

Excessive Road Signage - 'Information Overload'?



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Road users require information in order to complete their journeys safely, legally and efficiently? As such, a variety of traffic signage is provided to advise drivers of legal restrictions, identify potential hazards and guide them towards their destination. Because of the different types of information provided to road users, there is a need for care in the design and planning of traffic signing provisions. If, for example, safety critical messages are not provided and readily visible in good time then, the road environment becomes more dangerous. Similarly, without directional signage drivers may become lost, resulting in increased stress levels, lost mileage, congestion and accordingly the chances of collisions occurring. Conversely, too much or barely visible signing presents a cluttered and potentially confusing environment to road users, and ultimately some signs may not be read at all. This article considers road signage – their relevance and benefits and also, the fact that many roads are now over signed and cluttered. Therefore, this article sheds light and brings into question whether too many signs lead to information overload that can compromise road safety. Finally, a conclusion is given.

Excessive Road Signage - ‘Information Overload’?

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“In order to achieve safe and efficient operation of the highway network, it is essential that all signage provided is necessary, clear and unambiguous and gives its message to road users at the appropriate time. The message must be quickly and easily understood at the point it is needed, neither too soon that the information be forgotten, not too late for the safe performance of any necessary manouvere”. The excessive or insensitive use of traffic signs and other street furniture has a negative impact in the success of the street as a place”.¹

Introduction

Sometimes it feels like road signs are popping up like mushrooms all over the place. Over the last two decades the number of road signs in the UK has doubled to 4.3 million at the last count. According to the Department for Transport (DfT), the overuse of traffic signs blights the landscape, wastes taxpayer’s money and dilutes important safety-critical messages. Having too many signs can also distract drivers and increase the risks for road workers. Existing research shows that too much information may be a problem, as the efficiency cognition of drivers has been shown to decrease with an increase in the amount of information overload. Many road signs are repetitive, unnecessary and pointless. Repeated unnecessary signs can contribute to “information overload” and could cause drivers to miss an important sign hidden in their midst. Traffic signs should be designed and located with the aim to inform drivers not to confuse or distract them. Also, research has shown that removing white centre lines induces uncertainty and thus cuts speeds by 13 per cent. Traffic signs are not required to be erected by law, but are erected and placed where a clear need has been identified. They are erected by local traffic authorities through the powers provided by s. 122 of the Road Traffic Regulations Act 1984 and Part 2 of the Traffic Management Act 2004 to provide warnings, information and details of restrictions to road users. The term “sign” refers to all upright signs, road markings and traffic signals.² Traffic signs are utilized as a method of warning and guiding drivers to regulate the flow of traffic among vehicles, pedestrians, motorcycles, bicycles and others who traverse the streets and other roadways.

¹ DfT/ Communities & Local Government/Welsh Assembly, Gov, 2007. *Manual for Streets*. (MFS) trl.co.uk

² Road Traffic Regulation Act 1984. <http://legislation.gov.uk>

A range of signs are used on British and Irish roads such as destination signposts, advance warning signs of possible hazards ahead and regulatory signs instructing road users to perform or prohibit specific actions. Road signs in both Ireland and Britain are classified as either regulatory or prohibitory much like the US and the rest of Europe. Although many countries have largely agreed on the basics of shape, layout, colour schemes and configuration, road agencies around the world have applied different rules that vary in particular on the maximum amount of traffic signs allowed on a pole for example, one for New Zealand, two for the UK and three for Hungary.

