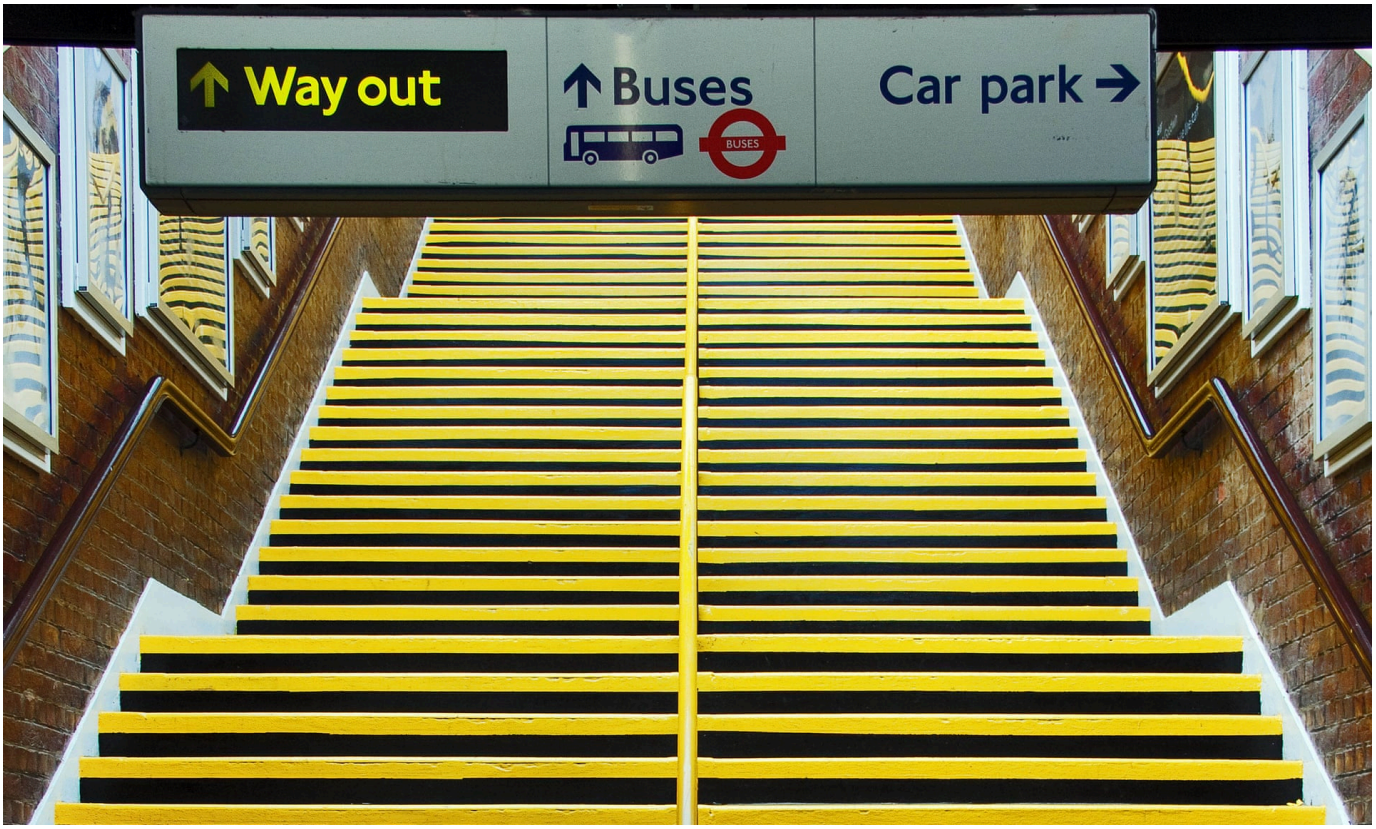
How Universal Design has changed the way we mobilise disabled people in the UK



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Abstract

This paper outlines the way in which universal design has helped shape the way the UK public transport service accommodates their disabled passengers. It begins by outline the history of the disability rights movement and who were the main contributors to pushing forward changes in laws all around the world that help fight against discrimination of disabled people. It outlines the barriers that disabled people face and Then moves on to look at the importance of public transport and how the have overcome some of those barriers and still need improvement of others. Finally analysing 3 case studies of how the public sectors have worked on the issue of mobilising the disabled population of the UK.

Table of Contents

P1 -Front cover

P2 – Abstract

P3- Table of contents

P4-5 -List of image sources

P6- Introduction

P7- Chapter 1

P13- Chapter 2

P22-Chapter 3

P 42-43 -Conclusion

P44 -46 - Bibliography

List of image sources

- *Figure 1*-unknow artist. Protest lead by the Union of Physically Disabled People. circa 1980's. Photograph. Greater Manchester Coalition of Disabled People Archive at the Manchester Central Library.
- *Figure 2:* Unknown Artist. Disabled Rights Activists protesting discriminatory laws. 1992.The People's history museum Manchester
- *Figure 3:*unknown artist. Disability Rights Activists protesting. 1995.Photograph. Scope Archive
- *Figure 4:Brian Arch/Stringer/Getty Images.* Jamie Brewer actress and first ever model with Downs Syndrome, walking the cat walk at New York Fashion Week.2015. Photograph. www.independent.co.uk
- *Figure 5.*Unknown Artist. Disability Rights Activist protesting about representation of disabled people in londond.1995.bbc news archives.
- *Figure 6.* Unknown Artist. Front desk of the emergency room floor, Worthing hospital.2019. Photograph. Www.adp-architecture.com
- *Figure 7*: Unknown Artist. Entrance Hall at Buckingham Palace.2019. Photograph. www.changining-guard.com
- *Figure 8 :* Unknown Artist. Image of bad wheelchair access design. Photograph. www.bespokenme.com/5 Ridiculously Bad Attempts at Wheelchair Ramps
- *Figure 9*:Richard Serra. *Tilted Arc*, 1981, COR-TEN steel, 37m long, 3.7m tall, 6.4cm thick, Federal Plaza in Lower Manhattan, New York.
- *Figure 10.* Unknown Artist. Example of UK Public toilet that have been deemed unsatisfactory and closed. Photograph. www.sheffield.ac.uk
- *Figure 11:*Unknown Artist. Black and white image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog
- *Figure 12.* Unknown Artist. Black and white image an Invacar on fire.1948. Photograph. www.bbc.com/ouch blog
- *Figure* 13. Unknown Artist. Colour image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog
- *Figure 14.* Unknown Artist. Colour image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog
- *Figure 15:* Harry Beck. *The London Underground Map.*london.1931. www.the londonist.com
- *Figure 16* Transport For London. *The London Underground Map.* London. 2019. www.tfl.gov.uk
- Figure 17 Transport For London. The London Underground Map. London. 1908. www.tfl.gov.uk
- Figure 18. Transport For London. The London Underground Map. London. 1915. www.tfl.gov.uk
- Figure 19. Transport For London. Black and white version of The London Underground Map. London. 2019. www.tfl.gov.uk
- Figure 20. Ian Hamilton. Example of the London underground map viewed with red green colour blindness and the improvement of makings to help differentiate the tube lines 2019.www.brilliantmaps.com
- Figure 21. Ian Hamilton. Example of the London underground map viewed with cataracts and how that improves with a dark blue background and bright yellow lettering. 2019.www.brilliantmaps.com
- Figure 22 Ian Hamilton. Example of the London underground map with high contrast yellow highlights on black background. 2019.www.brilliantmaps.com

- Figure 23 Ian Hamilton. Example of the London underground map edited to be read by those with and without colour-blindness 2019.www.brilliantmaps.com

