



Fit to Drive

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Can observation methodologies inform road safety research?

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Observation methodologies - definition

- Typically one or two researchers seated in an experimental vehicle
- Tasked with recording the behaviour of the driver WRT road environment & road users



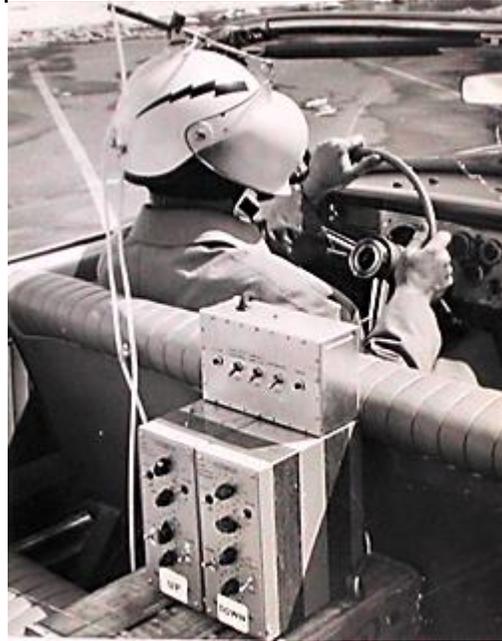
- Constitute an additional data source for on-road studies



On-road driving studies

- Real-world studies of driving behaviour do not form a homogeneous group.
- They vary in scale from short-term observations using a single vehicle to investigations of driving behaviour over many months with many vehicles.
- They may use simple equipment, sometimes just human observers, or they may record data via instrumentation and data storage systems.





Historical context

1. Studies of near accidents using both in-vehicle observers and instrumentation go back at least as far as the early 1950s (McFarland and Moseley, 1954).
2. Early studies using instrumentation in vehicles include those of Hulbert (1957) on drivers' physiological response to traffic and of Brown (1967) on the effect of fatigue
3. "In 1963, I was asked to investigate normal driving. Everyone was looking at accidents and things like that. And [Don Gordon], at the Bureau of Public Roads, said that if I knew anything about normal driving he'd love to hear about it" John Senders.



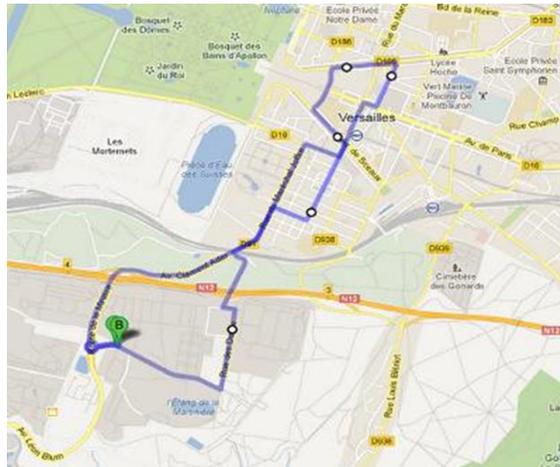
Categories of on road studies

1. Relatively small and controlled studies conducted to study how driving behaviour and performance are affected by, for example, fatigue, distraction, support systems.
2. Larger-scale and more long-term evaluation of a treatment, often called a field operational test. This method has been applied particularly to the evaluation of driver assistance systems .
3. Naturalistic Driving Studies - focus not on treatment but on diagnosis — on enhancing the understanding of how safety problems arise and unfold.





Controlled studies - characteristics



1. Can provide researchers with a limited dataset that can be highly tailored to the research questions
2. They use a pre-set route to reveal differences in behaviour, when driving under different experimental conditions.
3. The researcher has to identify a route that affords the best opportunity of being able to evaluate their hypotheses.
4. Unlike a naturalistic driving study, there is no question as to whether the road user does or does not encounter a particular traffic situation — this is predetermined by the characteristics of the route/ instructions given by the experimenter.





Controlled studies - the best place for observers



1. Controlled trials, due to their relatively short duration, can accommodate an observer.
2. This can provide context to driver behaviour, where even the most sophisticated camera system may fail (e.g. observing driver-to-driver non-verbal behaviour).
3. Using observers as data collection tools predates black-box monitoring.
 - McGlade (1963) evaluated almost 30 aspects of driver behaviour including parking skill, gear use, lane observance, attention and the use of the accelerator
 - Quenault (1966, 1967) focussed on aspects driving style, by obtaining measures of speed, use of signals, overtaking and mirror usage.



