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Communicating with Australian Deaf People about Communication Technology

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ABSTRACT

The paper examines deaf people's knowledge of modern Internet communication technologies and the possible benefits they could obtain from them. We found that organizations for deaf people were active in informing their members but a very large number of people deafened by ageing were not so aware of possible benefits. Signing deaf people benefit from video communication by telephone and the Internet. Signing avatars are also of considerable benefit in making available text and voice sites on the Internet. Methods of promoting awareness for better access and suggestions for their implementation are examined.

Communicating with Deaf People about Communication Technology

Australia has approximately three million deaf[1] people (Access Economics, 2006), most of whom were deafened through longevity as the population ages; three-quarters of those over 70 years are deaf. About 15,000 are signing Deaf people who may be considered members of the cultural and linguistic Deaf community (Hyde & Power, 1992); although this is controversial—see Carty (2006); Hyde, Power & Lloyd (2006); Johnston (2006). Communication technology increasingly offers deaf people opportunities for greater participation in the social and business aspects of their lives. This paper investigates the history and current status of access to communication technology by deaf people, describes present and impending technology, and investigates sources of information about available technology. Through the framework of Rogers' Diffusion of Innovations theory (Rogers, 2003) we will analyze ways in which information about communication technology is disseminated to deaf people and suggest how their access to and use of communication technology could be increased by more effective diffusion of innovations targeted to their special needs.

Previous Australian research has demonstrated that signing Deaf people are users of electronic communication technology of all types: TTYs (both among themselves and with hearing people and businesses via a relay service), email and instant messaging, fax, and lately, Short Messaging Service (SMS) on mobile telephones (Power & Power, 2004; Power, Power & Horstmanshof, 2007). Power et al. (2007) found that their Deaf respondents (members of Deaf Australia) used all of these methods regularly. They found that the different methods often had "niche" purposes:

> SMS [was used for] for quick and easy messages about personal and social matters and limited business, TTY-to-TTY ''for longer chats'' (as one respondent wrote in),

> the relay service for business and contact with people and organizations without TTYs, e-mail for communication with people who have computers, and fax for a range of social and business purposes (p. 89).

Power et al. asked their Deaf respondents how they found out about the most recent of these technologies—SMS. Fifty-five percent heard about it from Deaf friends, 7% saw others using it, 5% heard from hearing family members and 3% from hearing friends. Eight percent reported finding out via a range of other methods; very few of which mentioned public advertising via the media (print, television or the Internet) as a method of discovery. These findings support "Diffusion of Innovations" research which posits personal contact with known others as a major method for learning about and taking up new technologies (Rogers, 2003).

In investigating text communication preferences of deaf people in the United Kingdom Pilling and Barrett (2007) found that learning about the technology available and how to use it was a major problem in gaining access and that, "Older respondents were more likely to give 'not knowing how to' as a reason for not using particular forms of communication and would have liked more information about what text communication is available" (p. 92). Power et al. also found that their older signing Deaf respondents were less likely to know about and use innovative communication technologies such as SMS. They also found that some signing Deaf people have low literacy levels which impede their learning about new technologies through the most frequently used media based on text in print and on the Internet.

Access and advocacy

Deaf people in Australia have been active in lobbying governments to obtain equity of access to telecommunications services, both as individuals and through their organizations (particularly through the Australian Association of the Deaf (AAD; mostly signing Deaf people; AAD was renamed "Deaf Australia" (DA) in 2008;

http://www.aad.org.au/info/media29.php; http://www.deafau.org.au/), Better Hearing Australia (mostly hard of hearing and late deafened people; http://www.betterhearing.org.au/) and the Deafness Forum (an umbrella organization of many deaf groups; http://www.deafnessforum.org.au/).

