

The RT-2S Simple Reaction Time Tester: Test/Retest Reliability

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PURPOSE

- The purpose of this study was to examine the test/retest reliability of the RT-2S brake reaction timer.
- The establishment of a reliable and valid reaction time tester is critical for occupational therapists who evaluate drivers for safe mobility in a motor vehicle.

DESCRIPTION

- A brake reaction timer may assist in determining a driver's ability to safely operate a motor vehicle. The previously used AAA brake reaction timer, which has established norms with reliability and validity, is no longer being manufactured which suggests the need for a reliable reaction timer.
- The RT-2S brake reaction timer is a lightweight and portable device that assists driving evaluators in assessing driving safely.
- Brake reaction time is measured as the time of the stimulus to the time an individual fully depresses the brake pedal. The researcher randomly controls the illumination of the red and green lamps.

DESIGN

- Simple test/retest design
- Independent Variable: Age, gender, race, health status
- Dependent Variable: Reaction Times
- Participants brake reaction time is tested one day and then retested 3-14 days later

SAMPLE

- Convenience Sample: Data was collected from health fairs, senior events, fitness centers, personal contacts, college students and faculty at East Carolina University.
- Age, time one and time two averages, and standard deviation are depicted in Table 1.
- Prior to the study, the researchers obtained institutional Review Board approval.

REFERENCES

Ganz, S. B., Levin A. Z., Peterson, M. G., Ranawat, C. S. (2003). Improvement in driving reaction time after total hip arthroplasty. *Clinical Orthopaedics and Related Research*, 413, 192-200.

PROCEDURES

1. All participants given the same instructions regarding the use of the RT-2S brake reaction time simulator system that has a car brake and accelerator pedal before the test begins.
2. Each participant will be instructed to place his/her right foot on the accelerator and keep it depressed to the floorboard sufficiently to keep a green light lit on the driving reaction time simulator.
3. Each participant will be instructed that as soon as a red light appears, to place their right foot on the brake pedal as quickly as possible.
4. Each participant will be instructed to move their foot back to the accelerator pedal after they press the brake pedal (Figure 1).
5. The timing of illumination between the green and red light will be controlled by the researcher.
6. Each participant will be given 3 practice trials then 8 test runs.
7. Subjects will be thanked for their participation.
8. Participants will be asked to agree to a time and place where a second measure of the brake reaction can be repeat and recorded. This will be between 3 and 14 days.

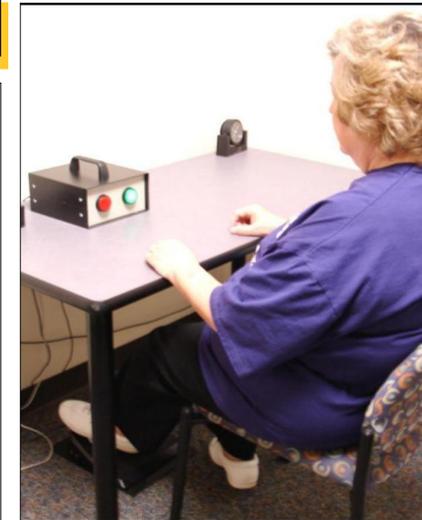


FIGURE 1



FIGURE 2

The RT-2S Simple Reaction Timer (Figure 2) consists of an acceleration pedal, brake pedal, one green light, and one red light. It also has a stop clock display that enables the tester to measure reaction time.

AGE GROUP	N	Minimum	Maximum	Mean	Std. Deviation	Correlation
20 years or less	Average BRT Time One	6	0.36	0.72	0.49	0.13
	Average BRT Time Two	6	0.35	0.60	0.45	0.09
21 to 35	Average BRT Time One	66	0.25	0.59	0.45	0.06
	Average BRT Time Two	66	0.26	0.59	0.45	0.07
36 to 55	Average BRT Time One	20	0.33	0.57	0.44	0.06
	Average BRT Time Two	20	0.36	0.53	0.43	0.05
56 to 65	Average BRT Time One	12	0.31	0.68	0.49	0.09
	Average BRT Time Two	12	0.30	0.61	0.47	0.08
66 and above	Average BRT Time One	15	0.40	0.73	0.54	0.12
	Average BRT Time Two	15	0.36	0.69	0.50	0.11

