

# ANALYSIS OF RELIABILITY OF AUDIO VISUAL REACTION TIME MACHINE AND RULER DROP TEST FOR ASSESSING REACTION TIME

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## Abstract

**Background:** Reaction time is the ability to respond quickly to a stimulus. Athletes can improve reaction times by training to make the right choices (choice reaction). Simple reaction time is very important in activities such as 100 meter sprint on the track or in the pool. There are various methods to measure reaction time but most of these methods require expensive machines or computer software. Other common method to measure reaction time is the meter stick test or the Ruler Drop Test. **Objective:** To prove intrarater reliability of measuring reaction time with audio visual reaction time machine and ruler drop test. **Methods:** Design: Analytical study. Subject: Total 92 female subjects were taken for the study. Informed consent was obtained. Reaction time measured with audio visual machine and Ruler Drop Test. Reaction time was noted. After a gap of one day both the test were done again. Reaction time was measured. Same procedure was repeated twice and data was noted. **Result:** Interclass correlation method (ICC) was used to prove intrarater reliability of the tests to measure reaction time. Intrarater reliabilities for audio visual reaction time machine (ICC=0.889) were higher than for ruler drop test (ICC=.743). **Conclusion:** These results show that both these tests are highly reliable for measuring reaction time and ruler drop test can also be used in cases where audio visual reaction time machine is not present.

**Key words:** Reaction time, Ruler Drop Test, Audio visual reaction time machine

## Introduction:

There are various methods to measure reaction time but most of these methods require expensive machines or computer software. Other common method to measure reaction time is the meter stick test or the Ruler Drop Test. The present study is focused to check the reliability of Audio Visual Reaction time machine and Ruler Drop Test the test is done on 100 normal college going students. Mark Dilworth wrote about the importance of reaction time in sports. Athletes can improve reaction times by training to make the right choices (choice reaction). Simple reaction time is very important in activities such as 100 meter sprint on the track or in the pool. Researchers in France performed a study that proves reaction time is a skill that can be improved and/or learned. The study looked at world class sprinters reaction times. The main findings were these: Reaction times were quicker as the races shortened (from 400m to 60m), Sprinters in shorter races (60m to 100m) anticipated the starter's gun while runners in longer distance races where happy to respond to the sound of the gun shot. Hogene Kim, James T. Eckner, James K. Richardson,

James A. Ashton-Miller, University analysed the reliability of ruler drop test for measuring choice reaction time.

### **Research question**

Does any intra rater reliability exist for measuring reaction time with audio visual reaction time machine and ruler drop test?

### **Aim of the study**

To prove intra rater reliability of measuring reaction time with audio visual reaction time machine and ruler drop test.

### **Significance of the study**

Reaction time is important in many sports such as track sports, archery, swimming etc. By measuring reaction time in an athlete, his/her performance can be improved significantly as it can provide feedback. Ruler drop test can be effectively and easily used in the field and is inexpensive and portable.

### **Methodology:**

#### **Population**

School of Physiotherapy, DPSRU

#### **Samples**

A sample of 100 students who fulfilled the criteria of inclusion were randomly included in the study

