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Sauter, D.A.

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# Is There a Role for Language in Emotion Perception?

Disa A. Sauter

*Department of Social Psychology, University of Amsterdam, The Netherlands*

## Abstract

What is the relationship between language, emotion concepts, and perceptual categories? Here I compare the strong Whorfian view of linguistic relativity, which argues that language plays a necessary role in the perception of emotions, to the alternative view that different levels of processing (e.g., linguistic, conceptual, perceptual) are relatively independent and thus, that language does not play a foundational role in emotion perception. I examine neuropsychological studies that have tested strong claims of linguistic relativity, and discuss research on categorical perception of emotional expressions, where the two accounts have been directly tested against each other. As in other perceptual domains, there is little evidence that language plays a foundational role in the perception of emotion.

## Keywords

categorical perception, emotion, language, linguistic relativity

## Words, Concepts, and Emotion Perception

Whether language shapes the way we perceive the world is often referred to as the Whorfian question, after the late linguist Benjamin Lee Whorf. He proposed the principle of linguistic relativity, by which the structure of a language determines the patterns of thought and perception of its speakers (Whorf, 1956). The relationship between concepts, language, and perception has been the topic of considerable controversy in several psychological domains, including colour perception (Bird, Berens, Horner, & Franklin, 2014; Franklin, Pilling, & Davies, 2005), and spatial (e.g., Majid, Bowerman, Kita, Haun, & Levinson, 2004) and numerical cognition (e.g., Everett, 2005). The zeitgeist has shifted back and forth between acceptance and rejection of the Whorfian hypothesis, but a degree of consensus has emerged in some fields, such as colour perception, supporting some but rejecting other Whorfian claims (see Regier & Kay, 2009). For example, perceptual categorisation of colour occurs before the development of lexical categories, but the learning of colour terms is associated with a change in hemispheric lateralisation (Franklin et al., 2008).

## A Whorfian View on Emotion

Recently, strong Whorfian claims have been made in the field of emotion science, with proposals that language determines

emotion thought (i.e., how emotions are conceptualised) and perception (i.e., how emotional information is perceived; e.g., Barrett, 2006; Barrett, Lindquist, & Gendron, 2007). Linguistic relativity could reconcile the fact that emotion perception is typically categorical, in the sense that it results in a categorical representation in the perceiver, even though some accounts argue that emotions result from noncategorical processes (e.g., Barrett, 2006). According to this view, language directs how information is grouped into emotion categories in ontogeny and this affects adult on-line emotion processing. This account considers words and concepts as closely linked, in that conceptual emotional processing is explained as “the ability to access the semantic meaning of emotion words” (Gendron, Lindquist, Barsalou, & Barrett, 2012, p. 8). In fact, this account arguably goes further than strong Whorfian claims because no clear boundary is posited to exist between conceptual and perceptual representations (Barrett, 2006). What is typically considered different levels of processing (e.g., emotion words, emotion concepts, and emotion perception) should thus align. Such correspondence between lexical and conceptual categories was previously a popularly held view in other domains of cognitive science, but this notion has not been found to hold up well to more recent findings (see e.g., Malt et al., 2013, on human locomotion).

The current discussion focuses on strong Whorfian claims that propose that language and concepts are necessary

for categorical emotion perception. In contrast, weak Whorfian claims include the notion that language has some influence on conceptual and/or perceptual levels of processing. Failure to find support for strong Whorfian claims of a necessary role for language or concepts in emotion perception would not rule out the possibility of some causal relationships between linguistic and perceptual levels of processing (or indeed links to emotional experience). While there is little controversy over the notion that there is some concordance between emotion words, concepts, percepts, and expressions, the degree to which linguistic representations causally influence others is unclear. Research across the cognitive sciences has purported to show top-down effects of cognition on perception, but a number of limitations question this conclusion (see Firestone & Scholl, 2016, for a recent review). Criteria such as reliance on self-report judgments and peripheral attentional influence will have to be evaluated for studies claiming top-down influences on emotion perception (e.g., Anderson, Siegel, & Barrett, 2011; Anderson, Siegel, White, & Barrett, 2012). However, it is worth noting that independence between lexical, conceptual, and perceptual aspects of emotions does not rule out the possibility of linguistic or conceptual knowledge influencing perceptual judgments. Such influence may occur postperceptually, for example at the decision-making stage.

