COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME

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1   Executive Summary

This report represents part 1 of a series of two reports representing the full and final results and conclusions of the work done to date on mature services. The supplementary 'Final Report' will include the final results of the work that is currently ongoing with the Universities Sub-titling team. This represents work that has been delayed due to issues encountered with the eye-tracking technology that was a key element in the tests that were carried out. The supplementary report will follow in May 2010.

Section 2 - Introduction - explains the aims of the pilot and the rationale adopted for putting the findings and conclusions of the user studies of mature access services in a broader policy and strategic context. The focus here is on extracting information that looks at the match (or mismatch) between the needs of viewers and the mature access services available to get the most out of watching television.

Section 3 - Goals and Outcomes - uses the structure from deliverable 1.3 to revisit the analysis of the needs of those with functional impairments and who are at risk from being excluded from watching television, demographic trends for the coming decade, current access service provision across Europe and three scenarios for their expansion in the coming decade. In terms of the supply side, the scenarios show the need to allow for a wide variety of circumstances for e-inclusiveness provision across Europe.

Section 4 - Evaluation - is a review of the work done as of late January 2010. The section starts with a listing of the studies and the extent to which they are final or will be provided in a new iteration in May 2010. The studies included here represent a rich and varied collection of research both in terms of their methods, findings and presentation. They also address important lacunae in our understanding of the workings of mature access services. To help the reader identify central issues and conclusions, we have added sections 5 and 6 that build on what is reported in Section 4.

Section 5 - Key Findings from the Viewer Perspective - collates the findings in terms of what can be termed an Access Service Maturity Model. It starts with six prerequisites for access services for television, first awareness levels for access services not only among those who would potentially benefit from them but also from the population at large. It continues with access to an appropriate digital television receiver and the ability of viewers to (re)configure them in order to receive TV and access services; and the extent to which viewers can discover, select and watch television programming for which access services are available. It concludes with a discussion of the attractiveness" of the access services considered and the extent to which they actually deliver on their e-inclusiveness potential.

Section 6 - Conclusions of the Pilot of Mature Access Services - demonstrates that awareness levels both among those with impairments and the population at large need improving. The section identifies actions that could be taken to improve awareness and other measures of service use. Each of the main mature services is reviewed in turn. By and large, they are meeting the needs of many viewer groups with impairments. The conclusions do, however, highlight the need for ongoing actions to optimise access services to increase their attractiveness and perceived value. The main area of concern relates to live subtitles created using re-speaking. This method of generating subtitles is central to the scaling-up of subtitling for the deaf and hard-of-hearing to nearly 100% of television programming (already a requirement or soon to be a requirement in a number of member states). The issues of the delay in the presentation of the subtitles with respect to the main programme, the presentation differences in live subtitles between broadcasters and the factual and semantic errors that regularly appear in live subtitles all require renewed efforts to make live subtitling a service that really makes a difference to those for whom it is intended.

2 Introduction

2.1 The aims of this report

The vision underpinning DTV4All is one of e-inclusiveness. It is about a Europe in the not-too-distant future where as many Europeans as possible are able to access digital television.

Access services for digital television are already available in many EU member states. DTV4All operates at the policy level and aims to identify measures to accelerate e-inclusiveness.

To improve the e-inclusiveness of digital television, action is required on three fronts:

1. In the short term, facilitating the take-up of mature access services on what the project team has termed first generation digital television. This will be operational over the timeframe 1997-2012 and is concerned with broadcast systems based on MPEG2 technology.

2. Preparing for the second generation of digital television by assessing the viability of mature services on second generation digital television platforms.

3. Identifying and validating emerging solutions that will either replace mature access services, or extend the scope of access service provision, on second generation digital television platforms.

This report covers the Pilot of Mature Access Services (WP2) and its primary aim is to contribute inputs to the first two action points.

2.2 Who this report is aimed at

- The DTV4All project partners
- The European Commission
- Other interested stakeholders

3   The Goals and Outcomes of the Pilot of Mature Services

In this section we will return to the operational goals and outcomes of the Workplan provided in DTV4All Deliverable D1.1 and indicate how the Pilot of Mature Services can be translated into inputs for a strategic toolkit for use by a wide range of stakeholders in digital television across Europe.

As suggested in the Work plan back in October 2008, we need to identify the kinds of information that will help us to answer the following question: Who needs to know what in order to be able to plan, produce, deliver, promote and successfully use mature access services within a given timeframe?

Previous versions of this report were structured primarily to document that the project had carried out a wide range of user tests as part of the Pilot on Mature Access Services.

In this version, the aim is to go one step further. We want to extract preliminary findings and conclusions about mature access services from the various studies listed here that can make a difference to

- television viewers with impairments;
- professionals in education and healthcare who assist citizens come to terms with their impairments after accident or illness (also as regards watching television);
- bodies/associations representing those with impairments and
- research groups working on the user experience of access services.

In subsequent deliverables, the aim is to address the information needs of all the other key stakeholders so that they are in a better position to plan, produce, deliver, promote and successfully use mature access services within a given timeframe.

3.1   Who are potentially excluded from watching television and what are their needs?

This section focuses on viewers who watch TV with the aid of mature access services. It identifies the kinds of challenges they currently face in order not to be excluded from viewing TV. It also looks at three scenarios for e-inclusiveness in order to assess whether TV will become more inclusive in the coming 5-10 years.

3.2   *The demand side of e-inclusiveness*

3.2.1   *Major viewer groups who have difficulties watching television*

The demand side of the equation deals with the nature, size, and needs of the various groups of citizens potentially excluded from following television without the support of access services.

We revisited the original table in Deliverable D1.1 and conducted a review of 12 target groups originally identified in the Work Plan which was subsequently refined as a result of

the Pilot. Together these groups include and describe the major groups at risk of being excluded from watching digital television. The list is not meant to be exhaustive nor exclusive, but just an indicator of the kinds of groups that need to be considered:

List of groups at risk of being excluded from watching television

1. *Viewers born deaf whose mother tongue is sign language.* The viewer finds it impossible to understand the sound track of a TV programme.

2. *Deaf viewers (oralists) who lost their hearing in childhood or adulthood.* The viewer finds it very difficult/impossible to understand the sound track of a TV programme in his/her own language in spite of some degree of lip reading skill.

3. *Viewers who are hard-of hearing.* The viewer has some degree of difficulty understanding the sound track of a TV programme in his/her own language.

4. *Exclusion of viewers who have difficulty in following spontaneous speech.* The viewer has some degree of difficulty understanding the dialogue of a TV programme in his/her own language.

5. *Viewers of TV programmes in a foreign language.* The viewer has some degree of difficulty understanding the dialogue of a TV programme in a foreign language.

6. *Young viewers (0-6 years) of TV programmes in a foreign language.* The viewer finds it very difficult/impossible to understand a TV programme in a foreign language where inter-lingual subtitling is offered.

7. *Social exclusion of immigrants or refugees.* The viewer finds it very difficult/impossible to understand the sound track of a TV programme.

8. *Viewers who have receptive aphasias such as dyslexia and/or cognitive impairments affecting their short-term memory (caused by accident, illness or substance abuse).* The viewer finds it very difficult/impossible to understand a TV programme in a foreign language where inter-lingual subtitling is offered

9. *Viewers who are blind.* The viewer finds it very difficult/impossible to understand a TV programme with a sound track in his/her own language (original/dubbed) or in a foreign language.

10. *Viewers with visual impairments.* The viewer finds it very difficult/impossible to understand a TV programme in a foreign language with inter-lingual subtitling and/or SDH for same language content.

11. *Viewers (often senior citizens) getting started with digital television.* The viewer finds it difficult/impossible to set up, configure or reconfigure his/her digital TV receiver.

12. *Viewers (after digital switch-over) using digital television on a regular basis.* The viewer finds it difficult/impossible to discover, select and view a given television programme using one or more remote control devices.

As can be seem from the example below, we have made some changes to the original table[1]. The current version includes a more detailed listing of the groups at risk of being excluded, the possible causes of such exclusion, e-inclusiveness options and a new column with examples of such options.

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[1] D1.1 section 4.1.4 entitled "Television: Access problems, causes, solutions & technical options"

Problem	Cause	e-Inclusiveness Options	Examples
1. Exclusion of viewers born deaf whose mother tongue is sign language. The viewer finds it impossible to understand the sound track of a TV programme.	The viewer's mother tongue is sign language. (This may or may not be recognised as an official language on a par with the spoken language in the state or territory in question). The presence of subtitles for the Deaf and Hard-of-hearing may be of little or no use to the viewer.	**Visual Signing, also known as Deaf Signing (DS)** Provided for pre-recorded and live TV programmes. - in-vision (open) or closed. - Closed DS delivered using "picture in picture" or a separate video stream with the interpreter super-imposed but with the original audio.	**Portugal**: RTP offers in-vision DS for many live programmes in early prime-time (news, live studio shows) **UK**: Early morning show with video clips offers DS for young adults (signer dancing at bottom of screen). Please see (reference/link) **Denmark**: DR and TV2 have a virtual channel with DS which appears late afternoon/early evening. The signer is full-screen stands to the left of a flat panel display showing the programme. Please see (reference/link)

Example of a group at risk of being excluded from watching television

The complete, updated table is to be found in Appendix A.

The Work plan foresaw our being able to quantify the proportion of the population of each of the participating countries that fall into each of these categories. In spite of considerable effort in this regard, it has not been possible to come up with good national statistics for each of the target groups described.

In fact, the lack of a clear consensus about the nature and size of groups who could be excluded from watching television is one of the issues that impedes a balanced discussion of policy and strategy within television and e-inclusiveness. Without generally accepted statistics, individual stakeholders chose the figures they have at hand, making consensus difficult.

There is, however, a solution that can be used across Europe.

We can indicate the approximate size of most of the groups facing exclusion by using the exclusion calculator at the University of Cambridge. This is based on an extremely large interview survey by Grundy (1999) of those over 16 in the UK. The interviews were conducted two years earlier. As a related study using the same questionnaire in the USA gave results that were about 10% greater than for the UK, and given the a priori assumption that impairment levels are unlikely to be significantly greater than those of the USA, we can use the UK figures as a baseline to talk about groups at risk across the whole of Europe with a possible variance of ±10%. As far as television viewing is concerned, hearing impairments are regarded as being the most widespread. Figure 1 below is taken from a table on the Cambridge website and shows the range of hearing impairments that impact television viewing for adults in the UK. The prevalence of a given impairment in the UK will be approximately the same in other Member States.

Population statistics: Prevalence data

Hearing ability level (in increasing order)

H1 Cannot hear sounds at all

H2 Cannot follow a TV programme with the volume turned up

H3 Has difficulty hearing someone talking in a loud voice in a quiet room

H4 Cannot hear a doorbell, alarm clock or telephone bell

H5 Cannot use the telephone

H6 Cannot follow a TV programme at a volume others find acceptable

H7 Has difficulty hearing someone talking in a normal voice in a quiet room

H8 Has great difficulty following a conversation against background noise

H9 Full hearing ability

Ability level is measured with any desired hearing aids.
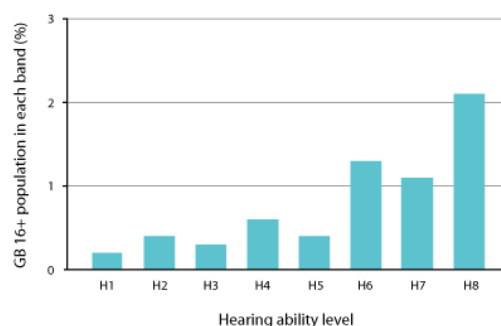
Graph showing the distribution of hearing ability, where those with full ability (H9) are not shown.

Important note
These hearing ability levels and prevalence statistics are taken directly from the 1996/97 Disability Follow–up Survey (Grundy et al. 1999), which was commissioned by the government to plan welfare support. The GB adult population was 45.6 million people at the time of the survey. Please see the Framework section for more detail.

Figure 1: Prevalence of hearing impairments in the UK
Source: http://www-edc.eng.cam.ac.uk/betterdesign/usercap/hearing/hearing9.html

The Grundy study for hearing ability uses 9 self-evaluation categories (H1-H9). Those who are unable to follow a television programme even when using their hearing aid would be found in groups H1-H8 (approximately 5.7% of the adult population). There are comparable ability scales for other abilities including mobility, dexterity, and seeing. The exclusion calculator on the University of Cambridge worksite allows for the combination of abilities to calculate figures for those with multiple impairments.

As part of our work with DTV4All, we have complemented the Grundy study with exclusion categories covering television programmes in foreign languages where some kind of interlingual support is required (dubbing, lectoring or interlingual subtitles). We have also attempted to be more specific about age and socially-related exclusion and television viewing. Examples of the first are children under the age of 6 (not covered in Grundy) who cannot yet read in their mother tongue and who need dubbing or lectoring in order to follow a TV programme. Examples of the second are immigrants and refugees in various member states and territories within the European Union. There is a case to be made for covering social exclusion and the use of subtitles in one or more languages for TV programming on main channels to promote social cohesion and defuse potentially divisive polarisation in certain parts of Europe. There are several good examples of social inclusion using television in countries like Finland and Catalonia.

3.2.2   *Forecasts for access in the coming 5-10 years (the demographic trends)*

The exclusion calculator mentioned above can be used to identify the approximate numbers of those at risk of exclusion. Over time, the prevalence figures will need adjusting.

There are two major demographic trends which have an impact on exclusion and television viewing:
- *the increasing longevity of the European population* (the average life expectancy is increasing giving an increase in age-related functional impairments) and

- *improvements in healthcare provision* (leading to a reduction or least a mitigation of inherited impairments (e.g. cochlear implants giving the born-deaf some kind of hearing).

Overall we can expect no significant change in the incidence of functional impairments among the young and middle-aged, but some increase in the proportion of the over 60's with impairments related to sight, hearing, mobility, dexterity or cognition. There are some doubts about the future demand for visual signing for those born deaf, although this is not expected to disappear in the foreseeable future.

In terms of the *expectations* among such groups, claims have been made that there are major differences among the so-called "baby boomers" (those born after the Second World War who will be retiring in the coming 5-10 years). In Western Europe at least, baby boomers were brought up so expect some degree of public social welfare. This group may well make more vociferous demands of public health and social welfare provisions in the coming 10 years.

A related phenomenon is the changing expectations of service provision when an access service evolves from being a pioneering service for the few to being a mainstream provision for the many. Initial gratitude changes over time when such services are seen to be a right, not a privilege.

To conclude, the proportion of the adult population with one or more impairment is expected to rise moderately over the next to 5-10 years, mainly among those aged over 60. Expectations of access service provision are likely to increase faster than can be explained by demographic changes alone.

3.3   The supply side of e-inclusiveness

3.3.1   *Prerequisites and proposed metrics for e-inclusiveness*

This section looks at access services for television, both the services themselves and also metrics for assessing their impact. To assess e-inclusiveness, statistics are required for both the demand side and the supply side. In a few member states, there are good statistics for access services specified in legislation or by the regulator. For most member states, however, discussions on e-inclusiveness are hampered by adequate statistics as we noted for demand side statistics.

For exclusion to be prevented, the following prerequisites have to be met:
- the viewer must be aware of the existence of television programming with an access service relevant to his or her needs
- the viewer must have the appropriate (digital) receiver to receive the service
- the viewer must be able to set up the receiver or ask someone else to do so in order to receive the service in question
- the viewer must be able to find the programme and service on the receiver
- the viewer must have the necessary motivation to use the service and
- the viewer must be able to derive benefit from the access service.

The studies conducted in the Pilot of Mature Services have covered all of these prerequisites, in particular 2-6.

It is proposed that the success of a given access service is assessed using the following general metrics:

- awareness of the existence of access services

- being able to discover and gain access to access services associated with digital television

- the ease of use of the access service

- the usefulness of the access service and

- the attractiveness of the access service.

The Pilot of Mature Services conducted by DTV4All partners and academic associates has focused primarily on the last three of the five metrics.

Before conducting the user tests, there was a general sense that the challenge was mainly to build awareness in the value network so that stakeholders at national or regional level could focus on the production, distribution and use of services such as Subtitles for the Deaf and Hard-of-hearing, Audio Description (receiver mix) and Visual Signing for the deaf.

Taken together, the studies suggest that the challenge is more complex than we had assumed. There are numerous issues with so-called mature services and considerable scope for optimising their production, distribution and use. Furthermore, scaling up the provision of Subtitles for the Deaf and Hard-of-hearing faces significant challenges which will be dealt with in Findings and Conclusions.

3.1.2 The current availability of mature access services for free-to-air television

(on digital terrestrial and digital satellite or cable, where appropriate):

This section address the kinds of mature access services currently available on free-to-air television in Europe and the availability of statistics for the supply side.

- Subtitles ("closed" Subtitles for the Deaf and Hard-of-hearing (SDH)), "closed" inter-ingual subtitles) and the subtitling delivery methods - teletext and DVB-subtitles.
- Dubbing and lectoring (commonly termed "voice-overs")
- Audio Description (AD Broadcaster mix, AD Receiver mix)
- Audio Subtitles (usually inter-ingual, spoken subtitles – can involve speech synthesis at the broadcaster (YLE, Finland) or decentrally (public service broadcasters in the Netherlands)
- Visual signing (usually "open" in-vision , but sometimes "closed", opt-in solutions)

We had originally excluded Audio Subtitles from the mature category, but closer examination of centralised solutions such as those found in Sweden and Finland indicate that some of these solutions are certainly mature.

