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Citation for the original published paper (version of record):

Mathew Martin, P J., Sahasrabudhe, S., Chavan, P D., Toppo, D. (2013)
Captioning and Indian Sign Language as Accessibility Tools in Universal Design.
SAGE Open, 3(2): 1-15
<http://dx.doi.org/10.1177/2158244013491405>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:oru:diva-46005>

Captioning and Indian Sign Language as Accessibility Tools in Universal Design

SAGE Open
April-June 2013: 1–16
© The Author(s) 2013
DOI: 10.1177/2158244013491405
sgo.sagepub.com


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Abstract

Universal Design in Media as a strategy to achieve accessibility in digital television started in Spain in 1997 with the digitalization of satellite platforms (MuTra, 2006). In India, a conscious effort toward a strategy for accessible media format in digital television is yet to be made. Advertising in India is a billion dollar industry (Adam Smith, 2008) and digital television provides a majority of the space for it. This study investigated the effects of advertisement in accessible format, through the use of captioning and Indian sign language (ISL), on hearing and deaf people. “Deaf (capital letter ‘D’ used for culturally Deaf) and hearing” viewers watched two short recent advertisements with and without accessibility formats in a randomized order. Their reactions were recorded on a questionnaire developed for the purpose of the study. Eighty-four persons participated in this study of which 42 were deaf persons. Analysis of the data showed that there was difference in the effects of accessible and nonaccessible formats of advertisement on the “Deaf and Hearing” viewers. The study showed that accessible formats increased the comprehension of the message of the advertisement and use of ISL helped deaf persons to understand concepts better. While captioning increased the perception of the hearing persons to correlate with listening and understanding the concept of the advertisement, the deaf persons correlated watching the ISL interpreter with understanding the concept of the advertisement. Placement of the ISL interpreter in the screen and color of the fonts used for captioning were also covered under the study. However, the placement of the ISL interpreter and color of fonts in the screen and their correlation with comprehension of the advertisement by hearing and deaf persons did not show much of significance in the result of the study.

Keywords

accessibility, advertisement, Indian sign language, captioning, deaf persons

Introduction

People with disabilities participate in all types of activities if they have access to them (Mace, 1991). India has 40 to 80 million persons with disabilities (World Bank Report, 2007). According to the 58th National Sample Survey (NSS) round in 2002, there were 18.5 million disabled population of which 3.62 million were deaf persons. Majority of them are illiterate. The use of Indian sign language (ISL) in India got institutionalized with the setting up of the ISL cell in 2001 at Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH) in Mumbai. The Indian Sign Language Research & Training Centre (ISLRTC) set up recently at the Indira Gandhi National Open University (IGNOU) campus in New Delhi, inaugurated on October 4, 2011, gave ISL national acceptance in India Universal Design (UD) tools in digital media, such as captioning and use of ISL is the key to opening up a digital world of information and abstract concepts for children/persons with and without hearing loss or literacy/learning and language needs.

ISL is the language of the Deaf in India. It is estimated that there are more than 60 million Indians, with some type of hearing loss. Millions of them are illiterate, learning to read, or use a second language. Indian television advertisement is estimated to be a 22 lakh dollar industry. In India, with 22 scheduled languages, localization of digital advertising industry is still growing. The level of awareness regarding the linguistic/language needs of the disabled is very low in India (Prajapati & Asai, 2010). Sometimes small changes make a difference, for example, at typing, the use of a bigger font and well-contrasted color makes books easier to read for low-vision people.

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According to the Telecom Regulatory Authority of India (TRAI), there is 23.77 million Direct to Home (DTH) subscriber base in India. As per the Ministry of Information and Broadcasting, there are 515 registered channels in India. Apart from the free DTH service of Doordarshan, there are six private DTH licensees, Dish TV, Tata Sky, Sun Direct, Airtel digital TV, Reliance BIG TV, and Videocon d2h. On installation of set-top boxes in Conditional Access System (CAS)-notified areas in the four metros such as New Delhi, Mumbai, Kolkata, and Chennai, TRAI said 770,519 boxes had been installed till June 30, 2012. This means there is great scope for captioned news, information, and entertainment in India. However, the legislation for accessible digital telecast is yet to be made mandatory.

Importance of the Study

There is no legislation in India for making captioning mandatory for the telecasters. However, international mandates have been adopted by Government of India to achieve international standards in Communication. Information and Communication Technology (ICT) has also been emphasized in Biwako Millennium Framework (2002-2012) and United Nations Convention of Rights of Persons With Disabilities (UNCRPD, 2007) guidelines. The UNCRPD marked a "Paradigm Shift" in attitude and approaches to person with disabilities. It takes us to new height of the movement from viewing people with disabilities as "object" of charity, medical treatment, and social protection toward viewing people with disabilities as "subject" with rights, who are capable of claiming those rights and making decision for their free and informed consent as well as being active members of the society. Digital advertisements in India can provide this platform if they are in accessible format. In UNCRPD, it has been specifically directed on application of ICT for "access to information and communication, including information, communication and assistive technologies" for persons with disabilities. Therefore, the use of captioning and ISL forms a prerequisite for telecast organizations, if they want to provide access to information and partially fulfill their communication needs. Articles 9 and 21 of the UNCRPD guidelines deal with accessibility and access to information. Article 9.2 (g) and (h) of UNCRPD especially lays down that states should facilitate access for persons with disabilities to new information and communication technologies, including Internet. India is a signatory to UNCRPD guidelines since 2008. Article 21 of the UNCRPD guidelines deals with fundamental right of persons with disabilities to opinion and expression; this includes their rights to seek, receive, and impart information. It mandates states to ensure all information that is made available to the general public to be made available to persons with disabilities in accessible formats, including electronic or digital formats, within reasonable time and at no extra cost to the consumer. Hence, it is significant to study the effects of accessible formats in digital advertisements.

Review of Literature

United Nations (UN) Secretary-General Ban Ki-moon (2008) on commemoration of the International Day of Persons With Disabilities in New York, December 3, remarked, "Accessibility has many aspects. It means access to the Internet and communications technologies" (p. 1). In the 11th 5-year plan, the government of India has yet again come out with positive measures for disabled persons. The plan calls for the setting up of a National Institute of Universal Design (NIUD) to promote greater accessibility and a barrier-free environment. The 11th plan emphasizes the need to carry out all the objectives set out in the 10th plan. The need for captioning of digital video programs telecast in the country could be implemented if it is made mandatory through policy decisions. Ray (2006) stated that UD is unexplored in India, despite the tremendous growth in the building industry and the demand for international standards of construction. Balaram (2008) pointed out that a developing country like India has some traditions that are inherent in UD principles. These traditions should be redefined to bring changes. He also says that although new development and technology are looked as a matter of doubt in India, it is better to implement UD in all over India as its benefits have been seen in developed countries. Furthermore, he says a number of innovative technologies and design solutions are applicable to India.

