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## Shared Space – Implications of Recent Research for Transport Policy

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## **Shared Space – Implications of Recent Research for Transport Policy**

### **1. Abstract**

Shared space is an approach to street design which minimises demarcations between vehicles and pedestrians. It has become particularly influential in the UK, where a comprehensive study of shared space schemes has informed recently published national guidance to local highway authorities. This article critically examines the claim made in the guidance that it is 'evidence based'. Primary research reported in the article, examines one of the sites in the 'official study', in Ashford, Kent, in greater depth, using video observation and a street survey of pedestrians. The findings show that most pedestrians diverted away from their desire lines, gave way to vehicles in most cases and felt safer under the original road layout. This study casts doubt on some aspects of the methodology and findings of the 'official study' and its interpretation in the national guidance. The authors conclude that some claims made for shared space have been exaggerated. Shared space is not, in itself, a sustainable transport measure. It may be combined with, and form part of a sustainable transport strategy. It has also been proposed as an alternative to measures such as pedestrianisation, in which case its effects on modal share and the externalities generated by road traffic would be deleterious.

**Keywords:** shared space; evidence-based research; UK transport policy; pedestrianization; pedestrian experience

### **2. Introduction**

The concept of 'shared space' between vehicles and pedestrians in streets is becoming increasingly influential across several countries, particularly in Europe (Shared Space 2011; Hamilton-Baillie 2008). Its origins are generally associated with the late Hans Monderman, a traffic engineer who pioneered the approach in the Dutch province of Friesland. But the concept has achieved most influence in the UK, where the Department for Transport (2011) has recently published the most comprehensive study yet of shared space sites (MVA, 2010a; MVA, 2010b) to coincide with new national guidance (DfT, 2011) on shared space for local highway authorities.

The use of those research findings in drafting that guidance appears at first sight an exemplary instance of evidence-based policy, but as this paper will demonstrate, some of the claims made in the guidance are not supported by the evidence. The primary research described in this paper focuses in greater depth on one of the sites also studied by MVA (2010a, 2010b). Some of the findings are consistent; others cast doubt on aspects of both the methodology and the interpretation of the 'official' studies. The concluding sections of this paper, discuss the implications of this analysis for transport policy in the UK and elsewhere.

### **3. Definitions of Shared Space**

There is no agreed definition of 'shared space'. Some writers have described it as a design approach (or 'philosophy': Shared Space, 2011). The recent UK Government

guidance follows advocates such as Hamilton-Baillie in defining shared space aspirationally:

“A street or place designed to improve pedestrian movement and comfort by reducing the dominance of motor vehicles and enabling all users to share the space rather than follow the clearly defined rules implied by more conventional designs.”

(DfT 2011)

This is followed by a list of ‘tangible indicators of sharing’ such as “pedestrians sharing the carriageway”. This approach is problematic: if a shared space design fails to improve pedestrian movement should it still be considered a shared space?

MVA (2010a) proposes a ‘shared space rating’ based on observable characteristics (e.g. presence or absence of kerbs, crossing points, road markings etc.). This more sophisticated approach can still be questioned on the same grounds. For the rest of this paper, **the term ‘shared space’ will be used to describe streets designed to minimise demarcations between vehicles and pedestrians** – regardless of behavioural outcomes.

#### 4. Claims Made for Shared Space

Shortly before his death in 2007, one of the authors of this paper interviewed Hans Monderman and other traffic engineers in the Dutch town of Drachten, where the first schemes explicitly identified as shared space were implemented. The original intention behind schemes such as the celebrated Laweiplein (Figure 1), Monderman explained, was to reduce accidents and congestion and to increase the flow of traffic. There was no expectation of any effect on modal share, and no one had attempted to measure this. Drachten also has a substantial network of segregated cycle routes. In common with many other Dutch towns, the network was designed to give an advantage to cyclists, by offering them shorter, more direct routes than those available to motor vehicles (Figure 2 – an example of ‘filtered permeability’: see: Melia, 2011). The traffic engineers believed this form of segregation to be an essential corollary to the sharing of space on some other streets.



