The 'Deaf Subscriber' and the Shaping of the British Post Office's Amplified Telephones 1911-1939.

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

In the aftermath of the First World War, hearing loss gained a new prominence in public consciousness because of the mass 'deafening' of soldiers. For the British Post Office, this meant that the amplified telephones they had designed for the trenches could be appropriated into civilian use as their new 'telephone service for the deaf'. This thesis traces the development of this telephone service to explore how such technology has interrelated with the social construction of hearing loss.

Answering what motivations underpinned the development of the amplified telephone has necessitated studying the history of technology alongside science and technology studies and disability history. This fusion of approaches provides a creative analysis of amplified telephony to give greater insight into the impact of communication assistive technologies. This thesis demonstrates that a historical understanding of technology designed for the disabled can reveal the agency and experiences of disabled individuals to show their interactions with technology as a reciprocal relationship instead of an imposed one. My thesis offers a way to do this by combining a social constructionist approach with elements of disability history to reveal the contribution of disabled users to amplified telephony. An aspect of prosthetic production that has previously not been emphasised, this shows the rich connections between technology and creativity in the disabled context.

Indeed, the development of the amplified telephone was heavily influenced by its users, as so called 'deaf subscribers' made their voices heard in order to influence the telephone's form, frequency and cost. By drawing on the socio-technical approach that questions how users matter, this thesis will foreground the individual experiences of users to shed light on how the telephone was used as a prosthetic, and emphasise the forgotten contribution of users to the development of amplified telephony.

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List of Abbreviations

Full Title	Abbreviation
The National Bureau for the Promotion of the General Welfare of the Deaf	*The Bureau*
The Ministry of Pensions	MOP
The British Medical Journal	*BMJ*
The National Institute for the Deaf	*NID*
The Royal National Institute for the Deaf	RNID
The Hearing Aid Manufacturers Association	HAMA
American Telephone and Telegraph Company	AT&T
The British Postal Museum and Archive	BPMA
British Telecom	BT
Teletypewriter	TTY
The United Kingdom	UK
The United States	US
Member of Parliament	MP
Knight Commander of the Most Excellent Order of the British Empire	KBE
Doctor of Medicine	MD

Chapter 1: A Telephone Theory of the Sense of Hearing

On the evening of Monday 6 September 1886, Professor William Rutherford travelled from Edinburgh to Birmingham to deliver a lecture to the British Medical Association on a subject that he described as being on 'the borderland between the realm of physics and that of consciousness.'[1] He began by demonstrating the nature of sound by inviting his audience to observe a vibrating pendulum and listen to a number of differently pitched tuning forks. After this, he came to his main subject of the night, 'The Telephone Theory of the Sense of Hearing', inspired by the invention of the telephone ten years earlier. He enthused that: 'It is, indeed, one of the most wonderful inventions of recent times. Can it throw light on the sense of hearing?'[2] His frequency theory based on the working of the telephone postulated that each individual sound stimulated a corresponding hair cell, with a correlation between the number of hair cells and the audibility of the transmission. Rutherford had reached this conclusion by taking apart and experimenting with, variously: a telephone, a frog, and a rabbit. He boasted: 'I could send as many as 352 impulses per second along the nerve of a rabbit, and get a note from the muscle of the pitch of 352 vibrations per second. That is a note of the pitch of F on the lowest space of the treble clef.'[3]

At first glance, it might not seem that a rabbit vibrating in F has much in common with the British Post Office. However, 36 years after Rutherford's experiments, that institution was also trying to discover the extent to which the telephone could throw light on the sense of hearing. In fact, the Post Office was designing telephones specifically for people with hearing loss as part of their government mandated state monopoly. What happened, in this short space of time, to take British telephone technology from vibrating rabbits to a telephone service for 'Deaf Subscribers'? This is the central motivating question underpinning the thesis. I will argue that Rutherford's experiments were emblematic of the way that this service developed – dependant on user experiences and individual appropriation, and inextricably tied into the telephone's complicated connection to deafness.

My thesis explores how amplified telephony was introduced by the UK's General Post Office in an attempt to resolve the tensions between hearing loss and telephony in the interwar

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[1] Professor William Rutherford, 'The Sense of Hearing: a lecture by Professor Rutherford M.D., F.R.S. Professor of Institutes of Medicine in the University of Edinburgh' in *Acoustics: Music* (Lord Kelvin's Collection, 1886) accessed at the University of Glasgow Special Collections Kelvin 119 20 – 1892
[2] Professor William Rutherford, 'The Sense of Hearing: a lecture by Professor Rutherford M.D., F.R.S.' p.20
[3] Ibid. p.21

period. Although civilian telephone use was not widespread during the interwar years or even by the second half of the twentieth century, the initial users of telephony were big businesses and businessmen and so in order to compete it was crucial to have access to the system. It is also clear that widespread telephone use in the trenches accustomed a generation of men to telephone use, and they expected access to this technology in civilian life.[4] Therefore, those inhabiting these roles with hearing acuity below the level needed for the telephone were at a severe social and economic disadvantage. A focus on the amplified telephone and design developments associated with amplified telephony can shed much light on how hearing assistive technology has developed in Britain and illuminate the relatively unknown yet hugely significant story of the struggle people with hearing loss still have with telephony.[5] It not only tells us about how the authority over hearing loss changed from manufacturers to medical practitioners in a process that embedded technocratic priorities into hearing assistive devices: but also reveals much about the role of individuals with hearing loss who actively engaged with this process. Their story has been lost to posterity and in recovering it I show that historians *and* people affected by hearing loss have much to gain by revising staid historical narratives.

Yet the historical problem under consideration here remains: why did the Post Office develop an unprofitable and expensive technology for a small, insignificant market of potential customers? How does this tie into its relationship with the Government as a nationalised business? And how did the Government's complex attitude towards the deafened develop during the interwar years? These questions can best be answered through focus on amplified telephone technology which unites institutional politics, the construction of categories of deafness and the development of new technical 'fixes' designed to open up telephony to hard of hearing users. In the course of the thesis I also problematize the construction and use of the term 'Deaf Subscriber' by the Post Office; I argue that this arbitrary label was created in order that the Post Office could conveniently group people with hearing loss together, without considering the wide spectrum of hearing abilities or the stigma attached to the term.

Studying the development of amplified telephones for 'Deaf Subscribers' during the interwar years shows how telephony was used as a tool in the categorisation of disability and

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[4] K. Subramanian & G. Gooday, *British Telecommunications History in the First World War* Working paper available for download < K Subramanian & G Gooday, British Telecommunications History in the First World War Working paper available for download <http://www.leeds.ac.uk/arts/downloads/download/1552/ww1_working_paper> July 14th 2016.> July 14th 2016.

[5] A 2015 blog post on hearing loss recently explored how inaccessible telephony still is for those with hearing loss and many of the comments on this article expanded on what one reader termed the enduring 'tyranny of the telephone' http://www.hear2work.com/2015/11/20/tips-on-managing-phones/ accessed online February 2016.

how, in turn, telephone users modified such technology to fit their personal needs, experiences and identities. While a growing number of histories of disability examine the multiple ways in which social contexts shape and define disability and ability, this analysis provides a new perspective on the fluid definitions and boundaries of hearing and deafness through use of telephony. Here, focus on the telephone uncovers some of the ways in which hearing and deafness were socially and technologically constructed in interwar Britain. This neglected episode of early twentieth-century telephony refines the relationship between technology, communications and disability, and broadens our historical understanding of deafness in ways which have the potential to speak to other time periods and national contexts.

The telephone was patented by Alexander Graham Bell in 1876 and it became a tool for people with unproblematic hearing to communicate with each other.[6] It was thus a purely aural device that served to further isolate hard of hearing people from key areas of everyday life. This isolation intensified when the telephone was taken up more broadly after the First World War and became an essential business tool. During the period of this thesis, the telephone was transformed from a luxury item to a necessary one. Yet a subsequent cross-fertilisation between telephony and hearing assistive technology embedded the connection between hearing loss and telephony in devices like electronic hearing aids and amplified telephones. It is the purpose of this thesis to explore and explain the development of the amplified telephone in Britain during the interwar years.

1.1: A Natural History of Amplified Telephones and their Users

In 1961, the *Post Office Magazine* featured an article charting the development of its telephone for 'Deaf Subscribers.'[7] This article featured the new amplified telephone designed by the Post Office, and publicised it as being the culmination of years of Post Office engineering. This new telephone known as Handset No.4 replaced past amplified telephones, the Repeater 17 from 1934 and the Repeater 9a from 1922, which were the only options available for telephones users in Britain with hearing loss until this new handset was developed. In this promotional article, the Post Office rewrote the history of these amplified telephones' development in order to place its new transistor based design in a narrative that celebrated its institutional innovation and

[6] A.G. Bell, 'Improvement in telegraphy', US Patent no. 174465 was filed on the 14th of February 1876 and is often described as the most lucrative patent of all time but only refers to 'transmitting vocal or other sounds telegraphically' *Patents*, accessed online via google, July 2016 <http://www.google.co.uk/patents/US174465>
[7] Post Office Magazine, July 1961, From an original held at the BT Museum, accessed at BT Archives (Disability folder).

inclusiveness over a wide historical period. It implied that the invention of these telephones was motivated by the Post Office's special awareness and consideration of the problems which faced those with hearing loss when using the telephone, and indicated that the institution's particular altruistic consideration of the disabled had led to its promotion of amplification technology. It is certainly true to say that the Post Office has historically been sympathetic to staff and users with disabilities.[8] However, its institutional narrative concerning the development of amplified telephony – which effectively constitutes the received view – does not give any indication of the considerable input that individuals with hearing loss had on motivating and directing its design through initial stages of development in the 1920s and through improvements made in the 1930s. Moreover, the Post Office actively appropriated the inventions of its hard-of-hearing users without giving them credit or acknowledging their design in any way. By recovering and reconstructing such input, I show that hard-of-hearing users had considerable agency and influence in specialist telephone development and reconsider the historical attribution of the invention of telephones for the 'Deaf Subscriber'. As the importance of technology has increased, so too has the fight for disabled people's self-advocacy.[9] In this thesis, I show that the fight for the right to participate in decisions made concerning the design of technology that affects disabled lives was fought at the start of the telephone's development, during the interwar years in Britain.

The Post Office designed the amplified telephone in its unique position as an office of state that also had to function as a profitable business. To an extent, therefore, this thesis presents a new narrative about the Post Office and its interactions with other institutions like the National Institute for the Deaf. Although the role of these institutions is mainly focused on through the lens of the historical 'Deaf Subscriber', it is also necessary to consider the history and ethos behind these major institutions. Stephen Tallents, who spearheaded the Post Office's major rebranding campaign during the 1930s, articulated the conflict of interest between profit and the state that was integral to the Post Office in 1935:

> The Post Office of today is a combination between great business corporation and a government department. As such its publicity [...] must be organised to combine, with such modifications as its special position demands, the well-tried methods of commercial advertising and the wholly unexplored and almost wholly

[8] The Post Office supplied aids to blind ex-servicemen working as telephone exchange operators in 1945, 1946, and 1948-1949 through the Scottish National Institution for the Blind and St Dunstan's. In 1939 and 1944 the Post Office worked with the Ministry of Labour to help women who had lost an arm through work with the women's land army to work as a telephone operator by modifying the equipment Accessed at BT Archives, in File TCB 2/ 171 *Employment of Disabled Ex-Servicemen as telephone operators by private firms- alteration to apparatus.*

[9] H.G. Lang, *A Phone of Our Own: the Deaf Insurrection Against Ma Bell*, (Gallaudet University Press, 2000) p.7

> unpractised methods of government publicity. That combination breeds certain advantages and certain difficulties.[10]

As a result of what Tallents termed its 'special position' within the Government, the Post Office developed amplified telephone technology according to its changing relationship with the Treasury, whose priorities regarding welfare were simultaneously in flux. The certain advantages alluded to by Tallents included the total control that the Post Office had over the telephone network. But this state backing also meant that they were required to work under the demands and financial constraints of the Treasury and act as an arm of the wider government. For this reason, the state and the newly enfranchised public expected the Post Office to provide telephones that could be used by people with some hearing loss. Amplified telephony was developed according to and alongside the emerging priorities of the embryonic welfare state.

The amplified telephone was thus co-constructed by the Post Office and its users in a long term process marked by user input and corresponding design modifications. This design process was particularly influenced by the Post Office's powerful position as the sole authority over telephone communication in Britain, and by its relationship with the wider government. The 1869 Telegraph Act had granted this monopoly over communications and it was confirmed in 1880 that this Act included telephony even though the telephone had not been invented when the Act was first conceived.[11] The Post Office therefore had legalised control over the telephone service in Britain and it was illegal for private companies or individuals to modify or tamper with its apparatus. This meant that commercial companies could not offer specialised telephones for those who struggled to hear on the telephone. As a result of this, the Post Office was challenged by aspirational users to provide telephones that could be used by people with less than perfect hearing and this led to its initial provision of a 'telephone for deaf subscribers.'[12]

Yet its first amplified telephone did not supply everyone with a telephone that they could use: those with hearing loss too great for this Post Office machine were thus redefined as living on the threshold of 'deafness'. During the interwar years, the state of being deaf or hard of hearing became defined through the ability, or otherwise, to use certain kinds of telephone – both literally in the form of the audiometer and socially through the ability to engage with the telephone. In order to retain their hearing identity and not be categorised as deaf, with the corresponding stigma that invoked, people with hearing loss such as deafened war veterans,

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[10] S. Tallents, *Post Office Publicity* (The Post Office Green Papers No. 8, 1935).
[11] D. Campbell-Smith, *Masters of the Post: The Authorised History of the Royal Mail*, (Penguin Books, 2011) p.193.
[12] This was the name given to the first amplified telephone in the Post Office publicity material. See Post Office Booklet, 1936, 'A Telephone for Deaf Subscribers' Accessed at BT Archives, Finding No. TCB 318/PH 632.

engaged with amplified telephones. Often this engagement was characterised by users bringing their own embodied knowledge about hearing to improve the telephones. Yet this promise of improvement was not realised in practice because the Post Office's standard amplified telephone model did not reflect the significant diversity of users' hearing loss. This meant that users had to continue to actively engage with the technology on an individual level in order to create a model that fitted with their level of hearing loss and their type of hearing loss.

1.2: An ideal prosthetic? Thesis Themes

Linkage between telephony and hearing loss has long been noted by historians of sound and historians of science, with many noting the involvement of Alexander Graham Bell, who cited his work with the deaf and the human ear as the inspiration behind his invention of the telephone in the 1870s.[13] Yet, beyond Bell, little is known about the later development of amplified telephony and its relation to hearing loss. Furthermore, we lack knowledge of how both producers and users affected the development of telephony during the interwar years. Bell's involvement with the deaf and telephony has been studied in relation to his status as the famous (though very contested) inventor of the telephone. However, there is no literature on how everyday users reconciled their hearing loss with telephony and how ordinary consumers tinkered with their telephone devices to improve their audibility. In contrast this thesis, by drawing on the socio-technical approach pioneered by Oudshoorn and Pinch in *How Users Matter*, will foreground the individual experiences of users to shed light on how the telephone was used as a prosthetic, and emphasise the forgotten contribution of users to the development of amplified telephony.[14] The relationship between users and technology has received increased interest within science and technology studies following the publication of *How Users Matter*, and has also received interest from scholars of medical technologies. Following Roy Porter's 1985 plea for 'medical history from below' there has been an increasing amount of literature concerning the patient's voice and its subordination to medical authority.[15] One important facet of this concerns the tension between the user imagined by designers and the reality of their lived

[13] See R.V. Bruce, *Alexander Graham Bell and the Conquest of Solitude* (Cornell University Press, 1973), O.Sacks, *Seeing Voices* (University of California Press 1989), C. Padden & T. Humphries, *Inside Deaf Culture* (Harvard University Press 2009), A. Enns, 'The Human Telephone: Physiology, Neurology and Sound Technology' in *Sounds of Modern History Auditory Cultures in 19th and 20th Century Europe* ed. by D. Morat (Bergham Books 2014) & Jennifer Esmail, *Reading Victorian Deafness: signs and sounds in Victorian literature and culture* (Ohio University Press, Swallow Press, 2013).
[14] T Pinch & N. Oudshoorn (eds), *How Users Matter: The Co-Construction of Users and Technology* (Cambridge: The MIT Press, 2005).
[15] R. Porter, 'The Patient's View: Doing Medical History from below' in *Theory and Society*, Vol.14, No.2 (Springer, 1985) pp.175-198. For a more recent critique on this subject see also F. Condrau, 'The Patient's View Meets the Clinical Gaze'. In *Social History of Medicine*, vol. 20, No.3, (Oxford University Press 2007) pp.525-540 (p.529)

experience. Stuart Blume has pointed out that: 'In designing medical, as any other, technologies, all kinds of assumptions regarding the intended users – their heights and weights, competences, preferences, behaviour and values – are made. But the user 'inscribed' in a technology, imagined by its designers, may not correspond with real users in the real world.[16] If there is incompatibility between these two things then frustrated users can respond by creating superior devices, using personally tailored devices, or rejecting the technology altogether. Sally Wyatt identified the importance of non-users in her work on non-users of the internet, and subdivided this category into four subgroups: resisters, rejecters, the excluded, and the expelled.[17] In my research into users of the telephone with hearing loss, I show a third way between use and non-use by considering aspirational users who wanted to use the telephone and used a variety of techniques in an attempt to gain access.

In this thesis, I define the amplified telephone as a prosthetic device in the sense that it was an assistive technology to those with hearing loss and was designed to enable users to cope with the loss of physical abilities. Crucially, the amplified telephone enabled those using it to 'pass' as hearing over the telephone during a period when the stigmatization of being hearing impaired remained.[18] Indeed, some have considered general telephony as functioning like a prosthetic through the technological extension of the senses. In the Victorian era where the *mechanistic* properties of aural perception were emphasised, the amplified telephone of the twentieth century could be considered as an ideal prosthetic because it promised to solve issues of both audibility and stigmatization without being apparent to the caller on the other side of the line.[19] Although the amplifying apparatus used in the design of the modified telephone was bulky and visible to its user, its invisibility to the caller on the other end of the line allowed the user to blend in with other non-hearing impaired telephone users.

Crucially, the principal groups targeted by the Post Office in attempts to popularise amplified telephones would not have necessarily identified as deaf and may indeed have passed as hearing in all other aspects of their lives.[20] In order to retain their hearing identity and not be categorised as deaf – with the corresponding stigma that invoked – some people with hearing

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[16] S. Blume, *The Artificial Ear: Cochlear Implants and the Culture of Deafness*, (Rutgers University Press 2010)
[17] S. Wyatt, 'Non-Users Also Matter: The Construction of Users and Non-Users of the Internet' in *How Users Matter* p.76
[18] For a consideration of disability and passing, see, A Brune & D.J. Wilson, *Disability and Passing*, (Temple University Press 2013)
[19] See M. McLuhan, *Understanding media: the extensions of man* (Routledge 1964) p.293 and A. Enns, 'The Human Telephone: Physiology, Neurology and Sound Technology'
[20] Jennifer Esmail, *Reading Victorian Deafness: signs and sounds in Victorian literature and culture* (Ohio University Press, 2013).

loss engaged critically with amplified telephones. Those who desired access to telephony in the interwar years would almost certainly not have recognised the Deaf community and its cultures of the late twentieth century, but less scholarly attention has been paid to those who became hard of hearing later in life and did not affiliate themselves with the Deaf community. This is in part because there is not an identified community of people with hearing loss, and in part because the stigma surrounding deafness has led those with hearing loss to identify with the hearing and minimise the significance of their hearing loss. In modern Deaf culture, hearing loss is not regarded as disabling; rather, the Deaf regard themselves as being defined not by their medical status but through their social and political status.[21] There were substantial differences between the early twentieth century Deaf community and hard of hearing telephone users.

In the early twentieth century there was a Deaf community whose members who felt that they were part of a group with shared interests and language. It can certainly be argued this group was marginalised and suppressed, particularly as a result of the ban on sign language in education. This suppression has been a key focus of Deaf History.[22] Nineteenth-century education grouped deaf children into separate schools which fostered ongoing community between the students, manifesting in Deaf Churches and Deaf Clubs, organisations like the National Bureau for Promoting the General Welfare of the Deaf and journals such as *The British Deaf and Dumb Times* and the *Silent Worker*. Jennifer Esmail has explored such activities by considering the Deaf as a cultural group during this earlier period. Through analysing these journals her research has concluded that the minimal coverage given to the telephone demonstrates that it was not considered to be a viable or useful technology for the Deaf.[23] However, there was evident interest in the connection between the telephone invention and Alexander Graham Bell's work with the Deaf.[24] The point in debating the terminology is to show that those who would describe themselves as deaf during this period would not have used the telephone and those who struggled with it would have described themselves as hearing or as hard of hearing and may not have been noticeably deaf in face to face conversation. The early telephone was initially very difficult for anyone to hear and this meant that the totally deaf were

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[21] L. J .Davis, *Enforcing Normalcy: Disability, Deafness and the Body*, (Verso, 1995) p15
[22] H. Lane, *When the Mind Hears: A History of the Deaf* (Random House 1984), O. Sacks, *Seeing Voices: A Journey into the World of the Deaf* (University of California Press 1989), P.Eriksson, *The History of Deaf People*, (SIH Laromedel 1991), D.C. Baynton, '"Savages and Deaf-Mutes": Evolutionary Theory and the Campaign Against Sign Language in the Nineteenth Century' in *Deaf History Unveiled*, ed. by J.V. van Cleve (Gallaudet University Press 1993) J.Branson & D. Miller*, Damned for their difference: the cultural construction of Deaf people as disabled* (Gallaudet University Press, 2002) and *C.Padden & T. Humphries, Inside Deaf Culture* (Harvard University Press 2005)
[23] J. Esmail, *Reading Victorian Deafness: Signs and Sounds in Victorian Literature and Culture* (Ohio University Press, 2013) pp.188-189.
[24] Ibid.

completely excluded from this technology. Michael Kay's study of telephone use in the nineteenth century has considered the telephone's inaudibility as being one of the main reasons for non-usage of telephony in its earlier stages.[25]

Somewhat paradoxically, modern communicative technology that does not require the voice has been blamed for the demise of a Deaf culture that revolved around face to face meeting places and had the Deaf Club as its focal point. Historians Padden and Humphries agree with this view to a certain extent, pointing out that: 'unlike the 1950s when Deaf people could not use the telephone […] Deaf people today have a wide array of telecommunication devices available to them.'[26] Indeed, the previously discussed distinction between the Deaf community and hard of hearing people has continued to be contingent on the ability to use the telephone. As Padden and Humphries have argued: 'Using this distinction, Deaf people range from those who are profoundly deaf to those who hear nearly well enough to carry on a conversation in spoken English and use the telephone, called hard of hearing.'[27]

By its very nature, the telephone already was a way to extend normal hearing, and so by amplifying the telephone, the category of those with 'normal hearing' could be widened. The amplified telephone became a device to categorise hearing in increasingly mechanistic terms. Viewing the amplified telephone as a prosthetic brings new analysis to bear on a never before studied technology and highlights the tensions between product categorisation and personal identity in the complex user/producer relationship. It also provides new perspective on the concept of invisibility in relation to hearing loss and stigma; the British Post Office exploited the stigma which attended to certain types of hearing loss so as to promote amplified telephony, emphasising the social embarrassment caused by having to use one's family members to conduct phone conversations.

1.3: Historiography

The broad subject area of my thesis is the history of telecommunications in relation to the hearing loss community and this topic can be placed at the intersection between the history of technology and disability studies. This project will build on research into prosthetic devices by

[25] M. Kay, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony*. (University of Leeds, PHD Thesis, 2015)
[26] C.A Padden and T.L. Humphries, *Inside Deaf Culture,* (Harvard University Press, 2005) p. 86
[27] C.A Padden and T.L. Humphries, *Inside Deaf Culture,* (Harvard University Press, 2005) p.1

specifically researching hearing loss in adults, thereby addressing a gap in the existing historiography between Deaf history and disability studies.

My exploration of the increasing quantification of hearing loss using such technology is somewhat analogous to Lennard Davis' influential argument about how statistical analysis influenced the social construction of disability in the nineteenth century. In 1995 he argued that the rise of eugenic based statistics worked to create a standard of 'normalcy', which resulted in a symbiotic relationship between the normal body and the disabled body, with one being defined in relation to the other.[28] He focused especially on deafness to argue that: 'the problem is the way that normalcy is constructed to create the 'problem' of the disabled body.'[29] Davis thus highlights what has become an important part of disability history, that is, acknowledgement of the fact that the construction of normalcy and deviance from normalcy (disability) is dependent on the time, place, and context in which the judgement is made. For example, during the interwar years, new forms of instrumental measurements were used to construct a standardised level of 'normal' hearing through tests carried out in newly established hearing aid clinics.

The hearing aid clinics developed during the inter-war years can usefully be considered in the manner of Latour and Woolgar as a space in which scientific facts such as normal hearing were constructed using the audiometer as an inscription device. In chapter five I explore the pioneering hearing aid clinic developed by Dr Phyllis Kerridge to argue that increased trust in objectivity over individual sense perception are shown in this case study in which the technical was prioritised over the social. Moreover, the variety of hearing assistance needed by the 'Deaf Subscribers' were subsumed as a result of the need for one standardised model. This case study is therefore of particular significance because of the nature of the sense under consideration; the fact remains that hearing was and remains singularly difficult to quantify and resists standardisation. The conflict between individuality and standardisation has been similarly explored in the case of wheelchairs. Woods and Watson have shown that the Ministry of Health prioritised standardised wheelchair design to keep costs of production low. However, this led to a standard wheelchair model suited to the largest user group, the elderly, who were less active and spent more time indoors. As a result, younger, more active wheelchair users became activists to successfully influence the creation of a more suitable design.[30] There has been an increasing amount of literature concerning the patient's voice and its subordination to medical authority, yet

[28] L.J Davis, *Enforcing Normalcy: Disability, Deafness and the Body* (Verso 1995) p.30
[29] Ibid. p.24
[30] B. Woods & N. Watson, 'In pursuit of standardization: The British Ministry of Health's Model 8F Wheelchair, 1948-1962' in *Technology and Culture*, vol.45, No.3 (John Hopkins Press 2003) pp. 540-568

there are inherent difficulties involved in recovering the views of patients from medical investigations. The amplified telephone and the amplified telephone user were constructed simultaneously through a drive for standardisation.

1.3 (i): How did the Post Office develop the amplified telephone?

The history of the amplified telephone in the UK has hitherto been almost entirely unexplored. With the exception of some specialised audiological journals, the technology has not been given any attention by the medical or historical profession.[31] Indeed, historical accounts even of general telephony are surprisingly sparse. Journalist J. M Robertson's 1947 *The Story of the Telephone* gives an entertaining and detailed history of how the telephone and its infrastructure developed in Britain and is particularly detailed on the nationalisation of the telephone by the Post Office. Contemporary accounts of the workings of the Post Office that touch on telephony are also useful, although as they are usually written by ex-Post Office employees, these works have a tendency towards bias, emphasising the achievements of the Post Office in whiggish, triumphalist narratives.[32] More recent works like Perry's history of the Victorian Post Office and Campbell-Smith's hefty volume on *Masters of the Post* offer more objective detail.[33] While Campbell-Smith's work makes good use of statistics and gives an excellent analysis of the politics and finance affecting the Post Office, the small section of the research station at Dollis Hill is largely focused on Tommy Flowers, and there is no mention of the Post Office's involvement with auditory technologies.[34] Perry's 'delay' thesis, in which he posits that the Post Office and the Treasury worked to delay the provision of telephony in Britain, has recently been challenged by Kay.[35]

With the exception of Kay, these accounts give little consideration to the way the telephone was taken up by the public, despite its impact being so substantial: 'social scientists

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[31] I have only come across one article that mentions amplified telephony in Britain, although it focused on the US context and on TTY technology. See D.L. Castle, 'Telephone Communication for the Hearing Impaired: Methods and Equipment' in *Journal of the ARA* vol. 11, no.1 (April 1978)
[32] For example, see: E.T. Crutchley, *GPO* ed. by Lord Stamp (Cambridge University Press) 1938
[33] C.R, Perry *The Victorian Post Office: The Growth of a Bureaucracy.* (The Boydell Press, 1992) and D. Campbell-Smith, *Masters of the Post*, (Penguin Books, 2011)
[34] D. Campbell-Smith, *Masters of the Post*, (Penguin Books, 2011).
[35] M. Kay, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony.* (Unversity of Leeds PhD thesis, 2014)

have neglected the telephone not only along with but also relative to, other technologies.'[36] Pool's 1977 account was an attempt to address this, but provided only a brief chapter interpretation of the British experience, focusing mainly of the US. Moreover, it uncritically accepted that telephony in Britain lagged behind telephony in the US. Michael Kay's thesis challenged this and provided a user focused account of the take up of telephony in Britain in the late nineteenth century by showing the varied ways in which the early telephone was adapted to different purposes.[37] For example, Kay revealed how the early telephone was taken up by the medical profession to prevent the spread of germs, by mining companies as a safety device, and by the army for a variety of non-verbal communication usages.[38] The cultural pathway of telephony has also been explored by Jessica Kuskey, who uses Victorian periodicals to show the significant impact of telephony on interactions between the social classes.[39]

Caroline Marvin's 1998 book provides further insight into the cultural and social pathway of telephony and electric lighting in both Britain and the US.[40] However, Graeme Gooday's work has highlighted how users take up of technologies influenced development by revealing the importance of gender, for example, by showing the key role played by aristocratic women who embraced electricity as a fashionable asset in the home.[41] Lisa Gitelman has also prioritised societal concerns in her history of the phonograph by taking a social constructivist approach to its dissemination.[42] In doing so, she emphasises the cultural and social importance of late nineteenth century aural technologies. This paradigmatic prioritising of auralism sets up the context for this thesis, which explores the needs of those unable to access these new sound based devices. As a result of forced exclusion, the 'Deaf Subscribers' in this thesis, are shown as increasingly frustrated with the restrictions on innovation that resulted from the state monopoly. Jon Agar's explanation of the development of the mobile phone offers insight into such tensions between public monopolies and private competition in the context of cellular networks.[43] His account also stresses the social construction of technology by, for example, demonstrating that

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[36] I. de Sola Pool (ed) 'Introduction' to *The Social Impact of the Telephone* (The MIT Press 1977) p.2
[37] M. Kay, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony.* (Unversity of Leeds PhD thesis, 2014)
[38] M. Kay, 'Chapter Two: Improving health and saving lives: the telephone innovators of medic al, mining and military users' in *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony.* (Unversity of Leeds PhD thesis, 2014) pp.44-88.
[39] J. Kuskey, 'Listening to the Victorian Telephone: Class Periodicals, and the Social Construction of Technology' in *Nineteenth Century Contexts*, vol. 38, no.1 (pp.3-22)
[40] C. Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century* (Oxford University Press, 1988)
[41] G. Gooday, *Domesticating Electricity: Technology, Uncertainty, and Gender*, (Pickering & Chatto 2008)
[42] L. Gitelman*, Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era* (Stanford University Press 2000).
[43] J. Agar, *Constant Touch: A Global History of the Mobile Phone,* (Icon books 2003) p.25-27.

the text function of mobile phones had not been envisaged as important by its creators, and was successfully exploited by users to offer an alternative mode of communication.[44] His recognition of the importance of standards forming the basis of successful mobile networks also speaks to the account of the conflict between standardization and individuality explored in Chapter 5.[45]

While these works provide fascinating insight into early nineteenth century users and the development of telephony in the UK, our understanding of telephony during the interwar years is wholly incomplete, and we have even less knowledge of how deafness and telephony worked interrelatedly in the context of amplified telephone design. There is a missing institutional history here. While there are histories of the Royal Mail, such as those produced by Campbell-Smith, and internal histories of the Post Office, there has been no historical account of Post Office telecommunications. One of the challenges of writing histories of institutions is avoiding writing an account of a seemingly monolithic entity with one overarching voice. Helen Anne Curry's account of plant breeding projects at General Electric is an exemplar of how individual researchers and engineers' views can influence the pathway of a technology. Her account shows, moreover, what she terms as a 'history of hopes', which reveals how dead end projects can constitute integral parts of a technology's history, as they reveal forgotten or unsuccessful ideologies and motivations.[46] One way in which this thesis avoids a monolithic institutional narrative is through investigating individual user experiences and recovering the stories of individuals with hearing loss within the context of expanding national infrastructure and technological change. By using close analysis of selected case studies, this thesis also demonstrates the significant effect that individual decisions have had on determining the future of a technology.

There have been a plethora of recent studies working to counter the vision based histories that have dominated the postmodern era. Since Schafer's conception of the soundscape in 1977, historians of sound have increasingly focused on how aurality affects our lives.[47] Jonathan Sterne's *The Audible Past* is a classic of this kind, and explores the complex connections between the attempt to make deafness visible and the creation of sound technologies. As he explains:

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[44] Ibid. p.108-109.
[45] Ibid. p.154.
[46] H.A. Curry, 'Industrial Evolution: Mechanical and Biological Innovation at the General Electric Research Laboratory' in Technology and Culture, vol. 54, no. 4 (The John Hopkins University Press, 2014)
[47] R. M. Schafer *The Soundscape: Our Sonic Environment and the Tuning of the World.* (Destiny Books, 1977)

> deafness was at the very beginning of sound reproduction. It directed Bell's work leading up to the telephone and haunted phonography as well: the Frenchman Charles Cros, who composed plans for a phonograph shortly before Edison's invention, worked at a school for the deaf and mute. Edison himself was hard of hearing. The bite marks on some of his experimental phonographs demonstrate a mode of hearing twice in need of supplementation- once from the machine and once from the bone conduction of his jaw.[48]

Hillel Schwartz's massive tome, *Making Noise*, extends discussions of hearing loss and technology to explore the measurement of noise, and offers an especially interesting analysis of the modern quest to discover 'how loud is loud?'[49]

This thesis relates particularly to such studies concerning how we have come to *measure* sound, and the instruments that have been developed to do this. Karin Bijsterveld's work on noise control is a classic in this area, particularly in its consideration of the manufacturing of seemingly scientific noise thresholds.[50] The role of space and architecture is also considered here, and ties in nicely with Emily Thompson's *Soundscapes of Modernity*, which gives a succinct analysis of how the new aural technologies of the early twentieth century affected architectural acoustics.[51] Of particular interest is her consideration of the way the audiometer was used by US industries for insurance protection purposes, which is an interesting parallel to my research into the contrasting way it was used in the UK to promote accurate studies on the social problem of deafness.[52] This thesis relates to these studies but moves beyond them in its emphasis on not only how we measure hearing, but also how we measure hearing *loss*. This thesis demonstrates the way in which such categorisations of hearing and loss are created by technology, specifically in the case of telephony and hearing loss in the interwar years. Graeme Gooday's work of the morals of measurement provides related insight into the technical aspect of this kind of normalcy construction, as he argues that increased use of instruments in the nineteenth century led to a distrust of the human body.[53]

Categorisation construction is a key concern of this thesis, as I show how standardisation of hearing loss, hearing measurement, and testing equipment led to the social exclusion of those who did not measure up to newly standardised levels. These tests and measurements have

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[48] J. Sterne, *The Audible Past: cultural origins of sound reproduction*, (Duke University Press 2003) p.41.
[49] H. Schwartz, *Making Noise: from Babel to the Big Bang and Beyond* (Zone Books 2011) See especially chapter 6 'Decibels Sones Phons' in 'Round Three: Everyhow.' p.678.
[50] K. Bijsterveld, K. *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*. (The MIT Press 2008) See also the edited collection T Pinch. & K Bijsterveld, (Eds.) *The Oxford Handbook of Sound Studies.* (Oxford University Press. 2012)
[51] E. Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933* (The MIT Press, 2002)
[52] Ibid.
[53] G. Gooday, *The Morals of Measurement* (Cambridge University Press 2004)

contributed to social stratification and exclusion from society, and such exclusion was often marked by the Post Office labelling people as either hard-of-hearing or deaf, and therefore 'too deaf' to use their telephones. This analysis is relevant to those historians working in disability studies who have critiqued over medicalised accounts of disability; as well as those in medical history that have questioned the loss of the patients' voice in traditional medical history.[54] I am similarly concerned with arguing that people with hearing loss have not been passive to medicalisation, rather, telephone subscribers with hearing loss adopted various active strategies to ensure they had access to telephony. It is also problematic to refer to the amplified telephones as 'medicines' or to their users as 'patients'. Their status as such was in flux at this time, and it may be useful to regard them as being at a stage of 'interpretive flexibility' in the manner that has been suggested by Bijker and Pinch as a way of understanding new technologies.[55] In a way, the amplified telephone had a hybrid status as a technology that was neither purely medical nor simply technical.

1.3 (ii): Why did the Post Office develop the amplified telephone?

Drawing on social construction of technology approaches (SCOT) and on Oudshoorn and Pinch's pioneering *How Users Matter* in particular, this thesis highlights the active role of innovative users with hearing loss in early twentieth century amplified telephony and their influence on Post Office designs. Aside from Bell's experience of deafness and telephony, we lack knowledge of how everyday hard of hearing users tinkered and tailored their telephone devices to improve their audibility. Yet, the development of amplified telephony by the Post Office was particularly marked by user innovation. Engagement with the amplified telephone was characterised by users bringing their own embodied knowledge about hearing to improve the telephones. Study of this interplay between producer and user can reveal new insights about innovation, use, and disability. These themes are most strongly reflected in Chapter 3 in the 1936 case of Raymond J Harris, a businessman with hearing loss, who wrote to the British Post Office to demand a telephone suitable for his level of hearing. Through focusing on this one case study of the individual experiences of just a single amplified telephone user, we can see the direct impact that hard-of-hearing telephone users had on the development of the British Post Office's

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[54] B. Linker, 'On the Borderland of Medical and Disability History: A Study of the Fields' in Bulletin of the History of Medicine, Vol. 87, No.4 (Project Muse 2013) Accessed online June 2016 < https://muse.jhu.edu/article/532461>

[55] T. Pinch & N. Oudshoorn (eds), *How Users Matter: The Co-Construction of Users and Technology* (Cambridge: The MIT Press, 2005) See also T. Pinch & W.E. Bijker 'The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other' in *Social Studies of Science* vol. 14 (pp.399-431) & W.E. Bijker, *Of Bicycles, Bakelite and Bulbs: Towards a theory of sociotechnical chance*, (MIT Press 1995)

amplified telephone sets during the interwar years, and accordingly, how users could be primary agents of technological change to amplified telephony. Thereby, the influence of hard-of-hearing individuals on the telephone system becomes more apparent than has hitherto been recognised.

In the context of the medical model of disability, technology is often characterised as apparatus that can be used to fix the problems associated with non-standard bodies. However, late twentieth and twenty-first century developments in telecommunication technology revolutionised the ways in which the Deaf communicated; the rise of text messaging, and social media in particular empowered Deaf technology users and allowed them to use a form of technology that had previously relied on audibility.[56] The cultural distinction between hearing loss and Deafness has recently been further challenged by the ambiguities around cochlear implants and the contested identity of their users. In this thesis I show how, in Britain during the interwar years, amplified telephone technology posed a similar challenge to deaf and Deaf identity. The amplified telephone was co-constructed by the Post Office and its users in an ongoing process of user inputs and corresponding design modifications. This design process was marked by the Post Office's powerful position as the sole authority over telephone communication in Britain and their relationship with the wider government. As the Post Office had legalised control over the telephone service in Britain and it was illegal for private companies or individuals to modify or tamper with its apparatus, this meant that commercial companies could not offer specialised telephones for those who struggled to hear on the telephone. The Post Office was challenged by such users to provide telephones that could be used by people with less than perfect hearing and this led to their initial provision of a 'telephone for deaf subscribers.'[57] However, this thesis makes clear that users moved from exclusion at a price, especially in cases where user innovations were appropriated by the Post Office.

Mara Mills has considered amplified telephony in the American context, and her work on the American Telephone and Telegraph Company (henceforth AT&T) provides a particularly useful transatlantic comparison for this work. Tensions between monopoly systems and individual use are manifest in AT&T, which functioned in a monopolistic fashion similar to the

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[56] For example, see: G.F. Pick & E.F. Evans 'Strategies for high-technology aids to compensate for hearing impairment of cochlear origin' in *High Technology Aids for the Disabled* ed. by W.J. Perkins (Butterworth & Co 1983) p99-106 For a discussion of the history of the medical and social model of disability see T. Shakespeare, 'The Social Model of Disability' in *The Disability Studies Reader,* 4th edition, ed. by L.J. Davis (Routledge, 2013) pp.214-221. For a discussion of the problems of the social model for historians see J. Anderson, *War, disability and rehabilitation in Britain*, (Manchester University Press 2011) p5-6 For more information on current issues with hearing loss and telephony see H.G. Lang, *A phone of our own: the deaf insurrection against ma bell*, (Gallaudet University Press, 2000).
[57] BT Archives, London, Finding No. TCB 318/PH 632 Post Office Booklet, 1936, 'A Telephone for Deaf Subscribers.'

Post Office. The relationship between deafness and telephony at AT&T is highlighted by Mills in her article on 'Deafening: Noise and the Engineering of Communication in the Telephone System.'[58] In this article, Mills traces the multiple connections between deafness and telephony and explores why the concept of deafening became a useful category and applied term for telephone engineers. Moreover, AT&T's audiometric experiments resulted in the 'normal' standard of hearing which was plotted on to US audiograms for hearing testing. The dispute over the legitimacy of this in the UK context is explored in Chapter 5 of this thesis, which highlights concerns over normalcy standardisation in the Post Office and in the medical field of Otology. A transatlantic comparison with amplified telephone development in the US would be an obvious contrasting case study to this thesis. However, the level of detail needed to explore the amplified telephone in the UK fully necessitates that this thesis gives full attention to its development in Britain. Mills's work on cochlear implants further emphasises the importance of deaf users in the development stage of design, and she tracks the resulting 'traces' of the user left in the commercial hardware.[59]

AT&T's specialisation in hearing loss over general telephone lines contrasts with their refusal to provide customers with a telephone system suitable for the deaf, and this became the focus of a widespread campaign in the late 1960s. This struggle has been documented by Harry G. Lang in *A Phone of Our Own*, which emphasises the difficulty of working with the British Post Office. Indeed, a revealing episode in this narration describes one of the advocates of TTY (a type of telecommunications for the hard-of-hearing which uses a telecommunications relay service) trying to bring the system to the UK against the resistance of the Post Office monopoly system. Andrea Saks was the hearing daughter of one of the inventors of TTY (Andrew Saks) and she worked to bring the system to England.

> Shortly after her arrival, she attended a charity dinner for the Royal National Institute for the Deaf (RNID) at the Rembrandt Hotel in London. She arrived in time to hear the speaker, RNID Chairman Rodger Sydenham, describe how deaf people in the United States were using the telephone and that the RNID were looking into it. Telephones were still far off for the British Deaf community, he explained.[60]

Yet this statement, made in 1972, seems incredible given that amplified telephones had been initially designed by the Post Office in 1922 and that the RNID (as was then, the NID) had

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[58] M. Mills, 'Deafening: Noise and the Engineering of Communication in the Telephone System' in *Grey Room* Vol. 43, Spring 2011, (Grey Room, Inc. and Massachusetts Institute of Technology 2011) pp.118–143.
[59] M. Mills, 'Do signals have politics: Inscribing abilities in cochlear implants' in *The Oxford Handbook of Sound Studies* Ed by Trevor Pinch and Karin Bijsterveld (Oxford University Press 2011).
[60] H.G.Lang, *A Phone of Our Own: The Deaf Insurrection Against Ma Bell* (Gallaudet University Press, 2000) p.133.

been involved in this process. It demonstrates that the history of amplified telephony technology has been lost and highlights the extent to which these designs were forgotten after the Second World War halted their production and they were not incorporated into the NHS as medical devices.

It is the First World War that is central to this thesis however, as it created both supply and demand of telephones for the deaf. Indeed, I argue that the telephone service for the deaf was part of a larger post First World War recovery and rehabilitation program.

1.3 (iii): How did the Post Office's relationship with the Government as a nationalised business affect the development of the amplified telephone?

The development of hearing assistive technology is not considered in isolation but rather, is seen as very much a product of its time, and especially of the social and cultural milieu of the interwar years. As a result, the First World War pervades the developments described in this thesis. Rather than seeing the interwar years as a period of escalation towards the Second World War, after which real change to welfare began, I argue that major changes were precipitated in the aftermath of the First World War.

Many studies have considered the impact of shell shock on medicine and especially on psychiatry.[61] Far fewer however, consider how contemporary conceptions of hearing loss (which was often amalgamated with shell-shock) changed after the conflict. As a result of this amalgamation, which I explain in more detail in Chapter 2, the deafening effect of warfare became opaque not only to the medical profession, but to historians. Mental health in the First World War is comparable to issues surrounding hearing loss because these are both invisible illnesses and soldiers suffering from these conditions had to face similar institutional prejudice, especially because they were often labelled by the military as 'malingerers'. This prejudice is especially obvious in the case of pension provision. The development of First World War pensions has been discussed in the context of mental health by Gagen, while Kowalsky and Bettinson have both offered comprehensive studies of the war pension system's development.[62]

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[61] S.C.Linden & E.Jones, '"Shell shock" Revisited: An Examination of the Case Records of the National Hospital' in *Medical History* Vol. 58 Issue 4 (2014): pp519–545 (p. 520) See also: A. Scull, *Hysteria: The Disturbing History*, (Oxford University Press, 2009) p.153, F. Reid, *Broken Men: Shell Shock, Treatment and Recovery in Britain* 1914-30 (Continuum 2010), E Jones 'War Neuroses and Arthur Hurst: A Pioneering Medical Film about the Treatment of Psychiatric Battle Casualties' *in Journal of the History of Medicine and Allied Sciences*, Vol. 67, Issue 3. P.5, M.S. Micale, 'On the "Disappearance" of Hysteria: A Study in the Clinical Deconstruction of a Diagnosis' in *ISIS*, Vol 84, No. 3 (University of Chicago Press on behalf of the History of Science Society, 1993) pp.496-526.

[62]W.T. Gagen, *Disabling Masculinity: ex-servicemen, disability and gender identity, 1914-1930* (University of Essex, 2004) M.M.M. Kowalsky, *'Enabling the Great War: Ex-Servicemen, the Mixed Economy of Welfare and the Social Construction of Disability, 1899-1930'* (The University of Leeds, 2002, unpublished PhD thesis) H. Bettinson, *"Lost Souls in the House*

Shell shock studies are also relevant because of their attempts to foreground the experiences of the affected men above the medical profession's experience of treatment. One notable example is Peter Barham's 2004 work on shell shock, *Forgotten Lunatics of the Great War*, which attempts to reveal the voices of the shell-shock sufferers.[63]

More recently Fiona Reid has built on this to show the voices of the caregivers. She points out in her introduction that shell shock as a condition has been analysed from multiple perspectives, and that: 'Shell-shock treatment can be seen as fundamental to the development of psychiatry in Britain; it can also be used to illustrate masculinity in crisis, or more widespread attitudes to disability and the debased body.'[64] The perspective of the caregivers and especially the impact of shell-shock on the family was further considered by Jessica Meyer, who highlights the strategies that families and particularly wives had to utilise after the head of the family could no longer work as he once had.[65] These kinds of narratives are particularly difficult to access, especially because of the stigma and shame that surrounds the condition. Stigma provides a challenge to studying hearing loss as well, and this difficulty is apparent throughout the thesis. However, Chapter 2 does briefly consider the role of the family and charities in caring for deafened ex-service men, but it is clear that more work is needed in this area. Other studies that have considered the care of disabled bodies after the First World War include, in the case of limb loss, Ott, Serlin and Mihm's foundational collection on prosthetics.[66] This collection of essays is especially useful because it questions the definition and categorisation of a prosthetic in a way that I extend to my consideration of the amplified telephone. Facial reconstruction in the First World War has also been researched, partly because of its strong relationship to the development of plastic surgery.[67] Yet the care of sensory disabilities in the First World War and after has scarcely received attention. One notable exception is Julie Anderson's work but this is

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of Restoration'?: British Ex-Servicemen and War Disability Pensions, 1914-1930 (University of East Anglia, June 2002, PhD thesis).

[63] P. Barham, *Forgotten Lunatics of the Great War* (Yale University Press 2004).

[64] F. Reid, *Broken Men: Shell Shock, Treatment and Recovery in Britain* 1914-30 (Continuum 2010) p.9.

[65] J. Meyer, 'Not Septimus Now: wives of disabled veterans and cultural memory of the First World War in Britain' in *Women's History Review*, Vol. 13, No. 1, (2004) & 'Separating the Men from the Boys: Masculinity and maturity in understandings of shell shock in Britain' in *20th Century British History*, Volume 20, Number 1, (2009).

[66] Ott, K. Serlin D, Mihm S, (eds) *Artificial Parts, Practical Lives: Modern Histories of Prosthetics.* (New York University Press, 2002) How the First World War worked as a a catalyst for the prosthesis industry, see R. Cooter, 'The disabled body,' in Cooter and Pickstone (eds.), *Companion to medicine in the twentieth century*, (Routledge, 2002) pp.367-84; & S. Koven, 'Remembering and dismemberment: crippled children, wounded soldiers and the Great War in Great Britain,' in *American Historical Review,* 99 (1994), pp. 1167-1202.

[67] See J. Bourke, *Dismembering the Male: Men's Bodies, Britain and the Great War.* (Reaktion; 1996) A Bamji, 'Facial Surgery: The Patient's Experience'. In: H Cecil & P H Liddle, (eds). *Facing Armageddon: The First World War Experienced.* (Leo Cooper; 1996) & S. Biernoff, 'The Rhetoric of Disfigurement in First World War Britain' in *Social History of Medicine* (February 2011).

concentrated on blindness and looks in most detail at the Second World War.[68] Recently, there was been more research on the relationship between the rehabilitation programmes of the Second World War and disability.[69] In Chapter 2 of this thesis I foreground hearing loss sustained on the front line in order to show that this was a significant factor directing the development of Post Office trench telephones into an amplified telephone service. In this way I revise our understanding of the scale and significance of hearing loss in the First World War and show how the need to rehabilitate deafened veterans influenced government policy at the level of the Post Office.

1.3 (iv): How did the Government's complex attitude towards 'the deafened' develop during the interwar years?

Disability studies has developed as a discipline relatively recently, concurrent with social changes concerning the perception of disability and the work of activists campaigning for greater rights for the disabled alongside the civil rights movement, starting around the mid-1980s.[70] David Gerber traces the manifestation of this campaign in the US to the effect of the Vietnam War and argues that veterans were the first major group to instigate the fight for greater recognition of disability rights.[71] Research into disabled veterans has thus been a major component of disability history, reflecting the strongest aspect of disability activism and political interests, especially in the US.[72] The role and perhaps more importantly, the public recognition of veterans rights, is a crucial thread interwoven into this thesis as this belief underpinned the perceived responsibility of the Post Office to help those with hearing loss.

The development of disability studies in the UK also stemmed from legal developments, for example, those engendered through the activism that took place in the 1970s and 1980s and which led to the disability rights act of 1995.[73] This activism was also characterised by its use of the concept of the social model of disability, which presented a dichotomy between the medical and social model of disability. In disability studies, the medical model represents the imperialism of the medical community over the disabled and its attendant treatments and prosthetics. In opposition to this is the social model, a phrase which was first coined by Mike Oliver in 1983

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[68] J. Anderson, *War, Disability and Rehabilitation in Britain*, (Manchester University Press 2011).
[69] B. Linker, *War's Waste: Rehabilitation in World War 1 America* (University of Chicago Press 2010) See also H.R. Perry, *Recycling the Disabled: Army, Medicine and Modernity in WW1 Germany* (Manchester University Press 2014)
[70] 'Much of the new work springs from disability studies, an interdisciplinary field dating from the mid-1980s that invites scholars to think about disability not as an isolated, individual medical pathology but instead as a key defining social category on a par with race, class, and gender' C.J. Kudlick, 'Why We Need Another "Other", in *The American Historical Review*, vol. 108, no.3, (Oxford University Press, 2003) pp.763-793.
[71] See the introduction to D. Gerber (ed.) *Disabled Veterans in History* (The University of Michigan Press 2012).
[72] D. Gerber (ed.) *Disabled Veterans in History* (The University of Michigan Press 2012).
[73] *The Disability Studies Reader,* 4th edition, ed. by L.J. Davis (Routledge, 2013).

and has since become an influential ideology that rests on the argument that it is society that oppresses and disables people on top of any impairment.[74] Technology has thus been regarded by disability theorists in a generally negative light, as something used by the medical profession to normalise or cure disability in an oppressive manner. As a result, technology studies have not traditionally meshed well with disability studies and have not received much attention by disability scholars. However, Anderson has pointed out that understanding disability from a historical perspective necessitates consideration of the interwoven connections between social and medical developments and that dismissing the role of medicine is tantamount to ignoring the full experience of the disabled individual:

> Medical treatment and health issues, although often dismissed by those who study disability politics as the 'medical' model of disability, can be an important way to gain insight into disables people's lives […] If the medical model is seen as problematic by many disability activists and theorists, the strong political overtones of the social model have limited its use as a tool for understanding disability in an historical framework.[75]

I extend this point to argue that we should also consider the role of technology like amplified telephony, especially as part of larger movements towards rehabilitation programmes for ex-servicemen.

From disability studies, disability history has emerged in the UK more recently. As late as 1999, Elizabeth Bredberg pointed out that: 'Just as skills in historical research are rare among scholars in disability studies, interest in disability has been rare among historians.'[76] Within disability history, Deaf history is largely recognised as being the strongest sub-discipline.[77] For example, Harlan Lane's classic study *When the Mind Hears* inspired best-selling author Oliver Sacks to write *Seeing Voices* which was followed by the equally influential *Damned for their Difference* and *Inside Deaf Culture*.[78] The strength of this field if partially fuelled by the impetus given by

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[74] T. Shakespeare, 'The Social Model of Disability' in *The Disability Studies Reader,* 4th edition, ed. by L.J. Davis (Routledge, 2013) pp.214-221 (p.215).
[75] J. Anderson, *War, disability and rehabilitation in Britain*, (Manchester University Press 2011) p.5. For a discussion of the history of the medical and social model of disability see T. Shakespeare, 'The Social Model of Disability' in The Disability Studies Reader, 4th edition, ed. by L.J. Davis (Routledge, 2013) pp.214-221. For a discussion of the problems of the social model for historians see J. Anderson, *War, disability and rehabilitation in Britain*, (Manchester University Press 2011) p.5-6.
[76] E. Bredberg, 'Writing Disability History: Problems, perspectives and sources,' *Disability & Society*, Vol. 14 Issue 2, (Routledge 1999) pp.189-201 (p.192).
[77] There is a particularly sensitive exploration of why this might be in C.J. Kudlick, 'Why We Need Another "Other", in *The American Historical Review*, vol. 108, no.3, (Oxford University Press, 2003) pp.763-793.
[78] H. Lane, *When the Mind Hears: A History of the Deaf* (Random House 1984), O. Sacks, *Seeing Voices: A Journey into the World of the Deaf* (University of California Press 1989), P.Eriksson, *The History of Deaf People*, (SIH Laromedel 1991), D.C. Baynton, '"Savages and Deaf-Mutes": Evolutionary Theory and the Campaign Against Sign Language in the Nineteenth Century' in *Deaf History Unveiled*, ed. by J.V. van Cleve (Gallaudet University Press 1993) J.Branson & D.

Gallaudet University and its publishing house, which provides a strong platform for the promotion of Deaf history. This may be why these are all American sources, and in Britain there is slightly less such research on Deaf history, although some notable examples include Jennifer Esmail and Iain Hutchinson's recent research into Victorian deafness and nineteenth-century Deaf education.[79]

1.4: Notes on terminology and institutions

I have used the word 'disabled' in this thesis concerned with hearing loss, with full awareness that many deaf people do not consider themselves to have a disability. I have avoided referring to people 'with disabilities' in order to emphasise, in line with the social model of disability, the fact people are disabled as a result of the working of society. Disablement is often contingent on temporality, spaces, cultures, and contexts. In this thesis, I demonstrate the way in which people have also been disabled by technology, as hearing loss became defined as the ability to hear the telephone. This meant that disability changed with improvements in technology and was nothing to do with individual bodies. Hearing the telephone was further used to create disability through the use of the audiometer, with which a standard of normal hearing was created, and disability defined as deviance from this norm. Therefore, while I use the word disabled, I am fully aware that it does not reflect the experiences of most people with hearing loss, or the Deaf. In this context and in this thesis, the word Deaf is capitalised in order to indicate the way that the term is being used to represent the members and views of a group identified by culture and community rather than purely through their medical status. The Post Office often referred to 'Deaf Subscribers' and a 'Deaf telephone service', and I have reproduced primary sources verbatim. However, it is important to note that in those instances, the capitalisation of Deaf just indicated the title of the subscriber and the telephone and is not indicative of the cultural identity now attached to the Deaf.

It is this strong cultural identity that has generated such strong scholarship in this field. However, such history is strongly focused on the cultural concerns of the Deaf community, especially issues around sign language and its historical suppression by medical and educational authorities. Deaf history is also predominant in the US, partly due to the existence of Gallaudet

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Miller*, Damned for their difference: the cultural construction of Deaf people as disabled* (Gallaudet University Press, 2002) and *C.Padden & T. Humphries, Inside Deaf Culture* (Harvard University Press 2005).

[79] J. Esmail, *Reading Victorian Deafness: signs and sounds in Victorian literature and culture* (Ohio University Press, Swallow Press, 2013). I. Hutchinson, 'Oralism: a sign of the times? The contest for deaf communication in education provision in late nineteenth-century Scotland' in *European Review of History*, Vol 14, no.4 pp.481-501.

University, which provides a hub for studying Deaf history and also extensively publishes on the subject. While these studies are important, they tend to emphasise education and the linguistic imperialism of oralism over sign language and do not speak to the struggle of adults losing their hearing later in life. Oralism is an educational technique that gained popularity in the late nineteenth century and was enforced by the 1880 International Congress on the Education of the Deaf held in Milan. Oralism used lip-reading, forced speech, and hearing aids to recover residual hearing, normalising the deaf and allowing them to 'pass' as hearing. This resulted in the banning of sign language and the prohibition of deaf teachers, which resulted in a 'dark age' of deaf education between 1945 and 1970 'when pure oralism was at its peak.'[80] Deaf historians have shown that this resulted in the linguistic repression of Deaf culture by hearing persons, although there is less literature in the role of technologies like hearing aids and the audiometer affected the embrace of oralism. These highly politicised concerns have affected the histories that have been told in relation to hearing loss. Institutions that are perceived to have embraced oralism at the expense of sign language and the Deaf community are usually ignored by Deaf historians. Charitable institutions like the National Institute for the Deaf have received little historical attention, yet their institutional story is intertwined with the Post Office at various points in this thesis.

While it is difficult to recover the history of the NID, writing a history of the Post Office poses particular challenges because of its institutional modelling. Structural issues within the Post Office business model complicate and conceal the agency directing amplified telephone development. Until the Bridgeman Report was instigated by the wider government in 1932, the Post Office telecommunications department had run on the same lines as its predecessor, the National Telephone Company. The growth of its telephone network put pressure on the larger Post Office operation. Moreover, any problems related to engineering had to be referred to the Engineer-in-Chief in London and this meant that any changes to equipment became extremely complicated: 'Local telephone operations were run from day to day by twenty-eight "District Managers", […] who were not entirely comfortable being subordinated to colleagues with no technical training whatever.'[81] In practice, this meant that all complaints about the efficacy of the amplified telephones and planned changes to their design were filtered through the London Office at St Martin's le Grand via the Engineer-in-Chief's research station at Dollis Hill. This means that this thesis has an inevitable London centric focus, further compounded by the fact

[80] I. Hutchinson, 'Oralism: a sign of the times? The contest for deaf communication in education provision in late nineteenth-century Scotland' p.483.
[81] D. Campbell-Smith, *Masters of the Post: The Authorised History of the Royal Mail*, (Penguin Books, 2011) p.270-271.

that as the telephone was initially used for business, this is where a great deal of telephone activity took place. Furthermore, it means that it is sometimes difficult to recover agency in the direction of telephone improvements, as individual actions are immersed in extensive bureaucracy. The telecommunications department of the Post Office exemplifies an office hidden behind its role as a cog driving the larger 'Government Machine', with its role in providing a telephone for people with hearing loss 'marked by opaqueness and discretion'.[82]

The National Bureau was founded by Leo Bonn, a merchant banker with hearing loss, in 1911. Since then it has developed into different incarnations with many different acronyms needed to describe its activities. After the First World War curtailed the work of the Bureau, it was reformed as the National Institute of the Deaf in 1924 and it continued with this name until it received royal patronage in 1961 and became the Royal National Institute for the Deaf. In 2011, it was rebranded as Action on Hearing Loss. This was partly due to the fact that the charity's historical embrace of hearing aids and oralist techniques has led to their condemnation from some Deaf cultural theorists.[83] This has meant there is less focus on the positive aspects of its work by Deaf historians, especially in comparison with charities like that the British Deaf Association, which was more sympathetic to sign language. In this thesis I focus on the NID and far less so on the BDA as they do not represent the appropriate demographic for amplified telephones.