As part of its work as an associated partner of the DTV4All project, and in response to requests to provide adequate statistics on the availability of mature access services in Europe, the European Broadcasting Union (EBU) conducted a survey in 2009 with follow-ups planned on an annual basis. The EBU survey includes figures for the following:

- Subtitling in 2007
- Subtitling in 2008
- Subtitling of foreign language programming
- Subtitling of the national language
- Subtitling delivery methods (Teletext, DVB-subtitles, in-vision)
- Spoken subtitling
- Signing
- Audio description
- The way forward (collaboration with Digital Europe)

The figures from the 2009 EBU survey are available from Edgar Wilson, EBU[2] who will also be handling the 2010 survey.

For 2010, the aim is to extend the coverage to include as much of Europe as possible; extend the questionnaire so it is known which delivery method is used for Audio Description; and generally improve quality control on the figures quoted (percentage of total TV output for specific channels rather than the broadcaster per se).

3.3.2 *Forecasts for each access service*

DTV4All was planning to look narrowly at statistics for the period to analogue shut-off to be completed by 2012 in Europe. However, this plan has been impacted by the change in the economic climate. The project has decided to look at the period 5-10 years ahead and make use of 3 scenarios due to the uncertainties arising from the economic climate. The future is unlikely to see the realisation of one of these three scenarios but rather a combination of elements of each of them.

The three scenarios are:

i.   *The Paradigm Shift*: digital television goes e-inclusive across the whole of Europe

ii. *The Haves and Have Nots*: steady progress in some parts of Europe and stagnation in others

iii. *Business As Usual*: economic constraints lead to no significant improvements over the decade.

(i) *The Paradigm Shift* scenario is the most optimistic of the three. Europe has overcome the economic downturn and has revisited the requirements of the United Nation's Convention on the Rights and Dignity of Persons with Disabilities. There is a clear awareness of the nature of the exclusion challenge, the e-inclusiveness options available for digital television and the cost and funding implications of scaling up access services. Examples of good practise from countries such as Catalonia, Finland, the Netherlands and the UK have been generalised and adopted across the continent. Broadcasters operating territory-wide channels with a

[2] Subtitling amongst EBU Members-Results of the latest EBU Survey into Access Services in Europe. Edgar Wilson European Broadcasting Union. Eurovision TV Summit: Subtitling Session Lucerne, 8 May 2009

significant market share all offer Subtitles for the Deaf and Hard-of-hearing not only for pre-recorded but also live programmes. The additional costs are to some degree offset by increased audience share for the channels offering such services. Audio Subtitles are used widely for foreign language programming to assure the accessibility for viewers with weak reading skills or reading impairments. The mobility of labour within Europe is being enhanced without giving rise to social exclusion in countries with significant immigrant populations by supporting the availability of subtitles for prime-time programmes in the main immigrant languages. Audio Description is widely used for films and television drama, in fact any TV genre with high production values and a long shelf life. Some of the marginal costs are offset by increasing sales of DVD boxes and/or online products.

(ii) *The Haves and Have Nots* scenario is the middle of the three. Some member states have overcome the economic downturn in 2011. Optimism has returned to the largest member states and some of the smaller member states in the north-west of Europe. There is a patchy awareness of the nature of the exclusion challenge, the e-inclusiveness options available for digital television and the cost and funding implications.

In the states which are back on track in terms of their economic growth, television here has revisited the requirements of the United Nation's Convention on the Rights and Dignity of Persons with Disabilities and broadcasters in these countries are doing broadly the same as in Scenario (i). However, member states in the south and east of Europe are still grappling with major economic and social challenges and do not feel able to find funding for a wide range of access services. Subtitling for the Deaf and Hard-of-hearing (SDH) is now offered in most of these states (pre-recorded programmes only) as the issues to do with re-speaking and language models for the languages spoken in their territories have not been resolved. In countries with a tradition of subtitling rather than dubbing, Audio Subtitles are also being offered on main channels to help those with poor reading skills or reading impairments. Audio Description is still a rarity. Some former state broadcasters have enhanced their standing among citizens by broadcasting both SDH and subtitles for immigrant groups.

(iii) *The Business as Usual* scenario is the most pessimistic of the three. Changing business models for commercial, free-to-air broadcasters mean that their existence is challenged. While access services such as SDH on major channels may be feasible, there is concern that making too arduous demands will undermine the commercial viability of these broadcasters. In other parts of Europe, in small member states where broadcasters operate on a shoestring and for specialised TV channels with a very small market share, the provision of access services presumes the availability of public funding either directly to the broadcaster or to the associations representing groups with disabilities. There are still states where broadcasters have consolidated work begun at the beginning of the 21st century, but the lack of a broad take-up of access services across Europe means that consumer electronics manufacturers have little incentive to extend access service capabilities in digital TV receivers.

3.3.3 Supply and Demand: which access services attempt to prevent the exclusion of the 12 viewer groups mentioned earlier in section 3?

Access service	Helps prevent the following groups from being excluded from watching television.........											
	viewers born deaf	viewers who have become deaf (oralists)	viewers who are hard of hearing	viewers who have difficulties following spontaneous speech	viewers of programmes in a foreign language	viewers (0-6 years) of programmes in a foreign language	viewers who are immigrants or refugees	viewers with receptive aphasias and/or cognitive impairments	viewers who are blind	viewers with visual impairments	viewers getting started with digital television	viewers using digital TV on a regular basis
Inter-lingual subtitles	?	+	+	+	++	0	+	?	0	0	0	0
Intra-lingual sub-titles, SDH	?	++	++	++	0	0	+	?	0	0	0	0
Audio Sub-titles, AS	0	0	0	0	+	+	+	++	+	+	0	0
Dubbing	0	0	0	0	++	+	+	+	+	+	0	0
Lector-ing	0	0	0	0	++	+	+	+	+	+	0	0
Audio Description, AD	0	0	0	0	+	+	+	+	++	+	0	0
Visual Signing, VS	++	?	0	0	++	0	0	0	0	0	0	0

This above table shows the mature access services listed vertically and the extent to which they prevent exclusion among the 12 groups at risk of being excluded. ++ denotes the main target group, whereas + means that the group in question is also helped. In cases where a group might be helped to a limited degree, a ? has been added. Where a service is inappropriate or irrelevant, this is indicated by 0.

This table clarifies one of the major challenges of supply and demand trade-offs: when the same service addresses the needs of various groups, what are the criteria for optimising the service? We have many of the same policy and strategy challenges as those facing public health care provision where explicit priorities are difficult to agree upon and respond to.

4 Evaluation Reports

4.1 Reports Status

The following list outlines the contributing studies to this report and describes the extent to which they are final or will be provided in a new iteration in May 2010. The studies included here represent a rich and varied collection of research both in terms of their methods, findings and presentation. They also address important lacunae in our understanding of the workings of mature access services. To help the reader identify central issues and conclusions, we have added sections 5 and 6 that build on what is reported in Section 4.

Broadcasters Subtitling Tests

1)	Final Report from DR	Status: Delivered included within D2.5
2)	Final Report from RBB	Status: Delivered included within D2.5
3)	Final Report from TVC	Status: Awaiting Data analysis. Final report available in May 2010 Report.

Universities' Subtitling Tests

4)	Final results Spain	Status: delivered included within D2.5
5)	Final Report from UK	Status: Interim Report included in D2.5, awaiting final data analysis. Final version available in May 2010 report.
6)	Final Results from Denmark	Status: Interim Report included in D2.5. Final version available in May 2010 report.
7)	Final Results from Italy	Status: Interim Report included in D2.5. Final version available in May 2010 report.
8)	Final results from Poland	Status: Available in May 2010 Report

Audio Subtitling

9)	Conclusions for AS	Status: Available in May 2010 Report

Audio Description

10)	Results from AD Deliverable 2(Poland)	Status: Pear Tree report included in D2.5

4.2 DR Mature Services Evaluation Report

Summary This final report focuses on live subtitles for the deaf and hard of hearing. DR conducted an exploratory study on live subtitles used in conjunction with the main news on DR1 to establish whether there were significant accessibility issues. A sample of 27 subjects watched a recording of the main news from June 19, 2009, that contained pre-recorded, pre-prepared and live subtitles for both inter-lingual and intra-lingual communication. User responses and the subsequent interviews revealed that there were significant problems with live subtitles. The delay of some 7 seconds was the main obstacle to user satisfaction. The study was used to argue the case for local buffering of video and audio streams in personal video recorders in order to re-synchronise the subtitles and the video/audio to which they refer. The results of the study also highlight the need for increased care when selecting subjects for accessibility service tests.

Introduction

One central area of interactive television that tends to be overlooked is accessibility, or e-inclusiveness. A European Commission policy document from 2005 noted that "People with disabilities constitute about 15% of the European population and many of them encounter barriers when using ICT products and services"…"18% of the European population was aged over 60 in 1990, while this is expected to rise to 30% by 2030." … "The implications are clear: making the benefits of ICT available to the widest possible number of people is a social, ethical and political imperative."

Hearing-related impairments are thought to be the most widespread. The most common means of addressing them is to offer in vision or opt-in subtitles for the deaf and hard-of-hearing (SDH), also termed close captioning in the USA and some other English-speaking territories.

While the production of subtitles for pre-recorded or pre-produced television programmes has a long history, providing subtitles for live programmes has been with us for a relatively short period. Live subtitling in the UK emerged in response to regulatory demands arising from the 2003 Communications Act to move towards 100% subtitling of television programming on the main TV channels – which has already been achieved. Other European countries are moving in the same direction. One should also keep in mind that subtitles are also used as a means to bridge language barriers. In the Benelux, the Nordic countries and the UK, subtitles are used for inter-lingual communication. In France, Germany and most of Mediterranean Europe dubbing is the most widespread means of making programmes in foreign languages accessible.

In Denmark, DR has been running both in vision and opt-in subtitling for the deaf and hard of hearing using Teletext for more than a decade, and started the transition to DVB-Subtitling in April 2006. A major user survey was conducted on subtitles in 1996 which forms the basis of policy and production priorities to this day.

Live subtitling using re-speaking was introduced in 2006. DR's public service agreement calls for an increase in subtitling by the end of 2010 so that nearly 100% of DR programming on DR1 and DR2 will have subtitles. This means a significant expansion in live subtitling for news, sports, current affairs and events.

Television programmes such as the main news at 6:30 pm are broadcast with subtitles for both intra- and inter-lingual communication. Inter-lingual subtitles are invariably pre-produced. SDH subtitles may be pre-recorded, pre-produced (e.g. the anchor's commentary is scripted and played out manually or by triggers from the teleprompter) or live. There is considerable anecdotal evidence to suggest that live subtitles constitute a major challenge for broadcasters and viewers alike.

The challenge of live subtitles

Providing live subtitling is a challenging matter. It normally requires
- Stenography using soon-to-be obsolete machines and staff with a long and specialised training;
- the TV3 (TV de Catalonia) set-up where a team of up to six subtitlers take turns to manually key-in small chunks of the required subtitles as the subtitler listens to the programme; or
- "re-speaking"), where the subtitler listens to the programme and dictates the subtitles (a compressed version of what was said) into a speech-to-text system.

Speech recognition systems are not used directly, as this would produce a transcription that requires a very high reading speed on the part of the viewer.

Regardless of how live subtitles are produced, there is a delay in relation to the programme of three to ten seconds. In The Netherlands public service broadcasters introduce a delay in live programming (on cable) of 10 seconds, allowing for the subtitles to be shown in synch with the content.

There are several problems with live subtitling:
- the quality of the subtitles themselves - the extent to which linguistic compression and the re-speaking system lead to semantic or factual errors,
- the way subtitles are displayed on screen (roll on rather than pop up) and
- the delay in showing the subtitles in relation to the video and audio to which they refer.

Three international service providers that use re-speaking solutions (IMS, ITFC, and Red Bee Media) claim up to 96-97% content accuracy for widely-spoken languages such as English. There are alternative solutions available for widely spoken languages such as English, but options for many less-widely-spoken European languages are either limited or non-existent.

Broadcasters offering live subtitles and using re-speaking systems report that there has been criticism of the quality of live subtitles, primarily semantic errors (misspellings, incongruous and omitted words).

Live subtitles also differ from their pre-produced counterparts in that text is presented as soon as it is available and the presentation conventions are different. The delivery rate may vary making demands on the viewer's reading speed.

The focus of the quality debate has been on semantic errors. Less emphasis has been given to presentation and the significance of the delay. When the exploratory study described below was designed, there were no known formal evaluations of live subtitling in the research

literature, only informal feedback from call centres and broadcasters, although two such studies are either in progress or will shortly be published.

DR's study of live subtitles (August-October 2009)

As part of its work in the EU-funded DTV4All project, DR conducted an exploratory user study of live subtitles. News was chosen for study. The reasons for this are that:

- The main news at 6:30 pm already offers live subtitles
- News is one of the critical genres in terms of its complexity involving a mix of pre-produced and live subtitles
- News is a genre with which the subjects would be familiar and
- Many elderly use television news as their main source of information about what is going on in society.

Other live genre, sport, factual, general election coverage, events, may well represent slightly different challenges for live subtitling, as they contain a higher proportion of spontaneous speech at a higher delivery rate.

Even so, results for a study of television news will be indicative of how users perceive live subtitles, and there is always the option of conducting additional studies on other genre if this is deemed necessary.

This was the rationale for the exploratory study with Danish viewers with a range of hearing impairments to assess the relative importance of three issues:

- Semantic errors
- Presentation differences between live and pre-recorded subtitles and
- The delay between the programming and SDH subtitles.

Experimental set-up

a. Introduction to the study. A folder was sent to participants in advance.
b. Briefing of individual viewers at DR (late afternoon)
c. Training in the use of a buzzer, an open source tool supported by DTV4All and the EBU for recording any output from a television set, marking events on the file and allowing for annotations.
d. Watch TV-Avisen (25 minutes)
e. The observer makes notes on viewer reactions during the 25 minute period
f. The viewer presses a buzzer every time there is something that interferes with their viewing.
g. The observer and the viewer review the recording of the programme with time markers indicating points at which the viewer pressed the buzzer.
h. The observer takes the viewer through each buzzer point, discusses the viewer's reactions and compares with their own notes from observation

i. Observer and viewer agree on annotation that the observer records in the file

j. Observer saves the recording with all annotations for future reference

k. Observer administers a short questionnaire saved on Survey Monkey (same ID as the file, no name) addressing:

- Background parameters (demographic, use of access services)
- Self-assessment of capability using same scales as the largest European self-reporting study on capabilities and impairments.

l. Rounding off – arranging for transport home for the viewer.

Three subjects with serious hearing impairments helped validate the procedures before the study itself began. The user panel in the study (30 people) was aged between 40 and 96 with a wide range of visual, hearing, motor and cognitive impairments. It was put together with the aid of a large Centre for Special Education of Adults in the Municipality of Copenhagen who help some 5,000 adults a year after suffering accidents or illness. Three of the panel were unable to take part due to illness, so the study is based on 27 subjects.

The kinds of impairments found in the user group are tabulated below:

Self-administered capability assessment for the 27 subjects in the panel

Subject Alias	Hard of hearing (minor impairment)	Hard of hearing (major impairment)	Deaf	Partially sighted (minor impairment)	Partially sighted (major impairment)	Blind	Short-term memory (minor impairment)	Short term memory (major impairment)	Mobility, impaired limb Movement and/or dexterity	Paralysis on one side of body
01AH	X			x			x			
02JE						x				
03BW										
04HC		x			x		x			
05MJ				x				x	x	x
06VS		x			x		x			
07LK						x				
08LL										
09IC	X			x			x			
10CH		x		x					x	
11AM		x		x					x	
12 HJ		x			x					
13 HJ								x	x	x
14ÅN					x					
15LB		x								
16JT								x		
17RB		x								

18AD					x			x	x	
19IP	x			x					x	
20KB				x						
21HN				x						
22KA			x	x						
23RJ										
24??					x			x	x	
25AG				x			x			x
26HJ									x	
27IK	x			x						

Subjects watched the TV news alone in an observation room with the look and feel of a living room. In most cases they were seated in an armchair with a cup of coffee or tea in front of a flat panel TV mounted on the wall, a rough approximation to watching the news at home. During the test, the test person could be monitored from a separate room with the aid of 4 surveillance cameras and directional microphones. The news programme contained an introduction, 7 main news items with two or more segments each and an outro:

4.2.1 News items in the "TV-Avis" from June 19 2009

News Segment	Description of news segment
1	Intro: Claus Bundgaard Poulsen (TV anchor) starts the news
2a	Three Danish soldiers killed in Afghanistan - Introduction
2b	Claus Bundgaard interviews Head of the Army Operational Command, Major General Niels Henrik Bundsgard
2c	Claus Bundgaard about casualties in Afghanistan
2d	Interview between Anne-Katrine Bondo (journalist) and an officer
2e	Claus Bundgaard about departure of a new team of soldiers
2f	Interview with soldier Peter Thorsøe
2g	Claus Bundgaard rounds off Afghanistan coverage
3a	Intro: 5 Iraqis arrested
3b	Claus Bundgaard interviews refugees & the Police Immigration Dept.
3c	Claus Bundgaard about forced deportations
3d	Interview with Iraqis facing forced deportation; rounding off
4a	Intro: Burglars
4b	Interview on burglary
4c	Claus Bundgaard - security company in the residential neighbor-hood of Kolding
4d	Interviews in Kolding
4e	Claus Bundgaard finishes Release:
5a	Intro: Row Over Payment of private hospitals
5b	Feature on Lars Lokke (Danish Prime Minister) and State Auditors
5c	Claus Bundgaard interviewes Ask Rostrup (political commentator) on political significance
6a	Short news: Belfast and romances

6b	Short news: struggle for survival for airlines
7a	Intro: Iran - Presidential election demonstrations
7b	Iran - demonstration interviews in Farsi and Danish
7c	Claus Bundgaard rounds off Iran presidential elections
8a	Intro: Old Town in Aarhus
8b	Feature on the building from Copenhagen
8c	Claus Bundgaard rounds off
	Transition to the evening show

Results

The viewer reactions were collated and tabulated. As some subjects pressed many times in segments that gave them problems while others chose just to press once or twice, it was agreed to score each segment of each item according to the number of subjects that pressed the buzzer at least once.

