



Voice and Emotion

An Overview of the Historic and Current Clinical State of the Art

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Introduction

"The voice is the mirror of our emotions and as carrier of the emotional message becomes part of the emotion." Moses 1954¹

Historical Overview

In the 'The Expression of Emotions in Man and Animals,' Charles Darwin² reported that our ability to express and understand emotion is an innate ability. It helped individuals to act in ways that gave them a better chance of survival, giving emotions an adaptive value.

Research on voice and emotion grew out of Paul Ekman's empirical research³ on facial expression and emotion (late 1960s). Facial cues are tangible, visual cues, easy to capture in photography. Voice is abstract and dynamic in nature, and could not be captured as a potential indicator of emotion. Therefore it was neglected as a measure of affective states.

Voice analysis was subjective and relied on descriptors like 'raspy', 'breathy', 'gravelly.' Acoustical analysis in the 1970s changed this. Measurement of pitch, intensity, and intonation made the application of acoustical analysis to affective states possible. We could now measure the changes in the voice brought about by emotions.

In the 1970s Klaus Scherer,⁴ who had worked with Ekman in California, built a research lab to investigate potential vocal parameters as indicators of the speaker's emotional state. Now vocal expression of emotion is enjoying popularity thanks to the empirical work of Scherer and advances in acoustical voice analysis.

Vocal Cues

Vocal cues are important indicators of stress and other emotional states.⁴ The vocal musculature is strongly influenced by changes in the emotional state. Emotions bring about changes in tension of the respiratory and laryngeal musculature which in turn result in changes in voice quality.⁵



Push Effect: Emotionally related physiological changes in the respiratory and laryngeal musculature *push* vocal expression in the same direction. One's voice accurately expresses one's internal physiological and emotional state.



Pull Effect: External factors such as cultural norms, and listener expectations *pull* vocal expression in a certain direction. One's voice does not accurately express one's internal physiological and emotional state.



Display Rules: Associated with pull effects. In a situation requiring politeness, one will produce the appropriate pleasant voice quality in spite of internally boiling with rage.⁶

Push and pull effects are an integral part of emotional expression.⁶

Characteristics

Emotions

- Emotions are innate, subjective experiences accompanied by interrelated physiological, behavioural, and cognitive changes.
- They are expressed by everyone, but are experienced differently from one individual to another.
- They are mental assessments that include appraisals, perceptions and expectations of the situation.

➔ Each emotion brings about a different physiological response within the organism with changes in voice, facial expression, and body language.³

➔ Emotions are universal³ and expressed in the same way regardless of race, culture or age. Expression of emotion has not changed since the time of our ancestors. See 'Universal Emotions.'

➔ Emotions are:

- temporary with relatively clear beginnings.
- of short duration, unlike moods which last much longer.
- positive or negative, can vary in intensity.
- involuntary.

Perception and Coping

- Perception and coping affect voice.
- Perception involves cognitive appraisal or the individual's evaluation of a situation.
- Acoustical analysis of the voice of subjects undergoing the same stressful situation revealed individual differences in fundamental frequency (Fo),³ these differences were attributed to the coping mechanism used which differed among subjects⁵ (Figure 1).

Cognitive and Emotional Coping Strategies

Coping is defined as "Constantly changing cognitive and behavioural efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person".⁷

Coping strategies are aimed at either:

- altering the problem causing the distress (problem focused coping) or
- controlling the emotional response to the problem (emotion focused coping).⁸

Perceived control over a situation influences the coping strategy used⁹. The degree of obstruction caused by a stimulus may be perceived as 'high' or 'low.'

- in a situation of high obstruction/low control an emotional coping strategy is likely
- in a situation of low obstruction/high control use of a cognitive coping strategy is more likely.

