

We need to pay more attention to distraction

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Distracted driving has been researched for decades. It was already established as a key risk factor for crashes in early attempts to describe different types of 'driver error' (for example [this classic investigation of crash data](#)). Since the 1990s, as mobile phones became more prevalent, research has tended to focus on this specific issue. More recently, research has examined more complex mobile devices such as [smart phones](#), in-vehicle technologies such as [infotainment screens](#), and external distractions from things such as [digital billboards](#).

The research literature is substantial, but beyond blanket statements such as "don't allow anything that will distract drivers" we are short on usable advice for those charged with managing distraction risks.

In this article we explain the basic science and describe some relevant recent case studies. We then attempt to plan a way forward, focused on changing the way that distracted driving is dealt with in policy, and in public discourse.



What is distraction?

For distraction to occur, there must be a distractor. The Penguin Dictionary of Psychology defines a distractor as "Any event or stimulus which diverts attention." [James \(1890\)](#) notes that attention "... implies withdrawal from some things in order to deal effectively with others..."

In these two statements we have the crux of the issue when considering distracted driving; driving is a task that requires a withdrawal of attention from other things so that it may be dealt with effectively, and if attention is diverted away from the driving task by a distractor, performance will suffer.

Almost anything can draw attention

One way of categorising such things in relation to driving is by their location. Things can be outside the vehicle (for example a billboard, another vehicle, a passer-by) or inside the vehicle (a mobile device, an in-vehicle system, a passenger). For the purpose of this paper we will largely ignore a third 'location' – things purely inside the driver's head (daydreaming) although we will return to this when we discuss policy-making around attention when driving, and how it ought to be made future-proof.

What types of distraction are there?

Another thing often discussed is the 'modality' of a distractor, or *how* it draws attention away from the driving task. Modalities discussed in the literature include visual, physical, auditory, and cognitive. In other words, distractors can cause drivers to 'look' at them, to 'touch', to 'listen', or to 'think about'.

Many distractors will involve combinations of these. Even someone engaged in a hands-free telephone conversation would almost certainly be experiencing not only auditory distraction (listening to the conversation partner) but cognitive distraction (planning what to say in response). Someone using a mobile device to send a text-based message would likely experience visual, physical, and cognitive distraction.

What things are the 'most' distracting?

The literature on distracted driving is full of studies which have attempted to answer this question. One issue to contend with is that the number of different tasks studied (talking on a phone, talking to passengers, engaging



in 'socialising' with multiple passengers, texting, listening to music, choosing music, using social media, eating, grooming, listening to arguing children, etc.) is very large. So are the number of different ways in which distraction effects are measured (crashes, hazard perception and anticipation performance, eye movements, reaction time to sudden events, lane keeping, speed control, following distance, near misses etc.) and the number of study designs and methods (experimental versus observational, simulated driving versus real-world, naturalistic data

versus data from a standard drive). The combinations of these make it very difficult to know what the true impacts are of different tasks. A rule of thumb, though, is that the more ways in which a thing engages a driver and the more cognitively demanding it is, the more attention it will draw away from the driving task. The impact of paying attention to something else while driving also depends on the duration of the distraction and how frequently it happens (i.e. the length of time for which the driver is exposed to the distractor).

