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DRIVER REACTION TIME

Within the driving task, reaction time in response to a particular potential traffic hazard is the time required from the point of initial detection of the hazard in one's field of view, through various stages of evaluation and decision making, to the time that vehicle control components are actuated, which includes the time necessary to move hands and feet to the appropriate vehicle controls (such as movement of one's foot to the brake pedal). *Perception* involves the process of not only detecting an object in a general sense, but also *comprehension of its significance*. Perception must occur before reaction can take place. Most objects perceived in the driving environment do not receive specific attention. That is, while attention is given to one object, others are not seen with the same clarity. Likewise, an object may be *seen* but its meaning may not be immediately perceived. Perception delay is the interval between the time that a hazard is reasonably available to be seen and when it is actually seen and fully understood.

If a driver, by chance, is looking at the exact place where a *simple* hazard appears, it will be seen and understood almost instantly, and there is virtually no delay in perception. However, if a driver is looking in some other direction, a particular hazard may not be perceived until his or her attention either happens to be directed to it, or is somehow drawn to it. This may require several seconds. In many circumstances, individuals may never perceive a hazard before they are upon it.

Four different kinds of reaction time have been recognized in the literature, based on the expectancy and amount of evaluation and decision making required by each.

Reflex reactions are instinctive or mostly so and require the shortest time because they involve no thought. An eye blink is usually a reflex action. Most driving does not involve reflex action. However, when a strong unexpected stimulus is presented to a driver, a reflex (hysterical or convulsive) action may result. Such reflex or startle actions are usually wrong and can be disastrous.

Simple reactions (and simple reaction time) are the most common kind in driving because the stimulus is reasonably expected and the driver has already decided (and practiced) what he will do when the stimulus appears. Simple reaction time is often a matter of habit. Such reaction times normally take about a quarter of a second to initiate action. The changing of a green traffic light to yellow in a driver's visual field and the typical driver's reaction to it would be an example of a simple reaction.

Complex reactions (and accompanying complex reaction time) generally call for a choice among several possible responses. Here, the decision related to the most appropriate response has not been made in advance. Even situations involving little ultimate choice can fall into this category. Complex reactions are slower than simple reactions. How long a complex reaction takes depends on how complex the stimulus is, how many choices there are for reaction, and how often the individual has been in a similar situation. Normally, such reactions can take from one-half to two seconds or more.

Discriminative reactions (and associated discriminative reaction time) occur when a driver is required to make a choice between two or more actions *that are not habitual or practiced*. Here, there is a great need to gather information regarding available alternatives, the nature (positive and negative aspects) of each alternative, probabilities regarding the appropriateness (dangers vs. successful hazard avoidance) related to each alternative, as well as the possible moral issues of the alternatives. This is the slowest of all the reactions and may require as much as a minute if the situation is complicated and the urgency slight. When the situation is urgent, there is a high probability that the response will be inappropriate or no response will be initiated before it is too late to respond at all.

Total reaction time related to the use of evasive tactics in response to driving hazards thus involves the elements of initial and full awareness (perception) of specific objects in the driving visual

field, required mental evaluations of such perception, the search for alternative evasive tactics, decision (or indecision) concerning appropriate reaction, and the time required for physical (bodily) reaction to operate vehicle controls followed by the time necessary for vehicle response to the controls used.

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Select References:

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