

# Automated Vehicles: The Highway Code Update

## Cognitive testing report



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# DfT | The Highway code Update cognitive testing report

## 1. Background and methodology

Updates to the Highway Code have been drafted to take account of the arrival on UK roads of vehicles with automated features. These updates were revised following a public consultation and The Department for Transport commissioned BritainThinks to gather feedback from drivers to ensure that the revised wording is clearly and correctly understood. In particular, the research sought feedback from drivers on:

- The difference between AVs and advanced driver assistance systems, in terms of understanding the different levels of automation and the responsibilities entailed with each;
- Understanding of the residual responsibilities of drivers when a car/vehicle is in fully autonomous mode;
- What drivers can and cannot do when the car/vehicle is in fully autonomous mode.

BritainThinks conducted 34 in-depth interviews with the following sample:

6 x Learner drivers	4 x Advanced Driving Instructors	24 x Current drivers
N/A		Mix of years of driving experience from new drivers (<1 year) to established (>20 years)
		Range of frequency of car use (pre-Covid/anticipated future use)
		Commuter vs non-commuter use
		Mix of road experience e.g. motorway vs urban
Range of demographics such as age, gender, social grade and location across the sample		

## 2. Key findings

- Participants felt they had a clear understanding when reading the information in detail, but comprehension of the passage “cold”, on first reading could be patchier
- Perhaps unsurprisingly, participants said that they wanted more clarification as there are certain points that feel open to interpretation given their lack of detailed knowledge of AV technology
  - In particular, they wanted more specific examples to illustrate what could and could not be done whilst a vehicle is in self-driving mode and a clearer articulation of how responsibility for driving is handed over between vehicle and driver.
- The novelty of fully automated vehicles sometimes posed a challenge to fully understanding the information (underlining the need for additional guidance and comms)
  - The idea of a driver not being in control of the vehicle felt very counter-intuitive to most, contradicting much of their understanding about road safety.
  - As such, participants did not always fully engage with what the text was saying about responsibility lying on the vehicle rather than the driver.

- To avoid ambiguity and misinterpretation the information should be “set up” with wider communication, giving lots of real-life examples, and having clear, precise wording when describing key changes in responsibility.

### 3. Context

For most participants, the concept of automated vehicles did not come as a surprise. The concept felt familiar in as much as participants have seen many other aspects of life become automated and have heard of such advances being made in the transport sector.

Nevertheless, the reality of automated vehicles on UK roads, felt far removed from participants’ lives in practice. It was common for participants to assume that they would never personally own an automated vehicle and that this change to the highway code would therefore not affect them.

Moreover, drivers did not think that they would necessarily read this update to the highway code as it they don’t tend to refer to the highway code in their day to day lives. This was true even for learner drivers, though advanced driving instructors said that they would expect to come across it. Instead, drivers felt that they would be more likely to come across these changes via media coverage – and that this would likely give them sufficient information to know how any changes would affect them. Communications and guidance accompanying the highway code update will therefore be important to alert drivers of the changes.

### 4. Overall communication and sense of clarity

#### Drivers:

Overall, once they had read the passage carefully participants’ understanding was broadly in line with the three communication objectives i.e. they ultimately understood that the passage was telling them about AVs as distinct from vehicles with assisted driving features; that they had split responsibilities when driving an AV in different modes; that there were things that they could and could not do when an AV is “self driving”.

They also felt that in general terms most of the language used was simple, non-technical and easy to understand.

However, whilst at a high level the overall understanding from participants was generally clear, the “acceptance” of the information communicated was more problematic. This led to some differences in specific interpretation of responsibility (e.g. that the driver must remain very vigilant at all times vs can relax their attention) as people grappled with the implications.

#### Advanced Driving Instructors (ADIs):

Driving instructors were more familiar with the context and with the Highway Code, but had similar responses to drivers. This was particularly in terms of the implications of the information rather than understanding it *per se*.

### 5. Detailed feedback

We showed the proposed text to participants on screen, asking them to read through once and answer questions, before going through the information in more detail.

Paragraph 1

*Automated vehicles differ from vehicles fitted only with assisted driving features (like cruise control and lane-keeping assistance), which can only carry out some parts of the driving task, but where the driver is responsible for driving at all times. If you are driving a vehicle with assisted driving features, rule 150 applies.*

**Overall response and understanding**

This paragraph appeared to be most problematic for participants to understand in the first instance particularly as the opening paragraph. Participants struggled initially to articulate exactly what it was telling them.