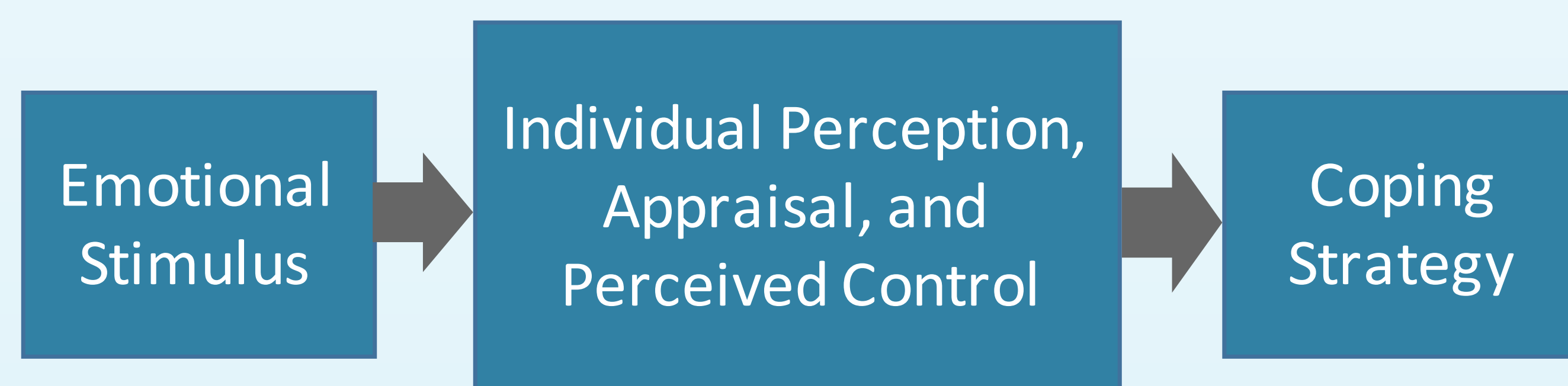


Figure 1. Model showing the relationship between Voice and Emotion

Research

Universal Emotions

Photos showing universal facial expressions across cultures,³ and the corresponding acoustical voice analysis for each emotion.



Emotion	Acoustical Voice Analysis for Each Emotion. ⁵
Happy	↑ Fo, Fo range, intensity, rate of speech
Sad	↓ Fo, intensity, rate of speech
Surprise	↑ Fo, Fo range
Fear	↑ Fo, Fo range, rate of speech
Disgust	↓ Fo, intensity
Anger	↑ Fo, intensity, rate of speech.

Results of Research Studies

In a study on 'Coping Strategies, Personality and Voice Quality in Patients with Vocal Cord Nodules and polyps'⁹ this author reported that patients with vocal cord polyps and nodules used emotional coping strategies more and cognitive coping strategies less, than a comparison group (p<0.01). Type of voice pathology was significantly related to dominance. Patients reported less depression and more altruism than the comparison group (p<0.05).

In an X Quest study, events in the game were manipulated to provoke appraisals of high or low obstruction by the introduction of enemy or friendly alien ships respectively. High or low coping potential was manipulated by increasing or decreasing the player's bullet shooting power and spaceship controllability.¹⁰ Results showed:

- ➔ An increase in Fo in situations of high obstruction.
- ➔ A decrease in Fo in situations of low obstruction.
- ➔ Effects of coping and obstruction on the voice were reflected in the means of the acoustic, and physiological parameters.

Clinical Applications

The results can be adapted for use in the voice clinic. Clinicians, with their patients, need to:

- ➔ Target awareness of the relationship between voice and emotion (Figure 1).
- ➔ Develop self awareness of the changes in voice brought about by the different emotions.
- ➔ Develop awareness of the role of individual perception and **perceived control**^{9,11} in the choice of coping strategy.
- ➔ Identify situations of **high obstruction** and **low obstruction** and understand their role in the choice of coping strategy
- ➔ Be aware that over-use of emotional coping strategies is a risk factor for the development of voice problems.
- ➔ Be aware of the benefits of cognitive coping strategies in terms of developing healthy vocal strategies.

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