- Figure 24.Unknow Artist.1945 Routmaster bus. Photograph. 2019.london bus museum collection

- Figure 25. View twisting steps to upper deck of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- *Figure 26*. View of high step of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 27 . View of the inside step of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 28. View of narrow, slippery garb handles of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 29. View of shiny grab handles and low ceiling on upper deck 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 30. View of specific disabled user bell that alerts the driver a disabled person wishes to alight at the next stop of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 31. View of disabled ramp undeployed of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 32. View of disabled ramp request bell that alerts the driver a disabled person wishes to come aboard the bus of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 33 high contrast signs that the bus has wheelchair access and buggy storage of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 34 blue and white high contrast signs that the bus has wheelchair access and mobility impairment support of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 35.view of wheelchair area on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 36 view of wheelchair stop sign on a 2019 Routmaster bus, Brighton and Hove Bus route 49. Personal photograph by Author. 12 Nov.2019

- Figure 37. view of wheelchair protective hand rail on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 38. view of upper deck area on a 2017 Routmaster bus showing white grab rails and higher ceilings, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 39 view of top of stairs on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 40 view of stairs to upper deck on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

- Figure 41 view of main walkway with light flooring and high-backed chairs on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Introduction:

I have decided to right this paper as my design practice has become if not focused but certainly inspired by disability and how to design appropriately for those with disabilities. During my studies I came across the term Universal Design. This grab my interest as it encompasses a type of design that is not just specialised for a particular disability but designed for all to use. I decided to focus on public transport, as a disabled person who does not drive, public transport is one of the most important ways in which I can participate in the outside world.

In this paper I will be looking back at the history of the Disability Rights movement, where universal design comes from and the main principles of design with regards to disability. I will be discussing the pros and cons of the social model of disability vs the medical model of disability and what both of those are.

I will be looking closely at what barriers disabled people face and defining what that word means. I will be explaining how barriers are not simply physical barriers such as flights of steps, but also psychological and social barriers that people with disabilities face.

I will be explaining the importance of public transport. And how the system of a transport chain is essential to call public transport universally accessible.

I will also be looking at 3 examples of designs with regards to mobilising the disabled community. The Invacar brought about by the NHS in 1949 and the pros and cons of this intervention, the London underground map and how a universal designer has redesigned it to accommodate those with visual impairments or colour blindness. And lastly, I will be looking at the Brighton and hove city buses and how they tackle making sure that their diverse customer base is accommodated.

Chapter 1:

"universal design, (…) seeks to build environments, products and systems as enabling as possible (…) it seeks to avoid creating barriers in the first place".[1]

The turning point for inclusion and social equality came in 1964 when the US enacted the civil rights act. During this time the Disability Rights Movement began taking shape and "in 1968 the first US federal law mandated accessibility of federally financed buildings to people with disabilities took effect."[2] One of the most prominent groups of the time was known as The Union of Physically Impaired Against Segregation: UPIAS.

UPIAS was formed by a disabled English man called Paul Hunt alongside Vic Finkelstein, a South African Psychologist and virement anti apartheidist. They initially referred to it as "the creation of a consumer group of disabled residents of institutions"[3]

Figure 42-unknow artist. Protest lead by the Union of Physically Disabled People. circa 1980's. Photograph. Greater Manchester Coalition of Disabled People Archive at the Manchester Central Library.

[1] Steinfeld Edward and Jordana Maisel, *universal Design: creating inclusive environments.*2012. 3
[2]Steinfeld and Maisel, *universal Design: creating inclusive environments.*15
[3] Tom Shakespeare, "The social Model of disability", *The disability studies reader* 2 (2006) 196.

A quote from their 1974 manifesto:

"We find ourselves excluded by such things as flights of step, inadequate public and personal transport, unsuitable housing, rigid work routines in factories and offices, and a lack of up-to-date aids."[4]

"UPIAS was a small but hardcore group inspired by Marxism"[5] they were intrinsic in the redefinition of disability and raising awareness of the injustices that disabled people faced, both socially and institutionally. Their policies were based around the aim to "replace segregated facilities with opportunities for people with impairments to participate fully in society, to live independently, to undertake productive work, and to have full control over their own lives."[6]

UPIAS were the first group to openly challenge the social interpretation of disability, and in their intellectual and political discussions 'the Social Model of Disability'[7] was created. This idea is still at the spearhead of many disability rights groups to this day.

The two conflicting models of disability are the Social Model, which basically lays out disability as a social construct. That in fact if the world were designed for universal use nobody would be disabled. The other model is the Medical Model, where disability is a list of things that a person is unable to do and when they reach a certain threshold, they are considered disabled.

The arguments against the Social Model of disability are such that it is an unachievable goal, referred to as "a barrier free utopia that is impossible to realise"[8] . Both ideologies aim to shift the social responsibilities to opposing sides. The medical model sees disability as something to be treated and cured whereas the social model "calls for a more sophisticated and complex way of theorising disability'[9]. 'over medicalised and individualistic accounts of disability'[10] were largely responsible for

[4] Shakespeare, "social Model of Disability" 196
[5] Shakespeare, "social Model of Disability" 196
[6] Shakespeare, "social Model of Disability" 196
[7] Shakespeare, "social Model of Disability" 196
[8] Shakespeare, "social Model of Disability" 195
[9] Shakespeare, "social Model of Disability" 196
[10] Shakespeare, "social Model of Disability" 195

institutions and major civil rights violations of disabled people. Culturally speaking disabled people have been at the brunt of 'social oppression, cultural discourse and environmental barriers'[11] since the earliest of times. 'Historically explained in terms of the Devine punishment, karma or moral failings'[12] which is why the disability rights movement focuses so heavily on the social model and fought so hard for de-institutionalisation.

Figure 43: Unknown Artist. Disabled Rights Activists protesting discriminatory laws. 1992.The People's history museum Manchester

UPIAS stated that: 'in our view, it is society which disables physically impaired people. Disability is something imposed on top of our impairments, by the way we are unnecessarily isolated and excluded from full participation in society"[13]This was a statement made in 1975, although there have been huge reforms in the way people view disability since then, have we done enough? Could the statement be made tomorrow and still be valid?

[11] Shakespeare, "social Model of Disability" 196
[12] Shakespeare, "social Model of Disability" 195
[13] Shakespeare, "social Model of Disability" 197

UPIAS also said:" the impairment is separate from disability. Doctors and allied professionals seek to repair impairment, the real priority is to accept it"[14] . This statement is problematic in that some disabled people would like to have their disabilities fixed or cured, in fact the idea that accessibility could improve health and wellbeing and therefore help towards limiting symptoms and help to avoid escalating the problems faced by isolation, is pinnacle to the modern views on universal design.

UPIAS definition of disability:" the disadvantage or restriction of activity by a contemporary social organisation which takes little or no account of people who have physical impairments and thus excludes them from participation in the mainstream of social activities"[15]. Another issue with this statement in terms of what we consider disabilities in the modern terms is that UPIAS are focused on those with physical impairments, this in itself excludes a large number of people with mental health issues, social disorders and those with cognitive impairments. UPIAS was undoubtedly a champion for disabled people but even within that organisation there was scope for discrimination and exclusion. It brings into question what we are neglecting nowadays when we think of inclusivity and accessibility.

In 1981 another activist group was structured, and they called themselves "The Liberation Network of People with Disabilities": LNPD. They were activist much like UPIAS that believed in the social model of disability. And went further to say that 'social division in society were driven by wealth'[16], this is of course very accurate for today too. The Scope website shows that 2 out of 3 disabled people are unemployed and over half are living in poverty[17].

