Qualitative methods in transport studies

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##### **Abstract**

In a society where the negative externalities of transport need to be reduced there has been an increasing emphasis on a more person-centred understanding of transport and travel behaviour change. This has led to a need for research, policy and practice to understand transport in the wider social context, not isolated or divorced from its social origin. This creates a growing role for social and people based academic disciplines such as sociology and psychology and along with them new research methods that may involve qualitative data collection and analysis. This paper explores how such methods are being used in transport studies and what contribution they can have to policy and practice and the discipline as a whole. However, there are barriers to using qualitative data to shape transport policy including generalisability of the findings, issues to do with the perceived subjective nature of the findings, the amount of data generated and the positioning of such findings to a policy addueince. There are still many challenges for qualitative data to overcome.

##### **1. A change in philosophy**

Over the past decade, there has been a growing recognition of the need to view transport within the social context of which it is embedded. The traditional consideration of transport as an abstract concept divorced from its social origin has resulted in at transport policy and practice that has unintended consequences for wider society within which transport is part of. As a result the system has been dominated by private motor vehicles at the expense of the environment, personal health and safety creating a society dependent on oil, a society severed in residential areas with associated eradication of local service, shops and provision and an unhealthy acceptance of injury and death and associated illness and injury, through an unwavering pursuit of policy aimed at a predict and provide approach (where road capacity was forecast and provision put in place to meet such prediction). The negation of the social element of transport has reduced the concept of travel and transport to a mere mechanism of getting to a destination as quickly and efficiently as possible for the greater majority at the exclusion of localness and the positive utility of the journey (Urry, 2011).

Civil engineering was the traditional discipline from which transport studies has emerged. Hence, transport has been dominated by concepts of applied physics and mathematics. Whereas there is room for such an approach, for example in working out required strength of bridges and wear and tear rates of road surfaces and pavement fatigue, for example, the approach has been over applied to also encompass physical science formulations of traffic flow and behaviour. Hence, traffic behaviour is seen in the same light as physical particles and should abide by the same laws. Unfortunately since transport and traffic is operated by people and people do not behave themselves when put into simple mathematical equations. Accurate models must become ever more complex to contain nuances of human behaviour reducing their simplicity and efficacy. This realisation has brought about an escalation of commitment in which ever more complex variables are added to try and match human variance, often with little success or such over complexity as to render the models useless. What is needed is a change in philosophy alongside an introduction of the human element into transport studies.

The growing disciplines of traffic and transport psychology (e.g. Steve Stradling, Ray Fuller, Ian Walker) , new mobilities movement in Sociology (e.g. John Urry), and the cultural spaces and mobility movement in Human Geography (e.g. Peter Merriman, Eric Laurier) emphasise the importance of placing the individual at the centre of studies into transport. They stress it is important to examine how individuals shape and are shaped by transport and how they embody and experience transport in relation to culture. There is a growing acknowledgement of such approaches in policy and practice, along with a change in focus from delivering efficient, speedy and safe mobility to one about facilitating movement of differing speeds, encompassing motivations and balancing needs of movement with those impacted upon by this movement. This change has been brought about in some respects by changes in cultural and political philosophy and ideology. The focus of the state is on encouraging individuals to change their own behaviour and there is a current focus on behavioural change and nudging (e.g. Thaler and Sustein, 2008), rather than enforcing or regulating change.

##### **2. A change in research**

These changes in approach demand new research philosophy, accompanying changes in research design and research methods. Within civil engineering discourse there is a general lack of epistemological reflexivity, whereby the construction of what does or does not constitute as warranted knowledge (Johnson and Cassell, 2001) is rarely discussed, contemplated or reflected upon, and research relies almost exclusively on a traditional positivist philosophy. Hence there is the belief that a researcher in the transport field should be objective and detached from the objects of research. Researchers within the domain tend to use experimental research design where the controlling and manipulation of independent, confounding and dependent variables are used to capture the ‘reality of the situation’. Overarching this has been a focus on generalisation from statistical analysis. However, many researchers within some branches of social science, particularly those in applied research, are questioning such epistemological assumptions, yet this is not yet happening in transport studies.

