**Reaction Time**

Introduction

Human reaction time is a critical consideration in aerospace system design and operation. Reaction time is influenced by multiple human factors, ranging from stimulus to complexity of the appropriate response. Common aerospace systems in place today utilize both visual and audible indictors and are positioned within the operator environment at precise locations in order to maximize reaction time.

In this activity you will investigate reaction time based on both visual and audible cues. You will conduct individual investigations and create a classroom data set.

Equipment

* Engineering notebook
* Metric ruler

Procedure

During this activity both team members will test and evaluate their reaction time using various scenarios. To facilitate the activity, both team members will serve as reaction tester and reaction test participant. Team member #1 will serve as reaction tester and team member #2 will serve as reaction test participant. After the completion of all reaction test scenarios, team members will switch roles.

1. Team member #1 will obtain all required activity equipment.
2. Identify a team location on the perimeter wall of the classroom with at least a two arm’s length distance between your group and any other group.
3. Team member #1 will position themselves with their back facing the perimeter wall.
4. Team member #2 will position themselves directly in front of team member #1 facing the perimeter wall.
5. The reaction test is evaluated based on distance measurements obtained using a metric ruler in free-fall.
6. After both team members are properly positioned, the reaction tester will administer 5 trials each of four different testing scenarios. Utilize the following table to record your team’s testing data. Record data in centimeters and then convert to reaction time.
7. Collect test data.

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| Testing procedureFor each testing scenario, the reaction tester will hold the metric ruler within arm’s length and eye level of the testing participant. The participant will position their thumb and index finger around the bottom of the ruler. The participant should not touch the ruler. Depending on the scenario, the tester will release the ruler. The testing subject will attempt to catch the ruler using their thumb and index finger. Once the ruler has been caught, the distance the ruler traveled is recorded. Travel distance is the distance between the test participant’s starting finger position and the finger position at which the ruler is caught. |
| Team member #1: |
|  | Distance measurement (cm) |
| Scenario | Trial 1  | Trial 2 | Trial 3 | Trial 4 | Trial 5 |
| Eyes open |  |  |  |  |  |
| Eyes closed |  |  |  |  |  |
| Eyes closed with release beep |  |  |  |  |  |
| Eyes open with release beep |  |  |  |  |  |
| Team member #2: |
|  | Distance measurement (cm) |
| Scenario | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 |
| Eyes open |  |  |  |  |  |
| Eyes closed |  |  |  |  |  |
| Eyes closed with release beep |  |  |  |  |  |
| Eyes open with release beep |  |  |  |  |  |

1. Convert test data into reaction time data.
	1. Recall that distance traveled by an object can be calculated by

$$ D=D\_{o}+v\_{o}t+\frac{1}{2}at^{2}$$

* 1. Given the data collected as well as known initial testing data, the equation can be rearranged to calculate time.
	2. Convert all reaction data from distance data to time data. Make sure to convert to compatible units.

|  |
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| Team member #1: |
|  | Reaction time (seconds) |
| Scenario | Trial 1  | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Average |
| Eyes open |  |  |  |  |  |  |
| Eyes closed |  |  |  |  |  |  |
| Eyes closed with release beep |  |  |  |  |  |  |
| Eyes open with release beep |  |  |  |  |  |  |
| Team member # 2: |
|  | Reaction time (seconds) |
| Scenario | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Average |
| Eyes open |  |  |  |  |  |  |
| Eyes closed |  |  |  |  |  |  |
| Eyes closed with release beep |  |  |  |  |  |  |
| Eyes open with release beep |  |  |  |  |  |  |

1. Share your team’s reaction time data with your class.
2. Record the classroom average reaction time for each scenario in the table below.

|  |  |
| --- | --- |
| Scenario | Classroom average reaction time (seconds) |
| Eyes open |  |
| Eyes closed |  |
| Eyes closed with release beep |  |
| Eyes open with release beep |  |

**Conclusion**

1. When designing an aerospace system that requires situational information processing or reaction of information, what type of warning devices should be utilized and why?
2. During the reaction time experiment, you used your thumb and index figure to catch the ruler. Would your data have changed if you used other appendages (e.g., both hands)? Explain your conclusion.
3. Describe the importance of instrument and control placement as it relates to reaction time.