Do Passengers Prefer Articulated Buses to Conventional Buses?

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Background

The perceived high cost of Light Rail schemes has led to a slowdown in their development in the United Kingdom. This in turn has lead to increased interest in bus-based schemes to provide what is seen by some as being a more cost-effective solution to urban transport problems. Increasingly, bus schemes are being seen as being capable of delivering many of the benefits of Light Rail, especially if they incorporate a full package of measures to help enhance comfort, reliability, accessibility and ease of use.

The choice of vehicle used in bus-based schemes is an important part of this ‘package’. Traditionally, the UK has preferred to make use of double-deckers for its higher-capacity buses, whereas continental Europe has tended to favour articulated single-deck buses. However, articulated buses are now becoming more common in the UK, most notably in London.

It has been argued that features such as more doors to reduce dwell times and a greater proportion of the vehicle having step-free access make these articulated vehicles intrinsically superior to their non-articulated counterparts, and therefore a more appropriate choice for high-quality rapid transit applications.

However, there seems to have been little research to date into passengers’ perceptions of the merits of different types of vehicle. A recent study carried out by MVA Consultancy for Transport for London provided an opportunity to investigate passengers’ perceptions and preferences for different vehicle types.

The Study

In April 2005, MVA Consultancy was commissioned by Transport for London (the integrated authority responsible for the UK capital’s transport system) to carry out a study into passengers’ preferences for different public transport sub-modes to support the modelling work being undertaken for their West London Tram project.

The proposed scheme is to build a tram along the busy Uxbridge Road corridor in London from Shepherd’s Bush to Uxbridge Town Centre. This route is currently served by an intensive bus service. In April 2005, new Articulated (‘bendy’) buses were introduced as the main service on this route, the 207.

It was hypothesised that the introduction of these buses represented a significant improvement in quality over the ‘Conventional’ (in the UK sense, i.e. non-Articulated) buses that formerly operated on this route. If so, this should be accounted for in the modelling work when considering the scheme (i.e. the difference between Tram and Articulated bus, in terms of boarding penalty (fixed for each leg of a journey) and in-vehicle time (variable) weights, should be less than when Tram versus Conventional bus is modelled. MVA’s role
was to assess whether, and to what extent, this was the case.

**Attributes of Intermediate Modes**

Light Rail and Modern Tram systems are generally perceived as providing a better quality of service than buses. A number of attributes that are intrinsic to such systems, or at least provided as standard practice, combine to create this perception of improved quality:

- the **certainty** of having a fixed route, facilitating route branding and other forms of more focussed marketing;
- greater **reliability**, especially if the alignment is segregated or priority over road traffic is provided;
- better **waiting facilities** with features such as shelters, ticket machines, lighting, CCTV and help-lines;
- real time **information** systems at stops and, potentially, via the web;
- **ease** of boarding and alighting, facilitated by more/wider doors, close docking next to kerbs/platforms, and equal height of pavement/platform and vehicle floor;
- more **comfortable** seating, as vehicles often wider than standard buses;
- **smoother** ride, due to being rail rather than road based, with little scope for poor driving;
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- **quieter** operation due to electric power; and
- better on-board **security**, using CCTV and/or conductors/security staff, which can be justified by larger loads carried.

Increasingly, attempts are being made to provide better quality bus services by incorporating many of these features, through concepts such as ‘Quality Bus Corridors.’ Increases in patronage of 10% to 30% for some schemes provide evidence that these attempts have been successful. Examples include Line 33 Quality Bus Partnership in Birmingham that recorded patronage growth of 30%; the Glasgow Overground concept, which achieved an 11% increase over two years through simplified networks, new vehicles and associated measures; and the Leeds Superbus guided busway, for which figures of between 45% and 60% in the first year are quoted.

But what contribution does the type of vehicle used make?. The options include:

- ‘Conventional’ Buses, i.e. rigid single and double deckers. Virtually all new vehicles are low floor, but success of this feature depends on a suitable kerb being provided and the vehicle’s ability to ‘dock’ with it.
- Articulated Buses, such as those used in London. Again low-floor.
- Kerb-guided buses, such as the systems in Leeds and Edinburgh. This offers a segregated alignment and, if properly designed, good docking between the entrance and the kerb.
- Optically-guided buses, such as the system being developed in Rouen.
- ‘ftr’, Firstgroup’s Articulated urban transit vehicle. This is designed to look like a Light Rail vehicle, and have as many Light Rail attributes as possible, while still using rubber tyres and being able to run unguided on-street.

