

SHORT COMMUNICATION

A COMPARATIVE STUDY OF VISUAL AND AUDITORY REACTION TIMES IN MALES AND FEMALES

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Abstract: Visual and auditory reaction times (VRT and ART) were studied in 38 male and 41 female healthy medical students in the age group of 17-18 years. Subjects were presented with two visual stimuli viz red and green light stimuli and two auditory stimuli viz high pitch and low pitch sound stimuli. The R.T. to red light was significantly lower than to green light stimulus in both sexes. No statistically significant difference was observed in the response to high and low pitch sound stimuli in both sexes.

In girls and boys, R.T. to visual stimulus was significantly lower than to sound stimulus. ART and VRT in girls were significantly lower than in boys.

Key words: auditory reaction time visual reaction time sex

INTRODUCTION

Reaction Time (R.T.) is the measure of function of sensorimotor association. There is no evidence available that the R.T. varies according to the receptor system stimulated. Few studies (1, 2, 3, 4) conducted on this subject suggest that R.T. for visual stimuli is appreciably slower than auditory stimuli. Whether different stimuli applied to the same receptor system affect the R.T. has not been studied so far. The present study seeks to determine (i) whether R.T. varies with the receptor system involved, (ii) whether R.T. varies with different stimuli in the same receptor system, (iii) the difference if any to reaction times between the two sexes.

METHODS

38 male and 41 female medical students physically normal, without any hearing or visual disorder in the age group 17-18 years were studied. The apparatus used in this study was the Digital Display Response Time Apparatus manufactured by Techno Electronics.

All the subjects were thoroughly acquainted with the apparatus. Three practice trials were given every time before taking the reading. The four stimuli viz red and green light and high and low pitch sound were then presented at random. Four readings of each stimuli were taken and their respective averages calculated. The readings were taken between 11 a.m. and 1 p.m. in a quiet secluded room. 'Z' test as test of significance was applied as the sample size was more than 30.

A comparison was made between :

- (a) Auditory R.T. to different stimuli in boys and girls separate,
- (b) Visual R.T. to different stimuli in boys and girls separate,
- (c) Auditory R.T. to different stimuli between boys and girls, and
- (d) Visual R.T. to different stimuli between boys and girls.

RESULTS

Table I shows that :

1. There was no statistical significance in R.T. for high pitch and low pitch sound stimuli in either sex.

2. The reaction time to red light stimulus was significantly lower than green light stimulus in either sex.

3. The reaction time for each stimulus was significantly higher in boys than in girls.

Table II shows that reaction time to visual stimulus was significantly lower in both sexes than to auditory stimulus.

TABLE I : Reaction Time (secs) (Mean±SD) to Auditory and visual stimuli.

	Visual		Auditory	
	Red light	Green light	High pitch	Low pitch
Boys	0.42*	0.51	0.60	0.64
(n=38)	±0.11	±0.14	±0.16	±0.17 (N.S.)
Girls	0.38* ^Δ	0.46 ^Δ	0.53 ^{ΔΔ}	0.53 ^{ΔΔΔ}
n = 41	±0.04	±0.14*	±0.08	±0.06 (N.S.)

*P < 0.01; **P < 0.02; ***P < 0.05 when different visual and auditory stimuli were compared separately for boys and girls.

^ΔP < 0.05; ^{ΔΔ}P < 0.02; ^{ΔΔΔ}P < 0.01 when each stimulus compared individually between boys and girls.

TABLE II : Reaction Times (secs) (Mean±SD) to auditory and visual.

	Visual	Auditory
Boys	0.47*	0.62*
(n = 76)	±0.14	±0.17
Girls	0.42*	0.53*
(n = 82)	±0.08	±0.07

*P < 0.01 when visual and auditory RT was compared with each other separately in boys and girls.

DISCUSSION

There was no significant difference in the auditory reaction time to high and low pitch sound stimuli among

the boys (Table I). This was also true for girls.

Reaction Time to red light stimulus was the least in both the sexes. The difference for the red and green light stimuli was statistically significant for boys as well as girls (Table I). This can be explained on the basis of the Trichromatic Theory of Colour Vision. When Tomita and co-workers (5) illuminated the retina with microelectrode penetration of single cones, they found that 16% of the units peaked in blue spectrum, 10% in the green and 74% in the red.

The Reaction Time was significantly higher in boys than in girls. This was true for all stimuli (Table I). This explodes the myth of male superiority in certain occupations and sports as in fighter pilots and race car drivers. These results are again at variance from those of other authors, who have found a sex difference favouring men (6, 7, 3, 4). However, according to Skandhan et al (8), mental alertness in girls from the age of eight years onwards is superior as compared with that in boys as also the latency age in the capacity to use intellectual abilities to a year or two ahead of the boys. These results are in conformity with Skandhan's observations.

The reaction time to visual stimulus was significantly lower in both sexes than to auditory stimulus (Table II). These findings are not in agreement with that of other workers (1, 2, 4). Reaction time is a function of sense modality stimulated, of the intensity of stimulus and the duration of the stimulus (4). In the case of each receptor system, R.T. is negatively accelerated decreasing function of intensity upto some maximum intensity value. Thereafter it either becomes discontinuous or asymptotic to a physiological limit. Under ideal conditions, the eye appears to be capable of responding even to a single photon (5) which is not the case with the ear. Light travels faster than sound. Response to visual stimulus will therefore be quicker. Reaction time increases with interference and even with minor distraction the auditory reaction time was found to increase by almost one and half times (6).