**Figure 1 – Laweiplein, Drachten, Netherlands**



**Figure 2 – Cycle Bridge, Drachten, Netherlands**

In transposing Monderman’s ideas to an audience outside the Netherlands, UK-based advocates of shared space removed the corollary about cycle routes and added to the list of claims made for it, presenting it as: “a key policy” combining aspirations for: “efficient traffic circulation, modal shift to walking and cycling, enhancement to the public realm and improved health” (Hamilton-Baillie, 2008). Surveying the literature,

the MVA study added claims about “enhancing social capital” and “the economic vitality of places” (MVA 2009).

*Manual for Streets* (DfT, 2007), design guidance for residential streets in the UK, recommended that shared space was only appropriate in streets with low traffic volumes. *Manual for Streets 2* – which extended the principles of the earlier guidance to mixed use streets – removed this caveat about traffic volumes, and suggested that shared space might be a ‘more desirable’ alternative to pedestrianisation in some contexts (CiHT, 2010). This approach raises a number of issues, not all of which can be addressed here, but clearly depends upon the validity of the claims that shared space designs create significant improvements for pedestrians (however ‘improvements’ are defined and measured).

## **5. Research Evidence on Pedestrians in Shared Space Streets**

Given the focus of shared space on pedestrians, it is striking how little research had been done until very recently on pedestrian behaviour and attitudes in shared spaces. Much of the earlier evidence focussed on accident statistics and traffic flows. Advocates of shared space provided largely descriptive accounts of benefits from existing schemes (e.g. Hamilton-Baillie 2008) whilst opponents questioned whether the reductions in accidents observed in some (though not all) sites were achieved partly through intimidating pedestrians (Methorst, 2007).

In 2007 the NHL, University of Applied Sciences conducted a study of The Laweiplein in Drachten (Figure 1). The scheme, implemented by Hans Monderman in 2000, is estimated to accommodate approximately 22,000 vehicle movements per day and is often cited as a leading example of shared space. The survey work was undertaken before and after the scheme’s implementation, using a combination of traffic flow data, video analysis and questionnaires. The study concluded that the area as a whole had improved, with fewer accidents and less delay for both pedestrians and vehicles (NHL, 2007). Although the overall findings were positive, it found most still preferred to use the informal courtesy crossings and that some pedestrians tended to ‘hurry’ across the space (NHL, 2007). Only 9.7% and 13% of participants surveyed in the before and after studies were pedestrians, so this study provides limited insight into the effect of the scheme on pedestrians.

Some have used stated preference methods to fill this gap. Kaparias et al (2010) found that pedestrians feel most comfortable sharing space in conditions which ensure their presence is clear to other road users, i.e. conditions involving low vehicular traffic, high pedestrian traffic, good lighting and provision of pedestrian-only facilities. It was found that young men were the most comfortable sharing space, whereas people with disabilities and older people were more negative.

These hypothetical findings pose the question of whether pedestrians with ‘real life’ experience of shared space schemes would react in a similar way. In March 2010 Bristol City Council conducted an experiment into the value of traffic management by switching off traffic lights at two sites within the city. This enabled a study of the willingness of pedestrians to share space with vehicles (Firth, 2011). Vehicle flows were relatively high: around 600 two-way movements per hour. Pedestrians’ attitudes varied across the different sites, but most believed that signal controls were safer and easier to use (Firth, 2011).

## **6. The MVA study for the UK Department for Transport**

In 2009 the UK's Department for Transport appointed MVA Consulting to develop 'evidence-based design guidance on shared space highway schemes'. The use (and arguably, misuse) of this evidence in the guidance will be discussed in Section 9.

The interim report, which reviewed existing evidence included several studies of 'home zones' and pedestrian priority zones (MVA, 2009). These schemes combined several changes making the effect of minimising demarcations difficult to isolate. In some cases, it was not even clear whether sharing of space was a relevant factor in the research reviewed. Section 3.2 on Economic Activity and Property Values describes one study which suggested a positive relationship between shop vacancy rates and vehicular traffic flows, and others which show positive relationships between commercial property values and "pedestrian friendly environments" or 'street quality'. Whether reducing demarcations between vehicles and pedestrians exerts any influence on these relationships was not discussed (and has not been demonstrated in any other research reviewed for this project).

