

The Importance of Inner Speaking in Improving the Student Actors' Emotional Impact of the Voice

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Received: May 23, 2024. Revised: November 29, 2024. Accepted: March 18, 2025. Published: June 6, 2025.

Abstract—The process of inner speaking, often referred to as self-talk or inner monologue, holds significant importance in the artistic expression of young student actors during their early and inexperienced new performances. This paper draws upon various studies and employs three distinct techniques to elucidate the underlying mechanisms of inner speaking's role in emotional expression and highlights its implications for a young student actor's training and performance enhancement. The first method involves the utilization of magnetic resonance imaging (MRI) to observe the oxygenated parts of the brain that are associated with emotional discharge. This approach is conducted by a team of medical imaging specialists and utilizes a 3.0 T Signa Pioneer MRI scanner. The second method employs the use of a convolutional neural network with fully connected layers that have been trained using Mel-frequency cepstral coefficients (MFCCs) of the input audio files. This technique is used to capture the strength of emotion expressed in the speech of student actors on the first day of training relative to the final day of trial. The third and final method is spectral analysis, which plots the spectrograms at the first and last days of training and compares the spectrum of the recordings. Then the extracted results of this analysis are continued comparing.

Keywords— acting students, inner speaking, emotion detection, magnetic resonance imaging, brain oxygenation, convolutional neural network, spectral analysis.

I. INTRODUCTION

Inner speech refers to the act of silently speaking to oneself within the mind, without producing any audible sounds or utilizing the vocal cords or muscles of the throat or mouth. This private form of communication is inaccessible to others and differs from the process of formulating thoughts in one's mind without producing any sound effects.

Numerous studies in the fields of psychology, linguistics, psychiatry, neurology, and sociology have examined inner speech and its effects. Research in linguistics and neuroscience suggests that inner speech emerges and develops as a mental skill from childhood, concurrent with the development of verbal expression abilities, and plays a significant role in memory formation and concentration, [1], [2], [3]. Inner speech is a concept that extends beyond the realm of psychology and is employed in various fields, such as acting, religious practices, yoga, and mindfulness. In these fields, specific techniques are employed to achieve particular effects on the individual. These techniques often involve focusing attention in distinct ways, in addition to using inner speech. To enhance the emotional impact on the audience, actors typically employ various techniques that involve simultaneously employing inner speech and attentively focusing on different regions of the body, such as the throat, chest, or abdomen, depending on the particular emotions they are attempting to convey. Books on hesychasm recommend that we should be praying within, with our faces turned and concentrated on the chest, and that the speech should also be internalized, so as to harmonize with this tremendous degree of inwardness, [4], [5].

Inner speech, also known as internal dialogue, serves as a fundamental part of psychological processes that plays a role

in a variety of cognitive functions, including thinking and working memory, [3]. [6] defined inner speech to be a phenomenon with its own specific rules and relations to other types of speech activity. In acting, inner speech is of particular interest as it plays an important role in the emotional experience as well as in performances of an actor, also triggering their cognitive processes and self-awareness, [7].

II. STATE OF THE ART

The inner speaking does not only refer to the actual thoughts running through an actor's mind or the words that leave their lips. The inner speaking is often accompanied by an emotional undercurrent that gives an added depth and color to an actor's performance.

[8] expands on the role of inner speech in meaning-making, both in verbal and artistic discourses, highlighting its significance in the formation and development of individual meanings. This study addressed the role of inner speech in meaning-making in artistic narration by analyzing the manifestation of inner communication in artistic discourse and intentional adaptation of the concept of inner speech. The author also draws attention to the necessity for further semiotic research on inner speech, particularly considering recent developments in research methodologies related to inner speech. This continued exploration holds significant value for semiotics by enabling the identification of mechanisms and principles governing meaning-making and semiotic behavior. Additionally, the author highlights the importance of understanding how diverse sign systems, through internalized verbal speech, play a role in the process of meaning-making. Moreover, further research will aid in investigating and specifying the influence of contemporary culture and evolving communication processes on the functions of inner speech in constructing meaning.

A. *The inner speaking and emotional impact/regulation*

The inner voice plays a significant role in an actor's emotional experiences and expression. In accordance with the James-Lange theory of emotion, the inner speaking contributes to emotional experiences by labeling and interpreting physiological responses, [9]. In the realm of acting, an actor's inner speech can either facilitate or obstruct emotional engagement with a character and scene. Additionally, the inner speaking serves as a means of emotional regulation in acting. By engaging in self-soothing and reassuring self-talk, actors can navigate emotionally challenging scenes with greater ease. This regulation is essential for maintaining emotional balance and preventing emotional exhaustion throughout the course of a performance or production.

