Are positive vocalizations perceived as communicating happiness across cultural boundaries?

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Laughter communicates a feeling of enjoyment across cultures, while non-verbal vocalizations of several other positive emotions, such as achievement or sensual pleasure, are recognizable only within, but not across, cultural boundaries. Are these positive vocalizations nevertheless interpreted cross-culturally as signaling positive affect? In a match-to-sample task, positive emotional vocal stimuli were paired with positive and negative facial expressions, by English participants and members of the Himba, a semi-nomadic, culturally isolated Namibian group. The results showed that laughter was associated with a smiling facial expression across both groups, consistent with previous work showing that human laughter is a positive, social signal with deep evolutionary roots. However, non-verbal vocalizations of achievement, sensual pleasure and relief were not cross-culturally associated with smiling facial expressions, perhaps indicating that these types of vocalizations are not cross-culturally interpreted as communicating a positive emotional state, or alternatively that these emotions are associated with positive facial expression other than smiling. These results are discussed in the context of positive emotional communication in vocal and facial signals. Research on the perception of non-verbal vocalizations of emotions across cultures demonstrates that some affective signals, including laughter, are associated with particular facial configurations and emotional states, supporting theories of emotions as a set of evolved functions that are shared by all humans regardless of cultural boundaries.

In a recent study, we showed that laughter vocalizations communicated an affective state across cultural groups, as did vocal signals of several negative emotions.[1] In contrast, other vocalizations of positive emotions, such as sounds expressing achievement or sensual pleasure, were not recognizable across cultural boundaries.[1] Some of these other positive emotions could, however, be inferred when the vocalization was produced by a member of the listener's own culture or a closely related group,[1,4] which may suggest a role for culture-specific social learning of some vocalizations of positive affect.

Could it be that these positive vocalizations, despite not being associated cross-culturally with specific positive emotional states, are nevertheless interpreted as signaling general positive affect? One influential view argues that emotional expressions communicate specific affective states,[5] while other accounts claim that these signals primarily communicate a state of valence and arousal to the listener.[6,7] The latter model raises the possibility that, despite listeners not reliably pairing positive vocalizations with emotion vignettes describing specific affective states,[1] these sounds may be cross-culturally associated with a smile. Smiling communicates joy[8] and it has been suggested that positive emotions all share the facial signal of a smile, even though several positive emotions are associated with distinct vocalizations.[5]

In order to explore this question, a match-to-sample task with auditory and visual emotional stimuli was conducted in two populations, native British English speakers (n = 24, 9 male), and Himba
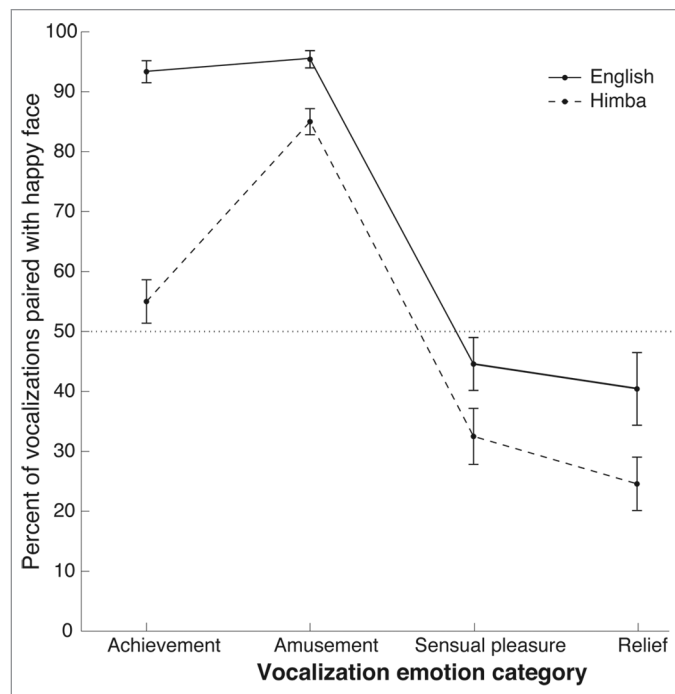
Figure 1. Percent of non-verbal vocalizations of each positive emotion category that English (solid line) and Himba (dashed line) participants associated with a smiling facial expression. Notes: Error bars denote standard errors. Dotted line marks chance level (50%).