On the defining issue of pedestrian movement it was noted that 'mixed priority routes' increased pedestrian movement whereas home zones did not. The evidence on casualty rates was mixed, with two Dutch studies suggesting an increased risk at higher traffic volumes (Quimby and Castle 2006; Zeegers, 2009 cited in MVA, 2009). No evidence was presented of any influence on modal shares.

MVA's primary research was based on 10 sites selected from across the UK, with a range of vehicle flows, speeds and features such as kerbs and crossing points (MVA, 2010a). These features were assessed on a point-scoring system contributing to a 'shared space rating'. This rating was used in various statistical tests, one of which showed a negative association with vehicle speed. In their commentary, the researchers imply that this association demonstrates causality (MVA, 2010a, 3.4.6). They did not acknowledge the obvious possibility that vehicle speeds might have (consciously or unconsciously) influenced the extent to which traffic engineers were willing to remove demarcations across the ten sites. Furthermore, the only physical factors included in the model related to the sharing of space. Other measures more explicitly designed to reduce speed such as the narrowing or deflection of carriageways were not included. The  $r^2$  of 0.65 suggested a model explaining two thirds of the variation in traffic speed, but if the shared space rating was acting partly as a proxy for other unmeasured factors (possibly implemented by engineers at the same time as the shared space conversions) the findings would be invalidated.

The researchers also sought to measure 'pedestrian use of space' through an idiosyncratic method involving the researchers drawing five 'desire lines' for each site based on observed pedestrian movements. On the basis of just 30 observations, Elwick Square in Ashford was recorded as achieving 100% movement along desire lines. The validity of this finding will be questioned in Section 9.

Across all the sites, no robust association was found between pedestrian use of space and the shared space rating, although negative associations were found with traffic volumes, kerbs and 'colour contrast between carriageway and footway'. Across most of the sites, pedestrians gave way to vehicles more often than vice versa. Higher vehicle flows were associated with a lower propensity of drivers to give way, whereas higher pedestrian flows were associated with a higher propensity.

The qualitative element of the research suggested that speed and volume of traffic were more important influences on pedestrian experience than demarcations, with some pedestrians preferring shared streets to their conventional controls and vice versa in other locations (MVA, 2010b). Interestingly the researchers did not ask any

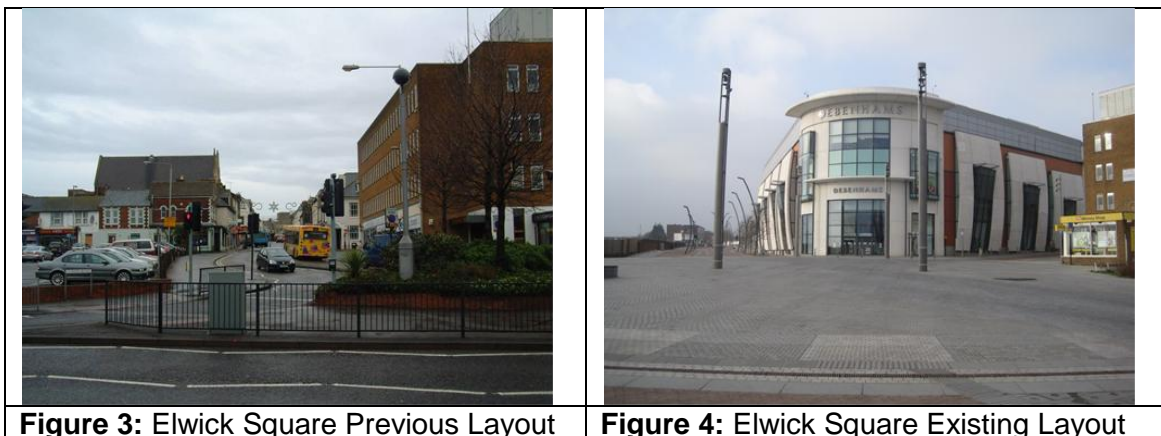
pedestrians with experience of conversions to shared space for their views on the advantages and disadvantages of the conversions.

