



Reaction Time of Female with Admiration to Personality of Stimulus and Age

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Abstract

To react to stimulus is a fundamental demand of life. In the field of games & sports reaction ability is a determining factor of performance. So, the reaction time occupies an important area of study and research in physical education and sports. A number of studies have been conducted in the psycho-physiological area to analyze the variation in reaction ability of individuals with respect to nature of stimulus and age. Results indicate that reaction time of an individual varies with change of nature of stimulus and increase of age. Present study was planned to analyze this change in reaction time for different age group of females using three different types of stimuli – visual, auditory, and tactile. A total of 800 female subjects of 05 to 70 years of age were selected as subjects. They were divided into 16 equal sized age groups of 50 subjects each. The reaction time was measured by multipurpose digital electronic reaction timer for auditory, visual, and tactile signals as stimuli. Results showed that the mean values of auditory reaction time were the lowest for all the age groups. Results also indicated that with different stimuli the reaction time decreased with increase of age up to 20-25 years and thereafter the reaction time increased gradually with increase of age. The trend of change in reaction time with age for all the three stimuli was similar. The results have been supported by many other research studies. Welford (1980) and Galton (1899) reported from their study that the mean auditory reaction time varied from 140 to 160 ms and visual reaction time varied from 180 to 200ms. Welford (1977), Jevan and Yan (2001), Luchies et al. (2002) and Rose et al. (2002) found the changes in reaction time with respect to age from infancy to late sixty.

Keywords: Psycho-physiological, Auditory, Visual, and Tactile.

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Introduction

To react to an external stimulus is a basic property of life and living being. To react to a stimulus is of fundamental importance for adaptation with the environment. So, the ability to react is very important for all living beings. Reaction time influences the reaction ability. Reaction time has been defined as the time elapsing between the onset of a stimulus and the onset of a response to that stimulus. Reaction time has become an important area of research for experimental psychologists since middle of 19th Century. The researchers have identified different types of reaction time such as simple reaction time (Luce, 1986), recognition reaction time (Welford, 1980) and choice reaction time (Donders, 1868). For about 120 years the accepted mean values of reaction time for college population have been about 0.19s for light and 0.16s for sound respectively (Brebner and Welford, 1980).

Reaction time is a measure of how quickly an organism can respond to a particular stimulus. Reaction

time has been widely studied, as its practical implications may be of great consequence, e.g. a slower than normal reaction time while driving can have grave results. Many factors have been shown to affect reaction times, including age, gender, physical fitness, fatigue, distraction, alcohol, personality type, and whether the stimulus is auditory or visual.

The model for information flow within an organism can be represented in this way:

Stimulus -- Receptor -- Integrator -- Effectors -- response.

Sensory neurons convert a stimulus into an electro-chemical signal, which flows the length of the sensory neuron(s), then through a neuron or neurons of the central nervous system, and then through the length of the motor neuron(s). Generally, motor neurons will cause a muscle to contract or a gland to secrete a substance. Reactions that involve only the receptor, the spinal cord, and the effectors, are faster than those which involve processing in the brain. Reactions which only travel to, through, and from the spinal cord are often called spinal reflexes or cord-mediated reflexes; withdrawing one's hand from a hot stove is an example of such a reflex. In 'simple reaction time' experiments,

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there is only one stimulus and one response. Catching a dropped stick, or hitting a button when a light changes are examples. In 'recognition reaction time' experiments, there are symbols to respond to and symbols to be ignored. There is still only one correct stimulus and one response. An example would be catching a dropped stick with a word cue, while having to ignore other spoken words which are not cues. In 'choice reaction time' experiments, there are multiple stimuli and multiple responses. The reaction must correspond to the correct stimulus. Typing a letter which matches a printed letter Prompt is an example of this type of experiment.