Figure 2 shows the results of the study. Each segment has been colour-coded: green (light grey) for Danish-to-Danish pre-recorded subtitles, Yellow (hatched) for foreign language-to-Danish pre-recorded subtitles and red (dark grey) for live subtitles (Danish-to-Danish):
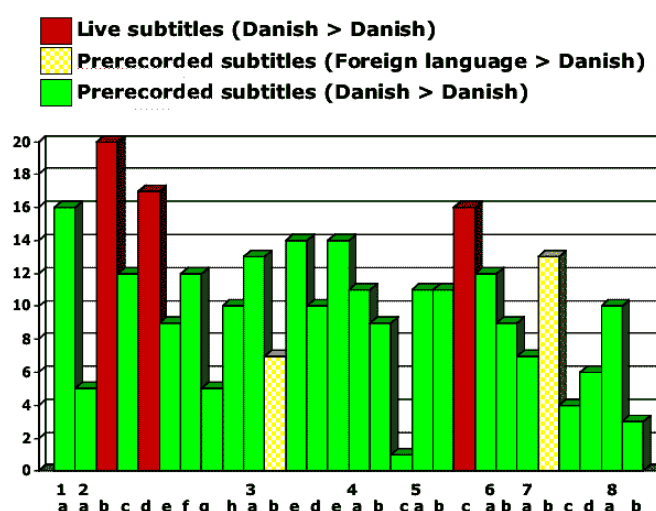

Figure 2: Number of subjects clicking at least once during each news item/segment

Between half and two-thirds of the panel reacted during segments with live subtitles. The figure was markedly lower for pre-recorded subtitles.

The follow-up interviews confirmed and explained the buzzer results. Live subtitles were very difficult to follow, the reason being the delay of typically 7 seconds between what was said and the subtitles appearing. The semantic errors and the differences in presentation convention were commented on, but in no case were these regarded as being "show-stoppers" by the viewers.

Quote: "If the subtitles from one TV news item overlap the next news item, it is impossible for me to keep up with the programme"[3]

---

[3] Female, 41-60 years, with higher education, hearing impaired, with slight visual impairment, thought to have an average reading speed.

Those who are good readers chose in some cases not to listen to the audio. Poor readers were obliged to try to understand what they could. If hearing was still an option, subjects adjusted their hearing aids and concentrated on the commentary when it was in Danish, only using the subtitles as a matter of last resort.

Quote: "I cannot keep up with the subtitles. I look at the picture and listen to the speaker instead."[4]

The pre-recorded subtitles fared better. The problems were predominantly associated with subject's slow reading speed and distractions caused extraneous features on screen or in the commentary.

The differences between the response rates for live and pre-recorded segments are statistically significant.

The study not only provided inputs concerning the three issues originally identified but also to do with other aspects of television news presentation that unintentionally have a negative impact on the viewer's ability to keep up. These are out of scope in this study, but have been noted for future work in this area.

Discussion

The delay between the video and audio and the appearance of subtitles will always exist. It is a natural consequence of the way in which live subtitles are made. The latency can be reduced, and in the case of the UK, the delay has been reduced to as little as 3 seconds. This is still a problem for viewers, as it increases the cognitive load for those with various kinds of impairments and prevents the synergies of listening and viewing (e.g. decoding body language and lip-reading).

The Netherlands experience of delaying the signal by 10 seconds at the head end during play-out has a number of editorial and legal implications for broadcasters of live programmes. TV newsrooms are usually working against the clock. Anything making life more complex or leading to delays is unlikely to be understood, let alone accepted by editorial teams.

For this reason there are good arguments for looking at mechanisms in the digital receiver to re-synchronise the video/audio and the sub-titles by using, say, a solid state buffer to delay the incoming video and audio so that the delay in showing the subtitles (normally fairly constant for a given programme) can be reduced or eliminated. If the subtitles are given an "artificial" presentation timestamp 7 seconds earlier than would otherwise be the case, these will be shown in synch with the audio and video when played from the buffer.

In coming years, with the emergence of hybrid broadcast/broadband delivery there will be the need to use presentation time stamps and a mechanism to resynchronise audio-visual content that is delivered to the receiver through separate channels.

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[4] Male, 61 - 80 years, 7 years of schooling, assesses his reading speed to be low. Deaf in one ear, with impaired hearing in the other and visually impaired.

These findings were submitted in the form of a memo to NORDIG, the Nordic standardisation body that deals with digital television and personal video recorders in the region. At their meeting of December 1, 2009, the findings were accepted and it is hoped that the recommendation to extend the functional specification of the NORDIG Personal Video Recorder (PVR) standard will be adopted. As the Nordic and UK free-to-air standards for PVRs are almost identical, there appear to be synergies – benefits of scale – if the buffer were adopted for the UK market, too.

Conclusion

Live subtitling in its current state does not lead to significant improvements in accessibility for a significant proportion of viewers due to the delay between the signal and the subtitles. Buffering the video and audio streams to resynchronise the content in programmes with live subtitles represents a realistic option to take corrective action.

4.2.2   *Reflections in relation to samples and studies of SDH subtitles*

In our background reading of literature on the efficacy of subtitles the authors noted that a number of studies were conducted on fellow academics and/or students. To explore the challenges viewers experience when watching the news and reading subtitles and draw meaningful inferences about the multifaceted nature of the challenge, the sample in such studies needs to reflect the wide variety of impairments found in the population at large. Studies such as Grundy (1999) discussed in Looms (2009) indicate that the incidence of one or more impairments increases markedly among those over 65 years of age, one of the audiences well-represented among viewers of television news.

Elderly people are often challenged by several physical and cognitive impairments that may have an adverse impact on their overall television viewing. Yet the elderly are often under-represented in studies on the efficacy of subtitling for the deaf and hard of hearing. Asking subjects to rate their capabilities – including their perceptions of reading speed – and ensuring that samples contain a broad range of capabilities would seem to be self-evident when trying to understand challenges, approaches and viewer communication strategies in relation to subtitles.

Our initial response was to discuss the design of our study with a research audiologist at a major manufacturer of hearing aids. We had hoped to "borrow" subjects from their user panels and thus benefit from having a sample with the necessary breadth and depth. It was through this contact that we were recommended to recruit our sample with the aid of the centre for special education mentioned earlier. Without any breach of professional confidence, they approached a representative sample of subjects and asked them for volunteers. Only those choosing to take part divulged their identities. In this manner, a balanced and varied sample was achieved without there being any need to release personal data to us (a third party), apart from a name, address and phone number.

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4.3 RBB Mature Services Evaluation report

RBB – Overview of the test

Introduction

RBB's DVB-subtitle pilot has been described in great detail in the preceding WP2 deliverables. This chapter sums up the most important facts in order to provide the context for the RBB test results presented. What is described in more detail than before is the test method including the test parameters as this is deemed very important in order to provide a context for the evaluation of the data provided.

RBB tested DVB-subtitles from February 2009 until November 2009 with 50 hearing impaired and deaf testers. DVB-subtitles were new to RBB and were produced and played out first in the context of DTV4All. In Germany up to now only ZDF and ARTE (only for its HD-Channel) have been broadcasting DVB-subtitles. To sum up RBB's motivation in short: The project offered us a great chance: extensive testing could take place before actually introducing a new technology/service in regular operation. While usually questions of technical feasibility are the prominent priority when introducing a new technology/service, the DTV4All pilot offered the chance to prepare the service roll out with extensive user tests involving a large group of potential target users for quite a long period of time.

Starting from the assumption that DVB-subtitles are a future-proof and valuable service offering an improvement for the users as compared to the current teletext subtitles, we wanted to have the users' opinions a) on whether they thought this new type of subtitles was generally an improvement and b) on what would be the optimum look-and-feel of these new subtitles from their point of view. In turn, the aim of the test was *not* to find out about the language, the content or the positioning of subtitles (even though the test provided valuable insights on this as a „side effect"). Given the many different options of lay-outing DVB-subtitles, the idea was to get the users' judgement on these design variations. And, of course, to deduce from this general conclusions that are of value to other European broadcasters.
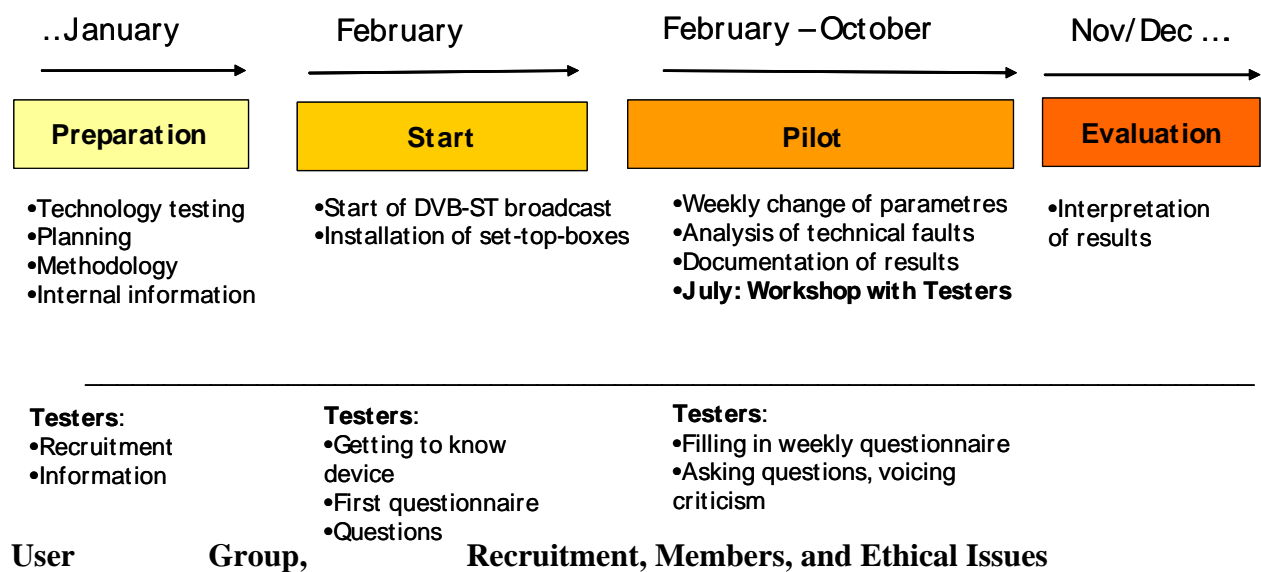
Set-up

The DVB-subtitles were produced by transcoding RBB's teletext subtitles, with the FAB Subtitler XCD, and played out on a regular basis via DVB-T to altogether 1.6 million set-top-boxes in the region. Traditional teletext was still available as usual and could be used in parallel.

In order to ensure that all test users would see the same thing so that comments could be evaluated on equal grounds, the users were equipped with the same set-top-box, namely, the Philips DTR 220. (Please see **Deliverable 2.3** for a detailed description of the selection of the technology based on RBB's tests). The devices were installed at users' homes by a member of the project team who also explained testing procedures and handling of the box in detail and handed out manuals in simple language. They were accompanied by a sign language interpreter in the case of the deaf users.

The testing week always lasted from Monday 12.00 am until Sunday 12.00 pm. On Monday, at 12.00 am the subtitle design was changed. On the preceding Friday the users received a questionnaire either by mail, post or fax which a) listed all the subtitled programmes of the test week to come and b) offered a combination of quantitative and qualitative questions on the subtitle design of the current test week. They were asked to submit the completed questionnaire by Tuesday of the week following the respective testing week.

Below you will find an overview of the test scheme for 2009:

2009:

...January	February	February – October	Nov/Dec ...
Preparation	**Start**	**Pilot**	**Evaluation**
•Technology testing •Planning •Methodology •Internal information	•Start of DVB-ST broadcast •Installation of set-top-boxes	•Weekly change of parametres •Analysis of technical faults •Documentation of results •**July: Workshop with Testers**	•Interpretation of results
Testers: •Recruitment •Information	**Testers**: •Getting to know device •First questionnaire •Questions	**Testers**: •Filling in weekly questionnaire •Asking questions, voicing criticism	

User Group, Recruitment, Members, and Ethical Issues

RBB has a longstanding co-operation with the two regional umbrella organisations for disabled people. The umbrella organisations are associated with the respective federal governments in Berlin and in Brandenburg. They represent all disability organisations.

In October 2008 a meeting was held at RBB where DTV4All was presented in detail and the umbrella organisations were asked for their support. Reactions to the project were very positive and interested. In the aftermath of the meeting one coordinating person for each of Berlin and Brandenburg was nominated. These two persons each represented a disability organisation for hearing impaired and deaf persons. They became RBB's contact persons and recruited possible candidates through their given contacts and also by putting advertisements into their publications. RBB then got in touch with the users, sent them a welcome letter with detailed information and a form for contact and communication details. Dates were arranged for instalment of set-top-boxes at their home. Here, RBB also organised a signer for all deaf persons; signers were also commissioned in case of technical problems and whenever extra communication beside the written communication became necessary during the duration of the tests.

In February 2008, the users received a second letter explaining in detail the proceedings of the tests, a sample questionnaire and the technical background of the tests as well as a short contract detailing their willingness to participate regularly in the tests and to have their data stored internally at RBB for a limited period of time (name, address, type of disability). All written communication was checked by experts on the appropriateness of the language for

deaf persons (short sentences, clarity of expressions). In July 2009 a workshop was held at the RBB premises in Potsdam which had been asked for by the testers and which offered very valuable insights as to their wishes and preferences of subtitle design.

Basically, communication with the testers throughout the test went smoothly and more or less free of misunderstandings. It was, however, much more work effort needed than had been anticipated. On the one hand the testers were more "loyal" and committed than we had thought beforehand. We were very delighted about the friendliness, the enthusiasm and grateful appreciation of most testers. On the other hand a lot of work effort was needed for reminding many testers of the timely submission of the questionnaires and, at a later stage, for sending "motivation letters" when we could see that motivation was dwindling towards the end of the test. Also, we really made a point of replying quickly, politely and in detail to each comment or question on the DVB-subtitles or on RBB-subtitles in general, which were either voiced directly or as major comments or criticism on the completed questionnaires. Sometimes this involved a good bit of research internally at RBB when, for example, a tester wanted to know why a film that was subtitled had not been played out with subtitles, etc. We took all feedback very seriously and also did our best to give the testers the feeling that we valued their input very much.

Concerning completing the questionnaire we knew that a method involving writing and especially written free comments might be problematic in the face of many deaf people having difficulties concerning written communication. Therefore, the testers were ensured that the text comments were only an additional, voluntary option. They were encouraged that if they chose this option not to think of orthography.

Ethical issues were dealt with in more detail in Deliverable D2.4.

There were two categories of users, "deaf" and "hearing-impaired". We managed to establish a user group representing these groups as well as men and women more or less equally. Originally the group encompassed 55 persons. Three people left the group quite early. From test week 8 until test week 31 there was a stable group of 52 persons which looked like this:

Deaf	26
Hearing impaired	26
	52

		Deaf	Hearing impaired
Male	27	14	13
Female	25	12	13

From test week 32 onwards there was one person less, in the last two test weeks there were only 48 left. There were six weeks where less than 39 testers participated. These were test weeks 24 to 28 (August-holiday season!) and test week 31 (in September – dwindling motivation …). **These weeks' data are not included in the statistical evaluation as we only included data based on the input of at least 39 testers.** Overall, the range of participation (i.e. actually sending back a completed questionnaire) was between 48 and 32 testers per week. On average, 42 testers sent back a questionnaire when including the six test weeks where there were less than 39 testers and 43 testers when excluding these six weeks.
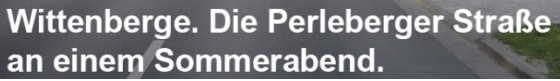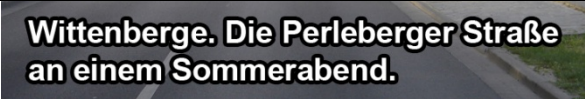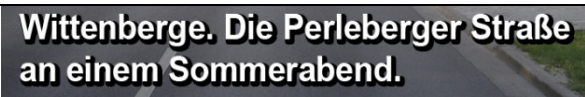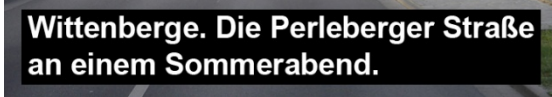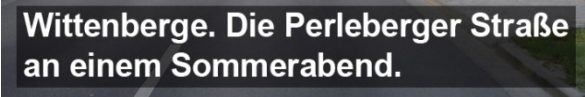
Method

The method of our test has been described in detail in deliverable D2.3, Interim Report on Pilot Services. This will hopefully become even more concrete in this document.
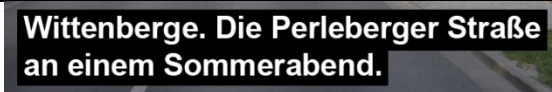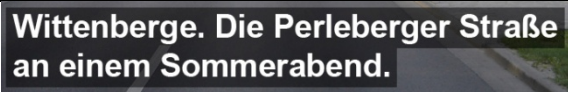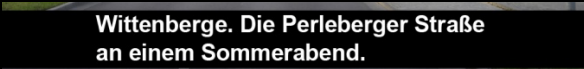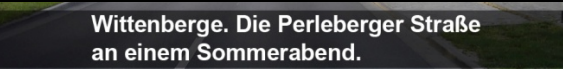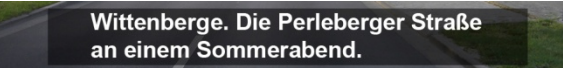
Possible Design Parameters

The technology that was finally chosen after various technical tests - the FAB Subtitler XCD - offers numerous possibilities for designing the subtitles. The following parameters for creating the subtitle layout are offered:

- **Font type:** any font (or icon) that can be stored on the machine. As the text is sent as bitmaps, the font does not have to be available on the DVB-T set-top box.
- **Font size**: the size is only limited by visual parameters.
- **Output style**: there are a number of options for the output style of the subtitles which are illustrated in the following table:

	Text only	*Outline* **and** *shadow*
Examples	Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend. Wittenberge. Die Perleberger Straße an einem Sommerabend.
Explanation		Each letter is rimmed or edged in order to provide more contrast.