Much of the opposition to the concept of shared space in the UK has come from groups representing visually impaired and blind people (Guide Dogs for the Blind, 2011). A chapter of MVA (2010b) describes the findings from qualitative interviews with people with a range of disabilities. The authors present this qualitative analysis in a quantitative form, showing graphs based on very small sample sizes. Although they could not be considered statistically valid, these confirm the findings of previous research (Guide Dogs for the Blind, 2011) that people with disabilities and particularly visually impaired people generally prefer conventional streets to the shared space streets. All disability types preferred 'wide pavements and quieter streets'. Visually impaired people preferred raised kerbs, whereas other groups preferred a flat surface.

## 7. Elwick Square Case Study

Elwick Square in Ashford, Kent, was ranked second of the chosen sites based on MVA's shared space rating. The primary research described here examined that one location in greater depth, raising a number of questions about the methodology, findings and interpretation of MVA (2010a and 2010b).

Elwick Square forms the centre piece of a larger regeneration project which opened in 2008 and won a number of national awards in the UK. The project involved the regeneration of a former one-way ring road which circulated Ashford town centre. The highway layout has been simplified and many conventional highway engineering features have been removed. The ring road now accommodates two-way vehicle movements and is subject to a 20mph speed limit. There is very little sign of segregation between modes, with all users occupying a largely unmarked level surface (O'Rourke, 2011). The Square also accommodates traffic flows of approximately 11,000 movements per day and up to 850 movements per hour, presenting an opportunity to analyse the use of shared space in an area of high traffic flow (Kent County Council, 2009).



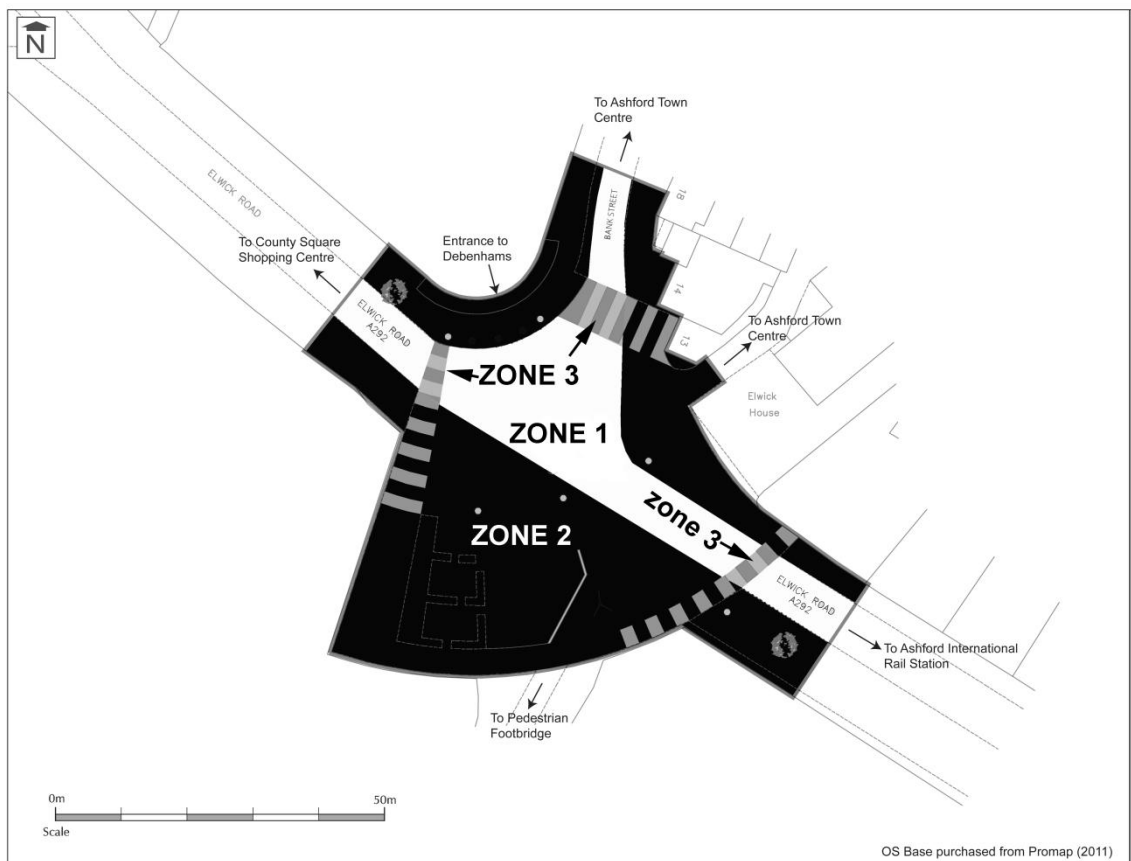
In the previous layout the carriageway formed the central feature of what is now Elwick Square. As shown in **Figure 3**, traffic signals, road markings, signs, guardrails, kerbs and footways were some of the many features of the previous layout maintaining demarcation between pedestrians and vehicles. Today, as shown in **Figure 4** the Square now incorporates a level surface with no delineation between the carriageway and footway, surfaced with square granite setts rather than conventional tarmac. The space is mainly clear with some landscape features and bespoke street lighting to