Universal accessibility is understood as the result of overcoming the medical/rehabilitation paradigm by incorporating the elements of the social model (MuTra, 2006). From the point of view of the social model, policies should aim at standardizing society so that it meets the needs of all and enables full participation of disabled people in all sectors of community life (Tatsuo & Yoichi, 2006). To achieve this goal, we can apply the principles of "Universal Design" or "Design for All" as defined by Mace (1998) in the Centre for Universal Design, North Carolina State University. UD is an approach to the design of products, services, and environments to be usable by as many people as possible, regardless of age, ability, or circumstance. This principle should inspire all actions and initiatives of the audiovisual sector. That is why we need to analyze how to make the new digital television accessible for all, as well as to identify the implications for audiovisual industry, consumer electronics' manufacturers, and broadcasters. The accessibility to audiovisual contents and on the level of development achieved so far in Spain to cover accessibility to digital TV equipments, and finally to the development prospects set by the regulation.

According to Mace (1998), UD broadly defines the user. It is a consumer-market-driven issue. Its focus is not specifically on people with disabilities, but all people. It actually assumes the idea that everybody has a disability and I believe strongly that is the case. We all become disabled as we age and lose certain abilities, whether we want to admit it or not.

It is negative in our society to say “I am disabled” or “I am old.” We tend to discount people who are less than what we popularly consider to be “normal.” To be “normal” is to be perfect, capable, competent, and independent. Unfortunately, designers in our society also mistakenly assume that everyone fits this definition of “normal.” This just is not the case. UD is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Mace, 1997). The intent of UD is to simplify life for everyone by making products, communications, and the built environment more usable by as many people as possible at little or no extra cost. UD benefits people of all ages and abilities. Captioning and use of sign language are tools for making accessible format in digital media.

Captioning

Captioning is the key to opening up a world of information and abstract concepts for children/persons with hearing loss or literacy/learning needs. In India, the Information Technology (IT) Act 2000 allows for access and control of digital information. Therefore, caption will open the world of information, news, and entertainment to all the deaf persons and persons with hearing problems in India. Subtitling for the deaf and hard of hearing is an accessibility service that displays on screen a written text reproducing oral communication. The discursive elements that appear on the screen (letters, words, posters, etc.), and the sound track (songs, voice over, effects, etc.), allow people with a hearing impairment to understand the information provided audiovisually (Diaz Cintas, 2003). Pereira specifies that subtitles should reproduce “not only what is said, but also how it is said (emphasis, tone of voice, accents, foreign languages, different noises, etc.) and who says it” (Pereira, 2005: 162).

According to Alberto, Fredrick, Melissa, Laura, and David (2007), the more inclusive definition of functional literacy acknowledges that obtaining information from the environment may be accomplished in a variety of modes, only one of which is reading words. Captions use words and it forms one of the variety of modes of obtaining information by deaf persons.

Today television broadcasting in India is becoming digital. There are more than 100 million Indians with some type of hearing loss (including the 28% of the geriatric population). Millions of others may be learning to read or to use a second language. Even captioning of ISL can lead to better comprehension of abstract concepts among the deaf and hearing. India has 22 scheduled languages. Captioning of digital information in each language in News, Entertainment, and Education will pave way for the increase of its accessibility. Open captioning, closed captioning, and on-line captioning provide accessibility to Television Telecast being

transmitted/beamed/cabled in the country for the deaf population in India.

Numerous research studies by National Captioning Institute (NCI-1982) have shown that captioned television provides a successful learning environment for deaf and hard of hearing students. Research (NCI-1983) has also shown that the benefits of captioned television extend to hearing students, including those with special educational needs. Just by watching captioned TV, young children who are learning to read are able to significantly improve their reading skills, people learning English can improve their language and vocabulary skills, and inexperienced readers and illiterate adults can augment their reading abilities. In India, the children who are deaf can also learn language better and faster.

When television programming is viewed with the captions displayed, household members can enjoy the many educational benefits of captioning. On average, kids spend more than 30 hr a week watching television. By turning on captions, parents can turn those entertainment hours into learning hours. The 1984 NCI study showed that hearing youngsters who watched captioned TV were able to significantly improve their vocabulary and oral reading fluency. While children are watching cartoons, videos and laptops, they can also be reading the captions (Goldman & Goldman, 1988).

Numerous studies on teaching English as a second language (ESL) and actual accounts relayed by ESL instructors have all come to the same conclusion that captioned television improves reading and listening comprehension, vocabulary, word recognition, and overall motivation to read among students who are learning ESL (Koskinen, Wilson, Gambrell, & Jensema, 1986). It is said that accessibility of digital media for persons with and without disabilities can increase their literacy, especially among the deaf. According to Kothari, Pandey, and Chudgar (2004) an important factor that binds the mammoth millions in India to early literacy skills is, arguably, lack of “print encounters” or exposure to print since early childhood.

For children and adults with hearing impairments or learning disabilities (NCI, 1982), captioned television helps improve comprehension as well as increasing self-confidence. Prior preparation including class discussion and related hand-out materials coupled with captions that highlighted important keywords resulted in the overall highest performance. The subtitles were used by national television broadcasting in India such as Doordarshan. This idea was struck upon by Kothari, Takeda, Joshi, and Pandey (2002) who believed that SLS (same-language subtitling) makes reading practice an incidental, automatic, and subconscious part of popular TV entertainment, at a low per-person cost to bring up literacy rates in India. The (author of this article maintains that the) same can be achieved among deaf population in India.

Subtitling and Its Difference From Captioning

Subtitling is the process of converting the dialogues of video production into text that is displayed on a television screen. It is therefore different from captioning in the sense that it does not take into consideration the audio information in the video production that is often missed by the Deaf persons for better understanding and comprehension of the video. To provide accessibility to the audio, icons of various sounds are also used in captioning process. For example, musical notes (♪) are used to indicate the music being played or in the background.

