

Brain Distinguish Speech From Music - A Review

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Abstract

Human potential is available both to speak and to listen to music. These are the important features in a person's life. Music aims at the language system's own efficacy that relies on the disposition of speech. Both music and speech share a tone of voice. The Relationship between music and speech has been a topic of much debate. In general, the idea that we have a rational left brain and a creative right brain is a myth, but how the brain circuitry for processing music and language works is still not clear. The topic is important because it speaks directly to the nature of evolved human cognition, these features overlap at times which leads to neuro comparative study of this process. This review was done based on articles obtained from various platforms like PubMed, PubMed central and Google scholar. They were collected with a restriction in time basis from 1970-2020. The inclusion were original research papers, in vitro studied among various conditions and articles that contain pros and cons. Exclusion criteria came into account for review articles, retracted articles and articles of other languages. All the articles were selected based on the brain distinguishing between song and speech. The information about the brain separating speech from song was searched in relevant search engines and relevant researches. The Knowledge and current point of analysis. Then Consensus we're established. This study explains that the right and left hemisphere of the brain distinguish between the song and speech and also this study gives clear information about the following.

Keywords: *Music, Speech, Hemispheres, Brain, Cognition*

Introduction

Human potential is available both to speak and to listen to music. These are the important features in a person's life. Music aims at the language system's own efficacy that relies on disposition of speech. Both music and speech share a tone of voice. Speech and music are human universals, and people around the world often blend them into vocal songs. This entwinement of the speech and music cognitive domains is a challenge

for the auditory cognitive system. Speech and musical sound are thoughts that differ in details of their acoustic structure and thus activate different receptive preferences of the left and right auditory cortices of the brain. There are doubts about degradation in each acoustic dimension that would affect the brain activity. They found that degradation of the spectral dimensions only influenced activity in the right auditory cortex, and only during melody perception. In contrast, degradation of the temporal dimensions affected only the auditory cortex, and just during speech perception. This shows the differential response. Each hemisphere relies upon the kind of acoustical data in the stimulus. Music and speech exploit different ends of the spectro temporal continuum and that hemispheric specialisation may be the nervous system's way of optimising the processing of these two communication methods.

It has been known for decades that the two hemispheres respond to speech and music differently,

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but the physiological basis for this difference remains a mystery¹. Brain regions are similarly and differently involved in listening and converting the production of singing related to speech. Use of auditory motor self monitoring consonance in the singing, brain regions involved processes and prediction to be differentially active for singing more than for speech². Neural connections help process music and speech coactivation of brain regions, neuroimaging studies neural circuitries for language recycled during evolution for musicality served as a springboard for language emergence³. Brain regions frontal, temporal lobes, activates speech and song and its acoustic features⁴. Language focuses on Broca's area, prefrontal cortex, Wernicke's area, superior temporal gyrus. lexicon accessed, articulate fasciculus, Left and right brain, per motor, somatosensory and inferior temporal gyrus, left plenum temporal which has greater memory⁵. Previously our team has conducted numerous clinical trials, studies and reviews about the upcoming topics⁶⁻¹². The main aim of this study is to understand the difference and responses that separates the song from speech.

MATERIALS AND METHODS

This review was done based on articles obtained

from various platforms like PubMed, PubMed central and Google scholar. They were collected with a restriction in time basis from 1970-2020. The inclusion were original research papers, in vitro studied among various conditions and articles that contain pros and cons. Exclusion criteria came into account for review articles, retracted articles and articles of other languages. All the articles were selected based on the brain distinguishing between song and speech.

They are determined by article title, abstract and complete article. When article holder websites were analysed on the topic of brain distinguishing between speech and song, more than 2000 articles and based articles were found, when it was shortlisted based on inclusion and exclusion criteria, the number of articles were lowered to 100 articles. When timeline and other factors were quoted only 25 articles came into play. This article is reviewed from 25 articles collected. The data was collected and quality analysis of the collected data was done using Health Evidence's Quality Assessment Tool (*Health EvidenceTM Quality Assessment Tool*, no date) and the data was shown in a tabular column. (Table 1). The knowledge at current point of time analysed and thus the consensus was established.

Table 1: QUALITY ANALYSIS OF THE STUDIES REFERRED :

AUTHOR	YEAR	QUALITY ANALYSIS
Daniel Samler	2020	Strong(9)
Callan DE	2006	Moderate(6)
Jackendoff.R	2009	Moderate(6)
Belin.D	2000	Moderate(6)
Koelsch.S	2002	Moderate(7)
Jancke	2020	Moderate(7)
Peretz	2015	Moderate(6)
Evelina	2012	Strong(8)
Corinne	2013	Moderate(7)
Aniruddh	2013	Strong(8)
Samuel	2015	Moderate(7)
Baheerati	2018	Moderate(5)
Fathima	2016	Moderate(6)
Rj I	2016	Moderate(6)
Priya J	2015	Moderate(7)

Table 1: QUALITY ANALYSIS OF THE STUDIES REFERRED :

Dave PH	2016	Moderate(5)
Koelsch S	2002	Moderate(6)
David	2019	Moderate(6)
Shruthi	2018	Moderate(5)
Choudhari	2016	Moderate(7)
Iyer PK	2019	Moderate(6)
Gayatri	2018	Moderate(7)
Swathy	2015	Moderate(6)
Renuka	2015	Moderate(7)
Timothy CN	2019	Moderate(7)

Discussion

Two of the most uniquely human uses of sound is enabled by specialised neural systems in different brain hemispheres adapted to respond differently to specific features in the acoustic structure of the song. Music and speech are often inextricably entwined and ability of human to recognise and separate words from melodies in a single continuous sound wave represent a significant cognitive challenge. Brain decode sound using two separate measures. One assesses how quickly sound fluctuates over time. The other detects the frequencies in a sound stroke. In left hemisphere you are much more likely to have a language impairment than if your stroke is in the right hemisphere. When it was scanned through fMRI it resulted that people decoded sounds same as the songbirds do by separating sounds time. Related elements from the frequencies it contains and processing the information using two different groups of specialised brain cells. Hence when song is heard it engages both the hemispheres. Degradation of the temporal information impaired speech recognition but not melody recognition. On the other hand, the perception of the melody decreased only with spectral degradation of the song. There are certain researches that conclude that speech is separated in the left hemisphere of the brain and melody in the right hemisphere of the brain¹³. A particular article explained neural overlap occurs in music and speech¹⁴. Music has a high impact on people¹⁵. Several recent studies suggest that speech and music perception recruit shared computational systems, and a common

substrate in the Broca's area for hierarchical processing has recently been processed¹⁶. Growing body suggest musical training which has an impact in the processing of speech¹⁷. Previously our team has also conducted studies and done reviews most importantly based with lab animals¹⁸⁻²² and few were in vitro^{23,24,25}.

Limitations Of Study

- Intensive study can't be done.
- Study could have been done by analysing or testing human beings.

- Basic Analysis gives inaccurate results.

Future Scope

- Speech and song separation is only discussed within the right and left hemisphere.
- Physiological connections have been a mystery for which more research in the future could give answers.
- Future analysis done regarding this topic could bring clarity to the present researchers.

Conclusion

Brain is one of the important organs which controls the whole body. It has many functions by its neuronal connection. This review may help the people to understand better how the brain separates speech and song by the right and left hemisphere. This helps to interpret the neuronal connections and the control of

speech and song.

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Conflict of Interest: All the authors declare no conflict of interest in the study

Ethical Clearance: As it is a review article so it is not required.

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