Observer techniques

1. The Wiener Fahrprobe – been used in evaluation studies e.g. of driver support systems.
2. Researchers have adapted the original tool, which was designed to be used overtly, to study driver behaviour covertly. For example, Brühning et al. (1989) used the technique to observe car drivers from a vehicle following behind.
3. Also been adapted by reducing the number of observers from two to one (Almqvist and Nygård, 1997).





Techniques (from paper to tablet)

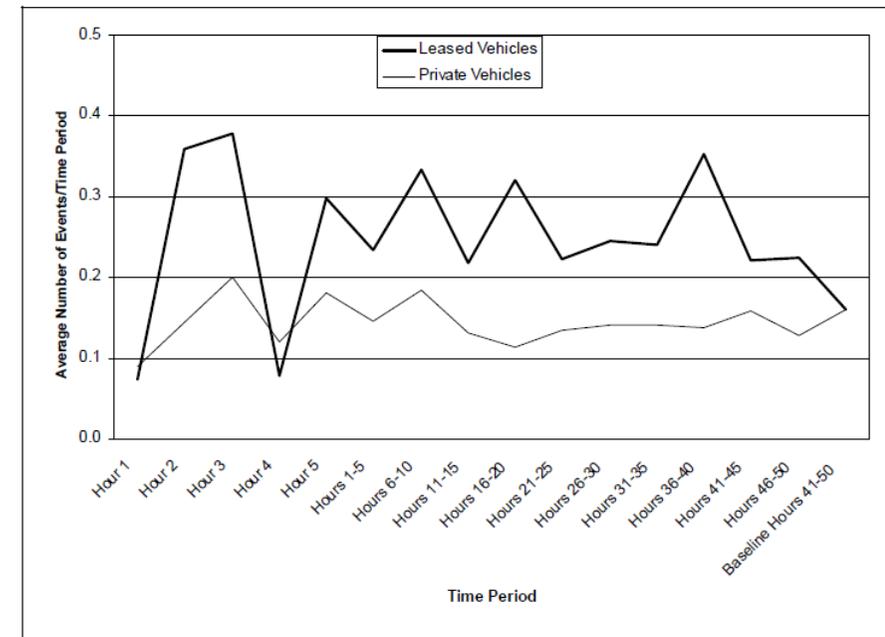
1. My first study using observer techniques (24 participants, 3 drives, 25 sections in each = 100s of pieces of paper!)
2. Most recent study:





Observer influences ?

1. Unknown effect that their presence may have on driver behaviour (Experimenter Effect)
2. Hjälmdahl and Várhelyi (2004) report that road users' behaviour did not change, Rathmayer et al. (1999) reported lower mean speed with an observer present.
3. Might depend on observation period - (Dingus et al., 2006) report a “four hour” effect.





Opposing observer & passenger effects?



1. The term **observer effect** refers to changes that the act of observation will make on a phenomenon being observed.
2. While a general protective effect of the presence of passengers is found, this is reduced in young drivers, during darkness, in slow traffic and at crossroads, especially when disregarding the right of way and passing a car.
3. In crash studies: passenger presence increases crash risk for teenage drivers, especially when the passengers are other teenagers and male (Williams et al 2007)
4. Passengers may distract drivers by an amount which cannot be compensated for, by cautious driving. (Vollrath et al 2002)



What aspects of F2D are aided by observation methodologies?

1. Communication between road users – hard to capture on video
2. In the absence of sophisticated data collection tools, observers may be at least “the next best thing” – fatigue study by Anund et al. (2013)



	B-ORS	D-ORS	KSS	BLINKDUR	LP	SDLP
B-ORS	1.000	0.588	0.437	0.360	-0.077	0.015
D-ORS		1.000	0.449	0.271	-0.108	-0.044
KSS			1.000	0.237	-0.137	-0.077
BLINKDUR				1.000	-0.003	0.006
LP					1.000	-0.006
SDLP						1.000



Key issues – F2D

1. The observer methodology can support evaluations of Fitness to Drive, under certain conditions only
2. For example, impairment studies are best done with objective data capture techniques
3. Studies with a focus on social interaction (e.g. violations) can glean a great deal from using observers
4. Issues such as inter-rater reliability and experimenter effects need to be overcome
5. Having an experimenter accompanying the driver on all rides will strain the project budget more than letting drivers go on their own.



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“He alone is an acute observer, who can observe minutely without being observed”
Johann Kaspar Lavater