[14] Shakespeare, "social Model of Disability" 197
[15] Shakespeare, "social Model of Disability" 197
[16] Shakespeare, "social Model of Disability" 196
[17] Scope website

*Figure 44:*unknown artist. Disability Rights Activists protesting. 1995.Photograph. Scope Archive

'The liberation argued that people with disabilities, unlike other groups suffered inherent problems because of their disabilities'[18] so not only are a significant percentage of disabled people inherently at a social disadvantage because they are poor, even those with money still face stigmatisation and social injustices simply because of their disabilities. What they did to help fight against these in justices was bring in the idea of creating community from those who were ordinarily isolated 'developing connections with other disabled people and creating inclusive disability communities for mutual support'[19]. Being able to identify themselves as disabled without shame and stigma was a turning point for the disability rights movement, disabled people were now a community, not just a group of individuals that needed curing of their impairments. People began to understand the value in a person even if they were not able to do all the physical things that an able-bodied person could. The LNPD fought for 'control over media representation' [20] .They pushed

[18] Shakespeare, "social Model of Disability" 196
[19] Shakespeare, "social Model of Disability" 196
[20] Shakespeare, "social Model of Disability" 196

forward the idea of 'positive self-awareness' [21]and pushed back against economic policies that affected the disabled community.

*Figure 46.*Unknown Artist. Disability Rights Activist protesting about representation of disabled people in londond.1995.bbc news archives.

Figure 45:Brian Arch/Stringer/Getty Images. Jamie Brewer actress and first ever model with Downs Syndrome, walking the cat walk at New York Fashion Week.2015. Photograph. www.independent.co.uk

[21] Shakespeare, "social Model of Disability" 196

Chapter 2:

Understanding the psychosocial interpretations of design

In the book: *Universal Design-Creating Inclusive Environment*s, the author mentions Understanding the psychosocial interpretations of design[22]. This is a theory that points out the social imbalances that design can produce. Our environments are a reflection and representation of the people that populate them, they can also exclude others that are not included within the designed elements.

The author goes on to talk about the "body buffer zone"[23] and refers to it as a "portable territory[24]". The idea that we inhabit public spaces with an element of territory claiming, brings into question how that plays out when designing areas. "Social spatial order"[25] comes into play a great deal when designing a public space, and within that decisions are made to identify which people the territory is designed for. When selecting materials for universal design those designers will be prioritising cost and functionality, but when designing a luxurious environment, they will be considering the aesthetic and social value of their design. If we lived in a world where things were equal then designers would be taking into consideration that to even out the social order, using luxurious materials and highly prized designs would be more beneficial for those in marginalised communities such as disabled people. The author concludes "Elimination of barriers symbolically also marks progress towards (…) social justice"[26]

[22] Steinfeld and Maisel, *universal Design: creating inclusive environments.*8
[23] Steinfeld and Maisel, *universal Design: creating inclusive environments.*9
[24] Steinfeld and Maisel, *universal Design: creating inclusive environments.*9
[25] Steinfeld and Maisel, *universal Design: creating inclusive environments.*9
[26] Steinfeld and Maisel, *universal Design: creating inclusive environments.*14

Figure 48: Unknown Artist. Entrance Hall at Buckingham Palace.2019. Photograph. www.changining-guard.com

Figure 47. Unknown Artist. Front desk of the emergency room floor, Worthing hospital.2019. Photograph. Www.adp-architecture.com

"Barriers and their social meaning[27]"

In the journal Universal Design - *Creating Inclusive Environments*, Edward Steinfeld and Jardan Maisel, discuss how physical barriers are more than physical but contain social meaning. They talk about how before universal design those with disabilities were institutionalised and how destructive that was for the people who lived in the institutions and for the communities around them, bearing the brunt of the stigma that these institutions brought about before universal design.

"design intervention can also lead to negative consequences. Large residential institutions such as poor houses, mental hospitals and penitentiaries were a late nineteenth-century adaptation to urbanisation and result in increased crime, poverty and disability concentrated in cities. But these created enormous barriers to independence and mental health (…) as knowledge about problems developed (…) new policies of community living with short- term treatment emerged."[28]

And there was born the need for universal design. The impact of community lead support meant that public places now needed to become more accessible to disabled people. It became widely accepted that isolation had a negative impact on those who experienced it, put larger pressure on the health services and lowered the standard of living in general. The author remarks that "barriers (…) result in behavioural adaptation of avoidance"[29]. This is evidence to this day in my research survey that highlights over 82% of the 126 disabled people, who answered my survey, said they felt anxious to leave the house by themselves. High levels of anxiety have a direct impact on the immune system and

[27] Steinfeld and Maisel, *universal Design: creating inclusive environments.*3
[28] Steinfeld and Maisel, *universal Design: creating inclusive environments.*3
[29] Steinfeld and Maisel, *universal Design: creating inclusive environments.*4

people's health. These levels of anxiety lead to people leaving the house less or relying on others to come with them.

Figure 49 : Unknown Artist. Image of bad wheelchair access design. Photograph. www.bespokenme.com/5 Ridiculously Bad Attempts at Wheelchair Ramps

"Barriers may not be a complete obstacle but simply a resistance of some sort (…) in the world of products, we encounter such barriers as complex operating systems (…) a steep incline (…) narrow doorway."[30] As disabled people have so many of their own barriers to deal with even smaller insignificant things to able bodied people can lead to avoidance all together.

This is highlighted by a sculpture created by the artist Serra; his sculpture Tilted Arc was a giant slab of steel that created huge wall. It was placed in the centre of a plaza and the local people grew to hate it." The office workers who regularly used the place

[30] Steinfeld and Maisel, *universal Design: creating inclusive environments.*4

complained the work ruined the plaza (…) the reaction to this sculpture illustrated the power of barriers"[31]. The shops in the surrounding area reported loss of income, drug users used the space and the entire thing was pulled down in the end

Figure 50:Richard Serra. *Tilted Arc*, 1981, COR-TEN steel, 37m long, 3.7m tall, 6.4cm thick, Federal Plaza in Lower Manhattan, New York.

This example is a representation of how disabled people live in the public domain as well as in their own homes. When we start to understand that and see "barriers as a social construct" instead of simply something to physically overcome, we can begin to design spaces that are truly accessible.

"Public transport is the quintessential public space. The place where different people come together."[32]

[31] Steinfeld and Maisel, *universal Design: creating inclusive environments.*15
[32] Etkind Liana, "Transport accessibility: how do we make public transport open to all?", *Better Transport,* 16 Dec.2017

This unarguable statement puts into perspective the importance of public transport. And even more so to those with disabilities as the statistics show that "disabled people are twice as likely to not have a car available to their household,"[33]. It stands to reason that access to and on public transport is of paramount importance to enable most disabled people to live their lives 'unless people can get to these places, disabled people will continue to face barriers in accessing employment and participating in life.'

When considering Universal Design with regards to public transport though, it becomes a very complex affair, that must take into consideration the financial difficulties, physical barriers, other impairments and safeguarding. The idea that public transport should take you from A to B might mean that several different forms of transport and/or public service have to work together. One issue that has been glossed over for some time, is that of the availability of toilets on your route. Who takes responsibility for that? When several different public organisations are involved. It is referred to as "the bladder's leash"[34].

Figure 51. Unknown Artist. Example of UK Public toilet that have been deemed unsatisfactory and closed. Photograph. www.sheffield.ac.uk

[33] Etkind Liana, "Transport accessibility: how do we make public transport open to all?"
[34]Juliette Hanson, "the inclusive city: delivering a more accessible environment through universal design",2004. 27

As our population age increases so does this issue, yet most public sector providers have opted to "close all facilities, thereby not discriminating against anyone but disadvantaging all"[35].