The ADVERTS study

Review of current practice for roadside billboards

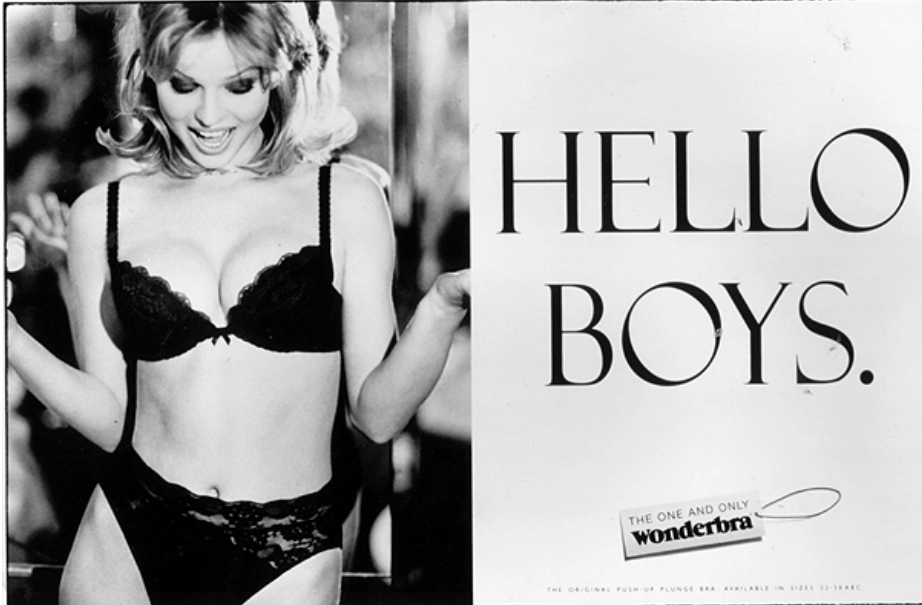
For roadside billboards, the most common safety-related characteristics covered by legislation or guidelines in the countries surveyed were either to do with placement of the billboard – e.g. distances and angles in relation to the road – or the design of the billboard – e.g. content, brightness, dimension, colours.

All the countries surveyed included placement restrictions in legislation whereas, for design, the focus was mostly on avoiding confusion with official road signs.

Although the overall concept was similar between the countries, the level of detail in the accompanying guidance varied significantly, resulting in different associated problems. At one end, some countries wrote the guidelines in broad terms, leaving a lot of space for interpretation and possibly exploitation. At the other end, some countries provided very detailed guidelines with specific criteria on, for example, luminance levels. As already discussed, there is currently little evidence on which this guidance could have been based and, in addition, such detail means there is a high risk of future developments in technology or techniques making it quickly out of date.

Box 1

TBWA's "Hello Boys" billboard for Wonderbra



It was reported that the famous 1994 Wonderbra billboard advert caused crashes when first unveiled in London

Distracted?

The link between distracted driving and safety

Currently we can't define with absolute precision how much attention is required for a given level of safety. There are rules of thumb, and specific studies that we can cite. For example commonly-cited [guidance](#) from the National Highways Traffic Safety Administration around distractions in the vehicle, which draws on naturalistic driving data from the [100-car study](#), suggests that any task requiring individual glances away from the road of 2 seconds or more, or 12 seconds in total, should not be allowed.

[Work from TRL](#) shows that response times to sudden events when driving in a simulator are slower with a task that mimics even a hands-free conversation on a phone; in this particular study the slowing of reactions was even greater than that seen when drivers were at the legal alcohol limit for driving. The issue however, is that although such studies can give us a comparison to some baseline, this does not necessarily tell us what is 'safe enough'.

The [ADVERTS study](#), carried out in 2018/2019 on behalf of CEDR, represents the best and most recent review of distraction risk from billboard

technologies (particularly digital billboards). This study made ten recommendations regarding roadside billboards based on the safety evidence available (see Box 2 and [www.cedr-adverts.eu](#) for further detail)

While the advice is specific – it is not able to provide clear boundaries for 'how much a billboard can distract' and still be 'safe'. Ultimately this means that while we can make general statements about effects of different distractors, we find it difficult to provide clear guidance and laws for particular use cases.



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Recomendations from ADVERTS:

1. Don't cause confusion with road signs
2. Don't block road users' view
3. Avoid complex locations
4. Don't use moving images
5. Don't encourage non-driving actions
6. Keep it simple
7. Minimise transitions
8. Don't dazzle road users
9. Don't have flashing lights
10. Avoid overlarge billboards

¹ [www.cedr-adverts.eu](#)

Box 2



How do we currently deal with distracted driving in policy?