## The Alternative View

Within emotion science, a number of theorists have advanced an alternative view to the Whorfian approach. This perspective emphasises the independence of different aspects of emotional functioning (Ekman & Cordaro, 2011; Griffiths, 1997; Sauter, Le Guen, & Haun, 2011; Scarantino, 2014; Shweder, 1994). In this view, findings from one level of processing cannot be generalised to another. For example, variation in emotion lexicons across languages does not constitute evidence for equivalent—or indeed any—conceptual or perceptual differences in those speakers. Rather, this framework proposes that lexical, conceptual, and perceptual levels of human emotional processing need to be examined separately, and that the extent to which different levels map onto each other is largely an open empirical question. It is difficult to imagine lexical categories that do not map onto conceptual knowledge. However, the reverse is not true, as one can have a concept without having a word for it; hence many English speakers' delight when they encounter a term like "*schadenfreude*" for the first time. It is also worth noting that proponents of non-Whorfian accounts may differ in how they consider emotions should best be defined, but for the current discussion the crux is that they argue that inferences cannot be drawn directly from findings in one domain (e.g., emotion words) to another (e.g., emotion perception, emotion production, or emotion experience). These relationships should be examined rather than assumed (see Niiya, Ellsworth, & Yamaguchi, 2006, for a good example).

In emotion research as well as in the cognitive sciences more broadly, arguments range from strong Whorfian claims proposing a causal role for language on perception or that

these representations align, to accounts arguing that language, concepts, and perception are separate levels of processing which may or may not have aligning representations. Not only is this debate relevant for questions about emotional processing in non- or preverbal organisms (e.g., infants, animals), but it also has implications for how we should study emotion perception. For example, free labelling has been argued to be a better measure of emotion perception than classification tasks (see Gendron, Roberson, & Barrett, 2015; Russell, 1994, for a discussion). However, if it is the case that lexical, conceptual, and perceptual levels of processing are independent, this would question the promise of free labelling as a paradigm for tapping anything but lexical emotion representations. It is worth noting that relationships between linguistic and conceptual and perceptual processes need not be limited to the domain of words (i.e., lexical categories), but words have tended to be the primary locus of study in the examination of linguistic relativity of emotion. The study of language in a broader sense may offer novel opportunities for examining the relationship between linguistic, conceptual, and perceptual levels of processing (e.g., see Lakoff, 2016, on the ways that emotions can be encoded in language using metaphors).

The current discussion primarily focuses on the strong Whorfian claim that language or concepts are necessary for perceptual categorisation of emotional expressions. The difference between an independent representations view and a Whorfian account is nowhere more pronounced than in the domain of categorical perception of emotional expressions, where the two approaches have made directly opposite predictions. It is to this research that I now turn.

## Categorical Perception of Emotional Expressions

Categorical perception is a phenomenon where physical continua are not perceptually linear, that is, perceivers judge a range of physically equidistant stimuli as belonging to one perceptual category or another, rather than as blends or incomprehensible. Categorical perception, often measured as more accurate discrimination of between-category pairs compared with within-category pairs, has been established for a range of domains, including phonemes (e.g., Liberman, Harris, Hoffman, & Griffith, 1957) and colours (e.g., Holmes, Franklin, Clifford, & Davies, 2009).