enhance the design (Coulthard, 2009). Much like the Laweiplein shared space scheme in Drachten there are informal pedestrian ‘courtesy crossings’ positioned where each of the carriageways adjoin the square, providing the pedestrian with an option to use an informal type of segregation.

The roads leading to Elwick Square have also been uncluttered and reconstructed as part of the regeneration scheme. A footbridge is located on the southern edge which provides an important pedestrian link from the residential areas in the south to Ashford town centre to the north of the square.

#### *Video Observation: Pedestrian Path Following Survey*

The research took place in two phases in early 2011. As in the MVA study, video cameras were used to track pedestrian movements across Elwick Square. To analyse the data, the study area was separated into three ‘zones’ designed to measure the sharing of the space, as illustrated in **Figure 5**.



**Figure 5 – Elwick Square: zones**

Zone 1 is an area of the square in which pedestrians could fully share space with traffic. Zone 2 is the area which could be covered by pavement in a more conventional street – where pedestrians may segregate themselves from traffic. Zone 3 covers the three ‘courtesy crossings’ where pedestrians may expect a higher degree of priority over traffic than in Zone 1. The coding scheme and the positioning of each zone were identified prior to the undertaking of any pedestrian observations in order to avoid the danger of unconscious bias (Robson, 2002).



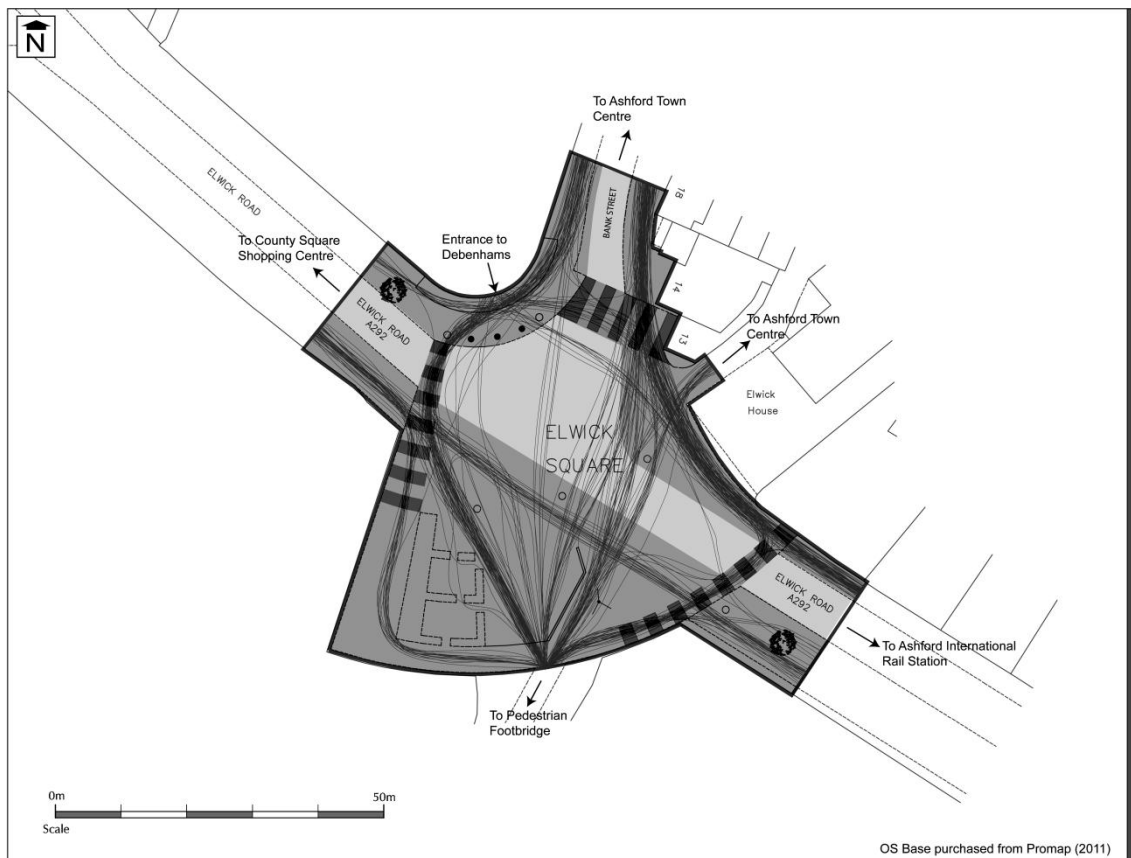
A total of 281 pedestrian movements were recorded. Only movements where the pedestrian would need to cross Zone 1 (using the courtesy crossings, or not) are included in the analysis which follows. These movements will be referred to as 'active pedestrian movements'. The survey also recorded 'conflicting movements' when the paths of a vehicle and a pedestrian conflicted, and instances of pedestrians running to cross the space.

