

Look: No hands!

Driving on the Motorway

James Hartley examines research on motorway driving and adds two new studies of his own

How drivers hold their steering wheels when driving has been studied in restricted ways for many years. Here I describe the advantages (and disadvantages) of a more naturalistic way of studying this phenomenon, and present my results.

Earlier studies of drivers' hand positions have taken place using driving simulators (e.g., De Waard, Van den Bold & Evans, 2010) or in more naturalistic situations, with independent observers observing from knolls slightly above the road, or standing on bridges (e.g., Fourie, Walton & Thomas, 2011). These methods mean, unfortunately, that usually only the top-half of the steering wheel can be seen! Other investigators have supplemented such observations with questionnaires asking drivers about how they position their hands on the wheel in a variety of driving conditions (e.g., De Waard et al, 2010; Thomas & Walton, 2007).

In one -rare- study Glendon & Bleicher (2006) actually filmed the position of 18 drivers' hands whilst they were driving around a set route and, more recently, Walton, Thomas, Murray and Fourie (2015) have recommended the use of elevated observers (p.51). However, no-one, as far as I am aware, has actually used elevated observers, or indeed sought to implement other more extreme methods of detecting the position of the hands on a steering wheel (e.g., using electronic buttons embedded in the wheel: see Klausner & Grimm, 2001; Steele and Gillespie, 2001; Murray, 1980).

It seems to me that observing drivers of vehicles from the windows of an elevated passing vehicle might provide the simplest way of observing drivers' hand positions when driving on the motorway.

The language of clocks

The previous literature – and general discussion – has commonly used the language of clock-faces to describe the position of the hands on the wheel. Originally it was suggested that 10 - 2 was the safest position for normal driving, and this position is advocated in the UK by driving schools and the *Highway Code* (e.g. see DVSA, 2015). Similarly, in France it is 10 minutes to - 10 minutes past. More recently this advice has been relaxed – especially in the United States - where 9 - 3 is now acceptable. This change seems to have followed from the fact that most steering wheels now contain an air safety bag in the middle of the wheel. Studies in New Zealand also usually measure from 9 - 3 but in China I understand that the suggested hand position is 10 - 4.

Clocks and wheels

To my surprise, no-one in these studies (to my knowledge) has commented on how the design of the steering wheel can affect where the hands rest most comfortably. In a recent edition of *Auto Express* (No. 1,386, 2015) I counted 28 different steering wheels – from *one* spoke from the centre to the rim in an ancient Citroen DS – to an almost rectangular shape of in a forthcoming Peugeot. Most of these wheels, however, had two or three spokes – either from 9 - 3, allowing the hands to rest on

top, or from 9 – 3 with an additional vertical spoke to 6. Some wheels, however, did have 4 spokes from 9 – 3 and centre to 5 and 7, allowing drivers to have both hands at the bottom of the wheel. Perhaps the most well-designed wheels prevented drivers from driving with both hands at 5 -7, or worse.

Callout of one or 2 steering wheels

Case-Study 1

I have long observed that looking through a coach window on the motorway whilst the coach overtakes, or is passed by another vehicle, provides a lot of information about individual drivers. In this case-study I decided to see if I could record the hand positions of drivers as we passed them (with me, in the UK, sitting higher up on the left-hand side of the coach). Sitting here meant that could record the hand positions of drivers in the slow lane. (Sitting high up on the right-hand side would mean that I could record the hand positions of drivers in the middle and 'fast' lanes – see Study 2.)

I decided to use a tape recorder to record my observations. I was able to observe the nature of the weather, and the nature of the road (e.g., three-lane motorway, two-lane main road, lanes at reduced speed because of road works, etc.).

For this study I recorded the hand positions of drivers for practically every vehicle that we passed in the 'slow' left-hand lane on a motorway journey of approximately 50 miles. This included the nature of the vehicle – car, van, lorry - the sex of the driver, the position of their hands on the steering wheel, and whether or not they were (illegally) using mobile phones or i-pads. A typical part of the recording might be as follows:

Van, man, 10 - 2

Car, woman, 10 - 2

Lorry, man, 8 - 4

Lorry, man, - 6 (left-hand on knee)

Lorry, man, 10 - (mobile in right hand)

Putting all of this information together it was possible to see what patterns emerged overall, for men and women, for different vehicles, and in some cases (but not here) for different types of road and weather conditions.

Table 1 summarises the results for lorry, tanker, van and car drivers driving in the slow lane over about 50 miles of motorway. Percentages are reported simply to facilitate comparisons.

Table 1. The percentage of drivers (i) with their hands in the 9-3 position (or better, e.g., 10-2) when driving in the left-hand lane on the motorway (N = 46 observations); (ii) using non-recommended hand position; (iii) driving with one-hand at the time of recording; and (iii) using i-phones/mobiles.

| | Lorry drivers N = 14 | Tanker drivers N = 6 | Van drivers N = 8 | Car drivers N=18 |
|------------------------|-------------------------|-------------------------|----------------------|---------------------|
| % 9-3 or better | 29% | 17% | 0% | 28% |
| % non-recommended | 71% | 83% | 100% | 72% |
| % one-hand only | 43% | 30% | 50% | 39% |
| % using i-pads/mobiles | - | - | - | - |

The data show very clearly that few drivers used the recommended position for their hands, and that a many more drove with one hand on the wheel. And, in this study only one van driver was using a mobile. No sex differences were observed.