Telephone typewriters

When telephone typewriters (TTYs) became available in Australia in the early 1970s deaf people were quick to seize on them as a means of telephone access which they had been denied by voice telephones. However, they were then quite expensive and most deaf people could not afford them. In 1995 a deaf man (Geoffrey Scott) and Disabled People's International (Australia) (DPIA) took a case against Telstra (then the only Australian telephone and service supplier) to the Human Rights and Equal Opportunity Commission (HREOC) on the grounds that it was inequitable for deaf people not to be able to access a telephone service, and as Telstra provided voice phones to subscribers, it should also provide TTYs to deaf customers. HREOC found in favor of Scott and DPIA and Telstra undertook to provide TTYs to deaf customers as part of its Universal Service Obligation (USO; (an Australian Government requirement upon telecommunications companies to provide equity of access to disadvantaged groups); Human Rights and Equal Opportunity Commission, 1995); see also Bourk, 1999). Since that time, Telstra has instituted a major Disability Equipment Program which provides a range of assistive devices for Deaf/deaf people (http://www.telstra.com.au/disability/index.htm). Recently pay telephones with TTYs have been installed on a number of sites around the country (http://www.telstra.com.au/disability/ttypayphones/index.htm). The other major telephone service provider (Optus) also provides TTYs to its customers under its Disability Equipment Program USO. The mobile telephone company (Vodaphone) also provides services for deaf customers in the form of services already available in its phones' text-based functions

(including a lower "text-only" rate for customers who do not or cannot use voice telephony), (http://www.vodaphone.com.au/UniversalFooter/AboutVodaphoneAustralia/DisabilityAccess/Hearingimpairment/index.atm).

Deaf organizations' research into communication technology

The Australian Association of the Deaf (now Deaf Australia) has conducted several projects on telecommunications developments. As early as 2002 AAD produced an "Emerging Technologies Discussion Paper" which gave information about videotelephony, signing avatars, mobile TTYs, "text alternatives" to voice portals, smart Internet technology and relay services: http://www.google.com.au/search?q=emerging+%2Ctechnologies+discussion+paper&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-GB:official&client=firefox-a

The Emerging Technologies paper points out the benefits of videotelephony for Deaf people: more natural and fast communication in Auslan, enabling provision of a video relay interpreting service, thus saving on travel and work costs and improving work and educational performance, but it also notes the high cost making it difficult to access for most Deaf people.

Signing avatars are described in the above paper as "a virtual 3D human animated model created by computer software … [that] can move, talk and use the body like humans. … Signing avatars are computer characters that can communicate in sign language" (p. 4). It is forecast that they would be useful for teaching and learning sign language, translating captions into sign language and providing information in sign language as an alternative to text.

The paper regrets the unavailability of mobile TTYs in Australia and notes the benefits forecast by the European Union WISDOM (Wireless Information Services for Deaf People on the Move) project. (For details see: http://www.fastuk.org/research/projview.php?id=371;

http://cordis.europa.eu/ictresults/index.cfm/section/news/Tpl/article/BrowsingType/Short%20Feature/ID/1664）.

The importance of a relay service availability is emphasized and the likelihood of eventual establishment of an SMS relay service and a video relay service for sign language users is mentioned, as is Video over Internet Protocol (VoIP) eventually accommodating signing between individuals or groups. The Emerging Technologies Report also points out that deaf people often cannot access “voice portals” that put a caller through a series of spoken prompts before getting to a live operator. This is very difficult even through a relay service via TTY because of the slowness of the relay system frequently causing loss of the call before an operator is reached. The possibility of a technology to solve this problem via dedicated lines and “Next Talk” software that enables the called number’s computer to “talk” with a TTY is mooted.

In 2007 the Commonwealth Government announced the extension of the ACE relay services to accept calls via the Internet from computers and mobile telephones (including SMS messages). See http://www.smh.com.au/articles/2007/09/03/1188783123002.html.

