

# **The Role of Industrial Design in Addressing the Disparity between User Perceptions of Public and Private Transport.**

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## **1 Introduction**

This paper examines the disparity between the perceptions of private and public transport from those who might exercise choice between them. There is a great body of literature concerning the identification of problems in public transport mobility e.g. Sorenson 1968 to Bunting 2004 to In this study the authors' have focused upon the emotional aspects of human needs as they are expressed in aesthetics, materiality and environmental functionality. These qualities have been long understood by the automotive industry in the development and marketing of their products. While the authors' acknowledge that these psychological and design factors are not completely unknown to the public transport industry (Novaco 2001 Veeneman 2002), they are largely inadequately considered compared to the automotive industry. The effect upon public transport is that it struggles to deliver a quality alternative to the car on routes or situations in which it could be seen as competitive.

The right to mobility is considered an important part of social inclusion (Wickham 2004). Within this context the private car remains, despite many negative issues, the pinnacle manifestation of this civil liberty. The layout and road network of modern cities presume a wide private vehicular enfranchisement (Wickham 2004). Private cars are seen as convenient for carrying people and articles. Cars are non-timetable dependent, embodying personal separation from those who might threaten them. Cars are accessible to a variation of leisure and work experiences, and importantly can contribute to the formation of a self-image through brand recognition (Baslington 2006). Popular culture, especially television advertising, reinforces these images depicting cars as functional and desirable but above all enjoying the freedom of uninterrupted open roads.

In reality high levels of private car ownership, particularly in urban environments, has led to road congestion, increased carbon emissions with corresponding impacts upon health, noise, accident related costs, maintenance costs, fuel costs, and parking restrictions (Cedar 1997) Conversely, positive impressions of public transport modalities have been discounted by negative suggestions such as limitations in carrying articles, containment to timetables, limited destinations, risk of anti-social behaviour, reflection upon personal self esteem and the removal from an inclusive mobile society (Cedar 1997 and Edwards 1992).

Parallels between the design of cars and the design of public transport vehicles have been made before (Tehan 1975), however due to commercial confidentiality there appears to be a paucity of academic literature developing this theme. There is, however, a growing body of research that equates human emotional responses to products with their usability (Jordan et al). Usability has often been treated separately from aesthetics. The *form follows function* doctrine has relegated the aesthetic in Industrial Design to a by-product of the object's efficacy. Automotive design creates a milieu of functional, aesthetic and haptic experiences that contribute to the pleasure of driving or travelling by car. For a passenger on public transport much of these pleasures of interaction are lost. While there maybe little opportunity to replicate a private car in public transport, the authors' contend that the latest developments in usability and interaction design could be applied to the public transport experience. The authors' suggest that there is an opportunity to develop this area of Industrial Design research in order that effective strategies might be created to improve the current passenger perception of public transport usability (Norman 2004).

## **2 Background**

### **2.1 The dominance of the private car**

Car users perceive a huge difference in performance between their personal vehicle and public transport (Bunting 2004). Private cars provide more and better access to employment opportunities. In many industrialised nations with large city conurbations, journeys of more than an hour to and from work are not unusual. The development of businesses at the fringes of cities has meant that a mobile workforce has become essential (Gray 1992). Cars provide the means to expand the choice of shops and recreation a person wishes to enjoy. Little or no planning is necessary for a car journey, so sudden changes of mind or breaking of the journey are possible. The car facilitates a 'door to door' journey. Amenities do not need to be within or at the end of a tightly controlled network, other than the road system (Baslington 2006). Within the bounds of traffic restrictions there is less to worry about since the vehicle is in the control of the driver. But, perhaps the automobile's greatest edge is its omnipresence where and when it is needed; for a solution to mobility for both carrying passengers and goods at a moment's notice the car is very hard to beat.

Generally, cars need to be of a good mechanical quality. In a number of countries legislation dictates that a car needs to be of a minimum safety standard. The inclusion of airbags, seat belts and structural design to accommodate crumple zones have radically increased the safety performance of the car (Newstead 2006).

Additional to the basic amenity provided by the car, manufacturers go to great lengths to develop brand image and loyalty. Each model is expressive of its owners' choices in appearance, performance, functionality and price. Comfort and accessories in cars are growing in sophistication and steadily coming into the reach of many. In car ownership there is a sense of acceptance within a mobile society. While product lines do not turnover as quickly as the clothes industry, cars also have a trend cycle and owners are encouraged to follow the herd in whatever the fashion may be. In the United Kingdom annual or bi-annual changes in number plate letter sequences for each year exaggerate this one-upmanship by implicitly displaying which car owners have brand new cars. This has national economic implications by spiking economic performance indicators as car owners rush to be seen in the latest car model.