This tactic began coming into effect after many failed attempts to make public toilets accessible, but instead creating huge issues such as unsanitary areas that were predominately used for drug taking and were unsafe for people to use. So many of these public toilets were demolished. Having a massive impact on the "transport chain"[36], without access to clean, safe and useable public toilets many are trapped in their homes unbale to leave their houses for long periods of time.

"the urban built environment, particularly the pedestrian ones that have been created, are not sympathetic to the needs of older people and disable people."[37]

Another reason for the importance of public transport for disabled people. Even those referred to as "ambulant disabled "[38] those who can walk but are still disabled, struggle to navigate the pedestrianised areas of our public spaces. They need public transport to take them as close to their destination as possible and pick them up from their homes from as closely as possible. This brings in to question another aspect of universal design in public transport. What happens to those that happen to be on a bus route that becomes restricted or even stopped altogether. These people are left with no way to get to work or socialise with friends or participate in life unless someone with a car takes them. This brings us back to the argument between the social model of design and the medical model of design. Let's say we are considering one individual, who has a disability that affects

[35] Juliette Hanson, "the inclusive city: delivering a more accessible environment through universal design",30
[36] Juliette Hanson, "the inclusive city: delivering a more accessible environment through universal design", 26
[37] Juliette Hanson, "the inclusive city: delivering a more accessible environment through universal design",1
[38] Juliette Hanson, "the inclusive city: delivering a more accessible environment through universal design",26

their ability to walk long distances, this person has a part time job working in an office as they can only manage that amount of time due to the pain levels they deal with on a daily basis and sitting for long periods of time can inflame their symptoms. One day the bus company decide to stop the bus route that goes passed their house. From one day to the next this person becomes too disabled to work, not because their symptoms have changed but because the social infrastructures around them have made it impossible to overcome them. Bear in mind also that over 50 thousand people have had their cars taken away from them in the last 4 years due to welfare reforms[39], so the hypothetical scenario that I have just talked about is almost certainly a very real situation for a large amount of disabled people.

"a train station example, a flight of 20 steps actually has the potential to exclude 1.7million adults in the UK based on locomotion alone"[40] That is a massive amount of people unable to access that station, purely based on their mobility. This does not include any other impairments such as visual or cognitive impairments that may also struggle with stairs, so the likelihood is that number will be vastly higher. When you compound that statement with the fact that over "1056 stations remain with no step-free access at all" it becomes very clear that we are a long way from calling our public transport system universally accessible, because even if one station has step free access it does not guarantee that the stop which the person needs to use at the other end does. Therefore, we create more barriers to travel for disabled people. From the "paucity of toilets"[41], restricted bus routes, steps in our train stations and the unsympathetic urban pedestrian environments, the idea of designing universal spaces relies heavily on the system to transport them their being

[39] Etkind Liana, "Transport accessibility: how do we make public transport open to all?"
[40] Russell Marshall, "supporting a design driven approach to inclusivity*" Social inclusion,* 4 (2016)20
[41] Etkind Liana, "Transport accessibility: how do we make public transport open to all?"

universal. “the transport chain could be extended beyond transportation to include matters such as urban planning and design. This would address the issue of a more inclusive urban realm”[42]

[42] Juliette Hanson, “the inclusive city: delivering a more accessible environment through universal design”27

Chapter 3:

The post WW2 Socialist UK government found itself landed with the gigantic task of having to care for a huge increase in disabled people in the UK. Not counting any civilians injured during bombings, 300 000 [43]ex-servicemen and women found themselves classed as disabled after the WW2. In 1948 the National Health Service was brought to life and it was this service that tasked themselves with the responsibility towards those with disabilities, and more importantly for this paper, mobilising them. This was during a time when the medical model of disability had not been contested so it seemed logical, that these sick people be treated as individuals and not to look at reforming or developing public transport.

Off the back of a brand-new invention, by an engineer Bert Grieves designed for his paraplegic relative[44], the NHS rolled out their first solution to the mobility crisis: the Invacar. Over 30 years tens of thousands of these were made and were a lifeline to some disabled people. Although as with a lot of the NHS free products, such as glasses and hearing aids, they came with a social stigma and were often referred to as "spaz carriages"[45] this affected disabled people's lives everywhere they went and were hugely problematic in their safety features. Eventually they ceased production in 1976[46] and were eventually banned from British roads in 2003.

[43] "Disability since 1945" *historic England*
[44] "Gone for a decade, invalid carriages" *BBC news: ouch blog*
[45] *The NHS: A People's Story*, *dir. Ben Ryder (BBC4, UK, 2018)*
[46] "Gone for a decade, invalid carriages"

*Figure 53:*Unknown Artist. Black and white image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog

Figure 52. Unknown Artist. Black and white image an Invacar on fire.1948. Photograph. www.bbc.com/ouch blog

Once again, we are brought back to the failings that occur when a disability and barriers to living are viewed with the medical model. Physically enabling a person to move from a to b does not fully solve the problem. Without a coherent comprehensive strategy individualised assistance like the invalid cars fall down. What happens is the people using them are branded, all the cars were painted the same blue colour, the people who used the cars daily were not able to imprint their own personality on them. The cars themselves were cheaply designed to allow for the government to afford to produce them in large quantities for the lowest possible price. But this impacted on their drivability and desirability, reinforcing that sociopsychological status that disabled people are less valuable members of society that able-bodied people.

Another glaringly obvious issue is that without accessible buildings, having an accessible car was useless. All in all, these cars were a step in the right direction but were very far from the mark when it comes to removing barriers to living for those with physical impairments. But what other way could those physically disabled people get from A to B? Again, the question relies not so much on how, but who's responsibility is it to do create that solution?

Figure 54. Unknown Artist. Colour image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog

Figure 55. Unknown Artist. Colour image of the first model of Invacar.1948. Photograph. www.bbc.com/ouch blog

Another iconic image that is known for creating a user-friendly design that helps travellers navigate their way through the maze of networks that comprise the London underground. Created by ex-London Transport engineer Harry Beck in 1931:

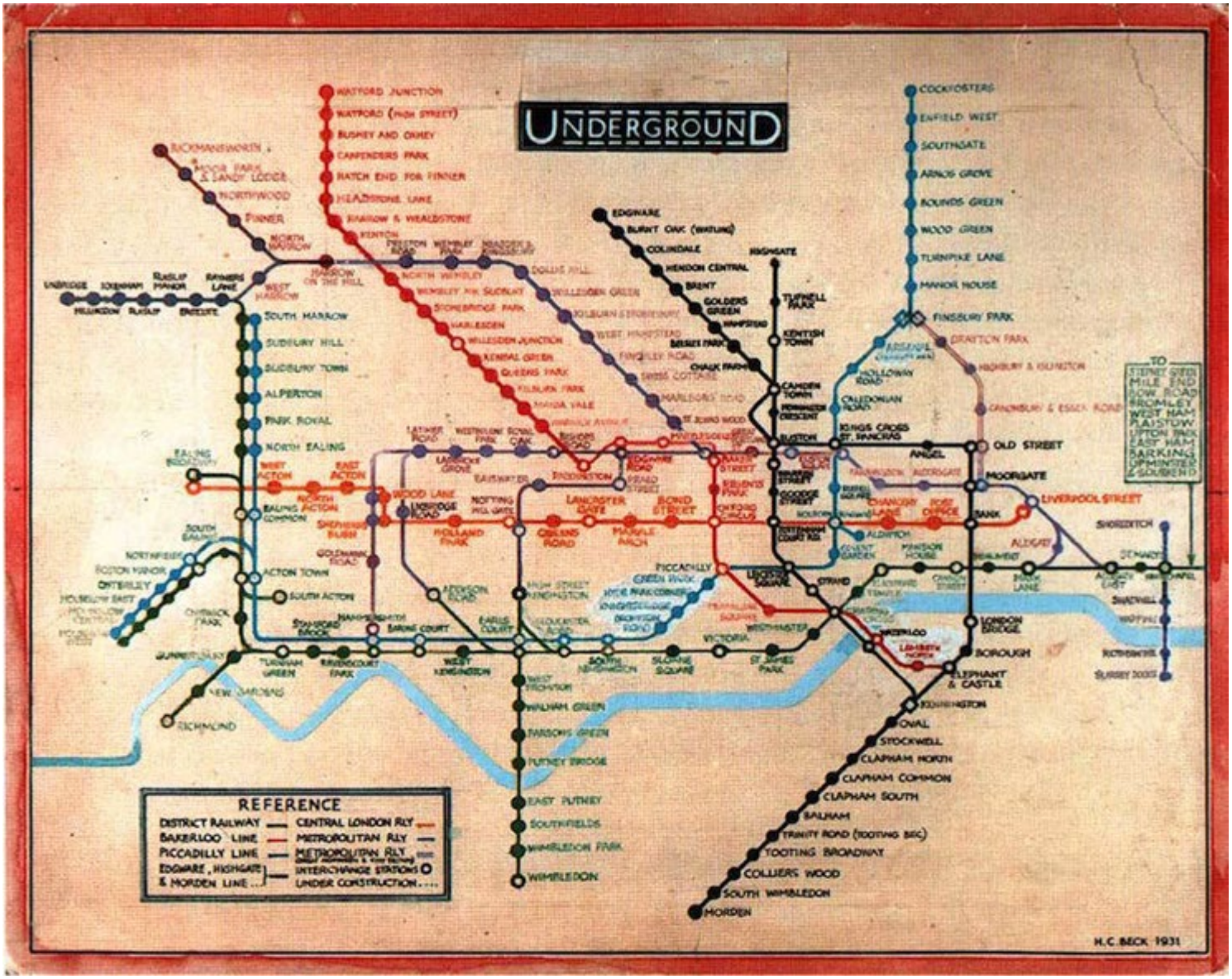

Figure 56: Harry Beck. *The London Underground Map.*london.1931. www.the londonist.com

It has been redesigned and updated several times over the years, to make it more useable and updated with all the new stations and train lines. Nowadays it looks more like this:

Figure 57 Transport For London. *The London Underground Map.* London. 2019. www.tfl.gov.uk

It is obvious that this map is indeed leaps and bounds more accessible and easier to use than those that came before it:

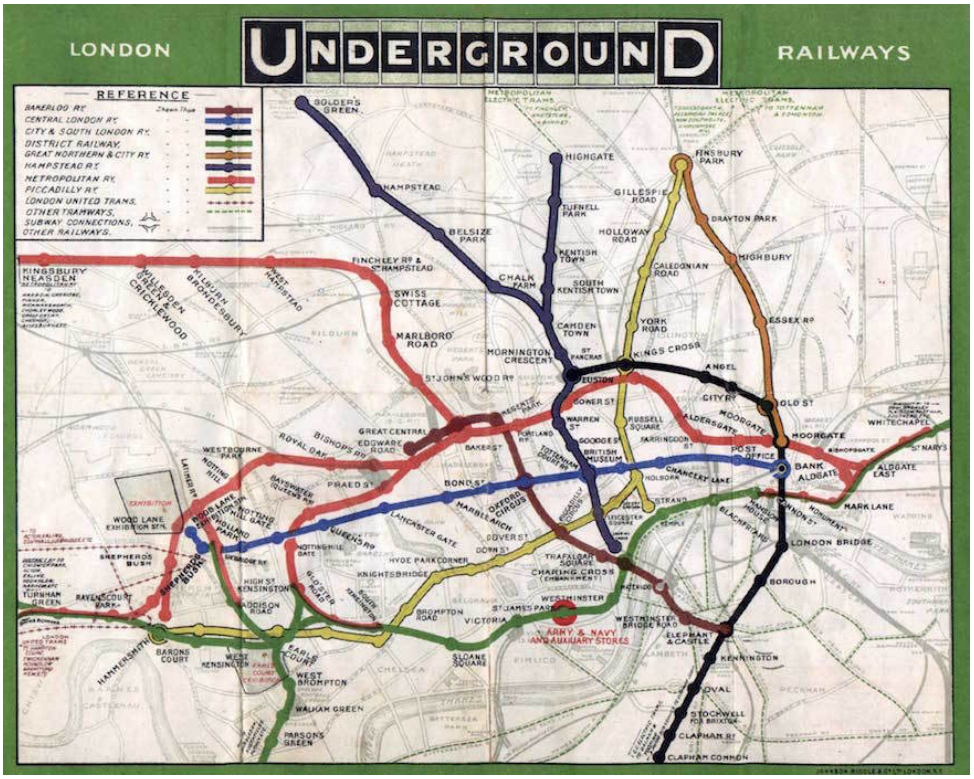

Figure 58 Transport For London. The London Underground Map. London. 1908. www.tfl.gov.uk

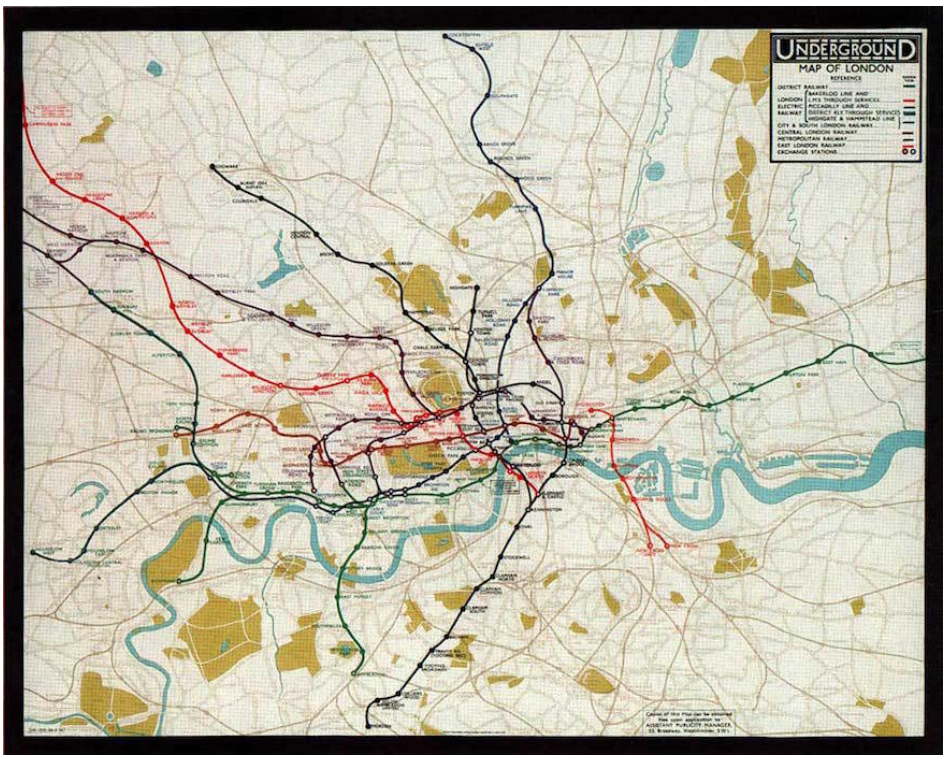

Figure 59. Transport For London. The London Underground Map. London. 1915. www.tfl.gov.uk