- This paragraph sometimes led participants to think that the rest of the passage was talking about vehicles fitted with assisted driving features, rather than vehicles with automated capabilities. This is likely because the examples of assisted driving features felt familiar and easy to understand, whereas the term ‘automated vehicles’ was less familiar.
- Hence, some suggested the order of paragraphs 1 and 2 could be reversed so that the main focus (AVs) could be introduced first

**Working well**

- Examples given of cruise control and lane-keeping assistance felt familiar and made it easier for participant to relate to the information

**Working less well**

- Rule 150 was not recognised, including by advanced driving instructors (though most assumed they could look this up easily)
- Upon first reading, a few participants misinterpreted ‘automated’ to refer to automatic gearboxes (though this interpretation was quickly rectified upon further reading)
- Reference to vehicles fitted with assisted driving features could potentially distract from the main message about automated cars

*“Everybody has heard of cruise control etc... They can link into that.” – ADI*

*“The first one is assisted, like cruise control. It’s helping you drive. But you still have to be driving normally. Automated does need monitoring by the driver, says it can do it on its own.” – Driver*

*“When I started reading the automated vehicle, I thought automated gearbox and manual gearbox” – Driver*

*“Rule 150... Not too sure about this but it can be looked up by the person reading it” – Driver*

**Paragraph 2**

*Automated vehicles are those listed as such by the Secretary of State for Transport. These vehicles are capable of safely driving themselves in at least some circumstances and, while doing so, do not need to be monitored by the driver.*

**Overall response and understanding**

This paragraph felt clear and easy to understand, clarifying some of the ambiguity found in paragraph 1. Participants were able to feed back that the information was focused on explaining what an automated vehicle is.

Whilst paragraphs 1 and 2 worked more effectively in combination, a few suggested that this section would work better as the opening paragraph (before paragraph 1) so that it clearly introduced the main subject area. This underlined the need for additional communication around different types of automated vehicles to address knowledge gaps.

**Working well**

- Clear definition
- Assumption that the list of automated cars would be clear and easy to find

**Working less well**

- Some questioned why the Secretary of State for Transport was mentioned and thought it would be simpler to provide a direct link to the list of automated vehicles

*“It’s telling me the difference between a car that fully drives itself vs something like cruise control.” – Learner*

*“It makes sense... it’s telling me that automated cars only work in some circumstances and are not monitored by the driver.” – Driver*

*“I would assume that there is a separate list, published by DfT. I think saying secretary of state is a bit meaningless, why not just say DfT?” – Driver*

*“I don’t know if this is an online version. Can you do links to what the secretary of state describes as automated vehicles, or is this for the book? I find [links] really useful, especially when you’re reading text like this, so you can get a bit of a better understanding.” – Driver*

**Paragraph 3**

*An automated vehicle’s ability to drive itself may be limited to particular situations, or parts of a journey, by factors such as road type, time of day, weather, location and speed of travel. You should follow the manufacturer’s instructions about the situations under which it is safe to use the self-driving function, and how to do so.*

**Overall response and understanding**

Participants understood that this paragraph described some of the limitations around automated vehicles. Although specific examples were given (and welcomed), some

participants felt that a comprehensive list of situations would help to remove any ambiguity, rather than just relying on drivers reading the manufacturer’s instruction.

- One ADI pointed out that drivers rarely engage fully with the manufacturer’s instructions and that it is can therefore be dangerous to rely on directing drivers to the instruction manual (e.g. many drivers are unaware that cruise control cannot be used in wet weather).

Working well	Working less well
<ul style="list-style-type: none"> <li>• Reference to manufacturer’s instructions was thought to be sensible / common sense</li> <li>• Examples of the particular situations were welcomed and made it easier for participants to understand how and when automated cars could be driven</li> </ul>	<ul style="list-style-type: none"> <li>• ‘May be limited’ was thought to be ambiguous language</li> <li>• Ideally, participants wanted a full list of situations when the self-driving function could / should not be used</li> </ul>
<p><i>“Depending on the manufacturer it might only be suitable for certain conditions. If it is you can turn your attention to other things but still need to be there. You still need to be available. Not to be asleep or distracted that you can’t take the wheel.” – Driver</i></p>	<p><i>“‘May be limited’ [is] open to interpretation... [It needs] something more concrete [such as] ‘should only be driven when...’” – Driver</i></p> <p><i>“Maybe it would be better to have [a list of] dos or don’ts.” – Driver</i></p>

#### Paragraph 4

*While an automated vehicle is driving itself in a valid situation, you are not responsible for how it drives, and you can turn your attention away from the road. However you retain all other aspects of driver responsibility and compliance with relevant laws including, for example, being fit to drive, ensuring the vehicle is road legal (e.g. if applicable, has an MOT certificate, is taxed and insured), and that it is in a roadworthy condition.*

#### Overall response and understanding

On first reading, most participants felt that they understood this paragraph well, recognising that it was trying to explain where the responsibility lies when it comes to automated vehicles.

However, participants frequently raised concerns with the idea that the driver could turn their attention away from the road. Although almost all participants recognised that the paragraph stated that the driver does not have responsibility for how the automated vehicle drives when it is self-driving, participants were often uncomfortable with the idea of handing over responsibility completely, saying, for example, that they would still ‘keep an eye on’ the road.

The sentence about the driver being responsible for all other aspects made sense and fitted with expectations and familiarity around MOTs etc. However, some participants would have liked more clarification here to ensure they were aware of their responsibilities, i.e., providing a comprehensive list rather than just examples.

There were two interesting instances where participants showed potential to misinterpret the information:

- One participant misread the first sentence, not noticing the word 'not', and therefore understood that the driver retains responsibility (which also fitted with their expectations).
- One participant raised the point that it was unclear whether 'being fit to drive' referred to the vehicle or the driver.