Some research on the use of videotelephony has been conducted in Australia. Harper, O’Connor and Owens (2007) report a study of the use of “Video*over*IP” for Video Relay Interpreting (VRI) in Deaf peoples’ workplaces. Their Deaf subjects reported several benefits of being able to sign rather than text: their easier understanding of signing than text, the ability to convey emotions via sign and body language, real-time interactive communication, and the quicker finalization of tasks requiring consultation with other Deaf or hearing people (the latter via VRI). They note especially that VRI can provide benefits in reduced travel time and costs for attending meetings, better communication and hence improved staff relationships in the workplace, better access to people in remote areas, and better access generally to health, social and other community services. They point out a number of

difficulties inhibiting extensive use of VoIP and VRI: the high cost of equipment and broadband access, difficulties with firewalls and other security arrangements on computer servers, and the need for training for users, especially those who may not be computer literate. They describe the need for updating telecommunications legislation to include reference to uses of the Internet, video and mobile telephony—none of which are mentioned in the present Act.

It is known that in the United States and Europe VRI (for the UK see http://www.signvideo.me.uk/services.htm) has been a great boon deaf people who sign. The Australian Communication Exchange has introduced VRI using Skype and this assists signing deaf people who do not or cannot use the text-based National Relay Service, either because of limited English skills or inability to master the system. As mentioned above it is also helpful in providing online interpreting for meetings where people are in remote locations, and enabling interpreters to assist rural and remote area deaf people, relieving to at least some extent the great shortage of qualified interpreters in Australia.

Skype can also be used by signing deaf people with access to suitable computers to have face-to-face signing conversations. An increasing number of visual chatrooms are available (http://dir.yahoo.com/Computers_and_Internet/Internet/World_Wide_Web/Chat/Chat_Rooms/?o=a): many of which can accommodate multiple users for social or business purposes: for example, ooVoo (http://www.oovoo.com/).

A trial of VRI was conducted by the Australian Communication Exchange in 1999 (McCaul 1999; Spencer 2000). Spencer concluded that “VRI could do much to address the lack of Australian Sign Language (Auslan) interpreting services in rural areas of Australia by providing interpreting from a central location via videoconferencing equipment (p. 5)”.

At present ACE VRI is available 9am to 4pm on Fridays and 9am to 5pm (AEST) Tuesday to Thursday. Several states provide VRI on a limited on-demand basis (for example, http://www.vicdeaf.com.au/video-relay-interpreting). The Victorian Government has let a tender for an extensive VRI trial from 2009-2011.

VRI was one of the telecommunications functions examined by the "Deaf Australia Online" (DAO) projects funded by the Australian Government Department of Communications, Information Technology and the Arts as part of its "Accessibility" grants program. DAO produced major reports in 1999 and 2001. The 1999 Report provided an extensive overview of the telecommunications activities and preferences of Australian Deaf people and of overseas advances that could be applied in Australia. It considered "appropriate online services" for Australian Deaf people. These would include, "A multi-function fixed communications unit (for home and probably work) … [which would include] email, facsimile/drawing tablet and corresponding display, Web access, TTY and a video display capability", "A mobile unit combining email, messaging, fax, TTY", "Public videoconferencing facilities … for education applications … [and] general communication use", and a "Video Relay Interpreting Service" (p.3).

The DAO II Report focused on the outcomes of extensive trials of a number of communication methods desired by Deaf people and considered in DAO I: a multi-function unit and videophone, mobile text telephony, public videoconferencing access, video relay interpreting, Auslan videoclips on the Internet, and strategies for developing the skills of Deaf people so they can make optimum use of the communication methods available.

The Project examined a multifunction unit which has the capacity to provide videoconferencing, email, fax, TTY and Web access. They found that Deaf people were enthusiastic about the unit and suggested some improvements (e. g., adding a fax capacity and using icons instead of text wherever possible). However, its then cost ($6000 plus online

connection costs and the need for a computer) was considered prohibitive for most Deaf people. The videophone trialled had the advantage of being stand-alone, but did not deliver the same quality of video as the unit. Since the Report was written in 2001 costs have reduced and the technology and variety of equipment has improved. It seems likely that widespread access to such communications will be available in the foreseeable future and even faster and cheaper methods are forecast: there may eventually be "high definition video telephony for the price of a local call" (Emery 2008, p. 3).