### *On-Street Pedestrian Interviews*

144 semi-structured on-street interviews were also conducted with pedestrians passing through and using Elwick Square on three week days. The interviewees were selected by using a systematic probability sample: every fifth person passing through the study area between 08:00 and 18:00. These hours were chosen because traffic flows remained relatively constant between them, ranging from 723 to 863 vehicle movements per hour (Kent County Council, 2009).

## **8. Results**

### *Video Evidence*



**Figure 6 – pedestrian movements observed by video**

**Figure 6** presents a plot of all pedestrian movements obtained from the video tracking. 56% of the 'active pedestrian movements' travelled around the periphery of the scheme. Most pedestrians tended to use the informal 'courtesy crossings', lengthening their route and diverting their desire line away from the natural continuation of the carriageway at the centre of the square.

Most pedestrians only tend to cross 'Zone 1' in specific sections, perhaps avoiding the most complex area at the very centre of the square. When travelling on a north/south axis most pedestrians tend to cross 'Zone 1' at the shortest point where there is only one stream of traffic, avoiding the centre of Zone 1 where all the carriageways meet. The natural desire lines of pedestrians which would pass through that point tend to divert via the informal courtesy crossing to the west.

In 72% of the conflicting movements, the pedestrian initially gave way to the vehicle. In 20% of instances the vehicle subsequently gave way, leaving 52% of conflicting movements where the pedestrian waited at the edge of zone 2, until the traffic had moved on. Although most pedestrians treated the courtesy crossings like zebra crossings, most drivers did not treat them in this way, initially giving way in only 37% of conflicting movements with a pedestrian in Zone 3.

Pedestrians were observed running in 17% of all 'active pedestrian movements' which crossed the natural continuation of the carriageway. This figure rises to 24% when looking at 'active pedestrian movements' in Zone 1 only.

### *Pedestrian Interviews*

Table 1 summarises some of the key responses from the questionnaires:

	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>	<b>n</b>
Are you ever worried about sharing space in Elwick Square?	<b>72%</b>	23%	5%	144
In this type of setting would you prefer traditional pavements and traffic light crossings?	<b>64%</b>	29%	7%	144
Do you view this square as an area in which you can stop and socialise?	33%	<b>65%</b>	2%	144
As a pedestrian would you make any changes to the layout of Elwick Square?	<b>74%</b>	24%	2%	144
	<b>Yes</b>	<b>No</b>	<b>Same</b>	<b>n</b>
As a pedestrian did you feel safer in the previous scheme?	<b>80%</b>	14%	6%	124
	<b>More</b>	<b>Less</b>	<b>Equal</b>	<b>n</b>
As a pedestrian, do you feel you have more, less or equal priority over vehicles?	19%	<b>78%</b>	3%	144

**Table 1 – responses from pedestrian interviews**

In responses to qualitative questions the most common suggestions for changes to the Square were the introduction of formal crossings – signalised or formal zebra crossings. Several interviewees doubted whether the informal crossings were prominent enough for drivers to recognise. Many pedestrians found motorists within Elwick Square hostile and unwilling to share space, citing high traffic flow and vehicles speeds as the main cause for anxiety. A number of respondents also spoke of how they deliberately moved around the edges of the square to avoid conflict with traffic. A few participants claimed to know of people who avoided Elwick Square altogether, signifying levels of anxiety actually prevented certain pedestrians from using the square.

