SYSTEM RESPONSE TIMES IN A SIMULATED DRIVING TASK: EFFECTS ON PERFORMANCE, VISUAL ATTENTION, SUBJECTIVE STATE AND TIME ESTIMATION

by

TANJA BAUER

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SUPERVISOR: DR HC JANEKE

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ABSTRACT

The utilisation of navigation systems in cars has given rise to road safety concerns, and the design and functionality of such systems must therefore be adjusted to the users' needs, since they have to divide their attention between driving and the operation of the navigation system. The study was aimed at finding the optimum system response time (SRT) which would enable a driver to focus as much as possible on the road while attaining an efficient task completion time using an electronic navigational system. The research project consists of two separate experiments and was completed by 10 subjects. Experiment 1 included a temporal reproduction task and a secondary memory task. The subjects had to memorise two symbols and then reproduce six time spans ranging from 1 to 30 s to provide a baseline measurement of their time estimation abilities. Experiment 2 consisted of a simulated automobile driving task. While driving in the simulator the subjects completed a memorising task displayed on a touch screen. The task was presented with seven different system response times (SRTs) ranging from 0 to 30 s. The effects of different SRTs on the eye movement from road to monitor, regarding the duration of fixation and the frequency of change were evaluated. The distribution of gazes to the secondary task was analysed to provide information about the time estimation performance in the driving simulator. Other dependent variables tested were the accuracy of selected items, memory game performance, drive performance and the subjective state of the test person. The results of this study can be employed to find the optimum duration of inter-task delays for in-vehicle technical devices.

Key Terms

System Response Time (SRT); inter-task delays; duration estimation; simulated driving task.

Declaration

Student no: 3433-607-9

I declare that “System response times in a simulated driving task: effects on performance, visual attention, subjective state and time estimation” is my own work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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SIGNATURE DATE

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LIST OF ABBREVIATIONS

ACC	Autonomous Cruise Control
SRT	System Response Time
SET	Scalar Timing Model
SOA	Stimulus Onset Asynchronies
ADHD	Attention Deficit / Hyperactivity Disorder
BPD	Borderline Personality Disorder
IQ	Intelligence Quotient
CA	Catecholamine
DA	Dopamine
DRL	Differential Reinforcement of Low rates
FI	Fixed Interval
FR	Fixed Ratio
TSC	Theory of Stochastic Counters
JND	Just Noticeable Difference
PRP	Psychological Refractory Period
TSE	Time's Subjective Expansion
STM	Short Term Memory
LTM	Long Term Memory
SBs	Significant Brakes
SDPA	Standard Deviation of Positive Acceleration
SDNA	Standard Deviation of Negative Acceleration
SMs	Steering Movements
COL	Crossing of Outside Line per mile on total duration
SDLP	Standard Deviation of Lane Position
NLE	Number of Lane Exceeds
SD	Standard Deviation