As also reported by Power et al. (2007) the Project found widespread adoption of SMS text messaging, "for activities of social communication with friends and family, work-related communication and non-work communication with business (p. 2)". Again, mobile telephones are now providing increasingly improved video as well as text and Deaf people are beginning to use them for signed communication and VRI. VRI was trialled in four locations in Victoria and was found to have very positive acceptance by Deaf people and interpreters, and as costs reduce, VRI is likely to be even more widely used. The Project also examined the extension of public videoconferencing facilities and noted that, "This has been done by … linking up to existing videoconferencing networks in public hospitals, schools and government agencies … across Australia (p. 3)".

On the website of the telecommunications provider Optus the Project arranged a trial providing customer information via an Auslan videoclip. This was enthusiastically accepted by existing and prospective Deaf customers, but does not seem to have been persevered with. A small number of government service organizations and Deaf organizations have an Auslan site, but the Report found no commercial organizations with Auslan capability as of April 2008.

Of particular importance is the skilling of Deaf people to improve their use of the opportunities available from modern telecommunications methods. Because of the often low

level of English skills of many Deaf people who could benefit from the use of the Internet particularly, the Report recommends providing training in these areas.

In summing up, the Report details a series of actions to implement its recommendations and urges the establishment of a "Deaf Online Task Force" reporting to the (Federal) Minister for the Department of Broadband, Communications and the Digital Economy, funded by and with membership from the Government, under the auspices of Deaf Australia, with links to other communications lobby groups such as ACCAN (Australian Communications Consumer Action Network), and industry, with its major role being "to facilitate and/or oversee the implementation of the key actions arising from the recommendations of the *Deaf Australia Online II* study (p. 11)". This Task Force was apparently not set up.

Deaf people's difficult access to communication technologies

The Report noted that there were a number of factors impeding Deaf Australians' access to the same level of use of telecommunications as most hearing Australians. These include a lack of awareness of the kinds of services available through the Internet, limited opportunities for skill and knowledge development, lack of a reference for face-to-face communication and sign language, low levels of literacy making text communication difficult for some Deaf people, characteristics of communication channels, a knowledge that other Deaf people use a particular service/s, and concerns about affordability.

The conclusion of the considerations covered in the Report was a recommendation for the utilization of "inclusive design" of products and applications to meet the needs of all members of the community without the need for specialized design so that all members of the Deaf community will have equitable access to information and services and have the skills and confidence to choose to use services as appropriate for their particular circumstances.

Access to call centres

Call centres and Interactive Voice Response (IVR) systems have become pervasive features of telephone use. The DOA I Report stated that new designs or adaptions of existing technologies could enable call centres and IVR services to meet the needs of Deaf people. This does not seem to be occurring. Staples, Dalrymple, Fathers, & Brett (2000) surveyed call centres with more than 100 stations and found that of the 88 centres from 52 companies surveyed only 32 centres (36%) had TTYs, most of which were from a small number of very large companies. Only 12 (23%) of the sampled companies reported having a TTY number. Of the fifty-six centres that did not have a TTY, nine actually said they would not accept calls from the National Relay Service (NRS). Overall, the knowledge of the existence and purpose of the NRS was very limited ("one in every three operators … is likely to have no idea what a TTY is"; p. 10). The study concluded that, "The results strongly suggest that for many call centres there is no strategy in place for providing access to services for deaf or hearing impaired customers or potential customers (p. 10)". It is not known if this situation has improved since 2000 and further research in this area is called for.

Publicizing communication technologies

Despite very little mention by Power et al.'s (2007) respondents of the media as a source of information about and a motivator for deaf people to adopt new technologies, deaf organizations and relevant equipment manufacturers go to some lengths to publicize the availability of communication technologies that would assist deaf people in communicating for their personal, social and vocational affairs (see, for example, some postings from developers and manufacturers at http://www.aad.org.au/info/dtan2002.php). We have seen above that Deaf Australia, Deafness Forum and Better Hearing Australia make extensive use of their websites and published reports and newsletters to make their members and other deaf people aware of opportunities with new technologies. It would be useful if deaf people could

be made even more aware of these opportunities so that they might come to use these innovations earlier and more easily to their benefit and that of their hearing friends, obtaining access to government and other services and work colleagues.