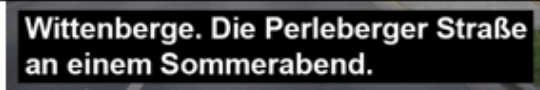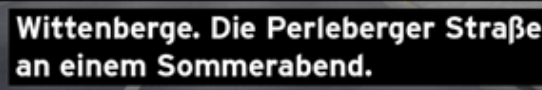|	**Text in** *full box* **black**	**Text in** *full box* **semi-transparent**
Examples	Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend.
Explanation	This is a box that is in size adapted to the longest line of the text. The black version of the full box is often also called "solid box".	The system offers the option to choose different grades of semi-transparency, starting from Black (transparency 0) to a very transparent light grey background (transparency 224). The transparency value shown above is 120. This type of background is sometimes also called "ghost".

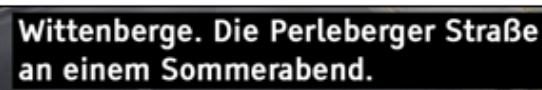|	Text in *normal box* black	Text in *normal box* semi-transparent
Examples	Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend.
Explanation	This is a type of box which is adapted to the length of each text line ("stair effect"). It is sometimes also called "block".	Like the full box above, the normal box can also be depicted in different grades of transparency ("ghost…")

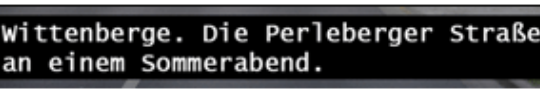|	*Band* within / without safe caption area	*Band* within / without safe caption area semi-transparent
Examples	Wittenberge. Die Perleberger Straße an einem Sommerabend. / Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend. / Wittenberge. Die Perleberger Straße an einem Sommerabend.
Explanation	The band is a background stripe that covers the width of the TV screen, either in the safe caption area (then the effect is similar to that of the full box above) or also outside the safe area.	Again, this option "band" can also be depicted in semi-transparent style of different grades.

Design Parameters selected for the test

From this "pool of options" the following design options were chosen to be tested in a number of combinations:

1. Chosen Font Types

	Arial	RBB Interstate Light
Example	Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend.
Justification	This font was chosen as a popular, clear font without serifs.	This font is used for all of RBB's external communications from screen design to print. It is quite similar to Arial in its clarity. We wanted to hear the users' opinion about it as it would make sense to use it from a Corporate Identity-point of view.

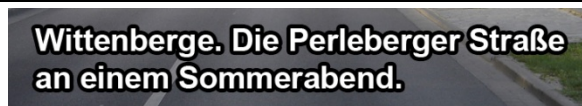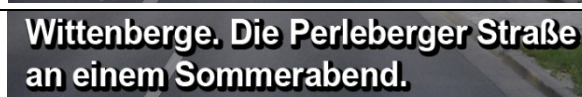|	ARD Font the antiqua	Tiresias Screenfont
Example	Wittenberge. Die Perleberger Straße an einem Sommerabend.	Wittenberge. Die Perleberger Straße an einem Sommerabend.
Justification	Even though serifs are controversial for good readability on screen we wanted a firsthand opinion on it. Again we chose a company font instead of Times New Roman. This was also done considering the possibility that there might be a joint decision at some stage of ARD's introducing DVB-subtitles of using this as a uniform style for all ARD affiliates.	This font was originally designed for subtitling on UK digital television. According to RNIB the design was carried out with specific reference to persons with visual impairments and has been tested by the public.

	Lucida Console
Example	Wittenberge. Die Perleberger Straße an einem Sommerabend.
Justification	This is the font used for the current *teletext* subtitles.
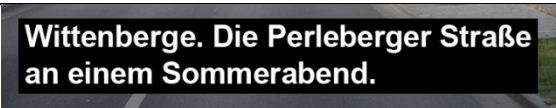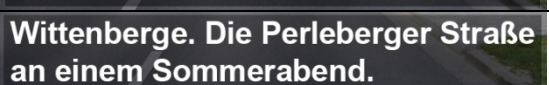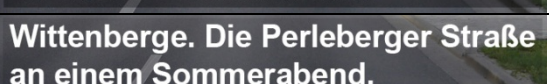
2. Chosen Font Sizes

Type of Font	Small	Small to Medium	Medium	Medium to Large	Large
Arial	32		40		44
RBB Interstate	32		40	42	45
ARD Font	35	37	40	43	48
Lucida Console	27		33		37
Tiresias Screenfont	41		45		
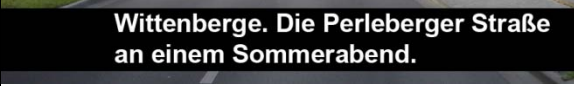
Each of the five selected fonts was tested in at least three different sizes. "Small" was modelled on the teletext standard size, "medium" meant twice the size of this standard size and was equal to the teletext size currently used by RBB and the other ARD affiliates. "Large" was defined by offering the largest possible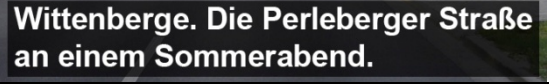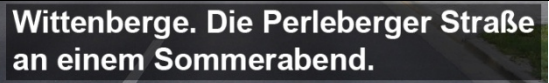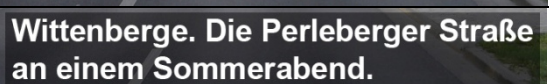 size so that all letters would actually fit on the screen. In five instances/test weeks "in between sizes" were tried out. This was not done systematically but in order to learn about tendencies and have a more differentiated result by verifying or falsifying the three fixed standard sizes – the optimum might well have been between the offered sizes. The size values (points of font) as shown in the table are naturally different for each font and size, as the "same size" (e.g. 10 pt.) looks quite different on the screen for each font. Therefore, the (point) sizes were chosen in a way that the actual size on the screen was the same.

3. Output Styles Chosen for the Test

	Outline and *Shadow*
Examples	
Justification	The two variants seem to be an attractive option as less from the TV picture is blocked out than in conventional teletext. Comment: We decided not to include "*only text*" in the user test as the contrast there is very obviously too poor.

	Text in *full box* black	Text in *full box* semi-transparent in different grades of transparency	
Examples		Grade 0 black	
		80	
		120	
		140	
		160	
		224	
Justification	This is the box well known from conventional teletext. We assumed that it might be popular as people are used to it and as it provides optimum contrast.		Such semi-transparency is not possible with conventional teletext. Its advantage: less of the TV picture is blocked out. Potential disadvantage: less contrast the more transparent the background is. With the full box all transparencies were tested, except for 224. This was due to the fact that a band with 224 early in the test was judged so negatively that we did not test this high transparency any more.

	Text in *normal box* black	Text in *normal box* semi-transparent
Example		
Justification	This adapted box has the advantage that it only covers as much of the TV picture as necessary, still providing utmost contrast for the subtitles.	Same as above in the case of full box. Here we only tested transparencies 0 and 80 because we estimated that the results for full box concerning transparency would also be applicable for these of the normal box.

	Band outside safe caption area black	Band within/without safe caption area semi-transparent
Examples	Wittenberge. Die Perleberger Straße an einem Sommerabend.	
Justification	We chose only to test a band that covers the width of the TV screen outside the safe area because a band inside the safe caption area is not really different from "full box" in its optical impression.	Same as above in the case of full box. Here we tested transparencies 0, 80, 120, 160, 224.

The Questionnaire

The questionnaire combined quantitative and qualitative questions. Users were marking the individual design parameters and also the combination of these parameters. The subtitle design of each respective test week on the whole was to be evaluated using marks from 1 (very good) to 5 (dissatisfying), similar to the German school marking system. Users could also add free text comments on the subtitles and their marks. The second part of the questionnaire dealt with technical faults and problems. This was, of course, important for us in order to find out about potential problems and by and by try to remove them.

1. Topic: Design of this week's subtitles

Scale from 1 to 5	1 …very good	2 …good	3 …average	4 …bad	5 …very bad
Font size is…					
Font type is…					
Output style is…					
The overall design of the subtitles this week is…					

1.1 Please give us some comments on your above marking of the subtitles:

Font size:	
Font type:	
Output style:	
Further comments on design of this weeks subtitles:	

2. Topic: Technical Problems / faulty depiction of subtitles

Problem		Programme with Date / Time
I could not see any subtitles	[ ]	
The subtitles were not complete	[ ]	
There were parts I could not decipher	[ ]	
Subtitles were "jumping"	[ ]	

2.1 Have you got any comments on "Technical Problems / faulty depiction of subtitles"?

3. Here you can write down general comments

Test plan

Before starting the test, we fixed the basic parameters which we wanted to test. Given the vast number of combination options of the different design parameters, we had to limit the parameters which are described above and the combinations to be tested in "only" 36 test weeks. More importantly, a mathematical approach to join each parameter with each other to enable maximum comparability might seem useful for statistical analysis of the acceptance of every single option per parameter. However, offering a specific option again and again even though a majority of users had repeatedly stated that they dislike this option, might have caused test users to quit the testing community – a risk that might have ruined the comparability of test data.

We therefore choose a flexible approach: we combined mandatory test parameters with flexible reactions to the feedback obtained during the testing procedure, i.e. after each testing week. The mandatory elements were the five selected fonts. These were to be tested five weeks each and each of these were to be tried out in at least three different sizes and in combination with variations of "box" and "band" as well as in "outline" style.

We therefore fixed the test plan which is depicted below only for the first six weeks and from test week seven onwards decided about next weeks' testing parameters once we had the evaluation result for the previous week. As a reaction to this regular analysis of the quantitative and qualitative feedback from the questionnaires, those options with the lowest marks and with the most convincing contra-arguments were taken from the list. For example, very early in the test it became clear that the testers did not at all like a black band. Therefore, this option was left out from then on. With this step by step approach the test came by and by to a reduced number of optimum choices which will be described below.

From week 26 - 29 we determined the best rated single parameters and overall-look-and-feel tested in weeks 1-25 (five fonts, five weeks each) and tested them again in different combinations[5]. In week 30 we tested a repetition of the best-rated overall-look-and-feel so far, as the same parameter sets might be evaluated differently in different test weeks. [6] Weeks 31-32 then aimed at confirming the best parameter combinations by repeating those sets with the best delta values (ranks #1 and #2). For weeks 33-36 we took into consideration the now available test results and tested the combination of the best rated parameters.

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[5] In weeks 26-27 we recombined those parameters with the best absolute results (i.e. top ranks in "Very good" and "Good" >> e.g. week 26: best font: Arial, best size for this font: 40, most popular design: outline). In weeks 28-29 we recombined those parameters with the best delta values (Solutions that were marked "very good" [1], "good" [2] and "average" [3] minus the statistical values for "bad" [4] and "very bad"[5])).

[6] As #1 would have been the same as in week 26 (Arial, 40px, Outline), this was not repeated. Instead the test went on with rank #2 in test week 30.

The table below shows what was actually tested and when:

Test-week	Font Type	Small	Small to Medium	Medium	Medium to Large	Large	Layout (Background)
1	Arial	X					Full Box, transparency 0
2	Arial			x			Full Box, transparency 160
3	Arial					x	Full Box, transparency 160
4	Arial			x			Full Box, transparency 120
5	Arial			x			Text with outline, 6 pixel
6	rbb Interstate	X					Band, transparency 0
7	rbb Interstate			x			Band, transparency 160
8	rbb Interstate					x	Band, transparency 224
9	rbb Interstate			x			Text with outline, 6 pixel
10	rbb Interstate				x		Band, transparency 120
11	ARD Font	X					Full Box, transparency 140
12	ARD Font				x		Normal Box, transparency 80
13	ARD Font					x	Text with shadow, 4 pixel, Offset 3 pixel (lower right)
14	ARD Font			x			Text with outline, 6 pixel
15	ARD Font		x				Normal Box, transparency 0
16	Lucida Console	X					Full Box, transparency 0
17	Lucida Console			x			Full Box, transparency 80
18	Lucida Console					x	Normal Box, transparency 80
19	Lucida Console			x			Band, transparency 80
20	Lucida Console			x			Text with outline, 6 pixel
21	Tiresias Screenfont	X					Text with outline, 6 pixel
22	Tiresias Screenfont			x			Normal Box, transparency 80
23	Tiresias Screenfont			x			Text with outline, 6 pixel
24	Tiresias Screenfont			x			Normal Box, transparency 80
25	Tiresias Screenfont			x			Text with outline, 6 pixel
26	Arial			x			Text with outline, 6 pixel
27	Tiresias Screenfont			x			Normal Box, transparency 0
28	rbb interstate			x			Normal Box, transparency 80
29	Arial			x			Full Box, transparency 80
30	rbb interstate				x		Band, transparency 120
31	rbb interstate			x			Text with outline, 6 pixel
32	ARD Font		x				Normal Box, transparency 0
33	Tiresias Screenfont			x			Normal Box, transparency 80

2 Interim Findings

2.1 Broadcasters and the mature access services evaluated

RBB – End User Test Results

Evaluation Method

Throughout the duration of the test, all quantitative results were collected in a table. With this, previous test weeks' data was analysed on a weekly basis in order to update the test plan as described above. Furthermore, a document was created for each week which summarised the statistical data and, very importantly, all free comments. Users' general comments were sent regularly to RBB's subtitle editors.

For this deliverable we first evaluated the statistical results and finally took into consideration the vast amount of free comments in order to either confirm or check the quantitative evaluation.

Evaluating the quantitative feedback as documented in this deliverable was led by the following considerations: Our overall target was to find out the optimum layout for DVB-subtitles derived from the opinion of a representative user group recruited from our broadcasting audience. Our original approach therefore was to find out about the most popular solutions (those that were marked "very good" [1] and "good" [2]). Soon we saw that popular solutions often tended to have a strong opposition (shown through marks "bad" [4] and "very bad" [5]). This impression of a strong polarity in judging some layout options was confirmed when we held our workshop with the testers in July 2009: If we opted for a solution that was very popular with a majority of the testers, there would be a great chance that we would leave a good few testers behind, disappointed and probably in the worst case even unable to perceive the subtitles. The most praised combination of parameters may as well be among the most discussed or even the most disapproved. As avoiding dissatisfaction is more important for a Public Service Broadcaster than fancy design, combinations with remarkably negative marks have to be handled very carefully.

Therefore, we decided it would be good to find out which solutions found the broadest acceptance among the testers, of course also take into consideration their popularity and finally also having a look at the level of negative criticism concerning these solutions. This means that the statistical results will be described along the following criteria:

- In order to find the solutions that find the **broadest acceptance** we use a Delta Value: Statistical values for marks "very good" [1], "good" [2] and "average" [3] minus statistical values for "bad" [4] and "very bad"[5]). Best delta values show the **broadest acceptance**. This is our priority for the reasons given above.

- Popularity is deducted from marks "good" and "very good" (leaving out completely "average", "bad" and "very bad").

- Controversy / antagonism are deducted from marks "bad" and "very bad".

In all cases we took mid-point values, the average based on the respective number of test weeks for one certain parameter or combination of these. This was done to safeguard maximum objectivity over a long testing period; just like with our focus on the broadest

acceptance, in the worst case one parameter setting might have been very popular in one week and much less in another, while another might have had better overall marks over a longer period even though it never reached a peak in popularity.

Based on the concept of the questionnaire as described above there has to be a basic differentiation in the evaluation:

A) User judgement ("school marks" / statistical) on the **overall look-and-feel** of the subtitles of each testing week.

B) User judgement ("school marks / statistical results") on **single components/parameters** like font, font size and output style in each testing week.

In the end we will compare the user judgement of the overall look-and-feel (the best solution here) with the user judgement of the single parameters (the best parameters) combined into one solution in order to find the optimum design.

Note: For comparability all statistical values are given in percentages.