#### **Place**

Research Laboratory, School of Physiotherapy, DPSRU

#### **Design**

Analytical and comparative study

#### **Sampling**

Random sampling

#### **Instrumentation**

- Ruler
- Reaction time machine
- Table
- Paper
- Pen

#### **Inclusion criteria**

- Female subjects

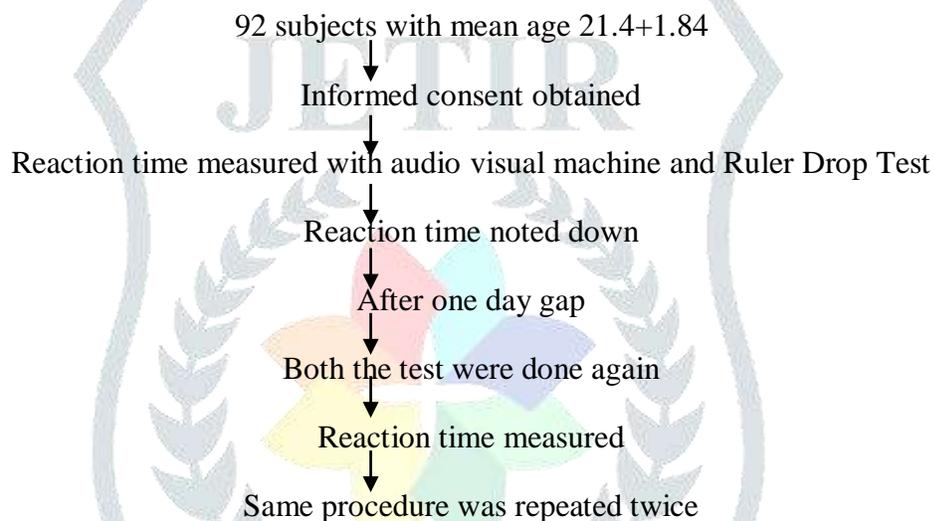
- Age group 18-25
- No known neurological disorder
- No known psychological disorder

### Exclusion criteria

- Subjects on any medications
- Fever

### Procedure

92 subjects with mean age  $21.4 \pm 1.84$  were taken as subjects where an individual informed consent was taken from each subject. Reaction time was measured with both methods and recorded and documented. After a gap of a day the procedure was repeated again twice and recorded.



### Data Analysis

The data were analysed using statistical tests, which were performed using SPSS 17.0 software package. Interclass correlation method (ICC) was used to prove intra rater reliability of the tests to measure reaction time. 0.05 level of significance (p) was used for all procedures.

### Result

Mean and SD of AV reaction time and Ruler drop test at day 1 and day 2 for the subjects were included in the study

| Variable         | Day 1  |       | Day 2  |       |
|------------------|--------|-------|--------|-------|
|                  | Mean   | SD    | Mean   | SD    |
| AV Reaction Time | 0.6311 | 0.078 | 0.6236 | 0.078 |

| Variable               | Day 1  |        | Day 2  |        |
|------------------------|--------|--------|--------|--------|
|                        | Mean   | SD     | Mean   | SD     |
| <b>Ruler Drop Test</b> | 0.2142 | 0.0211 | 0.2059 | 0.0198 |

### Reliability statistics for Audio Visual Reaction time machine

|                                 |       |
|---------------------------------|-------|
| Common Variance                 | 0.006 |
| True Variance                   | 0.005 |
| Error Variance                  | 0.001 |
| Common Inter-Item Correlation   | 0.797 |
| Reliability of Scale            | 0.887 |
| Reliability of Scale (Unbiased) | 0.889 |

### Reliability statistics for ruler drop test

|                                 |              |
|---------------------------------|--------------|
| Common Variance                 | 0.000        |
| True Variance                   | 0.000        |
| Error Variance                  | 0.000        |
| Common Inter-Item Correlation   | 0.584        |
| Reliability of Scale            | 0.737        |
| Reliability of Scale (Unbiased) | <b>0.743</b> |

## Discussion

The data revealed an excellent or high reliability for two tests i.e. audio visual reaction time machine and ruler drop test. The type of reliability measurement taken was intra-rater. Intrarater reliabilities for audio visual reaction time machine (ICC=0.889) were higher than for ruler drop test (ICC=.743). These results show that both these tests are highly reliable for measuring reaction time and ruler drop test can also be used in cases where audio visual reaction time machine is not present. The mean meters tick simple reaction time of 210 msec. was significantly faster than the mean machine simple reaction time of 627 milisec. Brebner and Welford (1980) have noted, the central area of eye produces faster reaction times than the edges. Central area of eye is the area where detectors are cones, and in edges the rods are dominant ones. These parts also have different roles in visual perception as noted in Money's (1993) paper where the difference is summarized as:

- Central Vision, serves to answer the question "what"

· Peripheral Vision, serves to answer the question “where”

### Limitations of the study

- A large sample size could have brought more clarity in observed trends.
- An error in recording of the distance from which the subject grabs the ruler could have caused some bias

### Future Scope

- The study may be done with different age group
- The study may be done with athletic population
- Gender bias can be included in the study
- Choice reaction time measurement reliability can be calculated with the instruments used in this experiment.
- Reliability of visual as well as auditory reaction time can also be measured.

### Conclusion

It can be concluded that both tests have intrarater reliability but meter stick is faster than the machine.

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