Accordingly this paper will investigate sources of information about communication technology that is suitable for deaf people and whether it is available to them in ways that they can readily access.

The technologies available may be considered under two headings:

1. Technology specifically designed for deaf people; e. g., TTYs
2. Technology for general use which can be used by deaf people; e. g., SMS, Fax, adapted phones, videophones, email.

METHOD

We conducted online searches using Google, Google Scholar, Ingenta, Proquest and ERIC on such terms as “deaf telecommunications (Australia)”, “Universal Service Obligation”, “Australian Communication Exchange”, “Australian Association of the Deaf”, “Deafness Forum”, “Australian Hearing”, “deaf telecommunications equipment/suppliers”, and like terms. We also examined Australian telecommunications suppliers’ websites and emailed major Australian suppliers of telecommunications equipment related to deafness and enquired of them about their methods of advertising their products. We sought the advice of the state Deaf societies, Better Hearing Australia state branches and TEDICORE (not merged with ACCAN at that time) as to their efforts in making deaf people aware of the opportunities provided by modern telecommunications equipment. Results were tabulated and are described below.

RESULTS

The Internet searches using the terms reported above returned many sites or references to these terms in Australian contexts. “Deaf Telecommunications (Australia)” returned 26

sites. Several such sites traced the history of the Human Resources and Equal Opportunity Commission's (HREOC's) enquiry into lack of telecommunications access for deaf people and its decisions on these matters providing better access (e.g., http://www.hreoc.gov.au/disability_rights/communications/list.htm). Other sites included supplier catalogues of available equipment, notices of a national government enquiry into telecommunications access, uses of technology for fostering literacy, the availability of public TTY Payphones, a survey of the availability of TTYs in large government and commercial organizations (which result did not provide encouraging information about access): http://209.85.173.104/search?q=cache:EQYy4_orlS4J:www.dbcde.gov.au/__data/assets/file/0010/26101/TTY_usage_in_organisations.rtf+telstra+TTY&hl=en&ct=clnk&cd=8&gl=au&client=firefox-a, the Telecommunications Ombudsman's site, and lists of government "e-resources".

Of particular interest is the existence of a number of Australian Deaf blogs and vlogs, a sample of which can be found at http://www.deafread.com/search.php?s=auslan. The importance of sport in Australian Deaf life is attested by the large number of sites relating to sporting clubs and activities and over 900 hits on a clip of the 1993-94 Deaf Games. A major site "Deafies Australia" (motto: "All Deafies Unite") has been established (http://www.deafiesaustralia.com/index.html) with an Open Forum for discussions, an Events page and links to other Australian Deaf sites.

Australian deaf people have also taken to YouTube (see, for example, http://www.youtube.com/watch?v=yRyrAIHG2q8). There are a number of sites originating in Australia and Australians are also using US and UK YouTube sites for Deaf people and there are numerous hits on Australian sites from British and American Deaf people discussing matters of common interest, limited somewhat with and for the Americans by their different sign language (ASL; British and Australian Deaf people can cope quite well with their related

sign languages.) There is also an Australian deaf presence on Facebook. See http://www.bebo.com/Profile.jsp?MID=367137231&MemberId=3835056369; a site oriented towards young people.

Googling "Deaf Second Life" produced a very large number of hits (http://www.google.com.au/search?q=deaf+second+life&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a. Deaf people seem to be very active users of Second Life. There are a number of specifically Deaf groups and some hard of hearing people appear to be active users too. Second Life recently introduced a voice capacity after being text-based since its beginning and this has generated a great deal of controversy with many even hearing/speaking users being against the use of voice – largely on the grounds of it being harder to be anonymous, concerns over privacy, and the possibility of eavesdropping. Deaf and speech-impaired people quickly pointed out that voice was no help to them and would exclude them from participating in mixed hearing/deaf groups if those groups went to voice-only. In 2009 Google announced that it was providing automatic captioning of voice on YouTube (http://googleblog.blogspot.com/2009/11/automatic-captions-in-youtube.html).