According to [10], inner speech is more of an epiphenomenon, and self-awareness is more consistently associated with self-regulation. The authors assessed self-awareness, self-preoccupation, self-compassion, wisdom, moral foundations of individualizing and binding, and psychological wellbeing in undergraduate students from the

Georgia Institute of Technology and participants recruited from Mechanical Turk. However, the limitation of this study was that it only used cross-sectional data and was limited by the scales and questionnaires used. Other measures of inner speech might have led to different results. It is possible that a more direct, in-the-moment measurement of inner speech and self-awareness would have increased the correlations.

[11] explored the role of emotion regulation knowledge in employee voice and found that it predicts more frequent voice and enhances the contributions of voice to performance evaluations. [12] examined emotional labor strategies and identified different profiles of emotional labor actors, which are associated with various antecedents and employee outcomes. However, all measures were collected from the same source, and the study did not assess key antecedents of profile membership, such as emotional intelligence. Finally, [13] investigated the cerebral representation of emotional voice cues described in literary texts in an fMRI study, revealing similarities in brain activation patterns with the perception of acoustic voice signals. The authors noted that the superior temporal, lateral, and medial frontal cortex contribute to the decoding process.

It is anticipated that professional actors display more realistic emotional expressions than non-professional actors, however, professional acting training may lead to a specific speech pattern, which might account for less authentic vocal expressions by actors compared to those of non-professional actors. Nonetheless, [14] suggest that emotional expressions by professional actors are not more suitable for emotion research than those of non-actors.

B. *Authenticity and depth of portrayal*

The impact of inner speaking on a young actor's performance extends to its authenticity and depth. By directing an actor's emotional interpretation, inner speaking facilitates the genuine expression of a character's emotions. When an actor successfully aligns their inner speaking with the character's feelings, it fosters a deeper connection between the performer and the audience.

Additionally, inner speaking contributes to an actor's performance by enabling them to tap into intricate psychological states and nuanced emotions. [7] posits that the inner speaking serves as a link between an actor's emotional range and the character's distinct experiences. This link enables performers to explore nuanced motivations, emotions, and vulnerabilities, giving their portrayals more nuance. Actors can explore the nuances of emotions and viewpoints by having a continuous internal conversation with the character, which adds authenticity and complexity to their performance.

C. *Implications for student actors' training*

Techniques to harness the power of inner speech are now part of training programs for actors. Actors can have a better knowledge of their inner speech by using these mindfulness-

based techniques. They will be better able to control their emotions and relate to others as a result, [15]. Additionally, actors can use cognitive restructuring techniques to change negative self-talk into positive speech.

- Mindfulness-based approaches - Actor training programs are increasingly using mindfulness-based techniques to foster emotional regulation and self-awareness. Actors can have a better grasp of how their inner speech affects their emotions by encouraging mindfulness activities, such as focusing on their breathing, body sensations, and inner experiences, [15]. Because of their increased self-awareness, performers are better equipped to identify and control their emotional responses, which helps them portray those feelings in their performances.
- Cognitive restructuring - The cognitive restructuring process, after cognitive-behavioral therapy, offers actors effective ways of changing internal speech. After identifying negative or harmful self-talk, actors can replace their internal speech with more constructive and supportive thoughts. Such a shift from self-criticism to self-support enhances not only the self-confidence of an actor but also his or her emotional commitment and authenticity on stage. [16] describes the attempt to integrate actor training methods with recent neurological knowledge while [17] highlights cognitive science, conceptual blending, and compression as factors in acting.
- Emotional memory and character dialogue – Student actor training techniques involving emotional memory and character-based inner speech can enhance the link between an actor's inner speech and the needed emotions for a scene. Techniques derived from Stanislavski's system motivate actors to utilize their own personal emotional experience to add depth to their performance, [7]. Merging personal emotional experience with the character's circumstances, actors can enhance the link between their inner speech with the character's emotions. Integrating these skills into actor training programs understand the central function of the inner speaking in emotional expression and sincerity. By improving their capacity to manage their inner speech, recall emotional memories, and coordinate their inner speaking with character drives, actors can raise the level of their performances to more developed levels of emotional nuance and genuine portrayal.

III. METHODOLOGY

While conducting the experiment, the researchers used nuclear magnetic resonance imaging (MRI) to observe the neural processes engaged in amplifying the emotional significance of the voice using inner speech strategies. Four student actors participated in the experiment by memorizing the use of inner speech strategies for 30 days by silently reciting the same prayer three times a day with their minds concentrated on the chest area. The actors were instructed to record their inner monologue as well as recite the prayer out

loud, which was recorded. An MRI scanner was employed in order to quantify the brain activity of the actors on the first and final day of training. Audio recordings of the four volunteers were analyzed with spectral analysis and artificial intelligence software to determine whether the emotional intensity of what was being expressed in the voices of the student actors differed before and after training.

