

Cognitive Distraction

Multimodal Activities

May 12, 2015



Cross-Modal Distraction Efforts

- ❑ DOT Safety Council
 - Is concerned with the safety impact related to distraction (e.g., speed, accuracy)
 - tasked the Human Factors Coordinating Council (HFCC) to develop a cross modal definition of operator distraction to enable accident investigators to attribute a causal factor of “distraction”
 - NHTSA and Volpe co-chaired a TRB Workshop to re-visit the HFCC definition and arrived at:
 - Distraction is the diversion of attention from operation-critical activities to non-operation-critical activities (TRB Workshop, January 2015).
- ❑ Separately, Volpe Staff devised a new distraction measure, separating:
 - Distractor (source; e.g., interruption) and
 - Distraction (experience; cognitive interference)

View on Cognitive Distraction

- ❑ Distraction linked to cognitive workload and stress in situ and in the greater context of the operator and operations
 - socio-technical framework applicable here as context is key
- ❑ Lesson from the past: attempts in military aviation to establish a standard “workload redline” in the 1990s were not successful.
 - New sensing capability may make this more realistic in the future

Cognitive Distraction Across the Transportation Industry

- ❑ Regulators and industry have placed restrictions on the use of electronic devices because of potential distraction, but they do not distinguish between preventing excessive visual-manual distraction, cognitive distraction, or both.
- ❑ It may be difficult to apply these restrictions, especially when they apply to some and not to other situations (**inconsistent messaging on problem**)
- ❑ Differences between nomadic and tailored solutions need to be acknowledged
 - Need to consider entirety of work being accomplished
 - Integrate into design and system SMS

Cognitive Distraction Across the Transportation Industry: Rail

- ❑ Report: Safety of Railroad Employees' Use of Personal Electronic Devices
- ❑ Examined distraction from personal electronic device (PED) usage among safety-critical railroad employees.
 - Study I considered railroad rules, railroad efficiency testing results and accident databases, as well as first-hand accounts of PED usage and the safety issues that can result from the distraction that they can cause. The Study I participants were non-operating employees, specifically maintenance of way employees and signalmen.
 - Study II expanded upon Study I to gather a wider “snapshot” of PED usage among operating and non-operating safety critical employees, specifically locomotive engineers, conductors, car inspectors, and dispatchers.
- ❑ The two studies provide a qualitative baseline for education and outreach programs that are intended to reduce distraction related to PED use in the workplace



FRA Federal Regulations Concerning the Use of Electronic Devices

49 CFR Part 220 Subpart C

General Prohibitions – §220.303

Railroad operating employees (Generally T & E employees - refer to 49 CFR §220.5 for complete definition) shall not use an electronic device if that use would interfere with their safety-related duties or safety-related duties of another railroad operating employee.

No individual in the cab of a controlling locomotive shall use an electronic device that would interfere with a railroad operating employee's performance of safety-related duties.

Personal Electronic Devices – §220.305

Must be turned OFF with earpieces removed when:

- On a moving train
- Any member of the crew is on the ground
- Any member of the crew is riding equipment during a switching operation
- Any RR employee is assisting in the preparation of the train for movement

Note: A railroad supplied electronic device not being used for an authorized business purpose is subject to the provisions of *Use of Personal Electronic Devices* in this regulation.

Railroad Supplied Electronic Devices – §220.307

May only be used for authorized business purposes which must be designated in writing by the railroad

A locomotive engineer operating the controls of a train may NOT use a device when –

- On a moving train
- Any crewmember is on the ground
- Any crewmember is riding equipment during a switching operation
- Any RR employee is assisting in the preparation of the train for movement

Use in a controlling cab (freight and passenger locomotives): Railroad operating employees shall NOT use a device unless-

- A safety briefing is held between all crewmembers; and
- All crew members agree it is safe to use the device

Use outside freight locomotive cabs is permitted if-

- The freight train crewmember is not fouling a track; and
- All crewmember agree it is safe to use the device

Dead Head Status – §220.311

Use by Dead Heading employees NOT in the controlling locomotive:

- May use an electronic device only if the employee is not using the device in such a way that interferes with any railroad operating employee's personal safety or performance of safety-related duties.