But it is in no way a universal design, it is very much a map designed for those without any impairments. One of the biggest issues is that it is colour coded. When an estimated 8.5% of the UK population suffer from some sort of colour blindness disorder it becomes unusable for over 5.7 million people in the UK, this figure does not include the millions of overseas tourists that use the underground every day. Transport For London's solution to this issue was to produce a colour free map:

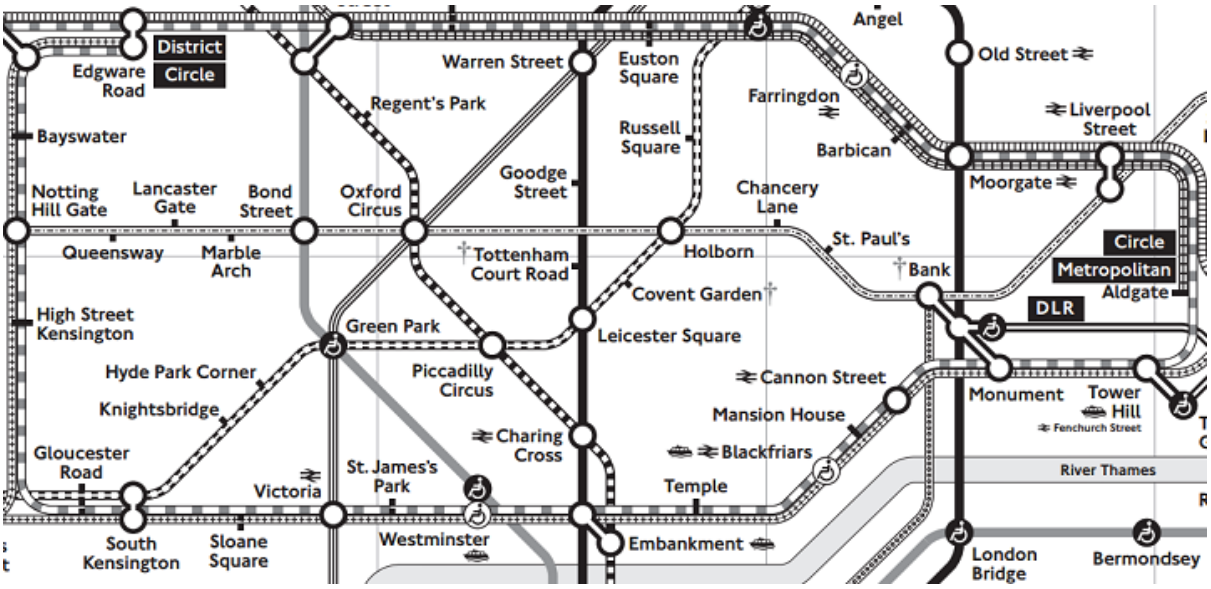

Figure 60. Transport For London. Black and white version of The London Underground Map. London. 2019. www.tfl.gov.uk

This does effectively cancel out any issues that colour blindness brings up to do with colour, but it severely reduces its readability in general. This is another example of how treating impairments as things to be overcome or overridden lead to bad design, that actual leaves the user feeling less valued.

One designer Ian Hamilton[47] an expert in UX design for games software, specialises in usability for children with profound learning disabilities, came up with a system that has revolutionised the London underground map with respect to colour blindness.

[47] "Ian Hamilton design and consultancy", Home page. 04 Nov. 2019

There are several versions of sight impairment to consider, but not an infinite amount of them, so by considering the different needs of each visual impairment he has design a system that is based on user choice.

Figure 61. Ian Hamilton. Example of the London underground map viewed with cataracts and how that improves with a dark blue background and bright yellow lettering. 2019.www.brilliantmaps.com

Figure 62. Ian Hamilton. Example of the London underground map viewed with red green colour blindness and the improvement of makings to help differentiate the tube lines 2019.www.brilliantmaps.com

This way the disabled person feels catered for, their own impairment is being dealt with. Perhaps this shows that with a sensibility of both models, the medical and social we can come up with better designs.

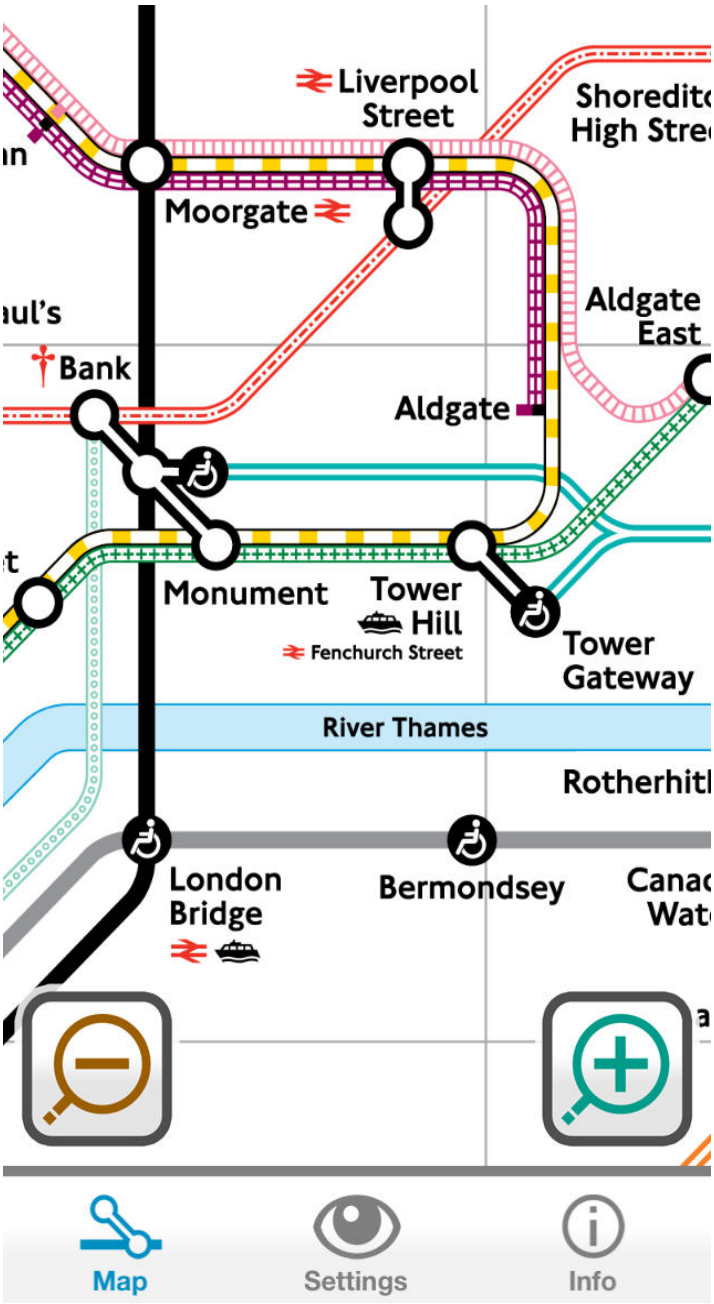

Figure 64 Ian Hamilton. Example of the London underground map edited to be read by those with and without colour-blindness 2019.www.brilliantmaps.com