Placing people at the centre of transport studies suggests that taking the population as a whole is inappropriate and that the study of the individual is needed; a move from the study of the aggregate to the disaggregate and the macro to the microscopic level. This is particularly the case when studying the effectiveness of interventions such as traffic calming, where there is a general appreciation for the central role that individual plays in the success of such schemes (Brindle, 1992, 1997; Carthy, Packham, Rhodes-Defty, Salter and Silcock, 1993; Webster, 1998). This is also evident in Advanced Vehicle Control, and Safety Systems (AVCSS) that are currently being developed, such as Intelligent Speed Adaptation and Adaptive Cruise Control, where the success of such interventions remains heavily on how the user interacts and uses such systems (Marell and Weston, 1999). In addition, a growing body of research has begun to address individual differences within driver behaviour in general creating a narrative and discursive approach to understanding risk, speed choice and the impact of interventions (Dorn and Brown, 2003; Musselwhite, 2006; Rolls and Ingham, 1992). Furthermore, in order to change travel behaviour, targeting people at different stages of change or holding different attitudes has led to a segmentation approach (Anable, 2005).

Hence, there is a shift towards understanding that the social elements intertwined with transport use is vital for a true realisation of transport studies. As Haglun and Aberg (2000) state, “traffic and transport should be viewed as a social situation where drivers interact and influence each other” and O’Connell (2002) notes, transport studies “must not be based on an erroneous model of humans as abstract rational actors, isolated from their social context and operating on purely ‘objective’ criteria” (pg. 201).

This in turn changes the focus of the questions to understanding the individual and how they interact with and are effected by transport. For example, it becomes important to study a number of previously undervalued interests. The socio-political context within which transport is situated cannot be ignored. Hence, there is a need to understand different stakeholder and actor opinions and perceptions of travel and transport and interventions placed therein. Public acceptability as a facet of political will becomes crucial in understanding the feasibility and ultimately the success of potential solutions to transport related ills. There is a need to document people’s motivations for transport and travel and realise these are not fixed and may be changed in light of differing contexts, including policy or practice based interventions which should not just respond to these motivations but may actually shape or create new motivations. They cannot be studied in isolation from their social context . In turn, these lead to need for a different approach to data collection and analysis. For example, qualitative data would inform such questions and as such methods that create qualitative data such as focus groups and interviews begin to enter the fold.

##### **3. Examples of qualitative research**

Three examples are now shown of qualitative data being used in transport studies research. The first involves data collected to look at the public acceptability of road pricing, to move beyond the headline figures from surveys to understand the reasons and motivations behind attitudes held. The second example examines older people’s motivations and needs for travel which helps explain how to provide travel beyond the car for those within the cohort who have to give-up driving. The finale example discussed how understanding the social nature of road user safety amongst the public is useful for road safety policy and practice.

***Example 1: Understanding the public acceptability of road pricing*** (Musselwhite and Lyons, 2009; Owen et al., 2008). Sponsor: Department for Transport, UK. 2006-2008. Methods: Re-convened deliberative focus groups, workshop and interviews. Analysis: Thematic analysis with matrix mapping.

Previous research and indeed public referendums in the United Kingdom show that at an aggregate level at least, there is low public acceptability for road pricing and highlight a number of underlying factors that contribute to the low acceptability including fairness, trust and privacy (see Owen et al., 2008 for review). The Department for Transport, UK, commissioned this project to try and understand in more depth how each of these factors played out amongst individuals in social settings. They wanted to examine where sticking points to acceptability really lay, for example is it in the concept of demand management, the principle of road pricing or the in-depth details of road pricing. The project undertook a deliberative methodology, where groups re-convene over a number of times to consider specific elements under scrutiny (see figure 1). The project consisted of a stakeholder workshop where key areas to be studied were generated by policy experts. This informed some of the topics be studied in the focus groups with the public. Groups of participants were identified initially for eight local authority areas in England and Wales selected because they were considering the potential for introducing road pricing (to varying degrees). With six groups per area reflecting a range of urban and rural locations, a total of 46 groups took part in the first phase of the research with each group convened twice. A total of 446 participants took part in wave one. All the participants were invited to attend the second wave of group discussions, and 380 (85.2%) returned. A total of 259 participants took part in wave three, who were selected from five of the eight areas, in order to concentrate on a smaller number of areas in more depth. A total of 143 participants took part in wave four, who were recruited from three of the original areas. All participants in wave four were invited to attend the group discussions for wave five, and 137 (95.8%) returned for wave five. At wave six, 20 participants were invited to attend each workshop who had been involved in at least three waves of discussion groups. A total of 89 participants attended the workshops in the five areas who took part in wave three. Each focus group lasted one and a half hours. In addition, at wave seven, 48 of the participants who took part in the group discussions were recruited to take part in telephone depth interviews which lasted between 30 minutes and one hour. Each participant was rewarded with an incentive for taking part in each wave with the level of incentive ramped across the seven waves.