Use by Dead Heading employees IN the controlling locomotive: Each electronic device must be turned OFF with earpieces removed when-

- On a moving train
- Any crewmember is on the ground (while any safety-related duty is being performed)
- Any crewmember is riding equipment during a switching operation
- Any RR employee is assisting in the preparation of the train for movement

Exceptions to Subpart C Prohibitions – §220.309

(Must not interfere with any employee's performance of safety-related duties)

Use of a personal device to take a photograph of a safety hazard or a violation of rail safety law, regulation, order or standard, provided:

- Camera is stand-alone, unless device is provided by RR and used in accordance with written guidance
- Camera, unless otherwise permitted, is turned off immediately after documentation
- Crewmember using the device is other than the locomotive engineer on a moving train

(Refer to 49 CFR §220.307 regarding use of RR supplied devices to take photographs)

A Medical device consistent with RR standards for medical fitness for duty

Device is a stand-alone calculator or used for authorized business purposes

Use of a device to conduct train or switching operations on a RR exempt under §220.9(b) when RR has fewer than 400,000 annual working hours

Summary of FRA Federal Regulations Concerning the Use of Electronic Devices

Never says Never

Reliant on Safety Culture

This document is general guidance only. Refer to 49 CFR Part 220 Subpart C for complete regulatory text.

* Railroad operating rules may implement more stringent requirements than this Federal regulation. *

Cognitive Distraction Across the Transportation Industry: Maritime

- ❑ August 11, 2010, NTSB issued recommendation M-10-2 that requested that the USCG “develop and implement...policies that address the use of cell telephones and other wireless devices aboard C.G. [USCG] vessels.”
- ❑ NTSB also issued M-10-3 recommending that the maritime industry issue a safety advisory to create an awareness of the “risk posed by the use of cell telephones and other wireless devices.”
- ❑ USCG issued a policy on September 1, 2010, that prohibited the use of electronic devices while onboard, unless it was approved by the person in charge (the coxswain) of the vessel and prohibited the person responsible for operating the boat from using a device at all while on duty

Cognitive Distraction Across the Transportation Industry: Aviation

- ❑ NTSB Says Northwest Pilots' Distraction led to Overflight of Minneapolis... (Press Release, 3/18/10)
 - Pilots had become engaged in a conversation dealing with the process by which pilots request flight schedules and during the conversation each was using his personal laptop computer, contrary to policy
- ❑ Prohibition on Personal Use of Electronic Devices on the Flight Deck (2/12/14)
 - ...to ensure that certain non-essential activities do not contribute to the challenge of task management on the flight deck or **a loss of situational awareness** due to attention to non-essential tasks
 - Extends the 1981 “Sterile Cockpit Rule” – flight crew members shall not conduct non-safety related activities which could cause distractions on the flight deck during critical phases of flight, to all phases of flight.

Restricting Use of Work-related Electronic Devices

- ❑ Santiago de Compostela (July 24, 2013): Spain's worst train disaster
 - "I got distracted and I [was meant] to be going at 80, but I was going at 190."
 - In the recording, Mr. Garzon is heard giving evidence about a phone-call he received from a train conductor moments before the crash, in which they discussed which platform they would pull into.
 - The driver [engineer] told the court **he lost a sense of where the train was during the call.**
- ❑ Volpe recently examined how pilot use of electronic flight bags have affected safety
 - A review of 276 unique events over 20 years yielded 335 human factors concerns were identified from international (e.g., ASRS and CAA) reports
 - Four FAA runway incursion and accident/incident reports cited EFB/PED distraction, head-down time and erroneous aircraft performance parameters (e.g., incorrect temperature).
 - The two NTSB accident reports that involved an EFB as a contributory factor both involved pilot misinterpretation of performance calculation data during landing.
 - Most human factors concerns pertained to the use of electronic charts, and in particular scrolling and zooming.
 - Many reports indicated that pilots were not familiar with features or limitations of a new application, missed important information, **lost position awareness, or became preoccupied with the EFB and failed to complete other duties.**

Considerations

- ❑ How successful are bans on the use of electronic devices in transportation settings? Are media campaigns and enforcement sufficient?
- ❑ If we can develop valid metrics and criteria for relatively safe levels of cognitive distraction, should we also provide advice about acceptable designs of electronic devices that can be used in transportation?
- ❑ Should restrictions specify broader contexts for acceptable use of particular electronic device functions? Can technology sense and predict when it is unsafe?
- ❑ We're at the intersection on self-operating vehicles, increasing numbers of vulnerable road users, and distraction. What are the associated safety issues?

Addressing Cognitive Distraction

