
AUDIO-VISUAL REACTION TIME IN INDIAN CLASSICAL SINGER

DR. LUXMI

Associate Professor, Department of Music Vocal

R.K.M.V Shimla

The reaction time of Indian classical singers—like any trained musician—is generally faster than average when it comes to auditory processing, pitch recognition, and vocal-motor coordination.

There are a few studies that have compared musicians and non-musicians:

Musicians generally show faster reaction times to both auditory and visual stimuli.

Introduction

Reaction time is the elapsed time between the presentation of a sensory stimulus and appearance of appropriate voluntary response under the condition that the subject has been instructed to respond as rapidly as possible. Reaction time is crucial for our everyday lives and requires intact sensory skills, cognitive processing and motor performance.

Reaction time is of three types: simple reaction time, recognised reaction time, and choice reaction time. Simple reaction time involves one stimulus and one response. Choice reaction time (CRT) tasks require distinct responses for each possible class stimulus. In choice reaction time experiments, there are multiple stimuli and multiple responses and the subject must give a response that corresponds to the stimulus. It was reported that the time for motor preparation (e.g. tensing muscles) and motor response was the same in all three types of reaction time tests, implying that the differences in reaction time are due to processing time.

Reaction time depends on various facilitatory and inhibitory factors and facilitatory factors include alertness, training, strength of stimuli and concentration. It determines the alertness of a person. Response to a stimulus depends on reaction time.

Reaction time must be lesser in certain occupations e.g. driver, sportsman, pilots, military people, doctors, nursing staff, security guards. Singing involves the reaction to change with the change in rhythm and notes. So singers may also have altered reaction time. They are involved in daily practice of singing and present study, audio visual choice reaction time is compared between singers and non-singers.

METHODOLOGY

This study was conducted in the Research Lab of Physiology department of Indira Gandhi Medical College Shimla and total 80 subjects were involved which are divided into two groups. Group 1 having 40 students who have been learning vocal music for minimum two years durations in Rajkiya Kanya Maha Vidyalaya and Sanjauli degree college of Shimla. In group 2, 40 normal aged and sex method was taken.

Subjects were selected on the basis of the following inclusion criteria.

Patients in age group of 16 to 30 years, non-alcoholic and non-smoker subjects having normal vision, had no abnormality or injury in the upper limbs, were not suffering from psychiatric disorder; not involved in any other sports activities which may improve visual reaction time were included in this study.

After taking informed consent, reaction time was measured with digital display audio visual reaction time machine (model No RTM 608 Medicaid: Ambala, India). The instrument has a resolution of 0.001 second. The machine has three light stimuli: red, green and yellow and three auditory stimuli; low, medium and high-pitched sound.

Tests were performed in adequate light and in silent atmosphere in research lab. Subjects were made fully aware about the procedure and also given adequate practice session before measuring the actual reaction time. Subjects

were asked to keep their dominant hand at equal distance from all the keys and press the specific marked key for particular stimulus and choice reaction time was measured

Visual Reaction Time (VRT) : Light stimulus for yellow red. And green colour was displayed randomly and subjects were asked to respond by pressing the knob of digital display apparatus for switching off the gives coloured light. Reaction time in milliseconds displayed on apparatus was recorded. Three readings were recoding for each colour and lowest of three readings was taken as the value for reaction time task for that colour. The readings of yellow, red and green colour were denoted as VRTY, VRTR and VRTG respectively

Auditory reaction time: Auditory stimulus for high and low pitch sound was randomly presented to the subjects by the observer. Subjects were asked to respond by pressing knob of digital display apparatus for turning off the produced sound. Reaction time in milli second displayed on the apparatus was recorded. Three reading were recorded for each sound stimulus and lowest of three readings was taken as reaction time value for that stimulus. The readings for low and high pitch sound were denoted as ARTL and ARTH respectively

Statistical methods: Data is represented as mean $\pm$ standard mean deviation and statistical analysis was done using student 't' test and the 'p' value for significance was considered at 0.05

Result

In the present case control study, mean age of group of cases and control are 21.67 and 19.27 years respectively. In study and control group, the number of mates were 21 and 22 respectively and number of females were 19 and 18 respectively