Topics followed a pattern from generic to specific issues and was to some extent iterative (what came up in previous waves could be investigated in more depth in further waves). Wave one examined attitudes and acceptability of congestion in general, examining effects, who caused it and how it might be solved; wave two investigated attitudes and acceptability of demand management (DM) and introduced road pricing. Wave three investigated congestion at a local level for the participants. Wave four investigated road pricing as a generic concept and wave five introduced a specific local scheme. Wave six investigated how road pricing might be sold to the public. At this stage a workshop was developed where individuals had to create an individual based on a statement about their driving and then sell road pricing as a concept to them (see figure 2)

Figure 1: Diagram showing the stages and waves involved in the deliberative work with the public investigating acceptability of road pricing (after Musselwhite and Lyons, 2009; Owen at al., 2008)



Figure 2:Completed montage of a created character during wave 6 the workshop phase of the research.

Qualitative data was analysed using a thematic analysis, mapping concepts arising out of the data to pre-determined categories (from the aims and objectives of the research) in a matrix mapping format. Areas of distinction, difference and similarity were noted. Open categories were also left for anything novel or unusual arising from the data and key quotes directly spoken by the participants were also kept. Data was analysed at the end of each wave, so that key findings could be further explored in subsequent waves.

The qualitative data suggested that people can struggle to really understand what road pricing would mean for them in terms of their daily lives and travel needs. This can hamper openness to the concept. Likewise, information on hypothetical road pricing schemes and concepts is harder to grasp and thus influence acceptance than would be the case if ‘real’ examples with evidence of impact were provided. At the end of a hierarchy of acceptance where a specific scheme is considered, the introduction of such detail tends, if anything, to reduce a sense of acceptance as concerns about wider issues such as cost and privacy are exacerbated by information presented on technology. In relation to specific issues, privacy is not a natural concern to many people; however when the topic is probed it can invite a sense of being a much greater concern: thus a dormant yet volatile issue.

It was concluded segmented or targeted approach for introducing road pricing is needed, since different groups of individuals view road pricing in different ways. Most noticeable during the research was the apparent tendency for female participants to become more open to road pricing over the course of the research and for younger males and those from C2DE socioeconomic backgrounds to either remain very negative or become more negative during the course of the research. Further study of the importance of travel and car use in terms of instrumental, affective and financial concepts could help shed more light on these differences. A final important concluding point concerns the different life roles people have and how these roles can differently affect issues of acceptability. It is notable that the role as driver rather than citizen or community resident tends to assert and reassert itself in discussion. However, in relation to effective communication of issues, a greater receptiveness to concerns and the need for solutions arises when people think as parents or, prospectively, grandparents.

***Example 2: The travel needs of older people*** (Musselwhite and Haddad, 2007, 2010a,b). Sponsor: Strategic Promotion of Ageing Research Capacity (SPARC) funded by EPSRC and BBSRC research councils, UK. 2006-2007. Methods: Focus groups, interviews, driver diary, e-delphi technique. Analysis: Grounded theory with constant comparative analysis.