Features of Good Captioning

The following are the features of good captioning framework by Association of National Advertisers in the United States of America (ANA, 2010) that should be considered for inclusion in all captioning of various features in a digital video to ensure good quality closed captioning:

- a. Words
 - No deletion of letters.
 - Inclusion of all spoken words verbatim and no paraphrasing.
 - A 100% accuracy rate.
- b. Music
 - Inclusion of the words (lyrics) for all music.
 - Description of the type of music when the music does not have words, for example, dramatic music.
- c. Sounds
 - Identification of all sound effects.
 - Inclusion of all different types of exclamation sounds such as “Yeah,” “Yup,” “Chee,” “Shooo,” “ums.” However, the captioner should not make editorial decisions.
- d. Conversations
 - Inclusion of background conversations.
 - Identification of the speaker when not visible.
 - Identification of the speaker with uppercase and a colon without parentheses.
 - For example, MARTIN: Yes, I want dinner.
- e. Synchronization
 - One or two lines of captions are timed to appear simultaneously with, or just before, the utterance of the first word presented and disappears after the last word is uttered in the caption segment.
 - Logical caption division is not sacrificed for exactitude in timing.
 - Captions may be timed to change with shot changes for readability and aesthetic purposes.

- f. Caption placement
 - Captions placed where they do not obscure information relevant to understanding or enjoying a commercial, such as people’s faces or descriptive banners.
 - Captioning placed in the position of the speaker’s location when there are multiple speakers on screen.
- g. Captioning style
 - Use of mixed-case letters. Digital television screens now permit the adjustment of font size. Updated software no longer deletes the descenders of letters such as “g” or “q.” Therefore, uppercase should not be used exclusively.
 - Use of pop-on instead of roll-up format.
- h. Passing of captions
 - Adding of a clearing pulse at the beginning of a group of captions and a release at the end to let the next wave of captions pass unencumbered.
 - During duplication and subsequent distribution, the captions should pass through intact with the video.

Types of Captioning

The National Centre of Captioning (United States) has divided captioning into 11 types. The type of captioning used in this research study is pop-on, prerecorded captioning, as the captioning was done at a later stage with pop-on effect addition using studio pinnacle software version-14. The 11 types of captioning are as follows:

1. Prerecorded (off-line) captioning
2. Pop-on captions
3. Center placement pop-on captions
4. Roll-up captions
5. Timed roll-up captions
6. Live (on-line) captioning
7. Real-time captioning
8. Real-time dictionary
9. Live-display captions
10. Closed captions
11. Open captions.

ISL in Digital Television

In Spain, sign language services were added to digital television, because of the Spanish Bill of the Audiovisual Law (Ley General del Audiovisual). It defines them as the interpretation of the message into Spanish sign language, permanently shown on screen (MITyC, 2005). This was done by incorporating a window with the interpreter transposed into the image. The application of ISL in digital telecast in India is limited to “News for the Hearing Impaired” telecast by “Doordarshan,” a Government of India Television channel. It was a small window on the television screen, with an ISL

interpreter signing the news. AYJNIHH also has news in ISL titled “AYJNIHH-NEWS” linked to “YouTube” with closed captions and audio description in the website (www.ayjnihh.nic.in). ISL is the mother tongue of Deaf Indians. Sign language is unique in many ways. It cannot be written like English or Hindi. ISL is a complete language. Anything expressed in spoken language can be expressed in sign language as well. You can talk about abstract thought, about the past, and about the future in ISL. If you did something, and you can invent new words for new things you want to talk about in ISL. While it is true that ISL does not have “signs” for everything imaginable, ISL is a concept-based language. It is also not true that sign language has no grammar. All sign languages have complex and difficult grammars. Sign language, in different countries, has their own structure. The linguistic structure of sign language is quite different from the structure of spoken language that is used in the same country. Sign language is not in any way dependent on the spoken language, and it is not a representation of the spoken language through use of hands.

Zeshan (2000), a linguist who has studied the ISL extensively, terms it Indo-Pakistani Sign Language (IPSL) as the deaf community of Northern Indian and neighboring area of Punjab in Pakistan uses the same sign language. She remarks in her research study report that the sign languages may also be similar in other neighboring countries such as Sri Lanka, Nepal, and Bangladesh.

Television Advertising in India

According to London-based GroupM Futures Director Adam Smith (2008), advertising in India is a 6.6 billion dollar industry. Advertising affects our lives, as well as the practice of business in significant ways (Kilbourne, 1999). Today more than ever before, the philosophy of advertisements requires being consistently informative and appealing (Kumar, 2010), persuading the thought pattern and purchasing behavior of the audience (Vecchione, 1997). After proper exposure, the audience begins to trust and believe in the advertisement (Murphy, 1998), that is, the art-of-the-trade. Advertisements broadcasting products considered to be ethically controversial or socially sensitive are on the increase, and the portrayal of controversial images is spiraling. As such, the issue of what to advertise and how best to advertise is crucial. This explains why advertisers must consider the impact of their work on the general public (Roerecke, Obot, Patra, & Rehm, 2008). Austin and Reed (1999) asserted that current practices reveal advertising ethics as a key conventional topic in marketing literature. According to Murphy (1998), it is largely the responsibility of media personnel, advertising professionals, and all marketing persons to ensure ethically responsible practices in their respective professions.

The world of advertising contains many gray areas of ethical choices that advertising agents must actively evaluate

to strengthen their moral compass (White & Rhodeback, 1992). Evaluation of these choices helps advertisers to make the best decisions for the company they advertise for and society in general. The advertising profession must be based on truthfulness, show respect for human dignity, and be socially responsible (Murphy, 1998). This is possible only if the advertisements are also made in accessible format, and persons with disabilities become the consumer of this media product. The purpose of advertisement is to persuade through a process of explaining a proposition, to persuade viewers to accept a point of view, or adopt a certain behavior (Wing Jan, 2001). Advertising techniques are tools. The tools you use to attract attention, engage minds, trigger emotions, and change what people think, all of which can lead to sales or votes or clicks. Hence, captioning and ISL are additional tools that advertisers must use to achieve their goal. Advertising techniques can influence behavior across the spectrum of persuasive communications: direct mail, newspaper and magazine ads, commercial websites, radio and TV, even social media pages.

Captioning As an Assistive Technology and Accessibility Tool

Captioning is one of the accessibility tools for persons who are hard of hearing. Accessibility is not to be confused with usability that is used to describe the extent to which a product (e.g., device, service, and environment) can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use. Accessibility is strongly related to UD when the approach involves “direct access.” This is about making things accessible to all people (whether they have a disability or not). An alternative is to provide “indirect access” by having the entity support the use of a person’s assistive technology to achieve access (e.g., screen readers). The term *accessibility* is also used in the Convention on the Rights of Persons with Disabilities.