As explained above, there is a subtle but crucial difference between Deaf history and the history of those with hearing loss, especially adults who have lost their hearing later in life. For these users, the amplified telephone could be considered as an ideal prosthetic because it promised to solve issues of audibility and stigmatisation without being apparent to the caller on the other side of the line. Although the amplifying telephone apparatus was bulky and visible to its user, it was invisible to the caller, and this invisibility also allows us to consider it as a prosthetic. This was particularly important because the kind of people the Post Office was targeting would not have identified as Deaf and may have passed as hearing in all other aspects of their lives. This focus on hard of hearing individuals, who desired access to telephony in the interwar years, means that it addresses those who suffered from hearing loss, rather than those who identify with the Deaf community and culture. Less scholarly attention has been paid to those who became hard-of-hearing later in life and did not affiliate themselves with the Deaf community. This is in part because there is not an identified community of people with hearing

[82] J. Agar, *The Government Machine: A Revolutionary History of the Computer*, (The MIT Press 2003) p.395.
[83] Conversation with Action on Hearing Loss committee members, London, 2014.

loss, and in part because the stigma surrounding deafness has led those with hearing loss to identify with the hearing and minimise the significance of their hearing loss. In modern Deaf culture, hearing loss is not regarded as disabling. Rather, the Deaf regard themselves as being defined not by their medical status but through their social and political status. In the context of the medical model of disability, technology is often described as apparatus that can be used to fix the problems associated with non-standard bodies, but late twentieth and twenty-first century developments in telecommunication technology revolutionised the ways in which the Deaf communicated; the rise of text messaging, and social media in particular, empowered Deaf technology users and allowed them to use a form of technology that had previously relied on audibility. The cultural distinction between hearing loss and Deafness has recently been further challenged by the ambiguities around cochlear implants and the contested identity of their users. In this thesis I show how amplified telephone technology posed a similar challenge to deaf and Deaf identity.

For the reasons outlined above, there is a sizeable gap in the literature concerning adults with hearing loss. One of the reasons for the lack of literature on adults with hearing loss is related to the stigma surrounding deafness, which has led many adults with hearing loss to seek to 'pass' as hearing. The concept of 'passing' was one first employed by those engaged with the new social history, especially with civil rights and black history to explain how and why one might 'pass' as a member of another race. More recently, however, the term has also been used in disability studies to describe disabled people 'passing' as non-disabled. I use the concept of passing here as defined by Rembis: 'in the disabled context, passing traditionally has been seen as the ability to conceal one's identity or to mask or cover impairment.'[84] Technology used in hearing assistive devices like amplified telephones and hearing aids more generally can therefore be regarded as a means to mask perceived impairment. In this thesis, I argue that the amplified telephone should be conceptualised as a prosthetic because it enabled those using it to 'pass' as hearing over the phone. As an assistive technology to those with hearing loss, I regard the amplified telephone as a prosthetic device designed to cope with the loss of physical abilities. This brings new analysis to bear on an understudied technology and highlights the tensions between product categorisation and personal identity in the complex user/producer relationship. It also provides new perspective on invisibility in relation to hearing loss and stigma because the Post Office promoted amplified telephony by emphasising the social embarrassment caused by having to use one's family members to conduct phone conversations. Gooday and Sayer have

[84] M.A. Rembis, 'Athlete First: A Note on Passing, Disability and Sport' in J.A Brune & D.J. Wilson, *Disability and Passing*, (Temple University Press, 2013).

similarly demonstrated how stigmatisation of hearing loss was used in the marketing and patenting of Victorian aids for those with hearing loss.[85]

Indeed, the first full length book history of hearing loss in the UK is due to be published this year by Gooday and Sayer.[86] This study provides the first book length account of the history of hearing loss in the UK and they note that the telephone reinforced the oralist education imperative:

> And for adults this focus on adapting to aural communication, without access to the visual methods of sign-language was further reinforced in the same decade by the rise of the first entirely non-visual hearing-only means of communication: the telephone. Widespread usage of this device by the early 20th century further normalized 'hearing' as the capacity to engage in a telephone conversation. This expected capacity would challenge many in decades to come, especially as expectations on that front converged with economic and eugenic imperatives that stigmatized such hearing loss in the early 20th century.[87]

This thesis will build on their account by examining hearing loss in the specific context in the interwar years and address the gap in the literature concerning the history of adults with hearing loss.

Flexibility of interpretation is a key issue in Chapter 4 of this thesis, on 'Advertising Deafness' which is concerned with the Post Office's endorsement of the 'quack' hearing aids that proliferated in the late 1930s. There has been a great deal of literature devoted to the concept of the medical marketplace, and in this tradition the eighteenth century has been regarded as particularly infected by quackery, a disease that gradually was eradicated due to increased medical professionalism. However, this analysis is too polarising. As Virdi-Dhesi has pointed out in her study of nineteenth-century Aural Surgeons, there was little to separate the quack from the medical pioneer in the context of hearing loss.[88] Moreover, deafness and hearing aids are an exception to this theory, as the rise of electronic hearing aids in the early twentieth century led to a proliferation of advertising and accusations of quackery. The term quack has been rightly criticised for being too complete and unconditional. Crucially, Roy Porter has emphasised that:

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[85] Gooday and Sayer, 'Purchase, use, and adaptation: Interpreting 'patented' aids to the deaf in Victorian Britain, in *Modern Prostheses in Anglo-American Commodity Cultures* (Manchester University Press, 2016).
[86] G. Gooday and K. Sayer, *Hard of Hearing: Managing the Experience of Adult Auditory Loss in Britain, 1830-1950*, (Palgrave, forthcoming 2016).
[87] Ibid. Chapter 6.
[88] J. Virdi-Dhesi, *From the Hands of Quacks: Aural Surgery, Deafness, and the Making of a Speciality in 19th Century London* (PhD Thesis, University of Toronto 2014) p.22.

> The question of quacks' sincerity of good or bad intentions is something of a red herring. The historian cannot peer into the souls of 'quacks' and find evidence of fraud, and it is certainly not clear that being called a quack was synonymous with incompetence. Indeed, the cotemporary usage of the term 'quack' was so wide as to cover a multitude of sins and malpractices associated with all ranks and sorts of medicine and beyond.[89]

Although Porter was writing explicitly about the nineteenth century, I believe this argument can well be extended to the case of quack hearing aid vendors in the early twentieth century. Especially because, as Ross, Lyon, and Cuthbert have also argued, the medical profession knew so little about deafness, it was particularly hard to strictly demarcate boundaries between quacks and professionals when it came to hearing loss.[90] Thus, when I refer to 'quacks' it is with consideration of the controversy of this loaded term, and awareness of the blurred boundaries between quacks and the medical profession. Indeed, the integrity of these boundaries was especially challenged by hearing aid vendors because of the contested state of hearing aid devices. In order to defend itself against the accusation that it was contravening the 1909 Patent Medicines Act, the Post Office argued that hearing aids were technological apparatus and not medicines, and therefore did not come under the jurisdiction of that act. Moreover, people with hearing loss engaging with the Post Office would certainly not have regarded themselves as patients and the Post Office tended to refer to them as 'subscribers' or 'deaf subscribers'. These labels are important because in the late 1930s the Post Office began to increasingly refer to their hard-of-hearing 'patients' and I show in Chapter 4 that this was a result of their collaboration with the medical profession. This ultimately led to an increasingly technocratic approach to hearing loss within the medical profession and an increasingly medicalised approach to hearing loss with the Post Office.

1.5 Sources and structure

The sources for this thesis have come primarily from BT Archives, which holds vast records from the Post Office and the National Telephone Company. Especially useful to me has been the detailed accounts of customer complaints, which form the basis of Chapter 3's case studies. These have been supplemented by evidence of public discourse around telephony found in local newspapers, letters, and advertisements, as well as the medical discourse traced in the journals

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[89] R. Porter, '"Quackery" and the 18th-Century Medical Market' in *Studies in the History of Alternative Medicine*, ed. by R. Cooter (Palgrave Macmillan 1988) p.2.

[90] L. Ross, P. Lyon & C. Cathcart, 'Pills, Potions and Devices: Treatments for Hearing Loss Advertised in Mid-nineteenth Century British Newspapers' in *Social History of Medicine* Vol. 27, No. 3 pp. 530–556

like the *BMJ* and *The Lancet*. These sources allow me to approach the topic of amplified telephony from the perspective of the users of technology, allowing me to form a more complex story apart from the steps of technical change. Although recent AHRC CDA studentships have focused on using this immense recourse to explore the history of wireless and telephony, this is the first thesis to use the archival sources on telecommunications and hearing loss. The second most important repository providing evidence to this thesis is the Action on Hearing Loss Library at UCL, which holds the records of the NID. The British Postal Museum and Archive has also proved useful, especially because of its collection of stamp books with hearing aid advertisements. This collection is more often used by philatelists, but has proven to be an unexpectedly rich resource for my study of stamp books. It is significant, too, because when Post Office Telecommunications became BT, its archives were divided between BT Archives and the BPMA with BT Archives consolidating most of the material related to the engineering side of the business. However, the BPMA hold most of the archives concerning the treasury involvement in the Post Office and the archives of the Postmaster general.

'The "Deaf Subscriber" and the Shaping of the British Post Office's Amplified Telephones 1911—1939' is divided into seven chapters, with each chapter aiming to tell the story of the amplified telephone by uncovering the complexity of its construction and the different influences on its development. The chapters of this thesis are organised chronologically but also thematically. For example, Chapter 2 focuses on the First World War and its immediate aftermath but the effects of the war are also relevant to subsequent chapters based during the interwar years, in which concerns over public health and the effect of the war on national health influenced Post Office policy. Similarly, although Chapter 3, 'Inventing the Deaf Subscriber: User Innovations in the Interwar Years', is comprised of detailed examples of users influencing amplified telephony, the tensions and sometimes conflict between producers and consumers is apparent throughout the thesis. However, this thesis is primarily a case study of a particular technology, the amplified telephone. In considering its importance to technology studies, disability history, and the history of the First World War, I take a corresponding interdisciplinary, pluralistic approach. I demonstrate that the development of amplified telephony by the Post Office was particularly marked by user innovation and the study of this interplay between producer and user can reveal insights about innovation, use, and disability.

These themes are most strongly reflected in Chapter 3, in which I consider four exemplar case studies of user activism. The most important of these is the 1936 case of Raymond J Harris, a businessman with hearing loss, who wrote to the Post Office to demand a telephone suitable

for his level of hearing. Although the Post Office already provided amplified telephony, its model did not suit Harris and so he built his own specially amplified equipment and attached it to his telephone. In contravening its monopoly over the telephone service, Harris forced the Post Office to respond to his demands. Through focusing on this one individual case we can see how users could be primary agents of technological change to amplified telephony. Harris not only appropriated the technology as he saw fit (thus challenging the Post Office's telephone monopoly) his use of the telephone then fed back into the design criteria of the Post Office. Yet this is not a simple story of institutional exploitation. Harris maintained a certain amount of power over production through manipulating the Post Office's dual commitments to national standardisation and national duty. Harris's invention was problematic because though he was using personal equipment on their lines and encroaching on the Post Office monopoly; the Post Office was also answerable to the Treasury as an office of state, and thereby compelled to provide a standard service for all subscribers. His apparatus provided greater amplification allowing him to hear the telephone, but the Post Office should have been able to provide equipment of an equal standard. Harris's personal innovation based on his individual hearing loss led to widespread changes in national production.

The amplified telephone became an increasingly important communication technology for those with hearing loss, but the Post Office's complete control over its production meant that individuals who desired access to this technology were required to challenge its authority. Through consideration of the direct impact that hard of hearing telephone users had on the development of the British Post Office's amplified telephone sets during the interwar years, the influence of users on the telephone system becomes more apparent than has hitherto been recognised.

However, this thesis does trace an increased involvement of the medical community in the care of hearing loss. The culmination of this is analysed in Chapter 5 of this thesis, 'From Subscribers to Standardisation: The instigation of a technocratic approach to hearing assistance', in which I describe the collaborations between the Post Office, the National Institute for the Deaf and the Medical Research Council. These institutional bodies were brought together partly because of the Post Office engineer's desire for standardised data to feed into future telephone designs, but primarily because of the efforts of Dr Phyllis Kerridge. A forgotten figure in the history of audiometry, this thesis underscores her importance in developing hearing aid clinics and providing a model of free healthcare in the pre-NHS era. Indeed, the question of which bodies had responsibility or authority over deafness is of key concern as the Post Office's

technical solutions to hearing loss developed from their experience in facilitating hearing over the telephone line more generally rather than from medical expertise.

I have chosen to focus on the dates 1911—1939 because in 1911 the Post Office nationalisation of telephony was confirmed and at the same time the National Bureau for the Promotion of the General Welfare of the Deaf was founded to ensure that deaf people were not included in the 1913 Mental Deficiency Act or barred from employment because of the 1911 National Insurance Act. Telephony was inaccessible due to high cost and low audibility and hearing was loss was considered to be a niche issue related to hereditary, that could be solved by eugenic practices. This demonstrates that the Government and wider public accorded low status and lack of concern to hearing loss as a social problem or to the viability of telephony. Yet 28 years later, in 1939, the Post Office had instated a large scale collaborative investigation with hearing aid clinics and the National Institute for the Deaf to improve its telephone facilities specially designed for 'the deafened', a new categorisation that specifically denoted adults who had lost their hearing. This thesis tracks the changing attitudes to hearing loss and telephony during the interwar years by explaining how and why the Post Office developed amplified telephone technology. In this thesis I answer a vital question: why did a nationalised Post Office feel the need to develop an expensive and unprofitable technology for a limited market, and how did this relate to wider changes in attitudes towards hearing loss in the interwar years?

In order to answer this, it is first necessary to explore how widespread war-related hearing loss affected changing attitudes to hearing within the medical profession and society. I do this in Chapter 2, 'The First World War: Pensions, Trenches, and Telephones', by exploring the role of warfare on simultaneously developing the technology and creating the need for amplified telephony. In Chapter 3, 'Inventing the Deaf Subscriber: User Innovations in the Interwar Years', I go on to show that the amplified telephone was co-constructed by exploring the respective roles of the Post Office and individual users with hearing loss in developing the telephone for 'Deaf Subscribers'. However, the Post Office's attitude towards the deafened was complex, and changed dramatically during the interwar years to shape amplified telephony. Recovering its complex and sometimes contradictory attitude to hearing loss is the focus of Chapter 4, 'Advertising Hearing Loss: Post Office promotion of public amplified telephony and private hearing aids in the late 1930s', in which I focus on advertisements targeting hearing loss to reveal the stigmatisation of deafness. The influence of the medical community is shown in Chapter 5, 'From Subscribers to Standardisation: The instigation of a technocratic approach to hearing assistance', and is related to the increased prioritisation attached to standardisation and

measurement in the late 1930s. Questioning the viability of providing a technological fix for a social problem is a key theme interwoven throughout these chapter and this culminates in the micro-study of the acoustic coupler in my epilogue chapter, where I consider the viability of 'Putting the User in the Picture'.

1.6: Conclusions

By putting the user in the picture in this historical research, I reveal not only the details of a hitherto neglected technology, but, crucially, highlight the role of adults with hearing loss in directing this development. By demonstrating that the amplified telephone was co-constructed in a complex process of interaction between users and producers by demonstrating, I add to the literature on the wider cultural and political climate of the interwar years. This is especially revealing of the interactions between private and public healthcare and shows the development of hearing loss care in the pre-NHS state.

This study will question the strict dichotomy between the medical model and the social model and question the utility of such categorisations in providing a historical perspective on technology and disabled users. This argument will change our understanding of communicative technology. This thesis will show that designing technology that affects disabled lives can only be successful when prospective users are involved from the start of the process and have their needs integrated into the resulting product. Self-advocacy and the recognition of the need for user input featured in the Post Office's development of the amplified telephone during the interwar years in Britain and this story does not end in 1939. The rise and significance of telephony as a mode of communications points to a bigger history related to the increasingly central role that communicative technology now plays in our lives.

Before we grapple with the shifting environment of innovation in amplified telephony in the aftermath of the First World War it is first important to get a sense of the wartime developments which acted as precursors. Thus I begin this thesis by showing the significance of the First World War by contrasting the political and cultural context of the interwar years to the end of the long nineteenth century.

Chapter 2: The First World War: Pensions, Trenches and Telephones

> Telephony and wireless have revolutionised life. Both are now indispensable to business and social happiness. In a moment, they overcome distance and unite friends separated by oceans and continents. It is, therefore, a greater misfortune to be deaf today than ever before. What has been described as the 'mental blindness' of deafness has become far more serious in its effects in social and working life since the losses of the closed ear grow greater as the discovery of acoustic sciences proceed. Can any of these discoveries be made serviceable in enabling the deafened to regain, even if only in measure, their contact with speech?[91]

The above paragraph was included in the minutes from the 1933 report of the Executive Committee to the Council of the National Institute for the Deaf. It encapsulates several key themes addressed throughout this chapter: the increasing importance of telephony; its corresponding isolating effect on those with hearing loss; the cross-fertilisation between telephony and hearing assistive technology; and the importance of technologies developed during the First World War, which would later be used in hearing assistive devices for the thousands of men with noise-induced hearing loss. These themes are crucial in understanding the ideology behind the development of the Post Office's amplified telephones. Rehabilitation of these men was taken over by the newly instated Ministry of Pensions (MOP), who worked closely with the charities who had previously been responsible for their care. However, 'shell shock' and changes in psychiatric practices characterised the First World War medical responses to hearing loss, and coloured the prevailing narratives concerning the history First World War medicine. Consequently, all hearing loss (whether noise induced or psychosomatic) was subsumed within diagnoses of shell shock or 'hysterical deafness'. Therefore, one of the purposes of this chapter is to separate the two conditions from each other and explore deafness in more detail. The substantial effect of the war on changing understandings of deafness has been largely forgotten or ignored. But the large-scale hearing loss suffered by soldiers was nonetheless closely linked to renewed medical investigations into deafness and a shift in attitudes towards the 'deafened'.

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[91] 'The Deafened by Disease' in the *Report of the Executive Committee to the Council*, Year ended March 31st, 1933. Minute book of the National Institute for the Deaf, Accessed via the RNID Library.

This chapter clarifies the medical conceptions of deafness that prevailed during the First World War to show how hearing loss sustained on the front line directed the development of Post Office trench telephones into an amplified telephone service. This telephone service for the deaf resulted from closer collaboration between the Post Office and the Government as part of the private/public partnerships that characterised the systems of care developed for returning injured soldiers.[92] While this intervention was couched in terms of helping the disabled, it also provided the Post Office with an opportunity to recoup money lost by recycling the amplification equipment developed in the war, and allowed them to develop the researches initiated during the war. Finally, the Government's increased intervention into the health and care of the nation through the pension system influenced the subsequent development of technological solutions for disability, such as amplified telephony. However, this intervention was scaled according to disability and the discrepancy between the amount awarded to those blinded compared to those deafened affected other types of provisions that were available to those who had lost their hearing.

Research into disabled veterans has been a major component of disability history, reflecting the strongest aspect of disability activism and political interests, especially in the US.[93] More recently, the years leading up to the First World War centenary have been marked by an increased interest in the legacy of the conflict and this has been reflected in studies of the care given to injured ex-servicemen.[94] However, Julie Anderson's work, *War, Disability and Rehabilitation in Britain*, is one of very few works to evaluate the care of sensory disabilities and she examines rehabilitation from the specific perspective of the blinded soldier during the First and Second World Wars.[95] In the US context, Beth Linker has moved from the thesis that the First World War worked as a catalyst to change medical practices in order to argue that rehabilitation medicine came out of the First World War *specifically* as way to reduce spending on pensions. Rehabilitation was funded out of a political impetus that regarded it as providing a fix

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[92] H. Bettinson, "*'Lost Souls in the House of Restoration'?: British Ex-Servicemen and War Disability Pensions, 1914-1930* (University of East Anglia, 2002) PhD thesis.
[93] D. Gerber (ed.) *Disabled Veterans in History* (The University of Michigan Press 2012).
[94] Deborah Cohen, for example, has compared provisions for disabled veterans in Britain to the care given in Germany by highlighting the crucial role that charities working alongside the state played to provide care in Britain and prevent the political instability that took place in Germany. D. Cohen, *The War Come Home: Disabled Veterans in Britain and Germany 1914-1939* (University of California, 2001) See also: H. Bettinson, *"Lost Souls in the House of Restoration'?: British Ex-Servicemen and War Disability Pensions, 1914-1930* (The University of East Anglia, 2002) PhD thesis, M.M.M. Kowalsky, *'Enabling the Great War: Ex-Servicemen, the Mixed Economy of Welfare and the Social Construction of Disability, 1899-1930'* (The University of Leeds, 2002) PhD thesis, W.T. Gagen, *Disabling Masculinity: ex-servicemen, disability and gender identity, 1914-1930* (University of Essex, 2004) unpublished PhD thesis, and J. Meyer, 'Not Septimus Now: wives of disabled veterans and cultural memory of the First World War in Britain' in *Women's History Review*, vol.13, No.1 (Routledge 2004).
[95] J. Anderson, *War, Disability and Rehabilitation in Britain*, (Manchester University Press 2011)

that could replace reliance on pensions: 'Rehabilitation medicine was thus seen as a way to radically overhaul the country's veteran-welfare system. Instead of a system based on collective dependency, rehabilitation emphasized individual recovery with the ultimate goal of remaking disabled soldiers into productive, employable wage earners.'[96] As we will see in this chapter, hearing aids were used similarly in a context of rehabilitation. Soldiers received them in addition to, or in lieu of, a pension.

Many of these texts highlight the way that the First World War catalysed the development of systematic state provision. But the state's role in ordinary people's lives had, in fact, been increasing since the end of the nineteenth century, partly because of widespread eugenic concerns. The 1911 National Insurance Act is an example of such pre-war extension of the state into welfare. It facilitated insurance for disablement, sickness, and maternity while simultaneously providing unemployment benefits.[97] The Act was designed to ease reliance on charities and family care and replace the traditional Poor Law system.[98] However, the Act actually resulted in a decreased number of deaf people being employed, leading to a greater need for charities for the deaf. These charities amalgamated under the umbrella organisation, The National Bureau for the Promotion of the General Welfare of the Deaf (the Bureau), in 1911.[99] However, the First World War is crucial to understanding attitudes towards disability and deafness.

Anderson's research highlights the fact that disabled servicemen could not be easily hidden from society and their visibility forced changes in public attitudes towards care: the conflict worked to facilitate greater public awareness of the disabled.[100] Visibility was also critical to what she describes as 'the hierarchy of disablement'. She relates this concept to how disability pensions were scaled and calculated in accordance with the perceived usefulness of the disabled body.[101] This concept is very useful in understanding the relatively meagre amount awarded to the deafened as being part of an ideology that saw the deafened body as functional rather than considering how deafness would affect individuals' ability to function in work *and* society. There is not, however, a book length study concerning the various ways that soldiers deafened by

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[96] B. Linker, 'The Great War and Modern Health Care' in *The New England Journal of Medicine*, vol. 374: issue 20 (Massachusetts Medical Society 2016) p.1908 and B. Linker, *War's Waste: Rehabilitation in World War 1 America* (University of Chicago Press 2010)

[97] J. Agar, *The Government Machine: A Revolutionary History of the Computer*, (The MIT Press 2003) p.156
[98] Ibid. p.156.
[99] G. Gooday and K. Sayer, *Hard of Hearing: Managing the Experience of Adult Auditory Loss in Britain, 1830-1950*, (Palgrave, forthcoming 2016).
[100] J. Anderson, *War, Disability and Rehabilitation in Britain*, (Manchester University Press 2011) pp.42-43.
[101] Ibid. p.42.

warfare were treated after the conflict ended. While this thesis does not aim to provide such a comprehensive account, it will point the way to necessary further research by considering how the British Government and medical establishment collaborated with the Post Office to create new technologies for the war deafened.

2.1: Wartime Hearing Loss and the National Perspective

> There were perhaps some 25,000 deaf persons in the Kingdom, whose welfare was largely dependent on the popular conception of them […] Unfortunately there was a very general opinion held that the deaf were feeble minded, indeed just a peculiar type of imbecile.[102]

These epigraphs from the Bureau reveal that general attitudes towards those with hearing loss before the First World War were formed through segregating the deaf as a separate, problem social group. Care of adults with hearing loss was left entirely with publicly funded charities, so adults suffering from hearing loss in the late nineteenth century were offered little assistance. Treatments for deafness were preventative, and heavily informed by eugenic principles.[103] The Bureau was keen to educate the public against this widespread prejudice and engaged renowned aurist Dr James Kerr Love to give public lectures on the causes and prevention of deafness.[104] Prior to the First World War, the state had little involvement in the care of those with hearing loss. Deaf children were cared for in schools for the Deaf, which had been established throughout Britain during the nineteenth century. But adults who became deaf later in life had to rely on charitable provision.[105] To meet this need, the Bureau was established in 1911 by deaf merchant banker Leo Bonn. It was intended to be an umbrella organisation, which would centralise the different charities working independently to help the deafened. It was established partly to ensure that the deaf were not classified as mentally defective under the Mental Health Act of 1913, and partly in reaction to the drop in employment of deaf workers that had followed the National Insurance Act of 1911.[106]

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[102] The National Bureau for Promoting the General Welfare of the Deaf, Report of the Second Annual Meeting. 26th Nov. 1913, Mr F G Barnes speaking in relation to the Mental Deficiency Act. Accessed via the RNID archives.
[103] See G. Gooday & K. Sayer, 'Chapter 6: Economic and eugenic challenges' in *Hard of Hearing: Managing the Experience of Adult Auditory Loss in Britain, 1830-1950*, (Palgrave, forthcoming 2016), J. Vird-Dhesi, 'Curtis' Cephaloscope: Deafness and the Making of Surgical Authority in London, 1816-1845' in *Bulletin for the History of Medicine* vol.87 No.3, (John Hopkins University Press 2013) pp.347-377.
[104] J. Kerr Love, *The Causes and Prevention of Deafness: four lectures delivered under the auspices of the National Bureau for Promoting the General Welfare of the Deaf* (from lectures delivered 1912-13, published as a bureau pamphlet in 1913).
[105] Jan Branson, Don Miller, *Damned for their difference: the cultural construction of deaf people as "disabled": a sociological history (*Gallaudet University Press, 2003).
[106] See Chapter 6, 'Economic and eugenic challenges' in G. Gooday and K. Sayer, *Hard of Hearing: Managing the Experience of Adult Auditory Loss in Britain, 1830-1950*, (Palgrave, forthcoming 2016).

Individual philanthropists such as Sir Frederick Milner (1848—1931) and Arthur James Wilson (1858—1945) had also taken an interest in the deafened, and particularly in deafened veterans.[107] Milner had been the Conservative MP for York and Bassetlaw until his increasing deafness forced him to retire.[108] He afterwards devoted himself to improving the welfare of disabled sailors and soldiers, founding hostels to this end in Hampstead.[109] These activities were sponsored by Arthur James Wilson, who provided the necessary funding for the Sir Frederick Milner Hostels. Wilson was a wealthy businessman who had made his fortune in London through the Pneumatic Tyre Company, but enjoyed greater fame due to his cycling prowess, for being the first deaf motorist in Britain, and for his invention of the wing mirror.[110] Wilson and Milner's work was shut down however, when the MOP informed Milner that they would personally deal with all cases.[111] However, Wilson and Milner continued to work with the Government and remained heavily involved in the care of the deafened through both the National Benevolent Society and the Bureau. The latter was founded in 1911 and its Executive Committee was not initially impressed with the National Benevolent Society. In 1911 the Executive Committee wrote in regards to the National Benevolent Society that:

> Several enquiries had been received at the Bureau from all over the country regarding the above society. Enquiries had been made by the Bureau into the work of this society, but nothing of a very definite nature had been obtained. This society issues broad cast series of appeals for subscriptions, claiming that they are the 'only benevolent society for the assistance of the deaf' and their objects are 'to provide for gratuities for ex-service men who have no pensions, and growth for those needing special assistance, to provide immediate help for any waiting for adjustment of their pensions, and to provide homes for the totally disabled and for the children of deafened men.[112]

The Bureau was understandably offended by the suggestion that the National Benevolent Society was the only charity working for the interests of the deaf given that the Bureau predated them by three years. The Bureau also noted concerns that the work of this society would interfere with the Ministry of Pension's Aural Boards and wrote to Major Dundas-Grant, President of the Special Aural Boards, to make this point. [113] He was also the Honorary

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[107] Minutes from the Deafened Ex-Service Men's Fund. Accessed at the RNID Library.
[108] 'Sir Frederick Milner' in *York History* Accessed online 19.11.15 < http://www.yorkhistory.org.uk/node/127>
[109] Sir Frederick Milner Obituary in *The Spectator* archives 12th June 1931, p.3 Accessed online 21.11.15 <http://archive.spectator.co.uk/article/13th-june-1931/3/sir-frederick-milner-we-record-with-regret-the-dea>
[110] D.W. Stiles, 'First Deaf Motorist and Inventor of the Wing Mirror' Accessed online 21.11.15 < https://blogs.ucl.ac.uk/library-rnid/2012/04/27/first-deaf-motorist-arthur-james-wilson/> See also 'Britain's Deaf Heritage' Accessed online 21.11.15 < http://www.disability.co.uk/sites/default/files/resources/b1.pdf>
[111] Minutes from the Deafened Ex-Service Men's Fund. Accessed at the RNID Library.
[112] The National Bureau for Promoting the General Welfare of the Deaf and National Institute for the Deaf Minute Book 1911-1926 Executive Committee Meeting 7th March 1919. Accessed via the RNID Library.
[113] Ibid.

Consultant Aurist to the Ministry and became a KBE in 1920 for his work in this respect.[114] Although Dundas seemed to take their concerns seriously, the message from the MOP was that any charity willing to work with the deafened soldiers would meet with their approval and so the Bureau concluded that they should leave the matter in abeyance.[115] This indicates the extent to which the MOP needed to rely on the work of charities like the Bureau. However, the advent of the First World War had somewhat curtailed the workings of the Bureau as many of its members were called up on service, and the National Benevolent Society was instated to meet the needs of deafened ex- service men in 1918. The objects of the society were threefold:

> a) To link together all who are interested in the deaf and all deaf people for fellowship in united effort and mutual help.
>
> b) To seek out and assist the deaf who are in need, especially ex-Service men deafened through the War, and to provide Homes for those who require care.
>
> c) To collect money for a Deafened Ex-Service Men Fund, for a Pension and Relief Fund and for General Expenses of management.[116]

Membership demographic of this charity differed greatly from the Bureau's at this time. Between 1911 and 1912 the Bureau's President, Vice Presidents and committee members were all male. Of the 22 ordinary members, only two were women.[117] In contrast, the National Benevolent Society had ten female Vice-Presidents compared with three men, although the trustees were all male. Of these ten women, nine had titled honorifics. As First World War historians have noted, the conflict offered aristocratic and upper-middle class women a way to extend their usual charitable activities.[118] However, the Bureau clearly had doubts about the efficiency of the ladies of the National Benevolent Society:

> Miss Inman, the secretary of this society, had persistently worried the MOP to become the Agent of the Ministry to which all deafened soldiers and sailors should be sent through, but the Ministry were not agreeable to this. Major Rhodes of the ministry had had lists of discharged soldiers and sailors who lived in the districts under what is known as the Southern Command, made out and sent to Miss Inman, so that she could get in touch with those men. Mr Hacycock

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[114] 'Dundas-Grant, Sir James, (1854-1944)' in *Plarr's Lives of the Fellows Online,* <http://livesonline.rcseng.ac.uk/biogs/E003996b.htm> Accessed May 2016. As well as listing his many accomplishments as an ENT surgeon, this entry also notes that 'he was particularly ingenious in improving mechanical instruments, often of his own devising, and in the development of aids to hearing' which explains his suitability for his position.

[115] The National Bureau for Promoting the General Welfare of the Deaf and National Institute for the Deaf Minute Book 1911-1926 Executive Committee Meeting 7th March 1919. Accessed via the RNID Library

[116] The National Benevolent Society for the Deaf: Hon. Central Secretary's Report 1918-1919. Accessed via the RNID Library.

[117] The National Bureau for the Promotion of the General Welfare of the Deaf, First Annual Report, Report for the Year 1911-12. Accessed via the RNID Archives.

[118] 'Chapter six: Charity' in M.M.M. Kowalsky, *'Enabling the Great War: Ex-Servicemen, the Mixed Economy of Welfare and the Social Construction of Disability, 1899-1930'* (The University of Leeds, 2002) PhD thesis. p.160.

> stated that he had inquired of the various districts in the Southern Command, and in only one instance had he found out where a district had had any sort of enquiries from Miss Inman.

The National Benevolent Society's work was welcomed by the Government according to their own estimation however, and they reported in 1918 that:

> The general public is only just *beginning* to realise as yet that the Deaf are as greatly in need of help as the Blind, and need all our best effort in many directions and our thoughtful care. The "After Care" work for 10,000 deafened soldiers, sailors and airmen has required incessant and untiring effort and has been widely welcomed by War Pensions, Secretaries, and greatly valued by the men.[119]

The Government did officially endorse the society in 1919 by licensing it under the War Charities Act to collect funds from the public on behalf of ex-service men.[120] The National Benevolent Society concentrated initially on administrating the Deafened Ex-Service Men's Fund and providing ex-servicemen with employment advice, loans, re-training, and help in claiming pensions and pension arrears, sometimes through specialist re-examination. They were aware that deafness scaled very low in the assessment for pensions, and that large numbers of seriously deafened men received little more than 11s 9d or 15s 3d to provide for themselves and their children. Furthermore, like the women working during the war, many deafened men were losing their jobs as men with better hearing returned from the front. This situation reveals the societal expectations concerning able bodied masculinity as it seems that hearing loss lessened the masculinity of the deafened men. This compounded the situation of those who had made no initial claim. By 1929 the National Benevolent Society reported that there were now 'a good number of cases unfortunately losing their employment owing to increasing deafness, which disability debars a man altogether from employment on the railways, in the mines, and at the docks.'[121]

In the earlier years of the society's work, loans given to men were mainly focused on re-training. Loans often allowed the men to change jobs or start new businesses where they did not need to communicate with people, or where they could be supported by their family. In 1923, the society considered 767 cases. Of these, 19 had pensions obtained or increased, 54 were examined by Medical Board, 12 received 'instruments for deafened men', 18 were examined by specialists, and one grant was given for lip reading.[122] This grant was awarded to a gunner from

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[119] The National Benevolent Society for the Deaf: Hon. Central Secretary's Report 1918-1919. Italics in original. Accessed via the RNID Library.
[120] The National Benevolent Society for the Deaf: Annual Report 1919. Accessed via the RNID Library.
[121] The National Benevolent Society for the Deaf: 11th Annual Report 1929. Accessed via the RNID Library.
[122] The National Benevolent Society for the Deaf: Annual Report 1923. Accessed via the RNID Library.

the Royal Garrison Artillery who was drawing the maximum pension for deafness, and 'informed the society that although he had been ordered lip-reading instruction he was unable to obtain this through the [MOP], owing to their being no school of instruction where he was living, and the [MOP] refused to make him a grant for private tuition.'[123] The state had advocated lip-reading since 1917. It had been concerned about the impact of deafness on national productivity because the 'industrial effectiveness [of soldiers] has been seriously impaired by deafness due to military service'.[124] Centres of instruction for lip-reading were set up in response, but very few ex-servicemen applied for classes or accepted them when offered. This prompted the MOP to set up a special aural board, which became instrumental in allocating the distribution of hearing aids and pensions.[125]

The Bureau was aware of these developments and also highly recommended lip-reading over sign language as a method of rehabilitation. Their committee wrote to the War Pensions Committee to emphasise the advantages of lip-reading over sign language for facilitating re-integration into society:

> Any proposals to re-unite these deafened soldiers with their lost environment of speech through teaching them to spell on the fingers would be futile. It is obvious that ability to do so would enable them only to converse with the very few who know the finger alphabet: and that as a medium of general communication it would not, in any sense, meet their needs.[126]

Such correspondence highlighted the discrepancy between *perceived* needs of the deafened and the care *available* to the Deaf. Prior to the founding of the MOP, disability pensions for soldiers and sailors had been administered through the Chelsea Hospital or the Greenwich Hospital, but were financed by charitable organisations.[127] The rate of pensions had not been increased since the Boer War and worked via a discretionary system. The vast casualties returning from the front from 1914 onwards tested this antiquated system to its limits.[128] Its reorganisation came at a time when the Government's duty to its citizens was changing and was being questioned both by

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[123] Ibid.
[124] DISCHARGED SOLDIERS (DEAFNESS) HC Deb 02 July 1917 vol 95 cc741-2 Accessed online 2015 < http://hansard.millbanksystems.com/commons/1917/jul/02/discharged-soldiers-deafness#S5CV0095P0_19170702_HOC_98>
[125] Ibid.
[126] The National Bureau for the Promotion of the General Welfare of the Deaf. Third Annual Meeting of the Executive Committee 1914. Accessed via the RNID Library.
[127] 'The Evolution of Pensions' in M.M.M. Kowalsky, *'Enabling the Great War: Ex-Servicemen, the Mixed Economy of Welfare and the Social Construction of Disability, 1899-1930'* P.140
[128] Ibid p.140

citizens and by the Government.[129] In 1915 the Murray Committee was set up to report on provisions for servicemen disabled in the war and concluded that:

> The care of the soldiers and sailors who have been disabled in the war, is an obligation which should fall primarily upon the state; and that this liability cannot be considered as having been extinguished by the award of a pension from public funds.[130]

This was a momentous statement. It moved the Government away from laissez-faire policies that advocated self-help, and towards direct state intervention. Importantly, it led to the establishment of the MOP in 1917. Their first task was to compile a revised system for administrating pensions, which became known as The Royal Warrant of 1917. It is clear, however, that deafened ex-service mens' pensions were somewhat problematic, particularly in the delineation of deafness as a condition deserving not quite half of the full pension amount accorded to those servicemen who had been blinded.

This discrepancy was brought up in the commons by James Hogge MP (1873—1928) an impassioned and influential advocate of pension provision. Hogge was a radical liberal who represented Edinburgh East between 1912—1924 and founded the Naval and Military War Pensions League in 1917.[131] He spoke eloquently about the arbitrariness of the different categories of disability, criticising the discrepancy between the amount awarded to deafened servicemen and those deemed to have more serious injuries:

> Take the first category, which is 100 per cent. disability. You will find that for very severe facial disfigurement a private soldier is entitled to a pension of 27s. 6d. per week. That increases up to a warrant officer, who gets 42s. 6d. But I take it on the basis of a private in the second category, 80 per cent. disability, if he is totally dumb as the result of wounds or shell shock or service he only gets 22s.; and in the third category, which is 70 per cent., the man who is totally deaf only gets 19s. 3d. Here you have three men, all of whom have fought in the War. One has his face severely disfigured. That is a pity, of course, because I can conceive a man suffering very severely, from the point of view of the economic industrial conflict to which he returns, owing to a disfigurement of that kind. But that man, at any rate, has all his faculties. He can see, he can hear, he can walk, and use his hands. The man who has lost his speech has lost one of his five principal senses, and so has the man who has lost his hearing. Yet, according to the Schedule, you give the man with the severely disfigured face 27s. 6d., you only give the man

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[129] Ibid p.140
[130] The Murray Committee, quoted in 'The Evolution of Pensions' in M.M.M. Kowalsky, *'Enabling the Great War: Ex-Servicemen, the Mixed Economy of Welfare and the Social Construction of Disability, 1899-1930'* P.140
[131] E.Jones & S. Wessely, *Shell Shock to PTSD: Military Psychiatry from 1900 to the Gulf War* (Psychology Press, 2005) p.125

> who is dumb 22s., and the man who is deaf 19s. 3d. This requires some explanation.[132]

Hogge's points were brushed over, however, although he repeatedly pressed the point about provision for deafened soldiers to the Minister of Pensions, George Barnes.[133] Barnes was Minister of Pensions between 1916–1917 and was a minister without portfolio between 1917–1920. He was thought to be sympathetic to the problem of pension provision, but nonetheless dismissed Hogge's criticism of pension discrepancies:

> No, I think if my hon. Friend will look into that a little more closely, he will find that there is not much demand for it. After all, both the deaf man and the dumb man are suffering very severely as the result of the War, but on the whole the man who is in the highest degree of disability is, I think, entitled to that amount more of pension. As a matter of fact, I have found a man playing football who was deaf.[134]

The above dialogue reveals the manner in which deafness was regarded as less of a privation simply because it was an invisible disability. More readily identifiable physical disabilities were consistently prioritised over sensory impairment. Pension provision was consistently viewed in terms of functionality in the light of the economic industrial conflict. Deafness was less visible than blindness, physical injuries or disfigurations, which meant that it did not attract the same attention or support from the public. Yet the role of the public was crucial because of the strong role played by charities working with the MOP. Engaging the sympathies of the public was essential for the provision of funding and services.

This situation was comparable to the difficulties faced by the men seeking compensation for mental illnesses sustained during the First World War. However, a clear distinction must be made between mental illness and deafening, as the two conditions have often been conflated by historians of shell shock. This complication has been compounded by the fact that many soldiers were diagnosed as suffering from both deafness and a mental health disorder. Separating the two conditions reveals how deafness was considered to affect production and therefore merited some

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[132] Ministry of Pensions. HC Deb 19 March 1917 vol 91 cc1588-694 (1602) Accessed online via Hansard 21.11.15 < http://hansard.millbanksystems.com/commons/1917/mar/19/ministry-of-pensions#S5CV0091P0_19170319_HOC_287>

[133] Barnes (1859-1940) was a Glaswegian MP who represented Glasgow Blackfriars and Hutchesontown between 1906-1918 and Glasgow Gorbals between 1918-1922.Hansard 1803-2015 PEOPLE, Mr George Barnes 1859- April 21 1940. Accessed online via Hansard http://hansard.millbanksystems.com/people/mr-george-barnes/

[134] Ministry of Pensions. HC Deb 19 March 1917 vol 91 cc1588-694 (1617) Accessed online via Hansard 21.11.15 < http://hansard.millbanksystems.com/commons/1917/mar/19/ministry-of-pensions#S5CV0091P0_19170319_HOC_287>

compensation. However, in this instance, deafness was writ into law as being of lesser concern than other war injuries.

This meant that charities had to intervene in order to assist deafened ex-servicemen. Most prominent was the aforementioned National Benevolent Society who administered the Deafened Ex-Service Men's Fund, to support soldiers, particularly in dealing with the MOP. The Fund's mission statement was: 'to assist these men in every way possible, as follows: advice and help re pensions, training, treatment, instruments, specialist's examinations, employment, emigration, clothing and grants of capital where a man had business experience and there were reasonable prospects of his being successful.'[135]

2.2: Alternative systems of rehabilitation

2.2 (i): Hearing Aids

Extensive charitable intervention indicates that the work done by the MOP was limited in its care of deafened ex-servicemen. It is notable that lip reading or retraining was the primary method of rehabilitation and that hearing aids were seldom advocated during the First World War or in the immediate years following. However, as valve technology progressed (in ways explored in the third section of this chapter) an increasing amount of the Deafened Ex-Servicemen's Fund was earmarked for replacing batteries and earphones. Between 1921 and 1923 there was no mention of earphones in the annual reports. The first mention of their use came in 1924, in a testimonial from a solider: 'I have great pleasure in informing you that I have been fitted with a Stools electrophone by the Ministry of Pensions.'[136] This testimony correlates with analysis of the MOP disablement services branch records concerning the supply of hearing aids.[137] The first official MOP ruling on hearing aid supply came in response to an enquiry from the commissioner of medical services for the MOP who asked whether or not hearing aids could be charged to their account. Director General of Medical Services, Sir Dundas-Grant (1854-1944), wrote in response that:

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[135] Minutes from the Deafened Ex –Service Men's Fund. Accessed at the RNID Library.
[136] The National Benevolent Society for the Deaf, Annual report 1924. Accessed at the RNID Library.
[137] Supply of electrophones: 1920-1923 Accessed at Kew National Archives PIN 38-449.
Supply of electrophones: 1924-1926 Accessed at Kew National Archives PIN 38-450.
Supply of electrophones: 1926-1929 Accessed at Kew National Archives PIN 38-451.
Supply of electrophones: 1938-1939 Accessed at Kew National Archives PIN 38-452. The Disablement branch was a dedicated branch that had been concerned with advances in prostheses before this point, and had been involved or aware of the testing of soldiers for deaf pensions but it was only in 1922 that they became involved with hearing aids. For example, see: 'The Inter Allied Committee for the study of questions concerning the disabled' *Review of the Technical and Scientific Institute of Prosthesis and Surgical Apparatus* January 1922 Accessed at the Wellcome Library MS 9200 Box 440.

> [if the hearing aid has] been recommended by a specialist member of the board which examined him [then] supply is admissible at the public expense and the article may best be obtained from the Stols Electrophone Company […] with whom the Ministry have a special arrangement and who are prepared to supply these appliances to our order at a discount of 20% on the list price.[138]

The MOP documents refer to the Stols Electrophone Company as having headquarters at St Martin's Place, London, which is also where the Stolz Electrophone Company was listed in *The Times* in 1915.[139] It is unclear whether their name was changed to be less Germanic reflecting wartime tensions or whether the name change was related to financial difficulties.[140] The Stols Electrophone was a cheap microtelephone style device but its exclusive contract with the MOP was discontinued in 1922. The MOP believed the appliance was not being used because they were not receiving requests for batteries.[141] Supply of batteries was also subsidised by the MOP but was closely controlled, with a restricted number of batteries (soldiers were allowed two a month) presumably also restricting the level and type of usage. This was despite the fact that firms would discount their batteries along with their hearing aids.

Indeed, hearing aid firms emphasised that they offered one price to the MOP and the medical profession and another price to the public, as well as special instruments, as the Mears earphone company emphasised in a letter offering their services to the MOP, 'we only hand these to Medical Men, not to the public.'[142] This split was undoubtedly partly commercial rhetoric. But as in the case of charitable provision, this meant that deafened servicemen were given consideration and support that did not extend to deafened civilians. In Figure 1, we can see a representative advertisement for hearing aids specifically targeting hospitals. It shows that, in this period, selling hearing aids to the MOP allowed firms to claim government endorsement and legitimacy without the approval of the NID. Not only did a government contract offer a secure and lucrative source of income, it also provided a unique selling proposition.

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[138] E. Barnes Major for Director General of Medical Services to The Commissioner of Medical Services, MOP, Northern Region) 1922 Accessed at the National Archives PIN_38_449_9.
[139] 'Stols', In *The Times* (London, England) 8th Nov 1915, p.3 Accessed via *The Times Digital Archive.*
[140] Stolz Electrophone Co (London) Ltd Accessed at the National Archives J 13/7107.
[141] MOP internal memo from 19.9.22 Accessed at the National Archives Pin_38_451_4.
[142] Messrs ear phones to the MOP in 1922. Accessed at the National Archives PIN_38_450_23.

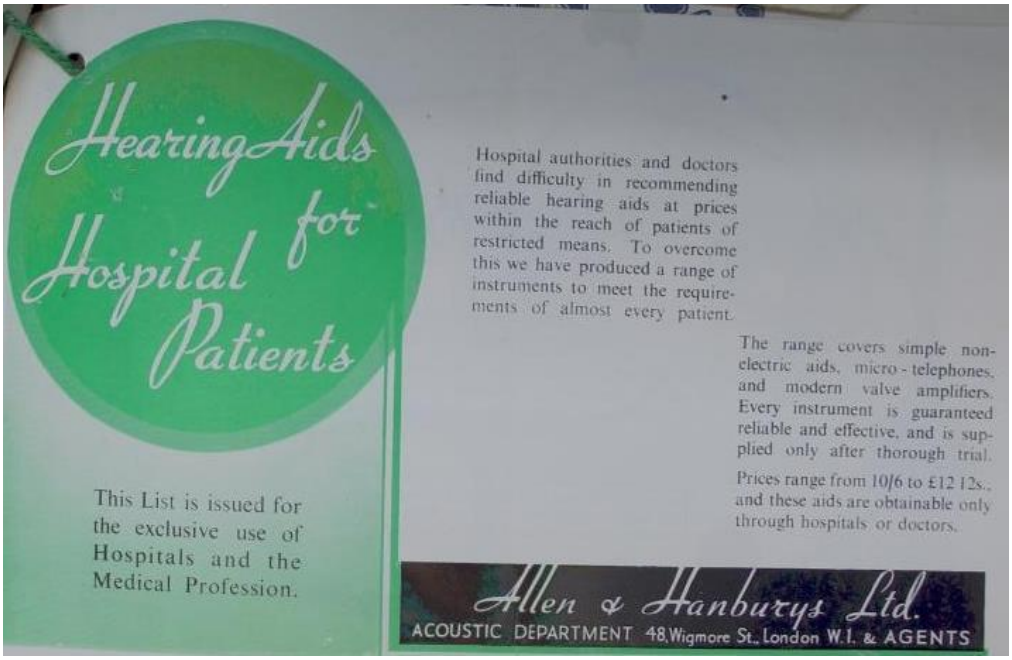

Figure 1: 'Hearing Aids for Hospital Patients.'[143]

In 1922, after breaking away from their exclusive deal with Stols, the MOP contracts were extended to other hearing aid companies. Between 1922 and 1929 this was mainly limited to the Stols Company, the Mears Company, or WH Pettifor who, interestingly, described himself as a telephone engineer, embodying the close connection between the telephone and hearing aids at that time. In fact, hearing aid manufacturers sometimes enclosed forms to allow potential customers to self-diagnose their hearing loss, and these included the question 'Can you hear at the telephone?'[144] This demonstrated the multiple ways in which the telephone was used to diagnose hearing loss both socially and medically. Furthermore, this shows that emphasis was given to the qualitative judgements of telephone users with hearing loss.

Despite the limited number of companies with tenders, the MOP's local aural surgeons were aware of the individual idiosyncrasies of hearing loss and they had the discretion to refer other instruments for their patients if necessary.[145] However, the person who made the final decision as to the effectiveness of a hearing aid instrument between 1917—1920 was Dundas-Grant. He was consulted by the aural surgeons attached to the MOP hospitals who dealt with patients in their local areas as part of a wide network of care. This care was supplemented by the MOP hearing aid manufacturers, who would test patients in all areas where they had offices,

[143] Allen and Hanburys Ltd, Acoustic Department, 'Hearing Aids for Hospital Patients' Accessed at the National Archives PIN_38_152_19.
[144] Stols Electrophone advertisement pamphlet, 'Free Advice Form' Accessed at the National Archives PIN_38_450_19.
[145] MOP letter from 1.9.1922 Pin_38_449_4.

which resulted in the Ministry tending to deal with firms that had branches throughout Britain. There was a degree of flexibility in prescribing instruments, but Dundas-Grant nonetheless emphasised that 'the least expensive instrument suitable to the particular case should, of course, be selected.'[146] Although the selected aids were cheaper, the MOP's hearing aid suppliers during the 1920s did not correspond to the list of approved firms compiled by the NID. This meant that, although the aids might have been cheaper, the Ministry had to contend with unpalatable advertising practices and take action against firms claiming to be the sole supplier to the Ministry.[147] The Stols Electrophone Company also capitalised on their association with the Ministry and advertisements like Figure 2 were common, specifically targeting ex-servicemen suffering from 'Gun Deafness'. A soldier in military attire uses a watch to demonstrate the recovery of his hearing. Although audiometers were available at this time, it is clear that there was an accepted cultural significance still attached to the watch tick test and that the watch tick-test was one of the standardised methods of testing hearing at the time. The reference to 'shocks' causing 'too great a strain' also echoes the dominant discourse concerning neurasthenia or war nerves, which were closely correlated with hearing loss during the First World War. Although gun deafness was a seemingly specific condition, noise-induced hearing loss was amalgamated with a variety of other hearing and stress-related conditions. It is also notable that the solider himself is holding the watch, as the test actually required the tester to hold the watch behind the patient's ear, out of sight. That way, the tester could measure the distance from the ear to where the watch tick could be heard. Yet here the soldier holds the watch, showing himself to be in control and testing his own hearing, blurring the objectivity/subjectivity line required for accurate scientific measurement.

[146] Memorandum for the information of Area DC's E.C., Officers-in –Charge of Clinics, Chief Area Offices, and District Officers, 'Aids to Hearing' from the Director General of Medical Services, 19th July 1929,Accessed at the National Archives PIN_38_451_2.

[147] The MOP wrote in a letter to hearing aid firm Ardente in 1925, that, 'The name of the War Office should be removed as soon as possible from your lists and from any other pamphlets or circulars relating to the instrument'. Accessed at the National Archives Pin_38_451_4.

Figure 2: Stols advertisement: 'I can hear the watch ticking nurse.'[148]

Yet use of electrical hearing aids increased rapidly year upon year according to the National Benevolent Society's reports: from no reports of use between 1921—1923, to 73 earphones issued in 1932 and 162 in 1939.[149] This increase could be explained by technical developments and increased manufacture of electrical hearing aids that took place during the 1930s. However, the National Benevolent Society themselves attributed the increase to 'so many

[148] Excerpt from the Stols Electrophone booklet. Accessed at the National Archives PIN_38_450_11.
[149] The National Benevolent Society for the Deaf, Annual reports, 1918-1952. Accessed at the RNID Library.

of the slightly deafened men of twenty years ago becoming so deaf that they are in danger of losing their employment.'[150]

The MOP not only provided electrical hearing aids but also devices such as artificial ear drums. These were advertised primarily by the Mears Company or as 'Murray Ear Drums' and worked more like prosthetics to replace the eardrum (which may have ruptured following explosions) but were usually marketed as extremely discreet invisible hearing aids.[151] Although this made them highly desirable, these invisible aids were of no use to people suffering from deafness caused by anything other than a ruptured eardrum. Many other devices were also advertised to the MOP by hearing aid companies who wanted access to the lucrative contracts extended by the MOP, as well as the prestige attached to it. For example, Birmingham hearing aid manufacturers Dorma wrote to the MOP to explain that they had produced a 'special appliance for the relief of Head Noises and Throbbing when resting and I have no doubt it would be of benefit to many of the disabled soldiers under your charge.'[152] Other accessories and appliances of somewhat questionable efficacy were also advertised to the Ministry by various firms. For example, in 1929 one of their tendered companies 'Ardente' supplied them with headbands, pips, and earwires, as well as a 'Vibrator' massage type hearing aid which promised to 're-educate' the sense of 'tone.'[153] These advertisements often played on gender stereotypes. The bulky 'Dorma' headband (Figure 3) is hard to imagine paired with the interwar gendered expectations of elaborate hairstyles (even for less conservative flappers) and delicate accessories. However, access to hearing could allow couples to regain access to the pleasures of sound, or whispered sweet nothings, as shown in Figure 4.

[150] The National Benevolent Society for the Deaf, Annual reports, 1938 Accessed at the RNID Library.
[151] See J.Virdi-Dhesi, 'Priority, Piracy, and Printed Directions: James Yearsley's Patenting of the Artificial Tympanum' in *Technology & Innovation: Proceedings of the National Academy of Inventors* Vol 16, Issue 2, pp.145-154.
[152] Dorma Manufacturers to Captain Joliffe, MOP, July 13th 1925 (my phrase in parenthesis) Accessed at the National Archives PIN_38_450_8.
[153] Mr R.H. Dent 'Ardente' to the MOP,6th May 1929, Accessed at the National Archives PIN_38_451_22.

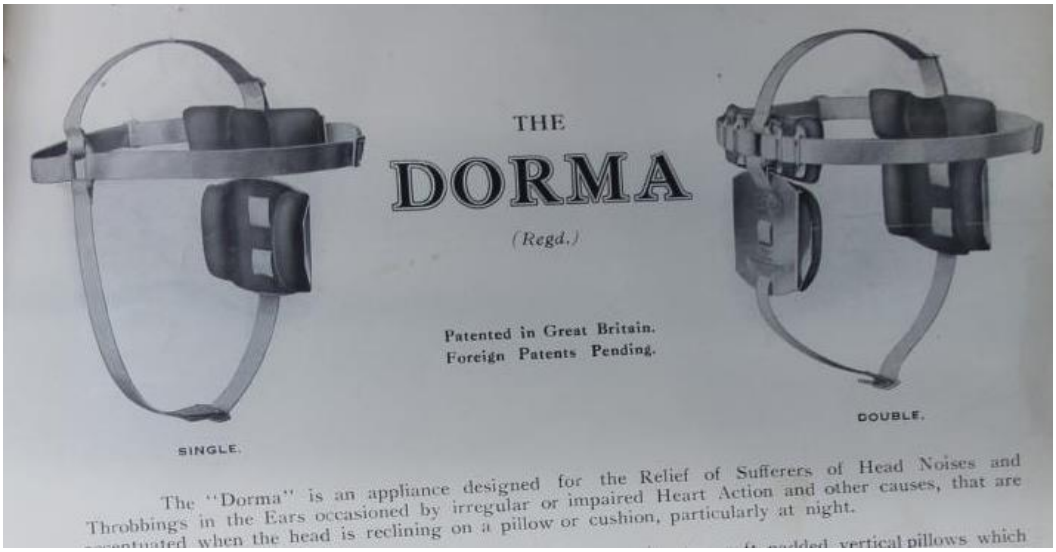

Figure 3: The Dorma Appliance.[154]

Figure 4: The Mears Ear Phone.[155]

In 1922 the MOP spent £100 on hearing aids and three years later in 1925 this figure rose to just over £136 2s 9d.[156] Although this was a considerable sum this was still much cheaper than providing more pensions, the sum spent on hearing aids was to increase exponentially

[154] Dorma hearing aid advertisement. This device was designed to relive head throbbing by keeping the ear orifice open and seems to have been recommended for people resting or sleeping. Accessed at the National Archives PIN_38_450_2.
[155] Mears Ear Phone advertisement, Note their boast of 'Contractors to H.M War Office' Accessed at the National Archives PIN_38_449_13.
[156] Historical currency conversion calculator for 2005. Accessed online May 12th 2016 <http://www.nationalarchives.gov.uk/currency/results.asp#mid>

throughout the interwar years. The MOP's relationship with hearing aid suppliers offers a fascinating snapshot of how state hearing aids were provided before there was a state hearing aid. Moreover, it demonstrates that state intervention into hearing loss increased alongside developments in hearing aid technology that was thought to provide a quick and cheap 'fix'. Yet before the NHS, there were still great discrepancies between the care given and the care needed. Charitable provision was left to address the gap. It is clear that electrical aids were increasingly used by the MOP as supplements or alternatives to a full pension, and as a means of reintegrating ex-servicemen into the workforce.

2.2 (ii): Social assimilation schemes

The NID began categorising deafened soldiers and sailors as 'the Deafened'. This was a category deliberately delineated from 'the Deaf'. Their annual reports were organised through sub-sections with titles like 'The Deafened by Disease', 'Wireless and the Deaf', 'The Deaf Motorist', 'Classification of the Deaf as Mentally Defective'. It was not until 1928 that The Deafened appeared as a regular sub-section, indicating the Bureau's recognition of a split between specific groups with specific needs. The Bureau addressed this dichotomy specifically in 1934, when they reported on the division between the 'deaf-born' and the 'deafened' under the sub-heading 'The Problem before the Institute':

> The deaf fall actually into two general classes, according to the history of their affliction and from the psychic point of view these classes are essentially distinct […] The problem before your committee is therefore of a two-fold nature, necessitating separate lines of action to meet the distinctive conditions of the deaf and dumb and the deafened.[157]

This was a key shift in terminology that reflected the growing understanding of hearing loss gained from the war; that deafness could originate from external factors rather than purely hereditary causes or disease. The Bureau had offered their services to the War Office as early as November 1914:

> The medical aspects of deafness, ably dealt with by the Medical Committee, were now brought to the front in a somewhat unusual way. The heavy percussion of modern artillery was likely to affect hearing, and they had felt themselves called upon to offer the services of the Bureau to the War Office and the Admiralty, in

[157] Report of the Third Annual Meeting, Wed Nov. 11th 1914, National Bureau for the Promotion of the General Welfare of the Deaf. Accessed at the RNID Library. See also - Annual Meetings between 1911-1922, National Bureau for the Promotion of the General Welfare of the Deaf. Accessed at the RNID Library.

> order to assist them in dealing with soldiers and sailors who may suffer from deafness in consequence of the war.[158]

The problem of the 'deafened' also attracted attention from the wider public and the Bureau received offers of help, especially from teachers of the deaf who offered to give free lip reading lessons to soldiers. Lip reading classes were given initially in hospitals and then organised by the MOP, local education authorities and charitable organisations. The MOP responded to questions about the reintegration of deaf soldiers by stating that, provision was made 'for the restoration of the maximum hearing capacity by means of classes for lip-reading or individual tuition and aids to hearing, in all cases which would benefit therefrom.'[159] Thus the Government advocated the use of hearing aids alongside lip reading and retraining in order that the deafened soldier could adapt and learn to cope with his condition. If he was unable to take up his previous employment, he would be given training in new skills. The Industrial Training Scheme of 1919 was utilised to this end. The Bureau emphasised the special suitability of deafened workers to economical industry because there was 'no charity in employing deafened workers, since the general experience is that their freedom from the distractions of talk and noise tends to their greater productivity and increased output.'[160] As well as charities, the MOP collaborated with hospitals to provide care:

> At the end of March, 1929, the Ministry of Pensions was still maintaining 6 Aural Clinics, and the number in attendance for treatment was then 103. In addition, use was being made of the treatment facilities afforded by civil hospitals who had entered into an agreement with the Ministry of Pensions in regard to the treatment of disabled officers and men.[161]

These schemes, which continued after the war, provide a marked contrast with the experimental medical treatments advocated during the war (explored in part two of this chapter). They represented forms of social assimilation and acceptance rather than invasive treatments for a medical problem. The Bureau was also instrumental in helping men appeal their cases and collect pension arrears.

Arrears may have been necessary for those who found that deafness was not immediately apparent after the war and became a problem later. 'Some 33,791 were discharged from the Services during the War as unfit for further service on account of deafness, and many others are

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[158] Report of the Third Annual Meeting, Wed Nov. 11th 1914, National Bureau for the Promotion of the General Welfare of the Deaf. Accessed at the RNID Library.
[159] *HC Deb 02 July 1917 vol 95 cc741-2* (741).
[160] Report of the Third Annual Meeting, Wed Nov. 11th 1914, National Bureau for the Promotion of the General Welfare of the Deaf. Accessed at the RNID Library.
[161] The National Institute for the Deaf Annual Report 1929. Accessed at the RNID Library.

finding deafness creeping upon them owing to their war service.'[162] The MOPs use of the phrase 'deafness creeping' denotes the negative associations attached to hearing loss. Delayed hearing loss probably affected Mr Horace Buckley, a war veteran who used his hearing loss and war pension award to leverage the Post Office into reducing his amplified telephone line rent. This case will be discussed further in the next chapter, but it is worth noting here that while his hearing loss was cited by him as his 'war injury', his pension was actually for injury to his arm.[163] Of course, loss of the use of a limb was awarded more money than deafness so it may have been that Buckley claimed for his arm injury over his deafness simply for that reason. Yet it is clear that it was the inability to use telephony that caused him real problems in his job as a schoolteacher. If other soldiers claimed pensions in this way, it may mean that the available figures of deafened ex-servicemen are skewed and do not reflect the real scale of the problem.