Less Signs – Less Confusion

It has been mooted that at least one-third of signs on UK roads are superfluous and that many could only have been invented by people lacking road-sense and commonsense. Road signs can be complicated for the average motorist. In fact, they're so complicated that millions of drivers struggle to make sense of them; that's according to research and surveys. It tends to be specific signs that cause motorists a spot of bother. Signs such as: level crossing warning; no vehicles except bicycles being pushed; no vehicles carrying explosives; no waiting; no stopping and soft verge etc. A survey by Kwik Fit³ revealed that one in five road signs are a mystery to the average driver. It also found that while 70pc of people know UK road sign meanings, two in five are so baffled that it leads to problems on the road. Take for example the airborne motorcycle "no motor vehicles" sign which can be confusing especially for overseas visitors. Then we have the "no entry" sign which previously incorporated the words "no entry" in the rectangle. These words should be retained as even overseas motorists understand the word "no". There are other road signs which are incomprehensible without previous memorising. To fully understand all road signs one must be mentally robust to withstand them all. Some say the importance of road signage is pretty self-explanatory; roadside signs restrict oncoming motorists from heading into opposing traffic, warn of upcoming hazards and inform drivers of local regulations and laws. But many take their versatility and impact for granted. Yes, effective road signage can often change drivers' behaviour without them realizing it, but ineffective signage will fail to influence decision-making behind the wheel. Pre-informed drivers, who take notice of signs and their meaning, will avoid committing mistakes or make sudden or abrupt actions causing danger. Well located, properly maintained and unambiguous traffic signs provide valuable information to drivers and other road users.

³ *Twenty five of the most confusing signs in the UK.* msn.com

They represent rules that are in place to keep you safe, and help communicate messages to drivers and pedestrians that maintain order and reduce accidents. Neglecting them can be dangerous.

To be effective, a road sign should meet five basic requirements:

- Fulfil a need
- Command attention
- Convey a clear and simple meaning
- Command respect from road users and
- Give adequate time to respond

Design, placement, operation, maintenance and uniformity are aspects that should carefully be considered in order to respect the ability of a road sign to meet these five basic requirements. ⁴ Edmond King, President of the AA said: *“You could get rid of about one-third of signs, no problem. Actually, reducing the number of signs will help drivers and lead to less confusion”*. At this juncture it’s worth noting that in October 2015, Britain’s most chaotic junction – dubbed the “red light district” - in the Yorkshire town of Beverley where 42 (yes, 42, no you didn’t misread that) sets of traffic lights broke down at that junction and according to locals, there was not a tailback in sight and traffic moved more smoothly. ⁵

Worboys Report

The system of British road signs was first developed around the turn of the 21st Century, but its more radical overhaul came between WWII and the Worboys Report in 1964. ⁶ The system that was developed over that time is still in use today and over those years it was altered and discussed by numerous government committees and came under fire from certain individuals over seemingly minor details. The report formerly known as Traffic Signs for All-Purpose Roads was a report commissioned in 1962 that outlined changes to the British signing system because most pre-war Worboys signs (see below) apparently had eight primary flaws ⁷ in the UKs system. Its fundamental aim was to review signs that were considered to be outdated and difficult to use in an era of faster motoring and higher quality roads.

⁴ Road Signs. February 2017. slideshare.net

⁵ Mail Online. dailymail.co.uk

⁶ Hansard: Worboys Committee & New Traffic Signs. 3 July 1963. Retrieved 29 June 2011.

⁷ Committee on Traffic Signs for All-purpose Roads. (Worboys Committee) Ministry of Transport 1963.

This would require not only a comprehensive re-write of the entire signage system, but also a means of ensuring that the signage system was compatible with European standards as international travel was becoming increasingly popular.

Necessary Pre- Worboys Signs

- Roadside signs were too small to be readily recognizable and could not be easily read by drivers travelling at normal speeds.
- They did not have a simple integrated appearance.
- The more important signs were not readily distinguishable from the less important at long range.
- They were not effective at night.
- They were different from those used on the Continent of Europe and only those who could read English could fully understand them.
- They were often mounted too high particularly in rural areas.
- They were often badly sited in relation to junctions: and
- There was insufficient continuity of place names on directional signs.

Not Merely Aesthetic

Traffic signs or road signs are erected at the side of or above roads to give instruction or provide information to road users. The earliest signs were simple wooden or stone milestones. Later, signs with directional arms were introduced for example, fingerposts in the UK and their wooden counterparts in Saxony.⁸ Have you ever passed a road sign and didn't understand what the message or symbol was informing or telling you what to do? Or have you ever wondered if the colour and shape of the road sign has a specific meaning? With so many road signs, it's easy to get confused wondering what each one means. To help prevent this, signs have increasingly used symbols rather than words to convey the different safety messages on roadways. Pictograms and symbols are easier to recognise and understand, cross various language barriers and often close the communication gap. Symbols are quickly becoming the standard for traffic control devices throughout the world. Understanding the meaning of road signs can be as simple as recognising what colours shapes and the symbols on the sign represent. Road signs populate the sides of quiet suburban streets, stand at busy intersections, and loom large over multi-lane motorways. But the traffic signs you see on British and Irish roads aren't merely aesthetic. They're there to warn you of potential danger and to keep you, your passengers and other road users safe.