In this study we looked specifically at passengers’ perceptions of the first two of these vehicle type, as well as trams.

**Boarding Penalty Model Parameters**

An important component of the West London Tram (WLT) Study’s current forecasts is the set of boarding penalties needed to reflect the ‘softer’ aspects of public transport that are not explicitly modelled as distinct levels of service elements. They are used in the assignment procedure. The boarding penalties are not used explicitly as a modal constant in the subsequent modal choice hierarchy, but are included in the costs used in the assignment routines and mode split functions.

The model reflects the perceived difference in softer aspects of Tram over Conventional Bus by applying an additional 4 minute fixed penalty. In addition, the model also includes different in-vehicle time weightings to ensure that differences in perceived in-vehicle quality are reflected in the model in proportion to the length of journey. In the current model, the Generalised Cost of every minute on Conventional Bus is equivalent to 1.2 minutes on a Tram.
A further modelling consideration, for TfL, was to test the impact of introducing Articulated Buses in the WLT corridor. The question, thus posed, was whether a reduced boarding penalty between Tram and Articulated Bus, compared with that for Tram versus Conventional Bus, should be incorporated – on the basis that the Articulated Bus was better than a Conventional Bus.

**Research Objectives**

The objectives of the research, therefore, were to:

- re-assess the Tram versus Conventional Bus boarding penalty; and
- establish whether Tram versus Articulated Bus boarding penalty should be any different from this.

The research approach sought to collect modal preference data on Tram versus Conventional Bus from Tram and Conventional Bus passengers; and modal preference data on Articulated Bus versus Conventional Bus from Articulated Bus and Conventional Bus passengers. This Paper focuses only on the findings of the latter exploratory research.

When deriving boarding penalties, only differences in the vehicles were relevant – for example seat comfort, in-vehicle layout and vehicle accessibility. Where possible, any confounding effects, such as perceived differences in reliability, crowding, fare-evasion or information provision for the two types of bus were to be identified and minimised.

**Research Approach**

Our survey approach was to conduct an SP survey amongst existing passengers. The sampling and questionnaire design was customised, as follows:

- the comparison between Conventional Bus and Articulated Bus was restricted to passengers in the Peckham – Lewisham corridor, where both bus types are in operation;
- an SP design was devised that was capable of allowing fixed and variable penalties to be derived;
- for each survey corridor, we developed a hypothetical, but realistic, SP context in which respondents were able to trade-off between the two modes; and
- all survey material was piloted (and re-piloted) and finalised in conjunction with TfL.

Thorough piloting was undertaken in each of the corridors. As a result of this piloting, the busiest and most suitable bus and tram stops were identified as recruitment locations for the main survey. The research was conducted within a 9-week time frame.

**Design of Survey Material**

The interview process was in two parts: an initial contact questionnaire; and a self-completion questionnaire.
The initial contact questionnaire contained seven questions and was interviewer administered. The main purpose of this initial contact questionnaire was to screen people based upon their chosen mode/route and their journey time.

Other questions asked during recruitment provided segmentation details including: age, gender, journey purpose and car availability. A vehicle preference between bus and the ‘other’ vehicle (all other aspects of the journey being equal) question was also asked so that we could check for any significant biases (in terms of vehicle preferences) between our initial, randomly-selected sample and our final self-selected SP sub-sample).

Those in-scope were handed a self-completion questionnaire. This part of the interview included the SP exercise and took 10-15 minutes to complete. The questionnaire was returned back to MVA in a postage-paid envelope.

To encourage good response rates, all respondents returning a completed questionnaire were entered into a prize draw, offering a cash prize of £1000 for the winner, and prizes of £100 each for the runners-up.

The self-completion questionnaire comprised:

- questions asking for actual details of the journey the respondent was making when contacted;
- an SP exercise;
- questions asking for details of the journey if made by the alternative mode of transport, as perceived by the respondent - to be used for subsequent RP modelling; and
- a direct question asking respondents which mode of transport they would prefer, if all time, cost and other service aspects of travel were the same.

Results of the Pilots

Questionnaire drafts were piloted, and re-piloted, with respondent feedback dictating changes regarding the hypothetical context of the SP.