User judgement ("schoolmarks") on the overall look-and-feel of the subtitles of each testing week

As elaborated above, the questionnaire asked the users not only to test the individual design parameters for each testing week but also the combination of these parameters, the **overall look-and-feel,** with respective school marks. In the table below this judgement of the users is documented along our evaluation interest of considering broadest acceptance (delta value), popularity (best marks) and also opposition (worst marks). Please note: Not all test weeks occur in this table as listed in the test plan above, this is due to the fact that we did not have the required critical mass of testers in six of the 36 test weeks.[7]

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[7] As explained in 1.1.1.4, this was the case for test weeks 24 till 28 and test week 31 which are not listed here.

| Testweek	Font Type	Small	Small to Medium	Medium	Medium to Large	Large	Output Style	Transparency		Delta Value (%)	Best Marks (%)	Worst Marks (%)
1	Arial	x					Full Box	0		74	47	9
2	Arial			x			Full Box	160		84	64	4
3	Arial					x	Full Box	160		91	57	0
4	Arial			x			Full Box	120		95	61	0
5	Arial			x			Text with outline			98	77	0
6	rbb Interstate	x					Band	0		68	46	12
7	rbb Interstate			x			Band	160		87	69	3
8	rbb Interstate					x	Band	224		84	52	2
9	rbb Interstate			x			Text with outline			90	73	0
10	rbb Interstate				x		Band	120		85	74	4
11	ARD Font	x					Full Box	140		83	62	5
12	ARD Font				x		Normal Box	80		93	71	0
13	ARD Font					x	Text with shadow			93	56	2
14	ARD Font			x			Text with outline			88	60	2
15	ARD Font		x				Normal Box	0		93	60	0
16	Lucida Console	x					Full Box	0		85	46	2
17	Lucida Console			x			Full Box	80		80	52	7
18	Lucida Console					x	Normal Box	80		86	67	5
19	Lucida Console			x			Band	80		83	60	3
20	Lucida Console			x			Text with outline			79	63	7
21	Tiresias Screenfont	x					Text with outline			85	67	3
22	Tiresias Screenfont			x			Normal Box	80		66	54	10
23	Tiresias Screenfont			x			Text with outline			82	74	3
29	Arial			x			Full Box	80		92	74	0
30	rbb interstate				x		Band	120		83	73	5
32	ARD Font		x				Normal Box	0		93	65	0
33	Tiresias Screenfont			x			Normal Box	80		83	71	0
34	Tiresias Screenfont			x			Text with outline			79	67	7
35	rbb interstate			x			Normal Box	80		100	90	0
36	rbb interstate			x			Text with outline			95	77	0

best
second
opposition

The table shows clearly that a medium size *rbb Interstate* in a *Normal Box* with transparency value 80 found broadest acceptance with a delta value of 100 % and no opposition at all! With 90 percent best marks this solution also proved very popular. Among testers' positive comments we found, among others: „The best I have seen so far, please leave it like that", "perfect" or "subtitles are overall very good like this".

This solution would look like this:

Rank two is *Arial* in a medium size with *Outline* as output style. In terms of broad acceptance (98% delta value) this was judged nearly as good as the above solution. Popularity (best marks 77%) however, was 13% lower. This overall design had also no opposition (no worst marks). This second best combination (according to the users) would look like this:
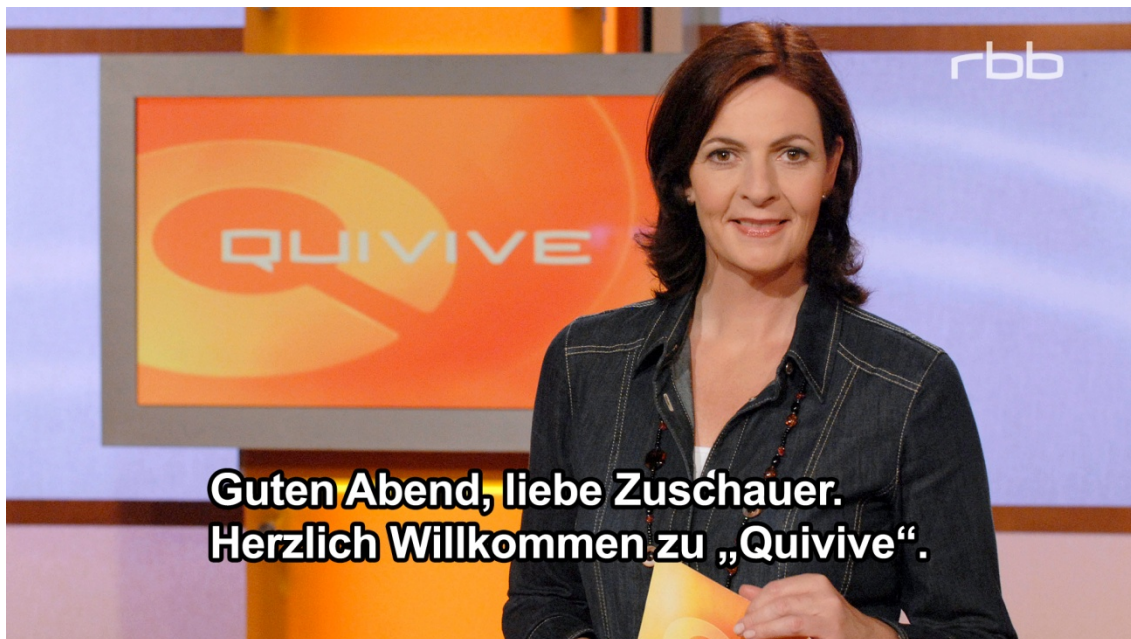
There are two main points which need consideration and which are exemplary to show the limits of a purely quantitative evaluation. It is important to cross-check the quantitative evaluation with individual qualitative remarks (testers' free comments) and to consider that the evaluation of the overall look and feel may infer aspects that were not part of the test, such as the density of the subtitle text, or a particular situation in that test week or the subjective situation of the tester.

1.
The second best solution features an **outline output style**. It got no opposition at all in that test week in the evaluation category "overall look and feel" as outlined above. However, when looking at the individual parameter results presented later in this chapter it becomes quite clear that "*Outline*" and the similar output style "*Shadow*" met – when judged as isolated parameters - with a lot of opposition. This happened even in this particular week (15%!). More so, 27% of the testers issued free comments in that week where they stated that they did not really like the output style. 15 percent of these said this was because the outlined or rimmed letters cannot be read well when there are certain types of TV pictures, especially pictures that are fair or bright. 13% of the critics stated that the background or output style should be "darker": "Black outline around white letters, that's bad. The background shines through!" or „When the TV pictures got brighter the subtitles were difficult to read".

The fact that the output style got such an amount of criticism and testers still judged the overall design so positively in that same week shows in an exemplary way that our statistical results often proved contradictory, that they do have their limits and need to be put into perspective by trying to draft a really comprehensive picture of opinions.
Furthermore, the above table for overall design of the subtitles also shows that "*Outline*" got 7% worst marks (opposition) twice.

The impression of *Outline* being controversial was very much confirmed when we held our workshop with the testers in July 2009. The vivid discussion there showed that outline was very popular with some of the testers as the subtitles cover very little space on the TV-screen. Other testers were against this style as they had problems with contrast especially when there were graphics or writing behind the outline subtitles. Therefore, quite a few testers would prefer to have subtitles with a dark transparent box for news programmes or magazines while having outline subtitles for fictional formats. Unfortunately, this cannot be realised on the production site. In our workshop we actually had a vote to find out the best output style according to the present testers: A slightly transparent normal box was the clear winner that day! (19 of 27 testers).
This leads to the second point that needs to be discussed.

2.
The worst marks (opposition) for **the overall solution of test week 22 featuring a midsize font *Tiresias* in a *Normal Box*** came as a total surprise which is especially important as this exact solution is the winner when taking into consideration test results for the single parameters, for example, the results of the workshop and also given the other positive evaluations for the single parameters, "*Normal Box*" and "*Tiresias*". When having a look into the questionnaires of week 22, at the results in detail, in turns out that the strong opposition is due to four of 41 testers marking the overall look and feel of week 22 with a "four" (the best of the worst marks…). There were a lot of positive free comments that week: five testers commented that this output style (the normal box) was "just perfect". Looking at the negative comments restricted to the four testers in question shows: For one the box was "too small",

for another the contrast was not strong enough and the remaining two (a couple) stated that the font size was too big and the background "too dark". Strangely enough all four testers in question gave better marks for the single parameters of this week – a real contradiction that occurred several times and again shows the limit of statistics: how can the overall impression be "four" and all the other parameters are marked "two" or "three"? It is interesting that especially those four critical testers complain in detail about the generally faulty technical presentation of the subtitles of this weeks' main news programme. We assume that their negative judgement of the overall design might also have been influenced by this. Finally, and most importantly, we presented the exact same overall look and feel once again in test week 32 and it got no opposition at all. Summing up, the level of opposition in this particular week does, in our opinion, not justify discarding this solution as being too controversial. A final remark on the parameter "output style": When we look at the table above, it turns out that in the test weeks which actually presented a normal box as output style, the worst marks (criticism) are the lowest when compared with those for all the other output styles (only 2.1%).

**User judgement ("schoolmarks") on single parameters**

One general remark in advance: When looking at the testers' judgement on single parameters like font, font size or output style, there is a tendency for less approval for more "extreme" parameter types. Examples are pitch black[8] or highly transparent backgrounds in the output style box / band or very small or very big font sizes. The best results were given to mid-size fonts and boxes/bands with medium transparency.

Font Type

Over the testing period five fonts were tested five weeks each. There were three non-serif fonts (Arial, rbb Interstate, Tiresias Screenfont), one with serifs (ARD Font) and one traditional monospaced font (Lucida Console). Why we selected these fonts is described in detail above.

The following diagram and table show the user test results in accordance with our evaluation method: Midpoint Deltavalues signalling broad acceptance, midpoint Best Marks for popularity and Midpoint Worst Marks for opposition.

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[8] (Transparency 0)
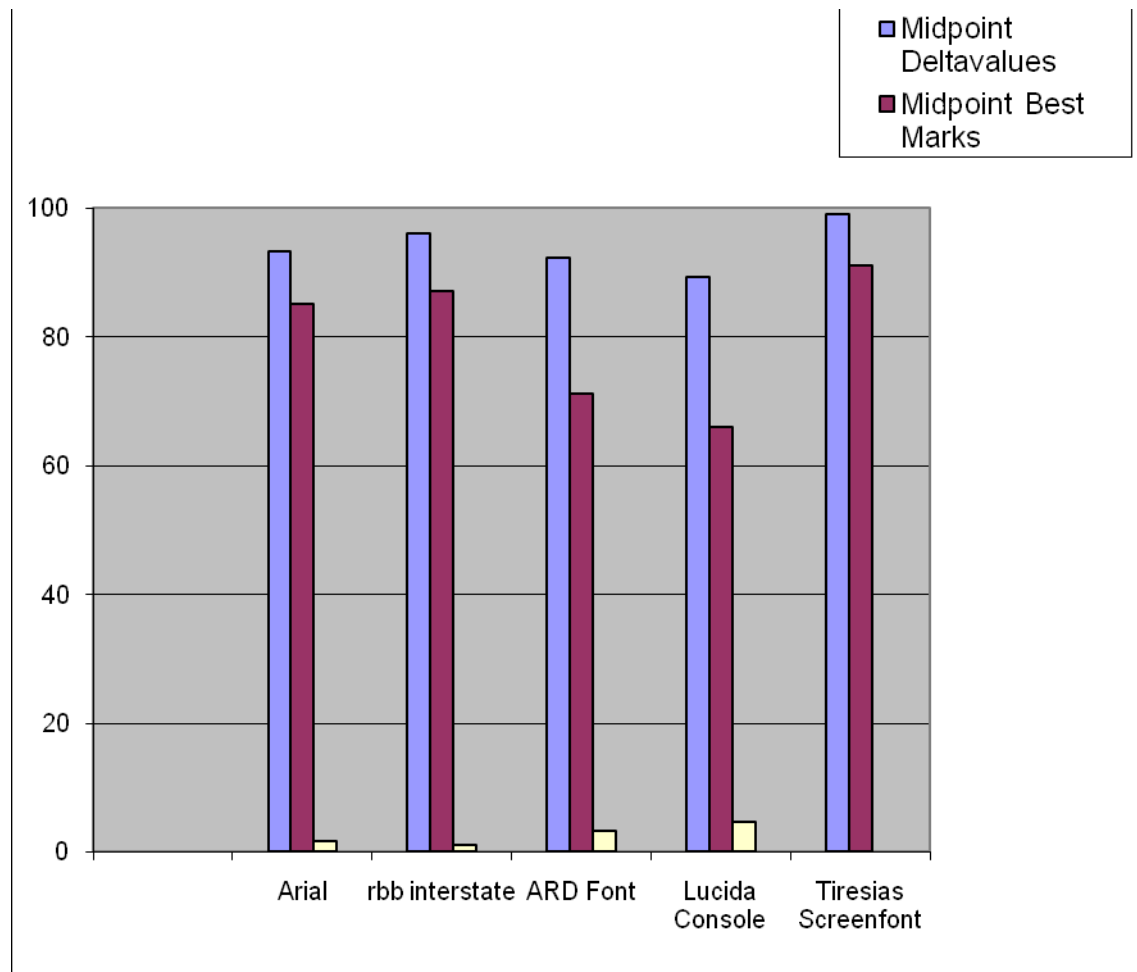
Type of Font	Midpoint Delta Values	Midpoint Best Marks	Midpoint Worst Marks
Arial	93	85	2
rbb interstate	96	87	1
ARD Font	92	71	3
Lucida Console	89	66	5
Tiresias Screenfont	99	91	0

Best
Second
Opposition

Obviously, fonts without serifs had the best results, with *Tiresias Screenfont* and *rbb Interstate* as the winners. For both fonts broad acceptance is very high. This is shown by the good Midpoint Delta Values in both cases demonstrating that many people marked

these fonts very good, good and average and very few gave them bad marks. *Tiresias* was judged slightly better with no bad mark at all and also more continuous popularity shown through the Midpoint Best Marks. The test results therefore suggest the use of *Tiresias Screenfont*, a font that was designed for such purposes and was very well approved by all test users. However, the results for our own CD font *rbb Interstate* are strong enough to justify a potential decision to prefer its use to that of *Tiresias Screenfont*. RBB being part of the German Federal Network of Public Service Broadcasters (ARD) this could be a political decision. If ARD wants a uniform design for its DVB-Subtitles, *Tiresias* would be the perfect option.

Looking at the results in more detail and taking into consideration testers' free comments, it can be stated that *Arial*, as one of the most popular fonts today, was rather well-approved by the majority of the test users with its average delta value of 93% over the whole testing period. Free comments praised it in general as very clear and straight so that "best marks" (good and very good) reached a peak of 100% in two out of seven test weeks and 85% on average (mid-point value best marks) over the whole testing period.

Obviously, *rbb Interstate* and *Tiresias Screenfont* reached even better values in popularity (best marks in peaks) (*rbb Interstate*: 4 out of 8 times 100%; *Tiresias*: 6 out of 8 times 100%). For both, *rbb Interstate* and *Tiresias Screenfont* testers explicitly approved of the clarity in their comments but furthermore praised especially that the letters are more condensed and that they stand closer to each other (narrow spacing/kerning) which makes the full line easier to capture at a glance. When Tiresias was first introduced in Test Week 21, 16 persons had positive comments on this font and only 7 negative comments which means a lot of positive feedback as testers usually voice negative criticism rather than appraisal. Testers stated: "Super! Very good readibility!", "the font is more narrow and one can therefore grasp them better and does not need to scan the full width of the screen", "very clear font" or "very good. Nor too thin and nor too fat".

Despite a general agreement that font types with serifs are not first choice for display on screens we decided to test ARD's official font and the results were not as bad as might have been expected. With a midpoint delta value of 93% this font was rather well-approved. However, apart from one test week there was protest as well. With a midpoint of 3% of all testers speaking against this font, it only ranks as #4/5.

Lucida Console as a monospaced font which is very similar to the traditional videotext font was also included in the test series and it was theoretically possible that viewers would prefer what they were used to. However, the tests proved that test viewers did not like *Lucida* for DVB-Subtitles. Written comments explained that this font was difficult to read due to the monospacing and that it appeared rather old-fashioned, almost like a type writer. For these reasons *Lucida Console* evoked more negative comments and respective bad marks (up to 7%; midpoint 5%) than any of the other fonts included in the test.
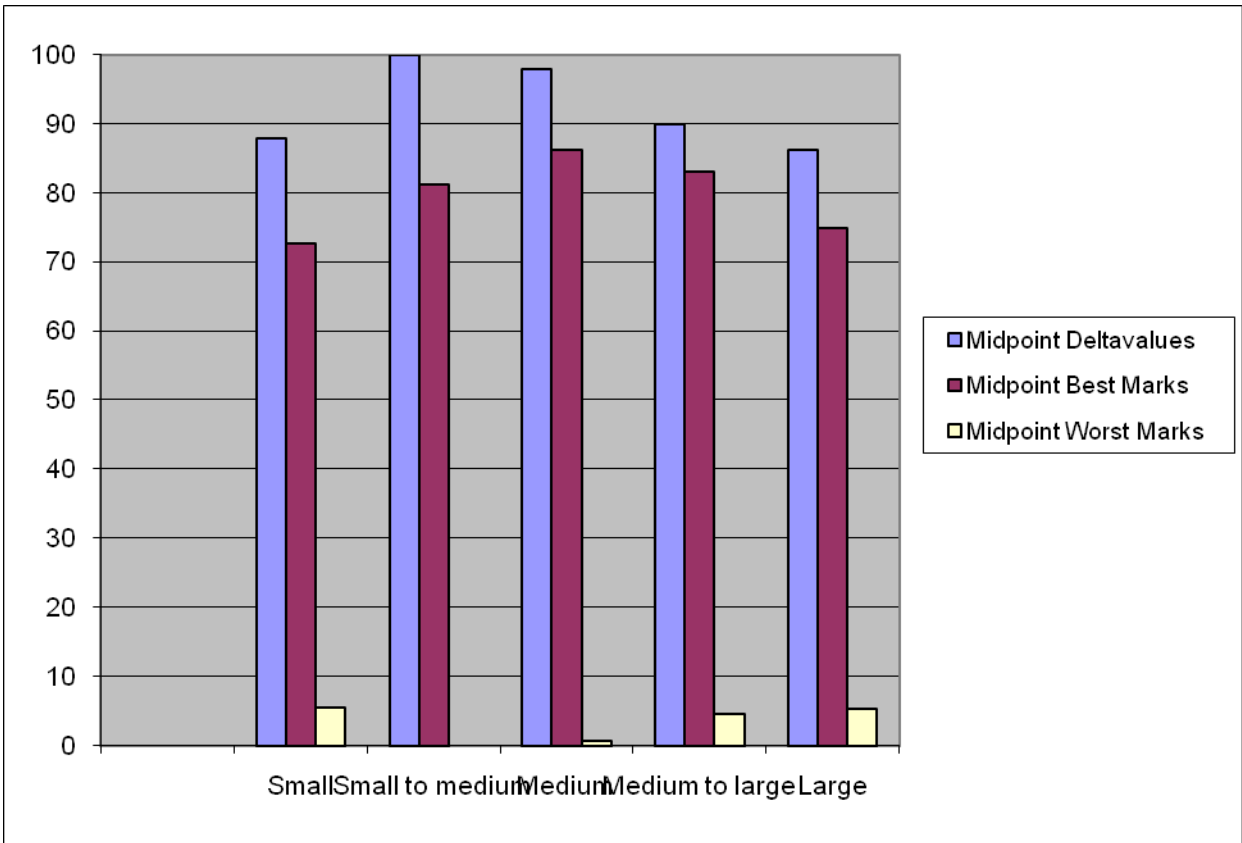
Font Size

Each of the above font types was tested in at least three different sizes. Font size is very closely related to the font type, as the "same size" (e.g. 10 pt.) looks quite different on

the screen for each font. Therefore, the (point) sizes were chosen in a way that the actual size on the screen was the same.