The figures available do give some indication of the extent of the war deafened: 'On the 31st of March 1928 the latest date to which figures are available the number of those to whom an annual award was still an issue was 15,875, of whom some 800 were pensioned at the rate of ten per cent of more.'[164] However, these figures do not reflect the true scale of deaf pensions, as research into the National Archives holdings of pensions records reveals only 392 pensions given specifically for deafness. This is a remarkably small number given that the records of the National Benevolent Society in 1928 reported that 'the latest official figures show that 33.768 men were discharged from the Army and Navy on account of deafness.'[165] According to these figures, 33,373 men were deafened but not given a pension for deafness. Compare this to the 1,833 servicemen who were blinded.[166] Yet the provision of pensions and care for the blinded was relatively straightforward and generous. Moreover, there is fascinating evidence of diversity within the category of deaf pensions. For example, of the 393 pensions awarded for deafness only 300 were for deafness alone and the remaining 93 (23.6 per cent) were for deafness alongside another disorder and many were for deafness of psychosomatic origins (see Figure 5, psychosomatic origins highlighted in green). This attracted the attention of the medical profession early on in the conflict.

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[162] Report of the Third Annual Meeting, Wed Nov. 11th 1914, National Bureau for the Promotion of the General Welfare of the Deaf. Accessed at the RNID Library.
[163] Medical Report on a Soldier Boarded Prior to Discharge or Transfer to Class W., W. (T) , P. or P. (T) of the Reserve, Accessed at the National Archives.
[164] The National Benevolent Society for the Deaf 10th Annual Report 1928 Accessed at the RNID Library.
[165] Ibid.
[166] J. Anderson, *War, Disability and Rehabilitation in Britain*, (Manchester University Press, 2011) p.49.

Type of award	No. of awards	Percentage of Total Number of Deaf Related Pensions
Deafness/ NEURASTHENIA	5	1.272264631
Deafness/ CONCUSSION/ NEURASTHENIA	1	0.254452926
Deafness/ OTITIS MEDIA	1	0.254452926
Deafness/ LOSS OF EYE/ INJURED VISION	3	0.763358779
Deafness/ RHEUMATISM	5	1.272264631
Deafness/ INJURED TESTICLES	1	0.254452926
Deafness/ RHEUMATIC FEVER	1	0.254452926
Deafness/ GAS POISONING	1	0.254452926
Deafness/ CATARHH	1	0.254452926
Deafness/ BRONCHITIS	3	2.290076336
Deafness/ SHELL SHOCK	2	0.508905852
Deafness/ CONJUNCTIVITIS	1	0.254452926
Deafness/ MALARIA	15	3.816793893
Deafness/ SYNOVITIS	1	0.254452926
Deafness/ G.S.W (GUN SHOT WOUND)	23	5.852417303
Deafness/ DYSENTRY	1	0.254452926
Deafness/ HERNIA	2	0.763358779
Deafness/ NERVE DEAFNESS	3	0.254452926
Deafness/ INJURED KNEE	1	0.254452926
Deafness/ RHEUMATOID ATHRITIS	1	0.254452926
Deafness/ MULTIPLE INJURIES	1	0.254452926
Deafness/ TUBERCULOSIS	1	0.254452926
Deafness/ HEART TROUBLE	1	0.254452926
Deafness/ CONCUSSION/ DERANGEMENT OF KNEE JOINT	1	0.254452926
Deafness/ FUNCTIONAL DEAFNESS	1	0.254452926
Deafness/ EPILEPSY	1	0.254452926
Deafness/DAH	3	0.763358779
Deafness/ CHEST TROUBLE	1	0.254452926
Deafness/ NEURASTHENIA/ DERANGEMENT F KNEE	1	0.254452926
Deafness/ INURIES TO FACE	1	0.254452926
Deafness/ G.S.W/ ALBUMINURIA	1	0.254452926
Deafness/ VARICOSE VEINS/ FACIAL PARALYSIS	1	0.254452926
Deafness/ INJURY TO SPINE/ FRACTURE OF SKULL/ NEUROSIS/ GIDDINESS	1	0.254452926

TOTAL number of pensions distributed for deafness alongside another disorder.	33	23.66412214
TOTAL number of pensions distributed for deafness alone.	300	76.33587786.
TOTAL number of deaf related pensions	393	100
PENSIONS distributed for illnesses of psychological origin.	13	3.307888041

Figure 5: Table showing numbers of pensions awarded for various types of deafness (figures from National Archives, PIN 26).

The resultant proliferation of articles concerning possible treatments for this new 'national problem' was due, in part, to the fact that hearing loss was symptomatic of 'shell

shock.'[167] So called cases of 'paralysis' after exposure to explosions were apparent from the start of the war but did not receive serious medical attention until the winter of 1914—1915 when these instances were labelled cases of 'shell shock' by the Cambridge medic and psychologist turned army doctor, Charles Myers.[168] Fiona Reid has argued that the term 'shell shock' carries a particular significance uniquely associated with the First World War because of the special significance and symbolism attached to the term. Although the term was soon considered verboten by the military (and replaced with 'not yet diagnosed nervous') shell shock took hold of the public imagination and the medical profession was faced with the task of diagnosing and curing its sufferers so that the men could return to the front. Soldiers who did not recover could be shot as perceived malingerers or become a drain on the war pension system.[169]

It is not within the remit of this chapter to adequately describe the complex condition of shell shock. However, it will show that treating hearing loss alongside shell shock drew greater medical attention to the condition of deafness and deafening. Hearing loss gained new public visibility and became a high-profile issue precisely because it was intimately bound up with the visible and disturbing new condition of shell shock. In this sense, shell shock was significant not just as a condition in its own right, but also through attracting widespread recognition and attention to a range of other conditions. Attracting public support and sympathy was important because in the aftermath of war the Government and the MOP worked closely with and relied upon the work of charities.

Many of the soldiers who appeared to be suffering from shell shock also presented with symptoms of deafness and deaf-mutism. After the conflict it became apparent that this hearing loss was temporary or symptomatic in some cases, permanent or noise-induced in others and only rarely hysterical; but initially all conditions were conflated together and various treatments devised for their cure. This conceptual shift which saw hearing loss as psychological was also marked by the intervention of psychiatry into a domain traditionally dominated by otology. Psychiatry was a relatively new profession, and its practitioners were still pushing for recognition

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[167] 'Section of Medical Sociology: Defective Hearing as a National Problem ' in The British Medical Journal (Aug 18th, 1934) 2(3842), (350–353) p.323, 350-351.

[168] S.C.Linden & E.Jones , 'Shell shock' Revisited: An Examination of the Case Records of the National Hospital in *Medical History* 58.4 (2014): pp519–545. (p. 520) See also: A.Scull, *Hysteria: The Disturbing History*, (Oxford University Press, 2009) p.153.
Shell shock is now often regarded as somewhat analogous to post traumatic stress disorder but shell shock was such a nebulous umbrella term that it has been disaggregated into a variety of modern conditions. The use of the term paralysis in this sense was not connected with the modern definition but related to ideas concerning 'general paralysis of the insane', a disorder associated with the ravages of tertiary syphilis.

[169] E. Jones 'War Neuroses and Arthur Hurst: A Pioneering Medical Film about the Treatment of Psychiatric Battle Casualties' *in Journal of the History of Medicine and Allied Sciences*, Vol. 67, Issue 3. p.5.

from the wider medical community. In this context, it was further challenged by 'shell shock', which did not fit with traditional gendered conceptions that regarded hysteria as a purely female disorder.

2.2 (iii): Hearing Protection

Protection of hearing was also advocated, for example, through the use of earplugs. However, there was some concerns about the types of material that should be used: 'in the external auditory meatus of the soldier exposed to a bombardment […] the obturator should be made of plasticine or some such material and never of celluloid, as several men have had their ears damaged by the flash of a shell igniting plugs made of that inflammable substance.'[170] A company called Mallock Armstrong advertised such earplugs (Figure 6 and 7) and claimed that ordinary sounds and conversations could be heard normally but 'Gun-fire and Shell-Bursts rendered harmless to the ears. Can be worn continuously. As supplied to the British admiralty.'[171]

Figure 6: Mallock Armstrong Ear Defenders advertisement.[172]

[170] War Injuries and Neuroses of the Ear' in *The Lancet* Vol. 189, Issue 4878, (24 February 1917) pp.285-324 (p.305).
[171] Hattrick Medical Trade Catalogue, 1931. Accessed at the Thackray Medical Museum.
[172] Ibid. p.219.

Figure 7: Mallock Armstrong Ear Defenders and Instructions.[173]

Hearing protection was investigated in the *BMJ* and Mallock Armstrong's earplugs received a full-page review. The *BMJ's* review was non-committal, pointing out to readers that plastic ear plugs were cheaper and easier to mould to an individual's ear. They conceded, however, that the plugs might be advantageous because they had been designed specifically to defend against gunfire while allowing soldiers to hear 'the words of command.'[174] They concluded: 'The fact to be borne in mind is that to-day many hundreds or thousands of men are suffering acute injury, and perhaps increasing and lasting deafness, from repeated concussions of the ears from gun fire; this renders it necessary that all means of preventing these consequences should be considered.'[175] Clearly, the *BMJ* was concerned about the problem of wartime deafness, but was unsure how best to deal with the problem. Letters from doctors and soldiers in the *BMJ* responded to this review and Peter Abercrombie wrote to discuss the points made by

[173] Image of the Mallock Armstrong earplugs and accompanying instruction booklet (author's own image).
[174] 'THE MALLOCK-ARMSTRONG EAR DEFENDER' in *The British Medical Journal* 1.2818 (Jan 2nd 1915) p.25.
[175] Ibid.

his brother, who was fighting at the front. This gives us a revealing insight into the everyday problems of noise at the front. 'When wearing them you can hear ordinary conversation with ease, also the telephone-and not a particularly good telephone at that! The sound of the gun firing seems to be just the same, but one never gets the sharp, painful jar in the ear that is usually felt.'[176] However, the *BMJ's* concerns about the potentially damaging effects of the spade included with the Mallock Armstrong ear defenders seem to have been entirely justified if this accompanying picture (Figure 8) is any indication.

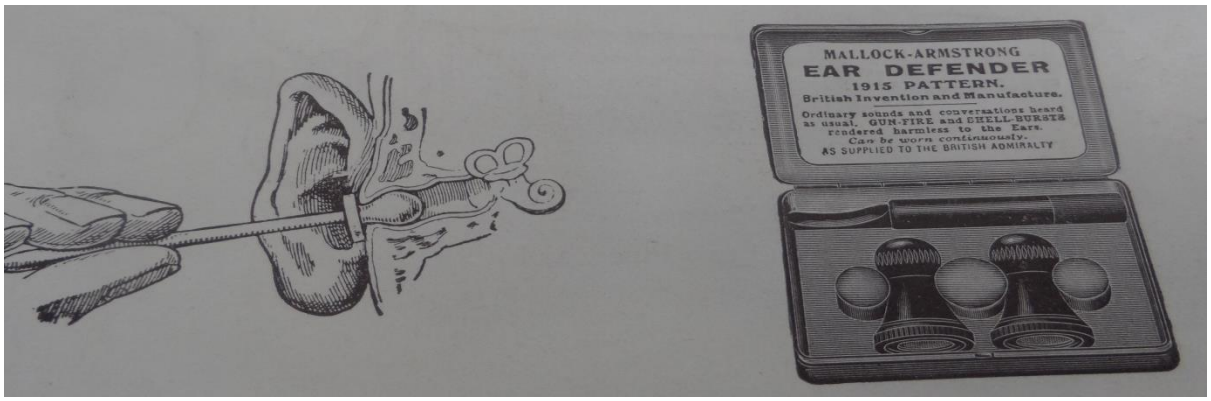

Figure 8: Mallock Armstrong ear cleaner.[177]

As well as the potential for causing greater damage, such earplugs were impractical in dark and muddy trenches. Hillel Schwartz has made the point that soldiers also disliked earplugs, perceiving them as a potential hazard that muffled their hearing in dangerous situations.[178] Moreover, 'most soldiers in the trenches did not cotton to the idea of putting mud-sopped plugs into ears rocked by hours of shelling that reverberated through their new metal helmets.'[179] Using hearing protection was also associated with a lack of masculinity which may have been a further factor leading to non-use.[180]

Hearing protection and the treatment of hearing loss were both explored as a result of the deafening effect of the war. In this section we have considered some of the alternative form of rehabilitation that were used as supplements or alternatives to inadequate pension provision.

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[176] P.H Abercrombie, 'EAR DEFENDERS' in 'Correspondence Section' in *The British Medical Journal* 1. 2840 (Jun 5 1915).
[177] Hattrick Medical Trade Catalogue, 1931. Accessed at the Thackray Medical Museum Library. p.219.
[178] H. Schwartz, 'Inner and Outer Sancta: Earplugs and Hospitals', in *The Oxford Handbook of Sound Studies* ed. by T. Pinch & K.Bijsterveld (Oxford University Press 2011) p.288.
[179] Ibid.
[180] For example, see discussion of the resistance of German Industrial workers to hearing protection in the 1930s, in H.J Braun, 'Turning a Deaf Ear? Industrial Noise and Noise Control in Germany since the 1920s' in The Oxford Handbook of Sound Studies ed. By T. Pinch & K.Bijsterveld (Oxford University Press) pp.58-78 (p.66) and H. Schwartz, 'Inner and Outer Sancta: Earplugs and Hospitals', in *The Oxford Handbook of Sound Studies* ed. by T. Pinch & K.Bijsterveld (Oxford University Press 2011) p.288.

Hearing aids, lip-reading classes, grants, and ear plugs were all utilised to protect and augment hearing in the body of the solider. For most soldiers affected, however, this intervention did not result in improvements to their hearing. Instead, they had to find new ways of coping with hearing loss and adapting to the condition as unprecedented noise levels led to permanent hearing damage in soldiers. Indeed, hearing loss was an almost inevitable consequence of the specific conditions of trench warfare. The next section will consider in more detail how the trenches affected hearing, and will explore the telephones that were developed in this context.

2.3: Trenches and Telephones

In the First World War trenches, hearing came to occupy a place alongside sight as a crucial sense. The increased importance of sound and hearing in trench warfare was augmented by the impairment to vision. As David Hendy put it: 'what really made sound a defining experience of battle was that so much of the war could never be seen.'[181] Yet the intense listening required by soldiers was not solely a product of sight deprivation but also a way to 'discern different and distinct sounds amid the din, and try to make sense of what they heard to work out what might be happening around them.'[182] For example, soldiers could listen in order to establish the weak spots of enemy defence fortifications and the areas of most intense gunfire. This was also a specialised skill used by military officers, who were trained to listen and use 'detailed mathematical calculations to work out the precise location of enemy gun positions based on the time lag between firing and shell-burst observed from different perspectives.'[183] In his article on Sir Lawrence Bragg's little known role in the development of sound ranging in France, William Van Der Kloot gives a more detailed description of how sound ranging worked in practice:

> The typical setup for a sound-ranging unit was to have six microphone stations and two observation posts in front of them. The observers would push a key when they saw a gun flash or heard a boom; their signal would turn on the film transport in the galvanometer. Each setup required about 40 miles of low resistance, well-insulated wire—of higher quality than telephone wire.[184]

Listening in the First World War was therefore of paramount importance, not only as an essential tool for survival but also in the context of the trench experience, where the importance of sound was amplified as a result of sight restriction. Hearing was of considerable strategic significance, and soldiers used their ears tactically in listening posts and for sound ranging. Julia

[181] David Hendy, *Noise: A Human History of Sound and Listening* (Profile Books, Ltd. 2013) p.36
[182] Ibid.
[183] Ibid.
[184] W. Van Der Kloot, 'Lawrence Bragg's role in the development of sound-ranging in World War I' in *The Royal Society Publishing* vol. 59, issue 3 (2005) p.278.

Enke has described the increased importance attributed to listening in the context of the German experience of trench warfare.[185] Enke emphasises the active listening that the soldiers consistently had to do and its effect on prioritising hearing to the level accorded to sight so that listening became a crucial skill.[186] The development of such listening techniques in turn engendered the creation of new electrical equipment dedicated to improving wartime acoustic techniques. Roland Wittje has shown how acoustic techniques were utilised to this end, and demonstrated how they were related to advancements in fields like telephony and submarine detection.[187] In Britain, the Post Office was at the forefront of such developments to acoustics as part of their role of the Army's telephone suppliers.

The telephone became a crucial mode of communication for the British Army in the First World War and therefore the Post Office was essential to the development of wartime communications and telephones specifically designed for the conditions of the trenches.[188] Although the telephone had been taken up by the military soon after its invention, and used firstly in the Second Afghan War in 1879, it was not a popular form of communication.[189] Written proof or an orderly was regarded as a more secure method and telephones were used in an alternative fashion, as Morse receivers and for communicating with surveillance balloons.[190]

Yet when the First World War began the telephone was not considered to be as important a mode of communication as telegraphy, visual signalling and motorbike couriers.[191] It was the specific conditions of trench warfare that made the telephone so essential and far more viable than any other form of communication and the Post Office signal services and research departments were integral to its development. Furthermore, the Post Office designed the hot wire microphones conceived by Captain Tucker that allowed the British Army to obtain such precision in their sound ranging. Recalling the Post Office's contribution to the war in 1920, Sir Andrew Ogilvie explained:

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[185] J. Enke,' War Noises on the Battlefield: On Fighting Underground and Learning to Listen in the Great War' in *German Historical Institute London Bulletin*, Vol 37, No. 1 (May 2015), pp.7-21
[186] Ibid. p.18.
[187] R. Wittje, 'The Electrical Imagination: Sound Analogies, Equivalent Circuits, and the rise of Electroacoustics, 1863-1939' in *Osiris 28, Music, Sound and the Laboratory from 1750-1980* ed. by Alexandra Hui, Julia Kursell & M.W. Jackson (2013) p.44 my phrase in parenthesis.
[188] M. Bridge & J. Pegg, (eds.) *Call to Arms: A History of Military Communications from the Crimean War to the Present Day* (Focus Publishing 2001) see especially p.39 and p.43.
[189] Ibid. p.40.
[190] For more information on how these alternative uses worked, see chapter 2 of M. Kay, *Inventing telephone usage: Debating ownership, entitlement and purpose in early British telephony.* (University of Leeds 2014) PhD thesis.
[191] B. Hall, 'The Life-Blood of Command? The British Army, Communications and the Telephone, 1871-1914' in *War and Society*, Volume 27, Issue 2 (01 October 2008), pp.43-65.

> The assistance of the Post Office was sought by the inventor, and I am proud to say that Mr Pollock, the head of the engineering Research Station, and his assistants not only devised a successful microphone on Capt. Tucker's plan, but also manufactured many thousands in a secret factory in the General Post Office, thus making a practical success of this very important invention.[192]

The Post Office also devised hypersensitive transmitters that were placed on the parapets of opposing trenches and used to spy on enemy conversations.[193] These transmitters were also used to monitor the conversations of prisoners of war. The Post Office's development of these was directly influenced by hearing aid technology, just as their development of hearing aid technology came to influenced by wartime technology. As Alice Haigh outlines in a forthcoming PhD thesis:

> On 21 February 1916, B. S. "Bertie" Cohen filed a preliminary report on a suitable design, this time similar to ordinary telephone microphones of the time. Previously, Cohen along with H. J. Gregory had experimented on existing sensitive transmitters, identifying the 'Acousticon' transmitter (made by the Acousticon Company primarily for the use of deaf people as a hearing aid) as "by far the most sensitive and articulate" on the market. However, it was fragile, had "a tendency to instability" and was very expensive. After a series of experiments and tests varying the size and shape of the carbon granules, plates, and mouthpieces, Cohen and Gregory managed to create a microphone that performed as well as the Acousticon transmitter whilst being suitably robust and much cheaper to produce.[194]

The Post Office contributed to the war time communications in three main ways: by supplying equipment; training and supplying men for the Signal Service; and researching technical developments. Relationships between the Post Office and the Signal Service had been mutually beneficial since 1879 when the National Telephone Company (the precursors of the Post Office) was short of skilled engineers and the army loaned the 22nd Company of Royal Engineers to the new telephone company.[195] This signalled the start of a close relationship between the Post Office and the Army, which was particularly strained during the First World War. As early as 1892 the Army had described telephony as common in use for internal communications but not as a tool for communicating in battle.[196] This can be partially explained by the aforementioned fears about security and the fact that the early telephone was very difficult to hear and audio attenuation increased with distance. Initial non-usage of telephony in the First

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[192] Sir Andrew Ogilvie, 'Reply: Complimentary Dinner to Sir Andrew Ogilvie' in *The Post Office Electrical Engineers Journal*, Vol 12, 1920, pp.70-81 (p.72).
[193] A Haigh, 'Post Office War Research' in Forthcoming PhD thesis. "*To Strive, To Seek, To Find": Post Office engineering research from the Experimenting Room to 'Dollis Hill', 1908-1938*.
[194] Ibid. p.9.
[195] M. Bridge & J. Pegg (eds.) *Call To Arms: A History of Military Communications from the Crimean War to the Present Day*, p.27.
[196] Ibid. pp.22-25.

World War can also be explained by reference to the type of battle that was expected. Preparations for battle were coloured by the prevailing opinion that the fighting would be over by the Christmas of 1914.[197] War was also expected to be characterised by active, offensive and mobile fighting, which would make telephone use impractical.

The trench warfare conditions that developed as fighting came to a stalemate prompted a rethink over the practicality and utility of telephony. In the dark, underground and isolated trenches, the telephone became a lifeline and an essential tool for communicating and working out what was happening over the fronts. The importance accorded to telephony was highlighted by the observation of one Corps that 'the telephone equipment is extremely valuable […] The equipment should, therefore, be treated as if it were made of glass, and as if it were as valuable as diamonds.'[198] Yet the sudden demand for telephone equipment could not be met by the small supply that had originally been stored and the Post Office became the Army's main supplier. In 1920, the Post Office believed that the total value of the equipment they had supplied so far totalled £6,400,000 and included 40,000 protected telephones, designed especially for the trenches.[199] Telephony became a crucial component of warfare and involved a huge investment from the Post Office. Not only did they provide a huge amount of plant, they also were able to use the specific conditions of trench warfare to experiment and test the limits of their equipment.[200]

The huge amount of equipment supplied to the Army meant that there were domestic shortages as manufacture for home use decreased drastically. British industrial factories were taken over to produce shells and telephone equipment specifically for the Army. This led to complaints at the end of the War. The Post Office played upon the patriotism of its wartime contributions with the following retort: 'He who asks, "Where are the wires to join up my telephone to-morrow, and why are they not available?" will receive the same answer he would have received had he asked, "Where are the men of the old Contemptible Army" "They lie buried in the soil of France and Flanders."'[201] By 1918 the Post Office had spent an estimated almost £7,000,000 on the war effort by designing and manufacturing communications equipment that could only be used by the military. 'Wire, cable, telephones, switchboards and

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[197] See M. Kay, 'Chapter 2, 3.1. The historiography of military telephony' in *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony*. (University of Leeds PhD thesis 2014) p.21.
[198] B.N. Hall, 'The Life Blood of Command? The British Army, Communications and the Telephone, 1877-1914' p. 62 my brackets.
[199] Sir Andrew Ogilvie, 'Reply: Complimentary Dinner to Sir Andrew Ogilvie' in *The Post Office Electrical Engineers Journal*, Vol 12, 1920, pp.70-81 (p.71).
[200] D. Juniper, 'The First World War and Radio Development' in The RUSI Journal, 148:1, 84-89 (p.87).
[201] W. Cruikshank, 'Editorial' in *The Post Office Electrical Engineers Journal,* 1919, vol.12. p.175.

signalling apparatus of new and varied types poured across the channel in ever- increasing quantities.'[202] In 1919, William Cruikshank, editor of the *Electrical Engineer's Journal*, bemoaned the fact that 'unfortunately the great proportion of this plant is of special design to meet military requirements, and would be of little use for civilian service if recoverable tomorrow.'[203]

However, by arrogating the technology of the trench telephones into technology for those with hearing loss, the Post Office was able to appropriate the military equipment for civilian use. Immediately after the armistice, the Post Office was reviewing their wartime expenditure and determining what could be recovered or salvaged. The Post Office was able to put specially amplified military equipment to a new use as specialised equipment for those with hearing loss. By identifying this new user group, the Post Office could try to recoup some of the money that had been spent on equipment and simultaneously recycle what was left to create their first telephone for the deaf.[204]

The editor of the Post Office's *Electrical Engineering Journal* recognised this kind of cross fertilisation of technologies and described it succinctly: 'The necessities of the war called incessantly for closer attention to research work, and the products of the military years are now being utilised in the arts of peace.'[205] The Post Office's research focus on developing telephony resulted in accelerated improvements to the service. Trench warfare led the Post Office's researchers to concentrate on improving amplification range and quality while simultaneously devising more portable sets that could be easily carried and set up in trenches. Civilian telephones did not function well in the damp and mud of a trench.[206] There was a constant tension, moreover, between audibility and portability, as an improvement to the latter tended to diminish the former. Similarly, in acoustic hearing aids, the desire for miniaturisation was offset by the awareness that larger funnels collected sound more efficiently and offered greater amplification. The conflict between miniaturisation, portability and greater functionality has continued on today and is evident in tensions over increasing functionality of hearing aids (to give access to music for example) within the power constraints of miniaturised batteries. While miniaturisation of technologies is often associated with progress (as in Moore's Law, for

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[202] Ibid.
[203] Ibid. p.176.
[204] Such appropriation of military equipment for civilian use has been explored by Mara Mills in relation to the miniaturisation of hearing aids in the U.S. in the context of the Second World War. See M.Mills, 'When Mobile Technologies were New' , in *Endeavour*, vol.33 no.4 (Science Direct 2009) pp.140-146.
[205] W. Cruikshank, 'Editorial' in *The Post Office Electrical Engineers' Journal*, 1920, Volume 12. p.77.
[206] M. Bridge & J. Pegg (eds.) *Call To Arms: A History of Military Communications from the Crimean War to the Present Day*, p.42.

example) in the case of hearing assistive technologies, miniaturisation has also been strongly related to the desire to disguise the technology.

Thus, engineers were aware that 'in designing light portable telephones such as those used for military communications at or near the fighting line it is necessary to make a fairly large sacrifice of signalling and speaking efficiency in order that the size and weight of the instruments may be reduced to a minimum.'[207] Portability was a crucial issue in the context of the battlefront. The first telephone supplied specifically for soldiers would have been a serious burden, weighing 26lbs (just over 11kg, see Figure 9).[208] This was because of the equipment used to increase the signal, as early valves were very heavy. Electrical hearing aids that used these kinds of valves faced similar issues around weight and portability. For example, the 1923 Marconi Otophone hearing aid was very heavy and immobile, so was advertised as a desk hearing aid that could be used for businessmen. This was very similar to the way the Post Office advertised their first amplified telephone, as the extra amplification equipment was stored in a desk box. This set did have a handle, however, and the telephone and its related apparatus were stored inside a wooden box designed to protect the equipment from rough handling and weather damage. Soldiers soon complained that it was too heavy and Post Office engineers designed a lighter version, which weighed just 13lbs.[209] This weight loss was achieved by replacing the bell receiver with a watch receiver and by cutting the cord to half length, while also waterproofing it and enclosing it in a thin rubber tube.[210] These were also designed so that their internal parts were easily accessible and thus could be easily repaired by the soldiers. Such accessibility remained built into the civilian telephones of the interwar years and enabled later hard-of-hearing users to self-modify their own telephones to better suit their own hearing needs.

[207] 'Trench Telephones' in *The Post Office Electrical Engineers' Journal*, vol. 8, 1915-16 pp.95-99 (p.95).
[208] Ibid. p.98.
[209] Ibid.
[210] Ibid. p.99.

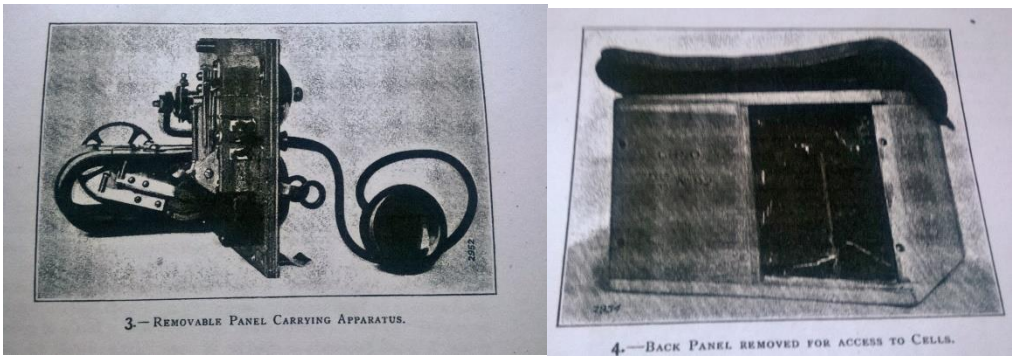

Figure 9: Trench telephones interior and back panel.[211]

The trench telephones benefited from further practical improvements that were necessary for their utility in trench conditions. For example, the top of the telephone box was covered with brown waterproof material cut from Post Office tents in order to camouflage the equipment and protect it from the rain.[212] Secrecy was paramount, and these telephones were further concealed with orthodox khaki paint to fit in with other standard army equipment (see Figure 10). This meant that the telephones did not create a visible target for enemy attention, but would have been large enough to have been obvious to the soldiers who knew where they were usually placed: 'When used in the field they are hung by the handle from a wooden spike driven into the wall of the trench, or a small rectangular recess may be cut with a spade to accommodate them.'[213]

[211] Ibid. pp.95-99.
[212] Ibid. p.99.
[213] Ibid. p.100.

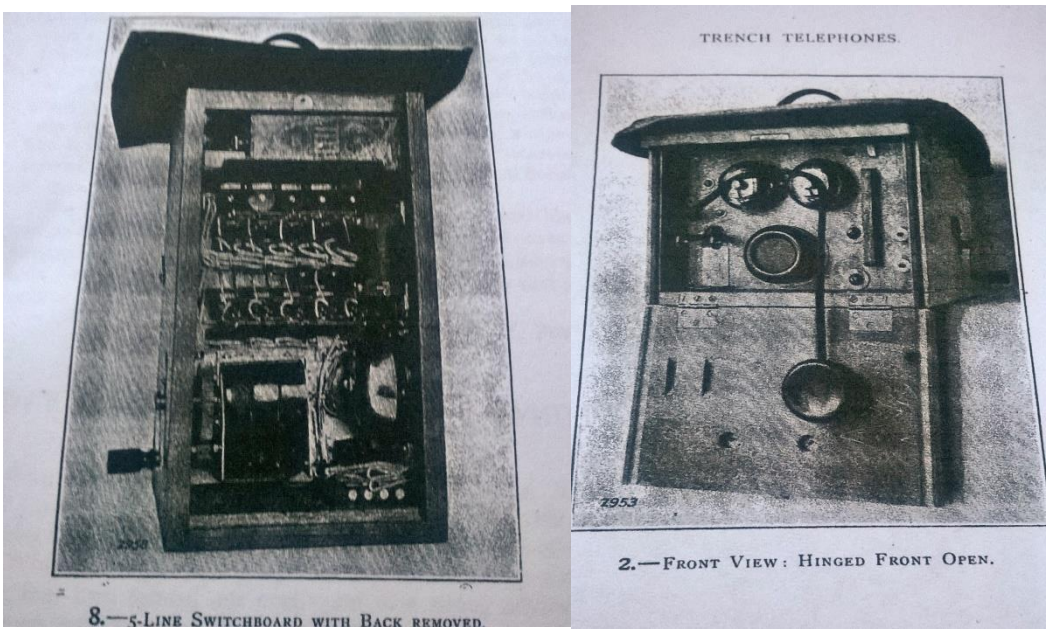

Figure 10: Trench Telephones.[214]

Concealment of the telephone box was simple enough, but the need for security over the line posed further complications. This issue was addressed by Captain AC Boney Fuller's invention. The Fullerphone (supplied by the Post Office) changed current frequency in order to combat enemy interception of telephone conversation, which had become a serious problem.[215] The Fullerphone became available in 1915, after it became clear that troop movements were being intercepted by the Germans.[216]

A previous solution to this problem had been trialled with the use of pairs of men who could communicate using regional accents or dialects which were harder for the German spies to understand. However, this solution was untenable long term and a lasting resolution was arrived at with the invention of the Fullerphone.[217] Captain Fuller's eponymous invention was initially conceived outside of his army work but then fully developed within the army and Graeme Gooday has shown that these issues were crucial in the post-war claiming of patent rights.[218] However, research at the Post Office was crucial to developing the device and they also offer specific insights into its workings. Colonel Vince recalled that 'he had many painful recollections

[214] Ibid. pp.95-99.
[215] M. Bridge & J. Pegg (eds.) *Call To Arms: A History of Military Communications from the Crimean War to the Present Day*, p.43.
[216] G.Gooday, 'Combative Patenting: Military entrepreneurship in First World War telecommunications' in *Studies in History and Philosophy of Science*, vol. 44 (Elsevier 2013) pp.247-258.
[217] Ibid. p.253.
[218] Ibid. pp.247-258.

when taking over battalion headquarters of having planted in his dug-out a fearsome instrument known as the Fullerphone, which throughout the night kept up a wail like a cow in distress!'[219]

Indeed, telephonic communication suffered most of all from poor sound quality, which was combated through the use of amplification technology, valves, and vacuum tubes. John Ambrose Fleming (who had hearing loss) had invented the thermionic valve while working for the Marconi Company in 1904. In 1906 Lee de Forest added a third electrode, meaning that those valves could be used for amplifying electrical current. This greatly improved long distance telephony but it was not until 1915 that they were used in European telephones.[220] A further challenge for innovation in the military context arose from the fact that the patent for thermionic was held by Marconi and lasted until 1918.[221]

Thus the telephone repeater was developed during the war amidst more secretive wartime developments. The *Electrical Engineers' Journal* took pains to emphasise that 'the author desires first to remove any misapprehension that the telephone repeater has been developed behind an official screen of secrecy.'[222] The term 'repeater' was initially used in telegraphy before the term was taken up in telephony, and initially referred to carbon microphones used to amplify the signal. There is further potential confusion over terminology because telephone repeater *stations* were also developed to boost the signal at points along long distance telephone lines. This meant that it stopped the signal strength decreasing over distance which had led to a reduction in audibility. However, the term repeater was also used by the Post Office to refer to the telephone instruments themselves, in which a thermionic valve was inserted to directly amplify the current. After valve technology became available, the Post Office engineers incorporated it into their telephone repeater systems to enhance the carbon microphone's power. The potential power of the thermionic valve as an amplifier was emphasised in the 1920 edition of the *Electrical Engineers' Journal*, in which the editor explained how the war activities had accelerated development.

> In no branch of the nation's activities- save perhaps in the development of aircraft – has there been such useful progress made during the war as in wireless telegraphy and telephony. The evolution of […] the oscillating thermionic valve, has been one of abnormal progress, and has placed in the hands of the engineer an instrument pregnant with possibilities.[223]

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[219] Sir Andrew Ogilvie, 'Reply: Complimentary Dinner to Sir Andrew Ogilvie' in *The Post Office Electrical Engineers Journal*, Vol 12, 1920, pp.70-81 (p.74).
[220] B.N.Hall, 'The Life Blood of Command? The British Army, Communications and the Telephone, 1877-1914' p.46.
[221] S. Arapostathis & G Gooday, *Patently Contestable: Electrical Technologies & Inventor Identities on trial in Britain* (MIT Press 2013).
[222] 'The Telephone Repeater' in *The Post Office Engineers' Journal*, Vol 12, 1919.
[223] W. Cruikshank, 'Editorial' in *The Post Office Electrical Engineers Journal*, 1920, Volume 12. P.79.

Amplification of telephony had long been a crucial issue for the Post Office. Its engineering department had been working with cathode rays to provide amplification as early as 1908.[224] The *Electrical Engineers' Journal* explained that their experiments were subsequently abandoned due to staff shortages but were revived in 1913 after the thermionic valve had been developed in the US.[225] The first valves used were 'round' French valves and these were incorporated into early instruments like Repeater Telephonic, No.2. From here, we can trace a line of development that leads to Repeater Telephone 9a, the first telephone specifically designed for those with hearing loss. Thus, repeater technology was initially applied to general improvements in telephony and then utilised in the unique challenge of communicating in the trenches, in which miniaturisation and lightening of equipment was a further issue. It is from these technical developments that the telephone service for the deaf emerged, in a post-war context in which hearing loss had become a high-priority issue.

The possibilities of amplification raised by valve technology were realised not only in general improvements to telephone audibility but also ultimately in hearing aid technology and in the telephone sets specifically designed for users with hearing loss; especially for those whose hearing had been affected by their war service. Moreover, the work that the Post Office did for the Government during the First World War signalled the start of an increasingly collaborative relationship between the state and the Post Office. This 'special relationship', as it was often referred to by the Post Office during the interwar years, was integral to the motivations behind the Post Office's development of their amplified telephone service for the deaf.

2.4 Conclusion

The First World War pension provisions mark a change in the extent to which the British government intervened in the health and welfare of its citizens. However, the pension system involved a variety of services and relied heavily on the activities of charities such as the work of the Deafened Ex-Service Men and the Bureau. These organisations were integral in campaigning for more help for deafened ex-servicemen. In addition to monetary recompense this help often took the form of lip reading classes and retraining. The deafened ex-servicemen were helped to adapt to their condition and reintegrated into the community. However, by the late 1930s, hearing assistive technologies such as hearing aids were clearly the standard solution for problems with hearing and it is in this context that we can place the continued development of

[224] 'The Telephone Repeater' in *The Post Office Engineers' Journal*, Vol 12, 1919. p.7.
[225] Ibid. p.7-8.

the Post Office's amplified telephony service. Moreover, the private/public system of providing care for the disabled set a precedent for the Post Office's development of hearing assistive technologies in their role as a state office.

The Ex-Servicemen who experienced hearing loss were often referred to as the War Deafened and this shift in terminology towards the 'Deafened' marks a change in categorisation which divided the deaf born from those who lost their hearing later in life. Yet, the pensions awarded to the deafened were less than half of those accorded to the blinded and this discrepancy is revealing of the priority still given to vision, despite the fact that hearing was often the more important sense in the trenches.

The kinds of coping strategies designed to assimilate ex-servicemen back into society were in marked contrast to the medical treatments promoted during the conflict. During the war, the clear disjuncture between the medical approach to curing hearing and the social approach to rehabilitating people with hearing loss through lip-reading and classes was especially marked. Perceived as a national problem, it was given high priority and regarded as being widespread. Within these changing social and medical attitudes to hearing loss the Post Office subsequently developed amplified telephony for the 'Deaf Subscriber.' Moreover, during the interwar years, the Treasury were in control of both the MOP and the Post Office finances and may have regarded the amplified telephony as working in tandem with the other rehabilitation solutions like hearing aids and lip-reading classes.

Reciprocity between warfare and technical development has been noted by many historians of science and technology.[226] Communications technology, in particular, has been developed in a wartime context. More broadly, historians have generally noted that the two world wars have changed the way science was practised and valued, especially by governments.[227] As well as changing the relationship between the state and science, World War Two has been identified as being responsible for a 'plethora of novel devices and instruments that were developed principally by physicists: oscilloscopes, microwave generators and receivers, rockets, computers, the myriad of new vacuum tubes and circuits: nuclear reactors, the many new particle detectors.'[228] The development of systems engineering has also been attributed to the Second

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[226] See M. Mills, The History of Electronics Miniaturisation' in *IEEE Annals of the History of Computing*. Vol. 33, Issue 2 p.25 and J.Abbate, 'Cold War and White Heat: the origins and meaning of packet switching' in D. MacKenzie & J. Wajcman, 2nd edition, *The social shaping of technology* (Open University Press 1999).
[227] M. Fortun & S.S. Scheweber, 'Scientists & the State: The Legacy of World War Two' in *Trends in the Historiography of Science* ed. By K. Gavrogla, J. Christianidis & E. Nicolaidis (K Luwer Academic Publishers 1994) p.327.
[228] Ibid. p.329.

World War communication collaborations between Bell Laboratories and the Western Electric Company.[229] These existing narratives concerning the civil appropriation of military technology is clearly relevant to this discussion of trench telephony being appropriated into a telephone service for the deaf. Yet the discussion of the cross fertilisation of military and civilian technologies is significant because not only was amplified telephony developed out of war technology but it was then used to mitigate a condition that was actually generated by the same conflict. Although the prevailing consensus on warfare and welfare is that it was the Second World War that precipitated large scale state intervention: this chapter has shown that in fact the trappings and ideologies inherent to the welfare state were apparent from the First World War. However, in the case of the amplified telephone, the influence of the state was not the primary factor motivating its design. In order to understand the fashion in which this technology developed, we need to understand its users.

[229] Ibid. p.330.

Chapter 3: Inventing the 'Deaf Subscriber': User Innovations in the Interwar Years

This chapter is concerned with the relationships between aspirational users and the development of the Post Office amplified telephones. By considering and comparing individual cases where customer interaction catalysed innovation, the chapter moves chronologically from the first amplified telephone, provided to customers in 1922, to consider the modifications which users compelled the Post Office to make during the interwar years, and finally concludes in 1939, after which point user input was sought in a more formalised manner.

As we saw in the preceding chapter, the First World War generated a new need for telephones for those with hearing loss. While the conflict had accustomed a generation of soldiers to the use of telephony, which they then desired to use at home, their wartime service had also left many of these same soldiers with myriad hearing loss problems, which raised the profile of deafness as a national concern in the public domain.[230] This development not only made the treatment of deafness a greater priority for the medical profession, but also changed attitudes towards deafness as perceptions of treatment shifted. This shift influenced a move away from treatments derived from eugenics based ideologies which conceptualised deafness as a purely hereditary condition to rehabilitation movements based around the theory that noise induced deafness could affect anyone. Chapter 2 of this thesis showed that war induced deafness meant that there was an acknowledgement of social responsibility (manifesting in various charitable movements for disabled veterans) as well as an official policy of state intervention (reflected in, for example, the establishment of the Ministry of Pensions in 1916).[231]

The Post Office's duty to provide an amplified telephone must be considered in the context of these interwar welfare developments. The Post Office was a state office of the Government, and its increased involvement in the welfare of its citizens had been marked through legislation like the National Health Insurance Act (1911), and the creation of the Ministry of Health (1919) and the Ministry of Pensions (1916). The First World War had further increased the newly enfranchised public's expectations that the Government was responsible for citizen welfare. The Post Office was under an obligation to provide amplified telephones because of the pressures coming from the Government, but also from users themselves. Disabled

[230] K. Subramanian & G. Gooday, *British Telecommunications History in the First World War* Working paper available for download <<http://www.leeds.ac.uk/arts/downloads/download/1552/ww1_working_paper> July 14th 2016.>

[231] War Pensions Records, *The National Archives*, Accessed online, 10th August 2014, < http://discovery.nationalarchives.gov.uk/SearchUI/details/C982-war-pensions-records-details>

veterans coming out of the First World War created a need for increased government intervention into public welfare and thus, as part of the Government, the Post Office had to have increased consideration of veterans who had become disabled as a result of their role in the First World War. Technical solutions were increasingly seen as the answer, with increased take up and provision of electrical hearing aids throughout the interwar years. Such contributing factors all created pressure on the Post Office to provide better service for their customers suffering from hearing loss. However, what is missing from this analysis is the influence of the customers themselves; the people with hearing loss who interacted with the Post Office and demanded a telephone they could use.

This chapter is structured around five case studies featuring hard of hearing telephone users who had a direct impact on the development of the Post Office's 'Telephone for Deaf Subscribers'. Although there was a great deal of interaction between customers and the Post Office during the interwar period, I have chosen to focus on a narrow but detailed sample of people whose actions had direct, tangible effects on the policy of selling, or the engineering of, these telephones. I will concentrate on two brothers running an eponymous firm, The Smith Brothers, as well as Mr Horace Buckley, Mr Raymond Harris, and Mr Mousley: key figures who made significant contributions to the development of the amplified telephone during the interwar years. By focusing on this narrow but representative sample, I bring greater depth to the experience of individual users. Indeed, the Post Office actively used the designs of certain individual inventors and incorporated them into subsequent versions of their amplified telephones. By analysing cases that provoked direct change, these studies chronologically chart the major developments in designing telephones for 'Deaf Subscribers' during the interwar period through the lens of the ordinary people using them. The first two case studies fall under the theme of critical engagement as the Smith Brothers and Buckley made persistent complaints to effect change, while two further instances of user engagement with the Post Office provide insight into the PO's attempts to balance the need to standardise its network with the need to provide for individual's hearing needs. Consequently, the chapter is arranged thematically, with individual case studies being used to illustrate these key moments of technological development.

The official institutional narrative charting the development of amplified telephony as provided by the Post Office itself does not give any indication of the considerable input that its users had on motivating and directing design. By recovering and reviewing such input, I show how hard of hearing users had considerable agency and influence in specialist telephone development and reconsider the historical attribution of the invention of telephones for the

hearing impaired. By analysing these case studies, we can see the way in which deafness came to be defined in relation to the ability to use the telephone and how the threshold for normal hearing changed as telephone amplification technology improved. Telephony was then used as a tool in the categorisation of disability and, in turn, telephone users modified such technology to fit their personal needs and identities.

However, there was increasing tension within the Post Office over how its apparent state responsibilities to provide a 'Telephone for Deaf Subscribers' conflicted with its need to function as a profitable business enterprise. Designing these telephones was not profitable for the Post Office because there was not a large market for their use. The motivation for their construction came primarily from the obligations of the Post Office as a state run organisation, and from the activism of individuals with hearing loss. This meant that the Post Office's involvement in telecommunications for hearing loss was marked by a conflict between duty and profit. Their use of the term 'Deaf Subscriber' did not reflect the needs or the identity of their clientele. The construction and use of the term 'Deaf Subscriber' was itself contrived in order to group people with hearing loss together, without considering the wide spectrum of hearing abilities or the stigma attached to the term. As a result of this, telephone users (such as those with greater hearing loss, different frequency needs or bone conductive hearing losses) were unhappy with their telephone provision and demanded that the institution fulfil its duty to provide telephone access to all types of citizens.

The first telephone designed especially to aid people with hearing loss was created by the Post Office in 1922 at the request of two wealthy London oil distilling businessmen called the Smith brothers, who insisted on an improved telephone service at any cost. Their actions form the basis of this chapter's first case study. The Post Office subsequently provided an amplified telephone service to their subscribers at an increased rental price. This first case study is significant because this alerted the Post Office to the problems people with below average hearing had with the telephone and caused them to make a telephone specifically for the hard of hearing for the first time. This was an extra cost to an already expensive telephone service and so between 1928 and 1934, Mr Horace Buckley, a schoolmaster and war veteran, continually demanded a cheaper amplified telephone for those who had lost their hearing in the First World War and could not afford high telephone rental on a meagre war pension (which was just under half of that accorded to those who had lost their sight).[232] Buckley threatened to take legal action against the Post Office because he found the Post Office's amplified telephone ineffective and

[232] Commons Sitting, Ministry of Pensions, HC Deb 06 March 1917, Line 251, Vol 91 cc241-354.

unnecessarily expensive. His complaints began in 1928 and were not resolved until 1934, when the Post Office introduced an improved amplifier at a reduced rate. His complaint was considered seriously because he had been deafened in the First World War and emphasised that the Post Office had a duty as a government department to help in such cases.

The improved telephone designed after Buckley's intervention was known as the Repeater 17a and was advertised in the booklet that came to the attention of Harris, whose actions modifying telephony instruments himself form the main focus of this chapter. Claire Jones has demonstrated similar processes of user feedback through analysis of the design process of medical trade catalogues in which medical practitioners would contribute to design and content.[233] Practitioners also engaged with the catalogue in ways that the catalogue manufacturers did not anticipate, for example, by adapting them to better suit their own needs and tearing out illustrations rather than using the reference numbers provided. However, the catalogue manufacturers, in turn, were more responsive to direct user input than to subversive practices and modifications. The Post Office also reacted negatively to Harris's subversive modification of the phone but it did have a concrete effect in that it forced the Post Office to take action and respond to his design and improve what they termed the 'Telephone for Deaf Subscribers'. In 1936, Mr Raymond Harris forced the Post Office to produce a superior amplifier by developing his own vastly superior amplifying device thus challenging the Post Office's monopoly. This third case is especially notable because Mr Harris' superior design invention was taken up by the Post Office and incorporated into their final amplified telephone in 1937. This telephone was far better but still expensive and it took Mr Mousley, the hard of hearing director of the Charles Winn Company and the subject of the fourth and final case study, to intervene for a better rate. These studies work chronologically to chart the major developments in designing telephones for 'Deaf Subscribers' during the interwar period. Comparison between private and public provision of amplification equipment is a recurring theme throughout all four cases.

Although combat in the First World War had led to a great increase in hearing loss among the nation's young men, the Post Office did not immediately consider this group as a significant market for specialist telephones. Moreover, valve technology used in amplified telephony was fragile and easily damaged and needed regular repair and replacement. Though valve technology and long distance telephone amplification had improved during the war, this research was being considered simply for incorporation into general telephone use because it was

[233] C.L. Jones, '(Re-)reading medical trade catalogs: the uses of professional advertising in British medical practice, 1870-1914' in *Bulletin of the History of Medicine* Vol. 86. Issue. 3 (2012) pp361-393. (p.367).

still difficult to hear the telephone even with normal hearing. More research and development was needed to apply such techniques to create telephones for the deaf. Furthermore, the installation and upkeep of the equipment was not covered by rental cost and the type of technology used often required adjustment and repeated maintenance. From a purely economic perspective it was not worth making such equipment. My preliminary financial analysis shows that the costs of manufacturing such devices were only just covered by charging increased rental.[234] What non-financial motivations did the Post Office have for creating their devices? While social and political considerations have been considered, here I demonstrate how users motivated design.

The cases I cite involve instances where the Post Office designed or advertised their products in a way that was not appreciated by their customers and so users reconfigured Post Office technology and created their own meanings and uses. The question of how technology users with specific needs shape the development of these technologies has also been addressed by Mara Mills and she identifies that people with disabilities are not readily identified as users with the power to effect changes in technological development.[235] Thus by ascribing agency to these hard-of-hearing users I bring increased focus to their central role in motivating the British Post Office to develop amplified telephony in the first half of the twentieth century. In this way, I also address the identification gap that Mills highlights, while also being influenced by the increased awareness that barriers to communication have been ignored within disability history narratives, which have been much more focused on issues surrounding physical barriers to access.

Mills's work considers the American case, providing an interesting contrast to the British case, because telephony developed almost concurrently across the Atlantic and was promoted by many of the same players, such as Bell and Edison. The American case also featured similar issues concerning the public/private dichotomy. Although there was not a nationalised company in the USA holding a monopoly over the telephone service as in Britain, the American telephone service was largely monopolised by AT&T, the company that had grown out of Alexander Graham Bell's telephone company. While AT&T's monopoly was not legislated by the Government, in practice it controlled the telephone service at this time and fought off any

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[234] Rental Particulars, 'Provision of Amplifier at Subscribers premises (rate book stores)' concerning Smith Brothers –Marshgate- Stratford. Accessed at BT Archives, In Folder no. POST 33/1491C Telephone Apparatus: Special Apparatus Fitted on Telephone Exchange Lines Rented by Deaf Subscribers. Valve Amplifiers.(henceforth referenced as Post 33/1491C).

[235] M.Mills, 'Hearing Aids and the History of Miniaturization' in *Annals of the History of Computing, IEEE* Volume:33, Issue: 2 (IEEE Computer Society, 2011) p.26.

competition in order to maintain this position. One seminal example of this is the 1949—1968 case of the United States versus the Hush-A-Phone company, which centred on the Hush-A-Phone device which was attached by the telephone user onto the telephone in order to improve audibility. This was considered by AT&T to be an illegal attachment that infringed on their monopoly and they fought for it to be banned in court.[236] The fact that it was physically attached may have helped them to win this case, as the Post Office decided not to press charges in a similar situation involving private hearing aid companies using couplers to link hearing aids with their telephones because they were not using physical attachments. This case will be explored in more detail in the next chapter.

The public/private contest in the UK was a result of the British Post Office's similar blanket ban on any private apparatus being used on their lines so, for example, private hearing aid companies could not insert equipment onto Post Office telephones and people with hearing loss could not fit private telephones for use on their lines. This denied them access to the main forum where telephony was used at that time: business. The lack of access to telephony was therefore both socially and economically disabling during this period. Issues over the terminology used to delineate different levels of hearing loss was a further recurring theme in this area and in this chapter it is particularly apparent that the Post Office was aware of the difficulties in categorising its 'Deaf Subscribers'. Increasing awareness of terminology reflected the increasing awareness of the stigma surrounding deafness.

Therefore, the changing terminology used in advertising to the 'Deaf Subscriber' is important because the Post Office's increasing awareness of the potential offence inherent in their terminology reflected their increasing awareness of the stigma, categorisation and conflict surrounding the term 'deaf'. By identifying a group of users as 'Deaf Subscribers', the Post Office was able to create a convenient category of people that they could target as a new customer group, but which did not in fact exist. Analysis of the proofs of their first advertisements reflect conflict about using the term 'Deaf Subscriber'. The tendency to employ the ability to use the telephone as a means of measuring deafness (a practice which continues today with over the phone hearing tests, for instance) is notable because the Post Office was in a position of being able to decide between declaring customers 'too deaf' to use their telephone or

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[236] G.F. George, 'The Federal Communications Commission and the Bell System: Abdication of Regulatory Responsibility' in *Indiana Law Journal*, Vol 44, Issue 3, Article 5, p.460-462 Accessed online, July 12 2014, http://www.repository.law.indiana.edu/cgi/viewcontent.cgi?article=2509&context=ilj
Thanks to Mara Mills for highlighting this case.

improving their technology so the threshold of measurement shifted. This kind of categorisation will be explored in more detail in the third case study on Harris.

Throughout my analysis of these case studies, I tend to refer to the Post Office as being a monolithic entity that spoke with one voice. This characterisation is largely pragmatic and is based on the fact that any institutional decision had to be agreed by the London headquarters where the Postmaster General always had the final say. On the other hand, the Post Office was comprised of a huge number of individuals who all played a part in various different departments that often had little communication with one another. Indeed, headquarters alone employed 10,000 staff members by 1920, excluding the head office personnel.[237] Of course there is a great deal of cross over between the development of amplified telephony and hearing aids, and the Post Office did test hearing aids at the research station at Dollis Hill on behalf of the National Physical Laboratory, in conjunction with the National Institute for the Deaf.[238] However, the case studies in this thesis highlight the division between the research and engineering department and the telecommunications and sales department, and reveal that these two branches had largely divergent views over the necessity of providing amplified telephony. This may have been because the Engineering Department was further removed from the problems that customers were bringing to their local district managers or sales departments. Duncan Campbell-Smith has noted that anything to do with engineering work had to be routed from the local divisions to headquarters in London, which 'led to endless complications: for example, over the installation of new or replacement equipment for telephone exchanges.'[239] This also meant that any meaningful decisions regarding amplified telephony were made in the London headquarters, with input from the Research Department. Moreover, until the Bridgeman Report prompted reform, the telephone network was severely retarded by the financial constraints imposed by the higher echelons of this massive administrative network, the Postmaster General and the Treasury. Essentially, the Post Office telecommunication services were still being run on the structure of the old National Telephone Company until the structural changes provoked by the 1932 Bridgeman Report.

3.1: The Businessmen

> If we were not bound by your authorities regulations- which forbid us- we think we are right in saying a private maker would very soon give us what we want the

[237] D. Campbell-Smith, *Masters of the Post: The Authorised History of the Royal Mail*, (Penguin Books, 2011) p.169.
[238] H.M.Wharry and G.PCrowden, 'Correction of Hearing Defects' in The British Medical Journal, vol 1, no.3727 (June 25, 1932)
[239] Ibid. p.271.

> same as the great National Telephone Company would have done- with an extra sensitive instrument (we do not mind paying).[240]

The Smith Brothers were the first customers to complain that the telephone was not loud enough for those with hearing loss. Their complaints resulted in the manufacture of the first amplified telephone designed specifically for the Post Office's new 'Deaf Subscribers'. The Smith Brothers were an oil distilling and refining company based at 24 Marshgate Lane, Stratford, London, who initiated a dialogue with the Post Office on 12 January 1922. One of the brothers in charge of the company, Mr Worringham Smith, had substantial hearing loss. By 1922, the telephone was considered an essential business and social tool and not only was it difficult to run a business without being able to use one; the Post Office would also have been aware that businesses like Smith Brothers Oil Company were their main clientele.

Figure 11: Letterhead of the Smith Brothers Company.[241]

Smith Brothers was a successful, powerful company with possible political connections and their letterhead (Figure 11) displays their government and railway contracts. Indeed, their business appeared in a directory of chemical manufacturers in England as early as 1869.[242] It also seems that they remained in business in this area until at least 1958.[243] Their correspondence with

[240] Smith Brothers & Co. Letter to The Engineer, London Telephone Service East Exchange, Jan 12th 1922. Accessed in BT Archives, POST 33/1491C.
[241] Smith Brothers & Co. Letter to The Engineer, London Telephone Service East Exchange, Jan 12th 1922. Accessed in BT Archives, POST 33/1491C.
[242] The Chemical Manufacturers' Directory, (Kent & Co, Paternoster Bow, London, 1869) Accessed On Google Internet Archives, April 1st, 2014.
<http://www.archive.org/stream/chemicalmanufac00artsgoog/chemicalmanufac00artsgoog_djvu.txt>
[243] M. Wells, *Contamination and Controversy in the Olympic Park*, in Games Monitor: Debunking Olympic Myths. Accessed April 1st, 2014.

the Post Office repeatedly stated that money was no object in their search for an amplified telephone, that the company had lost business because their company directors was unable to use the telephone, and stated that: 'They are willing to pay any sum within reason for facilities which will enable them to interpret their telephone messages. At present they are of the opinion that many orders are lost owing to their defective hearing.'[244] Emphasis of the impact that telephone exclusion was having on their business is important because businessmen were one of the first user groups to embrace telephony in the latter years of the nineteenth century.[245]

Their request was initially put forth in a detailed letter dated 12 January 1922, in which the author made two main points to persuade the Post Office to provide this service. First, he pointed out the lack of progress that the Post Office had made since nationalisation in 1912 and compared their service to private companies and in particular to the National Telephone Company. 'If we were not bound by your authorities regulations- which forbid us- we think we are right in saying a private maker would very soon give us what we want the same as the great National Telephone Company would have done- with an extra sensitive instrument (we do not mind paying).'[246] Their letter also pointed out that the requisite amplification technology was available and already used in telegraphy. 'In wireless telegraphy, as you know, they use amplifiers which greatly magnify the sound. Could not something of the sort be adapted to telephony, so that people with hearing below the normal could be placed on the same footing as those with normal hearing.'[247] Such a description of amplified telegraphy referenced in this instance was the repeater system which used thermionic valves along the line to prevent sound from weakening over distance.[248] The reason that this was in use for telegraphy long before being adapted to telephony is because the repeaters could amplify the static signal used in telegraphy but were unable to work in the same way with the undulating signals produced by the voice in conversation.[249]

<http://www.gamesmonitor.org.uk/node/406>

[244] Smith Brothers & Co. Letter to The Engineer, London Telephone Service East Exchange, Jan 12th 1922. Accessed in BT Archives, POST 33/1491C.

[245] M. Kay, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony*. (University of Leeds, PHD Thesis, 2014).

[246] Smith Brothers & Co. Letter to The Engineer, London Telephone Service East Exchange, Jan 12th 1922. Accessed in BT Archives, POST 33/1491C. His reference to the National Telephone Company is interesting as the government takeover of the telephone system was generally popular with the British public, who wanted a regulated, cheaper telephone service. A regulated government service may not however have been the best outcome for those who had specific needs that a private company might have provided for. The reference to using a private maker also referred to the threat of private hearing aid companies.

[247] Ibid.

[248] S.Hong, *Wireless: From Marconi's Black- box to the Audion* (MIT press, 2001) pp.163-167.

[249] Ibid. p.9.

The suggestion put forth by the Smith Brothers in their 1922 letters regarding amplified telephones for the hard of hearing was entirely feasible and the Post Office did adapt 'something of the sort' (as the London Superintending Engineer Mr Purves put it) in response to it. Purves firstly reacted by sending a letter to the Engineer-in-Chief which asked 'if there are any loud speaking receivers or other suitable devices to meet such cases.'[250] The Engineer-in-Chief responded to this request by developing amplification apparatus and inviting the subscriber to try it out. In this memo, from 10 March 1922, it became apparent that it was chiefly Mr Worringham Smith (of Smith Brothers) in need of the instrument. He wrote that he was, 'very favourably impressed' by the instrument and agreed to an annual rental addition of £5 15s to have it fitted to his telephone.[251]

After this success, it seems plausible that the Post Office would have started to advertise this impressive service and there is a note from the London Superintending Engineer on 10 April 1922 to the Engineer-in-Chief to that effect, which queried: 'Is it to be understood that this type of apparatus will be available for other subscribers? If so, presumably the Engineer-in-Chief will desire to consider all applications for its provision?'[252] The reply to this was a simple memo, stating: 'it is not desirable that the provision of amplifiers should be suggested to subscribers, but in special cases where a request for such provision is made and it is clear that the subscriber would benefit thereby it will in all probability be possible to supply the required facilities.'[253] This refusal could only plausibly be attributed to the prohibitive costs and is also an example of the Sales and Telecommunications Department within the Post Office being at odds with the Engineering Department; the former tended to show more enthusiasm for an amplified service than did the latter. The difficulties involved in improving the amplification technology were also a deterrent and this was compounded by the added expense incurred by adding the extra apparatus. Even though this extra cost to the Post Office could be offset by increasing rental, the cost of repairing the delicate valves meant that developing amplified telephony made very little fiscal sense even if many of their hard-of-hearing customers were able to afford such an increase to their rent.