In the Articulated versus Conventional Bus SP exercise, it was found that respondents were associating Articulated Buses with more crowded routes, and also higher levels of fare evasion. Both of these factors were seen as potential contaminators of the boarding penalty, so the wording of the introduction to the SP exercise was changed to minimise these perceptions influencing respondents’ attitudes in the Main Survey SP exercise.

The final version of the wording that introduced the Articulated Bus/Conventional Bus SP exercise to respondents was as follows:
Articulated Bus/Conventional Bus SP Context

"We would like you to imagine that, in this exercise, both 'Bendy' and 'Conventional' bus services will run between the same start and end points as your journey on the day of the interview.

- the walk to and from a 'Bendy' bus stop will be identical to the walk to and from a 'Conventional' bus stop;
- the fare when using the 'Bendy' bus and 'Conventional' bus will be the same;
- in this exercise, ALL bus tickets must be bought before boarding the bus (as is currently the practice with all Bendy bus services and all bus services in Central London); and
- both 'Conventional' buses and 'Bendy' buses will be uncrowded.
- ONLY JOURNEY TIMES AND SERVICE FREQUENCIES WILL BE DIFFERENT."

In this way, respondents were to focus only on differences in vehicle type - and in-vehicle time and service headway, which were the other two variables within the SP exercise. An example of an SP choice-set presented to a respondent is given at the end of the paper. The task was to rank the four options in each choice-set in order of preference. Each respondent was presented with three such choice-sets.

A total of 873 passengers in the Peckham – Lewisham corridor were initially interviewed and handed a self-completion questionnaire. Of these, 187 completed questionnaires were received by MVA. This amounts to a 21% return rate rather than the assumed 33% return rate. (The reason for this is unknown as it was expected that the £1000 prize draw would have been a significant incentive for questionnaire completion – and is, perhaps, an indication of indifference amongst bus users on this corridor. In comparison, we obtained a response rate of more than 30% in the Tram/Conventional Bus corridor) in the same, short, timeframe.

Following the SP exercises, respondents were asked to make the following direct trade-off between the two vehicle types:

"In the future, if there was a 'Bendy' bus and a 'Conventional' bus service that were identical in all respects (including journey times and service frequency) which would you choose?

'Conventional' Bus
'Bendy' bus
No preference

Please explain why:
Research Results

Table 1 shows the results of the SP model for the Articulated Bus versus Conventional Bus exercise.

**Table 1: Unweighted SP Model of Articulated Bus versus Conventional Bus SP Exercise**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>t-statistic*</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic IVT (mins)</td>
<td>-0.084</td>
<td>-9.0</td>
<td>-</td>
</tr>
<tr>
<td>Headway (mins)</td>
<td>-0.190</td>
<td>-18.2</td>
<td>2.26</td>
</tr>
<tr>
<td>Boarding Penalty (Articulated users)</td>
<td>+0.135</td>
<td>+1.2</td>
<td>0 IVT mins</td>
</tr>
<tr>
<td>Boarding Penalty (Conventional users)</td>
<td>-0.695</td>
<td>-6.3</td>
<td>8.3 IVT mins in favour of Conventional bus</td>
</tr>
</tbody>
</table>

* a t-statistic exceeding 1.96 indicates a statistically significant model parameter at the 95% level of significance. Note, our t-statistic calculation takes account of the fact that observations from the same respondent are not independent.

The results indicate distinctly different attitudes towards vehicle choice according to current mode. Current Articulated Bus users slightly favour Articulated Bus over Conventional Bus, but the preference is statistically insignificant. By contrast, the boarding penalty for current Conventional Bus users is significant, equal to 8 in-vehicle time minutes in favour of Conventional Bus.