Signing avatars

An interesting development which will impact upon Deaf people's use of video over the Internet is emerging – the use of signing avatars. Signing avatars for ASL and BSL and other sign languages are advancing in sophistication and are becoming more widely available for use – for example, http://www.w3.org/WAI/RD/2004/06/sims-mov.htm for ASL and http://www.sign-lang.uni-hamburg.de/eSIGN/ for BSL and some other European sign languages (see also Power & Power, submitted). Beginnings have been made with Auslan avatars (Wong, Holden, Lowe, & Owens, 2003), but unfortunately funding for that project has ceased. Once signing avatars are widely available and can translate from voice to sign and/or

text, Deaf people will find it easy to join Second Life and other sites for all kinds of activities – as well, of course, as still being able to use their local sign language among themselves.

Signing avatars have applications beyond Second Life; for example, in making SMS, chatrooms and podcasts accessible to signers, in online and console games, in making television more accessible as another form of "(closed) captioning" in sign language instead of text, and taking the place of scarce interpreters for relay interpreting with hearing contacts who cannot sign.

Activities of organizations for deaf people

Email queries of deaf organizations found that they all were active in attempting to bring to the notice of their members the availability of various telecommunications devices that might be useful for them. One state Deaf Society, for example, puts notices about new devices on its Internet Bulletin Board, sends out email updates to its members, places articles and advertisements in its Deaf Magazine, provides brochures supplied by suppliers, sends out media releases, and has information sessions at its Deaf Community Centre: "We find this information travels well to those without Internet by 'word of mouth'".

Two Better Hearing Australia (BHA) branches said that they sent guest speakers about their services and activities to community groups like Probus, University of the Third Age, and retirees' groups, all of which have a large number of deaf or hard of hearing members. They send articles to metropolitan and local newspapers community radio stations. Local newspapers particularly will often run "human interest" stories which can be used to convey information about services and devices. Another branch just said its members "learn of products in the same manner as the general population", without however providing any evidence that they did so.

The Australian Communication Exchange on its website (http://www.relayservice.com.au/equipment/) provides information on its services (telephone

and video Internet relay) and the equipment necessary to access them. It provides a Helpdesk and there are training officers who run information sessions on a regular or on demand basis and provide information sheets (which can also be downloaded from the site).

Contact with Australian suppliers of telecommunications equipment by email elicited a number of responses about bringing their products to the awareness of deaf people. One online media organization has a few applications housed for the hard of hearing but is a specialist supplier of information, not the devices themselves.

DISCUSSION

It is apparent from our results that Australian deaf people have very mixed access to information about the possible benefits to them of modern tele- and video- communication resources. Those who are close to specialist organizations such as Deaf associations and state Deaf societies or Better Hearing Australia branches or the Deafness Forum are regularly advised by these organizations about possible benefits and the availability of equipment and resources to access such. Many others, the large majority, appear to not have easy access to this knowledge.

This lack of easy access to knowledge of information about telecommunications benefits is particularly true for people deafened as a result of ageing who often do not seek out information about equipment and resources that might help them overcome their increasing difficulty hearing in family, social and work environments. Relevant government departments and community organizations could do more to bring relevant resources and training to the notice of this group.

Profoundly Deaf signing people are generally well supported by their organizations, but many of them face problems because of their difficulties with English and the fact that many of the resources which would be useful for them personally, socially and vocationally are based on English text or rely on spoken English. The increasing availability of voice or

text to sign avatars will go some way towards making access easier for these users (Power & Power, 2009), but this service is not yet widespread in Australia.

These findings point up the need to make information about the benefits of equipment and resources to deaf people more widely available through all media and through community organizations of which such people are members. For Deaf people the major necessity appears to be more education, both in how to use the resources and in the improvement of their English for those who need that.

It will be necessary for both government and community organizations to work together to provide the funds and programs to enable deaf people to obtain the same benefits from modern communication technologies as do the rest of the community.

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ENDNOTE

[1] For convenience, we use lower case "d" throughout, except where the context requires an upper case "D" to indicate membership of the signing Deaf community.