The present study has shown that the subjects who are practising daily for Indian classical singing have lower visual reaction time for yellow, red and green colour as that of age matched normal subjects and values are statistically significant ($p=.000, 0.30$ and $.000$ respectively)

The value of auditory choice reaction time for lower and high frequency is also found to lower in singers as compared to the normal subject ($p= .001$ and $.002$ respectively)

Parameters	Cases		p-value
		Controls	
No. of subjects	40	40	-
Age (years)	21.67	19.27	-
Male (n)	21	22	-
Female(n)	19	18	-
VRTY (mean $\pm$ std deviation)	447.63 $\pm$ 60.29	496.15 $\pm$ 51.458	0.000
VRTR (mean $\pm$ std deviation)	476.25 $\pm$ 52.73	489.68 $\pm$ 62.22	0.30
VRTG (mean $\pm$ std deviation)	379.78 $\pm$ 54.28	430.88 $\pm$ 47.72	0.000
ARTL (mean $\pm$ std deviation)	419.55 $\pm$ 83.86	486.00 $\pm$ 83.86	0.001
ARTH (mean $\pm$ std deviation)	440.40 $\pm$ 97.49	502.85 $\pm$ 77.79	0.002

Discussion

Reaction time measurement is an indirect index of processing capability of central nervous system and simple means of determining sensory motor association and performance of an individual

The finding of present study have shown that Indian classical singers have better visual choice reaction time then that of normal non singer subjects. The difference in visual choice reaction time value is statistically significant which justifies the shorter reaction time in practising singers than in the control group which reflects the improvements in processing. Reasons of such observations is that reaction time depends upon various facilitator factors such as practice , alertness, concentration and sport activity

It has been observed by Brouziyne M that mental practice can effectively cause moto improvement and performance. Singing can be compared with physical activity as students are doing daily practice of singing for 2-4 hours. It has been already observed that reaction time improves in various sport activities such as playing of badminton and tennis and basket ball

As regard to auditory reaction time the singers can well differentiate between the sounds of higher and lower frequency sound as compared to normal subjects. Singer may be facilitated by their skill development due to daily practice with sounds.

In previous study on simple reaction time, it was observed that auditory reaction time is lesser than visual reaction time but the present study on choice reaction time have shown longer auditory reaction time which suggest that it is easier to identify the colours due to prolonged familiarity of years as compared to differentiation of sounds of different frequency to whom subjects were familiarised only at the time of recording reaction time

CONCLUSION

The study results indicated that visual choice reaction time and auditory choice reaction time was significant lower in trained singers as compared to normal subjects. Impact of singing / music is on basic sensory processing , so music training to individuals having slower reaction time can be applied

REFERENCE

1. Teichner WH – Recent Studies of simple reaction Psychol bull 1954 ;51:128-149
2. Mohan M Thombre DP, Das AK , Subramanian N, Chandrasekar S. Reaction time in Clinical diabetes mellitus Ind J Physiol Pharmacol 1984; 28: 311-314
3. Welford A.T. 1980. Choice Reaction time Basic concepts. In A.T Welford (Eds). Reaction Times Academic Press. New York, pp 73-128
4. Miller J.O and Low K , “ Motor processes in simple, go/no-go, and choice reaction time tasks: a psychophysiological analysis,” Journal of Experimental Psychology: Human Perception and Performance, Vol. 27, no. 2, pp 266-289, 2001
5. Il Baaven and P.Milin, “ Analyzing reaction times ,” International Journal of psychological Research, vol. 3 , no. 2, pp 1-27, 2010
6. Das S, Gandhi A , Modal S. Effect of premenstrual stress on audio visual reaction time & rveenaudiogram. Ind J Physiol Pharmacol 1997; 41: 67-70.
7. Brouziyne M, Molinaro C. Mental imagery combined with physical practice of approach shots for golf beginners. Percept Mot Skills 2005;101:203-11
8. Bhabhor MK, Vidiya K, Bhanderi P Dodhia S, Kathorotia R, Joshi V.A Comparative study of visual reaction time in table tennis players and healthy controls. Ind J physiol Pharmacol 2013 ; 57(4): 439-42
9. Jain Aditya, Bansal Ramta , Kumar Avnish , and Singh KD, A comparative study of visual and auditory reaction times on the basis of gender and physical activity levels of medical first year students. Int J Appl Basic Med Res. 2015 May- Aug 5(2)