These results are supported by the analysis of the direct (non-SP) trade-off question between Articulated Bus and Conventional Bus (where the fare, in-vehicle time, walk times and service headway were the same). The results are reported in Table 2, by current mode.
Table 2: Results of Direct (Non-SP) Trade-off SP Question

<table>
<thead>
<tr>
<th>Respondent Category</th>
<th>Preferred Conventional Bus</th>
<th>Preferred Articulated bus</th>
<th>No. Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Bus users (prefer bus in SP)</td>
<td>63%</td>
<td>8%</td>
<td>29%</td>
</tr>
<tr>
<td>Conventional Bus users (prefer Articulated bus in SP)</td>
<td>4%</td>
<td>43%</td>
<td>52%</td>
</tr>
<tr>
<td><strong>ALL Conventional Bus users</strong></td>
<td><strong>45%</strong></td>
<td><strong>19%</strong></td>
<td><strong>36%</strong></td>
</tr>
<tr>
<td>Articulated bus users (prefer bus in SP)</td>
<td>32%</td>
<td>16%</td>
<td>52%</td>
</tr>
<tr>
<td>Articulated bus users (prefer Articulated bus in SP)</td>
<td>0%</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td><strong>ALL Articulated bus users</strong></td>
<td><strong>16%</strong></td>
<td><strong>35%</strong></td>
<td><strong>49%</strong></td>
</tr>
</tbody>
</table>

These results support the findings of the SP analysis. When asked directly which vehicle they prefer (if all levels of service were the same), more Articulated Bus users prefer Articulated Bus to Conventional Bus, but more still are indifferent – consistent with the SP finding of a small but insignificant preference for Articulated Bus. Amongst Conventional Bus users, on the other hand, almost half preferred Conventional Bus (45%), more than those expressing indifference (36%) and many more than those preferring Articulated Bus (19%) – consistent with the SP finding of a significant and sizeable preference for Conventional Bus.

For passengers overall, the analysis of the quantitative and qualitative direct comparison questions indicate that the greatest proportion of passengers are relatively indifferent (around 43%), with 30% preferring Conventional Bus and 27% preferring Articulated Bus. (For our random sample of direct comparison Conventional and Articulated Bus passengers recruited – rather than the self-selected group who returned a completed SP questionnaire, the corresponding ratios were: 52%/25%/23%).

Where a preference to the direct trade-off question was given, the respondent was asked to explain why they preferred one vehicle over the other. The reasons are reported in Table 3 by preferred mode.
Do Passengers Prefer Articulated Buses to Conventional Buses?

Table 3: Reason for Choosing Preferred Vehicle (Totals may not add due to rounding)

<table>
<thead>
<tr>
<th>Respondents who prefer Conventional Bus</th>
<th>Respondents who prefer Articulated Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>More reliable</td>
<td>28%</td>
</tr>
<tr>
<td>Better View</td>
<td>26%</td>
</tr>
<tr>
<td>Less crowded</td>
<td>15%</td>
</tr>
<tr>
<td>No reason given</td>
<td>11%</td>
</tr>
<tr>
<td>More comfortable</td>
<td>7%</td>
</tr>
<tr>
<td>Like upper deck</td>
<td>6%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Better view</td>
<td>33%</td>
</tr>
<tr>
<td>More reliable</td>
<td>28%</td>
</tr>
<tr>
<td>No reason given</td>
<td>13%</td>
</tr>
<tr>
<td>More comfortable</td>
<td>10%</td>
</tr>
<tr>
<td>Less crowded</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
</tbody>
</table>

In almost all cases, those who have a vehicle preference provide an entirely plausible set of reasons for their preference. Furthermore, their reasoning is directly linked to perceived attributes of the vehicle that are beyond the parameters currently modelled.

The most common reasons that some travellers in the corridor prefer Conventional Bus are the perceived advantages of: greater reliability, better view (i.e. more pleasant to travel in and easier to see where they are), less crowded and greater comfort. It is interesting to note that crowding still features in travellers’ responses, given that they were explicitly asked to consider the levels of crowding to be equal between vehicles in the SP questions.

Perhaps surprisingly, respondents who prefer Articulated Bus give very similar reasons for doing so to those who prefer Conventional Bus - with views, reliability, comfort and crowding all being identified as issues.

It is plausible that respondents can have vastly different perceptions of attributes between vehicles. For example, their perception of the view may be strongly influenced by where they tend to sit on the bus, for instance if they are used to sitting upstairs on a double-decker. Similarly, the perception of crowding may be influenced by seating density. On double-deck buses there may be relatively few seats downstairs, so passengers unable to access the upper deck may prefer Articulated Buses that provide more seats that they can use. However, Articulated Buses provide less seats overall and have features that are designed to cater for more standing passengers, so this may add to the perception of overcrowding for passengers who are used to being able to sit upstairs on a double-decker.