The perception of individual trip costs in a car is quite different from the perception of paying for a ticket to use public transport. Payment for a car is largely dispersed in the purchase of the car, paying taxes, fuel, etc, so each journey feels as though it is free. However toll roads, congestion charges and bridge tolls are becoming an increasing exception to this perception.

### **2.2 The problem with public transport**

Travelling on public transport can create or exacerbate a number of negative emotions. It has been suggested that this starts with a deficiency in the relationship between the transport provider and the passenger (Bunting 2004). This begins in the impersonal language that is used about it, for example, words such as 'mass transit', 'carriages', 'handlings' or 'users'. One's personal relationship history with public transport is shaped during childhood. As a child without legal right to drive, bus, train and tram journeys are seen as a right of passage to further mobility from the family home. As soon as a person is old enough, the aspiration toward a motorcycle or car in line with increased income and independence turns the individual away from public transport. A return to the public domain is only facilitated by legal requirement (avoidance of drink driving) or old age and disability. During the in-between years public transport is perceived as only for the economically poor or disabled.

High commuter activity into central business districts during mornings and evenings does suggest private car pacification. However, passengers can find themselves treated as 'cargo' to be moved, sometimes standing rather than sitting during busy peak times. During non-peak hours some modalities travel with very few passengers. Social acceptance does not support riding the train, bus or tram, although each to a different extent. The bus appears to be the least attractive mode (UITP 2006). Quiet outer suburb routes have become the most transport disadvantaged. Public transport is perceived as too slow (although this is journey and modality dependant). Geographic coverage of bus routes in particular causes 'snaking' through suburbs. Routes are fixed and linked to a timetable. Different transport modes seldom coordinate since separate companies often operate them.

Public transport vehicles are based upon high volume of use and, as a consequence, the refinement of their interior fittings are often basic or sub-standard compared with private vehicles. Public transport will require people to stand as they move to and from vehicles thus creating high-sided 'boxes' rather than sleek low forms built around seated accommodation. Despite the volume created in most train and trams a passenger is very limited in what they can carry. It is possible to carry items such as bicycles and prams but they may need to be placed out of sight or supervision.

There can be the requirement to make a payment transaction every time the system is used (although, monthly and yearly tickets are an exception to this). To an occasional user this creates a calculated cost implication and at unmanned stations and stops the possible need to carry loose change for each journey.

Humans are social creatures and generally like to be with others but only on our own terms. The public domain immediately creates a lack of privacy. Distracting and annoying use of mobile phones, and the risk of threatening and anti-social behaviour of others is part of the personal 'contract' entered upon boarding public transport.

Unsupervised station and bus stop areas can be a cause for concern especially at night. The transferring from one modality to another is time wasting and frustrating. Access to information and its interpretation is a cause for anxiety as passengers try to understand where to go next and avoid becoming stranded. These issues all combine creating decision factors other than just journey time and cost.

### **2.3 The problem with private cars**

Private mobility disperses land use, pushing industry and employment to the outer fringes and thus contributes to urban sprawl. Car use favours parking and direct road access, therefore creating a climate of less highly valued public spaces. There is a financial burden in the creation of infrastructure, roads, sewers and sprawling housing estates. In Melbourne an estimated 30% of surface area is given over to roads and car parks (Stone 1993).

The burning of fossil, carbon-based fuels has enormous environmental impact. Polluted air has links with global climate change (Newman 1999 and Chapman 2007). A future expanded world fleet of cars with the demise of public transport could have an even heavier impact. In some countries more than others there is an enduring public tolerance for ill health and risk. A private car user is ten times more likely to have an accident than travelling by public transport (Bunting 2004). Car traffic also presents greater dangers to pedestrians. Passengers and particularly the car driver have limited safe distractions, save that of conversation and listening to the radio or a CD. Personal danger is heightened by the phenomenon of 'road rage' as well as the freedom to inadvertently drive into 'bad areas' of a town.



Figure 1. Even with cars parked at an angle a mere twenty individuals are accommodated by one hundred metres of street parking. The private automobile utilises land very inefficiently

The car is limited to carrying small groups of people. Normally an occupant limit would be five people. Single person occupancy of a vehicle is very common but enormously wasteful in resources and space. The high mass of a car is highly disproportionate to the task of carrying an average 80Kg human being. During peak hours in Melbourne the average occupancy is 1.24 persons per car.

## **2.4 The perceived benefits of public transport**

Some surveys suggest that the broader community of car users recognise the value of public transport, although it is usually someone else other than themselves who would benefit from it (Guiver 2006). Public transport uses available land more efficiently, by collecting and centralising production and consumption together, e.g. the central business district of a city. Shopping zones that restrict access to only permit pedestrian and public transport have a marked improvement upon the retail business economy (Raje 2006).