⁸ A Saxon milepost gave distances expressed as journey times to the nearest eighth of an hour, with one hour being the equivalent of one league. This corresponds to a distance of about 556 mts. They were hewn from natural stone into the shape of an obelisk. Traffic Sign. en.wikipedia.org

As well as having a negative effect on the general appearance of the streetscape, sign clutter can cause a number of problems. Safety critical signing such as warnings of height restrictions for low bridges can get lost within an environment of a large number of signs in very close proximity. Too many signs can distract drivers from the primary task of driving safely and drivers may “look” at them but not have sufficient time to be able to read them with their “mind”. Previous research has shown that the addition of information to a sign generally increases driver response times. (*Cooper et al & Agg, 1993*).⁹ However, the over provision of signs can reduce the likelihood of drivers taking notice of them.

The DfT Traffic Sign Manual Chapter 4 states:¹⁰

“Appropriate warning signs can greatly assist road safety. To be most effective however, they should be used sparingly. Their frequent use to warn of conditions which are readily apparent tends to bring them into disrepute and detracts from their effectiveness”.

Traffic Sign Clutter

Have you ever consciously counted all the road signs you pass on your daily commute. (That’s provided you didn’t just look at them but looked and seen them with your ‘mind’) You might be surprised by the total number there are. Often they may be anything up to 20 signs over a very short distance approaching a junction. Traffic sign clutter often occurs over time where additional signage is provided without consideration of any existing signing. It can also occur where information for road users is unnecessary or excessively signed. Good sign design can prevent clutter happening in the first place, and integration of signing requirements into the design stage of a scheme can help ensure the number of signs is kept to a minimum needed without compromising on the necessary messages they need to deliver. Careful design of the signs themselves can also help to avoid clutter by reducing their size and by combining signs into fewer separate structures.¹¹ Signs should be mounted so that they are visible but not intrusive and should be mounted at the recommended mounting heights. Whilst lower mounting heights are generally less intrusive and put signs more directly into the drivers line of vision, the need for clearance, both vertically and laterally must be considered. The following are a number of benefits by reducing the amount of sign clutter:

⁹ Cooper et al & Agg, (1993)

¹⁰ The Traffic Sign Manual Chapter 4. (Warning Signs) DfT, (2004)

¹¹ DfT Traffic Advisory Leaflet. 01/13. January 2013. *Reducing Sign Clutter*.

- Improved streetscape by identifying and removing unnecessary, damaged and worn out signs.
- Helps rationalize signs to ensure they are provided only where required.
- Helps minimize the environmental impact of signing through careful design, including siting, size and colour.
- Reduce costs associated with providing traffic signs and lighting units; and
- Reduce the need for maintenance for example, sign cleaning, changing and foliage cutting.¹²

Increasing Cognitive Load

Driving is a complex activity requiring good management of attentional resources, efficient cognitive control and decision-making. Numerous studies have sought to understand dual-task interference, and in particular whether drivers have enough spare capacity to take on an additional task or whether the mental effort that demands results in driving task alteration. Given that human behaviour is active and adaptive, drivers seek to keep an acceptable level of performance at a comfortable level of effort and achieve such an adaptation by means of a cognitive compromise to maintain an acceptable task load level.¹³ As they (drivers) drive, the task demand fluctuates according to the situation they encounter for example, monotonous motorway driving versus driving in a busy traffic flow. Basically, the task level is low when processes are automatic and high when processes are controlled and/or when several controlled tasks interfere. Both overload and underload can have an impact on driver performance when the resources required exceed those available, human error can occur, but performance may also go down when the resources available exceed those required.¹⁴ Driver information overload results from providing too much information through devices or conditions for a driver to perceive and respond properly. Therefore, the information load on a driver is a property not only of the specific sign(s) they are encountering, but also of the roadway context in which the sign occurs, the behaviour characteristics of the driver and the particular navigational task. When drivers are presented with more information than they can process, they may slow down suddenly, drive unduly slowly, make late/sudden erratic manoeuvres, take an important route alternative, ignore critical information, fail to monitor other traffic or have excessive “eyes off the road” episodes.