Respondents’ comments identify a number of key issues that contribute to their preference, or non-preference. A selection of which include:
Pro-Conventional Bus Quotes

“Conventional buses tend to get less congested. For example, if you get a seat upstairs, you aren’t jostled by people. Also easier for me as I have a lot of luggage”

“quality of the vehicle - Conventional buses are ‘stronger’”

“journey more comfortable on Conventional buses”

“I like going upstairs on Conventional buses”

“Articulated buses are too big for the road”

“it’s really difficult trying to get off a full bendy bus. I’ve had the doors close on me before I could alight on more than one occasion”

“I do not feel very safe on the Bendy Bus. At the times I travel, they are very over-crowded and I have young children who often have to stand for the whole journey”

“less backwards-facing seats”

“better view from a top deck and you never miss a stop”

“they are the spirit of London. They are unique”

“it’s cute, got stairs to sit and see beneath. And faster than the Bendy in getting to destinations”

“with quite a number of fire incidents on Bendy Buses, the Conventional Bus will always be my first option”

“I just don’t like the Bendy Bus. They are always over-crowded, seems not to be reliable. Trust me, there is nothing like the Volvo Conventional Bus”

“[Articulated Bus] journeys are longer. They catch fire. And I like the view from the top deck”

“Lots of people treat it [Articulated Bus] like a ‘free bus’. It’s often, therefore, full of the poorest members of society (people that can’t afford the bus fare). People sometimes get agitated because they are so full, and I find it depressing. I would like to see conductors on board ... to stop people traveling without tickets”
### Pro-Articulated Bus Quotes

- "less litter, rubbish and graffiti and seats are generally cleaner on ‘bendy’ buses”
  - "because it’s longer, more people can fit on it”
- "Bendy buses are a lot more convenient if you are with children, pushchairs, heavy shopping, etc”
  - "the driver doesn’t restrict the amount of prams on the bus”
  - "less hassle getting on and off”
  - "more space, no stairs”
  - "for convenience and elegance”
- "I would not have to worry about showing my ticket every time I board the bus”
  - "because no time is wasted in selling tickets and collecting money”
- "because you have door options, so that’s why it is better for women and people with disabilities”
- "It’s more comfortable and easier to walk in than a Conventional bus that you need to climb stairs – especially for those of us that have problems with our knees”
  - "because it’s safer”
  - "more space, smoother journey”

### ‘Indifferent’ Quotes

- "as long as they are frequent, regular and uncrowded, both buses do the same job as far as I’m concerned”
  - "don’t mind as long as the buses are running and I get to work on time”
- "I think the bus service is improving and even though there are various types of buses, I like them all”
  - "neither offer an advantage, both provide the same service”
**Weighted (Articulated v Conventional Bus) SP Model**

To provide a combined model across both Conventional and Articulated bus users, a weighted model was estimated. As most users will tend to board the first bus that arrives at the stop, the most appropriate basis for doing this is to use a 50-50 weighting. Table 4 shows the result from a model weighted on this basis.

**Table 4: Weighted SP Model (50:50) of Articulated Bus versus Conventional Bus SP Exercise**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>t-statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic IVT (mins)</td>
<td>-0.083</td>
<td>-9.0</td>
<td></td>
</tr>
<tr>
<td>Headway (mins)</td>
<td>-0.187</td>
<td>-18.1</td>
<td>2.25</td>
</tr>
<tr>
<td>Boarding Penalty</td>
<td>-0.469</td>
<td>-5.8</td>
<td>5.7 IVT mins in favour of Conventional Bus</td>
</tr>
</tbody>
</table>

An SP model that provides both mode-specific in-vehicle time parameters and a boarding penalty was also developed. This is shown in Table 5.

**Table 3: Weighted SP Model of Articulated Bus versus Conventional Bus SP Exercise (Fixed and Variable Penalties)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>t-statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulated bus IVT (mins)</td>
<td>-0.102</td>
<td>-8.9</td>
<td>1.3 Conventional bus ivt mins</td>
</tr>
<tr>
<td>Conventional bus IVT (mins)</td>
<td>-0.081</td>
<td>-5.6</td>
<td>-</td>
</tr>
<tr>
<td>Headway (mins)</td>
<td>-0.201</td>
<td>-17.9</td>
<td>-</td>
</tr>
<tr>
<td>Boarding Penalty</td>
<td>+0.022</td>
<td>+0.1</td>
<td>0 IVT mins</td>
</tr>
</tbody>
</table>

Hence, an alternative way to model Articulated Bus would be to assume the same (fixed) boarding penalty as Conventional Bus, and a variable penalty of 1.3 times Conventional Bus minutes.