Captions are the visual (text) representation of the sound track of a video, film, television program, or commercial. In addition to dialog, captions include sound effects, speaker identification information, music notations, lyrics, and other key aural information. Captions are embedded in the television signal and visible, usually at the bottom of the screen, only when activated by the viewer. Captions are activated through the equipment remote control or onscreen menu. Live television programs, such as a live broadcast or special event or news program, may be captioned in real time. Prerecorded programs are captioned after production and before they are aired. The process of converting the narration, dialogue, music, and sound effects of a video production into text that is displayed on a television screen is known as captioning. The captions are typically white uppercase letters against a black background. Same-language captions, that is, without translation, were primarily intended as an aid



for deaf persons or hard-of-hearing persons. Internationally, there are several large-scale studies that demonstrate that same-language captioning can have a major impact on literacy to a certain extent and reading skill growth across a broad range of reading abilities.

Screen Shots of Advertisement Selected for the Study

Objective

The main objective of the study was to estimate the effects of addition of accessibility features to the short advertisements selected for the study. The study also aimed at assessing and measuring the profile of the viewers, profile of the advertisement, and profile of the accessibility features as perceived by the viewers.

Research Questions

Research Question 1: Does captioning increase accessibility of an advertisement?

Research Question 2: Does placement of the ISL interpreter in the screen, signing in ISL increase the accessibility of an advertisement?

Research Question 3: Does captioning distract the viewer of the advertisement?

Research Question 4: Does the use of ISL interpreter in the screen signing in ISL distract the viewers?

Research Question 5: Is right-hand-side corner an appropriate place for the ISL interpreter in the advertisement?

Research Question 6: Do captions and ISL interpreting reduce the visual appeal of the advertisement?

Research Question 7: Do persons with disabilities have preference in color of fonts used in captioning?

Hypothesis

Hypothesis 1: Persons with hearing impairment will not be able to understand the advertisement without accessibility features.

Hypothesis 2: The use of captioning and ISL interpreter in the screen interpreting in ISL increase accessibility of an advertisement.

Hypothesis 3: The captioning added to the advertisement distracts the viewer of the advertisement.

Hypothesis 4: The use of ISL interpreter in the screen interpreting in ISL distracts the viewers.

Hypothesis 5: The right-hand-side corner is an appropriate place for the ISL interpreter in the advertisement.

Hypothesis 6: Captions and ISL interpreting do not reduce the visual appeal of the advertisement.

Hypothesis 7: Persons with disabilities have preference in color of fonts used in captioning.

Limitations

1. Due to paucity of time and resources, data collected from only 84 viewers were studied. Among the viewers, 41 belonged to hearing persons, 42 belonged to deaf persons category, and 1 was orthopedically handicapped.
2. The deaf persons used ISL for communication in their day-to-day activities were as the hearing viewers, though aware of the use of ISL did not use them for communication in their day-to-day activities.
3. Short advertisements selected for the study were 30 to 60 s in duration and had less quality, due to the interference of Internet speed and at “YouTube” download software conversion levels.
4. The screening of the advertisement was done in an auditorium using Sony LCD projection and sound system available in the auditorium.
5. The captioning was done only in English with Arial fonts of size 32.
6. Viewers were in the age group of 18 to 60 years.
7. Educational qualifications of all the viewers were above Higher Secondary levels.
8. There was tool to control the cognitive ability of the viewers.

The screening of the short advertisements was done in the morning hours of the day from 10:00 am until 11:30 am in 1 week.

Research Methodology

In this study, the analysis of the conceptual model is made based on a regression model that includes five dependent variables for profile of viewer, advertisement, captions, and ISL. The prior research discussed in the review of literature section was used to justify the selection of the variables. The data are drawn from a sample of 84 viewers of the advertisement, with and without disabilities. The research was conducted based on a survey using questionnaire developed for the purpose. The data were collected with convenient sampling. As this study is essentially aimed at finding the effects of accessible formats in short advertisement on hearing and deaf persons, profiles of the short advertisements of “Life Insurance Corporation” (“LIC”) on insurance and “Airtel” mobile service provider in terms of quality of advertisement design, accessible format, functional and accessible features were studied. More care was taken to choose the short advertisements available in the “YouTube” without loss of quality. Hence, “YouTube” downloader software was used

to download the short advertisements and was later converted into wave file for captioning using “Pinnacle-14” software using a desktop. No changes were made to the quality of the image, screen, background, and audio track of the advertisement.

Short Advertisements Selected for the Study

One of the short advertisements selected for the study is a LIC advertisement on LIC endowment policy. LIC is the largest insurance company in India. The LIC advertisement selected for the study is of 30-s duration. The second short advertisement selected for the study was of “Airtel” advertisement on its services to remote areas. The “Airtel” advertisement is 60 s in duration. Bharti Airtel Limited, commonly known as Airtel, is an Indian telecommunication company that operates in 19 countries across south Asia and Africa and the channel island. Both advertisements were downloaded from the Internet using “YouTube” downloader software. The original script of advertisement was written in Hindi and then translated into English for the understanding of the deaf sign language interpreter.

Later, the advertisement was edited using pinnacle studio editing software version-14 for adding captions and sign language. The script for captioning of the advertisement was written in English. Later, this was used for signing by the deaf ISL interpreter. The deaf ISL interpreter signed the dialogues and sound of the advertisement in ISL with chrome background. The same was recorded using a Sony digital camera. Then, the recorded video was downloaded using Sony video downloader software on a desktop computer. After getting the video shots to the editing table with software studio pinnacle version-14, editing was done to incorporate the sound, captioning, and the signed video removing the chrome background. Captioned digital media can be a valuable resource because of its entertaining and motivating content (Strassman & O’Dell, 2010). The accessibility format quality was added to an existing advertisement using captioning and with ISL interpretation in ISL in picture format using digital video editing software. After the editing, the final output was video rendered making it as a movie format for screening to the public.

In the case of “LIC advertisement,” the audio and the dialogues in Hindi were converted into written script in English language, including the sounds, background music, dialogues, and so on for the use of the ISL interpreter. An interpreter in ISL is a deaf person. The written script in English was given to the interpreter, as he (deaf interpreter) was not able to hear or understand dialogues in Hindi language in the advertisement.

In the case of “Airtel advertisement,” the audio and the dialogues in Afghani language was converted into written script in English language using Google machine translation facility including the sounds, background music, dialogues,

Table 1. Information About Participants.