¹² DfT Traffic Advisory Leaflet. 01/13. January 2013. *Reducing Sign Clutter*.

¹³ Hoc, J.M. & Amalberti, R. (2007). *Cognitive control dynamics and reaching significant satisfying performance in complex dynamic situations*. Journal of Cognitive Engineering & Decision Making. 1, 22-25. hal.archives-ouvert.fr

¹⁴ Hoc, J.M. & Amalberti, R. (2007). *Cognitive control dynamics and reaching significant satisfying performance in complex dynamic situations*. Journal of Cognitive Engineering & Decision Making. 1, 22-25. hal.archives-ouvert.fr

These behaviours have obvious safety and operational consequences.¹⁵ Cognitive psychologists use the term ‘capacity’ to refer to the human ability to cope with the cognitive load associated with increasing amounts of perceptual information.¹⁶ Human capacity is often limited, yet many situations in modern traffic require simultaneous processing of information from multiple signals. Given the limited capacity for processing, it is important to understand the consequences of such limitations in safety critical activities, such as driving a motor vehicle.¹⁷ Mounting too many signs on one post or a series of signs in close proximity can cause an overload of information to drivers and add to sign clutter. It is recommended that, generally, no more than two signs should be mounted on a single post to avoid information overload. Cognitive load refers to the amount of mental effort, or information processing, which is required to perform a task, and it is related to task complexity. As the complexity of a task increases, the amount of information processing required from an individual must also increase to sustain task performance at the same level. If an individual’s level of information processing does not increase to match the increase in task complexity, then his or her level of task performance decreases. In the present context, the speed at which a driver is travelling can be seen as an aspect of task performance. Increasing the complexity of the driving task will result in an increase in the cognitive load on a driver, with the theoretical prediction being that the driver will then choose to drive at a slower speed to compensate for the increase in information processing required of him/her. This could be seen as a sub-conscious process, or as a consciously chosen response to increasing task difficulty. However, if the driver chooses to continue at the same speed, the increased load may mean s/he is driving less safely. A number of studies using an instrumented car have shown that drivers experiencing increased levels of cognitive load reduce their driving speeds. (*De Waard et al., 1995*;¹⁸ *Fusinato, 1977*;¹⁹ *Harms, 1986, 1991*)²⁰

Road Users Self-policing?

By demarking road lanes, the concept of “shared apace” and “naked streets” was developed in the 1990s by the late Dutch engineer Hans Monderman.

¹⁵ National Highway Cooperative Research Programme. (NCHRP) (3003) Report 448. Transport Research Board of the National Academies. onlinepubs.trb.org

¹⁶ Eidels, A. *et al* (2010). *Converging measures of workload capacity*. *Psychonomic Bulletin & Review*, 17 (6), 763-771. link.springer.com

¹⁷ Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, N.J: Prentice-Hall. link.springer.com

¹⁸ De Waard (1999) *Understanding the effects of speed on safety and quality of life*. Paper presented at the Speed Review Seminar. DETR, 15 September 1999.

¹⁹ Fusinato, L. A. (1977). *Psychological correlates of road traffic demand*. PhD Thesis, Melbourne: University of Melbourne. (TRL Report 564). trl.co.uk

²⁰ Harms, L. (1986-1991). *Drivers’ attentional responses top environmental variations-a dual-task real traffic study*. In: A.G. Gale *et al* (Eds.) *Vision in vehicles*. North Holland, Netherlands. (TRL Report 564). trl.co.uk

He held that traffic was safest when road users were “self-policing” and streets were cleared of controlling clutter. His innovations, now adopted in some 400 towns across Europe have led to dramatic falls in accidents and injuries. Monderman’s ideas remain starkly uninfluential in the world of “big” health and safety, especially in Great Britain. His principle is that freedom to assess risk for ourselves is what makes us safer. He contends that rules, controls, signs and traffic lights all reduce our awareness of our surroundings and thus our sense of danger. Monderman went on to say that a public road is like a restaurant. It’s a place where we daily put our lives at the mercy of strangers. We show a reckless faith in the chef’s skill and care, but at least a chef who poison us in trouble. Traffic engineers, who maim and kill us with their regulations, lights and paint pots, merely go on dreaming up ever more schemes and pretend they are making our lives safer, when they are doing the exact opposite, and we let them. Monderman, who died in 2008, saw traffic management as a symptom of a deeper ailment.