TABLE 1

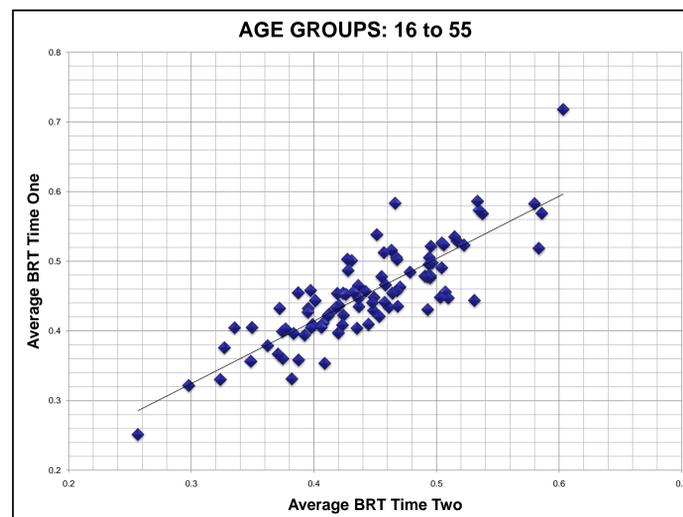


TABLE 2

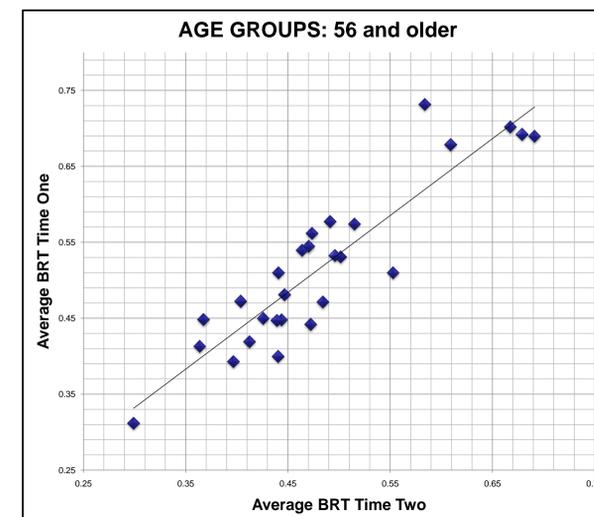


TABLE 3

RESULTS

RT-2S Brake Reaction Timer

- Correlation displayed test retest reliability was 0.871, which is significant $p < 0.01$. Refer to table 1 for age group correlations.
- Based on an ANOVA, there was a significant difference among age groups. The difference was between the over 66 age group and the 21-35 age group ($p = 0.003$) and between the over 66 group and the 36-55 group ($p = 0.005$).
- The post hoc test found a significant difference between the over 66 and 21 to 35 group and between the over 66 and 36 to 55 group.
- Tables 2 and 3 show a comparison by age group between test and retest.
- Significant gender differences: Males demonstrated faster speeds in time two when compared to females. Time 1, M vs. F ($p = .095$), Time 2, M vs. F ($p < .040$).

DISCUSSION

- Research showed that brake reaction time averages increased with age and both brake reaction timers.
- There was a statically significant difference between both young and old subjects with both times.
- Average brake reaction times for males were faster than females on the second trial. There was an increase in variance as age increased. There was a significant difference among the age groups.
- As a person gets older, there is more variability of speed of processing, with more younger subjects, the test/retest would be higher.

Does the RT-2S reliably test brake reaction of individuals consistently, reliably, and validly over time?

- One could argue that because there is no established or universal safe driving reaction time (Ganz, Levin, Peterson, & Ramwat, 2003), one cannot say with certainty whether the RT-2S can measure validly.
- The data shows consistent patterns between test and retest, strongly suggesting that the RT-2S is a reliable instrument.

CONCLUSION

- The RT-2S brake reaction timer is a useful tool for Occupational Therapists who evaluate driving.
- It is recommended that the RT-2S brake reaction timer be used as part of a multi-disciplinary evaluation rather than used alone.
- Additional studies that included a greater sample size and a more diverse age sample would be ideal.