*“For a long time I avoided the area, but I think I’m becoming more used to it now, but in the mornings getting to work must be a nightmare because of all the traffic. I don’t know what the younger people think of it but I know older people who don’t come through here, including me at first.”*

Several parents expressed anxiety about their children using the space, e.g.:

*'I'm worried about my child too who goes to school over there, I won't let him go on his own now. I don't tend to cross the middle. It might be alright for locals and people who know what's going on, but I know quite a few people who like to avoid the area, they take a longer way just to get into the centre'.*

90% of the people interviewed had experienced the previous scheme and 80% claimed they felt safer in the previous layout. A few interviewees preferred the new scheme, however, both in terms of its aesthetics and usability:

*'I feel safer here in this one, it's more open now, helps you see the traffic so you can cross a lot easier'.*

Important demographic differences were found in pedestrian attitudes towards Elwick Square. The following comparisons, using Chi-square tests, were all significant at the 95% level. Men were less likely to be anxious about sharing space with traffic in Elwick Square, with only 58% of men reporting anxiety in comparison to 91% of women. Men were less likely to prefer traditional segregation and less likely to want to make changes to the existing layout of the square. Males were found to be more likely to believe they had equal or more priority to the car, with 98% of women believing they had less priority in comparison to 63% of men. Men were more likely to view Elwick Square as a place in which they could socialise with other pedestrians.

People in the youngest age category ('18-30') were more likely to have adapted to certain aspects of Elwick Square. For example it was found that they would be more likely to view the square as a place for social interaction (46% - 95% confidence) and that they were more likely to believe they had equal or more priority to the car.

Finally, people who used the scheme on a daily basis were more likely to want to make changes to the layout (83%) than those who used it less than once a week (56%).

## **9. Analysis**

The DfT states that its guidance is 'evidence-based' drawing on the MVA research (DfT 2011). There are no footnotes or specific references to verify the source of each statement but some appear well supported; others are contestable. The statement that "key factors affecting pedestrian comfort in shared space appear to be volume, type and speed of traffic" is well supported by evidence, as is much of Section 6: 'Detailed Design'.

The statement that "reducing demarcation...and formal traffic management features tends to reduce speeds" (DfT, 2011, 3.2.6), if based on the MVA research, confuses association with causality, as discussed in Section 6. Clearly some street design measures can reduce speed but whether reducing demarcations *in itself* reduces speed, under some, all, or no circumstances is difficult to ascertain from existing evidence. This point applies to several of the claims made for shared space. The evidence on economic benefits discussed in Section 6 relates to vehicle speeds and 'pedestrian friendliness' but not to shared space *per se*.

The assertion that shared space streets have 'a comparable number of casualties' to conventional streets in DfT (2011) is a political statement, ignoring the influence of traffic volumes discussed in MVA (2009). The concept that removing demarcations reduces the risk of collisions and casualties seems counterintuitive. Several of the

studies reviewed here, including MVA (2010b) support the observation that risk reduction in shared spaces is largely achieved through the creation of anxiety or 'unease' amongst drivers and (as the case study demonstrates) pedestrians. In the UK, and even in those parts of the Netherlands where the concept was pioneered, shared space schemes are relatively new, and a departure from the normal expectations of road users. If shared space becomes the norm in some areas or circumstances, this raises the question of whether this unease might begin to diminish in the longer term, entailing an increase in collisions and casualties.