Categorical perception has also been found for facial and vocal emotional expressions (e.g., Calder, Young, Perrett, Etoff, & Rowland, 1996; Laukka, 2005). Theorists sympathetic to the Whorfian approach have proposed that categorical perception of emotional stimuli arises through verbal coding during encoding (e.g., Roberson, Damjanovic, & Pilling, 2007). Supporting this view, Roberson and Davidoff (2000) found that verbal, but not nonverbal, interference disrupted categorical perception, which was interpreted as suggesting that categorical perception occurs via the activation of a prototype of a semantic category during encoding (Huttenlocher, Hedges, & Vevea, 2000). If categorical perception arises through verbal coding

during encoding, verbal interference should always eliminate it. However, this is not the case: verbal interference only eliminates categorical perception of emotional expressions when interference conditions are presented in a blocked manner, but not when conditions are interleaved (Roberson et al., 2007). The fact that the effect of verbal interference is task-dependent suggests that the effect may be postperceptual (e.g., occurring during decision-making). This explanation also fits with findings from colour perception that show that when verbal interference is engaged only during encoding, performance is no different than in a no-interference condition (Roberson & Davidoff, 2000, Experiment 4), suggesting that the effect of verbal interference occurs at a later stage of processing.

A recent study provided a test of the possibility that verbal labelling underlies categorical perception. Specifically, Fugate and colleagues examined whether learning lexical categories for chimpanzee facial configurations would elicit categorical perception (Fugate, Gouzoules, & Feldman Barrett, 2010). They claimed that only perceivers who learned facial expression categories with a label (i.e., a word) showed categorical perception. However, neither participants who had learned labels for the chimpanzee expressions nor those who had not, performed better with between-category as compared to within-category pairs. This null finding is not consistent with the Whorfian perspective, which would predict that categorical perception should follow from having lexical representations for the chimp expressions. In contrast, the absence of the hallmark of categorical perception after participants had learned lexical categories for novel facial configurations seems to support the notion that language does not play a causal role in eliciting categorical perception. There is additional affirmative evidence for the non-Whorfian view, which has led to the proposal that categorical perception is a consequence of bottom-up learning of particular constellations, rather than of verbal coding. For example, neural network models relying exclusively on perceptual information from emotional facial expressions show categorical perception (Dailey, Cottrell, Padgett, & Adolphs, 2002), as do preverbal infants (e.g., Kotsoni, de Haan, & Johnson, 2001), suggesting that language is not necessary for categorical perception of emotional expressions to emerge. In a recent study, we conducted a direct test of the causal role of lexical categories for categorical perception by testing emotion perception in speakers of Yucatec Maya, a language with no lexical labels that distinguish disgust from anger (Sauter et al., 2011). Although Yucatec Maya participants do not have lexical distinctions for disgust and anger, they perceived emotional facial expressions of these and other emotions categorically. Furthermore, the magnitude of the effect was equivalent to speakers of a language that does differentiate between the emotions lexically.

Together these findings suggest that, although the availability of lexical categories may affect postperceptual processing, it is not necessary for categorical perception of emotional expressions. Furthermore, access to learned mappings of lexical categories to facial configurations appears to be insufficient for eliciting categorical perception. In the domain of categorical perception of emotions there is thus little support for the strong Whorfian claims

that have been put forth. An account that proposes lexical categories to be necessary for categorical perception will need to account for the computational, developmental, and cross-linguistic findings that appear inconsistent with this view.

## Neuropsychological Evidence

Another domain that allows for tests of claims that language or concepts are necessary for emotion perception to be categorical is the study of patients with brain damage. One such study tested LEW, a patient with difficulties in naming due to a left hemisphere stroke, and a group of matched control participants (Roberson, Davidoff, & Braisby, 1999). Participants performed a pile sorting task, an odd-one-out task, and same/different judgments, all with emotional facial expression stimuli. LEW was found to be very similar to the control participants in the odd-one-out and same/different tasks, which are thought to measure perceptual similarity, but he displayed an atypical pattern in the free-sorting task, which is believed to tap explicit categorical judgments. The authors concluded that LEW's problems reflected conceptual problems and argued that it is possible to perform similarity judgments without language, but that these are insufficient for forming or accessing categories. This is an intriguing possibility worth investigating further. As always in neuropsychological work, it will be important to rule out idiosyncrasies in the profile of a single patient. For example, this methodological approach could be extended to populations without brain damage who also lack lexical categories (e.g., cross-linguistic samples) to establish whether they show the same pattern of results across this set of tasks.