Type of viewers	Age in years	Gender category		Total
		Male	Female	
No disability	15-20	9	13	22
	21-30	6	4	10
	31-40	1	2	3
	41-50	2	1	3
	51-60	2	1	3
	Total	20 (23%)	21 (25%)	41 (48%)
Hearing disability	15-20	11	18	29
	21-30	5	5	10
	31-40	1	0	1
	41-50	0	1	1
	51-60	0	1	1
	Total	17 (20%)	25 (30%)	42 (50%)
Orthopedic disability	15-20	1	0	1
	Total	1	0	1
Grand total		38 (45%)	46 (55%)	84 (100%)

and so on. This was done for the benefit of the ISL interpreter, who is deaf and was neither able to understand dialogues in Afghani language nor hear the audio of the advertisement. The scripts of both advertisements were used by the deaf ISL interpreter for understanding the advertisements, as understood by the hearing persons. The concepts that were not understood by the deaf ISL interpreter were clarified by the researcher with the help of hearing the ISL interpreter.

After understanding the script, the deaf ISL interpreter was made to sign the script in ISL, in the studio with chrome background and the same was video recorded using Sony Digital Handy cam model DCR-SR42 with 40 × optical zoom. Maximum care was taken to match the time of the audio and the signing by the ISL interpreter while recording. Later, the video recorded was downloaded into the laptop using Sony Video downloader and converted into wave file for further import of video to Pinnacle Studio version-14 software for captioning and editing the recorded signing by the deaf ISL interpreter. Both the advertisements were captioned and interpreting in ISL was added using the Pinnacle Studio video editing software version-14 and rendered as a movie for final output with audio, captions, and interpreting in ISL in a separate picture-in-picture window, keeping all the features of the short advertisements intact for final screening. Thus, the advertisements were given the quality of accessible format features.

On selected days, both short advertisements were screened in an auditorium to deaf viewers and hearing viewers separately. Initially the short advertisement was screened without accessible format features and later with accessibility format features. On both the days, the research tool consisting of a questionnaire prepared for the purpose was administered to the viewers with a brief introduction about the same, in the same auditorium.

Sampling

The sampling was done by collecting the data from the 84 viewers of the above-said short advertisement, using the research tool consisting of a questionnaire developed for the purpose (appendix). They formed the participants of the research. The research tool had three assessments sections based on the profile of the viewer, profile of the advertisement, and profile of the accessibility format. A duration of 5 min was given to the viewer to provide answers to the questions in the profile of viewer section and later 10 minutes was given to the viewers to answer the questions in the profile of advertisement and profile of accessibility, after viewing the short advertisements. All the answers to the questionnaire by the viewers were collected, after 10 min of screening of the short advertisements in accessible and without accessible formats. This formed the sample data for research and the details of the participants of the study are given in Table 1.

The data collected were analyzed using SPSS version 14. The viewers, from whom the data were collected using the questionnaire, included hearing and deaf persons, as depicted in Table 1. Care was taken to explain the details of the questionnaire and its significance in ISL to the deaf viewers and hearing viewers about the short advertisements and the questionnaire, before screening and administering the questionnaire. The researchers made efforts to ensure that the viewers answered all the questions administered to them and the questionnaires were collected immediately after 10 min of screening the short advertisements using LCD projection and sound system available in the auditorium. No effort was made by the researchers to enhance the quality of the projection or the quality of sound of the two short advertisements (Figure 1).

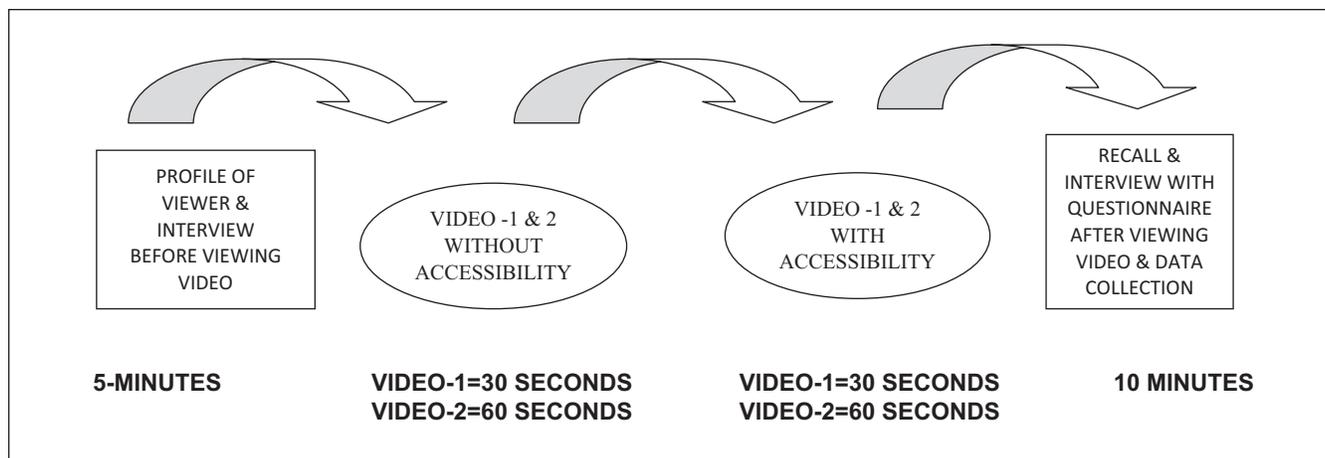


Figure 1. Flowchart depicting the data collection procedure.

Table 2. Type of Disability of the Viewers and Understanding of the Advertisement After Screening It Without Accessibility Format.

Type of disability of the viewers	What is the advertisement about		Total
	Did not understand	Yes understood	
No disability	16 (19.04%)	25 (29.76%)	41 (48.80%)
Hearing disability	41 (48.80%)	1 (1.19%)	42 (50%)
Orthopedic disability	1 (1.19%)	0	1 (1%)
Total	58 (69.05%)	26 (30.95%)	84 (100%)

Table 3. Type of Disability of the Viewers and Perception Regarding Comprehension of the Number of Persons in the Advertisement.

Type of disability of the viewers	Number of persons present in the advertisement				Total
	One person	Two persons	Three persons	Four persons	
No disability	9 (10.71%)	10 (11.90%)	19 (22.61%)	3 (3.57%)	41 (48.80%)
Hearing disability	6 (7.14%)	6 (7.14%)	21 (25%)	9 (10.71%)	42 (50%)
Orthopedic disability	0	0	1 (1.19%)	0	1 (1.19%)
Total	15 (17.85%)	16 (19.04%)	41 (48.80%)	12 (14.28%)	84 (100%)

Results and Discussions

To test the first hypothesis about the understanding of the advertisement by persons with and without disabilities, the data collected were analyzed. The results and details of the same are depicted in Table 2.

