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Survey of studies examining effects of Tomatis training on singers.

The following is a brief survey of studies that examine the relationship between audition and phonation, or that specifically investigate the efficacy of Tomatis-based listening training. Other studies, not summarized here, have found Tomatis listening to afford notable advantages in learning foreign languages, or have found correlations between what Tomatis defined as poor listening and vocal problems.[1]

The first investigation into the relationship between audition and phonation was presented in 1957 to the French National Academy of Medicine and French Academy of Science. This study, in which several subjects sang into a microphone while sound filters suppressed certain frequency bands, verified that vocal emission alters in response to artificially imposed alterations of hearing. Frequencies suppressed from their listening disappeared from their voices. The effect was true of both trained and untrained singers. Further, the study found that all subjects with an auditory scotoma (hearing loss in any specific frequency band), showed the corresponding frequencies were also missing from

[1] The additional studies are summarized in "Singers and Sound: An Introduction to Tomatis-Based Listening for Singers," Proquest 2012.

the subjects' voices. This is the study that codified Tomatis's observations as "the Tomatis Effect."[2]

Much more recently, a study undertaken at the University of Nebraska, Lincoln, investigated the effects of auditory feedback on singing. Published in 2012, the study showed that alterations in auditory feedback changed the way students sang, producing measurable changes in pitch, formant frequencies, vocal fold contact, and intensity. The study's author suggests that increased awareness of higher frequencies "may bring about a more relaxed vocal production, particularly if the student has a tendency to sing with a chest register dominated or pressed phonation sound."[3]

Other studies directly investigate the effects of Tomatis listening training on voice use. In 1985, a study examined the speech of 3 actors before and after a course of Tomatis listening training. Spectrographic analysis showed the speaking voices to have acquired

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[2] Husson, Raoul, and Pierre Grassé. "Étude Experimentale des Modifications Eventuelles de la Fourniture Vocalique sous L'Influence de Fournitures Auditives Stimulatrices Concomitantes." Paper presented at Académie des Sciences, March 25, 1957. Partially reprinted in "L'Effet Tomatis: Publications á l'académie des sciences et á l'académie de medicine de Paris 1957 et 1960." (Paris: Methode Tomatis 1993).

[3] Hanrahan, Kevin "The Effect of Auditory Feedback on Singing. *Journal of Singing,* 69, 2. Nov-Dec (2012) 145-152.

larger and wider formant peaks, greater variability in pitch and strength, overall pitch moved towards higher frequency bands, and an "increase in global energy."[4]

A study published in 1999 conducted a two-group, pre - and post - investigation of 18 musicians to examine claims that listening training improves listening, psychological well-being, and singing. Pre - and post - tests included voice recordings, the Listening Test administered by an experienced practitioner, and psychological evaluation by an intern psychologist.

Researchers intended to submit participant voice recordings to spectrographic analysis, but technological difficulties precluded analysis of singer formant curves, making this aspect of the study empirically inconclusive. Nevertheless, positive outcomes post program were noted: A voice teacher evaluated participants' voices after completion of the program and noted tendencies towards improved body-voice integration, intonation and vocal control, and negotiation of "breaks."[5]

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[4] Weiss, William "Long-term average spectra of continuous speech before and after Tomatis audio-vocal therapy" Journal of the Acoustical Society of America Supp. 1 (Fall 1985): 11. DOI: 10.1121/2022882

[5] DuPlessis, Wynand, Stefan Burger, Marth Munro, Daan Wissing, Werner Nel. "Multimodal enhancement of culturally diverse, young adult musicians: A pilot study involving the Tomatis method. South African Journal of Psychology," vol. 31 no. 3, (September 2001.) Academic Search Premier.

A study in 2002 at the Mozarteum in Salzburg examined the effects of an incomplete course of Tomatis listening training on 7 pre-professional singers. Participants reported increased communicative and attentive abilities, and improved listening ability. Six of the seven subjects noticed general improvements in their musicality. Five subjects reported positive changes in their singing voices. These positive changes were partially confirmed by outside observation. Technical problems interfered with analysis of the harmonics of the subject's voices, leaving the results of only four subjects interpretable. Of those four, two subjects showed a clear gain in intensity of harmonics.[6]

"The Effects of Tomatis Listening on the Artistic Voice," published in 2016, examined the voices and Tomatis Listening Tests of 19 singers and actors before and after 60 hours of Tomatis listening re-education. Pre -and post - tests included fibrolaryngoscopy, otoscopy, clinical audiometry, the Tomatis Listening Test, and voice analysis.

This study found that listening training resulted in increased voice energy accompanied by changes in the bone conduction curve of the Listening Test. Authors state the listening training improved subjects' ability to maintain stable voice emission. They noted better intelligibility and word articulation due to improved auditory perception at

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[6] Hesse, Horst-Peter, Hans-Ulrich Balzer, Kai Bachmann, Elisabeth Ferstl, Florentina Maria Fritz, Monika Schefhänker, Iris Schmidt. "Zwischenbericht: Tomatis Hörkur Studie," Mensch und Musik Salzburg: Universität Mozarteum, 2002. Accessed June 23, 2012. Reprinted at www.horstpeterhesse.de.

the range of 3000 Hz. Authors concluded that "improvement in the auditory perception leads to a correct register change and makes possible a better intonation and a better control of the voice emission."[7]

In 2016, a small-scale comparative study was done of 2 professional tenors, one vocalizing under the direction of auditory alterations in frequency, filter, and delay delivered through Tomatis's method and the other singer vocalizing without the auditory modifications. This study concluded that the Tomatis listening resulted in a substantial increase in the formants between 2000-4000 Hz.[8]

[7] Stillitano, Carmela, Norma Rosati, Sara Cisternino, Alessandra Fioretti, Sara Iaconelli & Alberto Eibenstein. "Effects of the Tomatis Method on the Artistic Voice." In International Journal of Listening 31, 2 (2017).

[8] Coppola, Walter. "The Tomatis Effect with Professional Opera Singers." In Gestalt Theory vol. 28, no 2/3 (2016) 239-252.