Giving-up driving is associated with loneliness, isolation and depression in later life (Fonda, *et al.,* 2001; Ling & Mannion,1995; Marottoli *et al.,* 2000). This project aimed to investigate why travel, and in particular the car, was so important to older people. The project took a needs based approach, to find out what motivated older people to travel and to use cars. It investigated both practical and affective needs older people have with the car (Musselwhite and Haddad, 2010b). In addition, it investigated issues people had with driving to assess whether technology could help prolong driving (Musselwhite and Haddad, 2010a).

The project took a modified *grounded theory approach*, where participants become co-researchers and participate throughout the research process (Strauss and Corbin, 1998; Glaser, 2001). This approach suits the nature of generating and developing knowledge and meaning from a wide variety of opinions and attitudes, without doing an injustice to their diversity and depth. Strauss and Corbin (1998) describe grounded theory as a theory “derived from the data, systematically gathered and analysed through the research process [where] method, data collection, analysis, and eventual theory stand in close relationship to one another.”’ (Pg. 12).

The project involved three phases of data collection (see figure 3). The first phase consisted of two waves of focus groups with three different samples of older car drivers (one from a rural, one from a semi-urban and one from an urban area with a total of 26 drivers over the age of 65. These participants also took part in a telephone interview and completed a driver diary. In order to examine whether the needs generated amongst the car drivers could be met without increasing the amount of car driving, phase 2 consisted of in-depth interviews with 31 older ex-car drivers who, for one reason or another, have stopped driving between six and eighteen months prior to the research. A final stage re-presented the findings virtually to a group of 15 experts (consisting of older people, charities, academics and other stakeholders) who further verified the findings and helped shape the findings into recommendations

Figure 3: Outline and design of three-phase project on older people (Musselwhite and Haddad, 2007, 2010a,b)

Since the research involved an emergent and iterative design, data analysis ran concurrently with data collection. A transcript of the focus group or interview was coupled with reflexive notes made by the researcher and analysed by a process of Constant Comparative Analysis (Glaser, 2001; Goetz and LeCompte, 1981; Janesick, 1994; Lincoln and Gruba, 1985) was used and theory developed using open, axial and structured coding. Open coding produced a summary of the data which was further reduced through a process of detection of units of meaning into areas of general, relevant and essential distinction using axial coding. In line with grounded theory, relationships within the data were framed using phenomenon elements and their associated causal properties and contextual conditions. Further data analysis occurred at the end of the data collection to supplement the process in light of new findings and selective coding ensued throughout to re-build, modify and establish phenomenon. Finally, independent analysis took place to establish investigator triangulation to enhance validity

The findings suggested that older people travelled for three main reasons. As predicted, practical reasons were initially described, especially the need to get from A to B to access services, Healthcare, shops and work as quickly, efficiently and safely as possible. Further in-depth discussion brought out an affective level of needs, such as the need to be independent, the need for travel to help define roles, status and confirm normalness. Finally, a final level suggested the need for travel for its own sake that allowed individuals to see nature, to enjoy the act of travelling. In all cases the car met these needs perfectly and this was especially true for the affective and aesthetic needs, which travel beyond the use of a car was unable to fulfil. The qualitative methodology was instrumental at generating these three levels of need and producing a model (see figure 4) which highlighted how prominent each level was in terms of discussion. The fact that practical needs are discussed first suggests they mask affective and aesthetic needs which rarely get attended to in terms of policy and practice, for example, with the main focus being on providing practical solutions. Quantitative data is unlikely to have moved the debate beyond the practical level of need and suggest why when this has dominated that solutions are generally practical in nature. This project suggests the importance of affective and aesthetic needs being met post-car for older people.

The project also highlighted that older people are quite aware of driving issues they have and are willing to accept they need help, especially in terms of maintaining a consistent speed, glare and luminance issues and being distracted. Awareness of such issues was heightened through in-depth discussions on the topic, showing that qualitative methodology can help reflection-on-action, especially in group situations (see Musselwhite and Haddad, 2010a)

Figure 4: Hierarchy of older people’s travel needs that the car fulfils by awareness of the participants themselves (after Musselwhite and Haddad, 2007, 2010b)

***Example 3: Understanding the public attitudes to road user safety*** (Musselwhite, et al., 2010a,b). Sponsor: Department for Transport, UK 2008-2009. Methods: Deliberative focus groups with workshop. Analysis: Thematic analysis with matrix mapping.