Methodology

A total of 800 female subjects taking 50 from each of sixteen age groups of 05 to 07 yrs, 08 to 10 yrs, 11 to 12 yrs, 13 to 15 yrs, 16 to 17 yrs, 18 to 20 yrs, 21 to 25 yrs, 26 to 30 yrs, 31 to 35 yrs, 36 to 40 yrs, 41 to 45 yrs, 46 to 50 yrs, 51 to 55 yrs, 56 to 60 yrs, 61 to 65 yrs and 66 to 70 yrs. were randomly selected as subjects. Three different types of stimuli were used to measure the reaction time. These were visual stimulus,

auditory stimulus, and tactile stimulus. Reaction time was measured by a multipurpose digital electronic reaction timer capable of measuring reaction time for one hundredth part of a second. The subjects were tested for reaction time in the afternoon between 4-6 p.m. At first the subjects of a group were assembled in a place and clearly informed about the purpose of the study. Later on, the method to measure reaction time was explained. The visual stimulus was used at first to measure reaction ability. It was followed by the auditory stimulus and at last the tactile stimulus. The collected data were statistically analyzed using ASP software. For descriptive statistics Mean and Standard Deviation were computed. Analysis of variance was done to test the significance of the inter group variation. Post hoc test was also conducted to find out the exact location of the inter group variation.

Results

The mean values of reaction time for different age groups of subjects for three different types of stimuli have been presented in Table-I.

Table I. Mean and SD of Reaction Time of three different Stimuli for Female Subjects

Sl. No.	Age Group (yrs)	Reaction Time (Sec.)		
		Visual	Auditory	Tactile
1	05 – 07	0.274 ± 0.043	0.255 ± 0.039	0.290 ± 0.040
2	08 – 10	0.270 ± 0.040	0.258 ± 0.039	0.287 ± 0.044
3	11 – 12	0.252 ± 0.038	0.236 ± 0.029	0.244 ± 0.039
4	13 – 15	0.234 ± 0.039	0.224 ± 0.033	0.252 ± 0.031
5	16 – 17	0.236 ± 0.037	0.228 ± 0.037	0.244 ± 0.040
6	18 – 20	0.235 ± 0.034	0.211 ± 0.032	0.230 ± 0.032
7	21 – 25	0.210 ± 0.037	0.195 ± 0.036	0.206 ± 0.031
8	26 – 30	0.219 ± 0.030	0.209 ± 0.026	0.226 ± 0.033
9	31 – 35	0.243 ± 0.040	0.231 ± 0.039	0.257 ± 0.036
10	36 – 40	0.262 ± 0.040	0.253 ± 0.037	0.265 ± 0.040
11	41 – 45	0.275 ± 0.034	0.262 ± 0.036	0.285 ± 0.036
12	46 – 50	0.290 ± 0.026	0.270 ± 0.025	0.295 ± 0.029
13	51 – 55	0.292 ± 0.037	0.276 ± 0.039	0.308 ± 0.031
14	56 – 60	0.298 ± 0.036	0.278 ± 0.034	0.307 ± 0.034
15	61 – 65	0.310 ± 0.029	0.303 ± 0.033	0.322 ± 0.030
16	66 - 70	0.341 ± 0.033	0.329 ± 0.033	0.348 ± 0.036

It is seen from the table that the mean values of reaction time was different for different forms of stimulus. The mean values were lowest for auditory stimulus and highest for tactile stimulus almost for the

sixteen different age groups. So, it is evident that the reaction time against auditory stimulus was quickest and that for tactile stimulus was the slowest.

Figure I. Indicates the variation in reaction time with respect to the nature of stimulus and age for female subjects.