Mobility for all demographic strata creates a more active social and economic engagement at stations, bus stops and termini. Stronger public transport identity and its associations with a sense of place contributes to social interactions, community and psychological well-being. Travelling by public modalities allows the passenger passive moments of disengagement from the world. Passengers can read, listen to music, or work whilst travelling. Without the requirements of controlling a vehicle, in-transit time is valued for other activities.

The cost of maintaining a monthly pass for public transport let alone the undertaking of procuring individual journey tickets is vastly cheaper than purchasing, fuelling and maintaining a car. A yearly pass for a generous central zone one on Melbourne's transport system costs little over \$1000. Pass and seasonal ticket systems do much to remedy the visibility of costs so detrimental to the perception of public transport. As discussed earlier, car expenses are dispersed and so are seldom so 'visible'.

On certain routes, city centre travel using public transport can be much faster than the car. This does depend on what type of car pacification methods are used. Bus only laneways and outright car bans can make inner city movement quicker by public transport. As a journey's distance from the city centre increases, so to does the dominance of the car, as freeways and road networks take advantage. However, there must be a threshold for this car-

dominance since at great distances trains, and ultimately aircraft, begin to take pre-eminence.

### 3 The role of Industrial Design in the perception of objects

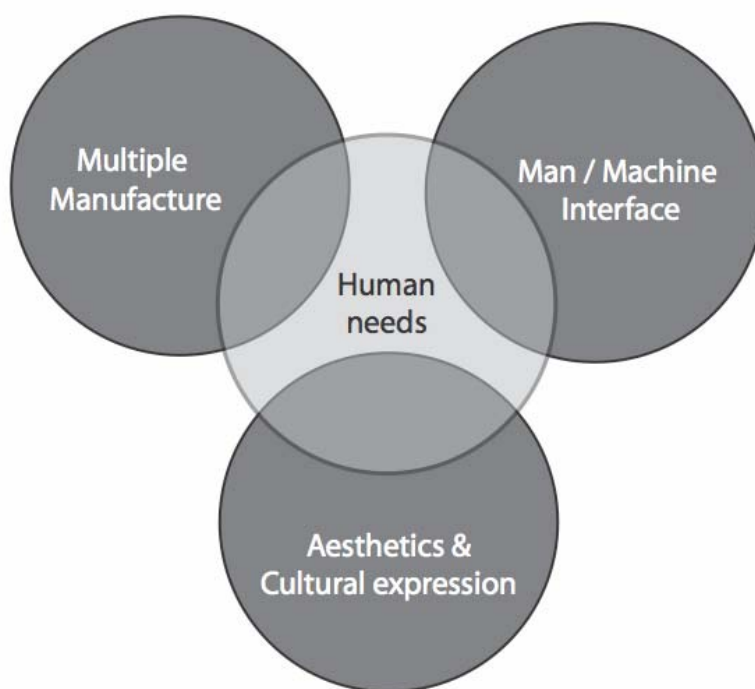


Figure 2. The central philosophy and surrounding disciplines of Industrial Design

The design of artefacts beyond their intrinsic engineered functionality to embrace human needs lies at the centre of the complex discipline of Industrial Design. Around the needs of people are the key influencers of design namely; materiality, manufacture, interface and aesthetic sensitivity. A product with perhaps the highest profile of all designed objects in which appearance contributes to purchase choice would be that of the automobile. Roland Barthes, the French social theorist, recorded the 'intense amorous studiousness' with which people at the 1950 Auto show in Paris looked upon a new model of automobile.

*"The bodywork, the lines of union, the upholstery palpated, the seats tried, the doors caressed, the cushions fondled, the vehicle is conceived with passion from unknown artists and consumed in image if not usage by a population that perceives a whole magical object"*

Henry Ford's famous maxim 'any colour as long as it's black' might have held initial success in bringing the automobile to the masses, but the original Model T's market share went from 55% in 1920 to 15% in 1927. When he finally relented his simple form of automobile to create the Model A, a 'styled' vehicle, the delay had cost him 18 million dollars creating what has been described as the most expensive art lesson in history (Molotch 2005). Harley Earl, the former theatre set designer, joined General Motors in 1926 initially as a member of the 'Paint and Enamel Committee' later developing into the Art and Colour department and fully flowering as the Styling Division by the early 1930's.

Public Transport has had fewer heroes. Douglas Scott and the AEC Routemaster double decker bus made so synonymous with London is perhaps a stand out. But in books that describe the 20<sup>th</sup> Century's design classics, chairs and cars may feature but never public transport vehicles. The commercial imperative of the manufacturer is vastly different between selling a vehicle to an operator and selling a car to a private user.