**Relationship between Headway, Wait Time and Perceived Reliability**

Articulated and Conventional bus users assign a high value to service headway relative to in-vehicle time (2.25 in-vehicle time minutes for every extra minute on service headway). To infer the implications for wait time, we needed to look at the relationship of headway and wait time for passengers in the corridor.
Typical bus service headways along the Peckham / Lewisham corridor are 5 to 10 minutes. Two-thirds (67%) of all bus respondents perceived that the service headway was within this range, with the remainder suggesting a headway as low as every 3 minutes and as high as up to 30 minutes. Actual wait time responses ranged from 1 minute to 35 minutes. Overall, the wait time/headway ratio is approximately 0.85 minutes waiting for every minute’s headway for Conventional bus users. For Articulated bus users, this value is 0.77 minutes waiting for every minute’s headway. An average value for all bus users of 0.8 can be assumed. The lower wait time/headway ratios for Articulated buses compared to Conventional buses suggests that passengers may perceive Conventional buses as tending to be less reliable than Articulated buses.

This ratio, combined with the Value of Headway (from Table 4), we can infer that 0.8 minutes wait time is equivalent to 2.25 in-vehicle time minutes. Hence the value of a minute’s wait time is $2.25/0.8 = 2.8$ IVT mins/wait minute.

**Study Conclusions**

Based upon the primary data collected, the main research conclusions were as follows:

- there was no evidence to support the view for a reduced boarding penalty for Tram v Articulated Bus, compared with that for Tram v Conventional Bus;
- overall, bus passengers along the Lewisham – Peckham corridor have the opportunity to use both types of vehicle currently, and are relatively indifferent about them; and
- amongst those passengers who do have a preference, more favour the Conventional Bus than favour Articulated Bus.

These findings may be a surprise to many. But the views expressed in the WLTM research by current bus passengers appear to be internally consistent and based on a plausible rationale.

Furthermore, there seems to be no obvious reason why residents in this part of South London would have a significantly different view of these two vehicle types, than other residents in London. Nor, indeed, to people living in urban environments elsewhere in the UK.

Overall, our research suggests that Articulated buses are not perceived as intrinsically superior to Conventional buses. However, there are some differences in passengers’ perceptions of the two vehicle types that may impact upon their perception of the quality.

Some of these have a positive impact on the way Articulated Buses are perceived, for example:

- providing step-free access to most of the vehicle;
- more space; and
- enabling faster boarding times.
Some passengers also preferred the Articulated Bus vehicle because it has less litter and cleaner seating. Though this is likely to be because they are new vehicles, rather than because they have a design component that will keep interiors looking cleaner/newer.

Others have a negative impact on the way Articulated Buses are perceived, such as:

- their larger size making it harder to negotiate junctions and some of London’s narrow streets, and consequently being more prone to delay due to traffic congestion; and
- where off-bus ticketing and free boarding is implemented, there is a perception of increased fare evasion, and the driver has less opportunity to exclude any unsavoury characters from boarding.

In conclusion, the key to raising the perception of quality of bus services lies in the overall package of measures that accompany the service. Articulated buses and Conventional buses can both be perceived as providing a higher quality of service as long as this overall package of measures is right.
### Example Stated Preference Choice Set

<table>
<thead>
<tr>
<th>OPTION 'A'</th>
<th>OPTION 'B'</th>
<th>OPTION 'C'</th>
<th>OPTION 'D'</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Bus" /></td>
<td><img src="image2" alt="Bus" /></td>
<td><img src="image3" alt="Bendy Bus" /></td>
<td><img src="image4" alt="Bendy Bus" /></td>
</tr>
<tr>
<td>Bus</td>
<td>Bus</td>
<td>Bendy Bus</td>
<td>Bendy Bus</td>
</tr>
<tr>
<td>20 min journey</td>
<td>10 min journey</td>
<td>15 min journey</td>
<td>10 min journey</td>
</tr>
<tr>
<td>Every 10 mins</td>
<td>Every 20 mins</td>
<td>Every 5 mins</td>
<td>Every 20 mins</td>
</tr>
</tbody>
</table>

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