It may be noted that in Table 2, majority of viewers who were disabled (deaf, 49%) did not understand the advertisement after viewing it without accessibility format, that is, without captions and ISL. Among all of the viewers, 69% did not understand the advertisement. This may be because of the speed in the audio and quick passing of the frames in the advertisement, thus reducing retention power among the viewers who may not have visual literacy skills as compared with the deaf viewers who have innate visual literacy skills, as demonstrated by Furlonger et.al., (2010). In fact,

according to Winn (1982) in general, any basic visual process can be developed into a visual skill only through practice, and any visual skill can be developed into a useful learning strategy through training. The deaf persons are able to develop this innate visual literacy skill. Wakshlag (2010) of Turner Broadcasting also found that the commercial retention rate for online video was higher than for traditional television.

To test the first hypothesis, regarding comprehension of the advertisement, the retention power among the viewers regarding the number of persons in the advertisement was collected from viewers with and without disabilities. The data were analyzed. The results and details of the same are depicted in Table 3.

It may be observed that in Table 3, only 46% of the viewers without any disability perceived the correct number of

Table 4. Type of Disability of the Viewers and Perception Regarding Whether Captioning Increases Accessibility of an Advertisement, After Screening It.

Type of disability of viewers	Opinion of the viewers after viewing the video: Captions increase accessibility of an advertisement?			
	Without accessibility format		With accessibility format	
	Yes	No	Yes	No
No disability	14	27	39	2
Hearing disability	39	3	42	0
Orthopedic disability	1	0	1	0
Total	36 (43%)	48 (57%)	82 (98%)	2 (2%)

Table 5. Type of Disability of the Viewers and Perception Regarding a Suitable Position of the ISL Interpreter in the Screen of an Advertisement, After Screening It.

Type of disability of the viewers	Suitable position of the ISL interpreter in an advertisement				Total
	Right-hand upper corner	Right-hand lower corner	Left-hand lower corner	Left-hand upper corner	
No disability	13 (15.47%)	26 (30.95%)	2 (2.38%)	0	41 (48.80%)
Hearing disability	17 (20.23%)	24 (28.57%)	1 (1.19%)	0	42 (50%)
Orthopedic disability	0	1 (1.19%)	0	0	1 (1.19%)
Total	30 (35.71%)	51 (60.71%)	3 (3.57%)	0	84 (100%)

Note. ISL = Indian sign language.

persons (three persons) in the advertisement without accessibility format. But 50% of the deaf viewers were able to give the correct answer. This may be because other viewers were not able to comprehend or retain the number of persons appearing in the advertisement. This supports the claim by the communication scholar Paul Messaris (1994) who argued in his book "Visual Literacy" that "people become visually literate through a process that is basically perceptual and innate rather than learned as is language" (1994, p.199). Messaris, even in his earlier work on visual literacy, identified a need for an understanding of a different set of interpretive skills that are more intuitive than conventional. The analysis shows that the deaf persons appear to have these interpretive skills more intuitively than their hearing counterparts.

Captioning and ISL Interpreting in the Advertisement Increase Accessibility

To test the second hypothesis, regarding whether the use of captioning and ISL interpreter in the screen, interpreting in ISL increase accessibility of an advertisement, answers collected from viewers with and without disabilities were analyzed. The results and details of the same are depicted in Table 4.

To address the first research question, which investigates "which is the best position for the ISL interpreter in the screen," the viewers were asked to answer their viewpoint in a 4-point scale. The answers differed after viewing the

advertisement with and without accessibility format. The answers were analyzed and it was found that only 43% viewers were of the opinion that captions increase accessibility of advertisement, after watching the advertisement without accessibility format. But after viewing the advertisement in accessibility format, 98% of the viewers expressed that captions increase accessibility.

Right-Hand-Side Corner Is an Appropriate Place for ISL Interpreter in the Screen

To test the fifth hypothesis, "right-hand side corner is the appropriate place for the ISL interpreter in advertisement" viewpoint from the viewers with and without disabilities was collected and analyzed. The results and details of the same are depicted in Table 5. To address the fourth research question, which investigates "which is the best position for the ISL interpreter in the screen," the viewers were asked to answer their viewpoint in a 4-point scale. The answers differed after viewing the advertisement with and without accessibility format.

The answers were analyzed and it was found that only 29% deaf viewers were of the opinion that best suitable position for the ISL interpreter in advertisement is right-hand lower corner. Similar was the opinion of 31% of the persons without disability. This may be because the position would be easy for the viewer to view the ISL interpreter nearer to the captions and a position at right-hand upper corner would

Table 6. Type of Disability of the Viewers and Perception Regarding Captions in the Advertisement Acting as Distraction to the Viewers.

Type of disability of the viewers	Never	Captions distract the viewer of the advertisement			Total
		Rarely	Sometimes	Always	
No disability	06 (7.14%)	12 (14.28%)	19 (22.61%)	4 (4.76%)	41 (48.80%)
Hearing disability	23 (27.38%)	11 (13.09%)	05 (5.95%)	3 (3.57%)	42 (50%)
Orthopedic disability	1 (1.19%)	0	0	0	1 (1.19%)
Total	30 (35.71%)	23 (27.38%)	24 (28.57%)	7 (8.33%)	84 (100%)

Table 7. Type of Disability of the Viewers and Perception Regarding Whether ISL Interpreter in the Advertisement Acts As Distraction to the Viewers.

Type of disability of the viewers	Never	ISL interpreter in advertisement distract the viewer of the advertisement			Total
		Rarely	Sometimes	Always	
No disability	03 (3.57%)	12 (14.28%)	9 (10.71%)	17 (20.23%)	41 (48.80%)
Hearing disability	23 (27.38%)	11 (13.09%)	5 (5.95%)	3 (3.57%)	42 (50%)
Orthopedic disability	1 (1.19%)	0	0	0	1 (1.19%)
Total	30 (35.71%)	23 (27%)	24 (29%)	7 (8%)	84 (100%)

Note. ISL = Indian sign language.

have been more difficult for majority of the viewers. However, it may be noted that none of the viewers suggested left-hand upper corner as the best suitable position for the ISL interpreter in the advertisement.