Throughout the testing period, the general tendency was that very small and very big letters were not rated as positively as medium sizes.

The table below shows the overall results as to font sizes.

Font Size	Midpoint Delta Values	Midpoint Best Marks	Midpoint Worst Marks
Small	88	73	5
Small to medium	100	81	0
Medium	98	86	1
Medium to large	90	83	5
Large	86	75	5

best
second
opposition

The table shows clearly the broadest acceptance for small to medium sizes (Midpoint-Delta Values). We were surprised that in those few test weeks where we tried sizes in between, the tendency went towards smaller font size. There were (almost) no bad marks at all speaking against *medium* or *small to medium* sizes, as opposed to small or large font sizes, including medium to large, all of which were answered with considerable opposition. Hence, contrary to our original expectations, the test results do not suggest the use of larger fonts for better reading but rather the use of smaller fonts as viewers seem to appreciate it if subtitles cover as little as possible of the screen. The broad acceptance Delta Value is slightly smaller for medium size than for small to medium size. However, when it comes to average popularity (Midpoint Best Marks), the medium size is the winner. Here, the values for small to medium size show even less popularity than for the more controversial medium to large size. Taking into consideration both midpoint delta values and midpoint best marks we therefore would decide in favour of a medium size. Furthermore, a decision for medium is based on a much broader test sample.

Output Style

The three basic output styles – Outline/Shadow, Box and Band – were tested in several variations, with special hindsight to the levels of transparency of the boxes and bands. The diagram and table below sum up all statistical results of the parameter "Output Style". Generally it can be stated that there is a kind of "conflict" between the wish for "as much contrast as possible" / good readability of subtitles and to have as little of the TV screen covered as possible by the subtitles. Say, a more transparent background (box or banner) was praised by some as the TV picture shines through, for others this was inacceptable for lack of contrast. The same applies for the outline or shadow style as discussed above.
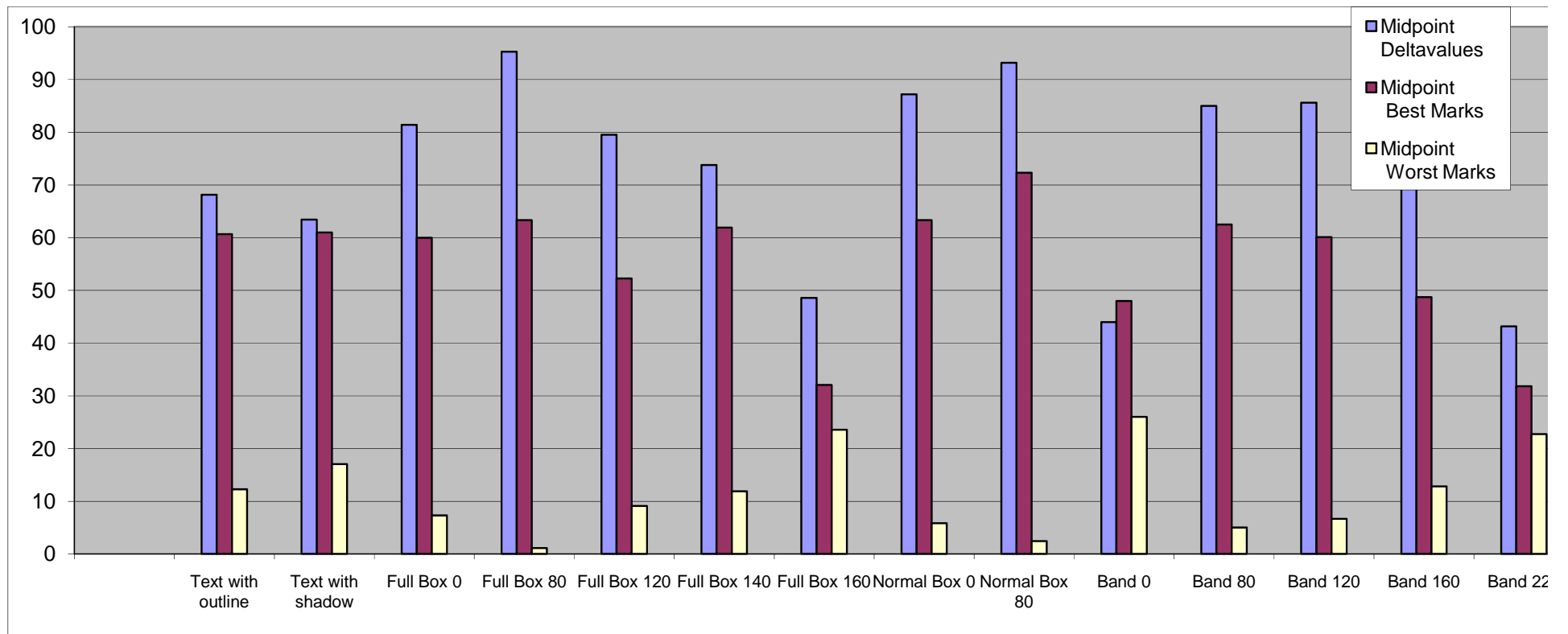
Output Style	Midpoint Deltavalues	Midpoint Best Marks	Midpoint Worst Marks
Text with outline	68	61	12
Text with shadow	63	61	17
Full Box 0	81	60	7
Full Box 80	95	63	1
Full Box 120	80	52	9
Full Box 140	74	62	12
Full Box 160	49	32	24
Normal Box 0	87	63	6
Normal Box 80	93	72	2
Band 0	44	48	26
Band 80	85	63	5
Band 120	86	60	7
Band 160	72	49	13
Band 224	43	32	23

Best
Second
strong criticism

It is worth first having a look at the specific aspect of the different grades of transparency. The table/diagram show a clear tendency that those backgrounds with no transparency at all (0=black) or very high transparency (120 or higher) were not as popular as average transparency solutions. With 26 % worst marks for opposition, the black (zero transparency) band comes last here. This is not surprising as such a black band covers the full width of the screen and more of the TV picture than is necessary. Likewise, Full Box 160 and Band 224 – both with a very high transparency - which means less contrast for the subtitle depiction - got also very high 23% and 24% worst marks. All three solutions have also low delta values and low best marks. Some of the other more "extreme" solutions as to a high or low transparency (see Full Box 120, Full Box 140, Normal / Full Box 0 or Band 120 and 160) show quite high Delta Values and could thus be regarded as acceptable solutions. However, the Midpoint Worst Marks and therefore the critical potential of such a solution would be much too high for a public broadcaster.

In turn, all variants with a moderate transparency value of 80 were met with very little opposition. Among the 80 percent solutions the band did get an opposition of 5 %, however, this was lower than the opposition for all the other more "extreme" solutions. This leads to the conclusion that an 80 % transparency is the optimum transparency be it for Full Box, Normal Box or Band (while band is obviously more controversial).

Having a look at the most positively rated overall solutions a Full Box with an average transparency of 80 found the broadest acceptance (95% delta value). This went along with quite a positive value for popularity for this feature (63 %) and with only 1% for negative criticism. In turn, number 1 in popularity is clearly Normal Box 80, the box adapted to the exact length of the subtitle test, in this same average transparency of 80. The broad acceptance value for this solution is also only slightly lower than this of the full box (93 as opposed to 95%) and opposition is at 2 % also low. For us, this makes the Normal Box the "winner" of all output styles. This positive judgement is underlined by the overall positive evaluation for Normal Box in transparency 80 as outlined earlier in this chapter. In test week 12 when this output style was introduced first, 40 % of the testers had positive free comments on it. There were also no worst marks at all. Testers liked that the contrast was good and that the background was adapted to the exact length and shape of the subtitles. „Very nice that the background is reduced to the actual text, Its possible after all!" or "Background is dark grey, however you can still see through. And its also adapted to the text, nice". Likewise, in test week 35 when this style was tested for the last time 46 % of users commented very positively on it (free comments of 15%: "very good", free comments of 12 %: "good". "Super, the TV picture can be seen while the subtitle text is provided with contrast. I like this transparent background very much!!!!!"

Outline and Shadow are very similar in appearance and were therefore met with very similar responses: the Midpoint Best Marks show 61% for both styles, Midpoint Delta Values 63% and 68%. Many test persons explicitly voiced their approval of these output styles in the free written comments. They especially praised the fact that so little of the background is being hidden behind a dark or even black bar. However, numerous other free comments pointed out that outlined text is quite difficult to read, especially when there are movements in the background. The controversial points concerning "outline" as output style were discussed in detail earlier in this chapter. This controversy is well mirrored in the more detailed statistical figures of the respective test weeks: As a tendency, the many approving marks were countered by considerable protest (10-15% on average). Although the protest tended to weaken with the number of test weeks, it never disappeared altogether.

All in all, Box was the most praised and, - even more importantly - the less criticised output style offered to test users, considerably better than Band or Outline/Shadow.

Band, too, was tested with differing grades of transparency. In contrast to Box, Band was met with considerable protest in all test weeks. Even "the most acceptable" variant (Band, Transparency value 80) had 5% of the testers speaking against it. In other weeks negative marks came from 26% of the testers.

Conclusion

Based on the final results for the single parameter as evaluated in this chapter above "the winner" for each category can be combined into one look and feel. It is a solution that features a medium size Tiresias font in the output style of a normal box with a transparency factor of 80. This would look like this:

Final Conclusion – the envisaged solution

The favourite solution of the user judgement ("schoolmarks") on the overall look-and-feel of the subtitles of each testing week which has been discussed in detail above is nearly identical with the favourite solution identified from the evaluation of the single parameters.

While the winner from the marking process of the overall-look-and-feel for each testing week is a medium font size rbb Interstate in a transparency 80 normal box, the single parameter judgement culminates in the same solution only with the font Tiresias Screenfont. However, we explained in detail in chapter 2.1.1.3.1 that the good single parameter values for rbb Interstate could also justify a solution using rbb interstate instead.

We would therefore recommend the following two look and feel variations on an equal basis:

With Tiresias

With rbb Interstate

4.4 TVC (TV3) Mature Services Evaluated

TVC embarked in a series of tests to gather information regarding user satisfaction, quality control, and ways to improve its services. To this end two questionnaires were prepared, and they aim at gathering different information.

First a general questionnaire was drafted, using similar questionnaires as those used by subtitling in DTV4All and the RNIB report on Bollywood (2009)[9]. The general questionnaire aims at learning about users' preferences, and also helps to draft a profile of the user, education, expectations, etc. The questionnaire was designed to take no longer than 15 minutes to complete. It is to be completed anonymously.

This general questionnaire aims at collecting quantitative data. The questionnaire was digitised by Activa Multimedia and sent to the two local Blind Associations ONCE (Organización Nacional de Ciegos de España) and ACC (Associació Catalana de Cecs). It was also sent to the users we have been keeping informed as they have been giving feedback on the audio description (AD) service from the first day of films with AD.

The Catalan Association for the Blind distributed the questionnaires among their membership and will help those without electronic mail and those who may have difficulty answering the questionnaire.

ONCE has also assisted in the distribution of the questionnaires to their many contacts. The data has been gathered by TVC and is now at the point where further analysis work is currently being done and will be presented in the addendum to this report that will follow in May 2010.

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[9] http://www.rnib.org.uk/livingwithsightloss/tvradiofilm/film/Pages/bollywood.aspx

4.5   Universities and the Mature Access Services Evaluation

UAB and Roehampton have taken the lead role in the testing process. Tests carried out to date in the universities will on completion, approximate to 40,000 subtitles read by hearing, hard of hearing and deaf participants, which constitutes the largest corpus of its kind (eye-tracking plus comprehension plus opinion) and a treasure trove of information for research, further projects, etc. We can then attempt to map out, for the first time with this size of eye-tracking and questionnaire-base data, how hearing, deaf and hard of hearing viewers read and comprehend subtitles.

The three main subtitling deliverables from this team can be broken down into:

Deliverable 1: Report on the analysis of Stuart Little

Deliverable 2: Analysis of the long questionnaire administered to test subjects.

Deliverable 3: Report on eye-tracking tests, which includes a) opinion (what we refer to as post-test opinion, because we asked these questions after the test), b) comprehension (what have they understood?), c) pure eye-tracking data (fixations and so on).

Deliverable 1 and Deliverable 2 have been completed. The Deliverable 2 results of the University of Copenhagen and the University of Parma are included in this report. Deliverable 3 has been completed by UAB and to a large degree by University of Roehampton. However due to delays caused by technical issues with the eye-tracking technology this work is ongoing in the other partner universities.

This report incorporates below the findings and conclusions of the UAB and the interim findings of the Roehampton testing team concerning Deliverable 3.

Apart from the contents of DTV4All, the present analysis of Subtitling has yielded interesting data with regard to other issues that could constitute the basis for further research:

> 1- Mean Reading Time
>
> 2- Min. / Max. Exposure Times
>
> 3- Information Priority (Image Vs Subtitle)
>
> 4- Overall reading patterns per type of deafness, education, age and viewing habits

The other universities contributing to the work of the project have drafted and translated questionnaires for Subtitling of the Deaf and Hard of Hearing (SDH). They have also established contacts with users associations, and have commenced eye-tracking tests. Analysis of results is well under way and has produced some significant findings

Some tests have been done in order to ascertain the validity of test material and allow for adjustments to be done before embarking in a pan European experiment.

For AD the first deliverable is finished and results were outlined in D2.3. The objective was to present the audio describing practices of three different companies which would shed some light on issues such as:

1. **AD services**: AD services provided so far and the companies' future prospects for AD
2. **The process of AD**: how AD is carried out.
3. **Software**: presents the specific software used for AD
4. **Fees**: if disclosed, the fees for ADs are reported.
5. **The translation of audio descriptions**: a new alternative for AD generation
6. **Technical aspects**

As part of the Danish DTV4All Project, including also the research conducted by Peter Looms and his associates (from Danmarks Radio, DR), the University of Copenhagen administered a questionnaire on Danish viewers' attitudes and habits regarding subtitles on Danish TV. In accordance with the aims of the DTV4All project, special emphasis was been put on the needs of deaf and hard-of-hearing viewers, who comprise some 10% of the Danish television audience. See Appendix B for the full report.

The University of Parma have presented an analysis of the same Questionnaire that in their case was administered to 90 test subjects prior to the subtitling test. See Appendix C for the full report.

The Belgian team has completed the Audio Description tests and have provided their results. They have also delivered Pear Tree results. They drafted and translated the Subtitling questionnaire and have been in contact with the relevant local associations. Unfortunately due to a lack of response from users there was nothing more that they could do. The Italian partners have submitted Pear Tree results as well as Audio description Deliverable 2. They are currently working on Audio description Deliverable 3.

The University of Adam Mickiewicz University have delivered a Pear Tree report see Appendix D.

University of Warsaw, Parma and Copenhagen are currently working on the eye-tracking tests, their results will be available in May 2010 in the supplementary Final Results Report.

UAB has completed all project tasks in terms of the administration of the Questionnaires, the tests themselves and the analysis of the enormous quantity of data that has emerged from the tests. The following numbers outline the range and volume of tests that have been completed.

- 17 participants (5 deaf, 5 Hard of Hearing, 7 hearing)
- 500 subtitles per participant
- 2800 subtitles read by deaf

- 2800 subtitles read by Hard of Hearing
- 3900 subtitles read by hearing
- Total = 9500 subtitles
- 69 comprehension questions + 24 questions to contrast each user (465 replies from deaf, 465 Hard of Hearing and 651 hearing)

In terms of analysing the data the first task that has been completed is the preparation of the model of analysis. This is being used by all partners to analyse the information obtained in the tests and then compare it. This model of analysis is in turn divided in three parts, looking at opinion (based on questionnaires, before and after the tests), comprehension (based on questionnaires during the tests) and reception (eye-tracking data on how subtitles are read and processed). The main outputs are therefore as follows:

- The pre and post test questionnaire data gathering is complete
- The comprehension data gathering is complete
- The eye tracking data analysis is complete

The report D2.4 outlined in detail the results of the first two outputs. This report provides the full results of the eye-tracking testing.