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[250] Letter from Superintending Engineer (London Engineering District) to The Engineer in Chief. 30th January 1922. Accessed in BT Archives, POST 33/1491C.
[250] Ibid.
[251] Secretary for the Engineer in Chief, Memo dated 10th March 1922. Accessed in BT Archives, POST 33/1491C.
[252] Note to the Engineer in Chief, 1922, from Superintending Engineer. Accessed in BT Archives, POST 33/1491C.
[253] Memo attached to the above note. Accessed in BT Archives, POST 33/1491C.

Reluctance to develop specialist services can also be attributed to the nature of the Post Office institution and the way the Government influenced its attitude towards development. For example, when the Post Office did start to consider advertising in the late 1930s, an internal green paper on the subject was circulated by Stephen Tallents, which emphasised the special position of the institution and the perceived vulgarity of advertising.[254] The 1930s shift in attitudes towards publicity is explored in more detail in the next chapter, but it is clear that in the 1920s advertisement was considered to be far beneath the Government, which therefore influenced the workings of the Post Office. Its reluctance to advertise these services was to continue and will be discussed further in Chapter 4 in connection its relationship to wider government policy, but in the 1920s it seems that the reluctance could have been due to lack of confidence in the apparatus, the lack of profit it was likely to entail or to lack of demand. The influence of the Government on research and development has been commented on by Charles R Perry, who emphasised that: 'it is striking how much ideological attitudes actually influenced telephone development in Great Britain.'[255] The Post Office's reluctance to anticipate demand is the aspect that Perry highlights however, especially the way this was influenced by the Treasury, whose ideology was summed up by a clerk who wrote that:

> The sound principle in the opinions of My Lords is that the state, as regards all functions which are not, by their nature, exclusively its own, should, at most, be ready to supplement, not endeavour to supersede, private enterprise, and that a rough but not accurate test is, not to act in anticipation of possible demand.[256]

When it is considered that as a government institution it was so positively discouraged from innovation, it then seems less strange that the possibility of amplified telephony was only considered after complaints by irate hard of hearing customers. Nathan Rosenberg has also pointed out that: 'it is important to recognise that firms have little incentive to be fully aware of technological options which are not going to be used within the present production process. The reason is simple; acquiring new information is costly.'[257] The Post Office's reluctance to innovate and advertise its services in a relatively specialised area, that is, amplified telephony, can therefore also be attributed to the expense of research as well as being in line with government policy.

It seems that development at this time stagnated because there were no further references in the archives to amplified telephony until two years later in 1924, when advertising

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[254]S. Tallents, 'Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934) p.17.
[255] C.R. Perry, 'The British Experience' in I.D.S.Pool (Ed.) *The Social Impact of the Telephone*, (The MIT Press, 1977) p.85.
[256] Ibid.
[257] N.Rosenberg, *Exploring the Black Box*, (Cambridge University Press, 1994) p.5.

the service was again considered. This issue was addressed on 19 January 1924 when a letter to the Engineer-in-Chief stated:

> Presumably the provision of amplifiers for the use of telephone subscribers suffering from deafness can now be regarded as definitely past the experimental stage, in which case it is desirable that a brief description of the apparatus and the tariff applicable should be circulated to District Managers.[258]

This was done and a brief description of the 'Repeater Telephonic 9A' appeared in a press release given to various newspapers: 'A valve amplifier suitable for connection with the public exchange system is now available for the use of 'Deaf Subscribers' who experience difficulty in the use of the standard telephone.'[259] This cost £1.10 per quarter to rent and subscribers were invited to have a 'trial hearing' of the apparatus as long as they were prepared to pay for any expense incurred if they decided not to rent it. This was the first repeater telephone designed specifically for people with hearing loss and it was comprised of a single thermionic valve, a Siemens dry battery cell (27), three dry "Y" cells. This amplification equipment cost £13 in total, including the standard telephone no.48 which it was designed to fit on to. It cost £18 to insure and valves were notoriously difficult to maintain as they were fragile and often were damaged by weather extremes or by overheating. As a result, although projected annual profit was stated to be £0.81 (10% of the overall cost), it seems that with the extra maintenance this device was probably not particularly profitable.[260] The Smith Brothers made it clear that the money involved in renting this device was of no concern to them, but of course this was not representative of the majority of telephone users with hearing loss. Even by 1924, it still cost £18 to insure the plant, indicating how costly the apparatus involved in this device was.[261]

The Repeater 9a also featured a controlling key to turn up the volume or decrease it as necessary, which was initially stored in a separate wooden box, with the valve amplifier. This aspect of its design was later to be modified, following customer criticism. This device was stated retrospectively in 1939 to allow the hard of hearing user a 21.5 gain in decibels.[262] This figure is questionable however as it appears in a table made up by the Telecommunications Department charting the progress of amplified telephony, but internal correspondence from 1936 reveals

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[258] Unknown Author (possibly the Liverpool District Manager), Letter to the Engineer in Chief. 19th January 1924. Accessed in BT Archives, POST 33/1491C.
[259] Memo from Accounts to the Superintending Engineer, 23rd October, 1924. Accessed in BT Archives, POST 33/1491C.
[260] Breakdown of rental billing costs in rate book stores for providing amplified subscriber to Smith Brothers & Co. 1924. Accessed in BT Archives, POST 33/1491C.
[261] Memo concerning insuring the repeater 9a, The Engineer in Chief (Accounts) to the Superintending Engineer, 23 October, 1924. Accessed in BT Archives, POST 33/1491C.
[262] The Telecommunications Dept. 'Deaf Aid Telephone' 29th April, 1939. Accessed in BT Archives, POST 33/1491C.

that: 'The PO amplifier gain varies from 2-8 dbs over the usual range of frequencies.'[263] To put this into context: normal speech takes place at around 60db, an increase of 10db would be about twice as loud; 21.5db would be about four times as loud, yet 8dbs would be just above noticeable change, which is said to take place at 5dbs.[264] The telephone Repeater 9a in use with the standard telephone 150 featured a wooden box which contained the volume control dial and was meant to be either placed onto a desk or mounted to the wall behind it (see Figure 12). This desk-based design reflected the needs of the intended business user, but the box was very unpopular with customers who felt it was too cumbersome and its redesign is considered in Chapter 4.

Figure 12: The Amplified Telephone with separate box containing amplification equipment.[265]

The central problem with the volume control being held in a seperate box was: 'the need for accomodating the amplifier case on a desk in close proximity to the telephone in order that the volume control key associated with the amplifer case can be readily operated.'[266] It seems,

[263] Letter to the Engineer from H Stevens, Concerning the Harris Amplifier. 18/5/36 Accessed in BT Archives, POST 33/1491C.
[264] S. Claridge, 'How Loud is too Loud: Decibel Levels of Common Sounds', Accessed online, April 9th 2014, <http://www.hearingaidknow.com/2007/03/07/how-loud-is-too-loud-decibel-levels-of-common-sounds/>
[265] Accessed at BT Archives POST 33/1491C.
[266] Secretary for the Engineer in Chief, 'Valve Amplifier for use for deaf persons' April 3rd, 1933. Accessed in BT Archives, POST 33/1491C.

however, that for those who did try to take advantage of the available Repeater 9a, the experience was far from satisfying. It may be that unsatisfying customer service was sometimes to be expected from the Post Office. This is a point of view that the telephone historian JH Robertson suggested when he pointed out that, after nationalisation: 'there descended upon the telephone system of this country a certain sedate and smug inefficiency, which only put an edge on the by now almost traditional exasperation which the ordinary citizen felt in all his dealings with the telephone.'[267] It is not hard to imagine that if an ordinary citizen was exasperated with their telephone service, then someone with hearing loss could be seriously frustrated.

The unpopular box design was to remain until 1933, when it was deemed necessary to design a new amplified telephone due to the intervention of Mr Buckley, whose case is explored below. However, even a few years after their dissemination, these newer telephones were not avaliable for use in all areas. Futhermore, before this point many people with hearing loss would not have been aware of the possibility of renting an amplified telephone, as amplified telephony had not been widely advertised.

The case of the Smith Brothers is significant because it highlights the increasingly important role that telephony played in businesses in the early 1920s. It also shows that the Post Office took seriously the issues raised by their target users and crucially, that their first attempt to amplify telephones for the hard of hearing was a direct result of customer intervention. The Smith Brothers were not representative of the majority of hard-of-hearing telephone users however, as their sucessful business meant that the extra rent needed for their improved telephone was negligible. This was not the case for many hard-of-hearing subscribers however, particularly not for those who had lost their hearing in the war and were struggling with the small pension amount awarded for this injury. This was the case for Mr Buckley, a schoolmaster who had lost his hearing in the First World War and is the focus of the second case study.

3.2: The War Veteran

'the price charged by the Post Office is out of all reason.'[268]

Mr Buckley was a schoolmaster teaching at Magdalene Court Boarding School in Broadstairs, Kent, who described himself as slightly deaf due to his long war service but who needed to use the telephone to contact parents in London. In the late 1920s, there were still problems with

[267] J. H. Robertson, *The Story of the Telephone*, (Trinity Press, 1948) p.92.
[268] Correspondence from H.C. Buckley to Postmaster General. Dec. 12th 1928. Accessed in BT Archives, POST 33/1491C

increasing attentuation over long distances and this could exacerbate the difficulties of hearing on the telephone, especially for those living in the countryside. Mr Buckley's complaint was not with the efficiency of his amplifier however, but with the cost of rental. He made a number of points to support his claim that it was overpriced, attacking the institution in two ways: first of all highlighting the fact that the Post Office had a duty to their customers, especially if they had lost their hearing through war service, and secondly by threatening legal action to remove the Post Office telephone poles on his land. Denial of wayleaves was a fairly serious threat to telephone providers, going back to the beginning of telephone service, and could hinder service provision.

He started his complaint by writing directly to the Postmaster General on 19 October 1928 with the explaination that he was 'slightly deaf' and struggled to hear country calls clearly.[269] He followed on from this by stating that he had enquired into the cost for an amplifier and that 'the local engineers who do our wireless tell me that they are not allowed to fix an amplifer; that the actual cost is only a few shillings and that the proposed charge by the local Telephone Manager is exorbitant.'[270] The Postmaster General responded in December, pointing out that 'valve amplifers are relatively costly to maintain' which accounted for the increased rental cost.[271] The Post Office did however agree to reduce the original amount asked for and also stated that the engineering department were trying to design a cheaper version. This was, however, not enough to placate Mr Buckley and he quickly replied and emphasised the fact that 'the price charged by the Post Office is out of all reason.'[272] His grievance was not just based on the fact that he thought that the Post Office was overcharging for electrical equipment however, he also believed that it was their duty to help customers with hearing loss.

> I considered that it was the duty of the Department to make these charges as little as possible for the convenience of the telephone subscribers, that the necessity for the amplifier arises out of my deafness which is a result of my long war service and for which I am in receipt of a small pension for life; and furthermore, I draw attention to the fact that I was asked some time ago to permit the Dept to erect some telephone poles on my land. At the time of giving my consent to the erection of these poles I reserved my right to give the Dept notice to remove the poles within one month.[273]

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[269] Correspondence from H.C. Buckley to Postmaster General, October 19th 1928. Accessed in BT Archives, POST 33/1491C
[270] Ibid.
[271] Correspondence from secretary to the Postmaster General to H.C. Buckley, December 1928. Accessed in BT Archives, POST 33/1491C
[272] Correspondence from H.C. Buckley to Postmaster General. Dec. 12th 1928. Accessed in BT Archives, POST 33/1491C
[273] Ibid.

By referencing his war service and the fact that he received a small pension he pointedly reminded the Postmaster General that the Government was taking greater responsibility for the welfare of its citizens. The relatively paltry pensions for deafness (compared with other conditions) have been discussed in the previous chapter, particularly in relation to the discrepancy between the compensation for loss of sight and loss of hearing. Clearly, it was not enough to enable Mr Buckley to stop working although his disability meant that he was unable to do his job properly. However, examination of the pension records reveal that the only possible match for a Mr H Buckley is Horace Buckley, who had been given his pension for being shot in the arm.[274] His pension was therefore unconnected to his hearing loss, but it was his hearing loss that he found disabling because of his inability to access telephony in the way he was expected to.

His threat regarding the telephone poles wayleave did have some substance however, as the Telegraph Act of 1863 contained the restriction that the 'Company is not to place a telegraph along a street or road without the consent of the body having control of the street, etc.'[275] Crucially however, the Telegraph (Construction) Act of 1916 had amended this right of consent to be dependent upon the request for removal taking place within two months. As a result, this amendment had the proviso that the 'owner must consent within two months, otherwise a 'difference' is deemed to occur and must be resolved before work can begin.'[276] Perhaps Mr Buckley was not aware of this amendment as presumably he would have stipulated that he desired immediate removal, rather than trying to use their removal as a threat. The Post Office must have been aware of this, and waited for 28 days before responding to his threatening letter. This allowed them to respond by asking him to retract his stipulation for their removal, in full accordance with the law: 'The Postmaster General possessed statutory right to the use of all streets and public roads for the purpose of his telegraphs and it would be inconsistent with that right and contrary to public policy that he should give an undertaking to remove his telegraphs on notice.'[277]

Eventually, this case came to a close in 1934 when the Post Office designed a cheaper version of their amplifier which Mr Buckley agreed to rent at reduced cost and with a freehand

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[274] Medical Report of a soldier boarded prior to discharge or transfer to class W., W. (T), P., or P., or P. (T(, of the Reserve' Army Form B 179A. Accessed via the National Archives finding no. WO363

[275] Telegraph Act of 1863, Restriction No. 12. Accessed online, April 13th 2014, <http://www.tfo.upm.es/ImperialismoWeb/TelegraphAct1863.htm>

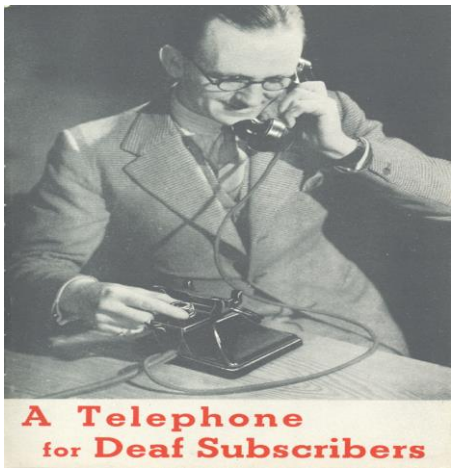
[276] Telegraph (Construction) Act of 1916. Accessed online, April 13th 2014. < http://www.tfo.upm.es/ImperialismoWeb/TelegraphActs.htm>

[277] Letter from The Superintending Engineer to Mr Buckley, 8th February 1929. Accessed in BT Archives, POST 33/1491C.

microtelephone. His resort to legal action and his threats to take the Post Office to court were clear demonstrations of how important the telephone was to him and also indicated his strong belief that on principle, the Post Office should support the men who had damaged their hearing in the war. The involvement of the Postmaster General also indicates how seriously his threats were regarded by the institution. The freehand microtelephone telephone given to him was for use with the Repeater 17a, and was referred to as 'freehand' because the volume control was situated on the telephone itself rather than in the wooden box. The Repeater 17a was a further improvement on the Repeater 9a because it utilised a triode valve rather than just one thermionic valve. This case was also significant because of Mr Buckley's status as a war veteran, which gave him more leverage to argue his case due to the Government's alleged post-war commitment to disabled veterans.

3.3: The Inventor

My instrument can be seen and tested at my office, Bowyers Wiltshire. I am not taking all this trouble in order to get an instrument for myself but because other deaf people also require an efficient instrument.[278]



> 'For a business man to have to rely upon a member of his staff to conduct his telephone conversations is a disability which must be irritating both to himself and, which is probably more important, to his correspondents. He cannot really afford to take this risk yet he may think he has no alternative. To be dependent upon his wife or servants to answer his friends' telephone calls is equally unpleasant in his social relationships. Many tolerate this condition while, fortunately, it is entirely unnecessary.'

Figure 13: 1936 advertisement 'A Telephone for Deaf Subscribers', shown with associated text above.[279]

[278] Mr Raymond Harris' reply to the Bristol District Manager, 12th January 1937. Accessed in BT Archives, POST 33/1491C.
[279] Proof draft of the 1935 advertisement 'A Telephone for Deaf Subscribers' Repeater 17a, 19th October 1935. Accessed at BT Archives. Finding no. TCB 2/ 172.

The advertisement shown in Figure 13 shows the way that the Post Office marketed the amplified telephone service as a device that could ease fraught social relationships and promote independence from familial care. They stigmatised hearing loss in order to market their products. Yet it is clear that this promise was not fulfilled in practice when Harris wrote to the Post Office to try the newly advertised amplified telephone, which had of course been designed in conjunction with the Smith Brothers. The pattern of such collaborations indicates that the Post Office was heavily influenced by the specific needs of certain hard-of-hearing subscribers. Harris stipulated regarding his new amplified telephone, that 'unless it was much better than the previous one I had tried I did not want it.'[280] After he had previously tried the 1922 Repeater 9a and found it to be unsatisfactory, Harris had instead designed and built his own personal amplifying apparatus which he used in conjunction with the Post Office telephone and insisted was far superior to even the most recently advertised equipment. This led to a protracted struggle between Harris and the Post Office. Whilst Harris believed that the Post Office should have been able to provide apparatus at least as good as his own for anyone suffering from hearing loss, the Post Office did not want private apparatus used on its lines, but simultaneously did not want to waste money designing specialised apparatus for a single customer. Although the Post Office was advertising to a category of people which its marketing labelled as 'Deaf Subscribers', who paid increased rent for the amplified telephones, it did not believe it needed to improve the apparatus aimed at them.

Harris was able to successfully modify his telephone because he was a wealthy and successful large business owner whose wealth had been partially built on his company's technical improvements to refrigeration techniques.[281] Harris had the wealth, technological facilities, and expertise necessary to create an apparatus that other users needed but had neither the skills not resources to construct. Harris, like Buckley, rejected the authoritative legitimacy of the Post Office. Although telephony was still a luxury item for most households in 1930s Britain, for Harris it was an essential and necessary business tool. The first communication between Harris and the Post Office was through his mother, Mrs. J. Mitchell Harris, as she telephoned to rent the amplified telephone on behalf of her son.[282] Harris, a businessman forced to rely upon his mother to conduct his telephone business, was exactly the type of customer the Post Office was

[280] Letter to the Sectional Engineer, Bristol, from Mr Raymond J Harris, Calne, Chilvester Lodge. 1st July 1936. Accessed in BT Archives, POST 33/1491C

[282] The Telecommunication Department to the District Manager 'Harris, Chilvester Lodge Calne', 21st November 1936. Accessed at BT Archives. Finding no. TCB 2/ 172.

targeting: a businessman forced to use unsuitable people as mediators in private transactions because of hearing loss. After Harris made it clear that he was not satisfied with the new telephone, the Post Office responded by visiting his home. This allowed them to ascertain that the equipment was working but that the newly advertised instrument was not supported in his service area.[283] The Sectional Engineer's visit was crucial however, because it allowed him to closely examine Harris's personal amplifying device and send a diagram outlining its design to the Engineer-in-Chief. Harris's apparatus was described by the engineers as a microphone that other members of the household could use, in the dining room for instance.[284] It is not completely clear whether this was used like a hearing aid for conversations or solely as a device to be used with the telephone. It could have been used in either capacity, because Harris used the older style of candlestick telephone, with a separate receiver and transmitter (see Figure 12). He would place his amplifier beside the receiver and then plug in headphones to hear the amplified sound. By doing this, he amplified the sound after it had passed through the telephone rather than increasing the signal strength in the manner of a Post Office telephone repeater system. Similar instances of unanticipated appropriation of candlestick style telephones were evident in cases of people with bone conductive hearing loss, who would hold the receiver to their mastoid bone rather than to their ear and still be able to comfortably talk into the transmitter (mouthpiece).[285] Such usage only became apparent to the Post Office as the candlestick telephones were phased out and replaced with standard integrated headsets. This led to an unexpected surge of complaints from telephone users with bone conductive hearing loss and was another factor that motivated the Post Office to improve their amplified telephone service. In 1936, newly integrated telephone headsets led to an unexpected surge of complaints from hard of hearing users who had been using the older candlestick models to listen to the telephone through bone conduction. For example: 'one deaf subscriber has encountered difficulties since the introduction of the hand micro-telephone, as he had been accustomed to holding the bell receiver to the bone at the back of the ear to obtain best reception for his particular deafness.'[286]

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[283] It could be used in CB. and automatic areas but not in the Magneto and CBS. areas. At this time, the telephone service was divided into service areas which were abbreviated according to the system they used. They were either CB (central battery working) CBS (central battery signalling) Magneto (using crank generators), or the Automatic exchanges which were becoming more common after 1920. CBS and Magneto were old and outdated systems by the 1930s which explains why the newer amplified telephones did not work in areas using these systems. They also had batteries at their end rather than at the exchange, which would have further complicated adding extra apparatus.
[284] Letter from A.C. Belgrave to The District Manager, 'Valve Amplifiers for Deaf Subscribers' September 12th 1934. Accessed in BT Archives, POST 33/1491C.
[285] For more on unintended user appropriation see N. Oudshoorn & T. Pinch (eds.), *How Users Matter*, (The MIT Press, 2005) and R.Oldenziel & M Hard *Consumers, Tinkerers, Rebels: The People who Shaped Europe*, (Palgrave Macmillan 2013).
[286] Research Report no. 9150 'Aids to telephone reception for partially deaf subscribers' Post Office Research Station, 21 April 1936, BT Archives reference no, TCB 422 09150.

This prompted an investigation 'as the result of a request by branch S1 for an investigation into the use of bone conduction devices, various possibilities of assisting 'Deaf Subscribers' in the use of the telephone have been considered and are reviewed in this report.'[287]

In their investigation, the work of a researcher – Dr Phyllis Margaret Tookey Kerridge – was foregrounded and referenced repeatedly, especially her 1935 article in the *British Medical Journal* on 'Aids for the Deaf.'[288] In this paper, Kerridge explained: 'what practical advice a general practitioner can give to help those deaf patients who are left with a permanent disability after the best has been done for them on medical and surgical lines.'[289] This statement of intent, with which she began the article, is revealing of the fact that responsibility for the deaf was in a state of flux between medics and manufacturers during this period. It is also clear in this article that Kerridge planned to work towards a method of measuring patients for hearing aids that would be followed by GPs as standard.[290] The Post Office engineers were chiefly concerned with Kerridge's discussion of bone conduction, and quoted her extensively:

> The whole subject of hearing aids for the deaf is complicated by the extremely varied nature of deafness and of individual requirements. As far as reception by bone conduction is concerned, a medical authority [Phyllis Kerridge] states that "bone conduction earpieces are popular because they are less conspicuous than the others, but their useful field is a limited one" […] In telephone usage, of course, the conspicuousness of the earpiece is of no consequence.[291]

The Post Office used Kerridge's observations to create their telephone Repeater 17b, which offered a different frequency characteristic to the Repeater 17a. However, this device could not be made available as standard, and this was not the last time that Kerridge's research influenced the Post Office as, two years later in 1938, the Post Office sought her help on a new, more ambitious project to create one standard improved telephone service for 'Deaf Subscribers', which is the subject of the Chapter 5 of this thesis.

The development of amplified telephony was marked by tensions between the Post Office's monopoly of telephony and its duty to provide a service to citizens with varying hearing needs. The diverse needs of telephone users were not met by the technology provided for an imagined

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[287] Ibid.
[288] Kerridge, 'Aids for the Deaf.' In *The British Medical Journal,* vol.1 no.3886 (June 29 1935) pp.1314-1317 (p.1316).
[289] Ibid. p.1314.
[290] For example, in relation to quack hearing aid manufacturers she stated: 'Much of the trouble would be avoided if the medical profession could advise their patients more precisely on the subject, but there is no source of information readily obtainable, either in text-book or in hospital teaching' and 'Ideally it should be possible to prescribe a hearing aid according to each patient's requirements. With modern methods of testing deafness accurately this end is perhaps within sight.' Kerridge, 'Aids for the Deaf.'
[291] Research Report no. 9150 'Aids to telephone reception for partially deaf subscribers,' Post Office Research Station, 21 April 1936, BT Archives reference no, TCB 422 09150.

standard 'Deaf Subscriber' and so improvements to amplified telephony were affected by the complexities of matching individual user needs with the Post Office institutional set up. Individuals' lived experience of hearing loss came into conflict not only with the dynamics of supply and demand within the Post Office but also with its desire to base production on standardised mechanisation.

3.3 (i): The quest for standardisation: Embodied knowledge embodied into measurement

The disparity between the Post Office's measured approach to the amplified telephone and Harris's personally embodied design was at the heart of the tensions that developed in this case. Although his modified device was perfect for him, it was not accepted by the Post Office because it was not standardised and could not be measured by their equipment or engineers. Harris's correspondence with the Post Office is especially revealing of such inconsistencies between institutional expectations of hearing and user expectations of amplification, as well as incongruities inherent in Post Office policies regarding their 'Deaf Subscribers'. Furthermore, his case highlights how users drew upon personal experience and bodily knowledge to improve the telephones in ways that the Post Office could not.

Through the increased use of machines like the audiometer that marginalised human experience, devices such as Harris's personally-developed apparatus for his individual hearing needs were increasingly in conflict with such methods of measurement and design. His invention could not be measured, tested, or trusted by the Post Office engineers. Ideas of trust being invoked by a particular instrument or measurement have been explored by Gooday in the context of electricity and measurement in the late nineteenth century. Trust in instrumental measurement was also contrasted with distrust in the body.[292] In the context of Harris's innovation, his body was problematized as a reliable source of knowledge because it could only be measured in individualistic terms. Yet it was his personal insight that allowed the Post Office to improve their amplified telephone service. They profited from his bodily knowledge by turning his insight into a commodity that could be exploited for commercial gain. Mills has pointed out that disability can be used in this way to provide a source of technical innovation but that in the case of telephony and hearing loss, this connection is far deeper and more complicated than simple appropriation.[293] Indeed, the kind of technical insights that Harris could

[292] S. Arapostathis & G. Gooday, *Patently Contestable: Electrical Technologies and Inventor Identities on Trial in Britain*, (MIT Press, 2013) p.33.
[293] M. Mills, 'Deafening: Noise and the Engineering of Communication in the Telephone System' in Grey Room Vol. 43, Spring 2011, (Grey Room, Inc. and Massachusetts Institute of Technology 2011) pp.118–143.

provide were not welcomed by the Post Office telecommunication department, who were trying to provide a standard telephone for the deaf that could be used by a typical 'Deaf Subscriber'. As a Government department, standardisation was integral to the Post Office's wider ethos regarding its customers at this time, as providing the same service to all was integral to its democratic position. The aspiration for standardisation was also a built-in component of telephone networks in general and was partially stimulated by technical necessity. In the US, for example, though the telephone network AT&T did not have a government mandated monopoly, it still dominated the lines of communication with standardised systems and policies designed to give standardised service.

Although it was created for an individual need, Harris's device was superior to the Post Office's device in providing greater amplification as well as being uniquely suitable for his exact level of hearing. The Repeater 9a, the only amplified telephone that could be used in Harris's area, utilised just one single thermionic valve and one dry battery whereas Harris's circuit created greatly increased amplification because it used a triode valve and a pentode valve. The resulting amplification was so great that Post Office engineers reported that it could not be tolerated by a person with normal hearing and that they could not risk putting on the headphones to test it.[294] The level of amplification was perfect for Harris however and this particular aspect of his invention can be usefully considered as a form of embodied knowledge, a type of knowledge intimately linked to a person's specific nature.[295] Knowledge of the degree of amplification and tone control needed in order for Harris to hear on the telephone was something that only he could gauge. His body and his hearing allowed him to mediate the level of amplification in a way that the Post Office engineers physically could not. However, the fact that the Post Office reproduced his amplifier instead of allowing him to use his own indicates that the kind of embodied knowledge gained through (dis)ability was not considered legitimate by the institution. Indeed, the decision to move away from equipment designed using personal, embodied knowledge of sound through individual sensory judgement was reflected in larger movements towards standardised measurements of sound in the 1920s and 1930s. Such technocratic approaches represented a developing dichotomy between the divergent needs of users with hearing loss and the decibel based standards of the Post Office. Although the Post Office

[294] W.G. Lucton, Sectional Engineer. Letter to the Bristol District Manager, 5th August 1936. Accessed in BT Archives, POST 33/1491C.
[295] M. Fourcade, 'The Problem of Embodiment in the Sociology of Knowledge: Afterword to the Special Issue on Knowledge in Practice.' In *Qualitative Sociology*, (Springerlink, 2010) p.2.

admitted that Harris's device provided greater amplification, this dichotomy proscribed Harris's embodied invention as an unmeasurable, untrusted and unpatented device.

3.3 (ii) The relationship between patents and community inventions

The relationship of patents to identity and community becomes clear when considering why Harris did not patent his invention. The ethical conflicts related to medical invention and patents have recently been explored in relation to hearing loss because of Andre Djourno's decision not to patent any of his inventions related to electrical auditory prosthesis, which stimulated the development of the cochlear implant. He believed his work should be open science, used in the public realm for the public good.[296] Such an attitude problematizes patents as counter to the unfettered development of important medical devices. By prioritising free access to invention, Harris allowed the Post Office to produce his device for others without due credit. His involvement was also restricted, as the quotation below demonstrates:

> For his private use the subscriber has an amplifier with associated microphone giving an output much in excess of our instrument. I have called for a special report on this private apparatus and may be able to adapt our amplifier to work in conjunction with it. No mention of this has of course been made to the subscriber.[297]

The Post Office explicitly decided not to inform Harris that they were compiling a special report on his apparatus as this, alongside the absence of patent protection, allowed its engineers to reproduce his design without his knowledge or consent. There was precedent within the Post Office of appropriating designs in this way, as can be seen in the case of the deaf electrical engineer Oliver Heaviside and his interactions with the Post Office in the late nineteenth century.[298] Like Harris, Heaviside had hearing loss, worked on improvements to telephony (long distance telephony) and did not protect his inventions because of his altruistic principles. Heaviside also had an acrimonious relationship with the Post Office and his 'open approach to 'do good to my fellow creatures' was in part a reaction against attempts by William Preece, the Chief Electrician at the UK Post Office, to suppress his theories of long-distance telephony.'[299] Because Heaviside did not patent his innovation and took the same moral stance as Harris regarding the need to share inventions, the Post Office was able to adopt his invention

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[296] P.R. Seitz, 'French origins of the cochlear implant' in *Cochlear Implants International*, Vol.3, Issue 2, (Whurr Publishers Ltd. 2002) pp.77-86 (pp.82-83).
[297] W.G. Luxton, Bristol Sectional Engineer to the Chief Engineer, 5th August 1936, Accessed at BT Archives. Accessed in BT Archives, POST 33/1491C.
[298] S. Arapostathis & G. Gooday, *Patently Contestable: Electrical Technologies and Inventor Identities on Trial in Britain*, (MIT Press, 2013) pp.106-10.
[299] Ibid. p.107.

without according Heaviside any recognition.[300] Like Heaviside, Harris was an innovator but he was also first and perhaps foremost, a user. Harris's design was clearly very personal and was tailored to his individual body and needs and yet was still commodified by the Post Office for national use.

The Post Office was protected from such accusations because its work was under crown copyright, which gave greater protection and secrecy than a patent. Established in 1911, this protected any works created under any government department.[301] However, although neither the Post Office nor Harris patented their amplified telephones, there were 13 amplified telephony patents taken out by private entrepreneurs between 1921 and 1935, despite the fact that it would have been illegal to use them.[302] Clearly, the problem of hearing over the phone was widespread and there was felt to be a need for it to be addressed. Private hearing aid companies including Amplivox, Multitone, and Ossicaide all invented systems of listening to the telephone via a hearing aid through induced currents.[303] The Post Office viewed private hearing aid firms offering telephonic assistance as a threat to their control and refused to sanction the use of such hearing aid couplers with their telephones.[304] Indeed, it was concerned to such an extent that it advocated completely prohibiting private hearing aids with couplers as illegal infringements, as they had done with Harris's equipment. However, as these devices did not have a physical attachment to the telephones, the Post Office could not completely ban their use as they had done with Harris's device, although they were still able to sanction their use.

Initially, a special report had considered whether it would be viable to combine Harris's device with the Post Office's own amplifier set. However, this idea was rejected by the engineering department because of concerns about overheating on adjacent lines and more importantly, the aberration from their standardised service:

> The subject is not merely hard of hearing but is extremely deaf […] It will probably be agreed that too much nonstandard apparatus on P.O lines is not wholly desirable […] the better plan would be to consider the matter from the point of view of economic value than the desire to please one subscriber in particular.[305]

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[300] Ibid. p.110.
[301] Crown Copyright in the Information Age, Section 2.5 (1998) Accessed online, April 29th 2015, <http://www.opsi.gov.uk/advice/crown-copyright/crown-copyright-in-the-information-age.pdf>
[302] Directory of European patents, Accessed online, April 2015<http://worldwide.espacenet.com/mydocumentslist?submitted=true&locale=en_EP>
[303] Letter from Edwin Stevens/ Amplivox to The Chief Engineer, 7th July 1938, Accessed at BT. Archives, Finding no. TCB 2/171-2/172.

[305] Mr Jones, engineer, replying to W.G Luxton, 18th August 1936. Accessed in BT Archives, POST 33/1491C

However, the Post Office did continue to engage with Harris to develop a more suitable instrument despite the fact that there was evidently no economic value in doing so. The instrument that the Engineering Department eventually developed was offered to Harris in order that he could try it out at home, subject to a trial fee. Harris strongly objected to this plan however, and pointed out in his typically eloquent manner that:

> It seems to me a somewhat unusual method of selling to charge £1 for testing the apparatus in order to test whether your claims that it is suitable for the purpose are true. Seeing that the P. Office will not allow private enterprise to supply efficient amplifiers so that deaf people can use them in connection with the National Telephones, I maintain the P.O should be in a position to supply good apparatus themselves.[306]

In the above quotation, we see again the comparison of the Post Office efficacy with that of private companies and Harris's point does seem to have influenced the Post Office to increase their efforts to develop an equally effective device. The Post Office then tried to persuade Harris to bring his personal apparatus to its Research Station in Dollis Hill, London. However, this request was rather impractical and Harris stated: 'I should be willing to visit the P.O Engineering Research Station when I am in London but I am sorry I cannot undertake to carry my amplifier with me, it is not made to be transported and in any case I seldom carry anything of this description.'[307] He added: 'My instrument can be seen and tested at my office, Bowyers Wiltshire. I am not taking all this trouble in order to get an instrument for myself but because other deaf people also require an efficient instrument.'[308]

His final comment on the benefit of his instruments for other hard of hearing users indicates why Harris did not protect his invention through the patent system. If he was only concerned with his own telephone service and his amplifier worked perfectly well then he did not really need to complain to the Post Office. There was no need for him to engage with the Post Office for his own sake and by doing so he was putting his modified device at risk from confiscation. We must then conclude that he contacted the Post Office in order that it could adapt his invention to benefit others with hearing loss. He allowed the Post Office free access to his design and encouraged it to develop a similar device without seeking any recognition or monetary gain for his invention. It is likely that he was acting with an awareness of an imagined community of other people with hearing loss like his own and their need to use the telephone. Benedict Anderson's concept of imagined communities, originally coined in relation to

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[306] Mr Raymond Harris' reply to the Bristol District Manager, 12th January 1937. Accessed in BT Archives, POST 33/1491C.
[307] Ibid.
[308] Ibid.

nationalism, can be usefully extended in order to explain Harris's feeling of belonging to a wide community of hard-of-hearing people.[309] This extension of imagined communities includes communities associated by empathy, explaining how Harris could have felt affinity and duty to other people with hearing loss. One of the reasons that the hard-of-hearing did not form distinct social groups was that many people with hearing loss would have 'passed' as hearing, perhaps with aids. I use the concept of passing here as defined by Rembis: 'in the disabled context, passing traditionally has been seen as the ability to conceal one's identity or to mask or cover impairment.'[310]

Harris was also acting to fulfil the principle that the Government and, by extension, the Post Office, was responsible for citizens with hearing loss. Although the hard of hearing did not form a cohesive group that identified with each other as having similar interests during the 1930s, it nonetheless seems that Harris was working altruistically for the benefit of an imagined community of people with hearing loss like his own.[311] Harris's unpatented invention was a way of reaching out to people otherwise being denied such relationships. Therefore, he was primarily motivated by his desire to make amplified telephony more successful, and he succeeded in his goal as the Post Office accelerated the development of their telephone for 'Deaf Subscribers' so a device with greater amplification could be used in all areas. This became known as the Repeater 17b and was 13.5dbs louder than the 17a and included a tone control button. The Post Office advertised the new phone in their 1938 booklet (shown below in figure 14) and this chapter has shown that Harris's design was a clear influence on that model. Harris's decision not to patent his design allowed the Post Office to appropriate it without acknowledgement and the Post Office incorporated important elements of his design into its improved telephone repeater.[312] By doing so, the Post Office used its telephone monopoly and crown copyright as a form of patent protection to commodify Harris's specific hearing ability and embodied knowledge in order to gain profit and positive publicity for their office and the Government.

Harris was able to use this new telephone despite the fact that according to the Post Office he was 'extremely deaf'. Categorical terminology like this is a recurring difficulty in such cases, revealing tensions regarding how best to decide who was 'too deaf' to use the telephone,

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309 B. Anderson, *Imagined Communities*, Revised Edition (Verso Books 2006).
310 M.A. Rembis, 'Athlete First: A Note on Passing, Disability and Sport' in J.A Brune & D.J. Wilson, *Disability and Passing*, (Temple University Press, 2013).
311 B. Anderson, *Imagined Communities*, Revised Edition (Verso Books 2006).
312 For example, see discussion of the use of the party line in rural America in R. Kline, 'Resisting Consumer Technology in Rural America: The Telephone and Electrification' in N. Oudshoorn & T. Pinch, *How Users Matter: the co-construction of users and technology* p.58.

who was simply hard of hearing, and what to call these two groups. The Post Office described those who could use the telephone with extra amplification as 'hard of hearing' and those who could not as 'deaf' or 'extremely deaf'. Categorising deafness in this way meant that the condition of hearing or deafness changed with the improvement of technology rather than through any improvement in hearing. When Harris was able to use the more powerful telephone, he was re-categorised as hard-of-hearing rather than 'extremely deaf', although his medical level of hearing was unchanged. Histories of technology by Winner and Mills that view the design and production of technologies as intrinsically political relates to the fact that the amplified telephone was used by the Post Office to categorise their users identity as either: hearing (could use the standard telephone model), hard-of-hearing (could use the telephone when amplified), or deaf (could not use the telephone even when amplified).[313] Categorisation depended on the efficacy of the technology rather than on the telephone user's level of hearing.

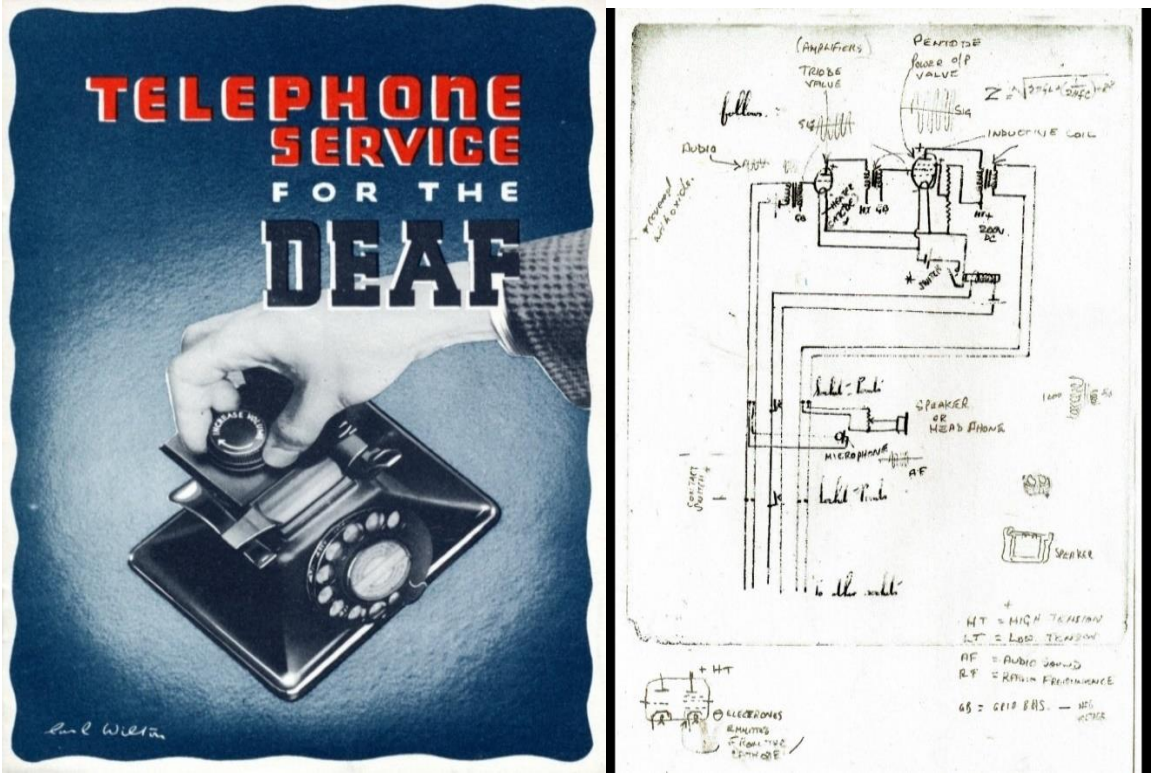

Figure 14: 1938 advertisement of the new 'Telephone Service for the Deaf' (left) and the sketch made of Harris's personal amplified telephone (right).[314]

[313] See L. Winner, 'Upon Opening the Black Box and Finding it Empty: Social Constructivism and the Philosophy of Technology' in *Science, Technology & Human Values,* (Vol. 18, No.3 Sage publications 1993) pp.362-378 and L. Winner, 'Do artifacts have politics' in *The Social Shaping of Technology* ed. By D. Mackenzie & J. Wajcman (Second Edition, The Open University Press, 1999).

[314] Post Office Advertising Booklet, *A Telephone for Deaf Subscribers* (1938) in In File No. TCB 318/PH 632 (left) and letter to the Engineer from H Stevens, Concerning the Harris Amplifier 18/5/36 in Post 33/1391/C (right) both accessed at BT Archives.

3.4: The Director

> I resent very much having to pay for an amplifier at all considering the reason is not really my deafness but the inefficiency of some of the Post Office lines and functions.[315]

Although the Repeater 17b had been developed after Mr Harris's remonstrations with the Post Office between 1936 and 1937, these instruments were not in circulation by 1938, as this case study of a company director demonstrates. On the 18 July 1938, Mr Mousley, Director of the manufacturing company Charles Winn & Co, wrote to the Post Office to complain that his amplifier was ineffective, particularly in dealing with weak calls.[316] In response, the Engineering Department wrote to the Sales Department to explain that: 'A more powerful amplifier is available known as repeater telephone no. 17b which utilises a pentode valve.'[317] The price of rental for this device was £3 per annum, an increase on the £2 that was charged for the older model. Mr Mousley was described as reluctant 'to pay any additional rental in respect of it, and threatened in a letter dated 28th July that if the matter is not given immediate attention he would take the case up with the Postmaster General.'[318] He was especially irate at having to pay the £3 at his home residence as well as on his business line and in response he withheld his telephone rent, starting on the 9 November 1938.[319] This was an effective strategy. The Telecommunication Department were concerned and asked the Birmingham Telephone Manager: 'if it is possible to accede to his application. Messrs. Winn & Co. are good customers, the account being in the neighbourhood of £50 per quarter.'[320]

The threat was effective and the Sales Department then allowed Mr Mousley a three-month trial of the improved amplifier. However, their real hope was: 'at the end of that time [to] be able to convince the subscriber that the difficulty that he is experiencing is not due to the service but rather to his affliction.'[321] The Sales Superintendent in Birmingham also pointed out to Mr Mousley that 'there were a good number of amplifiers existing in the Birmingham

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[315] Handwritten letter from Mr Mousley's home address, Heatherley, Walsall Road, Little Aston, Staffs, to the District Manager, 20/4/38,. Accessed at BT Archives Folder TCB 2/171 -2/172.
[316] Mr Mousley, Director of Charles Winn, letter to the Telecommunications Department, 28th July 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.
[317] Engineering Department memo, 30th July 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.
[318] Ibid.
[319] Printed letter from Charles Winn & Co to the Service and Sales Manager, 9th November 1938, Accessed at BT Archives Folder TCB 2/171 -2/172.
[320] Letter from The Telecommunications Department, Telephone Branch, 2nd November 1938, Accessed at BT Archives Folder TCB 2/171 -2/172.
[321] Letter from the Sales Superintendent in the Birmingham Area to the Service and Sales Manager. 30th July 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.

telephone area and that he was the only subscriber that complained.'[322] It seems clear from this that the amplification service was fairly popular at this time, although it is less clear whether this was due to widespread deafness or particular localised problems with the telephone system.

As with Mr Harris, this case involved the measurement and categorisation of levels of deafness rather than the efficacy of the amplifying technology. For instance, Mr Mousley wrote: 'I resent very much having to pay for an amplifier at all considering the reason is not really my deafness but the inefficiency of some of the Post Office lines and functions.'[323] This was contested by the Post Office, especially when the Traffic Superintendent discovered that Mousley wore hearing aids for ordinary conversation:

> Mr Mousley now regularly uses special apparatus with which to carry on his normal business conversation. It consists of a headgear receiver connected to a portable valve amplifier, the power being drawn- I am told- from a 2 volt dry battery. The subscriber carries on a conversation apparently without difficulty when wearing the headgear; but in my opinion he is deafer than ever when not utilising this apparatus.[324]

It is unclear whether this unusual headgear design was provided by a private hearing aid company or if it was an invention of Mr Mousley. His company Charles Winn & Co did specialise in manufacturing valves (also sewing machines and fire appliances) so he would have had easy access to such materials.[325] This kind of innovation was not unusual during this period, and reports of similar designs are outlined in the *BMJ* in 1935. For example, Dr Phyllis Kerridge reported on 'Aids for the Deaf' and explained: 'Amateur wireless constructors have often designed very satisfactory circuits for themselves or their relatives by the method of trial and error.'[326] She gave two examples to illustrate such home-made hearing aids, the first one featured a laboratory assistant:

> so deaf that unaided he could not hear conversation at all. He has a quadruple microtelephone instrument, and wears the microphone hidden under his overall. With this help conversation is possible, and he is able to take instructions and keep his job. He uses one battery a week, and finds that the old ones will light his

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[322] Memorandum by Acting Sales Superintendent in Birmingham, 17th November, 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.
[323] Handwritten letter from Mr Mousley's home address, Heatherley, Walsall Road, Little Aston, Staffs, to the District Manager, 20/4/38,. Accessed at BT Archives Folder TCB 2/171 -2/172.
[324] Handwritten letter from the Traffic Superintendent, to the Service and Sales Manager, April 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.
[325] Letterhead of the Charles Winn company stationary, also reveals that Mr Arthur Mousley, Director, held an MBE. Accessed at BT Archives Folder TCB 2/171 -2/172.
[326] Phyllis M.T. Kerridge, "*Aids for the Deaf*," *The British Medical Journal*, Vol 1, No. 3886, (June 29, 1935), 1314-1317 (1316).

> bicycle lamp after they are no good for the hearing aid. He had adapted the contacts of his instrument so he can use standard cheap batteries.[327]

This example gives us a fascinating insight into the everyday struggles of those trying to use technology to overcome their hearing loss during this time period. It is striking how often such apparatus was characterised by user modification. Another example in this paper was of a professional man:

> an amateur wireless constructor, and has made himself a valve amplifier set, incorporating a tone control, with which he can hear conversation quite easily. He keeps two sets in working order by him, as he is quite incapacitated without one. He finds the tone control satisfactory for clear understanding, and a further advantage is that he can tune out the unpleasant qualities of voices which he disliked in his hearing days.[328]

This kind of selective hearing and use of hearing aids as a means of power and control has been noted in the use of acoustic aids such as ear trumpets, which could be placed lowered to signal boredom with the conversation.[329] It is also notable that this kind of innovative usage has been mainly noted in men, and indeed, all the case studies in this chapter have featured men. This is partially explicable because telephony was mainly the preserve of businessmen in the 1920s, but there may be further points to be made about gender. Hillel Schwartz, for example, has argued that men were more likely to wear visible hearing aids than women because they had a greater cultural responsibility to communicate rather than just listen.[330] The Post Office however, characterised both Mr Mousley and Mr Harris as unreasonable, grumpy old men in order to avoid taking responsibility for their requests. The Service and Sales Manager in Birmingham responded to the Traffic Superintendent's report and stated: 'As it appears that Mr Mousley is very deaf and is apparently using artificial aids for ordinary conversation his attitude is considered to be unreasonable […] I think his affliction is a contributory cause.'[331] Thus there are other parallels with the case of Mr Harris, as both men experimented with personal apparatus to help them hear on the telephone and both were described as disagreeable, bad tempered, and very deaf. Both men were eventually satisfied with the use of the stronger amplifier, the Repeater 17b, which Mr Harris had perhaps initially inspired and Mr Mousley had then forced down in price.

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[327] Ibid.
[328] Ibid.
[329] G.Gooday & K.Sayer *Hard of Hearing: Managing the Experience of Adult Auditory Loss in Britain, 1830-1950*, (Palgrave, forthcoming 2016).
[330] H Schwartz, 'Hearing aid: sweet nothings, or an ear for an ear' in The Gendered Object ed. by P. Kirkham (Manchester University Press, 1996)..
[331] Handwritten reply from the service and sales manager to the Traffic superintendent. April 1938, And printed letter from 6th April 1938. Accessed at BT Archives Folder TCB 2/171 -2/172.

Mr Mousley and the Post Office were both eventually forced to compromise on price. Mousley agreed to pay £3 for his company phone but just £2 for the same service on his home phone. After this dispute concluded in April 1939, the provision of 'Deaf Aid Telephones' was reviewed by the Engineering Department. This review stated that: 'the rental of the present type of instrument is £2 per annum but it is believed that the rental has been specially adjusted to make the service more popular with deaf people.'[332] Lowering the rent in order to attract more deaf people seems a rather questionable initiative, given that the profit on these instruments was minimal. This can perhaps be linked with the increase in Post Office advertising in the 1930s, which will be explored in the next chapter.

3.5: Conclusion

Through the lens of four related case studies this chapter has explored the ways in which hard-of-hearing users influenced the Post Office in their development of amplified telephony. These cases are very much of individuals who did not form a united pressure group, but it is nevertheless apparent that the sum of their individual actions had significant effects on Post Office policy. By contrasting the Post Office's service unfavourably with that of the National Telephone Company and emphasising the business loss caused by being unable to use the telephone, the Smith Brothers in 1922 alerted the Post Office to the possibility of developing an amplified telephone specifically for those with hearing loss, the Repeater 9a. When this proved to be unsatisfactory for long distance calls, Mr Buckley in 1928 then pressurised the Post Office further by threatening to remove the telephone poles on his land, and reminded them of their duty to those who had lost their hearing through their service in the war. The improved model that resulted from this interaction, the Repeater 17a, was then shown by the actions of Mr Raymond Harris in 1935 to be unsuitable in all telephone service areas.

In many ways, it is Harris who is the most intriguing individual emerging from these examples.[333] By developing his own personal, superior apparatus he forced the Post Office into a position where they had no choice but to improve their amplifying device to a level at least as

[332] Review of the 'Deaf Aid Telephone' by the Engineering Department to the Telecommunications Department, 29th April 1939. Accessed at BT Archives Folder TCB 2/171 -2/172.
[333] This case is explored further in C. McGuire, 'Inventing Amplified telephony: the co-creation of aural technology and disability' in C. Jones (ed.) *Modern Prostheses in Anglo-American Commodity Cultures* (Manchester University Press, 2016)

good as his own, or to change their policy regarding private equipment on their lines. Of equal interest in this case is the extent to which the Post Office incorporated Harris's own invention into the Repeater 17b. Harris's motivations are also intriguing because even if the Post Office did plagiarise his invention, it is clear that his aim in showing his apparatus to the Post Office was not for personal profit but rather was to improve amplified telephony for all subscribers with similar hearing loss. Although he made it clear that he desired his actions to be beneficial to others, it is also clear that the Post Office did not include him in their reports and did not acknowledge his input, meaning it is unlikely that he was aware of the extent to which the Post Office had used his personally designed apparatus. This improved telephone was then given to Mr Mousley in 1938 and his complaints over its cost resulted in rental charges being reduced in order to make it more popular. It was subsequently produced in greater numbers, reflecting increasing demand for the service which can be linked with the reduced costs forced by Mr Mousley as well as the 1930s advertising campaign that is the subject of the next chapter. The increased professionalization of hearing aid companies from the late 1930s also gave the Post Office impetus to develop improved amplification technology in order to retain their complete control over British telephony.

These four cases demonstrate that the actions of hard-of-hearing users had a direct effect on Post Office amplified telephony. They also give some insight into how disability was conceptualised through technology. For many of the individuals discussed above, their hearing loss may have been concealable in everyday conversation in which lip reading (often done unconsciously) and other visual clues (such as those suggested by body language) could help the hard-of-hearing listener to piece together meaning. The telephone however, was a purely aural medium of communication and problems with sound attenuation were common. Moreover, it was an entirely new way of communicating in the nineteenth century, and thus created new ways of thinking about communicating in a wider sense. While the disability of hearing loss was increased by the existence of the technology there was clearly tension over whether the telephone amplification technology was the problem, or if the subscribers' hearing loss was simply too great. Conversely, this meant that improvements in amplification technology could change the status of a user from being too deaf to use the telephone to being a hard-of-hearing user who could.

Recurring themes also link together these individual cases. For example, the comparison between Post Office provision and private provision, the insistence that it was the Post Office's duty to provide this technology (especially for war veterans), complaints over the rental cost, and

the threat of using private and extensively modified apparatus on their lines. The relationship between hearing loss and technology, and those who control these two things are therefore more nuanced than existing studies have recognised. The telephone is a powerful symbol of the way that technology can augment disability. While technologies like telephony are more often characterised as a way to 'fix' disability, in this case it was Harris's hearing (dis)ability that allowed him to design specialised, superior equipment to fix his telephone. In profiting from Harris's personal creation by turning it into a commercial device the Post Office turned his hearing loss into a state commodity. It is clear that the Post Office commodified Harris's invention and profited from it. The experiments carried out to improve the telephone experience for Harris led to an awareness that frequency and tone were problems for hard-of-hearing subscribers as much as the problem of volume and the realisation that amplification was not the only component implicated in problems of audibility. Therefore, the Repeater 17b (Figure 15) signalled increased awareness of the diversity of problems of audibility and hearing experience that were not encompassed by the all-inclusive term, 'Deaf Subscriber'.

Figure 15: The Repeater 17b telephone (non-standard) with volume and tone control.[334]

This analysis builds on recognitions of the fluidity of deaf identity that have been flagged up by Gooday and Sayer, and shows the incompatibility of such diversity with increasingly

[334] The Repeater 17b with volume and tone control, Accessed at BT Archives Photograph Library, Disability Folder.

standardised technology. While Anthony Enns has noted the relationship between the desire for mechanisation and early developments in telephony, this chapter has extended this argument to show how these priorities affected the ongoing development of telephony for those with hearing loss. When hearing and hearing loss is considered to be on a spectrum, it becomes clear that the desire for objective measurement was in conflict with the body, as Gooday has explored in the context of nineteenth-century electrical measurements.

The interventions of Harris had a potent effect on directing the development of the Post Office's amplified telephones. Indeed, the telephone that he (at least) inspired and (more likely) designed was to remain in use until transistor technology started to supersede valve amplification in the late 1950s. To publicise its new transistorised telephone, the Post Office commissioned an article on the history of amplified telephony, which was disseminated in 1961.[335] In this article the Post Office rewrote the history of amplified telephone development in order to place the transistor based design in a narrative that celebrated institutional innovation and inclusiveness. It implied that invention of these telephones was motivated by the Post Office's special awareness of the problems that those using the telephone with hearing loss were faced with: 'Have you ever considered the difficulties encountered by those with impaired hearing or speech, and imagined how you would deal with the problems involved if you were similarly handicapped?'[336] This official history records a company-led, progressive technical narrative of amplified telephony, which is in fact a story of individual innovation and ingenuity working against institutional discrimination. Thus we can see how politics has been embedded in the amplified telephone in a similar way to how Mills considers the politics of cochlear implants. This chapter has shown that drawing such dichotomies between perceived polarities such as deaf or hard-of-hearing does not reflect the true diversity of hearing experience. If we are to truly profit from Harris's invention, then we should consider challenging the construction of such categorisations.

It was the labels and stigma attached to hearing loss, too, that allowed quack hearing aid firms to profit from people's desire to pass as hearing. The advertisement of hearing aids by the Post Office and private firms is considered in the next chapter, in which we see the mounting tension between the Post Office's public concern and private business function reach its zenith.

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[335] *Post Office Magazine*, July 1961, from an original held at the BT Museum, accessed at BT Archives (Disability folder).
[336] Ibid.

Chapter 4: Advertising Hearing Loss. Post Office promotion of public amplified telephony and private hearing aids in the late 1930s

> Why not advertise amplifier for phone[sic] What a boon to deaf people. I have just had one installed and very much regret I did not know about it some years ago.[337]

The previous chapter gave some brief consideration to the impact that advertising had on the awareness of amplified telephony among people with hearing loss, and their responses to misleading advertisements. This chapter picks up on this theme and looks in more detail at customer engagement with the Post Office's advertisements, investigating why and how these advertisements were produced by the Post Office. Analysis of the promotion of hearing aid and telephone amplification products provides valuable insight into the ways that early twentieth-century society regarded hearing during the interwar years. This chapter begins by considering the effects of the 1932 Bridgeman Report on the Post Office's general advertising policy. The Bridgeman Report was instigated at the insistence of the Government because of domestic and political pressure to improve the quality of the national telephone service and the Post Office's business structure. These public concerns focused on the outdated Post Office business model, and its consequent technological stagnation and lack of commercial innovation. The greatest criticism, however, was of the lack of telephone provision, which was considered in the popular press to put the UK at a disadvantage to the rest of Europe and especially the US. Comparisons with private companies, for example the old National Telephone Company in Britain and American telephone company AT&T were rife, particularly in the press. Generally, there was widespread public dissatisfaction with the Post Office telephone services and this in turn prompted increased institutional innovation within the Post Office, which led to a more proactive stance on public promotion. These concerns were addressed by the Bridgeman report and led the Post Office to reconsider its stance on advertising.

Before the Bridgeman report, advertising was condemned by the Post Office management to be an inappropriate and vulgar means for a government department to gain publicity. This dictum was overturned when the Post Office decided that it was necessary to re-design its public image and embarked on a dynamic and far reaching advertising campaign under

[337] A.M. Mansfield, (The Beach House, The Common, Upper Clapton) to the London Telephone Service, 7th of April 1935. Original emphasis. Accessed at BT Archives POST 33/1491C.

the auspices of public relations mogul Stephen Tallents. His appointment was part of the condition of the Bridgeman Report.

This chapter then moves from consideration of the 1930s Post Office advertising makeover to consider two specific advertising strategies employed by the Post Office in 1936 and 1938. These strategies advertised their amplified telephones in two leaflets showcasing 'A Telephone Service for the Deaf.' Following this consideration, I discuss the way in which private hearing aid firms' advertisements of telephone aids were used by the Post Office in 1938 to assess whether or not these competing devices posed a commercial threat to the Post Office's monopoly of telephone services. Lastly, I end by considering the incongruity of the Post Office profiting from these same hearing aid firms advertising in its stamp books. Selling space to companies to advertise in stamp books was an extremely profitable venture for the Post Office, partly because the Post Office's position as a department of government gave a crucial stamp of authority to the product being advertised. This became problematic however, when the Post Office chose to advertise the products of hearing aid firms condemned as 'quacks' by the medical profession and even unsanctioned by the Post Office for use on their own telephones. This chapter will end by explaining this seeming conflict of interests and by addressing the campaign that took place between 1936 and 1939 to ban this type of promotion.

Both the Post Office and private hearing aid firms advertised devices that could be used to make the telephone more accessible to those with hearing loss. Analysing these Post Office texts, images, and paratexts reveals the socially received attitudes contained within them, depicting deafness as a privation that could be fixed through technological intervention. By considering advertisements as legitimate forms of historical evidence, I look at how and why the Post Office developed its advertising strategy in the late 1930s, and the way that it reacted to the advertisements of private hearing aid firms that it perceived as threatening their monopoly. In doing so, I also look at a unique historical medium: stamp books. Although these books are generally considered important only for what they contain, I show that the material of the stamp books is itself intrinsically valuable. Therefore, the final section of this chapter looks at the dispute over the advertisements for hearing aids that the Post Office published in these stamp books. The Post Office had an inconsistent attitude towards private hearing aid advertisements, categorising them as both a threat of competition and a source of revenue. Indeed, its profits from selling such advertisements were so lucrative that they resisted a strenuous campaign from the media, the medical establishment, and the NID, which aimed to persuade the Post Office to remove them from the stamp books.