participants (n = 24, 9 male [reviewed in ref. 1]). Informed consent was given by all participants. On each trial, the participant was shown two facial stimuli, displayed side-by-side on print-outs, and was played an auditory stimulus via headphones. They were then asked which one of the two facial stimuli corresponded to the emotional state of the vocal stimulus they had just heard. The auditory stimuli were taken from a previously validated set of English non-verbal vocalizations of positive emotions [reviewed in ref. 3], with ten tokens of each of four positive emotions: achievement, amusement, sensual pleasure, and relief. The visual stimuli were taken from a standard set of black-and-white still photographs of male and female Caucasian faces showing a range of typical emotional facial expressions,[9] which are well recognized across cultures.[10,11] Participants indicated their choice on each trial by pointing to the image of their choice, and the experimenter noted their response. English participants were tested in the presence of one experimenter, and Himba participants in the presence of two experimenters. The experimenter noting down the response was naïve to which

auditory and visual stimuli the participant was exposed to and which response was correct. Stimulus gender was consistent within each trial, and was balanced in the task as a whole. All participants completed ten trials for each of the four vocal categories of emotions, resulting in a total of 40 trials, in one of six pseudo-random orders. The target stimulus was always a happy face, and the distractor expressions consisted in equal numbers of expressions of anger, disgust, fear, sadness and surprise. In half of the trials the target stimulus was on the right, and on the other half on the left. The participants were allowed to hear the auditory stimuli as many times as they liked, and there were no time constraints on their performance.

The results are displayed in **Figure 1**. The English participants consistently paired the smiling faces with vocalizations of achievement and amusement (χ^2 = 180.3 and 198.1, respectively, both p < 0.001, df = 1). They paired vocalizations of sensual pleasure with the distractor stimuli (χ^2 = 8.8, p < 0.01, df = 1), whereas performance was at chance for relief sounds (χ^2 = 2.8, df = 1). The Himba participants only paired vocalizations of amusement with

the smiling faces (χ^2 = 117.6, p < 0.01, df = 1). Sounds of sensual pleasure and relief were reliably associated with the distractor stimuli (χ^2 = 29.4 and 62.0, respectively, both p < 0.001, df = 1), while performance was at chance for achievement sounds (χ^2 = 2.4, df = 1).

These data complement previous findings on the recognition of emotional vocalizations across cultural boundaries,[1] by extending them to the associations between positive vocalizations and facial expressions. The results show that, across cultural groups, laughter is paired with a smiling facial expression. This is consistent with previous research that has shown that laugh-like vocalizations occur in non-human primates[12] as well as other mammals[13] in response to physical play. Laughter is a vocalization with considerable phylogenetic continuity from nonhuman to human expressions. The findings from the current study suggest that laughter is associated with a particular facial configuration in humans, which may also correspond to facial displays in other animals [reviewed in refs. 14 and 15].

For vocalizations of other positive emotions, the results did not support a cross-cultural association with smiling facial expressions. English participants paired vocalizations of achievement with a smile. Like laughter, sounds of achievement are perceived by English listeners to be highly aroused and positive,[2,3] and easy to recognize.[1-3] However, Himba participants did not pair the English achievement vocalizations with smiling facial expressions. Together with the finding that Himba listeners do not associate English achievement vocalization with an achievement scenario,[1] these results may indicate that vocalizations of achievement are not meaningful for signaling emotion across distant cultural boundaries.

Vocalizations of sensual pleasure and relief were not associated with smiling faces in either of the two groups of listeners in the current study (see **Fig. 1**). Sounds of sensual pleasure and relief are rated as less positive and considerably less aroused than those of amusement and achievement by English listeners,[2,3] and are not paired cross-culturally with emotion scenarios.[1] This pattern of results may suggest that vocalizations of sensual pleasure and relief

are not perceived as sufficiently positive to be associated with a smiling facial expression. A different possibility is that these sounds correspond to different (positive) facial configurations than smiles. Though little empirical work has investigated this issue [reviewed in ref. 16], it has been suggested that there may be a range of facial expressions that signal different kinds of happiness,[4,15,17] as well as a number of different smile configurations.[18-20] However, it remains to be established whether facial expressions of distinct positive emotions are consistent and recognizable across cultural boundaries. The data from the current study show that not all positive vocalizations correspond to a smiling face; further work is needed to establish whether some positive affective states are not consistently associated with any facial configuration, or whether there are cross-culturally consistent positive facial expressions other than smiling.

The findings from the current study, together with previous work on the cross-cultural recognition of non-verbal vocalization of emotion,[1] support theories arguing that some emotional signals are psychological universals, and thus reflect a set of basic, evolved affective functions that are shared by all humans.[5,21] In addition, this work demonstrates that human laughter, but not other positive vocalizations, is cross-culturally associated with a smiling facial expression.

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