4.6 UAB Eye Tracking Test Report

The Test Background

The study processes four different sources of information:

a. Personal Information derived from questionnaires administered before the eye-tracking test
b. Comprehension of issues and personal Information derived from questionnaires collected during the eye-tracking session
c. Information included in the National Standards: UNE-153010 and / or extended national practices
d. Eye-tracking data collected with Tobii Studio.

The main categorisation for analysis purposes is hearing capacity, thus we have 3 different groups:

- Hearers (5 participants)
- Deaf (5 participants)
- Hard of Hearing (5 participants)

It should be noted that within this classification we refer to "Communication Capacity". This further subdivides users where appropriate between Signing Deaf (Deaf) and Oralist Deaf (Hard of Hearing)

Other sub filters used in the analysis were:

- Education
- Reading Habits
- Age

On a general point, it was very difficult to get Deaf and Hard of Hearing participants involved in the test: the need to test their reading skills, the length of the test (1 hour and a half in some cases) and the lack of interest in the project, led to situations in which participants refused to take part; for some of the people who took part, only half of the test was run – making it useless in terms of data gathering – or in some cases attention was not paid to the audiovisual material – and so the eyetracker could not obtain data from some users.

The material selected for the test – the films "Shrek I", "Shrek II", "Shrek the Third" – limited the age of the participant groups. For the purposes of our study we needed audiovisual products originally dubbed into all the languages taking part in the project. Nevertheless, in subtitling countries this is only present in children's' animation. Although the videos selected are not only aimed children / teen audiences, working with animation was not appealing to some potential participants.

The different questionnaires – personal information pre-post test – and materials selected – Shrek videos – for the different parts of the project were defined through a "judge's validation".

Test Structure

Following the structure of our study, participants filled in a preference questionnaire before the Eye-tracking session. Depending on their "Communication Capacity", it took participants 10 – 30 minutes to fill the questionnaire in. Then, participants started the Eye-tracking test. There were 9 parameters to test, and 2 / 3 variables per parameter:

a. Identification
   a. Colours
   b. Tags
   c. Displacement
b. Placement
   a. Top
   b. Bottom
   c. Mixed
c. Justification
   a. Left
   b. Centred
d. Boxes
   a. Box
   b. No box
e. Borders
   a. Border
   b. No border

f. Shadows
            a. Shadow
            b. No shadow
    g. Emoticons
            a. Description
            b. Emoticon
            c. Non
    h. Icons
            a. Description
            b. Icon
            c. None
    i. Speed / Subtitle Type
            a. Standard
            b. Edited
            c. Verbatim

We had 23 videos to pass through the tracker. Watching the videos consecutively without pause would have taken 30 minutes (approx.), however participants were asked to answer comprehension questionnaires and another brief questionnaire on preferences after every video. This made tests last as much as 45 minutes for Hearers / Hard of Hearing and up to 1hour and 30 minutes for Deaf participants.

We are aware of the lack of accuracy that these long sessions could introduce in our study, but the number of parameters to test, and the need for keeping the tracking / background information conditions similar made it necessary to follow this approach.

Trying to minimize the effects of the tiring sessions and the lack of accuracy, we applied a random order to the tracking tests

Audio-visual Materials

Extracted from the same series of films, the aim was to find standard material and / or language, so that the same problems could be identified in any clip. In order to test the parameters, a series of materials – videos – were created.

The 23 videos were approx. one minute long – except the three videos created for "Speed", that were 1:30 (approx.)

All the videos included as many as 20 / 30 subtitles, and context (sound) information was an especially identified part of the videos that tested the correspondent parameters / variables – placement, emoticons, and icons.

1) COMPREHENSION

The Study of Comprehension processes information is derived from Comprehension Questionnaires completed during the tests.

In order to obtain a detailed analysis, after each of the 23 videos that built up the eye-tracking session, users replied to specific questions on content.

57

Questions detailed elements on textual, visual and intentional / general meaning.

Information obtained shed light on whether all kinds of information – Textual, Visual (Image), General Information (Sense) – are processed in an identical basis; or whether all groups – Hearers, Deaf, Hard of Hearing – process information identically.

As for "Personal Preferences", the main filter used is hearing capacity, thus we considered 3 different groups: Hearers, Deaf, Hard-of-Hearing.

Although further details on comprehension issues will be detailed later in the report, it is important to highlight the differences noted in the comprehension results of the different groups. These differences are especially relevant among Hearers and Deaf and Hard of Hearing users.

As expected, Hearers are the group with a better overall comprehension – 1.57 over 2, against the 1.30 of the Hard of Hearing and 1.25 of Deaf users. However, it was also possible to identify differences during the analysis of 'comprehension instances'. Hearers, with higher rates of overall comprehension, showed the best results at the main Comprehension instances marked – Text, Sense, and Image. Although "Sense" turns out to have the best comprehension rate, "Text" has the largest difference when compared to the other two groups – 1.53 (H), 1.18 (HoH), and 0.94 (D).

HEARERS COMPREHENSION
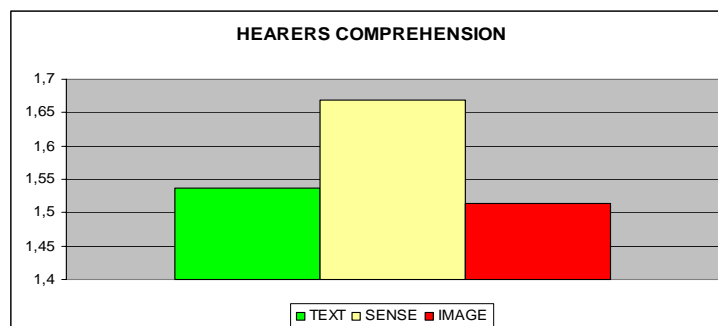
In contrast to Hearers, Deaf and Hard of Hearing viewers obtain the highest comprehension rates from Visual information – both "Sense" and "Image" – in a similar way. Furthermore, Deaf viewers' rates are even higher than Hard of Hearings' ones – 1.48 (D) Vs 1.39 (HoH) for Visual information; 1.35 (D) Vs 1.33 (HoH) for General information.
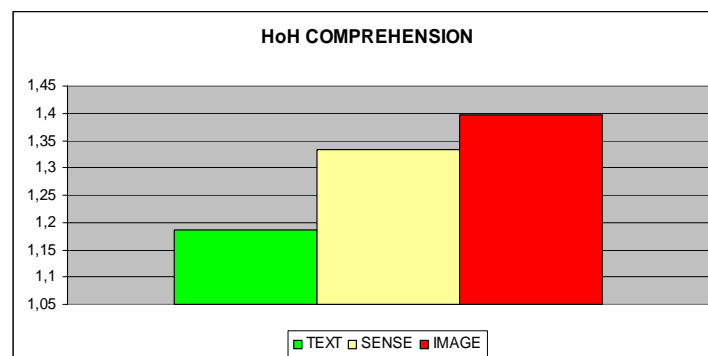
HoH COMPREHENSION

Not surprisingly, Deaf users have poorer scores than the Hard of Hearing for "Text comprehension". Thus, overall comprehension levels among the groups with hearing impairments are balanced, although, as it happens with Hearers, information is extracted from different comprehension instances.

DEAF COMPREHENSION
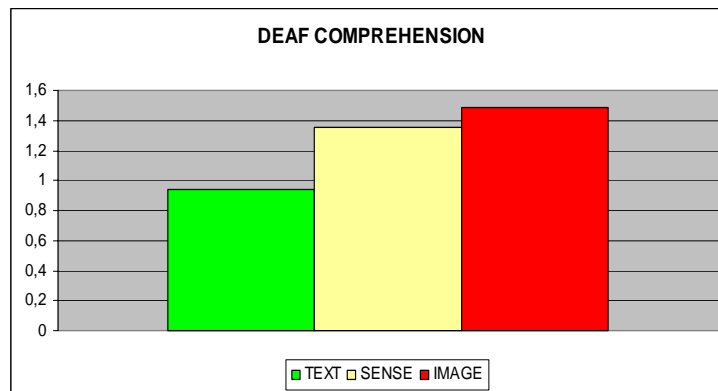
2) **INFORMATION PROCESSING**

The most technical part of this project studies how audiovisual products are processed. With the help of eyetracking technologies (Tobii T60 + Tobii Studio 1.5.8), we originally planned to focus on some basic elements:

a. Fixation Time. This is the term used to identify the time the eye spends at every "stop" (fixation) during the reading / viewing process. We first thought of the relevance of three basic measures, considering the first fixation on subtitle the most important one (MF):

   1. Time to first fixation: from the last fixation to MF
   2. First fixation length: MF length
   3. Time to second fixation: time elapsed from MF to the next fixation.

   However, during our analysis we realised that the difference between the "Time to second fixation" and the "First fixation length" was non-existent, and did not draw different results.

   For numbers 1 and 3 we thought of considering whether the previous fixation was set on image / subtitle / off-screen, but the volume of data recorded, and the need for a more accurate software encouraged our project to include this part in future pieces of work.

b. Fixation Count. By "Fixation Count" we refer to the number of times the eye stops during the "reading / viewing process".

   Rather than the number of fixations, results derived from this study will be represented as "Mean Reading Time" and will compare the time spent reading / viewing subtitles and/or images.

Further research could help us compare the Mean Reading Time obtained with the difference in fixations/micro-fixations.

c. Regressions. "Regression" refers to every backward movement the eye performs during the reading / viewing process. The pattern the eye follows during the reading process – the fixation path – is neither progressive nor ordered, and the eye moves backward and forward constantly. Lexical difficulties, comprehension, character identification may influence the regression occurrence.

The different elements that were to be analysed during our study were:
   1. Regression count
   2. Regression occurrence: before / during / after subtitle reading
   3. Regression reasons: text, comprehension, identification, exposure time, etc.

However relevant this information may be to our research, the difficulties encountered in the software accuracy have forced the inclusion of this part in further pieces of work: the lack of a tool in the software package to handle this information results in a time-consuming manual analysis – 6900 examples need to be analysed and categorised manually.

d. Eyetracking response at comprehension instances. Considering the answers provided to "Comprehension Questionnaires", we tried to determine whether comprehension problems – for Textual, Visual (Image), General Information (Sense) – are a result of limited memory or lack of perception.

All of the above elements of the study were applied to the 9 parameters under analysis:

- **Character Identification**

Three different variables were tested for identification:

   - Colour identification: Included in the UNE-153010 subtitling standards. Standardised in Spain.

- <u>Tags</u>: Included in the UNE-153010 subtitling standards – specific cases.
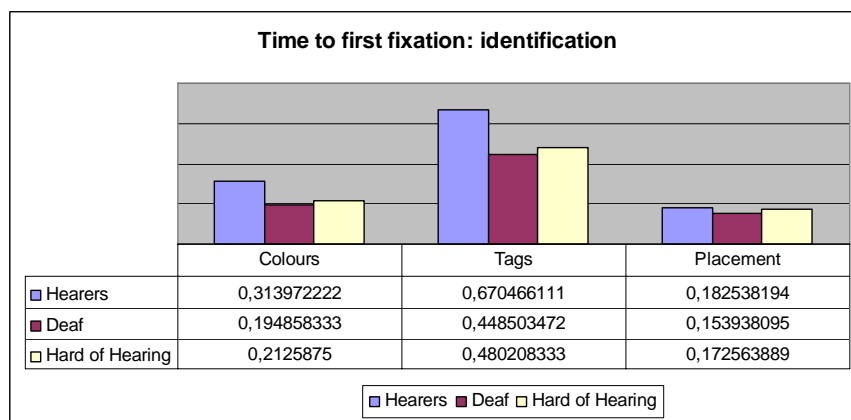

- <u>Displacement:</u> barely present in the Spanish market – isolated examples within private video collections, and the early days of some TV channels. Included in the UNE-153010 subtitling standards.

Reaction times – Time to first fixation – show that "displaced subtitles" cause a faster reaction in all users, being Deaf users the ones with the shorter times, followed by the Hard of Hearing and Hearers.

Although differences between "Colours" and "Placement" are not extremely significant within the Deaf and the Hard of Hearing, "Tags" obtain distant results in all groups. This could be explained by the fact that most users only read "tags" after going through the subtitle or even, as regressions during the subtitle reading process, but are rarely considered before.

First fixation length: Identification

	Colours	Tags	Placement
◻ Hearers	0,223274444	0,183266667	0,198163636
◼ Deaf	0,2293	0,296	0,259727273
◻ Hard of Hearing	0,195336111	0,218833333	0,222681818

◻ Hearers ◼ Deaf ◻ Hard of Hearing

Time to first fixation: identification

	Colours	Tags	Placement
◻ Hearers	0,313972222	0,670466111	0,182538194
◼ Deaf	0,194858333	0,448503472	0,153938095
◻ Hard of Hearing	0,2125875	0,480208333	0,172563889

◻ Hearers ◼ Deaf ◻ Hard of Hearing

However, although "Displacement" allows faster reaction times, it also entails longer reading time, investing 70-74% of the viewing times in subtitle reading, whereas "Tags" invest 57-70% and "Colours" are the form that allows the fastest reading, investing 44-63% of the viewing time in subtitles reading.

Mean Reading Time: Identification

	Colours	Tags	Placement
◻ Hearers	44,07412238	57,23734742	70,4341151
◼ Deaf	63,66053115	70,86279564	74,66522797
◻ Hard of Hearing	54,7641606	66,07814469	70,36966051

◻ Hearers ◼ Deaf ◻ Hard of Hearing

Comprehension Instances: Identification-displacement (Text)

Comprehension Instances: Identification-colours (Text)

Comprehension Instances: Identification-tags (Text)

Analysing the comprehension instances marked in our videos – text, image and meaning (sense) – results reveal similar data: "Colours" involve shorter "viewing time" and have better comprehension results both among Hearers and Hard of Hearing users.

As we have also seen in the general analysis, Deaf users compensate "Comprehension Instances". Although textual meaning obtained is poor – or non-existent, visual/image – and general meaning/sense obtain better data.
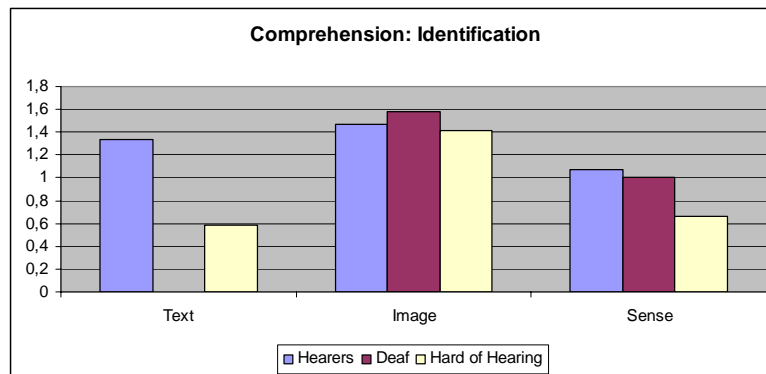
- **Placement**

Three different variables were tested for subtitle placement:

- Top: It's basically used in some live events – close-ups – and in isolated examples where subtitles cover important parts of the scene. Their presence was also included in the text given that they do exist in live presentations and specific contexts where bottom subtitles are not viable. Not specifically included in the UNE-153010 subtitling standards.


- Bottom: Included in the UNE-153010 subtitling standards. Generalised practise in all forms of subtitling, except for TV broadcasts.
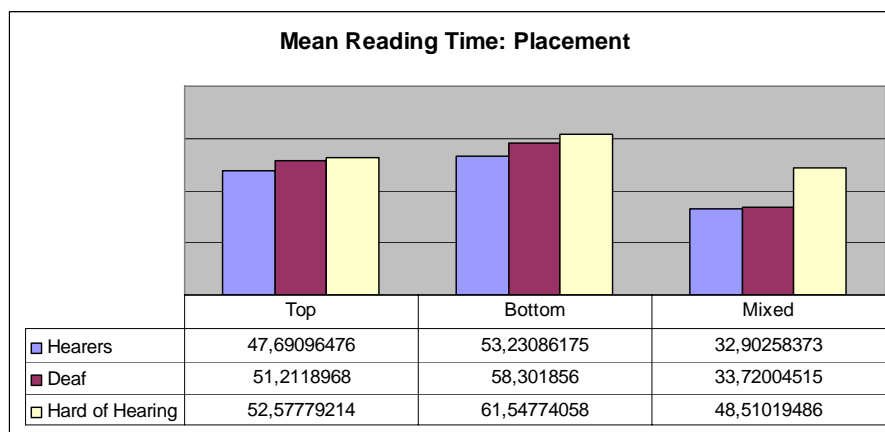
- Mixed: Established the by the UNE-153010 subtitling standards as the "most recommended practise". Its presence is basically limited to teletext subtitling and isolated examples in private video collections.