I therefore conclude this chapter by offering an explanation for the seemingly contradictory attitude of the Post Office, insistent on advertising hearing aids in its stamp book publications despite the efforts of a protracted and powerful campaign against their inclusion. My explanation for this hinges on an analysis of the relevant competing forces coming from outside the Post Office, such as pressure from the Treasury, which forced the Post Office to adopt its controversial position on advertising. How did these outside forces lead the Post office to portray itself as an institution dedicated to helping those with hearing loss while simultaneously profiting from their endorsement of private hearing aid equipment which was damaging to their users and condemned by the medical community?

Analysing historical advertisements through consideration of their representation of deaf people and of their narratives concerning both disability and technology clearly provides insight to the changing values and standards of society. This insight is evident in the way that advertisements can reflect existing social mores, and in the way they can create them. Indeed, many different disciplines draw on advertising as a source for theorising about society.[338] By applying similar techniques to the images and rhetoric used in advertising to the deaf in the early twentieth century through and by the Post Office, this chapter will illuminate the social, cultural, and economic values that society placed on both hearing and using the telephone.

The advertising used by the newly created Public Relations department of the Post Office in their bid to domesticate the telephone was also highly gendered. This is apparent in their desire to reconceptualise the telephone as a social tool (rather than a business tool) which was appropriate for women and home usage. The rhetoric of these advertisements made it clear that the telephone could be used in domestic contexts as well as in business, and thus the target audience started to include women. This shift was also manifest in the advertisements aimed at those with hearing loss. This indicated the more proactive attitude that had developed in the Post Office following the Bridgewater Report, which meant that it took an increasingly business-like approach to stimulating demand for their products.

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338 'Consideration of advertising is especially useful for historians attempting to explore the hidden cultural and social mores embedded within society, and is especially fruitful when texts are analysed using postmodern theory like discourse analysis. Advertising and consumption are topics of great interest to historians, linguists, sociologists, cultural anthropologists and media or communication scholars… Advertising lends itself particularly to such an analysis, because it is the ultimate 'parasitic' discourse, it has no original vocabulary of its own but it reinvents itself by taking ideas from art, popular culture, business and every-day language to try to render promotional messages relevant and persuasive to consumers' C. Hackley, 'Theorizing Advertising: Managerial, Scientific and Cultural Approaches', in P MacLaran, M Saren, B Stern and M Tadajewski (Eds) *The Sage Handbook of Marketing Theory*, (London, Sage, 2010) pp. 89-107 (p100).

Advertisements are often used by historians as examples of primary sources pertaining to their subject, but there are fewer examples of historians taking advertisements as their main source of interest and analysis. This can be partly attributed to the nature of advertisements, which are typically biased and exaggerated. Thus, they are often used as evidence adding to an already well-developed argument but less often used as the main source providing impetus to a theory. One exception is the analysis given to the impact of the Sears Catalogue on changing traditional society in rural America.[339] Gooday has also used historical advertising to demonstrate one of the ways electricity was personified by marketers in order to overcome a gendered phobia about electricity in the home.[340] Jones has further pointed out that: 'historians interested in the communication of scientific ideas have paid much less attention to the rhetorical content of advertising.'[341] An exception to this are medical historians interested in quack doctors and patent medicines, which were partly characterised by their florid advertisement. For example, Roy Porter closely analysed advertisements examining the way that quack doctors used printed advertisements and postal selling to expand their business in the seventeenth century.[342] Such literature is particularly strong in the US context, although the problems surrounding such advertisements were also endemic in the UK. One rich analysis of patent medicine advertising is given by Takahiro Euyama, who charts the promotion of electro-medical devices by 'quacks' in Victorian London.[343] One of the ways in which he does this is by explicit focus on the claims made for these devices in advertisements, and he analyses the vast amounts spent on advertising to demonstrate its effectiveness and the profitability of the burgeoning 'medical marketplace'. It is the rhetoric used specifically in advertising to the deaf that is of essential interest in this chapter. Changes in key word use reflected corresponding changes of awareness regarding the stigmatisation attached to deafness and marketers utilised this to emphasise the invisibility of their hearing aids. The specific advertising strategies employed by vendors seeking to exploit the stigma of deafness has not been considered by historians until recently, with Gooday and Sayer's consideration of Victorian hearing aids and Ross, Lyon, and Cathcart analysis of newspaper advertisements of quack hearing aids.[344] Similarly, by looking at the content of medical

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339 W. Leiss, S. Kline, S. Jhally and J. Botterill, 'Chapter 2: From Traditional to Industrial Society,' in *Social Communication in Advertising: Consumption in the Mediated Marketplace,* (London: Routledge, 2005)

340 G.Gooday, *Domesticating Electricity*, (Pickering and Chatto, 2008) pp 197-217.

341 C.L. Jones, *The Medical Trade Catalogue in Britain, 1870-1914* (Pickering and Chatto, 2013) p.59.
See also- C. L. Jones, 'Re-Reading Medical Trade Catalogues: The Use of Professional Advertising in British Medical Practice, 1870-1914,' *Bulletin of the History of Medicine*, 86:3 (October 2012).

342 R.Porter, '"Quackery" and the 18th-Century Medical Market' in *Studies in the History of Alternative Medicine*, ed. by R. Cooter (Palgrave Macmillan 1988) p.12.

343 T. Ueyama, *Health in the Marketplace: Professionalism, Therapeutic Desires, and Medical Commodification in Late-Victorian London*, (The Society for the Promotion of Science and Scholarship, 2010).

344 G.Gooday & K.Sayer, 'Purchase, Use, and Adaptation' in *Modern Prostheses in Anglo-American Commodity Cultures* ed. by C. Jones (Manchester University Press, 2016) & L Ross , P Lyon & C Cathcart , 'Pills, Potions

catalogues, Jones shows how advertising can also be used to communicate scientific ideas amongst medical professionals. Jaipreet Virdi Dhesi has also used advertisements to illustrate the way that patents were used to enhance the legitimacy of medical prostheses, for example in the artificial tympanums which were used to restore hearing in the late nineteenth century.[345] Finally, Stark has explored the way that early twentieth-century electrical rejuvenators were legitimised through the use of patent markings as well as diverse advertising strategies.[346]

Legitimising techniques were also utilised by private hearing aid companies in an attempt to legitimise their devices against enquiries by the medical profession and accusations of quackery. Such accusations created controversy for the Post Office between 1936 and 1938, as its support and endorsement of so called quack hearing aid firms came under heavy scrutiny from numerous quarters. Its perceived endorsement was seen as particularly problematic because of its position as both a commercial and public body. This special position also presented challenges for the Post Office's internal advertising and was an integral part of their initial reluctance to advertise.

4.1: Advertising as Publicity

> an institution like the Post Office is permitted little cupboard space for skeletons.[347]

In the 1930s, the Post Office revolutionised the way that it communicated with the public. The development of its iconic advertising style, which came to represent an exemplar of British governmental public relations, was shaped by Stephen Tallents, who received a knighthood for this work. The above epigraph is taken from his Green Paper on advertising in which he outlined how, in his role as the first Post Office Public Relations Officer, he would modernise the Post Office's Publicity Department. It encapsulates the specific challenges of advertising a government department that had traditionally not been run as a commercial enterprise: Tallents was acutely aware of the fact that the Post Office, even while becoming more commercial, was also held accountable by the public. This had impact on the Post Office's policy on advertising in

and Devices: Treatments for Hearing Loss Advertised in Mid-nineteenth Century British Newspapers' in *Social History of Medicine* Vol. 27, No. 3 pp. 530–556

345 J.V. Dhesi, 'Priority, Piracy, and Printed Directions: James Yearsley's Patenting of the Artificial Tympanum' forthcoming in *Technology and Innovation* (December 2014) Accessed via Academia.edu (07/10/14).
346 J.Stark, ' "Recharge My Exhausted Batteries": Overbeck's Rejuvenator, Patenting, and Public Medical Consumers, 1924-1937' in Medical History Vol 58, Issue 4, pp.498-518.
347 S. Tallents, 'Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934) p.3.

the early twentieth century because the Government initially considered it to be inappropriate and even vulgar for their departments to advertise.

In 1932 the Bridgeman Committee was put in charge of investigations into Post Office inefficiency following growing public and governmental condemnation of the Post Office's lack of commercial innovations and business enterprise – complaints of which had been growing since the late 1920s.[348] One notable example from 1928 involved the Assistant Postmaster General, the Conservative MP Roundell Cecil Palmer (Viscount Wolmer), who caused great consternation when he gave a speech that condemned the public running of the Post Office and advocated privatisation. Palmer alleged that he could: 'see the working of the Postal System as pure Socialism [...] There is great difficulty in a State-run department in finding the right man to control a great business organisation.'[349]

Under Ramsay MacDonald's Labour government, the Post Office had remained protected as a nationalised institution but when they joined with the Conservatives in 1931 to form a coalition government, the issue of the Post Office's administration could no longer be ignored and came to the forefront of domestic politics. Postmaster General Sir Kingsley Wood (Conservative MP) therefore appointed the Bridgeman Committee to investigate the charges of inefficiency and technological stagnation that were levelled at the company by the public and politicians alike.[350]

The committee reported that 'even Cuba's Havana […] had a higher telephone density than London, as did every large city in Germany.'[351] Comparison between the telephone provision in Europe and in America (dominated by private telephone company AT&T) was also often used by the British media to highlight the problem of telephone provision in the UK, which was 10% less than the take up in America.[352] By 1931, the number of the telephone connections was just about to reach the two million mark after 31 new telephone exchanges opened in 1930.[353] Yet by 1934 the telephone network had expanded without the Post Office making any profit from domestic telephone take up. This meant that although there was greater potential access to telephony in the home, the public was not making use of this by having

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348 BT Archives, 'Events in Telecommunications History: 1932' in *Our History*. Accessed online, 09/10/14. http://www.btplc.com/thegroup/btshistory/1912to1968/1932.htm
349 D. Campbell-Smith, *Masters of the Post*, (Penguin Books, 2011) p.282.
350 Ibid. p.290, p.292.
351 Ibid. p.297.
352 *Derby Evening Telegraph*, Friday, August 25th, 1933, Accessed 22/10/14 via <http://www.britishnewspaperarchive.com>
353 *The Nottingham Evening Post*, Saturday, January 3rd, 1931, Accessed 22/10/14 via <http://www.britishnewspaperarchive.com>

telephones installed in their homes. Making telephony essential for the home as well as for business thus became a major part of the Post Office's developing advertising work.[354]

The Post Office also sought to emulate AT&T's advertising practices as a way to counter such accusations of technological stagnation. Under the stewardship of Publicity Manager Theodore Newton Vail, 'AT&T had developed an expansive attitude to publicity and public relations which reflected both Vail's idealism and the company's near-monopoly power.'[355] As early as 1923, AT&T confidently claimed that telephony was essential both in business and at home with advertisements that proclaimed: 'An effective telephone personality is to-day a business and social asset.'[356] Yet by the 1930s in Britain the idea of the telephone as a domestic essential was still not widely accepted.

Since the late 1920s, there had been growing public and political criticism of the Post Office's lack of technological modernisation, their outdated mode of running the business, and especially the failings of their telephone provision. Although the final Bridgeman Committee report did not demand substantial changes to the style in which the Post Office was run (largely due to the political manoeuvring of Wood, the shrewd Postmaster General), this investigation did prompt restructuring of the company's organisation, especially of the configuration of the telephone service, which was still based on the structure of the National Telephone Company.[357] This reorganisation also restricted the financial control that the Treasury had over the Post Office, in order that any profits could be targeted towards innovation, especially to the telephone network, rather than being diverted back into other areas of government.[358] This meant that the Post Office was freed from total direct state control and gained greater operational and financial independence. For the Treasury however, this resulted in the loss of a large and steady portion of its finances. A further consequence of this reorganisation was the formation of the post of Post Office Public Relations Controller.

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354 354 S. Anthony, *Public Relations and the Making of Modern Britain: Stephen Tallents and the birth of a progressive media profession*, p.103.
355 Ibid.
356 J. Sterne, *The Audible Past*: *Cultural Origins of Sound Reproduction*, (Duke University Press, 2003) p.225.
357 BT Archives, 'Events in Telecommunications History: 1932' accessed online <http://www.btplc.com/Thegroup/BTsHistory/1912to1968/1932.htm> June 2015
358 S. Anthony, *Public Relations and the Making of Modern Britain: Stephen Tallents and the birth of a progressive media profession*, p.101.

4.1 (i) Sir Stephen Tallents (1884-1958)

In 1933, Sir Kingsley Wood appointed Stephen Tallents as the Post Office's first ever Controller of Public Relations (see Figure 16).[359] He was an early pioneer in the field of public relations and is sometimes attributed with the invention of the phrase.[360] After an initially unpromising start in the Civil Service, he proved himself to be an innovative and original thinker and distinguished himself during his work for the Irish Guards, the Ministry of Food, and the Ministry of Munitions during the First World War.[361]

It was in 1926 however, when Tallents was 41, that he started the work in public relations that would distinguish his career, initially through his role at the Empire Marketing Board (EMB).[362] The EMB was set up by the British Government to create closer connections between the countries still involved with the Empire. These goals were enthusiastically promoted by Tallents, who utilised a creative and influential film unit to this end.[363] He took this film unit with him to the Post Office, which accounts for some of the diverse and influential films created by the Post Office during the 1930s. For example, the style and ideology of the filmmaking of soviet Russia is readily apparent in the 1936 film *Night Mail*. The film tracked the journey of the night post from London to Glasgow and featured the work of WH Auden, Benjamin Britten, and John Grierson.[364]

Tallents was also concerned with internal publicity and wanted the huge work force employed by the Post Office to become more aware of how the different branches of the organisation worked. Indeed, in 1922 the Post Office was the largest employer in Britain and by 1935 employed 235,102 people.[365] Tallents therefore organised the publication of *The Post Office Magazine* which was initially aimed at staff but turned out to be popular with the general public. By 1934 it was selling over 170,000 copies per month in addition to the more specialised Post Office Green Papers which were read by the engineering workforce in particular.[366]

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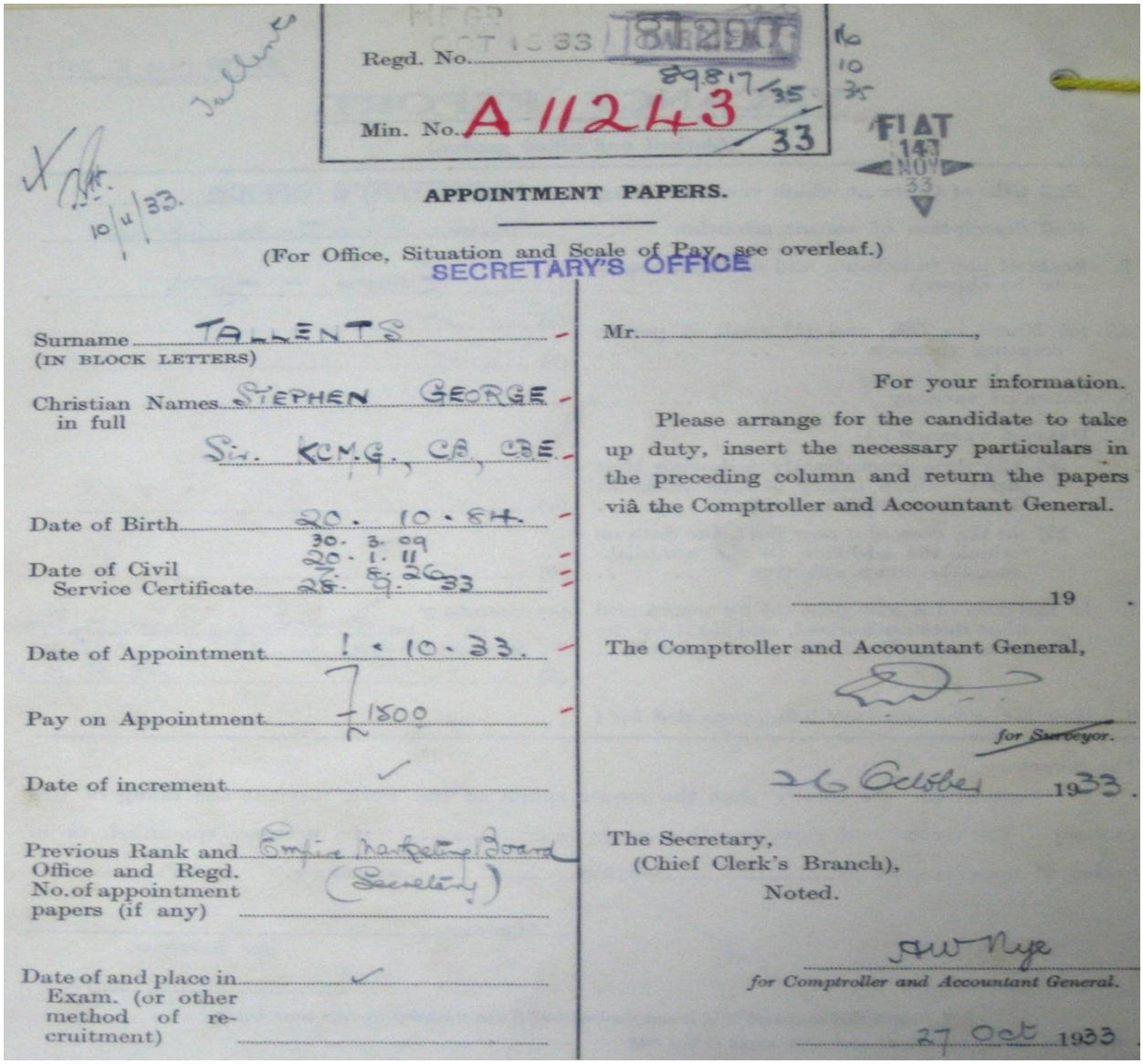
[359] Ibid.
[360] Oxford Dictionary of National Biography, 'Tallents, Sir Stephen George' Accessed 15/10/14 http://www.oxforddnb.com/view/article/36412
[361] Ibid.
[362] Ibid.
[363] D. Campbell-Smith, *Masters of the Post*, p306.
[364] Night Mail (The GPO Film Unit, 1936) Accessed on 24/10/14 via < https://www.youtube.com/watch?v=g_oekWnniDU>
[365] BP 37 (37) *Quarterly Summary of Post Office Staff'*(as of 1 Apr 1935) in Post Office Board 1937: Index and board papers: Volume 1 (POST 69/6) Accessed via BPMA website on December 29th 2014, <http://www.postalheritage.org.uk/page/statistics>
[366] Ibid. p.30.



Regd. No. 89817/35

Min. No. A 11243/33

FIAT 143 NOV 33

APPOINTMENT PAPERS.

(For Office, Situation and Scale of Pay, see overleaf.)

SECRETARY'S OFFICE

Surname (IN BLOCK LETTERS) TALLENTS

Christian Names in full STEPHEN GEORGE

Sir. K.C.M.G., C.B., C.B.E.

Date of Birth 20. 10. 84.

Date of Civil Service Certificate 30. 3. 09 / 20. 1. 11 / 25. 8. 26 / 28. 9. 33

Date of Appointment 1. 10. 33.

Pay on Appointment £1800

Date of increment

Previous Rank and Office and Regd. No. of appointment papers (if any) Empire Marketing Board (Secretary)

Date of and place in Exam. (or other method of recruitment)

Mr.

For your information.

Please arrange for the candidate to take up duty, insert the necessary particulars in the preceding column and return the papers viâ the Comptroller and Accountant General.

19

The Comptroller and Accountant General,

for Surveyor.

26 October 1933.

The Secretary,
(Chief Clerk's Branch),
Noted.

for Comptroller and Accountant General.

27 Oct 1933

Figure 16: Stephen Tallents appointment papers.[367]

In 1934, one of these Green Papers considered the topic of advertising and was based on a lecture given by Tallents to the Post Office Telephone and Telegraph Society.[368] In this paper Tallents made a number of points to explain why advertising had not been explored previously by the Government. Firstly, he pointed out that the Post Office existed not only as a business but also as a government department, and that this 'special' position necessitated more caution when advertising to the public than purely commercial companies would need to take. Secondly, he emphasised that the British Government had never before experimented with advertising and thus had no experience or tradition in the area upon which to draw. Furthermore, he explained

[367] The appointment papers for Sir Stephen Tallents, showing his starting date and his generous salary, (£92,920.00 in real prices 2013) which went alongside his position on the board.
Accessed via the BPMA website, 15/10/14 http://www.postalheritage.org.uk/page/appointments-tallents

[368] S. Tallents, 'Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934).

that the job of a publicist was regarded as very low status, and publicity was seen as a rather vulgar activity that could discredit the Government. Tallents also declared in this speech that: 'Official publicity seems to me to be regarded in some government circles much as scientific research was regarded when I entered the Civil Service. I hope that the younger generation of civil servants will live to see it as well appreciated as scientific research has today come to be.'[369] Tallents thus implied that advertising was a feature of modernity and drew on his own experience within the Civil Service where he had previously utilised medical science to tackle the problem of Beriberi disease.[370] As Scott Anthony has argued, this was another way in which Tallents proved himself to be ahead of his time: 'On many future occasions Tallents showed a respect for scientists which was then uncommon among civil servants.'[371] By making the comparison between science and marketing Tallents demonstrated that advertising's vilification was unjustified and the Post Office had to innovate in order to keep abreast of current trends.

In order to try to cast advertising in a more positive light, Tallents highlighted what he believed to be the three main purposes of government advertising: to sell Post Office services, to inform the public of the correct way to use these services, and to create goodwill towards the Post Office and by extension the Government. Tallents explained why goodwill was important in this characteristically witty aside:

> Every modern business concern recognises the value of goodwill. Government departments have been slower to recognise it, and have too often been regarded by the public in consequence as indifferent or unfriendly. "That's not the way to get new members for your club," as the tramp said, when the greenkeeper found him asleep in a bunker and kicked him.[372]

The creation of public goodwill was increasingly important, he suggested, because the Government needed to win consent from a greater number of voters: 'the newly felt need for publicity is due to the growing complications of government, and the growing number of voters to whom Parliament is responsible. The state enters far more into the lives of us all than it did even twenty years ago.'[373] Greater state intervention was compounded (according to Tallents) by the fact that the electorate was more generally educated than 20 years before and the increasingly popularity of the wireless and the cinema also meant that there were more ways for the Government to speak to the people and spread their messages. Tallents quoted media statistics

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[369] Ibid. p.7.
[370] Oxford Dictionary of National Biography, 'Tallents, Sir Stephen George' Accessed 15/11/14 http://www.oxforddnb.com/view/article/36412
[371] Ibid.
[372] S. Tallents, ' Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934) p.17
[373] Ibid. p.8.

to back this up, claiming that the weekly British cinema going audience in 1934 was 18.5 million, and that there were more than 40 million households with wireless sets worldwide.[374] He was especially concerned with showcasing the Post Office services through utilising the newest styles of art and display.

Tallents thus gathered around him a diverse and influential number of artists to form his Poster Advisory Board, which created the striking and iconic style associated with Post Office advertising. This style developed in the particular context of the 1930s, in which:

> A different challenge was offered – the opportunity to create designs for large-scale mass-produced commercial advertising. The poster was flourishing in an age of enlightened patronage, led by bodies such as London Underground, the railway companies, the Post Office, the Empire Marketing Board and Shell-Mex and B.P.[375]

Tallent's Poster Advisory Board artists included Kenneth Clark, Jack Beddington, and Clive Bell and formed a 'formidable' group of artists associated with the iconic Bloomsbury Group.[376] Furthermore, Tallents suggested that the Post Office should emulate commercial advertising and also look to the continent, where governments were more involved in mass media advertising. In particular, Tallents was keen for Britain to emulate the efforts of the Russian, Italian, and German governments in this area, and wrote: 'we ought to know, better than we do, how the Italian, German and Russian governments are setting about their deliberate task of speaking to their peoples through the various channels of modern publicity.'[377]

The pictures shown below (Figure 17 and 18) demonstrate the distinctive style the Post Office developed in the context of advertisements clearly aimed to domesticate the telephone.

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[374] Ibid.
[375] M. Timmers, 'Posters by the Bloomsbury Group, Art for Advertisement' *in Charleston: The Bloomsbury Home of Art and Ideas* Blog Post from January 13th 2011, Accessed online April 2016. < http://www.charleston.org.uk/art-for-advertisement/>
[376] Ibid.
[377] S. Tallents, 'Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934) p.4.

Figure 17: Telephone advertisements targeting women.[378]

[378] *The Yorkshire Evening Post*, Wednesday, June 8, 1932 (left picture) & *The Yorkshire Evening Post*, Thursday, January 14, 1932 (right picture).

Figure 18: Domestic telephone advertising targeting businessmen.[379]

[379] *The Yorkshire Post*, Tuesday, January 26, 1932.

The above advertisements portray the distinctive Post Office style developed under Tallents and his Poster Advisory Board to characterise the telephone as a suitable and even necessary part of domestic life. The first two advertisements (shown in Figure 17) were also distinctly gendered and designed to appeal to women. The woman on the left was portrayed as an upper-middle class socialite who used the telephone to arrange activities like bridge, to get her hair done, or dresses altered. The tone is light-hearted and playful and it seems to have been aimed principally at elderly women who may have been aspiring to the kind of lifestyle the advertisement indicated the telephone could provide.[380] At the end of the text the reference to her son filling in the form for her may also have been an attempt to prompt guilt in sons about isolated elderly mothers and a determination to provide them with telephones and thereby access to the lifestyle intimated in the advert. Furthermore, this is indicative of the Post Office's assumption that younger people and men were more likely to have expertise in technologies like the telephone.

On the right, the advertisement is similarly aimed at women, but this one was targeted at a younger audience and promised to connect young women with the important men in her life and to widen her social circle. This time, the telephone itself was the narrator and directly addressed the reader, with the final sentence pleading in a curiously seductive style: 'Tell your husband...and, remember, I may bring in more calls, free, than you send out... I am the Telephone- use me...'[381] Such usage included telephone shopping, especially for groceries, and thus associated the telephone with modernity and good housekeeping. This advertisement indicates that for the Post Office publicity department in the early 1930s, women were powerless without the support of their husbands and were assumed to be primarily concerned with being good housewives. Lastly, the advertisement pointed out the fact that the telephone could be used to summon the doctor in the event of illness to the reader or their child.

It is this theme which is further highlighted in the third advertisement (Figure 18), which had as its main heading simply 'Influenza'. The 1918—1919 worldwide pandemic of what was then dubbed Spanish Influenza would have been fresh in the minds of the populace in 1932 and the indication that the telephone worked to provide protection was powerfully persuasive of its usefulness. Since the nineteenth century, the telephone had been utilised as a way for doctors and loved ones to remain in direct communicative contact with sick people without risking infection, and in this advertisement we see again how the telephone could be useful in a medical

[380] Such a strategy of up-market appeal has been shown by Roy Porter to be an effective way of luring 'the aspirant, the fashion-followers, the emulative:' See R.Porter, "'Quackery" and the 18th-Century Medical Market' p.15.
[381] *The Yorkshire Evening Post*, Thursday, January 14, 1932.

context. This also showed an early depiction of the idea of 'working from home' at a time when the working week was becoming established. The text emphasised that: 'despite your illness, you can still control your business if you are on the telephone at home' and depicted a man lying in bed on the telephone with paperwork lying on the duvet by his side.[382] As well as controlling his business, the protagonist is able to keep in touch with his friends and it was emphasised that men as well as women could use the telephone for socialising alongside their business needs. These kinds of advertisement did engender criticism in parliament however:

> The perpetual appeal to fear is one of the worst forms of advertisement and is of quite recent growth; and I am sorry to see that the Postmaster-General himself has been guilty of appealing to it quite recently in connection with the telephone service, by pointing out how mothers may well be afraid of their children being run over in the street and how nice it would be to have a telephone so as to be able to make sure, by telephoning to the headmaster, that their children were in fact being detained at school. That is an unworthy form of advertisement and the less we hear of it the better.[383]

4.1 (ii): The Post Office Deaf Telephone Advertisements

> Do away with the word "sufferer" if possible, and rather, show the sufferer as deprived of telephone contact.[384]

Tallents's Green Paper, as examined in the previous section, emphasised the Post Office's special position as a government and business enterprise partially elucidate why there was little advertisement of the Post Office's amplified telephones, but do not fully explain their reticence to publicise them. Although such telephones had been available since 1922, it is clear that by the late 1930s their existence was still not well known amongst the population. Strangely, there was a press release in 1928 that described a telephone for the deaf that had been developed in America and that was expected to reach England shortly.[385] This is despite the fact that the Post Office had already developed such a telephone six years earlier. There was however, some press coverage of the amplified telephone in various newspapers in August 1934 (see Figure 19).[386]

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[382] *The Yorkshire Post*, Tuesday, January 26, 1932.
[383] MEDICINES AND SURGICAL APPLIANCES (ADVERTISEMENT) BILL. House of Commons Sitting Deb 27 March 1936 vol 310 cc1563-600 Accessed via Hansard online, 21st November 2014<http://hansard.millbanksystems.com/commons/1936/mar/27/medicines-and-surgical-appliances#S5CV0310P0_19360327_HOC_7>
[384] Reply to Richardson from indecipherable signature and date. Accessed at BT Archives POST 33/1491C.
[385] *The Yorkshire Evening Post*, Friday October 16, 1926, accessed via the British Library Board.
[386] *The Sunderland Echo and Shipping*, Friday August 3, 1934, Accessed via http://www.britishnewspaperarchive.co.uk/ March 2016.

FRIDAY, AUGUST 3, 1934 THE SUNDERLAND ECHO AND SHIPPIN

G.P.O. Engineers to Make the Deaf Hear

NEW 'PHONE APPARATUS

"Magic" of Little Brown Box

EXCEPTION VOLUME CONTROL

Where the Duke of Gloucester will Stay.—A new photograph of Government House, Melbourne, where the Duke of Gloucester will be the guest of the Governor of Victoria, Lord Huntingfield, during the centenary celebrations in October and November.

"THOSE ARE THE MEN"

Blinded Man Identifies Assailants

EAST MURTON TO BORROW £1,095

PROVISION OF NEW BURIAL GROUND

STUDDED WITH DIAMONDS

Politician's Railway Pass

DECLARATION ON DISARMAMENT

Primate's Sympathy With Plea

PEER ROBBED ON HIS HONEYMOON

Thieves Ransack Mansion

ACCIDENT TO WIFE OF ADMIRAL

Knocked Down By Gale At Customs Barrier

Joey Porter

Figure 19: 'GPO Engineers to Make the Deaf Hear.[387]

These articles were all written to highlight the Post Office's innovation in helping 'these poor hard of hearing folk.'[388] There was public acknowledgement of user input in the references to the 'letters to the GPO', and it was made clear that the Post Office was responding to a widespread need. However, this presentation of user input highlighted that the user's experience of infirmity could be fixed by the Post Office rather than revealing users' personal innovation (outlined in Chapter 3). The enduring lack of public awareness of the existence of amplified telephony was made clear by customers such as Mr HA Garratt who wrote to *The Times* in 1934 to complain that 'the telephone is no louder or clearer now than it was 40 years ago.' Though he admitted to being 'just the least bit deaf' he claimed that he could hear the wireless perfectly well and that: 'I have consulted the local telephone authority and am assured that there is not better instrument available, even if I paid an extra price for it.'[389] The Post Office responded to this

[387] *The Evening News*, Friday August 3, 1934, Accessed via http://www.britishnewspaperarchive.co.uk/ March 2016.
[388] Ibid.
[389] The Times Newspaper, Nov 12, 1934, pg 10, Issue 46909, accessed via GaleNewsVault, 22/10/14 <Telephone improvement complaint.>

complaint with a lengthy reply that appeared in *The Times* the following day. An unnamed official rebutted Garratt's complaint by stating that:

> The Post Office had made full provision for meeting the needs of persons suffering from deafness. The Department's engineers had produced a variable amplifier to increase the sound of the speech to the degree required by the subscriber […] the scope of the instrument, which could be hired from the Post Office at 10s, a quarter, ranged between normal and very loud.[390]

It is clear, nonetheless, that amplified telephony was not in the public consciousness as just a year later AM Mansfield wrote to the London Telephone Service to ask: 'Why not advertise amplifier for phone <u>What a boon to deaf people.</u> [sic] I have just had one installed and very much regret I did not know about it some years ago.'[391] This sentiment was echoed by Mrs Thorold Harper from Surrey in January 1936 in a long letter to the District Manager of the Guildford Telephone Service:

> Dear Sir, I should like to take this opportunity to tell you of what inestimable benefit the amplifier telephone has been, owing to my deafness. Would it not be possible for the G.P.O to advertise it very widely so that thousands of deaf people throughout the country could know about it and have it installed? I heard about it merely by chance and have longer for a similar apparatus for years.[392]

Both of these hard of hearing users refer to the product as an amplifier although the Post Office consistently advertised it as a 'Telephone for the Deaf.' Even though the hard of hearing subscribers admit to deafness or being just the least bit deaf, they refer to the technology as something clearly designed for hearing people, which amplifies the sound they are still able to hear.

One of the earliest ways in which the 'Telephone for the Deaf' was promoted was through demonstration at the Telephone Headquarters in Bournemouth in 1926. Bournemouth was chosen because 'it seems especially suitable for this purpose because, as you know, there is a large valetudinarian [elderly] population there.'[393] Nevertheless, it seems that this exhibition came to be considered a failure, as by December 1926 there had been no orders for the telephone set and it was consequently removed. In his Green Paper on publicity, Tallents outlined such haphazard modes of publicity utilised by the Post Office before his appointment and explained

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[390] Ibid.
[391] A. M Mansfield, (The Beach House, The Common, Upper Clapton) to the London Telephone Service, 7th of April 1935. Original emphasis. Accessed at BT Archives Post 33/1491/C
[392] Mrs Thorold Harper (Moor Hill, Hindhead, Surrey) to The District Manager, Guildford, 21st Jan 1936. Accessed at BT Archives Post 33/1491/C.
[393] Telephone Development Association, Aldine House, Bedford Street, Strand, London to General Post Office. 7th October 1926. Accessed at BT Archives POST 33/1491C.

that: 'Press Advertising was the first form of conscious publicity in which the Post Office engaged.'[394] However, there was an article featured in journal *The Electrician* in 1937 which outlined: 'P.O. research: The value of the investigations carried out at Dollis Hill.'[395] In this article, the unknown author (presumably someone in Post Office Public Relations) explained that: 'the interests of those who found the use of the telephone normally difficult were not forgotten. Telephones had been designed for subscribers with very weak voices and for those who were partially deaf.'[396] In line with this, Post Office newspaper advertisements of their telephone service for the hearing impaired featured in *The Times*, under the headline: 'Telephones for the Deaf: Post Office Invention.'[397] This article described how: 'Deafness is usually a bar to easy conversation on the telephone, and may indeed deprive the sufferer of many of its benefits in society and in business. It frequently leads to the undue prolongation of telephone conversation, which may prove expensive on long distance calls.'[398] This was followed with a brief description of how the telephone worked and its cost.

The image and text of this advertisement was also used in a 1936 leaflet to market telephone repeater devices which was titled: 'A Telephone for Deaf Subscribers' (Figure 20, left). Following on from this a revised copy was issued by the Post Office in 1938 (Figure 20, right) with the new title: 'A Telephone Service for the Deaf.' The revision of this leaflet caused some concern to A.C. Belgrave, the Telecommunications Director, who wrote to the Public Relations Department to query: 'Presumably the P.R. Dept is satisfied that objection is not likely to be raised by the people concerned i.e with defective hearing, to the term deaf?'[399] The fact that this question was raised clearly shows an increased awareness within the Post Office of the way that hearing loss could be stigmatised in society. The reply however, indicates that the importance attached to such terminology was not taken too seriously: 'The point about possible objection to the word "deaf" by persons not entirely deaf was duly considered, but an effective short description to meet such hypothetical objection is difficult to formulate.'[400] The title of the leaflet was changed however, because of the artist's objection to the word subscriber: 'The artist feels strongly that the word "subscriber" should be omitted from the title, as it conveys nothing to the

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394 S. Tallents, 'Post Office Publicity' in *The Post Office Green Papers No. 8*, (HM Stationery Office, 1934)
395 'PO research: The value of the investigations being carried out at Dollis Hill' in *The Electrician* vol.118 (May 28 1937).
396 Ibid.
397 Telephones For The Deaf. The Times (London, England), Wednesday, Apr 15, 1936; pg. 7; Issue 47349. Gale Document Number:CS119352975
398 Ibid.
399 A.C. Belgrave to the Public Relations Department, August 4th 1937. Accessed at BT Archives POST 33/1491C
400 August 8th 1937 Public Relations Department reply. Accessed at BT Archives POST 33/1491C.

public.'[401] In the final revision of the draft leaflet further concerns were raised about the title, which: 'as it stands may be interpreted as relating to assistance for the deaf quite apart from the use of the Post Office telephone network.'[402] The public relations department therefore concluded that they 'should do away with the word "sufferer"' if possible, and rather show 'the sufferer as deprived of telephone contact.'[403] Evidently, the Post Office's concern was not to label those with hearing loss as either 'deaf' or 'sufferers', but to make it clear that it was not hearing loss but lack of access to a the telephone network that was the cause of deprivation. The changing design of these booklets, in particular the shift from the depiction of a businessman working at his desk with the telephone to a woman simply listening also corresponds with the wider trend discussed above: to bring the telephone into the home and make it a familiar feature of domestic society.

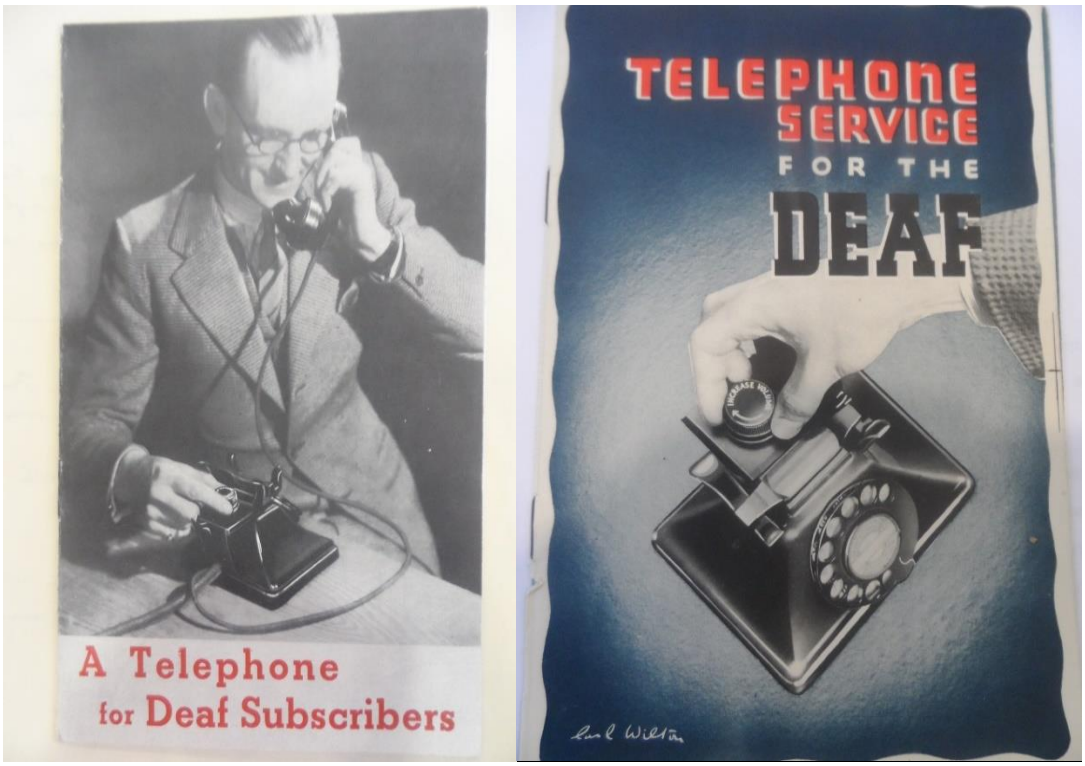


Figure 20: Post Office amplified telephone booklets. 1936 (left), and 1938 (right).[404]

[401] July 8th 1937, I Hutchinson to Ashton, Public Relations Department. Accessed at BT Archives POST 33/1491C.
[402] Ibid.
[403] Reply to Richardson from indecipherable signature and date. Accessed at BT Archives POST 33/1491C.
[404] On left- Post Office Advertising Booklet, 'A Telephone for Deaf Subscribers' (1936) & on right-Post Office Advertising Booklet, 'A Telephone for Deaf Subscribers' (1938) BT Archives File No. TCB 318/PH 632

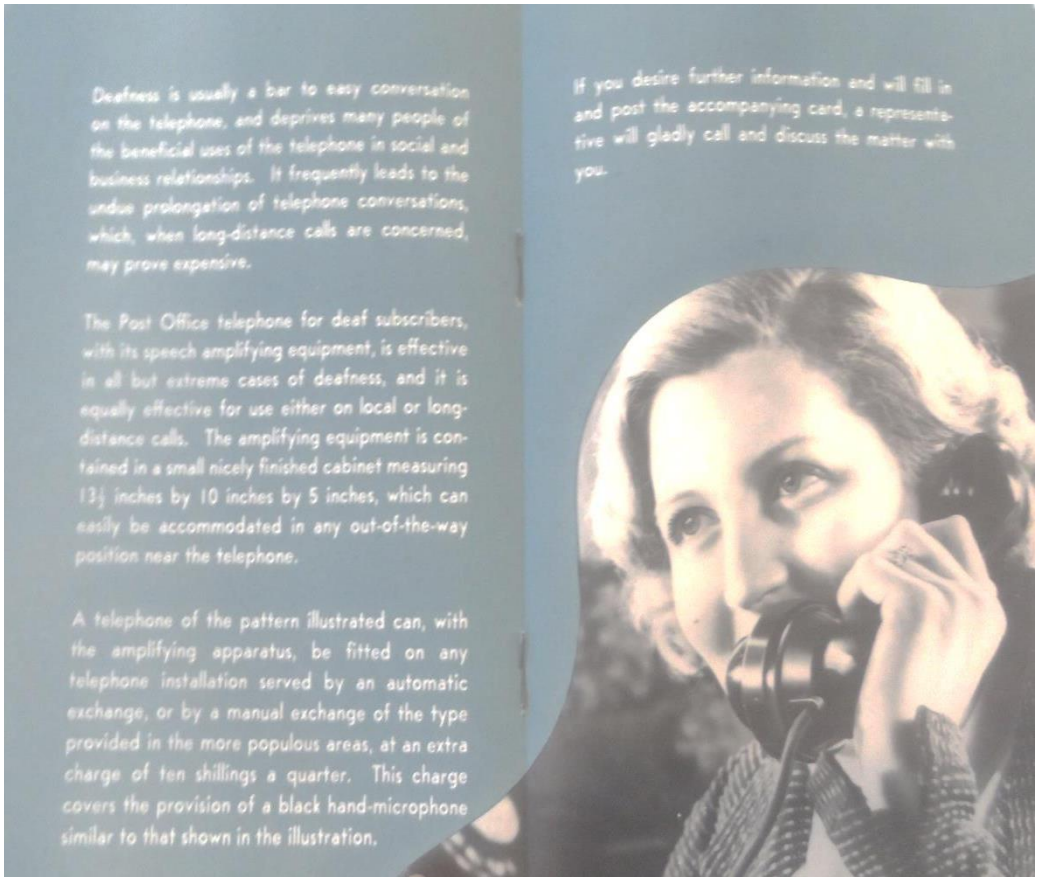
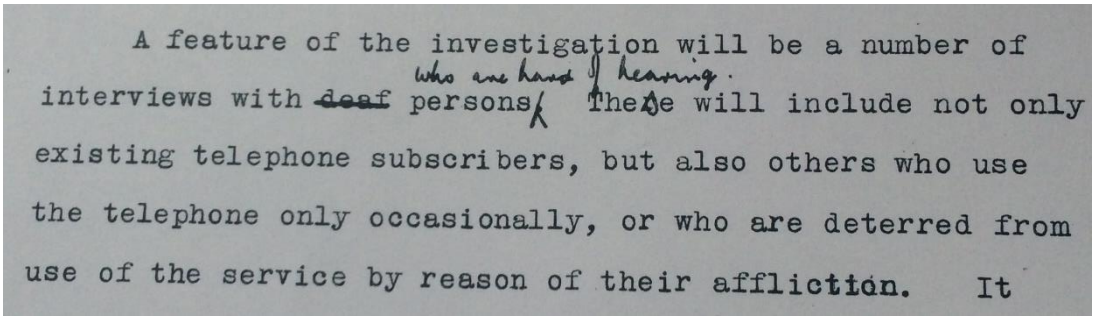


Figure 21: Inside the Post Office booklet 'Telephone Service for the Deaf' (1938).[405]

The final mode of publicity considered by Tallents in his Green Paper was of the use of film and radio. The use of radio in communication to the deaf became an issue of concern when the Public Relations Department instigated an investigation into the needs of deaf people and planned to use the radio to seek user input on their telephone needs. This investigation was designed to obtain more information for the Post Office about the needs of current 'Deaf Subscribers' to their amplification service and also to gain information about non-users who did not subscribe to the telephone service as a result of their hearing impairment. In seeking the views of non-users the department faced difficulties. If people with hearing loss did not subscribe to the service, then it was very hard to identify those who could have benefited from it because the hard-of-hearing did not seem disabled in any other aspect of everyday life. This investigation therefore enlisted the help of the NID, partly to assist in identifying and connecting with such non-users who had not subscribed to or enquired about the telephone. Initial plans were for a BBC broadcast announcement asking for listeners suffering from deafness to contact

[405] Post Office Booklet 'Telephone Service for the Deaf' 1938 Accessed in BT Archives File No. TCB 318/PH 632

the public relations department. The first draft of this planned announcement described the purpose of the investigation (Figure 22):


A feature of the investigation will be a number of
interviews with ~~deaf~~ persons who are hard of hearing. These will include not only
existing telephone subscribers, but also others who use
the telephone only occasionally, or who are deterred from
use of the service by reason of their affliction. It

A feature of the investigation will be a number of interviews with ~~deaf~~ persons, ^who are hard of hearing^. These will include not only existing telephone subscribers, but also others who use the telephone only occasionally, or who are deterred from use of the service by reason of their affliction.

Figure 22: Draft plans for BBC broadcast announcement; 'deaf' is crossed out and replaced with 'who are hard of hearing'.[406]

This investigation will be considered in more detail in the following chapter, as it related to the development of an improved amplified phone service. It is of interest in this chapter however, because the BBC broadcast was cancelled because of concerns voiced by the new controller of Public Relations, Colonel E Crutchley, who stated that: 'We should be flooded with applications from people who are completely deaf or, while not completely deaf, will expect more out of it than a simple visit from a Post Office sales-rep […] the importance of the scheme does not seem to call for BBC aid.'[407] His reticence in advertising the amplified telephone could also have been due to a new awareness of the difference between hearing loss and complete deafness.

4.2: Advertising as Competition

> If it were a private company I could believe that the desire would be to sell Post Office amplifier, but I am certain that the Post Office does not think in such terms.[408]

The Post Office Engineering, Research, and Sales departments also engaged with advertisements by researching the claims of private hearing aid companies who had started to sell devices that

[406] Proposed Broadcast Announcement, crossing out in original. Accessed at BT Archives POST 33/1491C.
[407] Colonel Crutchley, to AC Belgrave 30th August 1937. Accessed at BT Archives POST 33/1491C.
[408] Letter from Edwin Stevens/ Amplivox to The Chief Engineer, 7th July 1938, Accessed at BT. Archives, Finding no. TCB 2/171-2/172.

could be used with the telephone in 1938. In this section, I move on from consideration of Post Office internal publicity to examine the Post Office's reactions to such claims from companies that it perceived to be threatening its telephone monopoly. Thus, I examine the way that the Post Office viewed the advertisements of private hearing aid firms offering telephonic assistance as a threat to its control, and explore the motivation behind the decision to actively discourage the use of private hearing aid couplers with their telephones.

Indeed, the Telecommunications and Sales Department was concerned to such an extent that they advocated completely prohibiting private hearing aids with couplers as illegal infringements. They acquired advertising literature and hearing aids from these firms, which were then tested by the Research Department. Anxiety over competition also provided an obvious motivation to improve their services to the hard of hearing. This situation was somewhat analogous to the Hush-A-Phone incident in the US, in which AT&T achieved a controversial legal ruling banning the Hush-A-Phone device for improving sound quality on their telephones. AT&T in the US, although not nationalised, enjoyed a virtual national monopoly of the telephone system, and went through the courts to ban the use of the Hush-A-Phone device on their lines. This was a physical device however, a cup that went over the receiver to improve audibility.[409]

The integral issue for the Post Office therefore, was whether private hearing aids with couplers actually had a physical attachment to the Post Office telephones. As they did not it transpired that the Post Office could not ban their use outright as illegal. Amplivox described the way that these devices worked in their initial correspondence with the Post Office, and stated: 'We have recently developed a system of listening to the telephone through the medium of induced currents from the bell box into a coil connected to a miniature valve amplifier, being the same amplifier as used with a microphone for ordinary deaf aid purposes.'[410] In the previous chapter I showed how amplified telephones were initially developed and improved in reaction to people using amplification equipment on their lines. In this case, however, there was no apparatus that the Post Office could ban because the device worked via induced currents. It is clear that the Post Office was struggling with the concept of owning and controlling substances as intangible as induced currents of sound waves.

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[409] George G F, 'The Federal Communications Commission and the Bell System: Abdication of Regulatory Responsibility' in *Indiana Law Journal*, Vol 44, Issue 3, Article 5, p.460-462 Accessed online, July 12 2014, http://www.repository.law.indiana.edu/cgi/viewcontent.cgi?article=2509&context=ilj

[410] Letter from Edwin Stevens/ Amplivox to The Chief Engineer, 7th July 1938, Accessed at BT. Archives, Finding no. TCB 2/171-2/172.

It was in the above-quoted letter (Figure 22) that the perceived threat of private hearing aid couplers first came to the attention of the Post Office. Amplivox had written to the Engineer-in-Chief at the Post Office because when Amplivox customers requested that the Post Office move their bell sets in order that they could use their telephone with their hearing aids via couplers, the Post Office had instead persuaded them to rent their telephones for the deaf. This caused Amplivox to write and complain of their 'high handed attitude' which was 'a very negation of the service which the Post Office claims to give, quite apart from the human considerations that Miss Dean has much difficulty in hearing on the telephone and would, we believe, get on much better with our method as she wishes to use more than one telephone.'[411] In this letter, Amplivox also pointed out that the Post Office's status as a public organisation meant they had a duty to distance themselves from commercial business practices: 'If it were a private company I could believe that the desire would be to sell Post Office amplifier, but I am certain that the Post Office does not think in such terms.'[412] It is clear that although the Bridgewater Report had given rise to more commercial practices and goals within the Post Office, accusations like this were also problematic for them as an institution that was accountable to the British public, which contributed to and had a vested interest in Post Office enterprise. Amplivox recognised this and also highlighted the fact that persuading Amplivox clients to switch to the Post Office rental service:

> Is to be regarded as a breach of business courtesy, which would certainly be beneath the dignity of a business house, and should be expected to be outside the method of action of the Post Office, who are in a special position in being able to influence the client, and to veto our own provision.[413]

The Post Office took this letter very seriously, and brought it to the attention of the Postmaster General, who was not usually engaged with matters relating to engineering and sales. The response to Amplivox stated:

> I am directed by the Postmaster General to state that there appears to be a number of serious objections to the use of your apparatus in connection with Post Office telephones. Before a definite decision is reached, however, it is desired that the apparatus should be tested and examined by the Postmaster General's technical experts and I am to ask that you be so good as to forward a model for examination.[414]

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411 Ibid.
412 Ibid.
413 Letter from Edwin Stevens/Amplivox to A C Belgrave, head of telecommunications, 21st of December 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.
414 Letter from Belgrave to Stevens 15 January 1939 Accessed at BT. Archives, Finding no. TCB 2/171-2/172.

Although the Postmaster General was often cited in letters related to this investigation it was actually of primary concern to the Engineering and Sales Department. The above correspondence marked the start of a protracted two-year investigation into the accusations made by Amplivox regarding their clients and a Post Office internal investigation into the nature of other advertised hearing aid telephone couplers (specifically those of Amplivox, Multitone, and Ossicaide/Rados) and the possibility of prohibiting their use through legal channels. The previous chapter demonstrated how the Post Office prohibited people using private amplification devices on their lines. However, the Amplivox device worked so that 'The apparatus is not intended to be physically connected into the telephone installation, but, when the coil is placed close to the induction coil it is able to pick up and amplify conversation.'[415] Thus, the Post Office's argument centred on the physicality of the hearing aid coupler: 'The instrument does not seem to be an attachment in the physical sense and it is not certain how its use can be prevented, if so desired.'[416]

The Post Office advised Amplivox that they offered 'deaf aid amplifiers' that were superior to their private provision for a number of reasons. Firstly, the Post Office equipment was physically connected to the telephone and their rental included all apparatus and maintenance. Furthermore, their amplifiers were just as effective as Amplivox's and their investigation had revealed a number of problems with the Amplivox device. Their report indicated that the Amplivox device was disposed to 'howling', especially if not positioned properly, was subject to interference 'from extraneous magnetic fields - especially electric motors' and could pick up neighbouring noise.[417] Moreover, the Amplivox device was unsuitable for use with public telephone boxes in which the Post Office electrical circuits were covered. Similarly, the Telecommunications department warned that covering the electric circuit or introducing a closed core inductive coil may become the future design for all telephone which would render Amplivox apparatus either completely ineffective in the first instance or less effective in the latter. This would alienate subscribers who used their devices, and who might perceive the fault to lie with the Post Office. Additionally, the Post Office had 'no control over the manufacture and maintenance of the device' and were concerned that: 'The device might be improperly used to pick up conversations, e.g. on a bell set mounted on a boundary wall between two flats.'[418]

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[415] Draft amendment to Telephone Service Instructions, Section B- G. Accessed at BT. Archives, Finding no. TCB 2/171-2/172

[416] Letter from the LTR Regional Director to the Engineer in Chief, 21st of July 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172

[417] Telecommunications department, Telephone branch, Summary of the report from the Research Branch, 16th of September 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172

[418] Ibid.

Finally, 'Transmission improvements are being made by the Post Office on receivers and deaf aid amplifiers and there is no guarantee that the private firm will keep in step with these improved standards.'[419]

Their concern with the howling that could occur if the hearing aid was positioned too close to the telephone induction coil was couched in terms of the potential danger of noise-induced hearing loss. For example, the Sales and Telecommunications Department wrote that: 'It is considered that attachments of this type should not be authorised owing to the danger of acoustic howling being set up between the transmitter and the receiver, resulting in possible ill-effects to the ears of operators and subscribers.'[420] This indicates that by the late 1930s, the Post Office was aware of the danger to hearing that over exposure to loud noise could cause. It is likely that this was a result of increasing awareness of the widespread deafness afflicting soldiers following the First World War and could further be related to the debates over noise control in cities that had proliferated in the 1920s and utilised new terms (like the decibel) and new telephone based devices to measure this excessive noise.[421] In 1934, for instance, a Post Office worker employed in the Research Section gave a lecture on the subject of Room Noise and Reverberation which he then turned into a Green Paper. In this he described how: 'It is easy to construct apparatus comprising a microphone, an amplifier and a measuring instrument' in order to measure loudness using noise units or decibels, a term which had been coined in America in 1923. Indeed, the author admitted that: 'The standardization of noise units and loudness units is at present under discussion in this country.'[422] Hearing loss in the telephone system was of similar concern for the Post Office telephone engineers and their concern about operators and subscribers' hearing also indicates that the Post Office had an awareness of physiological hearing loss.

Their reported concerns indicate that the Post Office did have some anxieties about the use of these devices apart from the obvious threat that they posed to its monopoly. Inserting any new equipment from a different company could have led to problems with their network standardisation and made the Post Office accountable over issues their customers had with the private equipment over which they had no control. The allegations of interference from

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[419] Ibid.
[420] The Telecommunications Department to the Engineering Department, 23rd of July 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.
[421] See D. Hendy. *Noise: A Human History of Sound and Listening* (Profile Books, Ltd. 2013), E. Thompson *The Soundscape of Modernity*, (The MIT Press, 2002), and K Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century* (MIT Press, 2008).
[422] W. West, 'Room Noise and Reverberation' in *Post Office Green Paper No. 2* (His Majesty's Stationery Office,1934) p.4, p.7.

magnetic fields and the possibility of the devices being used for spying reveal the Post Office's concerns about advancements in audio technology in the lead up to war. Indeed, Chapter 2 highlighted that the Post Office was actively engaged in using microphone technology to spy on prisoners of war during the First World War.

Multitone and Rados by Ossicaide also released advertisements for hearing aids that improved the audibility of the telephone and these companies were also subject to the Post Office's investigation alongside Amplivox. In the case of Multitone, the Post Office acquired their advertising literature for the Multitone Telesonic system and highlighted the following lines: 'Any of our instruments so adapted can be used to obtain very considerable amplification and clarification of speech on the ordinary telephone. No connection to, or interference with, the telephone system is involved. The Telesonic Receiver is simply placed close to the Telephone instrument.'[423] The Ossicaide manufactured Rados device also caused concern because of their claims about their invention:

> Amazing portable instrument that picks up magnetic audio-frequencies and gives the deaf perfect hearing anywhere- at home, in any large building space. When placed near a telephone, it receives both sides of the conversation with much greater power than the actual telephone.[424]

These claims clearly posed a threat to the sale of the Post Office's amplified telephone and were also of concern because they did not actively interfere with the telephone network and so could not be illegalised. Their method of working via induced currents also held advantages over the Post Office amplified telephones because it allowed people to use different telephones instead of being restricted to one amplified telephone set. In addition to studying advertising literature from these companies, representatives from the Post Office telecommunications department also visited Ossicaide to inspect their Rados dual purpose deaf aid. They concluded from their inspection that the device was similar enough to that produced by Amplivox that it did not merit buying for closer research. They wrote up their findings in a report for the Engineering Department however, and explained that 'the search coil being included in the box, and not separate as with the Amplivox device, it is difficult to obtain the optimum volume condition and even so, the improvement over the reception by the telephone receiver is not great.'[425] They add that it was not possible 'to produce any howl during the rough test at made at

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[423] Advertising Booklet 'Development in Multitone Hearing Aids for 1939. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.
[424] Advert for 'Rados' for the Deaf in the Daily Herald, Tuesday, 20th September 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.
[425] Telephone branch of the Telecommunication Department, Report to Engineering Department, 28th September 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.

the firm's premises' and that 'Messrs. Ossicaide expressed considerable surprise that the Post Office should be at all interested in their advertisement.'[426]

It is unclear whether Multitone was genuinely unaware of the Post Office's vested interest in the telephone network or whether they were simply being coy. In the Post Office report, they conclude with the statement that: 'Multitone Electric Ltd, Ardente Ltd and Deafaids Ltd are all developing similar apparatus.'[427] The Post Office did not decide to visit all of these firms however, and instead released a blanket statement concerning all hearing aid devices that could be used to amplify the telephone: 'In view of all these circumstances the Postmaster General regrets that he cannot give his sanction to the device being sold as having his approval for use in connection with telephone calls.'[428] Thus their official policy was not to sanction any such devices but to instead recommend their own amplified telephone for rental. Despite their condemnation of these firms' devices, however, the Post Office simultaneously endorsed them in their controversial stamp books.

4.3: Advertising as Endorsement

> No government publication should be used to attract afflicted persons to seek relief from firms whose practises are incompatible with those usually observed in treating human suffering.[429]

In the final section of this chapter, I explore the seeming incongruity of the Post Office policy that allowed it to advertise hearing aids in its stamp book publications, despite the efforts of a protracted and powerful campaign against their inclusion. In previous sections, I have shown that the Post Office publicity portrayed the institution as concerned about the needs of the hard-of-hearing and was officially opposed to hearing aid firms selling apparatus that connected with and claimed to amplify the telephone. Yet while publicly avowing their dedication to helping those with hearing loss, the Post Office simultaneously profited from their endorsement of private hearing aid equipment which indisputably caused damage and was publicly condemned by: the medical community, Parliament, by more established hearing aid firms, and even by the Post Office's own policies.

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[426] Ibid.
[427] Ibid.
[428] Letter to Amplivox, 5th October 1938. Accessed at BT. Archives, Finding no. TCB 2/171-2/172.
[429] Letter from the NID to the Postmaster General, April 8th 1936. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

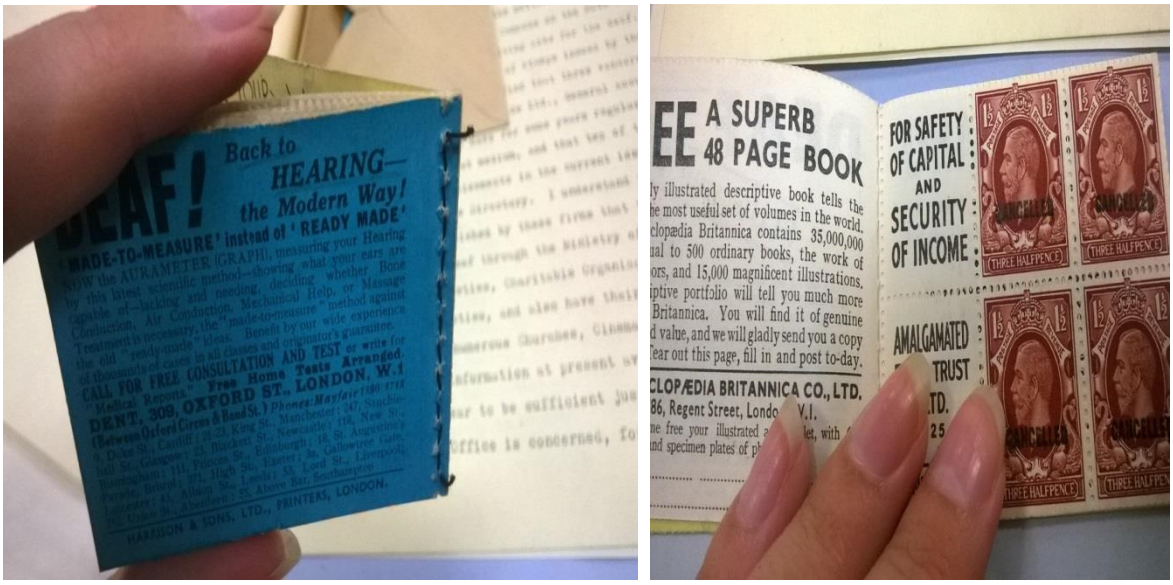

Figure 23: Stamp Books.[430]

Figure 23 show the kind of stamp books in which private hearing aid firms advertised. They were small booklets that contained stamps as well as pages of advertising features and in the late 1930s, the postal system was still heavily used. In 1920, nearly six billion letters and packages were posted. Stamp books were initially conceived of as a way of holding sheets of stamps together, but this was soon found to be a lucrative form of advertising. These booklets would have been prolific, highly visible publications that constituted a uniquely ubiquitous form of advertising that could target a spectrum of postal users, crossing boundaries of age, sex, and class. They were utilised by various companies for advertising purposes. Certain hearing aid firms, including Ardente and Ossicaide, had long term lucrative subscriptions to the Post Office to advertise their products.