Box 1 (the ADVERTS project on digital billboard distraction), 2 (ADVERTS Recommendations) and Box 3 (UK laws on mobile phone use when driving) outline current approaches and recommendations. The law on mobile phone use while driving in the UK misses the point entirely, focusing on whether a device is held (which as we have seen above is only one way in which a distractor can demand attention). A review carried out as part of the ADVERTS study of current practice in 20 countries shows that how it is managed is variable across jurisdictions. It's also worth noting that rarely is roadside advertising under the total control of the road safety authorities and in most cases their advice is considered non-binding. Implementing the advice provided in the ADVERTS study for road authorities (Box 2) would be a good first step but is not ultimately sufficient, since we lack a clear definition of 'what is safe enough', based on current evidence.

Clearly there is consumer demand for various technologies in vehicles, and demand from advertisers to be able to reach the public when it is safe to do so. We need a better understanding of the real impacts of distractors on attention in driving, and the consequences for safety, to ensure that we can balance safety outcomes with potential benefits from technology innovation and improvements.

Where do we go next, and how can we get there?

In summary, we know a great deal about the potential distraction caused by a range of tasks undertaken while driving, against a range of outcome metrics. However, we currently lack a way to use this evidence to assess the actual level of safety that would result in real-world use cases such as people using their mobile phone through voice controls while driving, or the placement of digital billboards with high-contrast moving images beside motorways.

What is needed (spoiler – this will require research) is an approach to policy that is based on an agreed metric of attention, probably arrived at through a standardised testing approach for any new technologies, or use cases, which are deemed worthy of consideration.

We should aim for 'attention testing' akin to 'emissions testing' for personal, vehicle and roadside technologies. By developing attention standards or guidance that manufacturers and software developers can follow when developing in-vehicle technologies and interactive elements, we can encourage a structured approach to assessing interface design. Akin to [Euro NCAP](#) standards for vehicle design, this would encourage the development of safer systems and improved HMI (Human Machine Interface).

The UK's laws on mobile phone use when driving

Since 2003 in the UK it has been illegal for a driver of a motor vehicle to use "...a held-hand mobile telephone or a hand-held device for an interactive communication function".

At the time this law was passed, plenty of road safety professionals were confused, given the evidence demonstrating that hands-free conversations were probably as distracting as hand-held ones when driving.

The change to the law proposed in early 2021 would extend the definition of 'use' (to cover things beyond 'interactive communication functions') – TRL has already commented on how this is a missed opportunity to develop the legislation in line with the more recent research evidence, rather than outdated assumptions about the action of holding the device being the key risk.

Box 3

We need a law that is focused on attention, not on individual components of distraction.

Future proof approach

Regulation will also play a role, although it is less able to keep pace with technology than standards and guidance are. TRL had a central role in the development of the General Safety Regulations (GSR); this legislation, especially type-approval for Driver Drowsiness and Attention Warning (DDAW) systems and Automated Lane Keeping Systems, underlines the need for better understanding of minimum attention requirements. The General Safety Regulations will significantly change the landscape for monitoring driver attention; within the fast pace of technology development, standards and guidance for developers and manufacturers

In short – if you have a new technology you want to place somewhere in the road transport system, you will need to get it checked against what it does to the

inside of drivers' heads, not the fact that it can be used hands-free or set below a given level of luminance. Importantly, the new technology will need to comply with standards that are future proof, rather than the standards needing to keep up with technology. By focusing on the attention people must allocate to the primary task of driving we will be able to test technologies that regulators are not yet even thinking about in current road maps. For example, when we all have microchips in our brains that allow us to directly interface with computers, or that can be used to control our moods, it won't matter, because the test-pass criteria will still be the same.

The challenge of creating usable standards around distracted driving is going to be a difficult one. It will need our full attention.