The social nature of road use, including attitudes, values, beliefs, pro-social behaviour and social norms, relates to how people perceive and accept levels of risk on the road and hence their road user safety behaviour (Haglund and Åberg, 2000; O’Connell, 2002). The research aimed to examine public attitudes to road safety in the context of other attitudes, identities, lifestyle and values. The research was qualitative in nature and brought together the views of a wide range of adult road users. The project aimed both to develop the evidence base on public attitudes to road safety and to support the development of policies aimed at improving road safety.

 The study used a deliberative approach to engage the public in discussions around road safety and risk. These in depth techniques are viewed as overcoming some of the limitations of top down consultative styles, providing a forum for reflective and informed discussion between people with a range of views and values. The deliberative approach built on an initial literature review (Musselwhite *et al*., 2010a) on road safety.

The research engaged 228 members of the public across the following four locations in the UK: London, Bradford, Glasgow and North-West Wales (Llandudno and Wrexham). The areas were chosen to reflect a range of socio-economic variables and well as a mix of urban (London, Glasgow and Bradford) and rural (North-West Wales) environments. Within each area an attempt was made to recruit 60 participants into one of six groups, with ten participants in each group, selected in response to include different road user groups, life-stages and attitudes to risk. This was a deliberate attempt to engage a diverse range of participants known to have differing views on road user safety as had been found in the extensive literature review (Musselwhite et al., 2010a), Each group met on 3 occasions and hence participants were engaged in three reconvened workshops across the four areas. Each workshop focused on a different road safety issue. Workshop 1 explored risk taking on the road in the context of wider risk taking and norm guiding behaviours. Workshop 2 explored the relationship between different road user groups, including car drivers, motorcyclists, cyclists and pedestrians. Workshop 3 explored participants’ views on potential road safety interventions, in terms of perceived effectiveness and fairness.

The data was analysed using a technique known as matrix mapping, which is a version of thematic analysis that involves assigning categories to the data a-priori, but leaving scope for additional categories to be formed post-hoc. Hence, based on the topic guide (which in turn was based on learning from previous research), experiences of conducting the fieldwork and a preliminary review of the data a thematic framework was constructed. The analysis then proceeded by summarising and synthesising the data according to this thematic framework and placing data into categories. These were then compared for similarities and differences and presented under key themes outlined in the findings below.

As with previous quantitative research, individuals tended to view themselves as good drivers and others as poor drivers. They often viewed messages, through campaigns, as being for other drivers and not being intended for themselves, thus distancing themselves from the message and justifying their own belief that they were safe. It is therefore suggested that future interventions make individuals explicitly believe that: ‘Yes they mean me. And yes, I can do something about it’.

One of the most interesting findings from the workshops was the shift on views in relation to speeding interventions: specifically average speed cameras, 20mph zones and traffic calming. The deliberative nature of the study illustrated that although initially sceptical about these interventions, with reasoned debate in the group discussions people’s views changes and acceptability increased dramatically. This strongly suggests the public are now at the ‘preparation stage’ in terms of change and will be willing to give these interventions a go if backed up with appropriate communications and enforcement campaigns.

Participants viewed the road space as “competitive space”. Largely they viewed the space in terms of being a driver and hence saw road user safety largely in terms of aiding the driver to have a safe passage of movement. There is a need for the public to be more aware of and empathetic towards other road users, and also help to re-establish norms that are guided by individual judgement, conventions and protocols, rather than a reliance on rights of way and laws. Investigating concepts of shared space is suggested as helping to achieve this.

Overall, the research highlights the importance of taking into account driving identity, road culture and risk taking when designing interventions on the ground. As well as traditional approaches, social marketing, new technologies and the novel design of space should play a role in thinking through the 3Es (Education, Enforcement and Engineering) over the coming years.

##### **4. Challenges to qualitative data**

There are a number of methodological challenges to the use of qualitative data, which affect its application to traffic and transport policy and practice, including cost, subjectivity, re-presentation and generalisability. There is a number of techniques that can be used to reduce these barriers and to encourage policy and practice to embrace qualitative methodology.