“We’re losing our capacity for socially responsible behaviour. The greater the number of prescriptions, the more people’s sense of personal responsibility dwindles”, he said

Kensington and Chelsea – “Naked Streets”

London’s best known “naked street” has seen a fall in driver speeds and fewer crashes. The Royal Borough of Kensington and Chelsea have adopted transport and streetscape policies.²¹ Within the context of the streetscape policy, one of their key objectives is to remove clutter from their streets and use high quality materials to improve their environment and create ‘naked streets’. Under this objective, Kensington and Chelsea have launched a number of projects for the 21st Century initiative, many of which involve streetscape. Their objective is to improve the Borough streetscape by means of a published streetscape guide. This guide covers the main principles for streetscape design, many of which are applicable to a reduction in sign clutter, for example, ‘respecting and enhancing local character’. These principles were developed during the design and implementation of the Kensington High Street improvements and are now being incorporated into the development of all traffic, maintenance and environmental improvement schemes within the Borough. With regards to minimizing the impact of traffic signs on the streetscape, the guidance covers many of the identified methods of reducing sign clutter, e.g. restrictions in the number of signs and road markings, appropriate sign location and mounting arrangements, and aesthetic considerations which limit the visual impact of signs, such as the use of backing boards.

²¹ TRL 5 CPR727 Client Project Report ‘Renewing the Legacy’.

Sign design issues are also covered, for example, recommending the simplest form of a particular sign or road marking, such as minimal zig-zag markings for pedestrian crossings, unless restricted visibility dictates otherwise. Apart from Kensington, other high streets that have become virtually accident-free zones - ²² due to the removal of road signage. They include Camden, Ashford and Poynton in Cheshire, along with the celebrated continental examples of Drachten in Holland and Bohmte in Germany. The German town of Brohmte has scrapped all traffic lights, road signs and pedestrian crossings while leveling the sidewalk and road. Traffic lights, road markings and pedestrian crossings have also been removed in Ashford (UK) which has seen “a 60% drop in accidents in the first three years”, said Hamilton-Baillie a British urban architect. But not everybody is convinced. A survey in Ashford published by the University of West England found the 80% of respondents felt safer under the previous road layout. The lack of boundaries was a particular concern for blind people, those with disabilities and the elderly.

Conclusion

Local authorities should consider auditing their traffic signs, traffic signals and road markings on a regular basis. This will enable authorities to manage their assets better and to determine whether their existing signs are necessary. An audit of existing signing to be undertaken before new signs are introduced and where new traffic schemes are being planned. This will help identify those signs that are obsolete or unnecessary which can then be removed from the road network, as well as signs that need replacing. As such, a variety of traffic signage is provided to advise drivers of legal restrictions identify potential hazards and guide them towards their destination. Because of the different types of information provided to road users, there is a need for care in the design and planning of traffic signing provisions. Monderman’s argument (above) that freedom to assess risk for ourselves is what makes us safer, and rules, controls, signs and traffic lights all reduce our awareness of our surroundings and thus our sense of danger, has some merit. However, proper, uncluttered and well located road signage will help drivers to drive safely, prevent property and vehicular damage and improve traffic flow. It will help drivers to get safely to their destination and also save time and fuel due to getting lost. Finally, one has to ask: “*How many traffic signs can a driver digest and understand simultaneously while travelling at speed, before the information becomes too overwhelmingly to absorb and results in information overload? Also, if he slows down to read these signs, what effects will this have on following drivers that may be local and know exactly where they are going*”?

²² Simon Jenkins. 4 April 2016. The Guardian. *The removal of road markings is to be celebrated. We are safer without them.*

Necessary road signs are important but must correctly placed, be easy to read or otherwise they will be of little use to drivers who are concentrating and alert or to those who may be engaged in “other unnecessary pleasurable pursuits” while behind the wheel.