The management of stylistic aesthetic detail helps determine the specific ways a product will be understood and used (Norman 2004). Traditional ergonomic theories argue that objects should be shaped by affordances; that is, their shape should communicate their use or action. At the very least the shape of an object should limit the likelihood of misuse. It has been contended that these considerations should be placed before aesthetic affections. However, Industrial Designers would counter, that it is the aesthetic that creates the sweeping curve or up lift button and brings into existence the very affordances that make a product usable and desirable.

### **3.1 Human emotion theory in Industrial Design applied to transport**

Human emotion is a state of mind deriving from one's personal circumstances, mood or relationships. It is an instinctive and intuitive feeling and distinct from reasoning or knowledge (Damásio 2000). The study of the connection between human emotion – particularly positive emotion – and manufactured objects has, in recent years, variously derived from 'usability design' and, more latterly, 'experience design' (Jordan et al). These studies have been drawn from the fields of ergonomics and psychology and often pertain to electronic products. Industrial Designers might rightly feel that they have been attempting to make this emotional connection between objects and people for very many years (Read 1956). Human pleasure has been connected to the pinnacle of human needs (Maslow 1970 and Jordan 2002). Since Industrial Design is a discipline dedicated to meeting human needs, pleasure in the use of an object should be the ultimate goal.

Figure 3, below, sets out to equate the hierarchy of human needs with the varying perception between private cars and public transport. Safety and well being are considered the very basic of human needs, and are shown at the base of the triangle. When each need is satisfied then a further higher-level response is sought. At the highest level of attainment, public transport struggles to satisfy. The authors' suggest that one reason for the disparity between public transport and the private car is that public transport remains at the functional end of the hierarchy of needs. Cars on the other hand have moved beyond this.

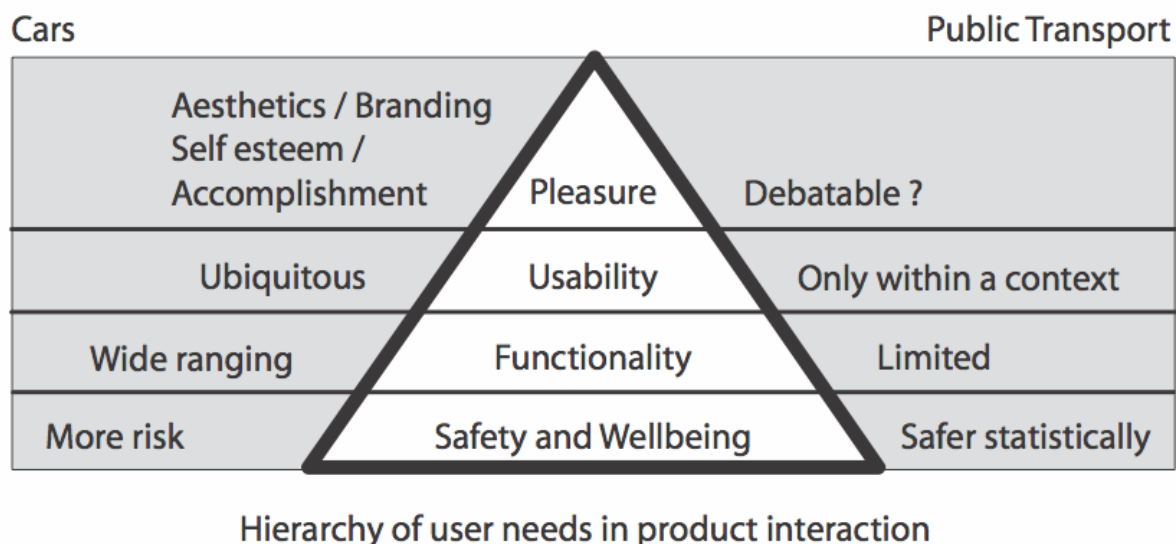


Figure 3. Equating a hierarchy of needs (Jordan's Model 2002) with transport modalities.