The auditory pathway is more polysynaptic than the visual pathway. At each synaptic junction, there is a modest (0.1 to 0.5 ms) and somewhat variable synaptic delay and therefore the conduction time is greater from the cochlea to the auditory cortex (10).

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ANNOUNCEMENTS

I. International Seminar on Recent Trends in Pharmaceutical Sciences, Ootacamund, February 1995 (last week). For more information, please contact :

Prof. Rajeev Dube,
Covenor
International Seminar on
"Recent Trends in Pharmaceutical Sciences"
Post Box No. 20
OOTACAMUND - 653 001
TAMIL NADU, INDIA

II. A Special Interest Group on Medical Informatics (SIGMI) has been formed under the aegis of Computer Society of India (CSI).

Those interested in any aspect of medical informatics (health information system, hospital information system, databases on medical measurements and health indicators, literature bases, biostatistical computation, graphics, medical lessons, expert systems, networking for consultation, computerized equipments, etc.) may please contact ;

Dr. A. Indrayan (Convenor, SIGMI)
Professor of Biostatistics and
Officer Incharge, Computer Centre
University College of Medical Sciences
Dilshad Garden, Delhi - 110 095
Phone : (011) 229-6637, (011) 228-2971, 72, 73
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Email : indrayanducm.ernet.in

III. Indian Association of Medical Journal Editors (IAMJE). This recently born Association is open only to Editors and Editorial Board Members of medical journals. For membership forms and other information, please contact Dr. V.K. Kapoor, Secretary IAMJE, Deptt. of Surgical Gastroenterology, SGPGIMS, Lucknow - 226 014

IV. The 12th Iranian Congress of Physiology and Pharmacology will be held at Tehran (Iran) from 6-9 November 1995. For more information, please contact ;

Prof. M. Mahmoudian
Secretary, 12th IPPC
Iran University of Medical Sciences
PO Box 15875-6171
TEHRAN, IRAN

V. Status Report in Pharmacology for the period 1988-1993 is to be published under the aegis of Indian National Science Academy, New Delhi. Investigators are requested to send before 30th July 1994, the reprints/references of their work published/accepted for publication during the period either directly to following authors or to Dr. (Mrs.) C. K. Chauhan.

1. Cardiovascular Pharmacology : Dr. Manjit Singh, Prof. & Head, Department of Pharmaceutical Sciences, Punjabi University, Patiala - 147 002.
2. Autonomic Pharmacology : Dr. K.G. Hemavati, Professor of Pharmacology, Medical College, Baroda - 390 001.
3. Tropical Diseases : Dr. V. Vijay Sekharan, Director Professor of Pharmacology, Madras Medical College, Madras - 600 003.
4. Autocoids, Pharmacology of Allergy and Anti inflammatory Agents : Dr. G.K. Patnayak, Head Div. of Pharmacology, Central Drug Research Institute, Lucknow - 226 001.
5. Clinical Pharmacology : Dr. R.D. Kulkarni, 284, Shrikrishna Niwas, B.A. Khimji Marg, Matunga, Bombay - 400 019.
6. Molecular Biology/Pharmacology : Dr. P. S. Chauhan, Head Genetic Toxicology, Bhabha Atomic Research Centre, Trombay, Bombay - 400 085.
7. Drug Metabolism, Gastrointestinal Pharmacology, Pharmacology of Peptic Ulcer, Neuropharmacology, Endocrine Pharmacology, Reproductive Pharmacology and Indigenous Drugs : Dr. Mrs. C.K. Chauhan, Prof. & Head, Department of Pharmacology and Clinical Pharmacology Unit, L.T.M. Medical College and L.T. M.G. Hospital, Sion, Bombay - 400 022.

VI. International Symposium on Gerontology and VIIth National Conference of Association of Gerontology of India : Will be held from 14-16 Nov. 1994 at New Delhi, India. For details, contact Professor Vinod Kumar, Department of Medicine, All India Institute of Medical Sciences, New Delhi - 110 029, India. Telephone (11) 661123, Fax (11) 6862663.

VII. Second one day 'CME ON EPILEPSY' will be held on NOVEMBER 12th, 1994 at K.G. Medical College, Lucknow. For further details kindly contact Organising Secretary : Dr. Atul Agarwal, Department of Neurology, K.G.'s Medical College, Lucknow - 226 003.

VIII. International Symposium on Cell Signaling and Ovo-implantation and Sixth Annual Meeting of the Indian Society for the Study of Reproduction and Fertility. November 21 to 24, 1994, All India Institute of Medical Sciences, New Delhi.

The lectures include : Cellular Signals, Integrins and Adhesion Molecules, Embryogenesis, Embryo Genomic Expression, Endometrial Receptivity, Peri-implantation Events, IVF-ET, Cell Biology of Regulation of Gonadal Function. These lectures will be presented by renowned scientists and experts from India, UK, USA, Europe, China and other South-East countries. There will also be poster sessions in these topics.

For details please write to : Dr. J. Sengupta. Organizing Secretary, Department of Physiology, All India Institute of Medical Sciences, New Delhi - 110 029, India.