[430] Accessed at the BPMA: Photograph author's own.

Figure 24: Stamp Book advertisements targeting the deaf.[431]

[431] Examples of stamp books sent to the Post Office from complaining customers. Accessed at the British Postal Museum Archives (henceforth BPMA) finding no. BPMA POST 33/3481B.

Figure 24 shows examples of just some of the advertisements that featured in these publications. The rhetoric that hearing aid companies used in these advertisements and the claims that they made were wildly exaggerated and misleading. Hearing aid companies used vivid language and images to persuade potential purchasers of their devices' effectiveness, and drew on the stigma of deafness in order to sell their products by emphasising the inconspicuousness and invisibility of their hearing aids. These advertisements thus relied for their effectiveness on the socially constructed imperative that such disability should be concealed. At the same time, the Post Office's internal advertising of their telephone for the deaf showed increased sensitivity and awareness of the stigma associated with hearing loss. It is apparent that many of these firms' customers were unhappy with the devices they had purchased and complained variously to their MPs, their ministers, doctors, and to the NID. For instance, one minister in Canterbury, whose wife had hearing loss as well as many of his congregation members wrote to the Public Relations department:

> I should like to know what guarantee can be given either by the PMG or the firms advertised on enclosed extracts from books of stamps that THE DEAF WILL HEAR. These firms are well known in London to exploit the deaf and their friends for their own profit and it is degrading to a Government department to lend any encouragement to such people. Papers like 'The Times' will never admit advertisements of quack remedies such as appear in your stamp books.[432]

The repeated inclusion of such 'quack remedies' led to a protracted campaign by the NID, the medical community, the press and several political figures, who aimed to persuade the Post Office to remove these adverts.

The NID initiated the campaign in 1936 with the emotive indictment that forms the epigraph to this section: 'No government publication should be used to attract afflicted persons to seek relief from firms whose practises are incompatible with those usually observed in treating human suffering.'[433] They then went on in 1937 to request that the Post Office insert a disclaimer absolving themselves from endorsement or responsibility for the devices but this was also refused.[434] In 1939 they again requested that the Post Office at least restrict their advertisements to firms on their approved list – see the first column of the table below (Figure 25).[435]

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[432] Mr Smailes, Minister of Methodist church, the Knoll, Elham, near Canterbury, Kent, to the Public Relation Office, May 23rd, 1938. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[433] Letter from the NID to the Postmaster General, April 8th 1936. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[434] Letter from the NID to the Major Tyron, Postmaster General, 16th Dec 1937 Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[435] Letter from the NID to the Major Tyron, Postmaster General, 13th May 1938 Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

UK Firms with NID Approval (in the late 1930s)	**Firms not sanctioned by the Post Office**	**Firms with advertising contracts with the Post Office**
Quant, Rich, Day, Medical Supply Association, Spence, General Acoustics LTD (Acousticon), Griffin & Tatlook, Milnes, Multitone, Sonotone, Reynolds & Branson, Broom Reid & Harris, Gardner, J & sons, Dunscombe, Rendle, Allen Hansbury's Ltd, Aural Appliances Ltd, Amplivox, British Thomson-Houston, Hawkesley, Fortiphone, FC Rein & Sons, Radio-aid, Western Electric, Farndell H Kennards,	Ossicaide, Amplivox, Multitone.	Ossicaide, Ardente, Multitone.

Figure 25: Table showing NID/Post Office endorsement status of UK hearing aid firms.

The left hand column details hearing aid dealers that were willing to fulfil the following NID criteria:

1 That the most suitable aid indicated by the conditions of the client, whether electrical or mechanical, will be recommended; and that if no aid appears likely to help, the client will be duly informed.

2 That in the event of the purchaser being dissatisfied with the hearing aid supplied and requesting the return of the amount paid, this will be refunded less a sum not exceeding 7 ½% of the purchase price of the instrument or appliance, with a minimum charge of five shillings for expenses, provided that it is returned in good order and condition with one week.

3 That no personal interview with the client at his home will be sought unless at the request of the client.[436]

It is clear from these requirements that there were problems with hearing aid firms making house calls and refusing to refund hearing aids that did not help their users. It is also notable that there was no set standard of efficiency and that these regulations could easily be met through changes in practice rather than equipment. It is surprising then, that there were firms that did not subscribe to these regulations and indeed it is these firms that were most engaged with advertising and used the Post Office to this end.

There is a clear correlation between amount of advertising and acceptance on this approved list, and it is a powerful indicator of reliability and acceptability, including acceptance by the medical profession. Amplivox explicitly explained that they did not advertise because of the association with quackery and complained about this to the Advertising Forum on 1 January 1938:

> As a company, we no longer advertise to the lay public, confining our activities in this respect to advertising to the medical profession […] we have been forced, against our will, into taking this stand in our advertising policy because of the claims that are made for some advertised hearing aids […] we would like to register here our urgent desire to line up with any united front which will be effective in the near or distant future in curtailing untruthful advertising that is injurious to the confidence of the unfortunate deaf.[437]

In the NID's correspondence with the Post Office, they emphasised the special position that the Post Office had in terms of influence and explained:

> These advertisements appearing in the Stamp Books acquire an added importance in the minds of the public who seem to think that such appearance in an official publication implies a government guarantee of the articles advertised. Indeed we are often told by deafened people who have been attracted by these advertisements, "I saw it in the Stamp Books so I thought it was all right.'"[438]

Ultimately, in 1939 they tried to place their own advertisement, which stated: 'The NID urges deafened persons to obtain medical advice and a list of the Institute's approved dealers in aids to hearing before buying a hearing appliance.'[439] This request was again refused: an even

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[436] The NID Recommended List of Hearing Aid Firms, 2nd of January 1939, The companies on this list fluctuated. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[437] B. A Dearsley, Amplivox Sales Manager in Advertising Forum, 13th of January 1938. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[438] NID to the Post Office- Letter from the NID to the Major Tyron, Postmaster General, 13th May 1938, Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[439] Ibid.

more remarkable outcome when it is considered that the Post Office actually worked with members of the NID during this period, for instance, testing hearing aids for them in Dollis Hill. Otologists Wharry and Crowden were active in the NID and at the London School of Hygiene and Tropical Medicine. They wrote to the *BMJ* in 1932 to describe the testing of electric hearing aids at Dollis Hill: 'owing to the courtesy of the Engineer-in-Chief of the Post Office, the National Institute for the Deaf has been able to have certain electric hearing aids tested by the staff of the Post Office Engineering Research Station at Dollis Hill.[440] Indeed, the two organisations would go on to collaborate in making the Medresco state hearing aid. It is hard to understand why the Post Office was so intractable when it was in some ways on good terms with the charity. The only conclusion seems to be that supporting the NID was not in their financial interests and their financial concerns at this time superseded their evident desire for good publicity.

The Post Office's most detailed response to the NID was in answer to their first letter in 1936:

> There would be difficulty, even if it were considered desirable, in seeking to impose on contractors the new and onerous condition involved in regulating particular advertisements according to the views of a third party […] it seems to the Postmaster General that, if it is desirable that such advertisements should be allowed only under the conditions which you mention, such a rule should be enforced generally by legislation…In the circumstances, the Postmaster General regrets that he is unable to see his way to adopt your committee's suggestion.[441]

After this first reply the Post Office only responded with repeated refusal of the NID's requests and the restatement that the Postmaster General had not changed his position on the policy of stamp book advertisements. The NID's concern about the Post Office's ability to influence the public was repeated in Parliament where the issue was brought up on numerous occasions. The first of these was on 2 June 1933 when Sir Harold Sutcliffe, the Conservative MP and ex-serviceman, asked the Postmaster General how much revenue derived from advertisements for hearing aids in books of stamps.[442] The Post Office replied that 'the financial

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[440] H.M. Wharry & G.P Crowden, 'Correction of Hearing Defects' in The British Medical Journal, vol.1, No.3729 June 25th 1932) p.1189 These trials were designed to chart the different responses of hard and soft carbon microphones to different frequencies using the telephone testing equipment. The purpose of this was the design of an electric hearing aid that would 'amplify speech in such a way that the naturally loud phonetic sounds are not made much louder, while the soft (weak) sounds- for example, vowel overtones and consonants which are essential for intelligibility- are raised above the threshold of hearing of the deaf patient.'

[441] Letter from the Personnel department to the NID,7th May 1936. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B

[442] House of Commons Sittings, 2nd June 1933 vol 278 c2237Accessed via Hansard online, 21st of November 2014 < http://hansard.millbanksystems.com/commons/1933/jun/02/post-office-advertisements#S5CV0278P0_19330602_HOC_4>

loss from the exclusion of advertisements to hearing would be upwards of £3000 a year.'[443] In an internal report however, the Postmaster General was more specific: 'The revenue derived by the Post Office from advertisements in the books of stamps for the year ending 30th of September, 1936 (an average year) was £16,492 of which a very significant proportion – £3073 or 18.63% – related to advertisements of appliances for the deaf.'[444]

On 30 March 1936, Labour MP Mr William Thorne questioned the Postmaster General:

> whether he is aware of the unfairness to the deaf arising from exaggerated advertisements of aids for hearing; if he will decline to accept advertisements for insertion in books of stamps and other publications from dealers whose business practises are thus prejudicial to the interest of the deaf; and, before accepting advertisements of aids for the deaf if he will communicate with the secretary of the NID?[445]

The Postmaster General responded by arguing: 'Unless and until Parliament enacts further legislation making all advertisements of this kind illegal, I do not feel that there is any adequate ground on which the Post Office can refuse advertisements.'[446]

On the 7 December 1936, Conservative MP Sir Robert Cary also asked the Postmaster General: 'whether, in view of paragraph 57 (2) of the Report for the Select Committee on Patent Medicines in 1914 recommending the prohibition of cures for deafness, along other diseases, if it is his practise to consult the Ministry of Health respecting such advertisements?' Then on the 29 July 1938, Conservative MP Lieutenant Colonel Sir Arnold Wilson asked: 'whether, in view of the recent discussion of the British Medical Association at Belfast and of the recommendations of the Select Committee on Patent Medicines in 1914, he will give further consideration to the expediency of excluding advertisements of aids to hearing?'[447]

The repeated reference in these objections to the ruling on the Select Committee on Patent Medicines, paragraph 58(2) was to the statement that fraudulent remedies included:

> a large class, having an extensive sale, often at high prices, consisting of abortifacients, of alleged cures for cancer, consumption, diabetes, paralysis,

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[443] Thursday 29th July, 1937. Response to Mr Sutcliffe. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[444] Internal report, Postmaster General, Slip G, Undated but judging by context- 1937. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[445] House of Commons Debate 30 March 1936 vol 310 c1609 Accessed via Hansard online,21st of November 2014http://hansard.millbanksystems.com/commons/1936/mar/30/advertisements#S5CV0310P0_19360330_HOC_68
[446] Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[447] House of Commons sitting, 7 December 1936 <http://hansard.millbanksystems.com/commons/1936/dec/07/advertisements#S5CV0318P0_19361207_HOC_82>

> locomotor ataxy, Bright's disease, lupus, fits, epilepsy, rupture (without operation or appliance), deafness, diseases of the eye, syphilis, etc. […] There should be little difficulty in identifying remedies of this class, and their treatment in the public interest need involve no doubt or hesitation. They are, and are known by their makers to be, cruel cruel frauds; and the sale and advertisement of them should be prohibited under drastic penalties.[448]

This legislation could have been interpreted as a clear and damming indictment of the Post Office's stance and their continued advertising did seem to contravene these guidelines. The Post Office defensive response hinged on a categorisation technicality, that hearing aids were an apparatus and not a medicine: 'Though deafness is mentioned, the reference is to medicines. Advertisements of medicines purporting to relive or cure deafness are not accepted for insertion in the books of stamps; but advertisements of appliances to assist the deaf are not rejected for they do not claim to cure the disease.'[449] This reveals the tension over categorisation of hearing devices as either being medicines, prosthetics, or technological apparatus. In this context, the label given depended very much on the agenda of the advertiser or the medical professional.

However, the Post Office did refuse to endorse various products and their list of prohibited or restricted advertisements included the following (Figure 26):

[448] 6th December 1937, Letter from Postmaster General Major Tyron to Hearder. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[449] Postmaster General Major Tyron, 11th of December 1936. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

Prohibited	
Alcoholic Liquor	Foreign agriculture produce
Temperance (anti-liquor)	Annuity business
Imitations of Post Office marks	Offers of employment
Betting and Gambling	Illustrations of Royal Family
Book makers	Political advertisements
Lotteries	Private telephone installations
Football pools	Money lenders
Clairvoyants, astrology & palmistry	Questionable or controversial books & periodicals
Birth control & rubber goods	Patent medicines – advertisements for specifics
Restricted	
Building Societies (only if they do not compete with the Post Office's	Parcel deliveries
Anti-vivisection (only accepted if wording is not controversial)	Corsets & lingerie (refused if the illustrations are deemed by the Post Office to be in doubtful taste)
Electric-Radiant treatment, Medical Institutes, etc. – refused unless treatments given under medical supervision	

Figure 26: Restriction to Post Office advertising. Original text, formatting changed.[450]

The problem of false advertising was deliberated by Parliament in 1936 in the context of a new bill to restrict the sale and advertisement of medicines and surgical appliances.[451] This bill was designed to extend and support the findings of the select committee on patent medicines and considered medical advertising in the widest possible sense. It caused controversy however, because it was perceived as a means of protecting and ensuring the monopoly of professional doctors over all aspects of the medical profession. The Post Office stamp booklets were not mentioned but fraudulent cures for the deaf were mentioned twice.

[450] Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[451] MEDICINES AND SURGICAL APPLIANCES (ADVERTISEMENT) BILL. House of Commons Sitting Deb 27 March 1936 vol 310 cc1563-600 Accessed via Hansard online, 21st November 2014<http://hansard.millbanksystems.com/commons/1936/mar/27/medicines-and-surgical-appliances#S5CV0310P0_19360327_HOC_7>

This bill was also clearly designed to protect the general public from their lack of understanding: 'we have taught the people of this country to read, but we have not yet taught them to think. Until men and women are able to take independent views and not be misled by propaganda, we must protect them as far as we can."[452] Although this bill did not explicitly consider the Post Office's stamp book advertisements it is clear that they were contrary to the ideas underpinning this bill and that the Post Office's intransience on the matter came at a very politically charged time, and against a backdrop of increasing regulations and control over medical appliances and treatment. This private member's bill did not get a second reading and it was suspected at the time that those opposing the bill resented the stronghold of the medical profession and their vested financial interests in its success.[453] However, the campaign for the removal of hearing aid advertisements was also supported by the British Medical Association, who made their position on the matter very clear: 'the committee deplores the continued appearance in books of stamps of advertisements of hearing aids."[454] This decision was then reported widely as part of the press campaign against the stamp book publications.

The campaign was reported across a spectrum of publications and locations, receiving coverage in *The Times* and *John Bull* as well as in the *BMJ*, all publications which condemned the hearing aid advertisements as 'misleading' and their producers as 'quacks'. They also described the Post Office's advertising as a 'bluff' and it is clear that these articles concerned the Post Office because they were kept by the Postmaster General.[455] Moreover, and as we saw earlier, the 1930s was a time when the upper echelons of Post Office administration were most concerned about their public image and positive publicity, so this kind of press attention would have been particularly unwelcome. Many of the articles highlighted the fact that it was especially those on a lower income who were conned into buying useless hearing aid products. For instance, the article shown in Figure 27 explains that: 'Ex-servicemen and domestic servants are constantly induced to throw away pounds they cannot possibly afford on some of these worthless "inconspicuous aids to the deaf.""[456]

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[452] Ibid.
[453] 'The Bill has the support of the medical profession and the pharmaceutical and advertisement trades, but opponents of the Bill seemed to suspect them of a financial interest in its success, and to resent the rigid conservatism of the medical profession.' 'Patent Medicines' in *The Spectator*, 3 April 1936, Accessed via www.archive.spectator.co.uk March 2016.
[454] Letter from the council of the British Medical Association to the Postmaster General, 23rd of February 1938. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[455] Various newspaper clippings collected by the Postmaster General. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
[456] Sir Wyndham Childs, 'Warning to 2,000,000 Deaf' in *John Bull*, page 19, March 7th, 1936. Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

WARNING to 2,000,000 DEAF by Sir Wyndham Childs

THERE are many reliable and efficient appliances for aiding the deaf—their nature, of course, varying according to the conditions causing deafness—but countless unfortunate people, suffering under the handicap of deafness, are being callously exploited through the wiles of certain medical "quacks."

When I point out that one person of every three of the total population of Britain suffers, in some form or other, from deficiency of hearing; that there are at least 2,000,000 in whom that deficiency is a major handicap; and that there are 40,000 completely deaf and dumb persons in the country, it will be seen that the field for the exploiter is a wide one.

Indeed, so grievous has this evil become that the National Institute for the Deaf, of Gower Street, London, has deemed it necessary to establish an official warning and to voice an opinion which I have long held:

"These evils are so widespread and so harmful to a large section of the community as to call for Government inquiry."

Commercial firms that sell appliances to overcome deafness are multiplying in number. There are, of course, many concerns that are straightforward and honest in their dealing with the deaf. These would be the first to welcome legislation which would exclude the charlatans bring their profession into disrepute.

There is an ever-increasing number of shady,

purchase aids to hearing or patronise alleged deafness cures.

They are severed from their fellows by their infirmity. They have suffered social misery and, in desperation, are willing to make great sacrifices to be even only partially restored to normality.

Many are predisposed to accept any promise of relief, no matter how extravagant,

JOHN BULL

Servicemen, and domestic servants are constantly induced to throw away pounds they cannot possibly afford on some of these worthless "inventions" aids to the deaf.

Specially trained salesmen and women are employed by several of the firms who market mechanical and electrical anti-deaf instruments. And they work under a rigid order that a sale must never be missed.

Persons entering any of the "consulting-rooms" of certain firms have the greatest possible difficulty in escaping without having signed a contract to make a purchase, or without parting with a cheque.

Every simple enquirer is converted into a purchaser—or the salesman must explain the reason why to his chief.

Blank cheque forms are always available at such places. The plea, "I will think the matter over. Anyway, I have not my cheque-book with me," is countered with the immediate production of a blank form cheque which can be filled in and signed there and then. Indeed, people are almost driven into buying.

Tests of the instruments made in these shops—for that is all they are in effect,—are often carried out in rooms cunningly constructed to magnify sounds and speech. In this way a deaf person is really deceived.

He tries an instrument in such a room and may imagine that he actually hears a little better.

Of course, he is delighted, thinking that the device will be of material benefit.

But when he goes away and uses the instrument under conditions of ordinary life, in home, office or the street, he discovers that the improvement in hearing is negligible.

Figure 27: Warning to 2,000,000 Deaf. [457]

This article was particularly detailed, and condemnatory in its style, using emotive language in its depiction of the 'innumerable instances- pathetic in their detail and hardship- where poor people have been despoiled of their savings in a vain search among the quacks for promised relief to their deafness.' It outlined those most afflicted: 'poor people, old age pensioners, ex-servicemen and domestic servants' as well as the heroes whose 'deafness [was] brought on by war service.' The poor were particularly vulnerable to quacks partly because they were lured in by cheapest devices that could not work, although there were effective electrical hearing aids available for a much higher price. Indeed, it seems that the market at which these stamp book advertisements were aimed was the lower income sector.

Conservative MP Sir Francis Fremantle was a key campaigner in these debates. He was an active figure in a variety of British medical services and an influential campaigner on issues

[457] Ibid.

concerning public health both within Parliament and during war service.[458] He was a Medical Officer of Health and held presidential roles at the British Medical Association, the Incorporated Society of Medical Officers of Health, and was an active member of the NID and the Deafened Ex-Service Men's Society[459] Fremantle portrayed himself as representative of the medical profession and was prolific in writing and campaigning for improved public health. On the 24 November 1937 he wrote to ex-Postmaster General Sir Kingsley Wood on these quack devices and their advertisement:

> To claim "amazing results" from any apparatus even in the most acute cases of Middle-ear Disease and "Stone Deafness" is a wicked lie, a danger to life and a deliberate fraud. And yet the government broadcasts this wickedness in order to obtain a few shillings more than they would from an honest advertisement. Couldn't you take this time-dishonoured scandal up now with George Tyron? Hitherto he, like his predecessor as P.M.G., has denied any power to stop so obvious a wrong. Now let the former poacher turn gamekeeper![460]

Wood sent it on to the current Postmaster General Tyron (who had previously held the position of Minister of Pensions) to ask what he should say and he responded that the position on hearing aid advertising was unchanged. The Post Office's continued refusal to remove these advertisements even in the face of this powerful campaign hinged on their definition of hearing aids as apparatus rather than medicines. Their response seems to actually have been framed by the Treasury and was then modified by the Postmaster General and Post Office PR Department.[461] Their response however – whether within internal memos or external publicity – does not at any point consider the actual utility of the product. This was not because it was outside their ability or jurisdiction to do so, as the Post Office had simultaneously undertaken a prolonged investigation into the efficacy of the hearing aid coupler devices and also seriously investigated claims about hearing aids of non-British origins.

This was one of the claims made by Ossicaide in an attempt to get more space in the postage stamp books by damaging the reputation of their competitors. Hearing aid companies were constantly accused of false advertising practices because advertising itself was seen as the domain of quacks, yet they simultaneously used advertisements to try and legitimate their claims and counter such claims. They did this through utilising testimonials, references to patents, medals,

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458 Plarr's lives of the fellows online, 'Freemantle, Sir Francis Edward' in *RCS, Advancing Surgical Standards*, Accessed on December 30th, 2014, < http://livesonline.rcseng.ac.uk/biogs/E004111b.htm>
459 Ibid.
460 Sir Francis Freemantle to Sir Kingsley Wood (passed to Major Tyron) Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.
461 Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

and awards and by emphasising that their product was British. The company Ossicaide make reference to 'all patents filed and registered' but Ardente, the most prolific firm in advertising, did actually try to take a patent out in 1927 for: 'Telephone Instruments for deaf persons', though this patent was refused because Henry Reuben Dent did not pay the sealing fee.[462]

On the other hand, choosing not to advertise could also be a tactic firms pursued in order to be considered legitimate. There is a clear correlation between the firms who did not advertise and those who were on the NID approved list and, as we shall see in the next chapter, used in hearing aid clinics. Amplivox explicitly chose not to advertise because they did not want to be associated with quackery (and perhaps because being on the approved list of manufacturers compensated enough for lack of marketing) and in 1937 Edwin Stevens, Amplivox's manager, formed the Hearing Aid Manufacturers Association, which only included firms on the NID list. He described his decision to do this in *The Lancet* in 1938, in response to a series of letters on the subject of 'Hearing Aids for Deafness' which had been initiated by the aurist Macleod Yearsley's complaint about advertising:

> There are, on the other hand, certain commercial firms who advertise continuously and flamboyantly in the daily press and whose sole object is to exploit the deaf public for all it is worth. Their prices are exorbitant and they charge fees for trial which are not allowed for when a purchase is made. These firms do not worry about decibels, possibly because they have not yet heard of them.[463]

This is significant for two reasons: firstly, it indicates again that advertising was linked to fraudulent practices, and secondly, it also shows the increasing acceptance of the decibel measurement as standard for the purposes of testing hearing as well as measuring noise levels. The letter generated many responses, one of which was from L.T.E Webb who asked: 'Is it not the inevitable conclusion that the time has arrived for an effort to be made to form a corporate body corresponding in aims and training to that of the opticians?' He commented that: 'To send a patient to a surgical instrument maker is to send him to a selling agent (sometimes one buying such aids through the second-hand columns of the Exchange and Mart).'[464] This remark generated further lengthy letters in response from hearing aid companies Amplivox and FC Rein

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462 Reuben Henry Dent & Sydney Wilfred Bussell 'An improved electric switch combined with a telephone receiver' Accessed via espacenet on 21st of November 2014 <http://worldwide.espacenet.com/publicationDetails/biblio?DB=worldwide.espacenet.com&II=174&ND=3&adjacent=true&locale=en_EP&FT=D&date=19270609&CC=GB&NR=272043A&KC=A>

463 M. Yearsley, 'Hearing Aids for Deafness', letter to the editor of *The Lancet*, Vol. 231, Issue 5981, 16 April 1938, p.914.

464 L.T.E. Webb, 'Hearing Aids for Deafness', Letter to the Editor of *The Lancet*, Vol. 231, Issue 5985, 14 May 1938, pp.1135–1136 (p1136).

& Sons, who wrote to defend themselves against these allegations and distance themselves from firms that advertised their services. Leslie V.K Rein wrote on behalf of company F.C Rein & Sons that:

> nobody is more fully aware of the unsatisfactory position that exists in certain quarters to-day in the marketing of so-called deaf-aids than our own group, and it is for this particular reason that a number of reputable houses have come together with the common object of supporting the approved list published by the NID, in the hope that in doing so they will create a closer understanding and fuller cooperation with members of the medical community.[465]

Thus more prestigious and well-established hearing aid firms also condemned the advertising strategies of less scrupulous companies; at the same time this allowed them to forge closer links with, and garner approval from the medical profession. Edwin Stevens of Amplivox also wrote to defend his profession and to introduce the group that would become the Hearing Aid Manufacturer's Association: 'A number of hearing aid manufacturers have already joined together to form the Aural Society of Great Britain, the aims of which are (among others) to regularise methods of trading, to establish standards of performance of various hearing-aids and generally to cooperate with the medical profession in the development and supply of hearing instruments.'[466] It is clear that increased regulation of hearing aid practices was a direct result of the controversial advertising endorsed by the Post Office. Moreover, it led to increased competition between firms who were not on the NID's approved list.

This meant that firms not on the list attempted to legitimise their devices by discrediting their competitors. One of the most effective ways of doing this was by questioning the legitimacy of the rival firms' British origins. During the interwar years, it was deemed of paramount importance that the Post Office used British manufacturers, even though their Marketing Department was looking to the continent for publicity inspiration. As we saw in the last chapter, this issue was of key concern for the Ministry of Pensions hearing aid provision. Through emphasising the British pedigree of their hardware and questioning the credentials of other firms, hearing aid manufactures attempted to legitimise their products. For example, Ossicaide accused Ardente of using equipment made in Germany and wrote to the Post Office to complain about their inclusion in the stamp books: 'Ours is an entirely British concern, and we would not mind our competitors having the monopoly so much, had they also been British firms, but such is not the case. The Ardente is a German instrument imported from Germany

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[465] L.V.K.Rein, 'Hearing Aids for Deafness', letter to the editor of *The Lancet*, Vol. 231, Issue 5981, 16 April 1938, p.1307.
[466] E. Stevens, 'Hearing Aids for Deafness,' Letter to the Editor of *The Lancet*, Vol. 231, Issue 5988, 4 June 1938, P. 1307A.

and the Acousticon is American."[467] The Post Office took this allegation entirely seriously and indeed it seems that if Ardente had turned out to be German, the Post Office would have stopped their inclusion in the stamp books, even though the prolific campaign to ban the advertisements had failed. Indeed, the fact that the Post Office wrote to all these companies and went to their premises to investigate these claims, as well as demanding witnesses and invoices to prove their British origin, shows how seriously they took these accusations. Certainly the report they made on this investigation was thorough and detailed and was taken far more seriously than the claims of the hearing aids inefficiency, which were not investigated.

The decisions made around advertising during this period often seem to be somewhat arbitrary and inconsistent. Why endorse publicly vilified products but potentially refuse to endorse a German one? Why endorse products that were unsanctioned for use by the Post Office? These specific incongruities can lead us to an explanation of the larger inconsistencies inherent within the Post Office advertising policies of the 1930s. Part of the ambiguity stemmed from the division within the Post Office between the Engineering, Public Relations, and Telecommunications departments and the Postmaster General and Treasury, who liaised closely between themselves, but not with other departments. The fact that advertised commercial hearing aids might have been German was actually the most problematic issue, and this indicated the effect that increased European tensions had had on Post Office policy. Indeed, understanding the increasing concern regarding the escalating political situation with Germany holds the key to understanding the incongruities in the Post Office policy that have been outlined in this chapter.

4.4: Conclusion

Escalating political tensions with Germany and increasing pressure on the Treasury had been building throughout the 1930s. Thus it seems understandable that the Post Office would have felt unable to publicise German hearing aids (though Ardente was in fact a British firm). Moreover, in the context of rearmament from 1935 and the Bridgeman Report cutting funding revenue to the Treasury, it seems that prioritising ethical concerns on this issue was simply too expensive for the Post Office.

As GC Penden has shown, in 1919 the British government had invoked a ten year rule to reduce funding on defence, following domestic and political pressure to lower defence estimates

[467] Letter from Ossicaide to Postmaster General, 24th July 1931, Accessed at the BPMA, Finding NO. BPMA POST 33/3481B.

and reduce taxation.[468] By 1935 however, Germany had commenced rearmament and defied the Treaty of Versailles, which prompted a rethink of the part of the British government on the subject of defence spending.[469] Spending on defence increased throughout the 1930s: 'Defence expenditure, and interest payments on the war swollen National Debt, made up the greater part of the budget.'[470] This massive public debt following on from the First World War meant that the Treasury struggled with the armed forces' demands for increased funding and the financial implications of impending warfare far outweighed the need for good Post Office publicity.

In 1938, the Post Office Public Relations officer, Colonel Crutchley, reflected on the fact that 'Wars are notoriously expensive and when it becomes necessary to pay for them one of the first services to be tapped for revenue is the Post Office.'[471] This observation allows us to comprehend the Post Office's seemingly inconsistent policies on hearing aid advertising. Although there was pressure on the Post Office to remove the contentious advertisements from the public, the medical profession and even the Government, it was Treasury control of the Post Office and reliance on its revenue that made the removal of these advertisements impossible in the financial strain occasioned by the build-up to war.

The outbreak of war temporarily prompted the end of stamp book advertising, as civilians were encouraged by the Government not to use the Post Office services during wartime. But use of the postal system actually increased during these years and stamp books were reintroduced because of their potential for income provision.[472] This again is proof of the immense profit that they were capable of providing. After the war however, the NHS and the Medresco hearing aid had effectively destroyed competition within the lower income private hearing aid market. It is notable that Amplivox, who did not advertise, are still in business today, perhaps indicating that their strategy of seeking approval through the NID list was the most successful in the longer term. The way that hearing aid firms chose to advertise their products was thus either through reaching the lay public through stamp books or by engaging with medical professionals by writing to medical journals and relying on the approval of the NID. It is clear that inclusion on the NID's list endowed a company with authority, power and trustworthiness, particularly in the eyes of physicians. Claire Jones has looked at a similar demarcation of advertising practices in the use of medical catalogues. She highlights: 'These companies purposefully shaped the catalogue

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[468] G.C. Peden, *British Rearmament and the Treasury: 1932-1939* (Scottish Academic Press, 1979) p.3.
[469] Ibid. p.9.
[470] Ibid.
[471] E. T. Crutchley, *GPO* ed. by Lord Stamp (Cambridge University Press 1938) p.78
[472] 'The divergence of Postal./ Telecom Profits' from BPMA POST OFFICE STATISTICS Accessed 31/12/14 via <http://www.postalheritage.org.uk/page/statistics>

into a unique hybrid publication—part medical reference material, part advertising—believing it would better appeal to the discernible professional readership than forms of advertising aimed at the public.'[473] Indeed, the hybrid status of hearing aids themselves was crucial to the way they were advertised. It is clear that if hearing aids were categorised as medical devices then they would have fallen under the jurisdiction of the medical profession and the NID. By referring to them specifically as apparatus, the Post Office was able to advertise them without contradicting the Patent Medicines Act. Professionalisation of the hearing aid manufacturers into the Hearing Aid Manufacturers Association in the late 1930s was also closely tied in with their stance on advertising and their relationship with the wider medical community.

In 1940, the increased revenue generated by wartime postage sales spurred an MP to request again that advertisements not approved of by the British Medical Association were banned.[474] Once again, the Postmaster General replied that cutting advertisements 'means forgoing the revenue derived from these advertisements; and I am not prepared to give this up, in view of the present heavy expenditure on national services.'[475] Thus it is clear that their contribution to national revenue was deemed to be of greater importance than the Government's role in protecting the general public from quackery. By the mid-1970s, the inclusion of advertising in stamp books stopped completely, as by then the telephone was being used as the primary mode of communication in Britain, finally taking over the traditional postal service. For instance, in the years 1947—1948 the postal profits stood at 11.5 million while telephony profits had generated 8 million. By 1975—1976 postal profits had decreased by 9.2 million while telephony had gained 154.7 million.[476]

The advertising strategies of the Post Office in the 1930s were characterised by awareness of its special position as simultaneously a business and a government department. Its complex relationship with advertising was inextricably linked with the campaigns devised by the charismatic Stephen Tallents in his 1930s makeover campaign, which focused on the domestication of telephony. Indeed, the Post Office's unique combination of identities has been a consistent theme throughout all three sections of this chapter, as in the examples explored in section two: hearing aid firms accused the Post Office of exploiting this special position to

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[473] C. Jones, ' Re-reading Medical Trade Catalogs: The uses of professional advertising in British Medical Practice.' in *Bulletin of the History of Medicine*, vol. 86, no. 3 pp.361-393 (p.365).
[474] Stamp Book (advertisements) House of Commons Debate May 1 1940 vol. 360, c 730W accessed 08/06/16 <http://hansard.millbanksystems.com/written_answers/1940/may/01/stamp-books-advertisements#S5CV0360P0_19400501_CWA_49>
[475] Ibid.
[476] A. Clinton, *Post Office Workers, A Trade Union and Social History* appendices 29 and 31 Accessed 31/12/14 via <http://www.postalheritage.org.uk/page/statistics>

influence customers to rent their telephone for the deaf rather than using their hearing aid couplers. Simultaneously, advertising of the Telephone for the Deaf was more problematic due to increased awareness of the stigma surrounding deafness. The Public Relations department negotiated these difficulties by ascribing the problem to the technology rather than to the person, an approach reminiscent of current theories concerning the social construction of disability, which have moved away from a medical conception of disability to emphasise that it is the assembling of society that creates disability rather than individual physiological difference.

Thus, the Post Office also engaged with advertising as a way of gaining information about companies that they regarded as a threat to their monopoly. The perceived seriousness of this threat was also apparent in the prolonged investigation into the threat of these devices, which they believed could damage the hearing of their operators. Their use of the newest techniques and equipment for measuring and controlling sound shows how interconnected hearing and telephony were. Similarly, for the US case, Mara Mills has argued that measuring and defining noise and hearing loss became essential to the telephone system in the US in the early twentieth century by analysing the way that AT&T undertook widespread hearing tests to establish the criteria of hearing for the 'average ear.'[477]

The Post Office's special position as both government department and private enterprise also allowed them to provide endorsement to alleged quack hearing aid firms through their uniquely effective stamp book advertising. The inconsistency of this practice against the Post Office's apparent commitment to helping the hard of hearing can ultimately be attributed to the pressure of war time government expenditures and the influence of the Treasury. Many of the people that had been deafened in the First World War became casualties of the financial strain of the Second World War as the Post Office and the Treasury used the profits from stamp book advertising to lessen the strain from the financial strain of rearmament.

The activities of so called quack hearing aid manufacturers provoked responses from other sectors of society apart from the Post Office. Indeed, it was the actions of nefarious hearing aid dealers that forced greater medical intervention into the problems of hearing loss and hearing aids, as the late 1930s saw the establishment of Britain's first hearing aid clinic. This establishment is especially notable because of its involvement with the Post Office, and the clinic's development of the amplified telephone, explored in the next chapter.

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[477] M.Mills, 'Deafening: Noise and the Engineering of Communication in the Telephone System' in *Grey Room*, Spring Issue, No. 43, (Inc. and the Massachusetts Institute of Technology 2011) pp.118-143.

Chapter 5: From Subscribers to Standardisation: The instigation of a technocratic approach to hearing assistance

> I need hardly say that if the E-in-C's officers want a deaf ear at any time I shall always be ready to supply one.
>
> There are more deaf people about than is generally thought and a reasonably good *but cheap* amplifier for the home combined if possible with amplification from call officers on demand would, I think, have a wide welcome. Now that amplifiers are getting to be common knowledge people are becoming much less shy of admitting that they are deaf. Previously there was no real help for deafness, the aids didn't help sufficiently so people shied at using them as they would at using clumsy spectacles which weren't good enough to let them read.[478]

In 1937 hard-of-hearing Post Office employee G.G Crawley gave this response on a telecommunications questionnaire about the needs of 'Deaf Subscribers'. His answers provide insight into how amplified telephones were used by individuals in practice, and how he perceived improvements in technology to have alleviated some of the stigma surrounding hearing loss. Crawley's offer to lend his 'deaf ears' to the Engineer-in-Chief's officers is indicative of the position from which the Post Office started their investigation, in which its hard-of-hearing subscribers were prioritised as a source of knowledge (access to deaf ears) as well as discerning consumers. In the same year, the Telecommunications Department planned to investigate the needs of their hard-of-hearing customers in order to generate information that the Engineering Department could then use in the development of a new amplified telephone. The investigation took the form of detailed questionnaires which sales representatives could complete by visiting the homes of those renting amplified telephones. Yet this investigation was ultimately abandoned by the Post Office before it distributed a single questionnaire to any of their subscribers. Instead its plans were superseded by a clinical investigation led by a medical professional, Dr Phyllis Margaret Tookey Kerridge. The ultimate result of this was that the amplified telephones designed by the Post Office in 1922 and 1934 were still in use in 1961, when they advertised a new transistorised device.[479]

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[478] G.G. Crawley to A.C. Belgrave, 3rd August 1937. Accessed via BT Archives, Finding no. TCB/2/172/A. Original emphasis. The reference to 'call officers could either by referring to call offices as in telephone boxes which would need to be amplified separately, or to telephone exchange operators who would amplify calls on demand through the exchange if the person was not at their desk. It is unclear if this was possible and this course of action does not seem to have been considered as viable by the Post Office Engineers. 'Call Officers' was not, in either case, normal terminology during this period.

[479] Post Office Magazine, 'To Speak, To Hear', July 1961 Accessed via BT archives Disability Pictures Folder. & Tp. S.I BI, 82 Sheet 32A / June 2 Valve Amplifier 10/5/55 BT Archives TCB/2/172.

This chapter will question why a more medicalised and technocratic approach to hearing aid assistance was prioritised by the Post Office at the expense of individual need. Furthermore, it will reveal how this approach led to a lasting loss of user input and decreased awareness among manufacturers of the social circumstances in which such devices would be used. The Post Office Engineering Department was particularly motivated to replace individual patterns of use with more quantifiable data concerning sound, hearing, and hearing aids. My focus is therefore on how notions of scientific objectivity and system standardisation impacted on individual perception and input. This shift in measurement and quantification was influential and impacted on the telephone developments related to the first NHS hearing aid, the Medresco.

During the early 1920s, sound had been quantified in ambiguous noise or sensation units. These were obtained through the use of an audiometer, which the recorder would turn up until the audiometer tone was loud enough to mask the ambient noise around them.[480] This of course did not take into account the wide spectrum of hearing ability even among those considered to hear 'normally' and so this kind of individual subjective measurement was superseded with the rise of less ambiguous decibel measurement, a term coined in 1923 by Bell Laboratories in the US and then gradually adopted by the UK.[481] These broad shifts towards increased objectivity and accuracy in measurement were also apparent in hearing testing, as the 1930s featured a drive for a standard criterion of sound.[482] W. West, an engineer from the Engineer-in-Chief's Research Section Office, gave a lecture to the Post Office Telephone and Telegraph Society of London on 11 December 1933 on the subject of Room Noise and Reverberation.[483] This was then published in 1934 as a Post Office Green Paper, part of a series of publications emerging from Stephen Tallent's public relations initiatives. West described how: 'it is easy to construct apparatus comprising a microphone, an amplifier and a measuring instrument' in order to measure loudness using noise units or decibels, and that standardising hearing loss units in the telephone system was of concern for the Post Office because the standardization of noise measurement was in flux in Britain at that time.[484] For example, his paper included a chart showing the 'frequency characteristics of normal hearing' and this used decibels in the graph axis alongside the older measurement describing 'Auditory Sensation Area.'[485] In the early 1930s, units of measurement were shifting, yet by the latter years of the

[480] E. Thompson, *The Soundscape of Modernity*, (MIT Press, 2002) p.148.
[481] W.H. Harrison (1931). "Standards for Transmission of Speech" in *Standards Yearbook* (National Bureau of Standards, U. S. Govt. Printing Office) p.119.
[482] Concert pitch was also standardised in the 1930s.
[483] W. West, 'Room Noise and Reverberation' in *Post Office Green Paper No. 2* (His Majesty's Stationery Office, 1934).
[484] Ibid. p.4, p.7.
[485] Ibid. pp.5-7.

decade the decibel was fixed in use to describe hearing loss both in humans and in the telephone system. According to the National Institute for the Deaf's Medical Committee in 1931, this resulted from an international agreement between the various telephone services.[486] However, these shifts in quantifying and assessing sound levels reflected deeper changes in the way that hearing was conceptualised by both engineers and otologists. It also was indicative of the influence of the Post Office engineering department in determining the type of information that it believed was important to obtain from its hard-of-hearing telephone users. Engineers therefore wielded great influence in the interpretation of what constituted hearing loss.

This chapter reveals these important changes through a detailed case study of the development plans for a new amplified telephone that would replace the Repeater 9a, the Repeater 17a, and the Repeater 17b (the amplified devices we encountered in Chapter 3). I begin by considering the planned investigation of the Telecommunications Department into the needs of their hard-of-hearing subscribers.[487] The London Telecommunications Department of the Post Office (headed by A.C. Belgrave) designed a questionnaire that actively sought to obtain user input from the very start of the design process. The intention was to create a device that would suit subscribers' personal needs and the proposed focus of this planned questionnaire provides valuable insight into the perceived and actual experiences of the hard-of-hearing telephone subscribers. Organisations that were approached by the Public Relations Department to this end included the NID, the Medical Research Council, Harley Street aural specialist Dr Londes Yates, and physiologist and hearing aid specialist Dr Phyllis Kerridge. Kerridge's hearing aid clinic provided a medical and professional space which could mediate user input and translate it into the kind of measurable terms desired by the Engineering Department. This chapter will show how Kerridge forged the initial links between the NID, the Medical Research Council, and the Post Office. These organisations would form the basis of more productive collaborations years later in the creation of the Medresco NHS hearing aid.[488] The success of these early collaborations was limited since the telephone model for which the research was designed was never made commercially available. As it did not become a marketable product the new

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[486] National Institute for the Deaf, Medical Committee, 6th March 1931. Accessed via the RNID Library.

[487] The word telecommunications was used in this sense from 1932, when it adopted as the subject of the' Convention Internationale des Télécommunications.' Conference in Madrid. This international usage initially applied to non-electrical as well as electrical communication but it was used in the more modern sense by the Post Office in their description of the London Telecommunications Region, which had been created in 1938 following the advice of the Bridgeman Report of 1932. It therefore seems that the Post Office was the first British institution to use the term telecommunications in the modern sense, as the Oxford English Dictionary denotes that it was not used this way in English until the 1940s.

[488] See S. McNally, *Medresco – the history of state sponsored auditory assistance* (University of Leeds, forthcoming PhD) for a detailed discussion of the Medresco.

amplified telephone could be considered to be a technological failure, but this telephone was in fact a victim of circumstance, as its development was curtailed by the advent of the Second World War.[489]

In Chapter 4 we saw that the Post Office tactically condemned private hearing aid manufacturers selling products that amplified the telephone as 'quacks', in order to maintain its control of the market. However, even as it refused to sanction private hearing aid products for use on the telephone, the Post Office courted controversy with its endorsement of these firms in its stamp books. Furthermore, this chapter shows that despite this controversy, the Post Office interacted with private hearing aid manufacturers in order to improve their amplified telephone service. An improved and competitive 'telephone service for the deaf' was intended to utilise a new standardised amplified telephone that combined the best features of the three existing models and would be compatible in all service areas, regardless of the differing exchange models that were in use. As we have seen in Chapter 3, there were ongoing complaints about the service. The result of these complaints was that the Engineering Department was determined that Public Relations should investigate the wants and needs of subscribers and thus provide information that would allow the Post Office to incorporate user input at the outset of the design process. This exemplifies the hierarchy at work in the Post Office that prioritised engineering.

5.1: Standardisations and motivations. 'One Policy, One System, Universal Service'

As a result of the miniaturisation of vacuum tubes, body-worn hearing aid devices became increasingly viable in the late 1930s. This led to a wider proliferation of electrical hearing aid manufacturers and the controversial practices of some firms resulted in the medical profession taking a more active interest in the regulation of their distribution. These controversial practices included the work of those who were widely derided as 'quacks', hearing aid vendors that exaggerated their ability to cure deafness in a way that sparked the ire of the professionalising medical community. The practices of such hearing aid manufacturers were of great concern to the NID because of their business practices, which the NID regarded as unethical. Such business strategies were condemned due to concerns about ethical commerce rather than efficacy. The hearing aids were not condemned for not working. Rather, firms were

[489] For discussion of the historiography pertaining to technical failures see H.J. Braum, 'Symposium on Failed Innovations Introduction' in *Social Studies of Science* Vol 22, no 2 (Sage Publications 1992) and G.Gooday 'Re-writing "the book of blots": Critical reflections on histories of technological "failure" ' in *History and Technology: An International Journal*, vol 14, no2, (Overseas publishers association 1998)

criticised heavily for not allowing free trials or refunds and for using intrusive advertising strategies that were regarded as immoral. In 1935 the NID complained about the lack of government legislation designed to regulate these issues:

> It is therefore open to any person, if sufficiently base, to pretend to cure deafness and to set up clinics for this purpose. A number of these establishments are in operation. Some of the people running them are well known. They appear in various places under different names and are sufficiently versatile in the healing art to undertake to treat other defects, such as rheumatism or asthma, when the supply of deaf persons willing to be duped in any particular locality runs short. Scarcely less despicable than the practices of quacks are the proceedings of those who take advantage of the deaf under the guise of helping them through aids to hearing. In the exaggeration of their advertising and other literature, there is little to choose between them. Hearing aids are now advertised by sandwich boards and hawked from door to door. Nothing like this is associated with any other affliction.[490]

As part of the attempt to regulate the practices of hearing aid manufacturers and fraudulent hearing specialists, a hearing aid clinic was established in London in 1937 in collaboration between the NID and University College Hospital, under the supervision of Kerridge. The link between Kerridge and the Post Office was facilitated by the increasingly central role that medical professionals played in the distribution of hearing aids and the development of the Post Office's services. It seems however, that the NID did not consider the telephone an essential for the deaf and did not contribute directly to the investigation. If the NID's clientele did not use the telephone this may have been because prior to the Second World War the telephone was considered a luxury item and an amplified one perhaps more so. The NID's Medical Committee explained in 1926 their belief that 'the partially deaf' would not benefit from telephony:

> The frequent press references to wireless telephony as a curative agent in deafness induces your Committee to make the following observations on the matter. Wireless is of no use to the deaf-mute. In cases of hardness of hearing, those who hear through the ordinary telephone will hear wireless through its earphones; and those who have difficulty with speech, heard through the air, will have the same difficulty with the loud speaker. There is, no doubt, a percentage of hard of hearing persons who experience pleasure from listening to wireless speech and music but the sensational promises of relief, often disseminated

[490] The Eleventh Annual Meeting of the National Institute for the Deaf, July 30th 1935, Accessed via the RNID Archives.

> through the Press, lead only to disappointment and add to the burden of the affliction.[491]

Nonetheless, Kerridge's clinic became instrumental in shaping the Post Office's investigation into the needs of their hard of hearing telephone users. Under Kerridge's guidance the Post Office moved from seeking individual experiences of hard-of-hearing users of the telephone service. It instead placed greater emphasis on institutional collaboration, both with the NID and medical institutions like the Royal Society of Medicine, the Medical Research Council, and private otologists that the Royal Society recommended. The Post Office only discussed its amplified telephones with recommended medical specialists rather than directly contacting private hearing aid manufacturers who were working on similar products. Although it is clear that the Post Office was interested in the telephone coupler devices created by private hearing aid firms, its engagement with these firms in planning the new amplified telephone was not openly acknowledged.

The outbreak of war in 1939 meant that its planned telephone was never made commercially available and it was not until 1946 that the investigation was reopened, by which time proposed plans for an NHS hearing aid had changed the Post Office's position entirely. Its previous plans were then adapted to create a telephone that linked to the NHS Medresco hearing aid via a coupler but this was again abandoned after negative reviews from hard-of-hearing clients who tested it at the NID. This final episode in the story of the amplified telephone reveals a great deal about the importance of engaging with users during the initial stages of production, and will be explored in greater detail in the epilogue to this thesis. Yet despite the fact that the designs for this particular amplified telephone did not come to fruition, the blueprints associated with this technology do reveal the expectations of hard-of-hearing telephone users, and the changing priorities and collaborations involving Post Office design of hearing aid apparatus during the 1930s. The telephone prototype was a victim of circumstance rather than a technological failure, and its development reveals important changes in design and practice.

The Post Office's design motivations in the initial stages of its amplified telephone development in 1937 were threefold. First of all, they resulted from the Post Office's desire for apparatus standardisation across the system. Secondly, the Post Office was reacting to persistent complaints from its hard of hearing subscribers. Thirdly, it was driven to improve the service by the threat of competition from private hearing aid companies. Standardisation was a built-in component of their telephone network monopoly and its pursuit was therefore partially driven

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[491] Medical Committee minutes, March 31st 1926, Accessed at the RNID Library.

by technical necessity. Today, telephony is often used by historians of technology to exemplify how a device can create a network effect.[492] The desirability of the telephone was increased by other users – and the users of the network became part of its appeal as there was no point having a telephone without having another telephone to call. This network effect meant that the desirability of the telephone directly correlated to the number of subscribers to the system.[493] However, this network effect was not a technical necessity and there were tensions between different exchanges and their networks in the era prior to nationalisation.[494] For example, local subscribers benefited more from local exchanges and public exchanges were more expensive for telephone companies to build than private wire systems.[495] But different exchanges that offered different types of connection did not comprise part of the Post Office's monopolised service. Similarly, in the US though the telephone network AT&T did not have a government-mandated monopoly, it still exerted its domination on the lines of communication in a way that has been described as a form of 'American socialism.'[496] This was exemplified by the AT&T slogan that demanded: 'One policy, One system, Universal service.'[497]

The importance of standardisation within the telephone system can explain why the Post Office found it opportune in 1937 to design an amplified telephone that would work with the newer automated systems that had been phased into usage from the 1920s.[498] The Engineering Department made this point in a letter to the Telecommunication Department, in which they explained that: 'A further advantage of this telephone amplifier is that it can be operated from the subscriber's A.C. mains in the more usual case where he is connected to a C.B. [central battery operated] or automatic exchange.'[499] The Post Office telecommunications department wanted to design a single standardised amplified telephone that would work with their newest automatic exchange equipment and replace the three different versions of the amplified telephones they currently sold. A new design was planned to incorporate all the features of greater amplification in the Repeater 17a and tone control in the Repeater 17a and 17b. It

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[492] In relation to 19th century telephony see M. Kay, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony*. (University of Leeds, PHD Thesis, 2014) and in relation to mobile phones see J.Agar, *Constant Touch: A Global History of the Mobile Phone*, (Icon Books 2003) p.64.
[493] N Gandal,' Compatibility, Standardization, & Network Effects: Some Policy Implications' in *Oxford Review of Economic Policy* Vol 18, Issue 1, January 2002 pp 80-91 (p.81).
[494] M Kay, Thesis, *Inventing telephone usage: debating ownership, entitlement and purpose in early British telephony.* pp.150-180.
[495] Ibid. pp.150-151.
[496] B. Sterling, 'The Hacker Crackdown: Evolution of the US Telephone Network' in *Information Technology and Society* ed. by N Heap, R Thomas, G Einon, R Mason & H Mackay (Sage publications ltd.1995) pp. 33-40 (p.37).
[497] Ibid.
[498] This was a slow process which would not be complete across Britain until the 1970s.
[499]'Deaf Aid Telephone' Letter to the Telecommunications Dept. from the Engineering Department, 29th April, 1939. Accessed at BT Archives, TCB 2 172.

combined both of their improved features into one universally available model.[500] The Engineering Department was especially aware of the importance of designing a telephone that would remain in use for as long as their present system remained. Further factors that contributed to the new design were the fact that stock of the current amplified telephones was low and, as the Engineering Department explained:

> In view of complaints from subscribers as to the inadequacy of the present amplifier and the activity of various deaf aid appliance manufacturers in producing magnetically coupled amplifiers for use with the telephone it is thought that the time is now opportune to consider whether the present apparatus should be superseded by the new type and to review generally the future policy with regard to telephone facilities for the deaf.[501]

Thus the complaints of hard-of-hearing subscribers, which were outlined in Chapter 3 as the driving force behind the initial development of amplified telephony, were also integral to facilitating its improvement. For this reason, the Post Office intended to create a telephone that would be of practical value for as many customers as possible. This meant that it incorporated a new three way switch that allowed: '(a) the telephone to be used normally, (b) the amplifier to be used with tone control facilities, (c) the amplifier to be used without the tone control.'[502] The new amplified telephone featured greater gain alongside tone control (previously only available with the non-standard Repeater 17b). These controls were designed into the telephone itself with the controls to hand which meant there was no need for separate box containing the amplification equipment (something that customers has complained voraciously about). The cost of standardising equipment, however, was the loss of individuality and flexibility required by customers with a diverse range of hearing abilities. While a network system is the most efficient method of successfully commercialising technology like the telephone, there are inevitable compromises between standardisation and individual flexibility.[503]

For the Post Office, manufacturing a new amplified telephone also made sense in the light of their dwindling stock of older models. The Engineering Department considered that: 'the stock of the present deaf aid instrument is approximately 600 and as the consumption is 400 to 500 per annum, it will soon be necessary to consider replenishment of stocks. It would take

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[500] It is important to note here that the Post Office was not advocating for universal service as we would understand it today. Indeed, the term universal service is a rather loaded one in telecommunications history because of the way it has been used in arguments for monopolies or against competition. For a discussion of this in the US context, see M Mueller, 'Universal service in telephone history: A reconstruction' in *Elsevier Telecommunications Policy* Vol 17, Issue 5, July 1993, pp 352-369

[501] Ibid.

[502] Ibid.

[503] N. Rosenberg, *Exploring the Black Box*, (Cambridge University Press, 1994) p.208.

approximately 12 months to have supplies of the new amplifier available for installation.'[504] The Public Relations Department was charged with the task of investigating how many potential users of the service there would be. In 1938 there were a total of 3,050,012 telephone stations in Britain, so 600 extra subscribers per year equalled just a small percentage of total telephone use.[505] However, it is unclear how many people already had amplified telephones installed, so usage may have been greater than these statistics indicate. In 1938 there were 177,200 new subscribers, so 600 as a percentage of that figure may give a clearer analysis of the prevalence of hearing loss.[506] The price of a regular residential telephone station in London in 1937 was £1 6s and was £1 10s in the rest of the country. This meant that the extra rental cost of an amplified telephone was a surcharge to an already expensive service.

Standardisation was integral to the Post Office company ethos and reflected overall government policy in its position as a state office. Being unable to offer a uniform service was therefore problematic for the Post Office. Similar concerns were raised in parliament in 1945 when the case for suitable hearing aid provision for deafened ex-servicemen was considered. In this later context, Sir Walter Wormesley (Conservative Minister of Pensions) was questioned in parliament by Mr William Rostron Duckworth about whether 'any special mechanical device is recommended for ex-servicemen who have sustained deafness as a result of their war service?'[507] Duckworth was a Conservative MP who was active in parliament between 1936 and 1945 and had questioned whether it was possible to provide: 'old age pensions to those who through deafness are unable to support themselves by their own labour?'[508] These are the only occasions on which Duckworth raised the issue of deafness in parliament so he does not seem to have been an activist in any sense. Duckworth was 67, however, and may have been sympathetic to those with hearing loss because he suffered from hearing loss himself, something that could be particularly problematic while debating in parliament. We saw in Chapter 2 that hearing aids for deafened servicemen were put out to tender to various companies, but that doctors were asked to advocate the cheapest suitable model. The Minister of Pensions was therefore obliged to acknowledge that there was no standard type. Rather, men were provided with the aid that aural

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[504] Deaf Aid Telephone' Letter to the Telecommunications Dept. from the Engineering Department, 29th April, 1939. Accessed at BT Archives, TCB 2 172.
[505] Telecommunication Statistics, 1937, Post Office Telephone Statistics: Summary of principal telephone statistics over a period of years', Accessed at BT Archives.
[506] Ibid.
[507] Mr Rostron Duckworth to the Minister of Pensions (Sir Walter Wormesley), EX SERVICEMEN (DEAF AIDS), Accessed via Hansard online, *HC Deb 12 April 1945 vol 409 c1965*.
[508] Mr W. R. Duckworth to Captain Wallace OLD AGE PENSIONS (DEAF PERSONS) *HC Deb 06 February 1939 vol 343 c649W* Accessed via Hansard online, <http://hansard.millbanksystems.com/written_answers/1939/feb/06/old-age-pensions-deaf-persons#S5CV0343P0_19390206_CWA_9>

specialists found most suitable in each individual case. It seems that individuality was prioritised over a standard model with a standard price.

The earlier 1939 attempt to design such a telephone model came at a time when methods of measuring and assessing hearing were becoming increasingly standardised and sophisticated, and conflicted with the idea of individual suitability. Similarly, the Engineering Department desired objective, quantifiable measurements rather than individual anecdotes to contribute to the design of the new telephone. Persistent customer complaints about the efficacy and availability of the amplified telephone repeater led the Post Office to conclude that it would have to improve the service dramatically. However, its utilitarian desire to standardise the service to provide a universal solution for as many people as possible meant that the increase in decibels from the Repeater 17b to the new 'deaf-aid instrument' was just 5dbs, which would have been a noticeable increase, but was far less than the previously improved telephones had gained. For instance, the Repeater 17b was 13.5dbs louder than the 17a.[509] Increase in the *number* of device functions led to a loss of improvement in single specialised functions. The Repeater 17a, for example, actually gave less gain than the original Repeater 9a because its chief improvement was in tone control.[510] The Repeater 17b was only given to complaining customers and it was considered non-standard because it worked on a different frequency. Furthermore, each set had to be made up for the individual customer. The Engineering Department wrote to the Telecommunications Department to explain that: 'Subscribers have previously been quoted £3. In Auto and CB areas and £3.14.0d in L.B. Areas for this Repeater, each model of which has had to be made up specially- in all about six having been supplied in his way.'[511]

Individually designing each amplified telephone set for cases 'where the subscriber has complained that the Repeater no 17A did not furnish sufficient amplification' would have been a time consuming and expensive method of supply. Moreover, charging different amounts according to area was not in line with the Post Office's ethos of standardised service.[512] However, combining gain in decibels with improved tone control in one standard set for use in

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[509] Mr W. R. Duckworth to the Minister of Pensions (Sir Walter Wormesley), EX SERVICEMEN (DEAF AIDS), Accessed via Hansard online, *HC Deb 12 April 1945 vol 409 c1965*.
[510] Ibid.
[511] Letter from the engineering branch to the telephone branch of the telecommunications department, 16th August 1936, Accessed at BT Archives, TCB 2 172.
[512] Preamble of the questionnaire form', in Draft typed reference for issue to District Managers, Regional Managers, and London Telephone Service. From Public Relations Department (Sales) Investigation into the telephone requirements of deafened persons Accessed at BT Archives, TCB 2 172.

all areas, meant tailored personal support and greater decibel gain were somewhat sacrificed. Yet the Engineering Department was optimistic about the new design:

> It is thought that the increase of gain which the new instrument shows over precious standard types would increase the number of people who would receive assistance from the instrument by a considerable amount, but no actual figures are known. The gain afforded by the new instrument is the maximum permissible, consistent with stability against howling between transmitter and receiver of the hand-set.[513]

As we have seen in Chapter 4, members of the Engineering Department experienced howling along the line when testing private hearing aid telephone couplers. It is clear that the flaws they found in these devices influenced their own design process. However, it is just as clear that they were influenced by the positive aspects of the private hearing aids. The drive for amplified telephone improvement was a reaction to the competing devices available on the market and the threat from private hearing aid companies provided motivation, and also inspiration. The public relations sales department made clear that: 'the Research Branch have therefore considered the design of a deaf aid amplifier along lines similar to modern deaf aid equipment.'[514] By making the 'telephone service to the deaf' comparable to its competitors' service, the Post Office hoped to improve their amplified telephone while simultaneously mitigating the impact of private hearing aid firms on the network.