Much of the higher profile literature in the area of pleasure and emotion in design has been undertaken by those who hail from cognitive psychology and ergonomics (e.g. Norman, Popovic, Spillers, Hekkert, Overbeeke, Green, Jordan). Norman writes that the human emotional state works at three variously conflicting and supporting levels. The basic level is the *visceral* which is an intuitive reaction to the visual aspects of the object, and where first impressions are formed. This effect might be translated to the initial impact of excitement or revulsion upon seeing a new car or stepping on a bus and finding it dirty, and the seats slashed. The visceral level is determined by sensory stimulus and is believed to be largely common amongst all humans. Positive visceral emotions are listed below:

- Warm comfortably lit places
- Temperate climate
- Sweet tastes and smells
- Bright highly saturated hues
- Soothing sounds and simple melodies and rhythms
- Harmonious music and sounds
- Caresses
- Smiling faces
- Rhythmic beats
- Attractive people
- Symmetrical objects
- Rounded smooth objects
- Sensuous feelings sounds and shapes

Equally there are conditions that stimulate negative emotions:

- Heights
- Sudden unexpected loud sounds or bright lights
- Looming objects (about to hit the observer)
- Extreme hot or cold
- Darkness
- Extremely bright lights or loud sounds

- Empty flat terrain
- Crowded dense terrain
- Crowds of people
- Rotting smells decaying foods
- Bitter tastes
- Sharp objects
- Harsh abrupt sounds
- Grating and discordant sounds
- Misshapen human bodies
- Snakes and spiders
- Human faeces (and its smell)
- Other people's bodily fluids
- Vomit

In Norman's emotional system the second level is referred to as the *behavioural*. This contains learned responses that enable us to understand the object and equate its function with a delivered performance. As outlined in section 2, it is at this level that travelling by car is perceived to out-perform public transport certainly within a wide range of contexts and circumstances. A positive emotion at this stage is expressed by the satisfaction of usability and performance.

The highest emotional level Norman identifies as the *reflective* where understanding and reasoning are in the consciousness. Unlike the visceral and the behavioural this aspect of emotion is linked to self-image, personal satisfaction and, importantly, memories. Although three levels are defined separately they are all part of the user's experience and, to a greater or lesser degree, help define individual tastes. The brain's emotional system changes the way the cognitive system works and aids in decision-making. Consequently, if attractive things make you feel better then they tend to be perceived as working better (Norman 2004).

Jordan expands upon these cognitive levels to describe four human pleasures. Pleasure he defines is the eliminating of discontent and the appreciation found in the worth of undertaking an activity. The pleasures are described as follows:

- *Physiological pleasure* (Physio). Physical pleasures mediated by the senses, which includes those of touch, smell, and comfort.
- *Sociological pleasure* (Socio). This describes status; inclusion and how we believe others perceive us.
- *Psychological pleasure* (Psycho). The pleasures of the mind and what engages us. For example overcoming a challenge.
- Finally *Ideological pleasure* (Ideo) of aesthetics and individual values.

This approach is very different to traditional human factors, which tend to see products as being merely tools with which users complete tasks. Human response to products and systems comprise of more than physical fit and information processing. Jordan's and Norman's work advocate further examination of the emotional component to design.

In large parts of the literature the focus of author's work has been objects and never public transport, although some include observations of private cars (e.g. Desmet 2002). Indeed, current user experience theory pays little attention to the notion of shared experience (Batterbee 2004 and Koskinen 2005) as a need to be addressed in the public domain. In figure 4 the authors' have attempted to equate the 'pleasures' model to both cars and public transport presenting examples for each. In this instance, no attempt has been made to subdivide public modalities.



Pleasures	Emotions	In a car	On public transport
<i>Physio - body and senses</i>	Visceral	Tactile sensation of driving / steering 'handling'	Grab handles, door and stop controls. Ticket machine buttons and acoustic feedback
<i>Socio - the company of others</i>	Reflective	Vehicle branding and self esteem	Talking to friends / other passengers. Collectively travelling to an event.
<i>Psycho - accomplishment</i>	Behavioural	Vehicle functionality, responsive controls, driving skills.	Reading or accomplishing something valued during transit time. Little hinderance to the journey.
<i>Ideo - personal values</i>	Reflective	Aesthetics. Individual values.	Aesthetics. Potential conflict between community and individual values.

Figure 4. Examples of pleasure and emotion as translated into user actions within a vehicle.

For the car driver pleasure can be derived from the physical act of driving and the sense of accomplishment derived from an acquired skill. Motoring journalists often describe a cars 'handling' as indicative of a particular car's performance benefit, and especially part of the pleasure of driving it. Public transport passengers are not privileged enough to have such a connection with their mode of transport. Tactile pleasures are, however, part of their experience. Door entry buttons, on-board ticket machines and a comfortable clean seat create the 'physio' pleasures for the bus tram and train passenger.

It is possible to elicit several emotions that are simultaneously both positive and negative. Attempting to unify various cognitive theories on emotion and design has been attempted under the banner User Experience (UX) (Gerken 2006). UX attempts to formalise the disparate emotion and pleasure theories (including Jordan and Norman) into a user experience model that includes the organization behind the product, such as the manufacturer and their influence upon the product experience. Organizational value is particularly important in public transport since timetabling and infrastructure are very much part of how the product is perceived.