The guidance amplifies the assertion in MVA (2010a) that reducing demarcations encourages people to "move more freely" and "follow desire lines". The case study described in this paper casts doubt on the methodology which led to that conclusion. As described in Section 7, the three zones in this study were defined before data collection began, in order to avoid the dangers of unconscious bias identified in the methodological literature. In MVA (2010a) the researchers defined the desire lines *ex-post* based on observations of pedestrian movements. Using this method, MVA (2010a) found that 100% of pedestrians crossing Elwick Square followed their desire lines, whereas the case study described in this paper found that most pedestrians were clearly diverting from their desire lines – using the courtesy crossings in most cases (see Figure 6). The survey responses suggest that this was mainly motivated by concern to minimise conflict with traffic. Either MVA's much smaller sample was reflecting very different behaviour on a different day or (more likely) the 'desire lines' were defined in ways which render the concept meaningless. In either case, the outputs of statistical analysis using this measure must be treated with caution.

MVA (2010b) acknowledges some of the negative perceptions of pedestrians towards the shared space scheme in Elwick Square. Traffic volume and a space 'too wide to get across quickly' were two possible reasons why attitudes there were more negative than in the other schemes included in their qualitative research. However, the types of questions shown in Table 1 – particularly the 'before and after' comparison were generally not asked in MVA (2010b). The answers reported here suggest a rather negative pedestrian perspective on a 'flagship' shared space scheme at odds with the aspirational definition of shared space in DfT (2011).

Neither the MVA study nor any of the other research reviewed for this project provides evidence to support the assertion of Hamilton-Baillie (2008) that shared space can contribute to modal shift. In the absence of specific research (which would be difficult to frame in situations where small schemes are implemented incrementally over time) it may be noted that one observed outcome of shared space – increased vehicle flows through junctions – would facilitate movement by car. The pedestrian anxieties revealed by the case study would also suggest a disincentive to walking. Whether these effects are outweighed by other effects favouring walking and/or cycling is difficult to predict: counts of pedestrian numbers through shared space schemes, though interesting, would not be sufficient to answer that question.

A substantial body of evidence supports the potential for modal shift from: pedestrianisation (e.g. Parkhurst, 2003), reductions in road capacity (Cairns et al, 2002), comprehensive networks of segregated cycle routes (Pucher and Buelher 2007), road layouts which discriminate between modes (Melia, 2011, Frank and Hawkins, 2008) and carfree development (Melia et al, 2010). At present, no such evidence exists for shared space (as defined by minimising demarcation) and there are reasons for doubting that its widespread adoption would achieve significant modal shift.

## **10. Conclusions**

Although this paper has focussed on the shortcomings of DfT (2011) and the research which informed it, much of the guidance is sensible and consistent with the evidence – particularly the emphasis on reducing traffic speed and volumes and holistic design. The authors of this paper believe that shared space has its place in the toolkit of traffic engineers, transport planners and urban designers. Like all design options it has advantages and disadvantages, and will be more appropriate in some locations than others. This research suggests that the disadvantages for pedestrians will generally be more serious on streets with high traffic volumes. Whether a proliferation of shared space schemes might erode the driver anxiety needed to avoid pedestrian casualties is an open question suggesting the need for longer-term monitoring and future research.

Some of the claims made for shared space have been exaggerated. Reducing demarcations between vehicles and pedestrians does not in itself constitute a sustainable transport measure. In some circumstances, shared space combined with one or more sustainable transport measures, may be the most appropriate solution, as illustrated in Figures 7 and 8.



**Figure 7 & 8:** Shared space combined with filtered permeability, Bristol, UK.

Where shared space is presented as an *alternative* to measures such as pedestrianisation, reductions in road capacity, comprehensive networks of separate cycle routes, filtered permeability or carfree zones, however, its effects on modal share (and carbon emissions and many other externalities) will be deleterious. The assertion in *Manual for Streets 2* (CiHT 2010) that shared space may be ‘a more desirable’ alternative to pedestrianisation implies that it may provide similar benefits for pedestrians. This implication is not supported by the evidence.

Despite the declared attempt at ‘evidence based policy’ in DfT (2011), the progression from *Manual for Streets* (DfT, 2007) through *Manual for Streets 2* (CiHT 2010) and the MVA research to the latest guidance (DfT 2011) suggests that ‘policy based evidence’ may also have influenced the process. In other countries, where the vogue for shared space is not as widespread as in the UK, policymakers and professionals would be well advised to approach the concept with caution and a degree of scepticism towards the claims made by its advocates.

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