

Driver Distraction: Towards A Working Definition

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Good Advice

Keep your eyes on the road,
your hands upon the wheel.

Jim Morrison, 1970

Presentation Overview

- **Paying attention**
- **Attention and safe driving performance**
- **From attention to situational awareness**
- **Some previous definitions of driver distraction**
- **What we know about the sources of driver distraction**
- **A Tentative Definition**

What is Attention?

- Our ability to focus on a task
- Focussing requires the allocation of limited information processing resources
- Three levels of attention:
- Selective (trying to attend to one task and ignoring information not relevant to that task)
 - Left turn on busy six-lane urban street during amber phase
- Divided (attending to more than one task at a time and mediating information)
 - Lane-keeping on divided highway in free-flow conditions while tuning radio
- Automatic (low attentional demands)
 - Driving on low volume two-lane rural road while listening to CD
- Driver's expectations regarding demands of driving task at hand will determine level of attention allocated to the task

The Iron Law of Attention

- Humans are serial information processors
- **We can only pay attention to one thing at a time**
 - Multi-tasking involves shifting attention back and forth between tasks

Why left turns more likely to be a selective attention task...

■ Approach

- Check traffic
- Turn on signal
- Slow down
- Enter lane

■ Turn

- Check traffic
- Steer around turn
- Change gear (if applicable)
- Maintain proper speed
- Follow correct path

■ Turn Completion

- Check traffic
- End in correct lane
- Cancel signal
- Accelerate

Additional complexity possible due to:

- traffic volume
- weather conditions
- road conditions
- pedestrian activity

Attention and Driving Safely

- Drivers must often perform complex information processing tasks in a split-second, including:
 - Detecting objects in the traffic environment
 - Identifying them
 - Assessing their speed, direction and intention
 - Considering appropriate responses
 - Evaluating own ability to respond
 - Responding
 - Evaluating own response
- The quantity and quality of information available to the driver are a function of her/his level of attention to the primary driving task

Primary and Secondary Tasks

- Primary driving tasks
 - Steering
 - Accelerating
 - Braking
 - Speed choice
 - Lane choice
 - Manoeuvring in traffic
 - Navigation to destination
 - Communicating with road users
 - Scanning for hazards
- Secondary (extra-driving) tasks – everything else drivers have been seen or reported to do while driving
 - Drivers seem to be determined to complete secondary tasks once they are initiated

Primary and Secondary Tasks (Continued)

- Secondary tasks are distracters, they include:
 - Eating/drinking
 - Grooming
 - Using and adjusting in-vehicle entertainment devices
 - Conversation with passenger(s)
 - Tending to children and pets
 - Smoking
 - Cell phone use and related conversation
 - Use of other wireless communication devices
 - Note-taking
- Not all distracters involve secondary tasks initiated by driver – they can be events, objects, activities or people both inside/outside the vehicle
 - Sometimes it's hard not to look or react...



(AFP PHOTO)



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Which secondary tasks interfere with primary driving tasks? Depends upon...

- Timing of distraction
- Duration of distraction
- Ease of returning to primary driving task
- Physical location of the distraction
- Driver's ability to divide attention and perform multiple tasks

Situational Awareness

- Situational awareness (SA) is a key concept in human factors that may help us to better understand attention and, more importantly, define driver distraction
- SA is knowing what is going on around you in the traffic environment (Endsley, 1988; 2000)*.
- There are three components:
 - Perceiving cues (ranging from obvious to subtle) from the traffic environment
 - Understanding what these cues mean
 - Using this information to forecast future events in the traffic environment

* All references listed on last slide

Situational Awareness (Continued)

- These three components all require that the driver be aware of **space** (how far vehicles and road users are from their vehicle) and **time** (how soon an event will likely occur)
- Good situational awareness is necessary to make good decisions and perform well, but it may not be enough
- We should think of SA, decision-making and performance as occurring in a continuous cycle – each affecting the other

Situational Awareness (Continued)