Other researchers have molded emotional experience theories together with the aim to create pathways to new design methodologies (Khalid 2006). Observations have included that emotional response is culturally specific and subject to a series of variations that include context. Social acceptability of public transport patronage in the morning commuter time is different to patronage for weekend social or shopping trips. This is a theme continued by (Spillers 2004) suggesting that the users' state of mind or emotion during the interaction with a product influences their perceived satisfaction with the object. Further, a product's performance (on all levels) can also affect emotion back to the user, through subtleties that create confidence in use or as the user makes sense of the product.

People are emotional beings and they measure the total experience of public transport. Emotive responses can overcome more logical decisions. For example purchasing a much

cheaper train pass versus car fuel costs. Dirty or vandalised trains and poor lighting contrast highly with the visual sensitivity and haptics of one's own car, where any disorder is generally of the owner's making and therefore not as onerous as disorder inflicted by others.

People are also active beings – they are not cargo. Simply moving them from one place to another is not enough. Stimulus is needed during a journey if they are not actively engaged in driving the vehicle, reading, listening to music and talking to other passengers. People are also habitual beings with feelings shaped by an accumulated life experience that is constantly unfolding. Indicative of this is how people feel in clothes they choose and for what occasion they might wear them (Balet 2006).

Industrial Design with its central goal to improve the performance of man-made artefacts is much respected in the automotive industry as an essential tool in creating the sales appeal of a vehicle. Car design attempts to induce in the consumers' consciousness the status of owning and driving that possession of a car will bring. Cars facilitate personal goals. For public transport the goal in the mind of the user is much simpler, to get from A to B. There is no status associated with riding public transport unless it is associated with collective values of town and society, or a desire to experience novelty such as riding an old tourist tram. The discipline of Industrial Design appears to have made less impact in the public transport arena where there is a marked difference in aesthetic strategy.

### **3.2 Variations between automotive and public vehicle aesthetic strategy**

While both the public and private sectors utilise Industrial Design expertise within their overall design strategy, the automotive industry has the luxury of designing to a varied and segmented consumer market. Car purchases are made on a variation of factors; psychological, cultural, social and personal economic situation. Manufacturers offer the consumer a specific targeted response to their needs resulting in a particular vehicular form (see figure 5, overleaf).

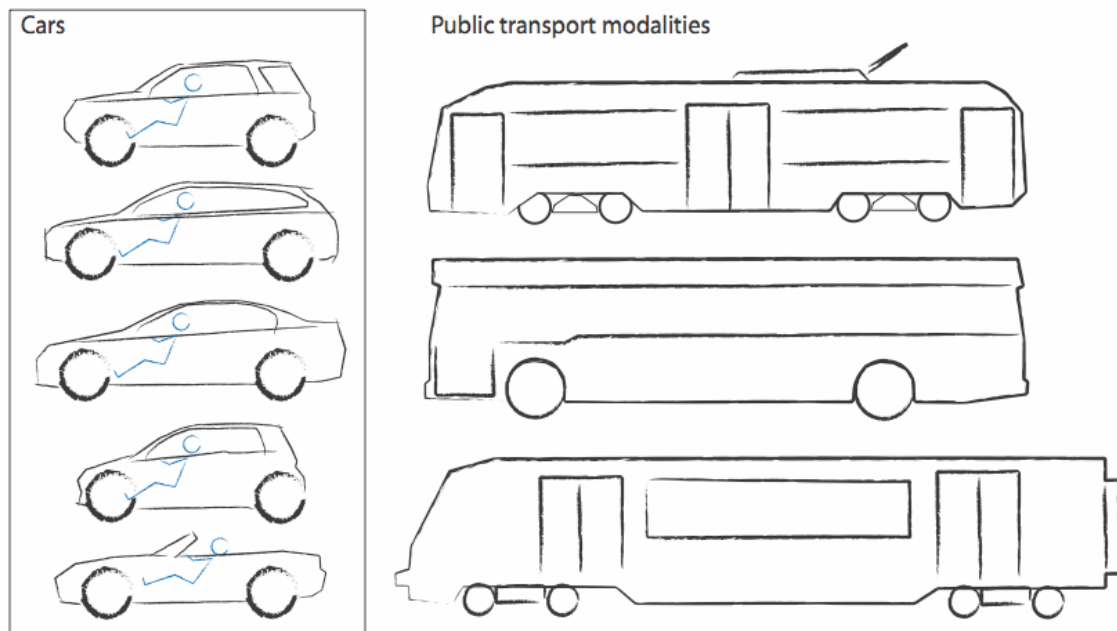


Figure 5. On the left hand side are the basic generic forms of the private car and on the right hand side examples of public transport offerings.