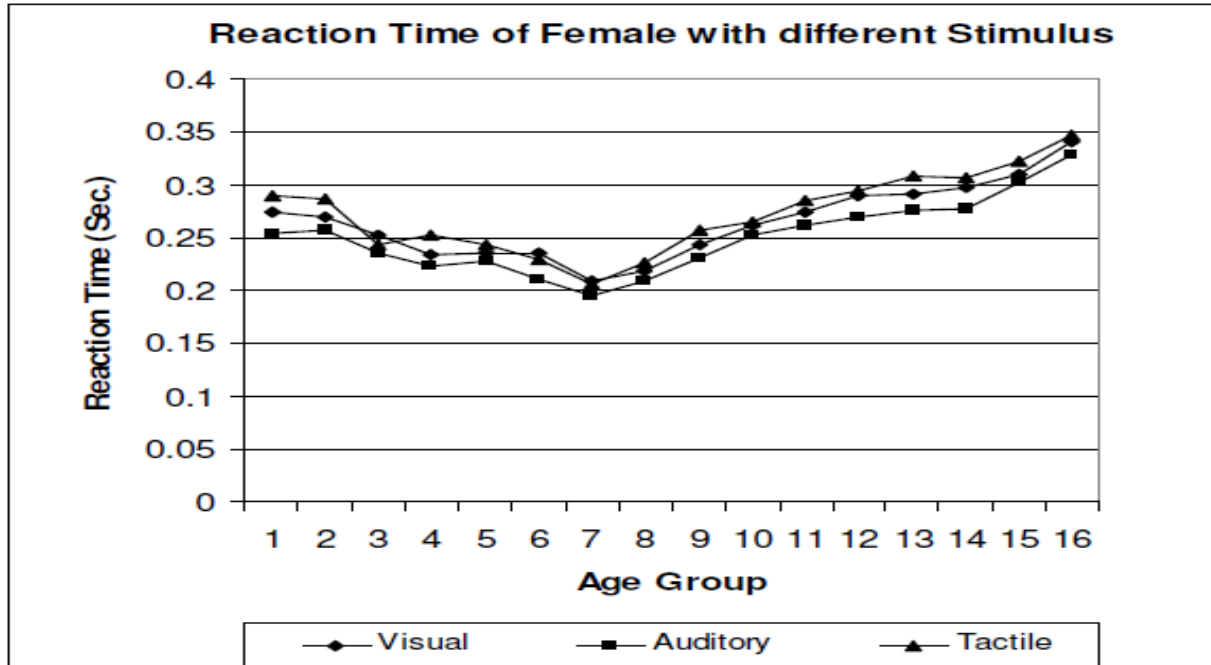


Table II. ANOVA for the Mean Values of Different Types of Stimuli

Gr. No.	Age group	F - value	Probability
1	05 – 07	9.61	0.0001*
2	08 – 10	6.47	0.002*
3	11 – 12	2.06	0.13
4	13 – 15	8.10	0.0004*
5	16 – 17	2.39	0.09
6	18 – 20	7.92	0.0005*
7	21 – 25	2.42	0.09
8	26 – 30	4.12	0.01*
9	31 – 35	5.48	0.005*
10	36 – 40	1.25	0.29
11	41 – 45	5.04	0.007*
12	46 – 50	12.43	0.00001*
13	51 – 55	10.03	0.00008*
14	56 – 60	10.16	0.00007*
15	61 – 65	4.86	0.009*
16	66 - 70	4.21	0.01*

Discussion on Findings

It is clear from the table values that in twelve out of sixteen age groups, the differences among mean values of reaction time with three different types of stimuli were statistically significant. Results of the post hoc test indicated that the mean value of reaction time with auditory stimulus was significantly lower than those of both visual and tactile stimuli. Similar results have been reported by Welford(1980) and Galton (1899). As per their report the mean auditory reaction time varied from 140 to 160ms, whereas the mean value of visual reaction time varied from 180 to 200ms. As the explanation it was mentioned that the auditory stimulus took 8 to 10 ms to reach the brain (Kemp et al., 1973) but the visual stimulus takes 20 to 40 ms for that (Marshall et al., 1943).The table values also indicate a definite pattern of change in reaction time with respect to age. The mean reaction time decreased with increase of age up to the level of 21-25 years. The mean reaction time became the minimum at this period. After that, the mean reaction time increased gradually with increase of age. This pattern of range in reaction time was same for all the three types of stimuli.

Conclusion

Within the limitation of the present study following conclusions were drawn:

1. The auditory stimulus produces quicker reaction than both of visual and tactile stimuli.
2. The visual stimulus is better in producing quicker reaction than the tactile stimulus.
3. The reaction time decreases with the increase of age up to the age of 21-25 years.
4. The reaction time becomes lowest showing quickest reaction ability of an individual during 21-25 years of age

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