Captioning Distracts Viewers

To test the sixth hypothesis, "The captioning added to the advertisement does not distract the viewer of the advertisement" perspective of the viewers with and without disabilities was collected and analyzed. The results and details of the same are depicted in Table 6. The viewers were asked to answer their viewpoint in a 4-point scale. The answers differed after viewing the advertisement both with captions.

To address the sixth research question, whether captioning distracts the viewer of the advertisement, opinions of the viewers were recorded in a 4-point Likert-type scale. The opinions collected were analyzed and it was found that 36% of the viewers expressed that it never distracts them and among them 28% were deaf persons. Thus, it supports the claim of Alberto et al. (2007) that "captions are one of the varieties of modes for obtaining information by deaf persons" (2007, pp. 93-102).

ISL Interpreting Distracts the Viewers

To test the sixth hypothesis, "The ISL interpreting added to the advertisement does not distract the viewer of the advertisement" perspective of the viewers with and without disabilities was collected and analyzed. The results and details

of the same are depicted in Table 7. The viewers were asked to answer their viewpoint in a 4-point scale. The answers differed after viewing the advertisement with and without ISL interpreting.

To address the fourth research question, whether the ISL interpreter distracts the viewer of the advertisement, the opinions of the viewers were recorded in a 4-point Likert-type scale. The opinions collected were analyzed and it was found that 36% of the viewers expressed that the ISL interpreter never distracts them and among them 28% were deaf persons.

Captions and ISL Interpreting Does Not Reduce the Visual Appeal of the Advertisement

To test the seventh hypothesis, "Both captions & ISL interpreting does not reduce the visual appeal of the Advertisement" perspective of the viewers with and without disabilities was collected and analyzed. The results and details of the same are depicted in Table 8. The viewers were asked to answer their viewpoint in a 5-point scale. The answers differed after viewing the advertisement with and without ISL interpreting.

To address the fifth research question, regarding visual appeal of the advertisement, the opinions of the viewers were recorded in a 5-point Likert-type scale. The opinions collected were analyzed and it was found that 36% of the viewers expressed that visual appeal of advertisement with accessibility format was excellent and among them 20% were hearing persons. This means adding accessibility features did not reduce the visual appeal of the advertisement to a great extent.

Table 8. Type of Disability of the Viewers and Perception Regarding the Visual Appeal of Advertisement to the Viewers with Accessibility Format.

Type of disability of the viewers	Visual appeal advertisement with accessibility format					Total
	Excellent	Very good	Good	Average	Poor	
No disability	17 (20.23%)	12 (14.28%)	12 (14.28%)	0	0	41 (48.80%)
Hearing disability	13 (15.47%)	12 (14.28%)	12 (14.28%)	5 (5.95%)	0	42 (50%)
Orthopedic disability	0	1 (1.19%)	0	0	0	1 (1.19%)
Total	30 (35.71%)	25 (29.76%)	24 (28.57%)	5 (5.95%)	0 (0%)	84 (100%)

Table 9. Type of Disability of the Viewers and Perception Regarding the Color of Captions Preferred by the Viewers of Advertisement with Accessibility Format.

Type of disability of the viewers	Which color do you prefer for captions						Total
	White	Yellow	Red	Blue	Green	None of above	
No disability	14 (16.66%)	20 (23.80%)	3 (3.57%)	1 (1.19%)	2 (2.38%)	1 (1.19%)	41 (48.80%)
Hearing disability	8 (9.52%)	23 (27.38%)	7 (8.33%)	2 (2.38%)	2 (2.38%)	0	42 (50%)
Orthopedic disability	0 (0%)	1 (1.19%)	0	0	0	0	1 (1.19%)
Total	22 (26.19%)	44 (52.38%)	10 (11.90%)	3 (3.57%)	4 (4.76%)	1 (1.19%)	84 (100%)

Persons With Disabilities Have Preference in Color of Fonts Used in Captioning

To test the seventh hypothesis, “Persons with disabilities have preference in color of fonts used in captioning,” perspective of the viewers with and without disabilities was collected and analyzed. The results and details of the same are depicted in Table 9. The viewers were asked to answer their viewpoint with a choice of primary colors scale format. The answers differed after viewing the advertisement with and without ISL captioning.

To address the sixth research question, regarding color of the captions and the perception of the viewers of the advertisement, the opinions were recorded in a 6-point Likert-type scale. The opinions collected were analyzed and it was found that 52% of the viewers expressed that yellow color for captions were more liked by them. The next best favored color was white.

Evaluation Using the Universal Design Performance Measures for Products (UDPMP)

Based on the principles of UD, an analysis of the advertisements in accessible format was done using the UDPMP guide prepared by the Center for Universal Design North Carolina State University (1997).

The performance measures identify the strength or weakness that is important for some portion of the user population. The analysis chart provides a type of graphic profile of usability features. The seven principles of UD and their guidelines were developed by a working group of architects,

product designers, engineers, and environmental design researchers as part of a project coordinated by the Center for Universal Design at North Carolina State University. The seven principles that describe characteristics that make designs universally usable are as follows:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use

The most appropriate principle applicable to the product developed was Principles 1 and 4 of UD. Hence, an evaluation of the advertisement in accessible format using Principle 1 “equitable use” and Principle 4 “perceptible information” of Universal Design Product was done and the result is given in Tables 10 and 11.

In Table 10, it may be seen that according to researchers, as per Principle 1 “equitable use,” the advertisement in accessible format could be used by all potential users, in essentially the same way regardless of differences in their abilities. Besides, the researchers strongly agree that the product appeals to all users.

In Table 11 it may be seen that, according to researchers, as per Principle 4 “perceptible information,” the advertisement in accessible format could be used by all potential users, in essentially the same way regardless of differences in their abilities. Besides, the researchers strongly agree that the product can be used without hearing and without sight,

Table 10. Evaluation of the Advertisement in Accessible Format Using Principle I of Universal Design “Equitable Use.”

Principle I “equitable use”	Not applicable	Strongly disagree	Disagree	Neutral	Strongly agree	Comments
I A. All potential users could use this product in essentially the same way, regardless of differences in their abilities.					X	The digital product easily accessible to PWDs and all persons
I B. Potential users of this product have access to all features of privacy, security, and safety, regardless of personal capabilities.	X					
I C. Potential users of this product have access to all features of privacy, security, and safety, regardless of personal capabilities.	X					
I D. This product appeals to all potential users.					X	Potential user appeal is part of the advertisement.

Note. PWDs = persons with disabilities.