5.2: Initial Investigations: 'A Telephone Point Of View'

Before manufacturing this new equipment, however, the Public Relations Department (instructed by the Engineering Department) was committed to investigating thoroughly the needs of 'Deaf Subscribers'. Undoubtedly, the 1938 investigation was to avoid the repeated complaints engendered by their previous 'deaf telephone' and was also, Public Relations noted, an easy way to generate favourable press comment. This investigation initially consisted of a questionnaire, which was meant to be given by visiting salespersons to existing subscribers to the 'deaf telephone' and to non-subscribers who had made enquiries about the phone. This questionnaire was never given out but its content is nevertheless very revealing of the intentions that Public Relations desired to be built into the design of the new telephone. However, GG Crawley (who we met at the beginning of this chapter) used an amplified telephone in his office

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[513] Deaf Aid Telephone' Letter to the Telecommunications Dept. from the Engineering Department, 29th April, 1939. Accessed at BT Archives, TCB 2 172.

[514] Draft typed reference for issue to District Managers, Regional Managers, and London Telephone Service. From Public Relations Department (Sales) Investigation into the telephone requirements of deafened persons (with defective hearing) August 1937. Accessed at BT Archives, POST 33/1491C.

at the Post Office and did fill out the questionnaire.[515] It is notable that he did not think canvassing other hard-of-hearing users was worthwhile, despite the fact that he clearly endorsed the technology. Indeed, he finished his responses with an explicit statement that explained how improved technology alleviated the stigma of deafness: 'Now that amplifiers are getting to be common knowledge people are becoming much less shy of admitting that they are deaf.'[516]

The Public Relations Department included a note in the questionnaire for its sales representatives which explained: 'consideration is being given to the design of a new type of amplifier for use by subscribers who suffer from partial deafness, and it is desired to obtain the experiences and opinions of [deaf~~ened~~] persons who may be considered as possible users of the new apparatus.'[517] The term deafened was being used here to explicitly denote those who lost their hearing later in life but did not so identify as 'Deaf'. Yet the second half of the word 'deafened' was later crossed out. It instead simply targeted the deaf, even though amplified telephones were targeting a very particular section of society: those with hearing loss induced later in life, who were therefore deafened, rather than Deaf. The questionnaires were meant to have been distributed by sales representatives, who would travel to the homes of people already renting amplified telephones and canvass their opinions. Representatives were instructed to take all three models of the Post Office amplified telephones with them and were also to call at the homes of subscribers who had made enquiries about the telephone. Sales representatives were told:

> If the person interviewed resents the procedure it should be stated, but if any information is forthcoming, as many answers as possible should be given to the questions on the form […] It should be noted that most persons suffering from defective hearing object to being described as "deaf". The terms "hard of hearing" or "deafened" should be used in all cases.[518]

The investigation and associated guiding shown in Appendix 1 reveal that issues surrounding stigma and appropriate terminology had become a priority of the Public Relations Department. The questionnaire, its attached preamble and Crawley's answers, provide a fascinatingly detailed account of the Post Office's expertise in contemporary medical research

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[515] He is the one respondent to the questionnaire and his answers are reproduced in Appendix 2.
[516] G.G. Crawley, Reply to Belgrave re questionnaire. 30 August 1937. Accessed at BT Archives, POST 33/1491C.
[517] Draft typed reference for issue to District Managers, Regional Managers, and London Telephone Service. From Public Relations Department (Sales) Investigation into the telephone requirements of deafened persons (with defective hearing) August 1937. Accessed at BT Archives, POST 33/1491C. 'Such' has been inserted over the scored out word, 'deafened' to change the word to 'such deaf.'
[518] See Appendix 3. Preamble of the questionnaire form', in Draft typed reference for issue to District Managers, Regional Managers, and London Telephone Service. From Public Relations Department (Sales) Investigation into the telephone requirements of deafened persons.

into deafness, commercial hearing aids, and the study of speech transmission. The Post Office's refusal to sanction hearing aids and its general attitude of condemnation towards private hearing aid manufacturers was in conflict with its evident desire to learn from their design. The questionnaire demonstrated the Post Office's specialised knowledge and shows the ways in which hard-of-hearing telephone users were innovative in combating their hearing loss. Furthermore, it reveals the Post Office's desire to imitate the commercial hearing aids that it regarded as competition. In particular, the Post Office wanted to find out more about hearing aids that could be used with the telephone (such as those considered in the previous chapter). Obviously, the Post Office viewed such devices as a serious threat to its statutory monopoly and the sales representatives were instructed that if such devices were in use then their trade mark and model number should 'be discreetly ascertained.'[519]

This was a marked change from the 1936 investigation which had seriously considered using private hearing aids alongside the telephone to promote individual flexibility. In the research report on 'Aids to Telephone Reception for Partially Deaf Subscribers' the Post Office engineering research station at Dollis Hill investigated how deaf aid sets (hearing aids) could be adapted to provide alternative frequencies.[520] The Public Relations Department commissioned this investigation in response to user complaints over the integrated handsets that did not allow them to listen to the telephone via bone conduction:

> A kind of partial deafness which seems to be rather common is localised in frequency range, and requires amplification of sound only within the particular frequency range – which differs for different individuals. The general requirement of deaf people is amplification of received sounds, but it is also desirable that flexibility should be available to enable individuals to use receivers which are suitable (e.g. in frequency characteristic or manner of application) to particular requirements).[521]

The emphasis on individual flexibility is notable here because consideration of such particular requirements was superseded in the 1939 investigation by the desire for standardisation and the increasing medicalisation of hearing loss. This quotation also reveals that the engineers believed there to be a kind of partial deafness that lost particular frequencies, and that this was more common than other kinds of deafness. The engineers were reacting in direct response to their subscribers; that is, to the type of people who were already using their

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[519] The Chief Medical Officer to The Telecommunications Department, Telephone Branch, June 8 1938. Accessed at BT Archives, POST 33/1491C

[520] Post Office Engineering Department 'Research Report No. 9150: Aids to Telephone Reception for Partially Deaf Subscribers' from *the Office of the Engineer-in Chief, Post Office Engineering Research Station, Dollis Hill.* Accessed at BT Archives TCB 22/82/54

[521] Ibid.

telephone. As a result, their users were, de facto, adults with hearing loss engendered in later life who must have suffered from noise or age induced deafness and had lost access to high frequencies. However, the Dollis Hill engineers were approaching this problem from a technical rather than a medical perspective; rather than identifying the type of deafness, they were concerned with how to overcome its limitations through improvements to their system.

Their central difficulty was that increased volume inevitably affected clarity of articulation. In the same way that zooming in on a picture of text on the computer screen means that the words become larger but ultimately unreadable, increased volume led to loss of articulation. The Dollis Hill engineers attempted to resolve this issue by testing out a thermionic amplifier against private hearing aids coupled to the telephone which they termed a 'Deaf-Aid Set'. They tested this set with hearing aids from Western Electric and the Rein Company, and it is clear that standardisation of equipment and the contravention of the Post Office's monopoly was not considered at this point by the Engineering Department. This indicates that the controversy over private hearing aid use was primarily an issue of policy rather than being a technical issue. They measured volume gain against intelligibility and distortion using a measuring device that imitated and quantified human hearing, that they termed the Artificial Ear (see Figure 28).

Figure 28: The Artificial Ear. [522]

[522] 'Artificial Ear- PO Research Station, Dollis Hill' in *Records created and used by the Post Office telegraph and telephone service 1854-1969* Accessed at BT Archives TCB 473/P 3513.

It is apparent that although users were being considered in this report, the experiment was entirely based on the comparison of decibels and only used artificial ears for testing. It is evident from the technical nature of this set up that users were superseded by detection and measuring apparatus. The only human input came from the engineer (above left), who was trusted only to run and read the machines. Although this thesis argues that the Post Office moved from a greater consideration of people to an increasing reliance on machinery and medicine, this report shows that this shift was complex and indeed, the 1936 report may indicate a moment of transition.[523]

The thermionic amplifier was pursued over the hearing aid design primarily for reasons of economy. Although it did not give as much decibel gain as the hearing aid, it was more efficient with regards to battery usage. Unfortunately, this meant that individual flexibility was sacrificed to cost. As with the thermionic amplifier 'there is no provision for flexibility as to either the method of holding the receiver to the head or to the over-all frequency characteristic.'[524] However, flexibility was clearly a key factor and the report ended by recommending that at least two types of receivers should be made available. It is apparent from this report that the needs of users with hearing loss were considered as a high priority. Moreover, there was emphasis on the need to provide options and flexibility to people with hearing loss, in recognition of the varied nature of the condition. In 1936 Post Office engineers were seriously considering using private hearing aids in conjunction with their telephones in a way that would seem to contravene the monopoly that the Postmaster General was so zealously guarding. The relationship between public and private in this matter was therefore extremely complex, multifaceted, and somewhat hypocritical on the part of the Post Office.

However, by the 1938 investigation, hearing aid companies were only consulted as part of an attempt to poach their customers:

> Of the deaf aid manufacturers the Western Electric Company stated that they could furnish the names and addresses of suitable deaf persons but would be very reluctant to do so. Other manufacturers might be able to help in this way, but would be likely to require some return which the Department is hardly in a

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523 Post Office Engineering Department 'Research Report No. 9150: Aids to Telephone Reception for Partially Deaf Subscribers' from *the Office of the Engineer-in Chief, Post Office Engineering Research Station, Dollis Hill.* (26th May 1936) Accessed at BT Archives TCB 22/82/54 p.7 See also, T.S. Kuhn, *The Structure of Scientific Revolutions*, (University of Chicago Press 1962).

524 Post Office Engineering Department 'Research Report No. 9150: Aids to Telephone Reception for Partially Deaf Subscribers' from *the Office of the Engineer-in Chief, Post Office Engineering Research Station, Dollis Hill.* (26th May 1936) Accessed at BT Archives TCB 22/82/54

> position to give, or might be likely to raise questions embarrassing to the Post Office.[525]

The extent of knowledge that the Post Office had of commercial hearing aids demonstrates its desire to know its enemy, as well as its desire to transfer users' knowledge of commercial hearing aids into improvements in the telephone system. Much of the questionnaire gave credence to the importance of the user's telephone habits and patterns of use. For example, they asked how important it was for the subscriber to have a portable amplifier and if long distance calls were harder to hear. Some questions took specific patterns of use further and questioned the extent of individual appropriation. For example, there was awareness and appreciation of the preference for subscribers to utilise the Bell earpiece on the old candlestick telephones through bone conduction and understanding that the new integrated 'microtelephones' were more inconvenient to use in that way. It is clear that this investigation could usefully have pertained to problems in general telephony, such as which words were hardest to hear across a telephone line: 'it would be particularly helpful if instances can be given of words which have been found difficult to hear over the telephone, for instance, words rich in sibilant, such as "sister", "insurance", etc.'[526] As the investigation was an attempt to obtain user input as a priority at the start of the design process, it placed telephone use in its social context. This was in marked contrast to the clinical investigation that was intended to determine the efficacy of amplified telephones and improve the new model. This dichotomy was particularly distinct in the deference to personal experience demonstrated by the questionnaire compared to the clinical investigations

In attempting to communicate their services to a greater number of subscribers with hearing loss, the Telecommunications Branch faced difficulties and explained their difficulty in contacting deaf people who did not currently use the telephone: 'It would be possible to obtain suitable addresses from the manufacturers of appliances for the deaf, but this course is unsuitable, for obvious reasons.'[527] The Post Office did not want to admit to the public or to manufacturers that it was attempting to copy the designs of the private hearing aids that it refused to sanction for use on their network. Initially, it planned to contact the wider deaf community through disseminating a broadcast announcement via the BBC, as this handwritten note shows:

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[525] Memorandum, Amplifier Telephone for Deaf Persons, concerning meeting at Dollis Hill, May 3 1938. Accessed at BT Archives, POST 33/1491C.
[526] Ibid.
[527] The Telecommunications Department (telephone branch) to the Engineering Department, September 1937. Accessed at BT Archives, POST 33/1491C.

> The needs of deaf users of the telephone are the subject of an investigation now being undertaken by the Post Office. Information bearing on all aspects of the question is being collected, and it is hoped, as a result of the investigation, to design a new type of amplifier for use with subscribers' telephones, ~~which will be an improvement on the type now available.~~ A feature of the investigation will be a number of interviews with ~~deaf~~ persons (who are hard of hearing inserted above) These will include not only existing telephone subscribers, but also others who use the telephone only occasionally, or who are deterred from use of the service by reason of their affliction. It would be of great assistance if anyone willing to help in the investigation would communicate with the Public Relations Department, (~~Sales Division~~) General Post Office, London, E.C.1. Arrangements would then be made for interviewing officers to call upon them in order to ascertain their experiences of the telephone, and what assistance could usefully be given in overcoming their disability when using the instrument.[528]

The Public Relations Department believed that this announcement was the best way to obtain information about how people with hearing loss engaged with their telephone service. At the same time, it hoped that a BBC announcement would lend prestige to the Post Office and inspire favourable press comment. This option was, however, abandoned on the advice of the new head of Public Relations, Colonel Crutchley, because he was concerned that the announcement would raise unrealistic expectations from the wider deaf community: 'we should be flooded with applications from people who are completely deaf, or, while not completely deaf, will expect more out of it than a simple visit from a Post Office sales rep.'[529] Crutchley was a friend of Postmaster General, Major Tyron and was brought in to try and curtail the prolific spending of the Public Relations Department under Stephen Tallents. The need to reduce spending was another reason for ending the questionnaire based investigation, as it would have required a great deal of time, money, and manpower. In contrast to this labour intensive investigation, Kerridge was willing to test the telephones as part of her work for the Medical Research Council, at no extra cost to the Post Office.

5.3: 'How deaf are the deaf?'

In 1935 Kerridge had remarked that: 'Although the telephone has been developed and exploited almost entirely for the use of those that hear normally, it was originally invented for the benefit of the deaf by Alexander Graham Bell, who was a professional teacher of the deaf, and had a deaf mother and a deaf wife.'[530] Yet the subsequent cross-fertilisation between telephony and

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[528] Proposed Broadcast Announcement, crossing out in original. Accessed at BT Archives POST 33/1491C.
[529] Letter to Belgrave Accessed at BT archives, TCB 2/ 172.
[530] Phyllis M.T. Kerridge, "Aids for the Deaf," *The British Medical Journa*l, Vol 1, No. 3886, (June 29, 1935), 1314-1317.

hearing assistive technology embedded the connection between hearing loss and telephony in devices like electronic hearing aids and amplified telephones. Kerridge's research into the limits of hearing thresholds had significant practical applications in the engineering of such devices as well as in medicine. Kerridge played a crucial role in creating and defining the audiometric standards that were integrated into these practical devices, and her input was particularly marked in her collaboration with the Post Office to improve the quality of their telephone service for the deaf. This collaboration was to prove influential not only for telephony but also for the post-war design of the Medresco hearing aid, Britain's first national hearing aid offered by the NHS in 1948.[531]

Kerridge was chosen by the Post Office to collaborate on the design of their amplified telephones because they believed her to be 'a well-known authority on deaf aids.'[532] Indeed, in the *BMJ* in 1944, she was described as the first person to introduce audiometry to the country.[533] In fact, audiometry as a profession emerged from the increased testing and widespread service and civilian hearing loss of the Second World War. However, Kerridge's unique blend of skills – a combination of otology, physiology, and the perfection of scientific apparatus – became fused together in the new field of audiometry. The claim in the *BMJ* is testament to high regard in which she was held by the medical profession.[534] Her qualifications were all from University College London because although London medical schools started to admit women during the First World War, concerns about overcrowding meant that many institutions ceased to admit women in the 1920s.[535] As historians have shown, faced with such restrictions, women scientists during this period frequently used education as a form of social mobility, obtaining multiple degrees so that their qualifications could outweigh the additional barriers posed by gender.[536]

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[531] The Kerridge-Fry Phonetic tests were used in the testing and development of the Medresco.

[532] Telecommunications Department (TP branch) 15th April 1937, Accessed at BT Archives, TCB 2 172.

[533] M.D.Sheridan, 'High-tone deafness in school children simulating mental defect' in *The British Medical Journal*, Aug 26th 1944, Accessed online March 26th <http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC2286117&blobtype=pdf>

[534] Kerridge began her postgraduate career at University College London, where she firstly worked in chemistry and then moved to Physiology. She then worked at University College London's Department of Physiology, and held part time and temporary positions at London School of Hygiene and Tropical Medicine, the Marine Biological Association Laboratory at Plymouth, the Carlsberg Laboratories at Copenhagen, and the Medical Unit of the London Hospital. One of her earliest articles, in 1933, was on 'The excretion of protein by the mammalian kidney' and so it seems her interest in hearing developed later, as a result of her association with the London School of Hygiene and Tropical Medicine. See Bayliss, L. E., Kerridge, P. M. T, Russell, Dorothy S., 'The excretion of protein by the mammalian kidney' in *The Journal of Physiology*, vol 77, issue 4, pp 386-398(March 15 1933).

[535] University College Hospital even considered banning women, but ended up instead strictly limiting the number of female admissions Carol Dyhouse, "Driving Ambitions: Women in Pursuit of a Medical Education, 1890-1939," *Women's History Review* 7.3 (1998): 321-343; 334.

[536] See the introduction to A. Powell, B. Baglihole & A. Dainty, 'How Women Engineers Do and Undo Gender: Consequences for Gender Equality' in *Gender, Work and Organization*, Vol. 16, No. 4, (Blackwell Publishing, 2009) also p.420 on 'Achieving a Reputation'; for example, women are 'seen as engineers first and women second' and 'the only thing that matters is their ability to do the job well (and not their gender).'

Gender could constrain integration into mainstream male-dominated science, but Kerridge was able to assert her scientific authority by holding numerous university and research positions at institutions including UCL, London School of Hygiene and Tropical Medicine, Marine Biological Association Laboratory at Plymouth, Carlsberg Laboratories in Copenhagen, MRC, and Medical Unit of the London Hospital. Although she worked on diverse medical and technical problems in areas including kidney research, electrodes, optometry, and collaborated with Lawrence Bragg on an early iron-lung style device (the Bragg-Paul Pulsator), it was in the fledgling field of audiometry that she was able to work freely and without having to rely on male collaborators.[537]

While at the London School of Hygiene and Tropical Medicine Kerridge began investigating the problems of hearing and speech in deaf children and 'aided by her natural talent for music, she applied her knowledge of physics to these problems with outstanding success.'[538] It is not entirely clear how she first became involved with the NID, although one possibility is that the collaboration stemmed from existing connections between the NID and the London School of Hygiene and Tropical Medicine established by her colleague Dr Crowden in 1930.[539] Between 1934 and 1936, while she was a lecturer in Physiology at UCL, she investigated hearing and speech amongst London school children and published the results in 1937 through the Medical Research Council, who funded much of her research.

At the start of her substantial report to the Medical Research Council, titled: 'Hearing and Speech in Deaf Children', she made clear her overall interest in measuring and quantifying hearing loss in both children and adults in more exact terms: 'A few years ago there was no satisfactory answer to the question "How deaf are the deaf?"'[540] She then moved on to link the ability to answer this question through the use of the newest amplification technology: 'the inquiry has more than academic importance, because of the development of sound magnifying apparatus, and the need to assess the compensations which the deaf may gain thereby.'[541] She used this investigation to compare different methods of testing hearing: 'although the pure tone audiometer was used throughout, some tests were also done with calibrated tuning forks, voice,

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[537] D.R.Adams & P.T. Kerridge 'A Note on the Hydrogen Ion Concentration of the Vitreous in eyes affected by Naphthalene in *British Journal of Opthalmology*, vol. 14, no.8 pp.397-401 (1930) & B.Blake-Coleman, 'Phyllis Kerridge and the miniature PH electrode' in I*nventricity* accessed online June 2016 http://www.inventricity.com/#!phyllis-kerridge/c5ic Thank you to Dr Jaipreet Virdi-Dhesi for pointing out the Bragg Paul Pulsator research and for sharing her insight into Kerridge's importance to audiology.

[538] 'Obituary, Phyllis Tookey Kerridge PHD, MRCP in the *British Medical Journal* 6 July 1940. Accessed online March 26th < http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC2179360&blobtype=pdf>

[539] NID Medical Sub Committee, Meeting held 6th November, Dr Crowden memorandum, Accessed through the RNID Library.

[540] P.M.T. Kerridge, 'Hearing and Speech in Deaf Children' in *Proceedings of the Royal Society of Medicine*, (30 October 1937) Accessed 3 March 2015, pp. 84-101 (p.84)

[541] Ibid.

and a gramophone audiometer, and the results of the different methods were compared.'[542] Kerridge questioned the 'normal' level of hearing set by the audiometer and wrote that:

> The zero line of the pure tone audiometer used in this work is reported to have been made by averaging the results of the minimal audible loudnesses which could be detected by 72 ears of adults in a sound-proof room. There is no indication supplied with the instrument, or in the literature, of the degree of variation among the "normal" […] Further, it is an assumption that lines are the same for children and for adults.[543]

The zero line to which Kerridge referred in this passage was the standard of normal hearing, or the average threshold level of listeners. As Kerridge was using a Western Electric audiometer this meant that the average threshold level was set according to the hearing of listeners working at the Bell Telephone Laboratory.[544] While audiometers had been in use since the late nineteenth century, it was not until the advent of the kind of miniaturised valve technology used in amplified telephony and hearing aids that commercial audiometers became available in 1922. After this point, hearing loss was plotted in audiogram form in order to show the standard of 'normal hearing'. This threshold of perceived normalcy proved contentious however, as the American zero level did not match the British zero level.[545]

Kerridge's project for greater standardisation of audiometry emerged in the 'Silence Room'; a 3,500 cubic feet soundproof room in the basement of University College Hospital on Huntley Street, London (formerly the Royal Ear Hospital, established in 1816 as the Royal Dispensary for Diseases of the Ear). This was a kind of early anechoic chamber, which used innovative architectural structures like sabinite plaster and corklined doors to ensure an incredibly quiet environment, ideal for scientific testing. In this setting, the audiometer became framed as a kind of inscription device, an apparatus whose end product was the audiogram and the creation of 'Normal Hearing.'[546] Methods of testing hearing were still relatively flexible in 1931, however, as the NID Medical Sub Committee reported on standard tests of hearing for speech and it is clear from this report that they desired that hearing no longer be tested through the unreliable and subjective medium of the voice:

> In view of the improvement in the making of gramophone records, in gramophone and in methods of transmission of speech sounds to the ear by telephone, the committee feel that it should be possible so as to standardise

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[542] Ibid.
[543] Ibid pp.87-88.
[544] W.G. Noble, *Assessment of Impaired Hearing: A Critique and New Method*, (Academic Press, 1976) P.176
[545] It was not until 1964 that an international standard was agreed upon by both the U.S and Europe. Ibid. p.178-179
[546] Burno Latour and Steve Woolgar refer to the end product as 'literary inscription.' *Laboratory Life* (New Jersey: Princeton University Press, 1979), p. 63.

> gramophone records and the speech intensity delivered to the ear so as to produce a standard of hearing for speech [...] Inasmuch as the decibel index of speech sounds by telephone has been adopted by international agreement between the various telephone services, the committee recommend that this index should be the basis of measurement and description of standard speech intensities used for testing hearing for speech.[547]

The above quote also shows that hearing testing was actively influenced by developments in telephony and this exemplifies the complexity of the connection between telephony and the classification of hearing loss. The NID Medical Committee planned to purchase an audiometer after this report was given, so that they could test their clients' hearing at their headquarters. However, they were delayed intermittently due to lack of funds. They did not have access to an audiometer until Kerridge established the hearing aid clinic in the ear department of University College Hospital.[548] This was the first permanent Western Electric audiometer in the UK. However, it was clear that the NID Chairman was initially unhappy with the plan as: 'the proposal under consideration virtually took the whole matter out of the hands of the Institute and that unless some special association with it could be devised which appeared to be difficult, the Institute would have no part in its activities beyond sending cases to the clinic.'[549] This territorial attitude may have resulted from the NID's foundational goal of unifying all deaf services under one umbrella organisation. The Medical Committee also regretted that the scheme would disassociate the NID from the clinic, but agreed to the clinic as long as they were kept regularly updated of the activities there. Kerridge deflected these criticisms by pointing out that there were greater conveniences at University College Hospital, 'including a silence room, an audiometer, a wide assortment of hearing aids and the specialist personnel so that the work could be carried out with efficiency and without difficulty.'[550]

Based on her research at this clinic, Kerridge published a paper in 1937 titled 'The Administration of a Hearing Aid Clinic'. In this paper, Kerridge considered the importance of *medical* practitioners giving guidance to those purchasing hearing aids, rather than hearing aid manufacturers. This idea was taken up by the NID, and they advised their clients to: 'take medical advice as to whether an aid is likely to help them.'[551] Again, these concerns were related to the activities of nefarious firms. As Kerridge explained: 'an impartial collection of hearing aids

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[547] Meeting of the Medical Committee of the National Institute for the Deaf, 6th of March 1931, Accessed at the RNID Library.
[548] Proposal by Dr Kerridge and Dr Formby, Medical Sub Committee, 28th of January 1937. Accessed at the RNID Library.
[549] Ibid.
[550] Ibid.
[551] J. Kerr-Love 'Aids to Hearing' in *The Problem of the Deaf* (National Institute for the Deaf, Revised Edition,) Accessed via RNID Library Archives.

is particularly necessary at the present time owing to the rapid development of the electrical aids and the increase in the number of hearing aid makers.'[552]

The hearing aids provided by the clinic were also cheaper because the hospital bought them in bulk. However, Kerridge was concerned that this 'must not become a means of advertising although the recommendation of an instrument by the clinic is naturally a commercial asset.'[553] It seems likely that the hearing aids manufacturers that supplied the clinic were on the NID approved list. This would explain why more prestigious firms did not have to advertise their wares in the objectionable ways discussed in the previous chapter. So called quack hearing aids were also discussed in her paper, as in the case where a woman was described as being:

> worried about loss of monetary deposit for a useless instrument to a well advertised firm, and by the letters sent to her by this firm; matter taken up by the local Poor Man's Lawyer, but no legal measures possible as she had been persuaded to sign a form agreeing to the purchase.[554]

It is clear that Kerridge's clinic was set up in large part to combat these quack hearing aid distributors. Moreover, it became a way for legitimate hearing aid manufactures to distribute their wares via medical practitioners. Legitimate hearing aids like the ones in the clinic retailed from £20 to £24. By contrast, the quack hearing aids advertised by the Post Office in their stamp books cost around £4, but their reliability was frequently questioned. Kerridge believed that increased standardisation and medicalisation of hearing care would work to resolve these issues: 'Deaf people want help to hear. They are obtaining it in a very muddled manner, and unscrupulous persons are profiteering out of the chaos. It is time the subject was given the place that it is due in medical science.'[555] The clinic was an alternative place for people on lower incomes to go to get free and impartial advice about the suitability of a hearing aid, as well as help in recovering the cost of the instrument. This was an early example of medical and state intervention into public healthcare issues before the instigation of the NHS. As well as being concerned with the ethical practices of hearing aid manufacturers, Kerridge was also instrumental in advocating free hearing aids for those using the clinics. In this way, her clinic foregrounded the work done to create the Medresco and its principles of free access were a direct reaction to the perceived quackery of private hearing aid manufacturers. As the NID stated in 1935: 'There is no need for any deaf person to run these serious risks of monetary and

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[552] P.M.T. Kerridge, 'The Administration of a Hearing Aid Clinic' in *The Journal of Laryngology & Otology* Vol. 53 Issue 6 June 1938, pp 370-385 (p.370-371).
[553] Ibid. p.382.
[554] Ibid. p.382.
[555] P.M.T. Kerridge, 'Hearing Aids' in The Practitioner, vol. 135 (Nov. 1935) pp.641-654 (p.654).

physical damage, since for those who cannot afford to consult qualified specialists privately, there are Ear, Nose and Throat Hospitals everywhere available.'[556] Kerridge was instrumental in advocating free hearing aids for those using the clinics. The clientele of the hearing aid clinic on Gower Street did not have to pay for the hearing aids they were recommended, and various funding bodies and insurance schemes were utilised to this end. In investigating the limits of hearing and compiling objective data, Kerridge perfected the prescription and fitting of hearing aids.

The case studies in her paper on the administration of the clinic are especially revealing of the way that people on low incomes or without jobs were able to purchase hearing aids. Three of the ten cases involved men who had been in the army. This was only explicitly stated in one of the cases, but these three men had their hearing aids paid for by, variously, the British Legion, the Deafened Ex-Servicemen's fund, the Soldiers' and Sailors' Help Society, and, in the case of the man who was definitely in the army, a 'Charity Organization Society who made themselves responsible for whole cost, intending to collect it from Army Funds, Church, etc.' [557]Other organizations giving funds to hearing aids included the Church, the Helpers' League and the Metropolitan Society for the Blind, and the patient's employer. In the course of her work, Kerridge must have become aware of the link between industry and hearing loss because 'Industrial noise' became the focus of her investigation in 1939. She also wrote to *The Lancet* in 1939 to try and persuade municipal authorities to include hearing tests during preliminary medical examinations they planned to give to their workers for superannuation schemes.[558] Her professed aim was to instigate social reform for the deaf rather than to protect the insurance interests of the industry, as had been the case in the US.[559]

Of further interest in these case studies is the way that music and the wireless were used to test hearing alongside the audiometer. Speech was not prioritised over music. Rather, access to wireless was regarded just as highly as access to conversation, as outlined in Kerridge's fascinating case studies of the lives of ordinary hearing impaired persons: 'heard conversations and the wireless with a carbon microphone valve amplifier'; 'he could hear the wireless and the band in the park'; 'heard the news bulletin and most of the talks on the wireless.'[560] It may have

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[556] 'The Exploitation of Deafness' in The Eleventh Annual Meeting of the National Institute for the Deaf, July 30th, 1935. Accessed via the RNID Library.

[557] P.M.T Kerridge, 'The Administration of a Hearing Aid Clinic' in *The Journal of Laryngology & Otology* Vol. 53 Issue 6 June 1938, pp 370-385 (p.370-371).

[558] Extract from *The Lancet*, 20th May, 1939, 'Medical Inspection and Deafness' Accessed at the National Archives, REF, FD/1/2330.

[559] E. Thompson, *The Soundscapes of Modernity*.

[560] Phyllis M. Tookey Kerridge, 'Medical Inspection and Deafness,' *The Lancet* 233.6028 (20 May 1939): 1178.

been that the wireless was simply used to provide an indicator of 'normal' hearing and was a way for patients to self-assess their hearing, but it also reveals the cultural importance accorded to music and the wireless reflective of the period. Likewise, Kerridge must have perceived music to be as important to hear as speech, especially as patients desired to use other acoustic technologies, such as the telephone. A 50-year-old male garage worker, for instance, refused his recommended valve amplifier with a crystal microphone, preferring a less suitable bone conduction instrument so that 'he could answer the telephone at work without stopping to take an instrument off, and his hands had to be free.'[561] Kerridge explained that the popularity of bone conduction devices was due to their increased invisibility: 'the popularity of bone conductor receivers is largely due to the fact that the mastoid bone which supports them is not visible when a person is viewed full face. But on the other hand, it must be held in lace with a metal hairband, which may show if the top hair is scanty.'[562] Whether or not the garage worker had scanty hair, he was able to afford the microtelephone hearing aid with the bone conductor earpiece through money obtained from 'the Prudential Approved Society, the National Benevolent Society, the British Legion and the Royal Surgical Aid Society.'[563]

Kerridge became aware through these cases of the value of considering audiogram readings alongside a patient's occupation to prescribe a more suitable hearing aid. Furthermore, they reveal her interest in examining the way people heard through different mediums, a notion that explains why she expanded her research to include Post Office amplified telephone sets.[564] It may have been that the wireless was simply used to provide an indicator of normal hearing but this also could indicate the importance accorded to music and to the wireless at this time. It was certainly important to Kerridge, who was described by the *BMJ* as a talented musician and set up 'The Phyllis Kerridge Orchestra'.[565] She organised the installation of hearing aid apparatus at the Home for the Deaf and Blind in Harrogate 'with the result that many suffering from this double disability are now hearing speech, and enjoying the "wireless", after an interval of many years. Some of the congenitally deaf are now actually hearing and appreciating music for the first time.'[566] Her husband, William Henry Kerridge was a Professor of Music and a choir master so

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561 'The Exploitation of Deafness," in *The Eleventh Annual Meeting of the National Institute for the Deaf,* 30 July 1935. RNID Library and Archives.
562 P.M.T. Kerridge, 'Hearing Aids and Social Problems of the Deaf' in *Ulster Medical Journal* vol. 8, no.4 (p.244).
563 P.M.T. Kerridge, 'The Administration of a Hearing Aid Clinic' in *The Journal of Laryngology & Otology* Vol. 53 Issue 6 June 1938, pp 370-385 (pp.370-371).
564 Ibid. p.381, p.375-376
565 The Phyllis Kerridge Orchestra started as a quartet based in St Margaret's Hospital in Epping but grew into an orchestra 'owing to the inspiration and great enthusiasm of Dr Kerridge, together with her charming personality'. It was named after her and continued after her death. *Epping Parish Church Programme* (Sunday 21 December 1941) Cherry Milne Family Archive.
566 Letter to Geoffrey Kerridge from a NID representative, Jan 2, 1941. Cherry Milne Family Archive.

music was likely central to her life and thus recognised as being as important to hear as speech.[567] However, if Kerridge was interested more simply in the way that people hear via different mediums then this could explain her desire to acquire the Post Office amplified telephone sets.

Kerridge had already done work for the Post Office telecommunications department by testing the hearing of telephonists on a Western Electric audiometer. When her research at the hospital was extended, the hospital provided her with two more rooms to be used as a waiting room and an office.[568] It was in these rooms that she installed the Post Office Repeater telephones 17a and 17b in order to test them during the routine examination of patients. Kerridge also told the Post Office that: 'she has about twenty deaf persons, whom she has trained as observers in connexion with her research work, and she offers to take early steps to test them also.'[569] Crucially, her observers were described as trained, indicating that they had to be taught what they were supposed to be listening for.

The Post Office telecommunications department reported that: 'Dr Kerridge displayed great interest in the investigation, and arrangements were made to have Repeaters Nos. 17A and 17B fitted at her clinic. She has a Western Electric audiometer available and promised to undertake the examination of intelligent deaf subjects, and report of their requirements from a telephone point of view.'[570] That it was necessary to stipulate the use of an 'intelligent deaf' subject shows that there was still great prejudice and stigma within the Post Office, despite increased awareness of the negative stigma attached to their advertisements to 'the deaf'. Kerridge also stated that: 'it has been found that trained observers are necessary to assess the usefulness of a deaf aid, or at least the test should be made under the guidance of a trained observer.'[571] This may have been another factor that led the Post Office away from seeking out the views of individual subscribers towards instigating an institutionally led investigation that prioritised standardised measurements of hearing over individual experience.

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[567] Kerridge's relationship with her husband was not without complication. The couple married on the 23rd of April 1924 at St Pancras Registrar's office when William was 42 and Phyllis just 23. On their marriage certificate Kerridge was described as being a Professor of Music and Language and formerly the husband of Irene Agnes Emma Kerridge (formerly Zellner) from whom he had obtained a divorce. Phyllis was described as a spinster and a research chemist. However, four years later, Phyllis petitioned the courts for a divorce on the grounds that 'the said William Henry Kerridge (described in the marriage certificate as Wilhelm Heinrich Kerridge) was lawfully married to Irene Agnes Emma Zeller…at Fraudenstadt…'

[568] Ibid.

[569] The Telecommunications Department, 15th April 1937. Accessed at BT Archives, POST 33/1491C.

[570] Memorandum, Amplifier Telephone for Deaf Persons. May 3rd 1938, Accessed at BT Archives, POST 33/1491C.

[571] Telecommunications Department (TP branch) 15th April 1937, Accessed at BT Archives, TCB 2 172.

Kerridge's input was considered instrumental to the design of the new amplifier and the Engineering Department stipulated that: 'the results of Dr Kerridge's experiments will probably give material help in evolving the final design and in this respect perhaps she will be asked to keep in direct touch with the Research Branch.'[572] Kerridge's clinical processes and scientific measurements were far more useful for the Engineering Department than the questionnaire would have been. Her measurements provided objective quantifiable data that could be used in the Post Office's design process far more simply than through relying on the user experiences and anecdotal evidence that Public Relation's questionnaire would have provided. Her interest in the hard-of-hearing as well as the deaf similarly corresponded with the interests of the Post Office. Her description of those who fall into that category was both perceptive and rather coy:

> The deaf are very numerous; and for the most part are neglected both by the medical profession and the charitable, unless they happen to have been deaf and dumb as children. The "Hard of Hearing" include the old ladies who do not hear when they are addressed unexpectedly, but who can overhear things they are not meant to when they are paying attention, and the senior gentlemen who complain that the elocution of actors is not what it was […] It must, however, be admitted that although great benefit can often be afforded to severely deaf persons, the amount of help which slightly deaf people can get is frequently disappointing.[573]

In this paper she also showed a keen insight into the specific problems attending the hard-of-hearing as a separate category to the deaf, the limits of scientific objectivity and the problems of the gendering of hearing aids:

> Science will not, however, dictate which of the ladies thinks that people do not notice she is deaf when they shout remarks to which she makes irrelevant replies, but considers that her friends will immediately become aware of her abnormality when she wears a horn or carries a "box"[…] self-consciousness is not confined to the female sex. While men cannot cover gadgets easily with their hair, they have advantage in the amount which they can hide in their pockets.[574]

Kerridge's interest in collaborating with the Post Office to investigate the needs of hard-of-hearing telephone users tied into her interest in electric hearing aids, particularly microtelephone and valve amplifier hearing aids, which incorporated the same technology as the Post Office repeater telephones.[575] She was also aware of the Post Office's research into the limits of hearing for telephonic purposes and referred to the problem of testing suitable hearing

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[572] Engineering Department to the Telecommunication Department, Telephone Branch, 16th August 1937. TCB 2 172.
[573] P.M.T. Kerridge, P, 'Hearing Aids and Social Problems of the Deaf' p.244.
[574] Ibid.
[575] P.M.T. Kerridge, P, 'Instrumental aids for defective hearing' in IOP Science, 1938 Rep. Prog. Phys. 5 150, pp.157-158 Accessed online, http://iopscience.iop.org/0034-4885/5/1/311/pdf/rpv5i1p150.pdf February 17th 2015

aids in a paper on instrumental hearing aids. The work being done within the Post Office to avoid hearing loss and deterioration of speech clarity over the telephone line was also utilised in her work: 'The question of a suitable test is by no means simple. It is possible to use a series of nonsense syllables pronounced by a trained speaker, as used by the Post Office Research Laboratory for testing telephone apparatus.'[576] In this 1938 paper, she also mentioned the problems that attended those with hearing loss who had to use the telephone: 'a clerk who has to answer the telephone often will find a microtelephone with a bone conductor earpiece behind his ear more convenient than one with a disc earpiece which must be removed every time before he can do so.'[577] Her paper ended with the hope that increased standardisation of hearing tests would increase their accuracy and efficacy and complained that: 'it must be obvious to workers in scientific fields where exact measurement is the rule how much is lacking in this sphere.'[578]

Kerridge had also collaborated with the UCL Department of Linguistics and Phonetics in order to investigate speech transmission. In particular, she worked on how the intensity and distortion of different frequencies affected understanding.[579] These concerns, which Kerridge was investigating with an aim towards application to hearing aid prescription, were also of key concern to the Post Office Telecommunications Department in ensuring the clear transmission of speech over their telephone lines. For example, in the application of her research into the pitch necessary to ensure vowel quality: 'the object of the present research is to discover within what limits (a) the relative intensities and (b) the actual frequencies of these pitches can be varied without altering the characteristics of speech as heard by the ear.'[580]

Kerridge was instrumental in advocating more accurate, universal standards of hearing tests and hearing aids. Individual perception was no longer considered a sufficiently accurate mode of measuring hearing loss. Preoccupation among medical professionals with precision hearing measurements may have resulted from the push for increased scientific accuracy at the end of the nineteenth century, and the perception that accuracy was connected to truthfulness and increased professional prestige.[581] The Post Office was certainly influenced by her ideas and dissuaded from its initial course of seeking out subscribers' personal views on the equipment they used: 'Dr Kerridge states that it has been found that trained observers are necessary to

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[576] Ibid. p.161.
[577] Ibid. p.159.
[578] Ibid. p.162
[579] *Further Research by Dr Phyllis Kerridge*. Accessed at the National Archives, REF, FD/1/2330
[580] Ibid.
[581] G. Gooday, *The Morals of Measurement: Accuracy, Irony, and Trust in Late Victorian Electrical Practice,* (Cambridge University Press 2004) pp.60-62.

assess the usefulness of a deaf aid, or at least the test should be made under the guidance of a trained observer.'[582] In this way, Kerridge pushed for greater scientific objectivity by removing the human element from her studies as far as possible.

Kerridge's work was clearly important to the Post Office but despite this the results of her investigations were never utilised. When the Second World War broke out Kerridge was seconded to the Emergency Medical Services as assistant pathologist at St Margaret's Emergency Hospital.[583] She wrote: 'I am quite content to stay. There seems to be a world shortage of pathologists, and my earlier interest in blood and in kidneys does not make it feel very strange […] clinical pathology here is much more interesting than in a large London hospital and […] in any case it is better than being a lodger in a provincial university.'[584] Sir David Munro at the Medical Research Council disagreed however, replying: 'If I may say so, I think that you are rather wasted as pathologist in a small hospital.'[585] It was while working at that hospital she contracted the illness which led to her untimely death on 22 June 1940. Her Obituary in the *BMJ* mourned her early death and the loss to the community.[586] As well as obituaries in *BMJ* and *Nature*, one of her patients wrote in to *The Lancet* to express their regret at her passing:

> As one of her many deaf-born patients I was immensely struck by her powers of sympathy and quick sense of humour. She asked me to do a little experimenting with her various hearing aid apparatuses of which I was rather shy, but she soon laughed me out of this. Her understanding of the difficulties of the deaf was reinforced by her belief in the possibility of future improvements in their education and her contact with trained teachers for the deaf inspired many of them with a desire to carry out her suggestions. May they carry on the work in memory of a unique but intensely human person.[587]

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[582] Telecommunications department (tp. Branch) 15th April 1937, Accessed at BT archives TCB/2/172.
[583] 'Obituary, Phyllis Tookey Kerridge PHD, MRCP in the *British Medical Journal* July 6th 1940. Accessed online March 26th < http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC2179360&blobtype=pdf>
[584] *Further Research by Dr Phyllis Kerridge*. Accessed at the National Archives, REF, FD/1/2330.
[585] Ibid.
[586] 'Obituary, Phyllis Tookey Kerridge PHD, MRCP in the *British Medical Journal* July 6th 1940. Accessed online March 26th < http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC2179360&blobtype=pdf>
[587] A. Sprigge, 'Dr Phyllis Kerridge: Letters to the Editor' in *The Lancet*, Vol. 236, Issue 6098 (July 13 1940) p.55.

Figure 29: Dr Phyllis Kerridge.[588]

Her work has not been recorded by posterity in any comprehensive manner and indeed, the scant material that does remain was almost lost and only recovered by Dr Julia Bell. Bell was a geneticist who worked at the Galton laboratory for National Eugenics at UCL and for the Medical Research Council as a researcher and a member of their genetics committee.[589] She was instrumental in compiling *The Treasury of Human Inheritance* and in isolating the X chromosome causing disability in males (now known as fragile X syndrome).[590] She seems to have been friends with Kerridge, and they collaborated in researching the effect of nutrition on deafness in children. In 1962, she described the events that had led to the loss of Kerridge's work:

> On my way to her funeral I looked in at the M.R.C and said that if I could help in any way to utilise her material I would be very glad to do so- the idea in my mind being to erect some kind of a tribute to all the devotion she had given to the problem of hearing. Hearing nothing I assumed that the MRC had other plans and that perhaps somebody was carrying on the work. Examination after a fire in the basement here [at UCL] revealed a large chest full of Miss Kerridge's

[588] Phyllis Kerridge working on portable glass electrodes at UCL, 1925 Accessed via the *Wellcome Library* Thanks also to Jaipreet Virdi-Dhesi for finding this image.
[589] G. Jones, 'Bell, Julia 1879-1979' in the *Oxford Dictionary of National Biography*, Accessed online, June 9th. <http://www.oxforddnb.com/view/article/38514>
[590] Ibid.

> material! Not addressed to me. The war was on and the college evacuated and it was probably just dumped down there by a porter- it was in fact a war casualty.[591]

As a result of Bell's efforts Kerridge's work was saved from the basement but her data was not considered useful by the Medical Research Council because the method she used for testing acuity of hearing was no longer the standard method – a somewhat ironic circumstance given her lifelong pursuit of measurement standardisation. Bell was not alone in her attempt to preserve Kerridge's legacy, and the 'Dr Phyllis Tookey Kerridge Memorial Fund' was initiated by a group of her friends and colleagues, including the NID, and the founder of hearing aid company Multitone. This initiative was designed to preserve Kerridge's memory by installing hearing aid equipment at the Home for the Deaf-Blind at Hoylake.[592] Kerridge had overseen a similar project in Harrogate, and according to one of the participants in the fund: 'this work perhaps gave her more satisfaction than anything else […] many of her friends think that nothing would have given her greater pleasure than the extension and completion of this work.'[593] This fund was managed by the NID, and was invested as capital in order that they could apply the annual interest to fund the hearing aids at the University Clinic to help patients who could not afford their full cost.[594] However, her impact on hearing aid provision went further than her set up of the clinic. In 1947 WH Mackenzie discussed the issue of hearing aids and their cost and he reflected that: 'Phyllis Tookey Kerridge laid it down, before the war, that no one who attends a hearing aid clinic need be refused a hearing aid on account of cost. Whether this will hold in post-war years has yet to be seen.'[595] Kerridge not only facilitated the provision of free hearing care in her lifetime, she created a situation where hearing aids became medicalised and in which their prescription was inevitably built into the NHS as basic medical care. As we will see, this did not happen in the case of the amplified telephone.

As well as working with Kerridge, the telecommunications department decided to 'get in touch with the Physiology of Hearing Committee of the Medical Research Council, which has a hearing aid Sub-Committee already in being.'[596] The Royal Society of Medicine also offered their assistance to the Post Office and suggested that a committee of otologists should be set up to

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[591] *Further Research by Dr Phyllis Kerridge*. Accessed at the National Archives, REF, FD/1/2330
[592] Letter headed 'Dr Phyllis Tookey Kerridge Memorial Fund', (October 1941, Great Portland Street,) Cherry Milne Family Archive.
[593] Letter to Geoffrey Kerridge from a NID representative, Jan 2, 1941. Cherry Milne Family Archive.
[594] Letter headed 'Dr Phyllis Tookey Kerridge Memorial Fund', (October 1941, Great Portland Street,) Cherry Milne Family Archive.
[595] W. Mackenzie, 'Diagnosis and Treatment of Chronic Deafness,' in *Post-Graduate Medical Journal* vol. 23 (January 1947) p.7.
[596] Chief Medical Officer to the Telecommunication Branch, 8th June 1938.

consider the requirements of hard of hearing telephone users.[597] It seems the Engineering Department considered this offer to be of little practical value but the Public Relations Department advocated fitting amplified telephone apparatus to the Royal Society of Medicine's building for the purpose of engendering publicity. The Chief Medical Officer however, believed that they would do well to 'get in touch with the Physiology of Hearing Committee of the Medical Research Council, which has a Hearing Aid Sub-Committee already in being.'[598]

No organisations involved with the welfare of the deaf collaborated with the Post Office at this stage although they were interviewed by the Post Office in 1938. It is not clear which organisations the Post Office approached but a memorandum stated: 'The charitable organisations concerned with the welfare of the deaf were not in a position to furnish much help. They have lists of deaf people, who could be approached for the purpose of the investigation, but the majority would not be telephone users and it would be impossible to make lists of suitable persons.'[599] For several reasons it seems most likely that the NID would have been the charity approached by the Post Office. First of all, because the NID were more closely associated with the concerns of the deafened rather than the Deaf compared to other charities for the Deaf working at that time, secondly because the Post Office would have been aware of the charity through their association with Kerridge, and thirdly because the NID had corresponded with the Postmaster General and the Public Relations Department in order to complain about their advertisements of hearing aids (as explained in the last chapter). Indeed, the Post Office's truculence in that matter may have led to the NID's reluctance to work with them.

As well as working with Kerridge, the Public Relations Department also contacted the Royal Society of Medicine, who advised that they interview Mr Londes Yates, a Harley Street specialist. Yates advised that: 'an amplifier giving increased gain at high frequencies might be likely to cause auditory fatigue. A possible means of avoiding this would be to interrupt the signal by the use of a neon lamp discharging through a condenser' and that: 'an optional facility of introducing hum into an amplifier may be beneficial to some deaf persons.'[600] Auditory fatigue was explicitly linked with telephony at least as early as 1889 in an article in the *BMJ* on 'The Telephone as a Cause of Ear Trouble.'[601] Yates also emphasised the need for objectivity and

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[597] The Telecommunications Department, Telephone Branch, June 2 1938. Accessed at BT Archives, POST 33/1491C.
[598] The Chief Medical Officer to The Telecommunications Department, Telephone Branch, June 8 1938. Accessed at BT Archives, POST 33/1491C.
[599] Memorandum, Amplifier Telephone for Deaf Persons. May 3rd 1938 Accessed at BT Archives, POST 33/1491C.
[600] Ibid.
[601] 'The telephone as a cause of ear trouble' in *The British Medical Journal*. Sept 21st 1889, p.671.

suggested: 'that research be undertaken by constructing an artificial ear and simulating deafness in it by damping by means of cotton wool, viscid liquids etc.'[602] The need for constructing such an artificial ear can be linked to the aforementioned desire to obtain standardised, objective data without the need for human input.

5.4: Conclusion

The desire to replace real ears with artificial ears can be linked to the rise of 'scientific objectivity' from the mid-nineteenth century; an idea based on removing the human element from investigation as far as possible in order to negate the influence of unconscious bias. This chapter has argued that in the 1930s the Post Office's 'Deaf Subscribers' were increasingly rationalised and made more quantifiable as a result of the need for such scientifically objective data. This was facilitated through the instruments that were made available via Kerridge. Her Western Electric audiometer and the data it generated was integral to changing the Post Office's focus from subscribers to statistics and advances in hearing testing instruments meant that the devices were trusted to give greater accuracy than people (and perhaps especially deaf people). In the case of the Post Office's investigation into the needs of their 'Deaf Subscribers', the individual subscriber's needs and perceptions were made less visible and replaced with measurable data. More accurate, universal standards of hearing tests and hearing aids meant that individual perception was no longer considered to be sufficiently accurate. Moreover, by designating their hard-of-hearing customers as patients in the context of clinical research, the Post Office accorded less agency to the group compared to when they categorised them as hard-of-hearing subscribers or customers.

The need for network standardisation led to a corresponding requirement for standardisation and objectivity of hearing loss, but the Post Office's desire for universal standards was in conflict with the diversity of hearing experience. The outbreak of war in 1939 meant that the planned amplified telephone was never made commercially available. The designs for this particular device did not come to fruition, but the plans for this technology nevertheless reveal the expectations of hard-of-hearing telephone users and the changing priorities and collaborations involved with Post Office design of hearing aid apparatus. The telephone prototype was a casualty of war rather than a technological failure, and its development reveals important changes in the design of hearing assistive technology and in Post Office practices.

[602] Notes of interview on April 7, 1938 with Mr Londes Yates, M.C., F.R.C.S., by Mr L.B. Stott, Sales Division, Public Relations Department. Accessed at BT Archives, POST 33/1491C.

It was Kerridge who forged the initial links between the NID, the Medical Research Council, and the Post Office which were to form the basis of more productive collaborations years later in the creation of the Medresco NHS hearing aid. The connections between the hearing aid clinics and Post Office telecommunications in developing their services for the deaf were expedited by the intervention of the medical profession into the regulation of hearing aids. The original questionnaire based investigation was an attempt to obtain user input as a priority at the start of the design process and placed telephone use in its social context. This was in marked contrast to the clinical research that the Post Office eventually undertook with Kerridge to investigate the efficacy of the amplified telephones and improve the new models. This dichotomy was particularly distinct in the deference to personal experience and user authority demonstrated by the questionnaire. This separation is starkly evident in comparison to the clinical investigations in which user input was considered to be more relevant when collected by, and filtered through, specialist organisations. Hard-of-hearing customers were later represented to the Post Office via the NID. Their opinions were then filtered through the organisation, which had its own agenda and desired to cement its authority as the umbrella organisation on all matters related to deafness and hearing loss. The technocratic approach to hearing aid assistance prioritised by the Post Office and in collaboration with Kerridge led to a lasting loss of user input and decreased awareness on the part of manufactures of the social circumstances in which such devices would be used.

The work of Daston and Galison on scientific objectivity has shown that new technologies such as photography led to distrust in human visual perception. It was feared that scientists were irrevocably biased by their expectations and that only machines could be trusted to be objective and honest.[603] Daston and Gallison link these perceptions to the development of photography and show how photography was viewed as a distinctively scientific medium that could lend objectivity to specific scientific images, such as atlases.[604] Using machines in this way led to what they term 'mechanical objectivity', and they point out that 'by the late nineteenth century, mechanical objectivity was firmly installed as a guiding if not *the* guiding ideal of scientific representation across a wide range of disciplines.'[605] Using photography allowed for machine produced images free from human intervention or interpretation.[606] Yet this nineteenth century focus on the visual image, reproduced through machines, led to vision and the visual being prioritised as scientific while less attention was paid to problems of audition in clinical practice.

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603 L. Daston and P. Gallison, *Objectivity*, (Zone Books, 2007) p.34.
604 Ibid. pp.130-131.
605 L. Daston and P. Gallison, *Objectivity*, (Zone Books, 2007) p.125
606 Ibid. p.139

However, others have linked developments in aural technologies like gramophones to the increased quantification of the human body, and a shift towards more mechanistic perceptions.[607] This chapter has shown how the audiometer and the telephone further assisted the drive to rationalise the sense of hearing. As a result, the human body could be trusted to operate testing equipment (like the artificial ear) but was too subjective to be used solely as a reliable source of measurement.[608] Similarly, Davis has shown that increased measurement and statistical analysis influenced the social construction of disability in the nineteenth century.[609] As we have seen in the examples from Kerridge's clinic, new forms of instrument based measurements were used to construct a standardised level of normal hearing. The clinic can usefully be considered in the manner of Latour and Woolgar as a space in which scientific facts such as normal hearing was constructed using the audiometer as an inscription device.[610] These conclusions about changes to objectivity and trust in sense perception are shown in this case study in which the technical was prioritised over the social and the variety of hearing assistance needed by the 'Deaf Subscribers' were subsumed as a result of the need for one standardised model. This case study is therefore of particular significance because of the nature of the sense under consideration; that is, the fact that hearing is singularly difficult to quantify and standardise. There has been an increasing amount of literature concerning the patient's voice and its subordination to medical authority. Yet, there are inherent difficulties involved in recovering the views of patients from medical investigations.[611]

However, the case of the Post Office's 'Deaf Subscribers' is divergent because there clearly was agency accorded to subscribers, as evidenced by the Public Relations questionnaire which actively sought out their opinions. This was reduced directly through engagement with the medical profession, which meant hearing loss on the telephone was reconceptualised as a medical problem rather than a social one, and the subscribers reconceptualised as patients. This also cemented the authority of the medical figure on deafness over the expertise of hearing aid manufacturers, who struggled with the accusations of 'quackery' that were levelled at them indiscriminately. Yet the voices of the 'Deaf Subscribers' were not completely silenced through these collaborations and the complaints highlighted in previous chapters continued throughout

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607 T. Grajeda, 'Early Mood Music: Edison's Phonograph, American Modernity and the Instrumentalization of Listening' in *Ubiquitous Musics: The everyday sounds that we don't always notice* ed by M.G. Quinones, A. Kassabian, & E. Boschi (Ashgate, 2013).
608 G. Gooday, *The Morals of Measurement*, (Cambridge University Press 2004) p.33.
609 Ibid. p.24.
610 In relation to this see, B. Latour & S. Woolgar *Laboratory Life* (New Jersey: Princeton University Press, 1979).
611 F. Condrau, 'The Patient's View Meets the Clinical Gaze'. In *Social History of Medicine*, vol. 20, No.3, pp.525-540 (p.529).

this period and long after. Although these 'Deaf Subscribers' seem to have been subsumed under the care of the medical profession, their views can still be unearthed from the records of their complaints kept by the Post Office.

These medical and technocratic priorities profoundly affected the construction of the Medresco hearing aid and its relationship with telephony. This was in stark contrast to Kerridge's attempts to include the lived circumstances of her patients in the prescription of their hearing aids. Even as early as 1935, she was investigating the possibilities of designing new apparatuses that would give deafened patients greater autonomy over hearing tests and possibility even replace the audiometer. However, as access to telephony was not considered by the MRC to be a medical issue, improvements to telephone service for the deaf were not funded alongside the Medresco. Not only did this lead to stagnation of the service, with the 1922 model still on offer in the late 1950s, it also meant that people with hearing loss continued to pay a surcharge to access telephony because of the failure to integrate the amplified telephone with the new health service. This failure can be traced to an investigation that began in 1946 and this episode forms the epilogue to this thesis.

Chapter 6: Epilogue: Putting the user in the picture

Jane Miller was an artist and photographer living in New York. As she worked in her studio one morning in 1972 she started to experience chest pains and realised that she was having a heart attack. Miller was deaf, but had recently installed a TTY phone which enabled her to phone the ambulance that rushed her to hospital. Afterwards, she credited the telephone technology with saving her life. Yet at that time in Britain TTY technology was still not available despite the concentrated efforts of Deaf campaigners and inventors who had been working on TTY in the US since 1964. One activist complained: 'it will be most difficult for me or anyone else to start the phonetype system here […] the PO authorities can do what they like- in fact they are a law unto themselves.'[612] In order to understand why Post Office specialist telephony was so behind the US by 1970 despite Britain's early expertise in the field, it is necessary to briefly consider what happened to the amplified telephone service after the Second World War.

From a review of the standard narrative of the amplified telephone development, it would appear that the Second World War signalled the end of innovation with amplified telephony. Despite the pre-war experiments with Kerridge, Repeaters 9a and 17a/b remained the standard models in use until the advent of transistorised technology in the late 1950s. Even then, the newly improved transistor telephone featured technology that was already out of date; the overwhelming impression of amplified telephony after the Second World War is one of apathy and stagnation.

At this point, the story of the Post Office's involvement with hearing loss is taken up by a partner project on the Medresco hearing aid which is linked to this dissertation as part of a wider project on telecommunications and hearing loss. Sean McNally's dissertation will show how the Post Office collaborated with the NID and the Medical Research Council to create the first hearing aid for the deaf designed by the state.[613] This has hitherto been attributed to the influence of the Second World War, which created even more mass hearing loss than the First, especially among civilians during the blitz. However, this thesis has shown that public/private partnerships had facilitated comprehensive networks of care that echoed the welfare state *before* 1939. Moreover, increased hearing loss after the Second World War would indicate that there was no reason for a sudden lack of demand for amplified telephony. Indeed, the Post Office supplied 1,449 amplified telephones between 1946 and 1948 which is much higher than the 400

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[612] H.G. Lang, *A Phone of Our Own: the Deaf Insurrection Against Ma Bell*, (Gallaudet University Press, 2000) p.124.
[613] S. McNally, *Medresco – the history of state sponsored auditory assistance* (University of Leeds, forthcoming PhD).

to 500 per year demand recorded in 1939.[614] Counterintuitively, it is the relationship between the amplified telephone, the Medresco hearing aid, and the NHS that explains the former's sudden disappearance.

After the outbreak of war in 1939 ended the Post Office's experiments with Kerridge, all the papers pertaining to the investigation were stored in a file marked during the war as: 'Keep till called for.'[615] A 1946 memorandum that circulated after the war explained and summarised their import and noted that the war had prevented any further action. As a result, the Telecommunications Department then contacted the Engineering Department in order to try and facilitate production of the new telephone models that had been designed as part of these pre-war investigations.[616] However, the Engineering Department replied that an investigation into amplified telephony was inopportune at that time because the Ministry of Health was developing a government sponsored hearing aid, which had not been announced to the public at that point:

> The present position in this respect is very different from that which existed before the war when the original enquiry was proposed, as at that time the Post Office was working practically single-handed. It now seems likely that almost all deaf people will become users of the Government sponsored hearing aid and that the best solution of the problem of affording them telephone facilities will be to design an adaptor for associating the microphone of the hearing aid acoustically with the receiver of a telephone.[617]

Instead of designing a new amplified telephone, the engineers designed an adaptor to link the new hearing aids with telephone receivers. This would have the advantage of allowing users to link into any telephone and not just their home sets. Once the Engineering Department decided an adaptor was the most suitable solution, two means of adaption were considered: an acoustic adaptor or electrical induction (as had been suggested by private hearing aid companies and sanctioned as illegal by the Post Office in the 1930s).[618] Electrical induction had several disadvantages and it was deemed liable to be inefficient and variable in performance due to electrical interference or 'howling'. Moreover, the Engineering Department was constrained

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[614] See Letter from F.T.D., (G.S.B.) to Engineering Department, 7th September 1949 . Accessed at BT Archives. TCB 2/ 172 & Review of the 'Deaf Aid Telephone' by the Engineering Department to the Telecommunications Department, 29th April 1939.
[615] Memorandum relating to files 61 and files 61, undated but reply dates from 1946. Accessed at BT Archives. TCB 2/ 172.
[616] Ibid.
[617] The Engineering Department to the The Telecommunications Department, I.T.B. (B) 30th September 1946, Accessed at BT Archives. TCB 2/ 172.
[618] See chapter on Advertising in this dissertation. Memorandum: Ministry of Health Hearing Aid. Hearing Aid Adaptor to permit use of the Aid with the Telephone in in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

because the Medical Research Council had mandated that the frequency response characteristic of the Medresco had to be maintained across all conditions of use.[619] Of interest in this section of the report is the note that this would also affect the ability to use induction 'pick up' between the Medresco and the radio. The report concluded that the hearing aid was 'primarily designed for speech.'[620] Building in speech as a priority over and above the need to access music or telephony was to have a long lasting negative effect on people with hearing loss as the aural landscape of the hearing aid users was constrained by the Medresco's focus on speech and its standardised design, which did not allow for bone conductive usage.[621] The new state hearing aid also incorporated a crystal microphone and would need to be re-designed to operate with an electrical 'pick up' coil. However, the Ministry of Health emphasised that no changes to the initial design of the Medresco would be tolerated. This stipulation further restricted the Engineering Department's ability to experiment with electrical induction. On the other hand, the only disadvantage of the acoustic adaptor was that it would have to be physically coupled to the hearing aid and telephone every time it was used. This was deemed to be the most advantageous design and so the Engineering Department began to create an acoustic coupler to link the amplified telephone with the Medresco.