A recent article argued that conceptual knowledge is necessary in order to perceive facial expressions as signalling discrete emotions, but not for judging valence (Lindquist, Gendron, Barrett, & Dickerson, 2014). Three patients with language impairments due to frontotemporal dementia and a group of control participants sorted facial expression photos into piles based on perceived emotion. Two of the three patients made more errors in which they collapsed across negative emotion categories compared to controls. The authors argued that the increased errors in within-valence judgments of the facial expressions were directly linked to the patients' semantic impairments. However, these errors may reflect the fact that patients made fewer piles (three or four) than controls ( $M = 7.8$ ) overall, and so ruling out a baseline difference in the number of piles in free sorting would be worthwhile (see also Kumfor, Irish, Hodges, & Piguet, 2013, for a different account of emotion impairments in frontotemporal dementia). Furthermore, the fact that controls' pile sorts did not correspond to the expected number (the stimuli were intended to reflect six behavioural categories) suggests the need for a replication using a rigorously validated stimulus set that is categorised in the predicted way by controls. The variability across patients and tasks found in these studies are typical of neuropsychological studies, which rely on small, often heterogeneous samples. Notwithstanding these issues, neuropsychological studies do offer a promising avenue

for testing causal claims of the relationship between language, concepts, and perception.

## Conclusions

The relationship between cognition, language, and perception is at the very heart of cognitive science, but it is a highly contentious issue. This article has examined the evidence relating to these relationships in two domains, categorical perception and neuropsychological case studies. This work fails to provide clear support for a strong Whorfian view of linguistic relativity, which holds that language plays a foundational role in emotion perception.

Of course the relationship between language and emotion goes beyond causal links from lexical categories to perception. One issue that has received some attention is the mapping of linguistic categories of emotions across languages. Though some theorists argue that the study of emotion terms is merely descriptive and tells us little about what emotions are (Scarantino, 2012), others draw inferences from cross-linguistic studies of emotion lexicons to the structure of emotions themselves. Positions on this point vary greatly, from proposals that “appearance in all languages of words like angry, afraid, and happy, suggests that these words represent universal experiences” (Plutchik, 1980, p. 102) to the argument that “[there are] culturally diverse emotion vocabularies [from which] it follows that there are culturally diverse emotions” (Harré, 1986, p. 10). In contrast, the literature on colour perception is an example of a domain where the current focus is on a more nuanced view than an all-or-nothing approach. Systems of colour naming have been found to reflect universal tendencies towards focal colours that constrain the formation of linguistic colour categories, though lexical categories can result in minor language-specific idiosyncrasies (see Regier & Kay, 2009). However, though the study of both emotion and colour attempt to establish the extent of preparedness in humans for classifying stimuli into specific categories, there is a significant difference between these domains of study in the extent of disagreement on the input into the system. While there is no disagreement about colours or colour chips, emotion researchers differ, for example, in whether they characterise “emotional facial expressions” as communicative signals, constellations of facial muscles, or expressions of emotional states (e.g., Keltner & Cordaro, 2015; Fridlund, 2015; Russell, 2015).

The title of this article asks whether there is a role for language in emotion perception. The evidence reviewed here suggests that if language does play a role in emotion perception, it is not foundational, that is, language is not necessary for emotion perception. This does not rule out language having any influence at all on emotional processes. For example, language could influence emotional experience. It is also possible that language could exert top-down effects on emotion judgments that are made after perception has occurred (see Firestone & Scholl, 2016).

In conclusion, there appears to be little evidence that language plays a foundational role in emotion perception. The perception of emotional expressions appears to be categorical, but

perceptual categories need not correspond to linguistic categories; whether a percept or concept is mapped onto a word may be largely epiphenomenal to emotion perception, though the existence of such mappings may have postperceptual influence. Until clear evidence is available to the contrary, language, concepts, and perception relating to emotions should be studied as independent mechanisms.

## Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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