Using the appropriate methods to collect qualitative data is extremely time consuming and hence costly. A great deal of time is needed to set-up, organise and facilitate each case to produce qualitative data. A typical interview lasts 30 minutes to an hour and a focus group one to two hours. Each case requires analysis, which even using computer sorting and analysis support software, requires reading, synthesising and reporting. There are no short-cuts to generate in-depth information! Therefore, those commissioning such research are often likely to go for a cheaper option, which would involve diluting the qualitative data or moreover using methods to generate quantitative data.

The analysis techniques are often viewed as being more subjective than quantitative data techniques. This is often due to the physical and philosophical proximity of the researcher to the data. The very nature of the data collection means the researcher may well influence the data, whereas the researcher is kept at a further distance from the research in a traditional positivist quantitative method. However, proponents of qualitative data emphasise the importance of documenting the relationship between the researcher and the researched, the same way a researcher would document how the research was kept objective when using methods that influence quantitative data. Hence the relationship can be revealed and understood and analysed along with the data collected. A number of checks can help reveal such processes. The data can be analysed with another researcher to help look for consensus in the analysis. Although this increases the resources, it is a good check on the trustworthiness of the data. On occasion the analysis or first level of write-up is re-presented to the participants, in terms of a “member check” , to assess validity and trustworthiness of the data.

There are further challenges in re-presenting the findings, so that they are useful to a potential audience. The usual way of reporting back is to write a report with key findings by themes emerging from the data and include verbatim aspects of speech to highlight points being made. However, doing justice to the data is not always possible in such a manner and the data needs to create more of an immediate impact. Indeed choosing the right medium to represent the findings can influence the impact. In a study on older people giving-up driving it was found that older people and their families quite often refuse to discuss the issue until it is too late increasing difficulties for older people who are forced to give-up driving. The data was therefore turned into a community play to spark debate and bring issues to the attention of older people, their family and the community as a whole (see Pauluth-Penner, 2010). Turning these into recommendations is a further challenge. First, although the participants are likely to represent people from the population being investigated, they are unlikely to be representative of the population in a way that would allow statistical generalisation as in a traditional quantitative piece of work. This does not mean that findings cannot be generalised, however, but that the author should include a speculative comment on how far such findings might be applicable to a wider audience, justifying why they believe that to be so. Another barrier is the sheer amount of data is a challenge to make meaning and recommendations from. Where this is the case it makes sense to further refine the findings through workshops perhaps utilising structured techniques such as Delphi Technique to try and create and order important recommendations for policy and practice with key stakeholders (see for example Musselwhite and Haddad, 2007).

Another strategy that can be adopted to increase the generalisabilty of the findings is to add a quantitative element to the data in a subsequent stage of research. Results can then be checked against a wider sample of the population to see if the patterns found in the qualitative data are present for a more representative sample. An example of this is found in a study on attitudes of car drivers to driver risk, whereby an initial qualitative data collection with 54 participants highlighted four groups of driver: unintentional, calculated, reactive and continuous risk takers (Musselwhite 2004). These four groups were then corroborated using a questionnaire which was received from 1655 participants (Musselwhite, 2006).

##### **5. Conclusion**

To fully embrace transport in its social context then a change of research question and focus is required. There is a need for research methods to be used that generate qualitative data. This brings with it new challenges to the transport world, especially in terms of how the research is re-presented and how to engage policy-makers and practitioners. It changes the notion of generalisation from the research and the relationship between the researcher (and team) and the researched. Hence, qualitative research is flawed, there are no complete truths, but this is no different to quantitative research. It does not reduce the need for quantitative data, nor the need for civil engineering to play a role in transport research, just that a change in focus is needed, along with policy and practice and researchers embracing a wider variety of techniques. It requires a change in attitude from policy makers and practitioners to embrace the change. It may require practitioners and politicians to be more involved in the research process and to actively engage in the research findings in order to generate recommendations that will have an impact. In order to understand transport from the human perspective and answer the transport issues of the day, there is a need to embrace qualitative methods for a more human-centred approach to transport studies.

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