitter cold wind blew through the icy cave, shaking the frigid icicles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The empty locket sunk into the dark abyss.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The kettle screamed red over the roaring flames.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 2

Two-word Phrases

Select the emotion that is conveyed by each of the following phrases.

	Happiness	Sadness	Fear	Anger
Bright sunrise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Empty abyss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Immobilizing chills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boiling blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 3

Imagine Yourself As...

	Happiness	Sadness	Fear	Anger
Imagine yourself as radiant fireworks. How do you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Imagine yourself as a dark void. How do you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Imagine yourself as frozen shackles. How do you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Imagine yourself as a hissing volcano. How do you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 4

Choose between Two-Word Phrases

A person feels sad. The person feels like...

- a dazzling rainbow
- a smoldering fuse
- a deflated balloon
- a bound puppet

A person feels angry. The person feels like...

- a floating bubble
- a roaring flame
- empty footprints
- frozen ice

A person feels scared. The person feels like...

- a beaming sun
- a blazing furnace
- a drooping flower
- frigid winter

A person feels happy. The person feels like...

- a zooming kite
- a scarlet kettle
- a barren ocean
- a frozen leaf

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