Table 11. Evaluation of the Advertisement in Accessible Format Using Principle 4 of Universal Design “Perceptible Information.”

Principle 4 “perceptible information”	Not applicable	Strongly disagree	Disagree	Neutral	Strongly agree	Comments
4A. This product can be used without hearing.					X	The use of ISL provides access to Deaf
4B. This product can be used without sight.					X	The use of audio provides access to Blind
4C. The features of this product can be clearly described in words (e.g., in instruction manuals or on telephone helplines).					X	Accessible features added can be clearly described in words
4D. This product can be used by persons who use assistive devices (e.g., eyeglasses, hearing aids, sign language, or service animals).					X	The product uses ISL as the accessibility format tool for adding Universal Design

Note. ISL = Indian sign language.

features of the product can be clearly described in words, and the product can be used by persons who use assistive devices including those who use eyeglasses, hearing aids, and sign language.

Conclusions and Further Scope of Research

Accessibility format in advertisement as a UD is possible only in digital television. India has a big market for advertisements in digital telecast. However, digital television is a completely new technology that needs to be massively implemented in India and, in compliance with the applicable and available legislations, it should be considered and designed, from the very start, to be used by all citizens, including persons with disabilities. Raheja (2007) stated that UD is a philosophy of thought and action for designers and

nondesigners to achieve the goal of UD. UD may be defined as the best approximation of an environmental facet to satisfy the needs of all the people. He concludes that India is in progress toward meeting the four goals. These goals are equality of opportunity, full participation, independent living, economic, and self-sufficiency. These goals are dependent on successful policies made by the government that are promoting a highly interactive process between environment and the people with disabilities.

Principles of UD have wide applications, in advertisements, in digital media, and use to all persons. Its application to digital media is a great challenge for both producers of programs, advertisements, broadcasters, and receivers in India. It opens another wide area of research with reference to persons with disabilities and their accessibility. Applying the principles of UD in this field and building an easy to use interactivity is imperative, not only for people with sensorial disabilities

but also for a much larger group of citizens who have difficulties when using these new services. Being a country with a billion dollar advertising industry, India should play in the forefront of the promotion of audiovisual accessibility based on evidence. There is further scope for research in the area of fonts used in the captioning, time duration of the captions per screen, and the use of ISL interpreter in the digital video.

Appendix

Evaluation of the Impact of an LIC Advertisement

(37.03 sec) in Accessible Format

QUESTIONNAIRE

(to be administered after screening advt. in accessible format)

A—Profile of the Viewer:

1. NAME: _____
2. AGE _____ 3. SEX MALE/FEMALE _____
4. QUALIFICATIONS _____
5. Do have any impairment? YES / NO _____
- 5.1 If "YES" what is the type of impairment?
 - a) Hearing impairment
 - b) Visual impairment
 - c) Any other specify _____

B—Profile of the Advertisement:

- B.1 What is the advertisement about?
 - a) about Insurance _____
 - b) about clothing
 - c) about sports
 - d) about building
 - e) any other? (specify) _____
- B.2. How many persons appear in the advertisement?
 - a) 1 person
 - b) 2 persons
 - c) 3 persons
 - d) 4 persons
 - e) Any other? (specify) _____
- B.3. What is an Endowment?
 - a) profit
 - b) policy
 - c) Insurance
 - d) Business
 - e) Any other? Specify _____
- B.4. What type of insurance advertisement it is?
 - a) life
 - b) general
 - c) Automobile
 - d) medical
 - e) any other? Specify _____

C—Profile of the Accessible Format:

- C.1. Which is the best position for the signing person in the screen?
 - a) middle of the screen
 - b) left-hand corner of the screen
 - c) right-hand corner of screen
 - d) right-top corner of screen
 - e) left-top corner of screen
- C.2 Can the signing of the dialogues increase the accessibility of the advertisement?
 - a) Strongly agree
 - b) Agree _____
 - c) Neutral
 - d) Disagree
 - e) Strongly disagree _____
- C.3. Can audio description make the advertisement accessibility?
 - a) Yes__
 - b) No__
 - c) can't say
- C.4. Visual perception of the advertisement?
 - a) Poor
 - b) Fair
 - c) Good
 - d) Very good
 - e) Excellent
- C.5. What color of caption you prefer?
 - a) White
 - b) Black
 - c) Green
 - d) Red
 - e) Any other? (specify) _____

DATE: _____ Signature _____

Evaluation of the Impact of an LIC Advertisement

(37.03 sec) in Accessible Format

QUESTIONNAIRE

(to be administered after screening advt. Without accessibility format)

A—Profile of the Viewer:

1. NAME _____
2. AGE _____ 3. SEX MALE/FEMALE _____
4. QUALIFICATION _____
5. Do have any impairment? YES / NO _____
- 5.1 If "YES" what is the type of impairment?
 - a) Hearing impairment
 - b) Visual impairment
 - c) Any other specify _____

B—Profile of the Advertisement:

- B.1 What is the advertisement about?
- about general insurance__
 - about dress__
 - about Life insurance
 - about sports
 - none of the above
- B.2. How many persons appear in the advertisement?
- 1 person
 - 2 persons
 - 3 persons
 - 4 persons
 - 5 persons
- B.3. What is Endowment?
- profit
 - policy
 - Insurance
 - Business
 - Any other? Specify_____

C—Profile of the Accessible Format:

- C.1. Do captions increase accessibility of an Advertisement?
- Sometimes
 - Always_____
 - Never
 - It depends on the Advertisement
 - None of the above. Specify_____
- C.2 Regarding readability of caption what is your opinion?
- It should be readable
 - It should be well timed with audio
 - The color should be appealing
 - Capital fonts should be used
 - It should not be distracting to the viewer
- C.3. Timing of the Captions:
- It should match with lip movement
 - It should match with sign language
 - It should match with audio
 - It should match with script
 - It should appear continuously
- C.4 Visual Appeal the advertisement?
- Excellent__
 - Very good__
 - Good__
 - Average__
 - Poor__

DATE: _____ Signature _____

Acknowledgments

This research was done with the help of Mr. Sujit Sahasrabudhe, Indian Sign Language (ISL) instructor at Ali Yavar Jung National Institute for the Hearing Handicapped, (AYJNIHH) Mumbai, India.

The authors are thankful to Prof. R. Rangasayee, Director, AYJNIHH, Mumbai, India, and all the deaf participants for their precious time and cooperation and Ms. Kinjal for providing ISL interpreter services where necessary.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research and/or authorship of this article.

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Author Biographies

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