Observations on the method

Tape recording was not always easy: it was hard to be consistent in recording the items observed. I got side-tracked when I saw a driver using an i-pad or, as once occurred, a lorry driver leaning forward with both his elbows on the wheel as he drove slowly along in a traffic jam... And sometimes I forgot to record the sex of the driver.

Accordingly, I decided that it might be easier to systematise everything by using pen and paper. So I constructed a record sheet with the following headings : 1) vehicle type, 2) sex of driver, 3) hand positions, and 4) other observations (like mobile/i-pad), and I set out to try this method on my next 100 mile coach trip on the motorway.

Call out of one steering wheel if only one used above

Case-Study 2

Apart from using pen and paper, there were other differences between Case-Studies 1 and 2. First, the journey was longer, and consequently more data were collected. Second, the recorded traffic was travelling in the middle or outer (fast) lane of the motorway, and was going much faster. Further, it was harder to see the hand positions in some vehicles in these lanes because I was sitting too high. Finally, there was a greater variety of kinds of traffic – lorries (rare in the fast lane), vans,

multi-purpose vehicles (MPVs), estate cars, small utility vehicles (SUVs), and large, medium and small cars. Consequently, for the purpose of this report, I grouped these into 1) lorries, 2) vans, 3) MPVs (multi-purpose vehicles), estates and large cars, and 4) SUVs (small utility vehicles), medium and small cars.

Table 2 summarises the results for these four groups of vehicles driving in the middle and outer (fast) lanes of over approximately 100 miles of motorway in fine weather, together with the percent using i-phones/mobiles.

Table 2. The percentage of drivers: (i) with their hands in the 9-3 position (or better, e.g., 10-2) when driving in the middle or 'fast' lane on the motorway ; (ii) using non-recommended positions; (iii) the using one-hand (at the time of recording); and (iii) using i-phones/mobiles. Again percentages are used to facilitate comparisons.

| | Lorry drivers | Van drivers | Large vehicles | Small vehicles |
|-------------------------|---------------|-------------|----------------|----------------|
| | N = 6 | N = 37 | N = 58 | N = 129 |
| % 9-3 or better | 20% | 14% | 26% | 25% |
| % non- recommended | 80% | 86% | 64% | 75% |
| % one-hand only | 80% | 30% | 31% | 34% |
| % using i-pads/ mobiles | 0% | 0% | 5% | 4% |

These data show, like those in Table 1 above, that few drivers held their hands in the recommended position and that many more drove with one hand on the wheel. Again the actual number of drivers using i-pads or mobile phones was very small.

Discussion

The findings reported above replicate almost exactly the more specific findings reported by Glendon & Bleicher (2006). In both their study and mine it appeared that only about 30% of drivers drove with both hands on the wheel within the clock positions of 9 – 3. Further, less than 5% were using mobile phones.

In terms of the methods used:

1. It was easier to record the data with pen and paper. But in both studies there has been no check for the reliability of the observations. Possibly one could employ an assistant to sit in the seat

behind (with recorder or check list) but joint-recording might be difficult in streams of traffic. Perhaps data could be averaged across a journey.

2. Each method (tape or check list) had its own benefits and problems. Audio tapes were easy to re-play if there were any doubts – and could be analysed by more than one person if this was felt to be necessary. The checklists were perhaps filled in more reliably, as using a check list meant that every cell was completed but it was sometimes difficult to be sure of one's observations in speeding traffic. In Study 1 most of the drivers (in the slow lane) were observed, but in Study 2 many observations were missed because of the nature of the speeding traffic in the two lanes.

3. The data obtained present only a snap-shot as it were of individual drivers at particular points in time, unlike the continuous data for different individuals, as obtained by Glendon & Bleicher (2006). However, these investigators only compared 12 male and 12 female drivers in set road conditions.

4. In terms of detail, only data for the drivers were collected. It would be interesting to record in addition the number (and seating position) of any passengers, and their sex, and whether or not the drivers were talking to their passenger(s). Drivers with passengers might be more constrained than drivers without them, or perhaps, with teenagers, the reverse? And is talking to passengers different from talking into i-phones (Amado & Ulupinar, 2005)? Similarly, might there be effects when young children are present? However, it would be particularly difficult to observe these and rear-seat passengers, especially for traffic in the fast-lane. Other distractions from driving might occur when eating/drinking at the wheel, listening to the radio, or simply day-dreaming and singing (Brodsky, 2002; Fontaine & Schwalm, 1979). Finally, the weather might play a role. Drivers might concentrate more in adverse conditions and use both hands: conversely, in hot weather, they might drive more happily with one hand on the wheel.

Concluding comments

Observational data like these can provide a more accurate picture of how drivers currently drive on the motorway than that obtained from the other observational methods used previously, although observation from a smaller multi-purpose vehicle (MPV) might be more reliable for recording data from traffic in the fast lanes (coach seats being too high).

The data obtained in these two pilot studies showed, however:

1. Adherence to the 10 – 2 driving position (or even the more generous 9 – 3 position) on the motorway was extremely low.
2. Approximately one-third of the drivers observed were driving with only one hand on the wheel. Actually this is less than the percentages reported by Walton & Thomas (2005).
3. Very few of the drivers observed (some 2%) were using mobile phones.
4. Two drivers were actually driving with no hands on the wheel.

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Approx. 2,500 words

The pictures of steering wheels attached can be used between sections singly or in pairs - they do not have to fit in a specified position.