A car user's need maybe a perceptual one as in the case of the urban popularity for sports utility vehicles despite their country off-road origins. Automotive design creates meaning through aestheticisation. Conversely public transport vehicular design has to be, by its very nature, a one size fits all solution. Public transport modalities are driven by carrying capacity and the characteristics of wide patronage. Ingress and egress for a wide range of human sizes, allowance for perambulation and disability, the form of propulsion, track, platform or roadside kerb stops, impact upon a spatial envelope that leads to a very utilitarian and often rectilinear form.

Figure 5 accentuates the generic forms of vehicular profiles. Car owners become accustomed to 'reading' the form of vehicular transport. From experience they can draw conclusions about the vehicle's purpose, functionality and related confidences in performance and safety. Some variability exists in public transport with regard to nose cone or driver cabin design, most notably on tram and train systems. Elsewhere along the body of a train, tram or bus the impression of a large high-sided box is generated. This can lead to the frustration or confusion of ingress and egress, the anxiety of what one might find aboard, the vehicle's condition or whether or not there will be a seat. There are payment and ticket validation systems to navigate as well as the potential need for further information to continue the journey.

Industrial Design strategies around public transport appear to focus upon the design of the interior and then progress to the exterior, concerning themselves with vandal proof fixtures and fittings, grab handles and a creation of space for busy commuter times. Some systems create provision for further information displays. Other systems have to accommodate a ticket machine. Interior space design demonstrates a variation of seating arrangements to improve ingress and egress for the elderly or disabled. These are very functional and cost sensitive issues. The goal in designing interior space is to create an organization of elements that appear to expand the negative or empty space including headroom and within overall widths dictated by track gauges or road regulations.

Polarised from this strategy, cars appear to be designed from the outside in. Apart from offering a variation in functionality automotive designs differ from public transport modalities as they build brand value in the user's mind. For example the brand BMW might well invoke a number of emotions or feelings in the consumer's mind. These connections might include that BMW is German, up market, creating fast sedans, have good engineering, and are driven by successful people. BMW is a strong global brand and would, therefore, likely stimulate the same perceptions around the world. People who wish to associate themselves with the brand do so because of a mixture of functional and emotional connections. Consumers buy branded products and services not trademarks (Pavitt 2000). A trademark is a symbol and its value derives from what it symbolises. The physical form of cars such as BMW re-enforces the visual identity of the manufacturer. Public transport vehicles are branded through the local operator and, therefore, suffer or enjoy the consequences of that organization (Pavitt 2000). Branding is one of the ways design as consumer is separated from design as social engineer. Careful design management of the brand creates a deep understanding of what the brand means to the consumer and what drives choice.

Industrial Design is instrumental in maintaining the reputable associations of a brand. They utilise the tools of form and proportion to generate an appealing visual impression. Manipulation of the perception of form through the use of line and colour is a key feature of the designer's activity. The automotive designer strives toward the creation of elegance. Horizontal lines reduce the impact of upright lines or the blacking out of upright pillars will give the effect of a sleeker appearance suggesting speed. Darker shades created by colour or shadow along the lower part of the vehicle reduces 'visual bulk' and attempt to make the vehicle appear to float. Automotive designers appear to have more visual freedom in creating aesthetically pleasing proportions. Designers and artists have attempted to define the most 'pleasing' size relationships in terms as diverse as the width to length ratio of sides of a

rectangle (the Golden Section 1 to 1.618) to patterns of growth in the natural world (Fibonacci Sequence). Scale and proportion are closely tied to the aesthetic emphasis and focal point of the vehicle. The front grill and headlights form 'the face' of the vehicle and is a dominant component in creating the character of the vehicle. Opposite to current trends in bus and tram design, automotive designers are diminishing the proportion of the window area in cars, presumably to create a greater sense of security and privacy in the car, but also to accommodate side airbag and crumple zone cavities. The overall proportion of the vehicle is dictated by the package configuration that includes all the essential elements within the body of the car, such as engine space, passenger cabin, luggage space etc. Cars have become a predictable sequence of forms (figure 5). The difference between beautiful and ordinary is a sensitivity of these proportions.