The MRI measurements (from the first and last day of training) focused on monitoring the oxygenation level of the following areas in the volunteers' brains:

- Amygdala - is located deep in the temporal lobe. It is an important center of emotional processes and is mainly related to the production of fear and anxiety responses.
- Hippocampus – is a region in the temporal lobe (this is where new memories are created) and is involved in the retrieval of old memories.

IV. EQUIPMENT USED

Magnetic resonance imaging (MRI) was carried out using a 3.0 T Signa Pioneer MRI scanner (GE Healthcare, USA), as illustrated in Fig. 1. A 21-channel phased-array head coil was employed for brain imaging. Standard MRI sequences were utilized, comprising 3D T2 Sag FLAIR CUBE and 3D T1 Ax fast spoiled gradient echo (FSPGR).

The length of each sequence varies for each individual based on their unique anatomy; generally, larger anatomies require more slices and consequently, take longer to complete. Both sequences utilized a slice thickness of 1.2 mm, resulting in a volumetric resolution of 1x1x1.2 mm.



Fig. 1. The 3.0 T Signa Pioneer MRI scanner GE Healthcare

All four participants recorded their speech in a well-equipped studio under special audio conditions on the first and 30th day of the experimental trial to obtain better and clearer voice recordings. The acoustically treated recording booth with a 0.4-second reverberation period was designed to minimize external noise and undesired reflections, resulting in a precise and controlled audio capture suitable for specific types of audio recordings, such as singers or instruments that

require minimal room ambience.

The CMC5 condenser microphone, paired with an MK4 capsule, was utilized to create the recordings. This microphone boasts an 80 dB Signal-to-Noise Ratio (SNR) to guarantee minimal noise interference in the captured audio. Additionally, the microphone can withstand a Maximum Sound Pressure Level (SPL) of 131 dB before distorting. The Apogee Symphony i/o audio interface, which has a Total Harmonic Distortion plus noise (THD+N) rating of -115 dB at 22 dB ensures accurate signal reproduction. The interface's dynamic range, measured at 122 dB A-weighted, provides an ample window for capturing finer audio details.

V. RESULTS AND DISCUSSIONS

A. MRI results

The MRI results indicate that both the amygdala and hippocampus areas of the brain exhibited enlargement on the 30th day of examination, suggesting that these regions had been activated during the second MRI evaluation. As depicted in Fig. 2 and Fig. 3, the amygdala regions displayed an increase in size from the start to the end of the trial.



Fig. 2. The left side of the amygdala seen from the MRI results

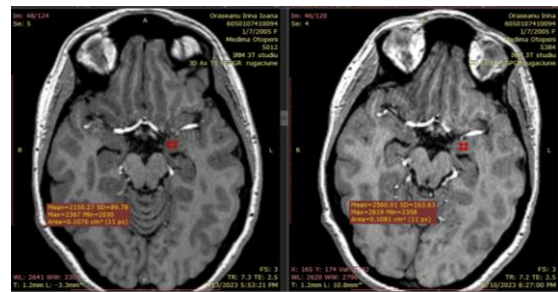


Fig. 3. The right side of the amygdala seen from the MRI results

In Fig. 2, the average value of the left portion of the amygdala was found to be 2093.7 μm , while on the 30th day of the study, the average value was 2308.4 μm , resulting in an increase of 214.7 μm . Similarly, in Fig. 3, the average value of the right portion of the amygdala was 2150.27 μm , while on the 30th day of the study, the average value was 2560.91 μm , resulting in an increase of 410.6 μm .

Additionally, Fig. 4 indicates that the hippocampus has also experienced an enlargement in size. The average value of the hippocampus was 2063.09 μm , while on the 30th day of the study, the average value was 2400.67 μm , resulting in an

increase of 337.58 μm .