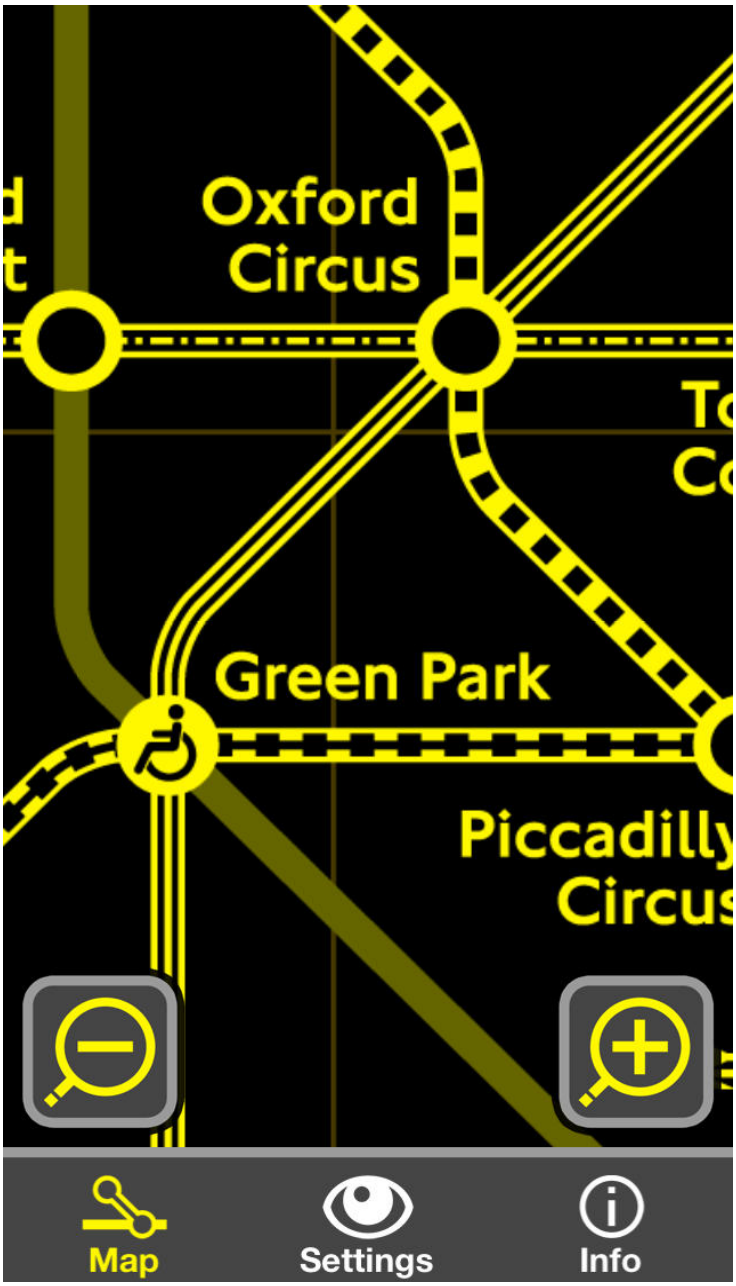

Figure 63 Ian Hamilton. Example of the London underground map with high contrast yellow highlights on black background. 2019.www.brilliantmaps.com

It's fair to say that the key player in the issue of mobilising the disabled communities of the UK are the buses. During the time of the Invacar and the first tube maps, buses

Figure 65.Unknow Artist.1945 Routmaster bus. Photograph. 2019.london bus museum collection

looked very differently to the way they do now. The buses of the 50's all the way up to the 90's changed very little in their design. Fig 24 shows a 1950's Routmaster bus, was and still is the most common model series found bus in the UK. It's iconic status that has always been considered very British, all those in the UK could relate to the big red buses and call them their own. But does that include disabled people? In fig 25 to 29 you can see some images of a 1965 Routmaster bus, the design barely differs from its 15-year older model. The buses had a high step that was so high they had to install a grab bar for people to pull themselves up on, this grab rail was though covered in non-slip material to make sure that people were less likely to slip off the bus, but that step of course immediately makes the bus inaccessible for anyone in a wheel chair and probably very difficult for anyone with mobility issues to use safely. Within the bus there as several other steps that need to be climbed in

order to reach the seating area. The ceiling is low, so most adults would have to crouch slightly to move around the bus, which makes people inherently less stable, this would exclude the next level of mobility issues as navigating the seats on a moving bus would be dangerous. The stairs up to the upper deck are extremely narrow and twisting this once again creates a great deal of problems for those less mobile or even those with small children. The grab rails and handles are all made from aluminium, this is problematic for several reasons: firstly, the grab rails are slippery which is less than ideal for assistance. Secondly the grab rails are shiny, so they are in fact very difficult to see in any light for those with visual impairments as they reflect the light and the surrounding background, rendering them almost invisible. Finally, they are very slender, this makes them extremely difficult to use if a person has joint issues such as arthritis, as they find closing their hands around a small area very painful.

Figure 66 . View of the inside step of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 68. View of high step of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 67. View twisting steps to upper deck of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 70. View of shiny grab handles and low ceiling on upper deck 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 69. View of narrow, slippery garb handles of a 1965 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Not to mention there are no spaces for pushchairs either. Considering all those factors, it is important once again to consider what that means for the disabled people in those times, about where they stand socially. Where such an iconic part of British culture is a place that they are neither catered for nor considered appropriate for. This must have been particularly hard for all those disabled service men and women to come to terms with after the war. They had fought for a country that no longer even provides public transport for them anymore.

Fortunately, modern buses have become much more accessible places. The issue with having a high step has been resolved in two different ways, one of those is that the bus can be raised and lowered by the driver to enable passengers to get on and off the bus much more easily. All Brighton and hove city buses have wheelchair ramps that lower to meet the ground to enable the wheelchair user to use them without assistance, they ensure this by raising the pavement height at all the bus stops that they cover. This is a very important issue, as often people find that bus stops are too low for the ramps and the angle of the ramp is too steep for them to use on their own, often leaving them to rely on the kindness of strangers or the driver to help them onto the bus, again this kind of design flaw works against the principles of universal design as it may solve the basic issue but it creates social tensions and isolation rather than independence and self-confidence, it also makes the wheelchair user extremely vulnerable as the person helping them on may not be a professional and could inadvertently harm the wheelchair user.

Figure 71. View of specific disabled user bell that alerts the driver a disabled person wishes to alight at the next stop of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 73. View of disabled ramp request bell that alerts the driver a disabled person wishes to come aboard the bus of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 72. View of disabled ramp undeployed of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 75 blue and white high contrast signs that the bus has wheelchair access and mobility impairment support of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 74 high contrast signs that the bus has wheelchair access and buggy storage of a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Another element of accessibility of these buses is that on the outside in several clearly marked vibrant colours that are all different and would allow a variety of users with visual and cognitive impairments to see are the disabled signs, symbols for those unable to read ,written words black on yellow font (widely regarded the most accessible colour combination for visual impairments) the other colours chosen are also contrasting enough to not cause an issue for any one with colour blindness.

So from the moment a disabled person gets to the front of the bus they are told in no uncertain terms that they are welcome and are about to enter a space that has been designed for them to use. The Brighton and Hove city bus company also have a guarantee taxi scheme that means that if ever a wheelchair user is not able to get on a bus ,for whatever reason, perhaps there is another wheelchair on the bus or the ramp is not working, That the company will pay for a taxi to get them to their destination.

Figure 76.view of wheelchair area on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Once inside the bus the area is clearly marked out for the wheelchair user to position themselves, there is a wide space free of chairs to allow for manoeuvring into the space, a comfortable backrest and an arm rail to allow the user soothing to hold onto if the bus needs to stop suddenly during the journey.