Curiously, as developments in manufacturing present the opportunity to become more creative, car-makers have grown more conservative. They are driven by the commercial imperative and the fear of losing market share by introducing radical design changes or upsetting brand expectations. Car consumers resist differences that depart too strongly from what they think an object ought to be or look like. The physical 'type form' is what auto designers have to work around. Adherence to type form is one reason why new cars can look so close to the old (figure 6 overleaf). Type form particularly constrains products that consumers do not often replace such as cars. New things acquire validity only through interaction in an environment that is yet to be. The 'line' of the vehicle determines another factor in the reading of vehicular aesthetic. Here the description of the edges of the car are important since these re-enforce a dynamism to the form and accentuate speed and, with it, the perception of freedom of mobility.



Figure 6. Different brands with a similar front 'face'.

Contrast the proportions and line of an automobile with the general aspect of buses, trains and trams and there is a polarity in sophistication. The proportions conform to a mass slab sided vehicle – a building on wheels – with little to commend it for speed and comfort from an exterior impression. In an attempt to remedy this impression some manufacturers have increased the break up of the slab side by creating larger windows and subtle gentle curves as well as dynamic and pointed driver cabins. These introduced design innovations aid access to the interior and visibility from within. The conservative and functionally pragmatic strategy of the public transport sector invites further research in creating more radical design statements. To this end some manufacturers, most notably Alstom in France, have developed in the last couple of years a design department mirroring automotive developments and recruiting its staff from the automotive design industry (figure 7).

## 4.0 Discussion

The authors' have sought to examine the contribution of Industrial Design and the emotive qualities within the discipline as a contributor to the complex dynamics that shape people's preferences, to either support or work against transport modal choice. In particular the authors' have considered current literature in the field of emotion and usability research. We know more about the negative perception of public transport than we know about the strategies of automotive designers to create appealing cars. Evidence from the literature outlined in this paper suggests that attractive things are perceived to work better and that usability and utility are essential, but not without pleasure or visual stimulus.



Figure 7. Alstom's light rail vehicle in Strasbourg, France.

Public transport vehicular design strategies assume that if a vehicle can be accomplished with a reasonable degree of efficiency and within acceptable levels of comfort, then the vehicle can be seen as fitting the user. The authors' would argue that in practice these approaches could be de-humanizing. People are more than merely physical and cognitive processors. They have hopes, fears, dreams, values and aspirations – the very things that make us human – and that these are utilised by automotive manufacturers to make their vehicles appeal to people. A revised Industrial Design strategy could contribute in turning a negative impression of public transport into a new advantage. Attention to Jordan's four identified pleasures (section 3) is one such example. As an analysis tool it might be applied to the public transport experience to determine a new framework for public transport design. The following are examples of potential research directions.

Examination of *Physio* pleasures through leveraging automotive design sensitivities to materiality. Automotive companies are already investing in the technologies that will help them create pleasant fragrances from the materials they build their seats and interiors from.

With *Socio* pleasure, for example, by engaging with others in particular contexts. Certain vehicles are more suitable for travelling to and from the theatre than travelling to and from work. Further to this, using operant conditioning where positive reinforcement methods diminish the worst of anti-social behaviour might modify the negative behaviours of others.

*Psycho* pleasure could contribute to making the most of current positive behaviours such as spending time on public transport reading, working or listening to music. How could these behaviours be developed and enhanced?

Finally, *Ideo* pleasure in which new public modalities are devised specifically for a pleasure-based approach, including broadening the user experience to cater for the variation of passengers that could take public transport. In many ways this already exists including mini-buses for specific interest groups, taxis, work utilities etc. Carefully designed and branded vehicles help signal and achieve affiliation and solidarity while also dividing them. Making the

most of current positive behaviours such as spending time on public transport reading, working or listening to music. These behaviours could be developed and enhanced by, for example, playing harmonious music and sounds for door opening, braking and mechanical movement. The formal qualities of the interior of public transport vehicles containing more of the finesse we are accustomed to in the interiors of private cars. Such as rounded smooth objects and sensuous shapes. Space filled with bright highly saturated hues, and repeated in the colour schemes of seating, grab handles and wall schemes.

The aesthetic pleasure component of *Ideo* pleasure, derived from the appearance of a vehicular interior and exterior needs further research. How are these aspects defined and by whom? Vehicular designs are open to controversial interpretations and not consensus. The subjective nature of emotional response is inherently difficult to predict and therefore to design (Desmet 2002). Industrial Designers have a long history in attempting to tackle this topic. However, unlike product usability studies, there are few methods or tools to adequately measure successful design interventions in this area of public transport. They are likely to be found at a meeting point of concerns between design and human factors

While it is acknowledged that improving and varying the environment in which the passenger travels will not solve all systemic issues within public transport, instead of asking for sacrifices from the car owner to take public transport, Industrial Design research could provide innovative approaches to tackling the emotive responses to public modalities. Further work by the authors' aims to achieve more insight into the nebulous process of defining and assessing a pleasurable public transport experience.

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