Influence of practice on visual reaction time

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ABSTRACT

Background: The present study was aimed to see the effect of practice on visual information processing speed. Reaction time is one of the important physiological parameters, which gives information how fast and quickly person responds. Reaction is purposeful voluntary response to different stimuli as visual stimuli. Visual reaction time (VRT) is the time required to response to visual stimuli. Materials and Methods: The VRT was measured by the multiple choice apparatus in subjects. Simple reaction time and choice reaction time measured. Reaction time was measured in two sessions. In the first session, VRT was measured without practice of task and in the second session VRT was measured after practice of task. The results were statistically analyzed and were recorded as mean ± standard deviation and Student’s paired t-test was applied to check the level of significance. Result and Conclusion: In the present study, we found that VRT was less after practice for both simple and choice VRT tasks. Reaction time decreases by practice. Skills can be improved by practice. In daily life majority of work is done by the use of visual information. By the practice of an important task time required for stimulus identification and response can be decreased. Practice is useful for driving vehicles. It is helpful to students, as they have identification of bones, instruments, graphs and viva questions in examination of various medical subjects. Hence by practice students can identify, understand and answer quickly.

Keywords: Choice, practice, reaction time, simple, visual

Introduction

Human body responses to the number of external environmental stimuli of different modalities. Human body gives a desired and purposeful voluntary response to stimulus. There is a certain time period between application of stimulus and appropriate motor response. There are various sensory modalities and human body responses to various stimuli with different speed. This plays an important role in everyday life.

Reaction time is defined as interval of time between presentation of stimulus and appearance of appropriate voluntary response in a subject.[1] Visual reaction time (VRT) is a time required to respond to visual stimuli. Reaction time becomes an important component of information processing as it indexes speed of stimulus processing and response programming.[2] Reaction time is one of the important physiological parameter which gives information how fast and quickly person responds.

Reaction time is having mainly two components.[3]
1. Mental processing time: Which is the time required for responder to perceive stimulus, identifying and analyzing of stimulus and decide the proper motor response.
2. Movement time: It is the time required to perform the movement after selection of response.

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1. Simple reaction time: Here there is one stimulus and one response.
2. Recognition reaction time: Here there are some stimulus that should be responded to and other that should not get a response.
3. Choice reaction time: Here, there are multiple stimulus and multiple responses.

By the practice of motor movements, muscular coordination and speed of movement can be improved which would improve movement time. Long lasting improvement in performing skilled motor movements can be achieved by training and retraining and repeated practicing.[7-9] The present study is carried out to see the effect of practice on visual information processing speed which is analyzed by measuring VRT. We compare VRT before practice and after practice for simple and choice reaction time task.

Materials and Methods

The study was conducted among 50 male healthy subjects of Bhavnagar region. Subjects of 17-20 years included in the study. Personal history and medical history of all subjects was collected in pre-designed performa. Medical history was taken to rule out any medical or surgical disease which would affect reaction time of individual. After taking consent, reaction time was measured with multiple choice apparatus 653MP (reaction time apparatus), an Inco Company Product (Ambala), with accuracy of ± 0.001 s. VRT was measured under two categories:
1. Simple reaction time, where subject has to respond to visual stimuli by pressing key and
2. Choice reaction time, the subject had to respond to different coloured visual stimulus by pressing respective key.

Study was conducted in two sessions. In the first session, visual stimuli were given for 3 times and minimum reaction time was taken as a final reaction time for that sensory modality of that subject. In the second session, subjects were given practice session in which the subject responded to visual stimuli until near about constant values of reaction time come and then visual stimuli were given for 3 times and minimum reaction time was taken as a final reaction time for that sensory modality of that subject. In both sessions, simple reaction time and choice reaction time was measured.

Data was collected and was statistically analyzed. Reaction time was taken as mean ± standard deviation. The level of significance between before practice VRT and after practice VRT was tested by Students t-test (Paired). The observation was taken as a significant of $P < 0.05$.

Result

VRT was measured in seconds for both simple and choice VRT task.

VRT found to be significantly ($P < 0.05$) less in after the practice session when compared with before practice session for simple reaction time task [Table 1].

VRT found to be significantly ($P < 0.05$ ) less in after the practice session when compared with before practice session for choice reaction time task [Table 2].

Discussion

In the present study, we found that VRT was less after practice for both simple and choice VRT tasks which means that reaction time decreases after practice. This is in parallel with previous studies concluding that a practice decreases reaction time.[10,11]

Several possible mechanisms have been described for this. People can acquire new motor skills and improve them with practice.[12] Learning of motor skill practice influenced on information processing.[10] With repetition of motion, person’s conscious effort is decreased and the motion becomes more and more automatic.[13] Motor circuits of basal ganglia play a key role in the automatic execution of motor tasks.[14]

It was concluded in other study that mental practice influences the learning of cognitive activities.[15] Hence

<p>| Table 1: Difference in simple visual reaction time in before the practice session and after the practice session |</p>
<table>
<thead>
<tr>
<th>Simple VRT (before practice)</th>
<th>Simple VRT (after practice)</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.16190±0.02624</td>
<td>0.14190±0.02624</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

VRT = Visual reaction time

<p>| Table 2: Difference in choice visual reaction time in before the practice session and after the practice session |</p>
<table>
<thead>
<tr>
<th>Choice VRT (before practice)</th>
<th>Choice VRT (after practice)</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.30368±0.07461</td>
<td>0.26958±0.06699</td>
<td>0.0003</td>
</tr>
</tbody>
</table>

VRT = Visual reaction time
practice is useful in the skills having cognitive factors. Since information processing is also a mental process that affects response time, it is also influenced by practice. Practice is an activity related to the nervous system and it can have a direct influence on memory and so it results in progress in performance.

Mental practice can effectively cause motor improvement and performance. In another study, it was found that reaction time to a visual stimulus decreased with 3 weeks of practice. It was observed in other study that training older people to resist falls by stepping out to stabilize themselves did improve their reaction time. The study of the response time for the pre-test and post-test in the mental practice group revealed that mental practice has a positive impact on response time so that it improves the response time of the subjects.

It was found in the other study that in karate, more experienced practitioners had shorter reaction times. One study concluded that training on a complex task both shortened reaction time and improved accuracy. Mental imagery and practice is an activity related to the nervous system and it can have a direct influence on memory and so it results in progress in performance.

Conclusion

In daily life majority of work is done by use of visual information. VRT decreases with training and practice. This information can be useful in day-to-day regular life. By the practice of an important task time required for stimulus identification and response can be decreased. Person should have adequate practice of vehicle driving before he travels in traffic. It is helpful to students, as they have identification of bones, instruments, graphs and viva questions in examination of various medical subjects. So by practice students can identify, understand and answer quickly. This information is useful in physically reactive sports such as basketball, car racing. Apart from physical fitness, in sports, players must be quick reactive in different stages of the game. This reaction time can be improved by practice. Coach can improve reaction time of players by practice and improve their performance. Information from the study also useful in reactive jobs like army personals and fighter airplanes pilots. Here also by practice not only accuracy but fast reactivity improves which is utmost required for the army and air force personnel when they are in the face to face with the enemy.

References


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