Figure 78. view of wheelchair protective hand rail on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 77 view of wheelchair stop sign on a 2019 Routmaster bus, Brighton and Hove Bus route 49. Personal photograph by Author.12 Nov.2019

One of the newest editions to the Brighton and hove Buses is a backwards facing board that tells the passengers what stop is coming up, as this is normally placed behind the wheelchair user in a very difficult position for someone with limited mobility to see as the wheelchair is facing the other way.

Handrails are large and matt white or red, so they are easier to see and hold onto than those in the older models.

Figure 79. view of upper deck area on a 2017 Routmaster bus showing white grab rails and higher ceilings, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 80. view of red hand grabs on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

The stairs are also straight and wider with lots of handrails and safety no slip flooring to help people ascend safely.

Figure 82 view of stairs to upper deck on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

Figure 81 view of top of stairs on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

The dark black floors have been replaced with lighter coloured floors that demarcate where the walkway is, this is to help those who are living with dementia as dark spaces can often feel like holes to those and can be quite frightening and disorientating ,so the blue and light blue pattern on the floor is a subliminal way helping with that issue. They have also rolled out a new scheme called the helping hands scheme that is aimed at tackling the issues that people with invisible disabilities face. A system that is being constantly looked at to become more effective.

Figure 83 view of main walkway with light flooring and high-backed chairs on a 2017 Routmaster bus, Brighton and Hove Bus depot. Personal photograph by Author.01 Nov.2019

High backed seats offer additional hand holds plus better support and safety for those sitting in them.

It seems at odds with logic that such a small space in a moving vehicle has managed to achieve such a high level of accessibility for disabled people when those needs are often thought of as space hungry and costly changes. The diversity of the space reflects the diversity of the people using them, a design that can be altered by the user to encompass

many different needs, such as the seats that flap up and down. The ideology that the wheelchair user gets precedents over that area, that kind of sociopsychology that people have begun to take for granted on buses is rarely seen in other public spaces.

conclusion

It is evident that public transport and accessibility have had a long history together, it appears that there is still a long way to go until the UK can call its public transport universally accessible. But to truly embrace the spirit and ethos of universal design, the war between social and medical model of disability needs to end and designers need to consider a more comprehensive approach like Ian Malcom design for the London tube map. Consideration of people physical, mental or emotional needs and how they live with these conditions should be top of the list of priorities for good inclusive design as the medical model dictates. But one must equally consider the social impact of what is being designed and how that will impact not just on the user but onto the community that user belongs to. Multifunctional spaces and such as the wheelchair/seating area on the Brighton and Hove buses tackle these issues too, allowing for passenger to be medically and socially accommodated. And although there are still stations that need step free access and accessibility issues throughout the public realm still left to be addressed, I feel my priority as a designer lies with the issues around dealing with accessibility for those with invisible disabilities. These issues seem to ones that the larger organisations shy away from, like with the public toilet access, rather shut them all down then get in trouble for not making them accessible enough for all. But looking at my research those are a sector of the disabled community that feels sorely neglected, and that creates opportunity for me to see where clever design can come in and fill those voids. It’s inspiring to see that the original tube map was not designed by an official designer for the TFL and the re- designs of the maps for colour blind people were not commissioned by the TFL either. These people saw an issue and they designed solutions to overcome them. And that they were improved over time as knowledge and understanding grew.

In conclusion I see myself designing spaces that are not only multifunctional but also adaptable. Ready to accept that they are not a solution to all the difficulties that universal design throws up, but a working model able to be re-sculpted and change according to new knowledge without the need for huge expense. Creating environments that will encourage large organisations to take the leap be more proactive in making the public realm accessible for all.

Bibliography

"Archive Launch Will Shine Spotlight on Impact of Disabled People's Movement." (2019). Print.

"Changing-Guard." 2017. Web. 10/11/2019 2019.

"Disability since 1945 | Historic England." (2019). Print.

"Disability since 1945 | Historic England." (2019). Print.

"Ian Hamilton Design and Consultancy." 2013-2015. Web. 04/11/2019 2019.

"Sign Zone: The Nhs: A People's History @ Bob." Ed. Ryder, Ben: BBC4, 2018. Print.

"Stories." 2019. Web. 04/11/2019 2019.

"What Made Richard Serra's Tilted Arc Sculpture So Controversial?" (2017). Print.

BBCNews. "Gone for a Decade, Invalid Carriages." (2013). Print.

---. "When Disabled People Took to the Streets to Change the Law." (2019). Print.

Abernethy, Laura. "You Don't Look Sick:'I Thought Only Old People Got Arthritis, until I Was Diagnosed at 28'." 2019. Web. 05/05/2019 2019.

Architecture, adp. "Emergency Floor Worthing Hospital." 2019. Web. 11/11/2019 2019.

BBCOuch. "Ouch Blog - Bbc News." @BBCNews 2017. Web. 04/11/2019 2019.

Bella, Martin, and Hannington Bruce. *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. 2012. Print.

Ben, Ryder. "The Nhs:A People's History.". Ed. Ryder, Ben2018. 60 mins. Print.

Buhalis, Dimitrios, Simon Darcy, and Ivor Ambrose. *Best Practice in Accessible Tourism: Inclusion, Disability, Ageing Population and Tourism*. Bristol: Channel View, 2012. Print.

Campbell, Denis. "Nye Bevan's Dream: A History of the Nhs." (2016). Print.

Connell, BR, et al. "What Is Universal Design." *The Center for Universal Design* (2001). Print.

Edward, steinfield, and Jordana Maisel. *Universal Design: Creating Inclusive Environments*. Hoboken N.J: John Willey, 2012. Print.

Goldsmith, Selwyn. *Universal Design: A Manual of Practical Guidance for Architects*. 2000. Print.

The Inclusive City: Delivering a More Accessible Urban Environment through Inclusive Design. 2004. Print.

Jorgen, Aarhaug, and Elvebakk Beate. "The Impact of Universally Accessible Public Transport- a before and after Study." *Elsevier* (2014). Print.

Kelley, Ryan. "Toward an Unconditional Right to Vote for Persons with Mental Disabilities: Reconciling State Law with Constitutional Guarantees." *BC Third World LJ* 30 (2010): 359. Print.

Lianna, Etkind. "Transport Accessibility: How Do We Make Public Transport Open to All?" *Better Transport*. 2017. Web. 09/09/2019 2019.

Marshall, Russell, et al. "Supporting a Design Driven Approach to Social Inclusion and Accessibility in Transport." *Social Inclusion* 4.3 (2016): 7-23. Print.

Mary, O'hara. "Disability Style Counsel." *Guardian* (2009). Web.

Neurodiversity, Supporting and Celebrating. "Understanding Different Categories for Expression of Difference - Co Occurring Conditions." Web. 24/12/2018 2019.

Nianias, Helen. "Why Down's Syndrome Model Jamie Brewer Has Changed the Game." (2015). Print.

Phillipa, Aldrich. "Future Perfect,N Design Labels for an Ageing Society." *Housing and learning improvement network* (2013). Web.

Planetmclulu. "Living with Dp/Dr." *Iv'e been suffering from dpdr for over 3 years now and i want people to know what it's like (10 comics)* (2019). Web. 06/06/2019.

Richoux, Paul. "% Ridiculously Bad Wheelchair Ramps." 2019. Web. 11/11/2019 2019.

Shakespeare, Tom. "The Social Model of Disability." *The disability studies reader* 2 (2006): 197-204. Print.

Story, Molly Follette, James L Mueller, and Ronald L Mace. "The Universal Design File: Designing for People of All Ages and Abilities." (1998). Print.

transport, Department of. "Bus and Coach Accessibility and the Public Service Vehicle Accessibility Regulations 2000." 2000. Web. 09/09/2019 2019.