Having decided an acoustic adapter was the best option to service the needs of its 'Deaf Subscribers', the Engineering Department launched a research project to produce the device. However, several design constraints were imposed on the project because of the Ministry of Health's restrictions, and this was exacerbated because the Medresco was never designed to function in conjunction with the telephone; the crystal microphone precluded the use of electrical induction technology and it was impossible to make changes to the moulded case of the hearing aid to facilitate an adapter, as this would delay production and therefore miss the deadline for release on the NHS.[622]

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[619] Engineering department, S. Branch *Memorandum: Ministry of Health Hearing Aid* 'Hearing Aid Adaptor to permit use of the Aid and the Telephone' accessed via BT Archives TCB_2_172. See also Medical Research Council, Special report Series no. 261 *Hearing Aids and Audiometers.*

[620] Memorandum: Ministry of Health Hearing Aid. Hearing Aid Adaptor to permit use of the Aid with the Telephone in in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

[621] Investigations into the difficulties of accessing music with hearing loss has recently been the subject of new projects at the University of Leeds. For example, the project 'Hearing Aids for Music' aims to investigate how hearing loss affects the experience of listening to music, especially for hearing aid users. See website < http://musicandhearingaids.org/about-the-project/> accessed June 12, 2016.

[622] Memorandum: Ministry of Health Hearing Aid. Hearing Aid Adaptor to permit use of the Aid with the Telephone in in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

Subscribers already using the amplified telephones were not consulted before the telephone was designed because: 'as far as likely users are concerned the subjective conditions likely to be met with will be extremely varied and cannot be satisfied equally.'[623] This was perhaps one of the legacies of users modifying their telephones in the 1920s. Although there was recognition of the diverse needs of people with hearing loss, the design of the telephones was conducted entirely to the specifications of the engineers, with no input from relevant users. The Public Relations Department reiterated the conclusions of the 1938 investigation and decided that: 'no useful purpose would be served by undertaking interviews with deaf persons as was originally proposed.'[624] However, the possibility of collaboration with the medical community was taken as a given from the start of the project. Figure 30 shows the adaptor worked by attaching the strap of the adaptor to the microphone of the hearing aid while the clips attached to the telephone receiver.

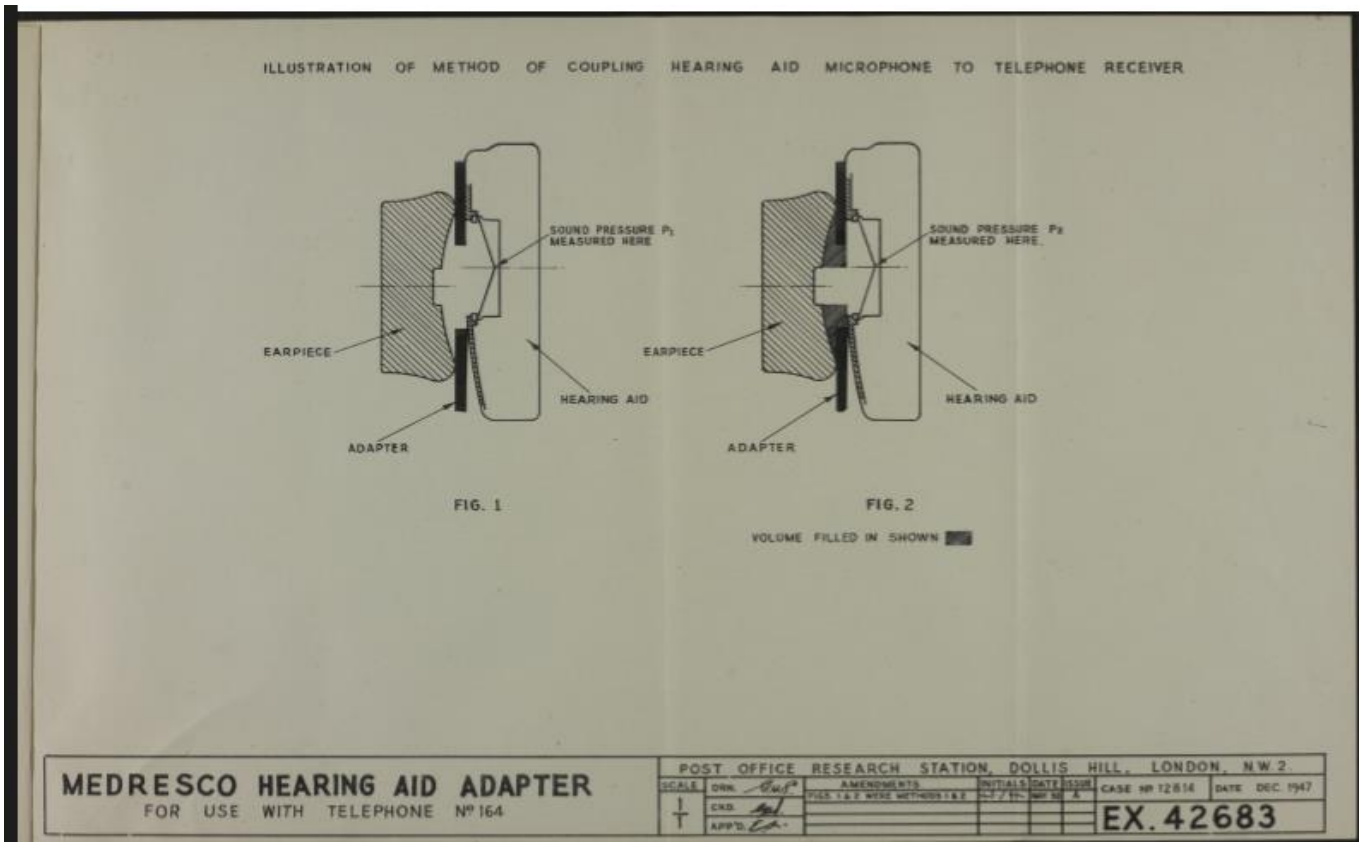

Figure 30: Medresco Hearing Aid Adapter.[625]

[623] Public Relations department memorandum to engineering department, 27th July 1946. In *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
[624] Ibid.
[625] Medresco Hearing Aid Adapter, from *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

In addition to technical difficulties, the funding of the device was a major source of contention. There were questions from the start of this proposal over how the service would be funded and distributed. In particular, Colonel McMillan of the Research Branch in the Engineering Department raised the issue of how the telephone would be distributed in relation to the new hearing aid:

> It is the intention to give a hearing aid to any person who needs it, as part of the National Health Service. It is a question whether free distribution of the adapter ought to follow as a complementary feature of the deaf aid service, and if so on what basis the distribution should be made, and by whom. As it is understood that the adapter will be capable of use with a coil office telephone as well as a subscriber's telephone, it seems clear that the distribution could not be limited to subscribers. The question of need might be determined simply by application i.e., a person having a deaf aid might be supplied with an adapter on demand.[626]

Although there were practical concerns over distribution, the Post Office obviously considered that the amplified telephone should be offered to people in receipt of a hearing aid as part of the NHS. Clearly, at this point, the Post Office conceptualized the amplified telephone as a *medical* device that should be free as part of a national *health* service. Yet still the Post Office were unwilling to cede control of the device to the Ministry of Health and so attempted to categorize the device as an adjunct to the telephone rather than a hearing aid and stated that:

> This department favours control by the Post Office but it is agreed that it would then be necessary to consider how the cost of the item to the department might be met. It would perhaps not be reasonable to contemplate selling the adapter when the hearing aid itself is issued free. It should perhaps be regarded as an adjunct to the telephone rather than to a 'hearing aid' and its issue and control vested in the Post Office.[627]

Once the conditions of supply of the state hearing aid had been determined the Engineering Department resumed investigations and sent the sketch below (Figure 31) showing how the device would work to the Ministry of Health with the proviso that 'the Post Office must still preserve the design approval rights.'[628] The Post Office's need to retain control over its telephone monopoly remains apparent here, even in its attempt to collaborate with other departments of the Government.

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[626] Memorandum, September 1947, in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
[627] Telecommunications dept. to the engineering dept. 29th July 1947 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172
[628] Letter from the S. Branch Engineering Department to the Telecommunications Department P. & P.B. 'Ministry of Health Hearing Aid' 27 July 1946.

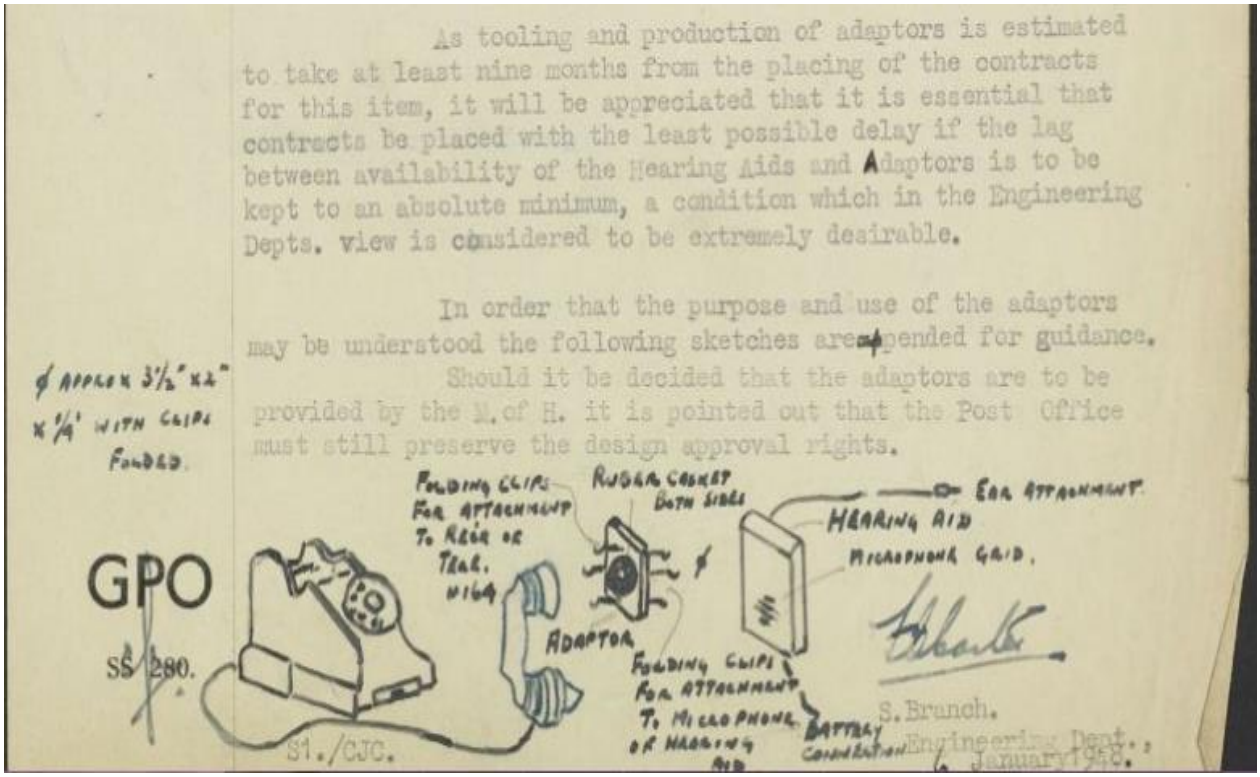

Figure 31: Engineer's drawing of the hearing aid adaptor. [629]

While this design does illustrate clearly how the circuit would work from a detailed technical perspective, it does not actually show anyone talking on the telephone or wearing the hearing aid. The user is utterly absent. By failing to put the user in the picture, the engineers neglected to consider the social context in which the device would be used. This is in contrast to the earlier period of amplified telephone, during which changes in design were instigated by the user and moulded to their expectations.

While the Engineering Department attempted to perfect the design, the Telecommunications Department were receiving letters from subscribers paying the excess rental for their amplified telephones who were now refusing to pay the surplus in accordance with the new National Health Act. Clearly, for the 'Deaf Subscribers', the amplified telephone also naturally fell under the remit of the NHS. However, the Post Office's request for grants for those who needed the repeaters was rejected by the Ministry of Health out of hand as: 'this is not a charge which could be accepted by this department under the National Health Service […] Their primary purpose is not medical but simply to enable a telephone conversation to be heard through a hearing aid. It would seem, therefore, that they should be sold or rented by the Post

[629] The Services Division, Letter dated September 1947 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

Office Telephone Service.'[630] Again, we see that the categorisation of the amplified telephone device was flexible, and subject to different party interests. The Ministry of Health seemed to react in a somewhat bemused fashion to the idea of a hearing aid for the telephone. Their reply stated: 'We have had difficulty in getting clear Otological advice about a telephone attachment to the Medresco Hearing Aid […] Would you be good enough, therefore to have a model sent to us, so that we can have it examined by Otologists?'[631] The Ministry of Health, as a body responsible for government healthcare policies, felt that the adaptor designed for hearing loss should rightly have been handled by medical experts in hearing loss. However, the amplified telephone had been designed in response to user demand, by engineers. What is abundantly clear is that users were not included in any part of this process.

It was at this point in 1949 that that the Ministry of Health asserted its position regarding the need to provide telephones to the deaf. As well as deeming amplified telephony to be out of their remit, they also considered the adaptor to be unnecessary, and one minister complained to the Post Office that: 'Under the National Health Service Act we have no power to sell "gadgets."'[632]A vitriolic dispute between the two government bodies ensued. A similar struggle was ongoing between the Ministry of Health and the Ministry of Pensions, as both bodies argued that wheelchair provision was not in their remit.[633] The Post Office was adamant that access to telephony was an essential aspect of the health and well-being for the deaf, in accordance with their long experience in providing such apparatus. They were also quick to recognise that the issue at stake was whether or not the adaptor was categorised as medical or not, as this would determine which body took responsibility for enabling the deaf to access the telephone. The Post Office emphasised that they anticipated a large demand for the adaptor, and that the Ministry of Health should sponsor it:

> If it decides to the contrary we could hardly sell or rent an article for attachment to an aid provided free by another Government department- If you decide that an aid to hearing ordinary conversation is medical, whilst an aid to hearing telephone conversation is not, you will have some difficulty in providing suitable answers.[634]

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[630] Ministry of Health to the Post Office 30th April 1949 (my phrase in parendissertation) in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
[631] Ministry of Health to Wooley, 26th May 1948 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
[632] Ministry of Health to Post Office, June 1949 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
[633] B.Woods & N.Watson, 'In pursuit of standardization: The British Ministry of Health's Model 8F Wheelchair, 1948-1962' in *Technology and Culture*, vol.45, No.3 (John Hopkins Press 2003) pp.540-568 (p.554).
[634] Post Office to the Ministry of Health, 14th May 1949 (my emphasis added) in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

The Ministry of Health disagreed, and argued that access to speech was essential to health and social wellbeing, while access to telephony was not. Nevertheless, they recognised that this distinction was tenuous:

> There is some distinction between providing a hearing aid for restoring the sense of hearing, thus enabling a person to take his part in social life- important from the health point of view- and proving apparatus to enable that person to use the telephone; we feel the latter is not for us. This distinction is one which would be difficult to make in a manner convincing to the public who would be slow to understand why we provide aids free but make a charge for the adaptor. We are hoping that we may be able to persuade you to regard this adaptor as a fitment enabling a telephone to be used with a hearing aid rather than as a fitment enabling a hearing aid to be used with the telephone.[635]

The Ministry of Health interpreted the 1946 National Health Act to include 'provision of surgical, medical, and other appliances.'[636] However, despite the decree that amplified telephony did not fit any of these headings, the adaptors were produced.[637] In fact it was a letter from the NID offering to arrange user trials of the device that rang the death knell for this project.[638] When people actually used the adaptor (Figure 33), it became clear that the engineers had not considered the reality of hearing aid use, particularly from a female perspective. The stigma attached to hearing aids meant that most users concealed the devices under clothing. While men would easily conceal the aid in jacket or shirt pockets, most women would disguise the aid under skirts; making use of stockings and suspender belts to attach the device to their person. The failure of the engineers to envision practical use meant that the clip on attachment was very difficult for women concealing the aid to use without partially undressing to use the phone.

Reviews on performance were overwhelmingly negative. Background noise was considered to be a major problem. In terms of increased audibility, the adaptor was thought to be inferior to Repeater telephone 17a, the standard model still available. At this point, the Post Office had capitulated to the Ministry of Health with regards to payment, and so asked testers if they would pay 4d to 5d. for the adaptor. The majority of testers deemed this to be excessive. However, even more problematic than the cost was the fact that the adapter had to be attached to the microphone of the hearing aid, which was usually embedded within garments.

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635 Ministry of Health reply to the Post Office, June 1949, my emphasis added) in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
636 B.Woods & N.Watson, 'In pursuit of standardization: The British Ministry of Health's Model 8F Wheelchair, 1948-1962' in *Technology and Culture*, vol.45, No.3 (John Hopkins Press 2003) pp. 540-568 (p.555).
637 Although designed by the Post Office research and engineering departments, The Plessey Company provided equipment for the prototypes.
638 This trial was with members of the London League for the Hard of Hearing (who were also testing out the Medresco).

The first tester to respond was female and she stated that: 'I consider the aid unsuitable for a girl who wears the aid concealed under clothing as I do.'[639] The second respondent also emphasised the fact that: 'if, like myself, the user wears the aid concealed, it means that one has to detach the microphone case from the inside of ones apparel each time it is used.'[640] Similar objections were made by all the female correspondents but perhaps the most succint expresssion of the problem came from the Head Postmaster in Malton, Yorkshire, who had been using an amplified telephone for his work at the Post Office for years. He asked if he could test out the adaptor and responded to its trial with a detailed letter. While he felt the adaptor was useful for his purposes, he candidly pointed out that:

> One's aid is usually hid beneath clothing. In my case I wear the aid under my waistcoat clipped to my shirtfront. I permanently had the adaptor linked to the aid, and soon got used to slotting into position the earpiece end of the telephone. Now, how a woman would manipulate the phone and where she would fit her aid is up to her, but she could hardly be expected to partly undress, and women are a bit keen to undisclose the aid outside, but to me- a man- I don't mind in the least as it is results I am concerned about. I must hear at all costs- regardless of sight of plastic bands etc.[641]

Essentially, the adaptor perfectly suited the needs of the engineers but not the needs of their 'Deaf Subscribers'. It was clear that by choosing not to consult people with hearing loss who wore hearing aids and desired to use the telephone, the Post Office had engineered a device that was unsuitable for the everyday lived reality of hearing loss. In fact, they had designed an aid that was inconvenient for everyone except for a man working in an office for the Post Office! The image below (figure 32) shows such idealised use of the telephone adaptor, with a man wearing work clothes and the microphone concealed. The engineers' purely technical approach did not take into account the social aspects of deafness. There was no awareness of the stigma that still surrounded hearing loss or the difference that gender made to the way people wanted to use such devices. In the case of the Head Postmaster in Yorkshire, he had to simply *hear* at all costs, whereas for the female correspondents' concealment was prioritised over efficiency. Due to the overwhelmingly negative feedback from users the NID recommended the cancellation of the project, a position with which the Post Office agreed. The decision not to put users in the

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639 Letter from The National Institute for the Deaf to St Martin le Grande, 16th October 1950 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
640 Letter from the National Institute for the Deaf to St Matin le Grande, 13th December 1950 in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.
641 Letter from Head Post Office, Wheelgate, Malton to R W Clarke (Sales Division) 26th April 1951. in *Special apparatus fitted on telephone exchange lines rented by deaf subscribers* accessed via BT Archives TCB_2_172.

picture at the start of the design process meant that the end product was not acceptable to people with hearing loss who desired access to telephony.

Figure 32: The Medresco Hearing Aid Telephone Adapter.

Chapter 7: Conclusion

7.1: Shaping the 'Deaf Subscriber'

The Post Office has often used promoted its work with the NID to demonstrate its longstanding commitment to accessibility in promotional material. The Post Office, and subsequently BT, have emphasised that they pioneered a philanthropic technological fix.[642] For example, in a history tracking the 'rewards of war', the *BT Journal* explains that in the Second World War 'improved ears and voices were constructed for use in telephone measurements'.[643] The narrative emphasises the development of better artificial ears and technical improvements, while human involvement is notably absent. Overall, the historical account concerning hearing loss highlights that:

> In the past, the Post Office has helped subscribers handicapped in this way by providing two types of valve operated equipment, but these were relatively bulky and drew attention to the user's disability. These two equipments have now been miniaturized and styled for use with modern telephones.[644]

On this reading the Post Office operated in a benevolent, philanthropic fashion to aid its customers by providing superior technology. Indeed, the miniaturisation of technology was explicitly linked with modernisation and discreetness, implying that it was best to conceal evidence of hearing loss and that technology could be used to solve this social problem. Yet my user focused approach has shown that the history of the amplified telephone is one based on the actions of people. It is essentially a story about the desire for people to effectively communicate with others. There was an uncomfortable dialogue between the Post Office and its users with hearing loss, and the process of amplified telephone design was marked by tensions and reluctant accommodation. Moreover, the increasing intervention of the medical profession led the Post Office to pursue ever more technocratic solutions for hearing loss, which failed to connect with the lived experiences of their users.

The main period covered by this thesis is 1911—1939. The interwar years provide an ideal period to study the amplified telephone as it is in these years that the 'deaf telephone' could most easily be described as at a stage of 'interpretive flexibility'; as the boundaries between

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642 For example see W.T. Lowe, 'A New Telephone for Deaf Subscribers- Handset No. 4' in *Post Office Electrical Engineers Journal* Vol 52, (April 1959) From an original held by BT Museum, W.T. Lowe, 'To speak – to hear' in *Post Office Magazine* July 1961, From an original held by BT Museum, and P. Panton 'Rewards of War' in *British Telecom Journal 1984-85* From an original held by BT Museum All accessed via BT Archives 'Disability Folder'

643 P. Panton 'Rewards of War' in *British Telecom Journal 1984-85.*

644 W.T. Lowe, 'To speak – to hear' in *Post Office Magazine* July 1961.

hearing loss and deafness changed so too did the technology. Indeed, this thesis has shown that the categorisation of deafness was defined by the amplified telephone. The post-war milieu in which wider social and cultural concerns related to national efficiency and the medical marketplace also influenced the way that the Post Office responded to user demands and marketed the telephone. At the outset of this thesis we saw how 1911 was a pivotal year in the history of two major institutions. The Post Office confirmed its monopoly over telephony, and the National Bureau for the Promotion of the General Welfare of the Deaf was founded. Telephony had been stagnating since the National Telephone Company lost its battle for independence, and in the years immediately prior to the First World War access to the telephone was a luxury for the upper classes and wealthy businessmen. Meanwhile, the Bureau was campaigning to ensure that the deaf were not included in the planned 1913 Mental Deficiency Act. This legislation reveals the way that the deaf were considered to be a social problem. Before the First World War noise induced hearing loss was a problem for a working class minority, but 28 years later, before the Second World War, hearing loss was regarded as a serious national health concern. This transition was largely affected by the First World War changing the context of hearing loss. Losing one's hearing in the service of the country made the condition one that demanded compensation. Moreover, hearing loss became an issue for the middle and upper classes. During the interwar years the boundaries between deafness and hearing loss were blurred, and that definitions depended on the cause and the context of the hearing loss. Generally, telephony was inaccessible and hearing loss was considered by the mainstream to be a minority issue principally related to hereditary and eugenics, outside of the concern of the mainstream. Yet by 1939 the Post Office had instated a large scale collaborative investigation with hearing aid clinics and the National Institute for the Deaf to improve its telephone facilities specially designed for those with hearing loss. What happened to effect such changes in attitudes towards hearing loss to facilitate provision of specialist telephony? Apart from the specialist technology provided by the Post Office, by the eve of the Second World War hearing aids were widely subsidised by the Government, telephones usage was widespread, and the 'deafened' had emerged as a fixed new term used to categorise adults with hearing loss. At the start of this thesis I posed three main questions to try to explain this phenomenon: why did the Post Office develop an unprofitable and expensive technology for a small, insignificant market of potential customers? How does this tie into its relationship with the Government as a nationalised business? And how did the Government's complex attitude towards the deafened develop during the interwar years? This thesis answered these questions by explaining what influenced the Post Office to develop amplified telephone technology. In this conclusion I will elaborate on why a

nationalised Post Office developed this expensive and unprofitable technology for a limited market, and how this related to wider changes in attitudes towards hearing loss in the interwar years.

The contest over who held power over hearing assistive technology and had responsibility for hearing loss has been integral to this thesis. In Chapter 2, I showed how and why the British government became increasingly responsible for the hearing loss caused by the First World War; they provided limited support through pensions, lip reading, and crucially, promoted 'technical fixes' for the problem by issuing hearing aids. However, though the Government effectively admitted responsibility for 'causing' hearing loss, individual users took initiatives to adapt technologies to their own personal needs, as I demonstrated in Chapter 3. At the same time certain hearing aid manufacturers saw the problem of hearing loss as one that *they* had the responsibility to 'cure', and their exaggerated advertisements to this effect was part of the focus of Chapter 4. While quack hearing aids manufacturers failed to live up to their hyperbolic rhetoric, their commercial exploitation of a new marketplace for managing hearing loss was tempered by companies affiliated with the NID and Hearing Aid and Manufacturers Association focused on achieving legitimacy to achieve responsible solutions for hearing loss. However, some private hearing aid companies acted directly against the Post Office's monopoly by creating hearing aids that users could use with the phone with illegal coupling devices. As a result, the Post Office's monopoly generated increased conflict between the desire for standardisation of the telephone network and its associated apparatus, and the individuality of hearing loss, with the 1930s especially marked by user appropriation and innovation. As chapters 3 and 4 demonstrated, users with hearing loss took responsibility for their individual needs and created modified devices so that they could access telephony in a manner sympathetic to their personal experiences of hearing loss. Although the state played a key role in directing Post Office research into hearing assistive devices, the main force motivating the design of the amplified telephony was user activism.

In the case of Raymond Harris, the Post Office actively appropriated his amplified telephone design and integrated it into their system. Concurrently, Harris's personal bodily knowledge was turned into a product that the Post Office could sell on. Thus – and in the cases of Mr Mousley, Mr Buckley, and the Smith Brothers – the interplay between the Post Office and its users was more complex than simple appropriation. This interplay can be best analysed by examining the way in which the Post Office responded to complaints, especially in the 1920s

when the amplified telephone was in a state of 'interpretive flexibility'.[645] The knowledge embodied by people with hearing loss who complained about their telephone was subsequently commodified by the Post Office in their amplified telephone design. We saw in Chapter 5 that Kerridge's 'trained deaf observers' in the hearing aid clinic had their individual hearing loss and personal bodily knowledge commodified into standardised telephone systems. The transformation of personal experience into cultural capital is acknowledged to a certain extent today, particularly in medical experiments.[646] Yet these innovators and observers have been written out of Post Office reflections on its role in providing accessible technologies. This is the first historical reconstruction of users' role in the case of amplified telephony.

I have analysed this intervention through the study of Kerridge's innovative hearing aid clinic and, in so doing, I have recovered her forgotten contribution to the standardisation of hearing loss and the prescription of hearing aids. However, increased medicalisation and focus on engineering technical solutions led to disjuncture between the needs of those with hearing loss and the devices they were given, and this tension culminated in the failure of the acoustic coupler. Part of the reason for these problems is the contested status of the hearing assistive devices like the coupler as hybrids which were categorised variously as phones or prosthetics, technical gadgets or medical equipment. Such categorisation largely depended on what label suited its promotors. Hearing aids were deemed to be purely technical apparatus when the Post Office wanted to advertise them for financial gain in the 1930s, but were considered to be purely medical when the Ministry of Health could have been held liable for their funding in the 1940s. These labels were not simply related to profit but also to responsibility. Issues surrounding which bodies had responsibility for the deaf were in flux during the pre-NHS interwar years, as hard of hearing adults (especially ex-servicemen) were rehabilitated by a complicated network of actors and organisations comprising of the Ministry of Pensions, the medical profession, charitable provision, and specially developed technologies from both the public and private sector in the form of hearing aids and amplified telephones. Different groups had different responsibilities and stakes in providing hearing assistive technology. How they attempted to deal with the problem depended on their priorities. In the case of the Dr Phyllis Margaret Tookey Kerridge and the NID, the desire to regulate 'quack' hearing aid vendors in the late 1930s led them to promote a scientific approach to hearing loss and standardisation of hearing aid prescription. However, the Post Office was able to profit from hearing aid advertisements, and

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[645] T. Pinch & N. Oudshoorn (eds), *How Users Matter: The Co-Construction of Users and Technology* (Cambridge: The MIT Press, 2005).
[646] S. Blume, *The Artificial Ear: Cochlear Implants and the Culture of Deafness* (Rutgers University Press 2010).

approached the problem of hearing loss as an engineering issue that could be fixed by providing technical solutions to users' complaints. Yet, Kerridge, as a self-styled representative of scientific expertise, led the intervention of the medical profession which led the Post Office to collaboration, and to increasingly technocratic solutions for hearing loss which failed to connect with the lived experiences of their users. However, Kerridge doesn't fit into a simple critique of the medical model which sees medical intervention as necessarily damaging, rather it is clear that she held the needs of her patients to be paramount, and worked with them to lobby for better care for hearing loss through scientific attention and quantification of the problem.

Moreover, the case of the acoustic coupler highlighted in chapter six demonstrated the close relations between warfare and welfare. This thesis has shown especially that the First World War was more important in setting up the ideological trappings and practical framework of the welfare state than has previously been acknowledged. The First World War was the first example of large scale, industrialised deafening of soldiers and this noise induced hearing loss was compounded and complicated by the symptoms of hysterical deafness that attended shell shock. Newly disordered and newly deafened soldiers prompted an ideological shift concerning attitudes to hearing loss, and the concept of 'the Deafened' emerged during this period. Changed attitudes to hearing loss had an impact on three key bodies. Firstly, the public, who gave thousands to the 'Deafened Ex-Service Men's Fund' and other charities. Secondly the medical community, who argued over how best to treat various different forms of hearing loss. And thirdly the Government, whose limited responsibility to the deafened bodies of the soldiers was manifested in its (limited) support of pensions, lip reading classes, hearing aids, and amplified telephony. This emphasises the lack of a coherent understanding of 'deafness', stemming from its inclusion in the constellation of symptoms which comprised shell shock.

The idea of there being a unified response to the newly disabled by the public and private sectors has been problematized in this thesis, however. There was division between public and private ideologies in considerations of responsibility, categorisation, advertising, and the Post Office monopoly. For instance, the position of the Post Office as a public office with simultaneous business concerns meant that their responsibility for deafened customers continually conflicted with their profitability. This conflict was particularly shown in Chapter 4, which highlighted the controversies surrounding the Post Office's stamp books in the late 1930s. In that chapter, I showed the value of these novel and highly relevant primary sources which illuminate further the dual nature of Post Office involvement with hard-of-hearing users. Stamp books provided ubiquitous and immersive advertising solutions that targeted all echelons of

society. By examining stamp packaging – wrapping for a readily available, necessary commodity – we can see the cultural concerns over disability during the interwar period. The appearance of advertisements in stamp books also crystallises the inherent tension within the Post Office between functioning as an arm of government and as a profitable business. Indeed, the Post Office's nationalised telephone monopoly and prohibition of private equipment created a situation in which individual users were forced to adapt equipment for their own purposes and thereby was key to prompting user innovation to telephony.

The technology used in amplified telephone equipment developed very much in tandem with the technology used in trench telephony in the First World War. In particular, telephony increased in use and improved in amplification thanks to the valve technology that was used in the trenches and designed by the Post Office. It was this very technology that came to be redeployed in a civilian context to facilitate increased communication for the hard-of-hearing after the First World War. Yet while amplified telephony and state sponsorship of hearing aids signalled the start of government intervention into hearing loss, it also signalled the start of an institutionalised scaling of disability in which deafness was defined as a lesser impediment. Soldiers with hearing loss clearly felt they were not adequately or proportionately provided for through the Ministry of Pensions scheme when compared to other war injuries, and utilised other rehabilitation programs like lip reading and charity funds. We must therefore understand hearing aids and the amplified telephone as a wider part of post-First World War rehabilitation. The Post Office worked with the Government and alongside hospitals and charities in order to provide such connected care.

The complexity of this care must be considered in the context of the warfare and welfare developments that characterised the interwar years. This dissertation therefore contributes to debates about the Government's provision for ex-servicemen by extending the idea of rehabilitation to include auditory prostheses. I have further demonstrated that the Government arguably had a certain amount of responsibility to men with hearing loss, which motivated the Post Office design of amplified telephony.

Telephony was ultimately used as a tool in the categorisation of disability by the Post Office, which defined people unable to use the amplified telephone as deaf, and those who could use it as 'hard of hearing'. At the same time clinicians like Kerridge used the telephone in the form of the audiometer to create standardised levels of normal hearing and defined deviance from that norm as deafness that could be corrected with appropriate hearing assistive aids. In turn, telephone users modified such technology to fit their personal needs, experiences and

identities. By considering the role of users, l have shown how hard-of-hearing subscribers influenced the form and accessibility of this technology, thus contributing to the relatively recent field of historical research concerning the interaction between technical development and disability. In this thesis, I demonstrate the way in which people have been disabled by technology, as hearing loss became defined as the ability to hear the telephone. This meant that disability changed with improvements in technology and was nothing to do with individual bodies. Hearing the telephone was further used to create disability through the use of the audiometer, with which a standard of normal hearing was created, and disability defined as deviance from this norm.

In Chapter 4, my analysis of the promotion of amplified telephones and hearing aids has revealed the inherent tensions in the Post Office's role as a state office which also had a remit to turn a profit as though it were a business enterprise. This was reflected in its advertising to the deaf and its complicated interactions with private hearing aid companies and the NID. These tensions escalated in the late 1930s, the focus of Chapter 5, which showed how concerns over 'quack' hearing aids led to the instatement of hearing aid clinics, and how a lack of regulation and control over the hearing aid market prompted state and medical intervention. One of these clinics, run by Dr Phyllis Kerridge, became the site for testing the Post Office's amplified telephones. In this way, collaboration between the medical profession and the Post Office was initiated; and the user based approach that had initially led to the development of the amplified telephones was replaced by a more technocratic focus to hearing loss. This study has revealed the previously unknown contribution made by Kerridge to the study of hearing loss. Kerridge's research was instrumental not only in its contribution to the creation of the first state hearing aid but in setting up the principles of free access to medical care and hearing aids. While not a direct precursor to the NHS, the hearing aid clinic does provide an important foundational example of government funded public healthcare in the interwar years. Indeed, Kerridge's previously unrecognised influence on the policy of free provision of hearing aids is still with us today. Despite the fact that she was acknowledged by her contemporaries to have created a situation in which it would have been difficult to justify not including hearing aids in the NHS, there is no historical literature on her work in this field, nor related to her pioneering career as a female scientist. Kerridge not only facilitated the provision of free hearing care in her lifetime, she created a situation where hearing aids became medicalised and in which their prescription was eventually built into the NHS as an accepted element of basic medical care.

However, despite Kerridge's awareness of the social context of hearing loss, her collaborations with the Post Office initiated the scientific technocratic approach that was further used in the NHS hearing aid after the Second World War. Thus, while the Post Office's expertise in amplification technology enabled them to create a further legacy in the form of state provision of hearing aids, this dissertation has shown that a technocratic approach that excludes users was especially unsuited to individuals with diverse hearing loss. Kerridge's desire to bring science to bear on the field of hearing loss means that her legacy is complex. Although she raised the profile of hearing loss within the scientific community, her emphasis on standardisation conflicted with the diversity and individuality of the problem she was attempting to solve. The problems with the standardisation of the Medresco that ensued are explored in Sean McNally's PhD dissertation, which this work most obviously points towards.[647] McNally shows that the 'one size fits all' approach led to rejection from users who could not use the Medresco as it failed to account for diversities such as preference for bone conduction, gender, age, or skin colour.

After 1922 aspirational users of the telephone were key to directing improvement in the amplified telephone service. It is clear that it was people with hearing loss who ensured greater access to telephony as, unable to use private equipment, they utilised innovative solutions in order to gain access to the telephone. In many cases, this took the form of persuading the Post Office to improve their service and make it more accessible by complaining, withholding rent, and threatening legal action. The most extraordinary case that stands out in these examples of user innovation is that of Raymond Harris, who buildt his own personal amplification equipment and successfully challenged the Post Office to do better. One of the issues highlighted by this struggle of individuals is that hearing loss was, and remains, so varied. This diversity challenged the Post Office, as it worked towards greater standardisation of equipment, especially in line with the accelerated instatement of automatic exchanges in the 1930s. Moreover, it shows that providing a technical fix for disability has never been a simple solution, and thus provides further confirmatory evidence of the arguments made by disability historians concerning the failures of the medical model.

[647] S. McNally, *Medresco- the history of state-sponsored auditory assistance* (University of Leeds PhD Thesis forthcoming 2016).

7.2: Approaching assistive technologies through disability history

This study is situated at the intersection of science and technology studies, history of technology, and disability history. As a result, it emphasises the significance of examining amplified telephony in relation to its users. The relationship between users and technology has received increased interest within science and technology studies and has been extended to the study of medical technologies. Considering user experiences in this area often reveals discrepancies between the designed ideal user and the disabled user in real life. In fact, this problem goes beyond disability history as there is no such thing as the imagined ideal user. However, in the case of the disabled user the frequent imbalance of power between designer and user can heighten these discrepancies. Such incompatibility based on assumptions on the part of the user was shown in the case of the acoustic coupler, as female users were frustrated by a device that did not correspond with their needs. When attempting to use the amplified telephone, users responded to its failings by using alternative devices, creating individual devices, or lobbying the Post Office to improve its service. Non-use was also a response, and Sally Wyatt has clarified the importance of this by studying this category in four subgroups; resisters, rejecters, the excluded, and the expelled.[648] Users of the telephone with hearing loss fit into this analysis as aspirational users who wanted to use the telephone and used a variety of techniques to gain access. Analysis of the way these users adapted the telephone to suit their individual needs corresponds to studies concerned with deaf users' relationships to prostheses, especially the way they have been adapted, modified, and controlled.[649] By following the individual experiences of users, I have argued that the telephone was used as a prosthetic to enable users to pass as 'hearing'. By evaluating user responses, I have extended the category of aspirational user, to Wyatt's original breakdown of non-use as another way of characterising 'non' users.[650]

While disability history has received increasing scholarly attention in recent years, it has not often meshed with science and technology studies because studying the history of prosthetic devices has been associated with the medical model of disability history. The politicised concerns about hearing assistive technology has meant that historians of disability and Deaf historians

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[648] S. Wyatt, 'Non-Users Also Matter: The Construction of Users and Non-Users of the Internet' in *How Users Matter* p.76.

[649] For example see S.Blume, *The Artificial Ear: Cochlear Implants and the Culture of Deafness* (Rutgers University Press 2010), J.Virdi-Dhesi, 'Between cure and prosthetic: 'Good fit' in Artificial Eardrums' and G. Gooday & K.Sayer, 'Purchase, use, and adaptation: Interpreting 'patented' aids to the deaf in Victorian Britain' in *Modern Prostheses in Anglo-American Commodity Cultures* (Manchester University Press, 2016, forthcoming).

[650] S. Wyatt, 'Non-Users Also Matter: The Construction of Users and Non-Users of the Internet' in T Pinch & N. Oudshoorn (eds), *How Users Matter: The Co-Construction of Users and Technology* (Cambridge: The MIT Press, 2005). p.76.

have paid less attention to technology in comparison to recovery of sign language suppression and the role of the medical community in impeding Deaf culture. Furthermore, the stark division between the social and medical model of disability has meant that collaboration between science and technology studies and disability studies has been regarded as counterproductive and even inappropriate.[651] Technology and medicalisation have been negatively linked in the minds of many, and likewise associated with the oppression and normalisation of disability by the medical profession. Indeed, certain proponents of disability history define the discipline explicitly in opposition to medical history.[652]

In this thesis, by contrast, answering what motivations underpinned the development of the amplified telephone has *necessitated* studying technology alongside disability history. Anderson has made the point that it is essential to consider medical as well as social developments in disability history in order to reveal the full lived experience of individuals.[653] By focusing entirely on the social model of disability history, we are missing out on the perspectives and experiences of the users of technology and therefore their reciprocal impact on the technologies themselves. This dissertation has demonstrated that a historical understanding of technology designed for the disabled can reveal the agency and experiences of disabled individuals and reveal their interactions with technology to be a reciprocal relationship instead of an imposed one. I argue that focus on technology from the perspective of the disabled user can reveal the myriad ways in which disabled people have contributed to technical developments. My thesis offers a way to do this by combining a social constructionist approach with elements of disability history to reveal the contribution of disabled users. An aspect of prosthetic production that has previously not been emphasised, this shows the rich connections between technology and creativity in the disabled context.

Enriched by such perspectives from disability studies, this work has broadened the role of users to show that the relationship between hearing loss, technology and those who control these two aspects are more nuanced than existing studies have recognised. In the context of the medical model of disability, technology is often described as apparatus that can be used to fix the

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651 T. Shakespeare, 'The Social Model of Disability' in *The Disability Studies Reader,* 4th edition, ed. by L.J. Davis (Routledge, 2013) pp.214-221 (p.215).

652 For a review of the divergences between medical history and disability history in the U.S. see, B. Linker, 'On the Borderland of Medical and Disability History: A Study of the Fields' in Bulletin of the History of Medicine, Vol. 87, No.4 (Project Muse 2013) Accessed online June 2016 < https://muse.jhu.edu/article/532461>

653 For a discussion of the history of the medical and social model of disability see T. Shakespeare, 'The Social Model of Disability' in *The Disability Studies Reader*, 4th edition, ed. by L.J. Davis (Routledge, 2013) pp.214-221. For a discussion of the problems of the social model for historians see J. Anderson, *War, disability and rehabilitation in Britain*, (Manchester University Press 2011) pp.5-6.

problems associated with non-standard bodies. However, late twentieth and twenty-first-century developments in telecommunication technology have revolutionised the ways in which the Deaf communicated; the rise of text messaging and social media in particular have empowered Deaf technology users and allowed them to use a form of technology that had previously relied on audibility. This represents a contemporary appropriation of new technologies in a similar way to the early user-innovators of amplified telephones. The cultural distinction between hearing loss and Deafness has recently been further challenged by the ambiguities around cochlear implants and the contested identity of their users. However, it is clear that the earliest electro-acoustic technologies posed a similar challenge to deaf and Deaf identity.

While Deaf history remains a strong and vibrant sub-section of disability history, this dissertation has moved away from that genre to consider the experiences of people with hearing loss. As a result, my focus has shifted from the oralist/sign language debate in the context of child education to consider adults with hearing loss. I have therefore looked at institutions and movements that have been variously condemned or ignored by Deaf historians. As politicised concerns have affected the histories that have been told in relation to hearing loss, the roles of government, charities, the medical profession, and technology, have been marginalised because of the perception that any and all of their intervention has been either misguided or harmful. Deaf historians have been disinclined to research the medical history related to deafness apart from its role in impeding Deaf culture.[654] By focusing on institutions like the Post Office, this dissertation has revealed its hitherto unknown expertise in the field of hearing loss, as well as its varied interactions with the NID.

Finally, as a broad examination of the technology used by those with hearing loss, this study provides a counterpart to the strong genre of Deaf history and can be read alongside Gooday and Sayers' upcoming work on hearing loss in adults in the nineteenth century. It complements the political and cultural concerns inherent to Deaf history, while bringing new focus to the role of technology within this context. In doing so, it provides an example of how to work at the contested intersection between disability history and science and technology studies whilst incorporating important methodological perspectives from the history of technology.

As well as affirming that users do matter – and disabled users in particular – this study also contributes to the burgeoning field of sound studies. In particular, the development of the

[654] J. Virdi-Dhesi, *From the Hands of Quacks: Aural Surgery, Deafness, and the Making of a Speciality in 19th Century London* (PhD Thesis, University of Toronto, 2014) Accessed online, June 2016 < https://tspace.library.utoronto.ca/handle/1807/68165>

amplified telephone as a method of measuring hearing loss relates to studies of how we have come to *measure* sound, and the instruments that have been developed to do this.[655] Future research might continue to look at the first hearing aid clinics in order to focus on the creation of the audiogram and the standardisation of hearing loss. Although this dissertation has made consistent comparisons with US developments, a particularly fruitful avenue of research could lie in comparison of the creation of such standards across a variety of different spaces and contexts. Moreover, Kerridge's clinic itself merits further study, in the manner pioneered by Thompson, as a unique space, designed with specific architectural acoustics to create scientific standards.[656]

Furthermore, this study has emphasised not only the history of measuring hearing, but also the history of measuring hearing *loss*. It has also questioned whether it is measuring hearing loss at all. In line with Gooday's observations about the morals of measurement, the way that society construes someone as abled or otherwise is dependent on the time, space and place in which the judgement is made.[657] Hearing loss was defined as deviance from a norm defined by Kerridge's audiometer, which I regard as an inscription device in the clinical construction of scientific 'facts' such as 'normal' hearing, in the manner of laboratory life. As a result, this thesis has emphasised the way that such categorisations are created by technology, specifically in the case of telephony and hearing loss in the interwar years. The role of technology in normalcy construction and in increased objectivity has thus been extended into the twentieth century and into the context of hearing loss, following on from Gooday's insight into the way that increased use of instruments in the nineteenth century led to distrust of the human body.[658]

Categorisation construction is a key concern of this thesis, as I show how standardisation of hearing loss, hearing measurement, and testing equipment led to the social exclusion of those who did not measure up to newly standardised levels. These tests and measurements have contributed to social stratification and exclusion from society, and such exclusion was often marked by the Post Office labelling people as either hard-of-hearing or deaf, and therefore 'too deaf' to use their telephones. This analysis is relevant to those historians working in disability studies who have critiqued over medicalised accounts of disability as well as those in medical history who have questioned the loss of patient voices in traditional medical history. People with

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655 K. Bijsterveld, K. *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*. (The MIT Press 2008) See also the edited collection T Pinch. & K Bijsterveld, (Eds.) *The Oxford Handbook of Sound Studies*. (Oxford University Press. 2012).

656 E. Thompson, *The Soundscape of Modernity*: *Architectural Acoustics and the Culture of Listening in America, 1900–1933* (The MIT Press, 2002).

657 G. Gooday, *The Morals of Measurement* (Cambridge University Press 2004).

658 Ibid.

hearing loss have not been passive to medicalisation; rather, telephone subscribers with hearing loss adopted various active strategies to ensure they had access to telephony. It is also problematic to refer to the amplified telephones as 'medicines' or to their users as 'patients'. Their status as such was in flux at this time, and we can usefully regard the amplified telephone as being at a stage of 'interpretive flexibility' in the manner that has been suggested by Bijker and Pinch as a way of understanding new technologies.[659] In a way, the amplified telephone had a hybrid status as a technology that was neither purely medical nor simply technical. Flexibility of interpretation was a key issue in Chapter 4 of this dissertation, which brought to light the Post Office's endorsement of the 'quack' hearing aids that proliferated in the late 1930s.

As has been argued by Virdi-Dhesi in the context of aural surgery in the nineteenth century, the term 'quack' was used in the contest for authority over hearing loss.[660] In order to defend itself against the accusation that it was contravening the 1909 Patent Medicines Act, the Post Office argued that hearing aids were technological apparatus and not medicines and therefore did not come under the jurisdiction of that Act. Moreover, people with hearing loss engaging with the Post Office would certainly not have regarded themselves as patients and the Post Office tended to refer to them as 'subscribers' or 'Deaf Subscribers'. These labels are important because from the late 1930s the Post Office increasingly began to refer to their hard of hearing 'patients', a shift which I argued in Chapter 5 was a result of their collaboration with the medical profession. This ultimately led to an increasingly technocratic approach to hearing loss within the medical profession and a more obviously medicalised approach to hearing loss with the Post Office.

7.3: Disabled users matter

In this dissertation I set out to explore and explain the development of amplified telephony in Britain during the interwar period. My study has revealed the details of this hitherto neglected technology, and highlighted the actions of adults with hearing loss, a particularly understudied group of people. In this dissertation, I have argued that the amplified telephone was co-constructed in a complex process of interaction between users and producers by demonstrating the respective roles of the Post Office and its so-called 'Deaf Subscribers' in technological

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659 T. Pinch & N. Oudshoorn (eds), *How Users Matter: The Co-Construction of Users and Technology* (Cambridge: The MIT Press, 2005).

660 J.Virdi-Dhesi, *From the Hands of Quacks: Aural Surgery, Deafness, and the Making of a Speciality in 19th Century London* (PhD Thesis, University of Toronto, 2014) Accessed online, June 2016 < https://tspace.library.utoronto.ca/handle/1807/68165>

innovation. Exploration of this element of development has shed further light on the wider cultural and political climate of the interwar years and particularly on the dominant features of hearing loss care in the pre-NHS state. The Post Office's relationship to wider government has been especially notable, as the Government's complex attitude towards the deafened developed during the interwar years to help shape this technology.

This dissertation has opened up a number of avenues for further research. In disability studies, the strict dichotomy between the medical model and the social model has often placed technology as part of the medical model and thus regarded it as unsuitable for the focus of disability studies. I have shown that such categorisations do not reflect the true extent and significance of interplay between technologies and disabled users. Furthermore, as the first study on telecommunications assistance for ex-servicemen with hearing loss in the interwar period, my analysis has revealed a large gap in the scholarly literature concerning care for sensory impairments for those injured in conflicts. While there is (some) excellent literature on the care of blinded ex-servicemen after 1918, there is a notable absence of comparative work on the deafened. The conflation of mental illness and shell shock with hearing loss has also meant that the specific care of deafened ex-servicemen with hearing loss has been subsumed into shell shock studies, itself just one form hearing loss experienced by ex-servicemen in this period. Close analysis of the medical records within the pension records for deafness would reveal the ideologies surrounding pension provision for deafness of psychological origin versus deafness of physical origin and shed new light on how and why physical illnesses were given greater priority and recompense. This would also show why certain combinations of deafness were compensated more highly than others and would lend itself to a comparative study between deafness and blindness and between deafness and mental health disorders. Moreover, we lack accounts of the ways in which technology was used alongside monetary compensation and retraining to provide a more comprehensive rehabilitation of soldiers in Britain. A particular fruitful study might look to international comparisons, for example, by looking at other national pension schemes and related compensation given to soldiers in the Empire, in order to show how cultural contexts contribute to modes of rehabilitation.

Additionally, further comparative research could usefully compare the development of standardisation of hearing and the creation of levels of normal and abnormal hearing with analogous developments in optometry. This dissertation has hinted at the way that otology and hearing aids were frequently compared to optometry and spectacles by medical professionals and hearing aid vendors in order to draw unfavourable comparisons. More research is needed to

explore why the stigma attached to hearing aids was not attached to spectacles, while at the same time blindness was conceptualised and compensated as a far worthier disability, with correspondingly larger amounts of compensation available through military pensions.

Policy makers within and without Deaf culture have argued that technology has provided an answer to the problem of hearing loss and communication because of the rise in non-telephonic conversation: e-mails, social media, Skype, FaceTime, and a variety of mobile applications designed for the deaf/Deaf. This means that a 'telephone service for the deaf' can be written off as an outdated problem. Yet this perception is simply not true. There are still problems with access to telephony for those with hearing loss. Even the ability to connect hearing aids to telephones via Bluetooth does not help people with hearing loss working in offices where in many instances they need to move from phone to phone.[661] An influential blog on managing hearing loss in the workplace commented recently that telephony was one of the first things that adults with hearing problems complain about. One comment on that post came from a man exhausted as a result of 'the tyranny of the telephone.'[662] It still remains more expensive to buy a specially amplified telephone than it is to buy a regular telephone.

However, the Post Office's expertise in amplification technology did create a further legacy in the form of state provision of hearing aids. This large scale state intervention in hearing loss was built into the NHS, and yet amplified telephones were never similarly considered as medical devices and customers still had to pay a surfeit charge to access telephony. This charge was justified through the categorisation of amplified telephony as a non-medical device. Such categorisation of telephony was a key issue as it related to whether or not amplified telephone devices counted as a medical item, a prosthetic, or simply telecommunication apparatus. This dissertation has shown that drawing such dichotomies between perceived polarities such as Deaf or hard-of-hearing does not reflect the true diversity of hearing experience. If we as historians are to truly profit from the historical innovations of people with hearing loss, then we should consider challenging the construction of such categorisation.

Such historical research is particularly pertinent in an age where communicative technology is playing an increasingly central role in all our lives. This thesis has shown that designing technology that affects disabled lives can only be successful when prospective users are

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[661] 'Personal stories from the workplace: Christine the telephone call handler' in *Hear2Work: Managing hearing loss in the workplace*, accessed online April 2016 < http://www.hear2work.com/2015/12/10/personal-stories-telephone-call-handler/>

[662] 'Tips on managing phones' in *Hear2Work: Managing hearing loss in the workplace*, accessed online April 2016 < http://www.hear2work.com/2015/11/20/tips-on-managing-phones/>

involved from the start of the process and have their needs integrated into the resulting product. Self-advocacy and the recognition of the need for user input featured in the Post Office's development of the amplified telephone during the interwar years in Britain. Yet the conflict between users with hearing loss and the Post Office has been lost to posterity until now.

Appendices

Appendix 1

P.R.D. (S.I.) 14/1937.

Investigation into the telephone requirements of deafened persons.

District ..... Interviewed by .....

Name of person interviewed .....

Address .....

Class of business or, residential tenancy classification .....

Is an amplifier fitted? .....

If so, state type .....

Type of telephone fitted ..... Tel. No. .....

Question	Answer
1. Is the person interviewed able to use the telephone satisfactorily on (a) local calls (b) long trunk calls?	(a) ..... (b) .....
2. If any criticism is forthcoming following on Q1., state shortly the points raised.	

3.

4. Questions 1 and 2.

The volume and clarity of speech on long trunk calls from subscribers within the local fee area of a large city (e.g. Bristol) to subscribers in the local fee area of another large city (e.g. ~~Aberdeen~~ Glasgow) are often much better than on comparatively short distance calls from a subscriber on a small exchange to another exchange where several intermediate junction circuits are used. It is quite possible, therefore that a negative answer might be given to question 1(a), and an affirmative answer to 1(b).

5. Question 3. It would be particularly helpful if instances can be given of words which have been found difficult to hear over the telephone, for instance, words rich in sibilants, such as "sister" "insurance", etc.

6. Question 6. The Bell earpiece is the type fitted to the "candlestick" type of telephone. To use it for bone conduction it is pressed on the bone immediately behind the ear. It is inconvenient to use the hand microtelephone in this way.

7. Question 7. Commercial types of deaf aid may be divided as follows:

(a)

(a) Acoustic, covering any type of sound collector, not using batteries, such as the ear-trumpet.

(b) Electro-mechanical amplifiers, using a small battery of the "flash lamp" type, but without valves. It may be distinguished from the valve type by its smaller size and weight. Usually the apparatus consists of three units - earpiece, microphone attached to the dress or coat, and battery concealed in the clothing.

(c) Valve type, consisting of an earpiece and a microphone and associated valve amplifier. The smallest type is similar in size and appearance to a large box camera.

The earpieces are usually:

(a) ordinary, i.e. similar to the Post Office watch receiver.

(b) miniature, a small moulded type designed to fit inside the ear cavity.

(c) bone conduction, designed to clamp on the bone behind the ear.

If the trade name and model number of the deaf-aid in use can be discreetly ascertained, it should be given in the answer to question 7(b).

8. Question 8. There are deafened people who actually hear better in noisy situations such as a busy street than in a quiet room, and who are quite unconscious of a loud hum from a wireless set which would be annoying to persons with normal hearing.

9. Question 9. Where a deaf aid with adjustable volume control is used, the answer to this question may be elicited indirectly by asking if it has been found necessary to make frequent use of this control when listening to ordinary conversation.

10. Any points raised during the course of the interview, but not covered by the questions asked, should be noted briefly.

Question	Answer
3. If an amplifier is fitted, has it been found satisfactory? Note any suggestions for the improvement of the amplifier if such are made.	
4. Is the person interviewed in the habit of using Public Telephone facilities?	
5. Is there a demand for a portable amplifier which could be used by plugging in to various telephones fitted with a socket for the purpose?	
6.(a) Has the Bell earpiece been used for listening by bone conduction? (b) If so has it been found preferable to use it in this way?	
7. ~~(a)~~ Does the person interviewed use a commercial type of deaf aid? ~~(b)~~ ~~If so~~, which type, acoustic, electro-mechanical or valve, is preferred? ~~(c)~~ Which type of earpiece, ordinary, miniature or bone conduction has been found to give the (i) greatest volume (ii) greatest clarity? ~~(d)~~ Which type of earpiece is usually employed?	

Question	Answer
8. Has it been found that hearing is better in the presence of extraneous noise?	
9. Does the degree of deafness vary from day to day?	

10. Any further observations.

Appendix 2

Notes for Interviewing Officers.

4. Questions 1 and 2.

The volume and clarity of speech on long trunk calls from subscriber within the local fee area of a large city (e.g. Bristol) to subscribers in the local fee area of another large city (e.g. Glasgow) are often much better than on comparatively short distance calls from a subscriber on a small exchange to another exchange where several intermediate junction circuits are used. It is quite possible, therefore that a negative answer might be given to question 1(a), and an affirmative answer to 1(b)

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The earpieces are usually:

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(b) Miniature, a small moulded type designed to fit inside the ear cavity.
(c) Bone conduction, designed to clamp on the bone behind the ear.

If the trade name and model number of the deaf-aid in use can be discreetly ascertaines, it should be given in the answer to question 7 (b).

8. Question 8. There are deafened people who actually hear better in noisy situations such as a busy street than in a quiet room, and who are quite unconscious of a loud hum from a wireless set which would be annoying to persons with normal hearing.

9. Question 9. Where a deaf aid with adjustable volume control is used, the answer to this question may be elicited indirectly by asking if it has been found necessary to make frequent use of this control when listening to ordinary conversation.

10. Any points raised during the course of the interview, but not covered by the questions asked, should be noted briefly.

Appendix 3

Dear Belgrave,

Yes, thanks. This is very interesting to me because, as you know, I have been using deaf aids or all sorts, including an amplifier on my office telephone, for many years.

I agree with your view that a B.B.C. announcement is undesirable at the present stage any way and that a limited enquiry from deaf subscribers would be more suitable, in fact I doubt if we will get anything new from them. I have been in touch with all the principal makers of deaf aid apparatus in London and should be pleased to put the Engineering Department officers concerned in personal touch with a reliable expert if necessary. Col. Rei of the Eng. Dept., I recollect, saw him some time ago about a suggestion for fitting amplifiers in telephone exchanges for use of deaf people. His name is C.R.M. Balbi (A.M.I.E.E. He has been connected with deaf aid work for many years and was honorary consultant to the National Institute for the Deaf. He now runs "Radio Aid" Lts., a first class firm, but would be interested uncommercially.

As a deaf person I would reply to the questionnaire as follow:

(1) If it is satisfactory for long trunk calls it won't be too unsatisfactory for locals, i.e. the difference will not be enough to make good into bad. I think all would agree to that.
(2) Quality, i.e. clearness, is vitally important even if a little amplification has to be sacrificed, in fact one can't say much more than the obvious remark that the louder and clearer the better. I don't think a deaf person will be able to make any useful remarks about difficulties with different words.

(5) Some arrangement for a deaf person to use a call box would be an enormous boon but it must not necessitate anything being brought to the box by the deaf person. Something at the exchange would be ideal.

(6) Bone conduction hearing useless for this work.

(7) No one will use an electro-mechani cal aid if he can afford to buy a valve one because the former are far inferior. If he can't use a valve on owing to nerve deafness and is driven to an acoustic one he won't do much with a telephone amplifier.

The best volume is obtained with an ordinary earpiece, then a miniature arrangement and then a bone conduction. Clearness depends so much on the design that it is not possible to say which arrangement is clearest though bone conduction is distinctly good for clearness though very much inferior for volume.

(8) and (9) depend of course on the form of deafness but I don't think there is much to be got out of that.

In Notes for Interviewing Officers 7(c), there are some very small valve sets recently produced, e.g. the vest pocket aid of the Multitone Co. which is a three way valve aid for the vest pocket. Perhaps "usual" might be substituted for "smallest and "large" omitted before box camera.

I need hardly say that if the E-in-C's officers want a deaf ear at any time I shall always be ready to supply one.

There are more deaf people about than is generally thought and a reasonably good <u>but cheap</u> amplifier for the home combined if possible with amplification from call officers on demand would, I think, have a wide welcome. Now that amplifiers are getting to be common knowledge people are becoming much less shy of admitting that they are deaf. Previously there was no real help for deafness, the aids didn't help sufficiently so people shied at using them as they would at using clumsy spectacles which weren't good enough to let them read.'

Yours sincerely,

GG Crawley 3/8/37

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