Working well	Working less well
<ul style="list-style-type: none"> <li>• Examples of what the driver is responsible for fitted with expectations.</li> <li>• 'Valid situation' was understood to refer to the examples given in paragraph 3. Again, some would want a comprehensive list of such situations to avoid all ambiguity.</li> </ul>	<ul style="list-style-type: none"> <li>• 'All other aspects' – some participants would have wanted a comprehensive list here rather than leave it ambiguous.</li> <li>• One participant raised the point that it was unclear whether 'being fit to drive' referred to the vehicle or the driver.</li> <li>• Not enough emphasis on the fact that the driver does <b><i>not</i></b> have responsibility for how the vehicle drives (when it is self-driving), considering that it goes against how people have learnt to drive.</li> </ul>
<p><i>"I think they're quite to the point, I think if I were reading it, I'd understand it. I suppose the relevant laws, if there was a link to that it'd be quite good."</i> – Driver</p>	<p><i>"In some circumstances there may be a few lines that are hard to distinguish between. Putting the responsibility on the car can be a bit confusing as the driver still needs to be aware of surrounding etc... If the car drove straight into something, that would be the driver's fault? Maybe you could blame the car but it would be difficult to distinguish."</i> – Learner</p>

### Paragraph 5

*If an automated vehicle needs to hand control back to the driver it will give sufficient warning to do so safely and you should take control when prompted. You MUST remain able to take control. For example, you should stay in the driving seat and stay awake. When you have taken back control or turned off the automated driving function you are responsible for all aspects of driving.*

### Overall response and understanding



Participants understood that this paragraph was describing what happens when the vehicle transitions out of self-driving mode and that the driver takes over responsibility.

The description of how the driver should be able to take back control when prompted made sense to most and fitted with their expectations. Some pointed to this as evidence that the driver should 'keep an eye' on the road.

However, those that interpreted this information to mean that drivers had to still partially monitor the vehicle and/or road situation, felt that this paragraph contradicted the earlier point about the driver turning attention away from the road. A more comprehensive list of examples of what a driver can or cannot do whilst the vehicle is self-driving would improve clarity here.

Many participants jumped to the conclusion that the vehicle would hand back control in emergency situations (rather than in a controlled/planned manner). This assumption compounded the interpretation that the driver would have to be alert, watching the road even when the vehicle was in self-driving mode, rather than being able to turn their attention away.

In addition, there was felt to be potential ambiguity in the description here:

- 'Sufficient warning' raised concerns about how quickly a driver would have to take back control. Participants wanted the description to set a specific time period for the handover to avoid having a 'grey area' when it wasn't clear who was responsible for the vehicle.
- The examples given of staying in the driving seat and staying awake did not help to illustrate what a driver could do e.g. participants raised questions about whether a driver could use their phones.
- One participant completely misinterpreted the description, thinking that the driver was allowed to change seats and go to sleep, because the warning would be sufficient to allow them to take back control safely.

Working well	Working less well
<ul style="list-style-type: none"> <li>• Emphasis on 'MUST' was felt to be clear and helpful.</li> <li>• Explanation that the driver has responsibility for everything once control is handed back over was thought to be clear and to make sense.</li> </ul>	<ul style="list-style-type: none"> <li>• Examples given of what a driver cannot do when in self-driving mode were not felt to be sufficient, leaving a lot of grey area.</li> <li>• 'Sufficient warning' was felt to be somewhat ambiguous when participants feel it is important to have clarity here.</li> </ul>
<p><i>"I feel like it's a really important one, out of everything above, this is the one that hits home the hardest by saying actually, it's nice that you have this fancy vehicle, but you've got to be prepared to be sat in the driver's seat ready to take control"</i> – Driver</p>	<p><i>"It's very circumstantial on how long you would need to take control back...sufficient warning – it's vague enough that for one situation... I don't know what I would say there to cover all bases."</i> – Leaner</p> <p><i>"It should probably say to not use a mobile phone – would you get done for that? What are</i></p>

	<p><i>you allowed to do vs what you can do in a normal vehicle, e.g. mobile phone? Lots of questions that are still unanswered. Take attention off if kick back in – what do they mean by that?” – ADI</i></p>
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## **6. Implications for further communications and guidance**

Based on participants' feedback, we recommend:

- Extensive communication in advance of the update (or when automated vehicles start being used on public roads).
  - This will help prime drivers to the idea that there are instances when vehicles themselves would have responsibility for driving, rather than drivers, and therefore lessen some of the misinterpretation that we saw when testing the passage 'cold'.
- Detailed guidance to go alongside the passage, e.g.:
  - Comprehensive list of what a driver can and cannot do in self-driving mode
  - Comprehensive list of the exact vehicles that fit into this 'automated' category (the proposed vehicle checker would be very useful and welcome)
  - Comprehensive list of which aspects the driver is responsible for when the vehicle is self-driving (other than being fit to drive, ensuring the vehicle is road legal – as mentioned in the passage)
  - What is meant by 'sufficient warning', e.g. whether there would be a time limit for when the driver had to take over, situations when this might happen