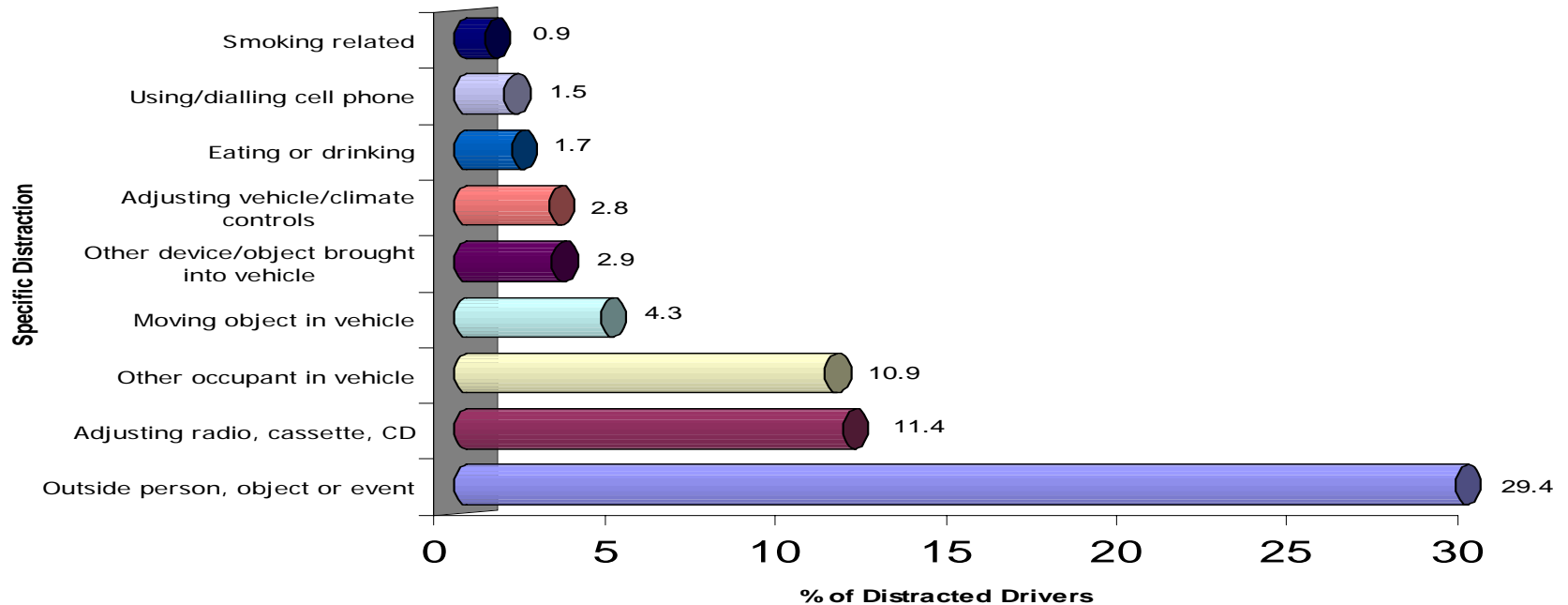
- SA, decision-making and performance all depend on factors which include a driver's:
 - training
 - experience (expectations)
 - personality
 - cognitive ability
 - physical ability
- SA, decision-making and performance also depend on other key factors:
 - vehicle's capabilities
 - immediate road environment

What we know about the sources of driver distraction...

Stutts et al. (2001) - Sources of Driver Distraction – Phase I

Analyzed data from the National Highway Traffic Safety Administration's Crashworthiness Data System (CDS) from 1995 through 1999, a total of 32,303 vehicles involved in crashes attributed to driver distraction. The specific sources of distractions identified were as follows:

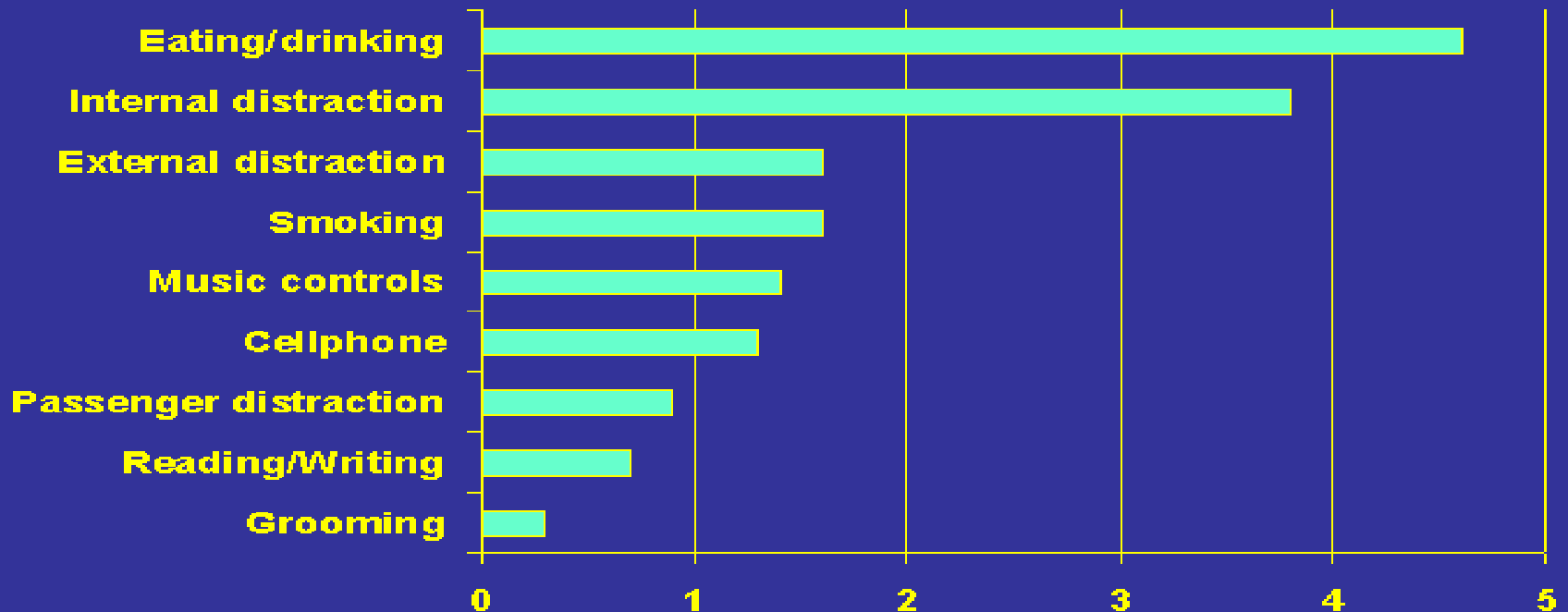
Sources of Driver Distraction



Stutts et al. (2003) - Sources of Driver Distraction - Phase II

Follow up to 2001 study; in-vehicle video cameras to record in-vehicle behaviour of 70 participants for one week:

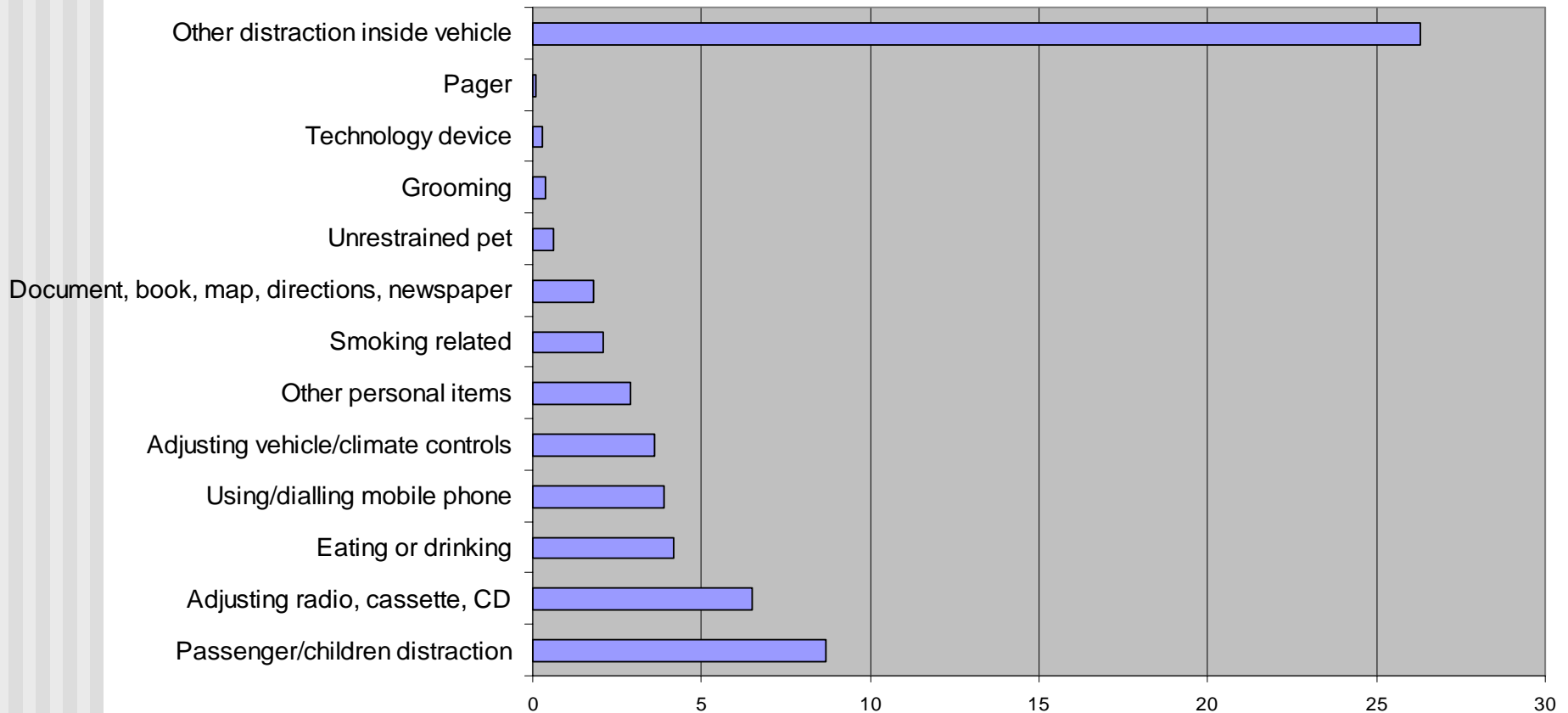
% of Total Time While Driving Engaged in a Potentially Distracting Activity



Glaze and Ellis (2003) – Pilot Study of Distracted Drivers

Used collision records collected by Virginia State Police during last half of 2002 to identify sources of driver distraction contributing to collisions:

Sources and Percentage of Distractions



Driver Distraction: Previous Definitions

Ranney et al., 2000

- Driver distraction may be characterized as any activity that takes a driver's attention away from the task of driving.
- Any distraction from rolling down a window to using a cell phone can contribute to a crash
- Four distinct categories of distraction:
 - Visual (eg. looking away from roadway)
 - Auditory (eg. responding to ringing cell phone)
 - Biomechanical (eg. adjusting CD player)
 - Cognitive (eg. lost in thought)

Stutts et al., 2001

- *Distraction occurs when a driver is delayed in recognition of information needed to safely accomplish the driving task because some event, activity, object or person (both inside and outside the vehicle) compelled or tended to induce the driver's shifting attention away from the driving task (citing Treat, 1980)*

Beirness et al., 2002

- Need to distinguish distraction from inattention
- Distracted driving is part of the broader category of driver inattention
- Presence of a triggering event or activity distinguishes driver distraction as a subcategory of driver inattention

Green, 2004

- “Driver distraction” is not a scientifically defined concept in the human factors literature.
- As used by the layperson refers to drawing attention to different object, direction or task.
- A distraction grabs and retains the driver’s attention.

Driver Distraction: A Working Definition...

Distraction occurs when there is...

- A voluntary or involuntary diversion of attention from primary driving tasks not related to impairment (from alcohol/drugs, fatigue or a medical condition)
- Diversion occurs because the driver is:
 - performing an additional task (or tasks) or
 - temporarily focusing on an object, event or person not related to primary driving tasks
- Diversion reduces a driver's situational awareness, decision-making and/or performance resulting in any of the following outcomes
 - collision
 - near-miss
 - corrective action by the driver and/or another road user

Better Advice

Keep your eyes on the road,
your hands upon the wheel and
an appropriate focus on your
driving.

Leo Tasca, 2005

References

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