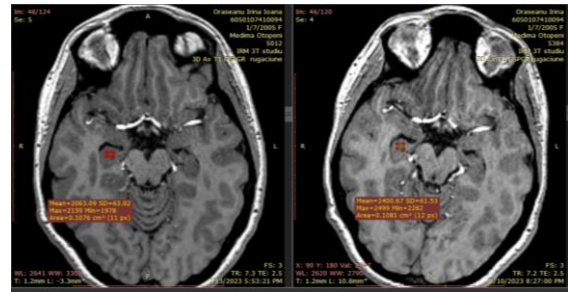


Fig. 4. The hippocampus part seen from the MRI results

B. AI algorithm results

The AI algorithm utilized for assessing the emotional intensity in participants' voices during a 30-day trial employs a convolutional neural network architecture that features fully connected layers, which have been trained using Mel-frequency cepstral coefficients derived from input audio files, [18]. The audio files are divided into segments of two seconds in length using a fixed window size, and then the Discrete Fourier Transform (DFT) is applied to extract 40 features for each file. The CNN boasts a total of 87,944 trainable parameters and employs a Rectified Linear Unit activation function and a dropout rate of 20%, [18].

Specifically, Table 1 shows the results for the first and 30th day of training for each actor. The data in the table clearly indicates that the intensity of the emotion induced increased significantly from the initial day of training to the final day.

Table 1. The CNN results for each participant

Actor No.	Intensity value on the 1st day	Intensity value on the 30th day
#1	1	1
#2	1.5	2
#3	1	2.5
#4	0.5	1.5

C. Spectral analysis results

Fig. 5 and Fig. 6 depict the spectrograms for the first and last day of training. The spectral analysis conducted on the audio recordings demonstrated that the actors' voices displayed a wider range of frequencies on the final day of training compared to the initial day. The aforementioned observation implies that the breathing techniques that were rehearsed enabled the actors to employ their resonant cavities in a proficient manner, thereby infusing the text with deeper emotions.

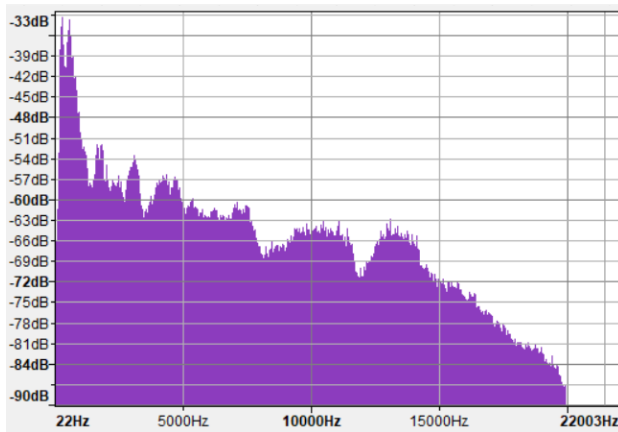


Fig. 5. Spectrogram from the first day of training

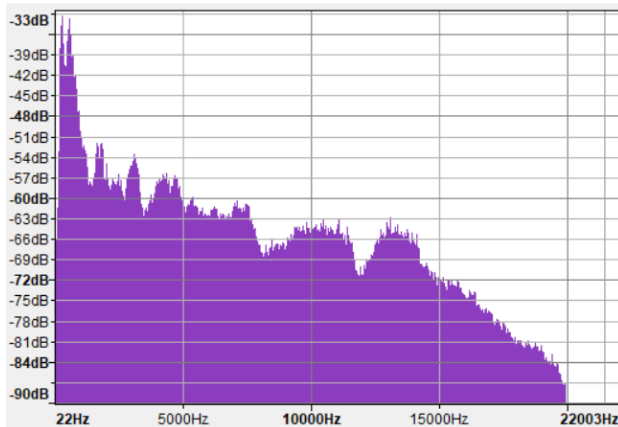


Fig. 6. Spectrogram from the last day of training

VI. CONCLUSIONS

The findings of this study indicate that mentally rehearsing speeches prior to delivery can improve not only memory and concentration but also elicit a strong emotional response from the audience. Various inner speech techniques exist, each with varying levels of difficulty, but all involve reciting the text with appropriate emotional emphasis. Although mastering these techniques requires dedication and practice, continued effort can significantly enhance the emotional impact of one's speeches on the audience.

Inner speech serves as a crucial channel through which young and inexperienced student actors tap into their emotions and characters, ultimately influencing the authenticity and depth of their performances. Research has demonstrated that harnessing the power of the inner voice can positively impact a young actor's emotional experiences and portrayal. As the fields of psychology and performing arts continue to advance, understanding the complex interplay between inner speech and emotional expression will remain a critical factor in enhancing student actor training and performance quality.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

The authors wrote, reviewed and edited the content as needed and they have not utilised artificial intelligence (AI) tools. The authors take full responsibility for the content of the publication.

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Contribution of individual authors to the creation of a scientific article (ghostwriting policy)

We confirm that all authors equally contributed to the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of funding for research presented in a scientific article or scientific article itself

No funding was received for conducting this study.

Conflicts of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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