"Top" subtitles obtain faster reaction times for all groups, than "Mixed" and "Bottom" subtitles. Just in the case of Hearers differences are barely remarkable – 2% slower than "Bottom". It is necessary to highlight the fact that "Mixed" subtitles obtain poorer results, being the slowest variable in terms of "Reaction Time" – Time to first fixation.
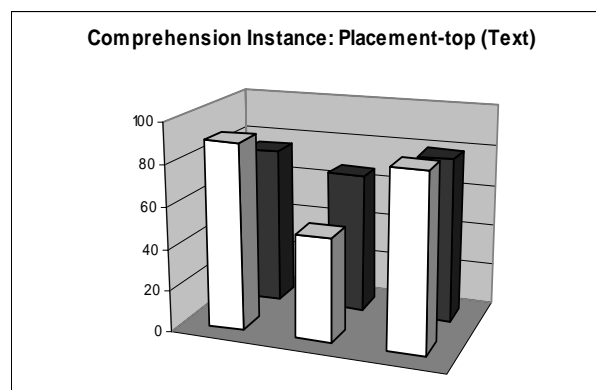

Time to First Fixation: Placement
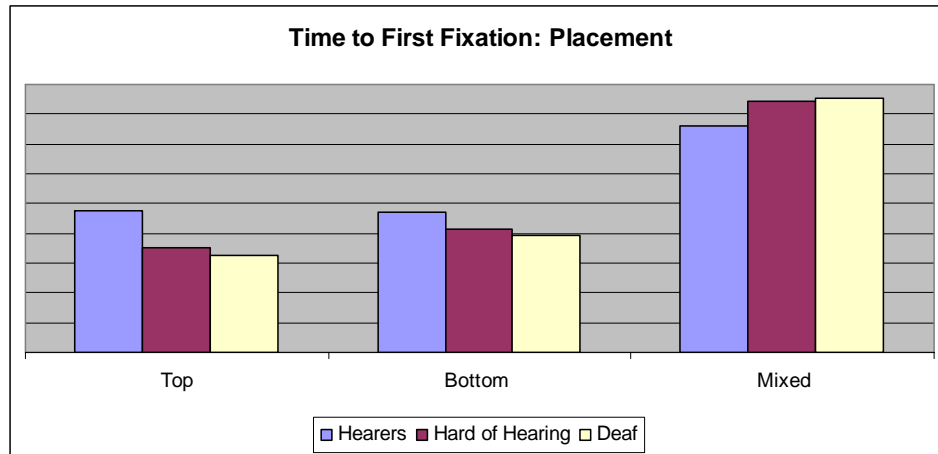
The "Mean Reading Time" reveals that reading "Mixed" subtitles required less time than reading "Top" and "Bottom" Subtitles. This is especially remarkable among Deaf users who spend 25% less time reading subtitles, whereas "Bottom" subtitles have reading times ranging from 53 to 61% longer. Nevertheless, it is also important to point out that "Mixed" subtitles are available in TV, whereas "Bottom" subtitles are the standard for any other subtitling format.

Mean Reading Time: Placement

	Top	Bottom	Mixed
Hearers	47,69096476	53,23086175	32,90258373
Deaf	51,2118968	58,301856	33,72004515
Hard of Hearing	52,57779214	61,54774058	48,51019486

When it comes to comprehension, results are varied: "**Mixed**" subtitles obtain good results in comprehension tests among **Hard of Hearing** users, but not among Hearers or Deaf users, who obtain better results when subtitles are displayed at the bottom of the screen.

"**Top**" subtitles, although quicker in terms of reaction times, do show poor results among Deaf users – although **Hearers** and the **Hard of Hearing** perform better.

It is necessary to highlight, however, that the mean of all groups indicates that "**Bottom**" subtitles are the most adequate format for all viewers.

Comprehension Instance: Placement-mixed (Text)

Conprehension Instance: Placement-bottom (TexT)

Comprehension Instance: Placement-top (Text)
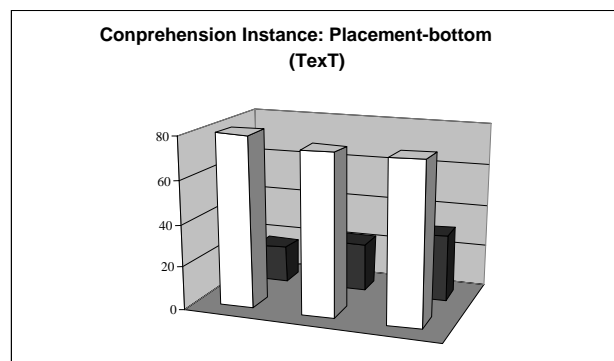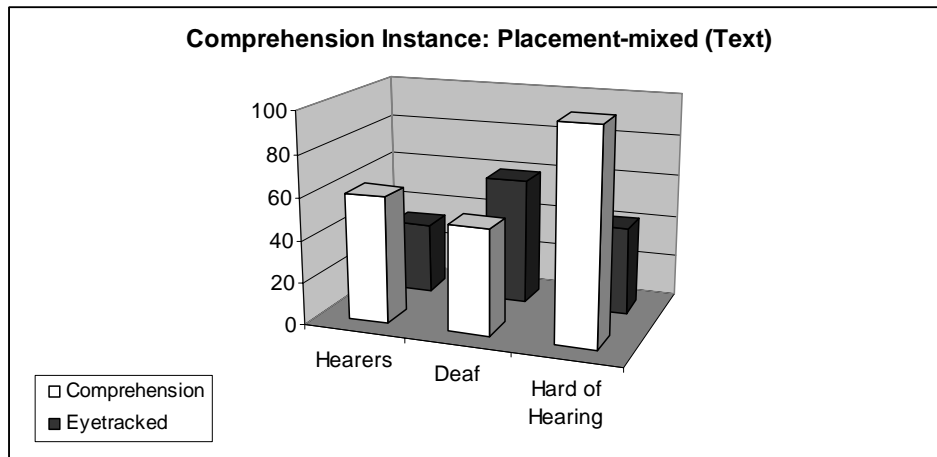
- **Justification**

Two different variables were tested for subtitle placement:

- Centre: Specified in the UNE-153010 subtitling standards and common practise in TV, DVD and video subtitling.

- Left: Not included in UNE-153010 subtitling standards, but generalised in teletext subtitling of live events: either steno typed or respoken.

All groups have faster reaction times with Subtitles Centred than with Left Justified texts. Differences are especially relevant among Deaf and Hard of Hearing users.

As previously seen, Deaf and Hard of Hearing participants perform "better" than Hearers, possibly influenced by their subtitle reading habits.

Time to first fixation: Justification

	Hearers	Deaf	Hard of Hearing
■ Centre	0,449074233	0,265597953	0,298977206
■ Left	0,466947075	0,351916667	0,419814134
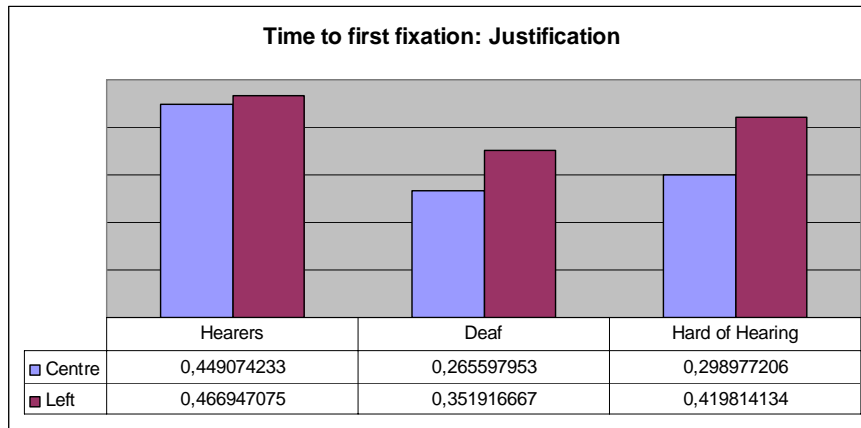
However, when it comes to the length of the first fixation, centred subtitles show longer fixation among Hearers and Deaf users, but that is not the case for the Hard of Hearing.

First fixation length: Justification

	Hearers	Deaf	Hard of Hearing
■ Centre	0,236764356	0,25067619	0,215503571
■ Left	0,215569036	0,236555556	0,225379493

When comparing the time spent reading subtitles, both Deaf and Hard of Hearing users spend longer time – 8% longer – reading when subtitles are centred, whereas Hearers read faster left aligned titles.

Mean Reading Time: Justification

	Hearers	Deaf	Hard of Hearing
■ Centre	47,90706653	64,88231713	58,15776203
■ Left	57,07847341	57,03416681	50,56837064

69
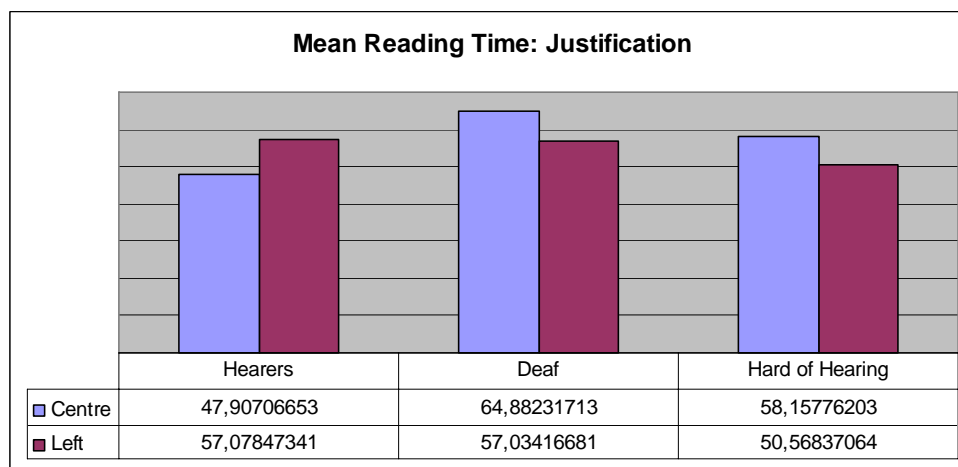
However, although the longer time spent could be interpreted as a positive sign in terms of comprehension, test results do not support this idea. Comprehension instances demonstrate that centred subtitles are better read – in terms of comprehension – by Hearers and Deaf users, whereas only the Hard of Hearing get better results with left aligned texts, though the time invested in subtitle reading is also higher than for centred subtitles.

Comprehension Instance: Justification-centre (Text)

Comprehension Instance: Justification-left (Text)
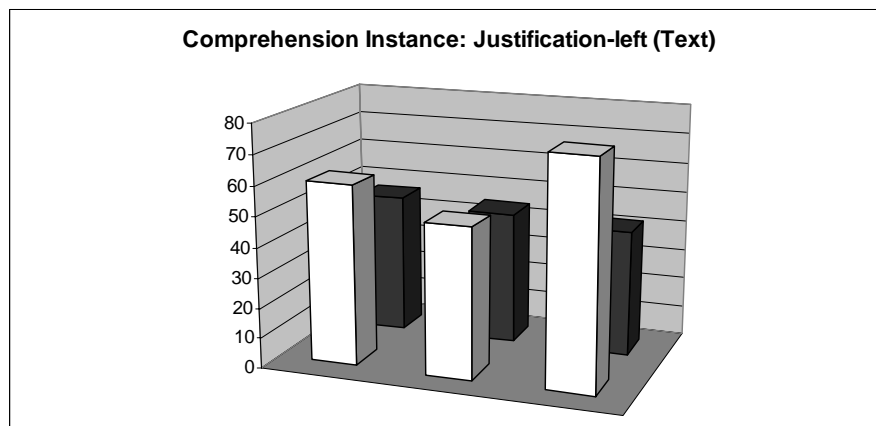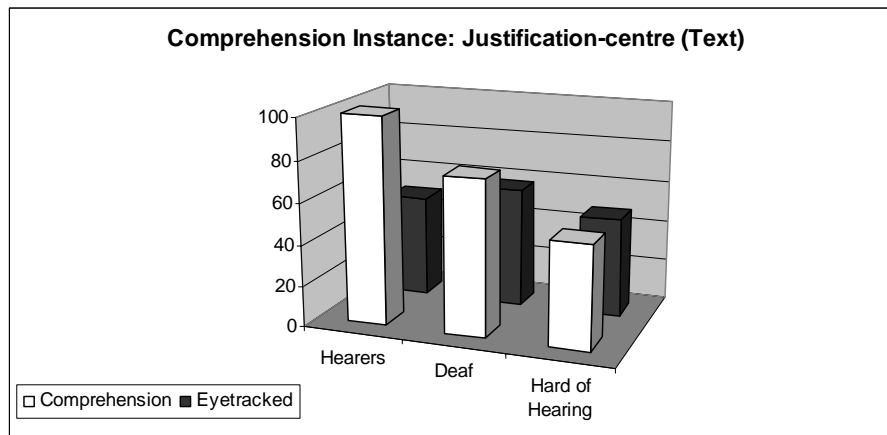
- **Boxes**

Two different variables were tested for subtitle placement:

- Box: Specified in the UNE-153010 subtitling standards due to technological restriction no longer valid – the current Spanish Standards are applied to analog teletext subtitling, where subtitles are always broadcast in boxes.

- <u>No box</u>: Not considered in UNE-153010 subtitling standards, but generalised in DVD subtitling, and also possible nowadays in digital subtitling for TV.

Checking the reaction time, once again we find that Hearers' reaction is slower than the other groups, the Deaf are the group with shortest reaction times, especially when "Boxes" are used – 0.180042 sec.

It is remarkable that all three groups show faster times to first fixation when "Boxes" are used. The biggest difference can be found with Deaf users, as reaction times rise considerably – 33% - when "No boxes" are used, whereas reaction times of Hearers and Hard of Hearing users are only increased by 12-15%.

Time to first fixation: Box

	Hearers	Deaf	Hard of Hearing
Box	0,28341842	0,180042459	0,201458333
No box	0,329923028	0,267754945	0,229513971
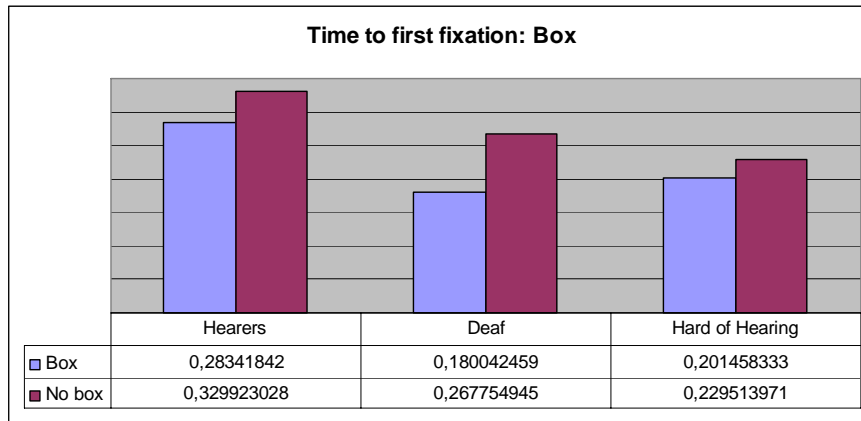
The faster reaction of Deaf users when reading subtitles in boxes is also accompanied by a longer first fixation length. This implies that users stop longer once the eye has reached its "target". The "Mean Reading Time" of the same groups shows how it takes users longer to read subtitles in "Boxes".

This reaction, however, is not similar in the other two groups, as "No boxes" force longer first fixations among Hearing and Hard of Hearing users, with longer "Reading Times" among the latter, whereas slight difference is found among Hearing users. The reading time invested by this group in subtitles with "Boxes" is longer.

First fixation length: Box

	Hearers	Deaf	Hard of Hearing
Box	0,289127387	0,307075	0,213105556
No box	0,291948846	0,270310927	0,258159783

Mean Reading Time: Box

	Hearers	Deaf	Hard of Hearing
Box	53,41	62,58	54,68
No box	48,7593301	57,44446378	60,1501288
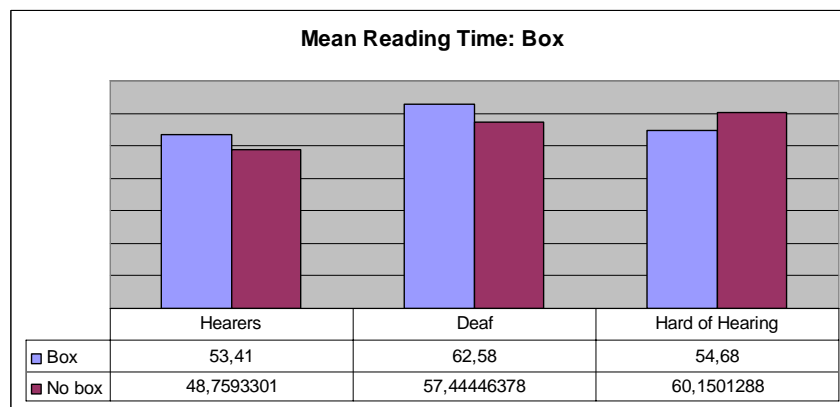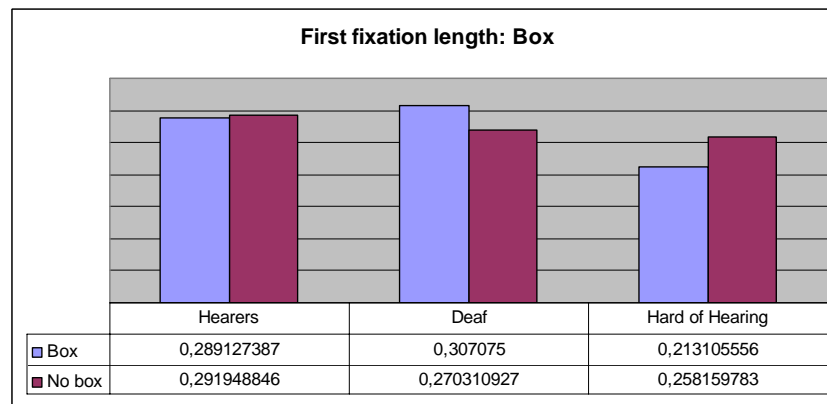
But once again, the "Mean Reading Time" does not explain the underlying comprehension process.

Although the fixation length and the longer time spent in reading the subtitle could lead to better understanding, results show that subtitles with "No Box" achieve a better textual comprehension – 77% Vs 60% with "Box" -, with similar or shorter fixation times.

We could then conclude that "No Box" reading results in a more performant reading process.
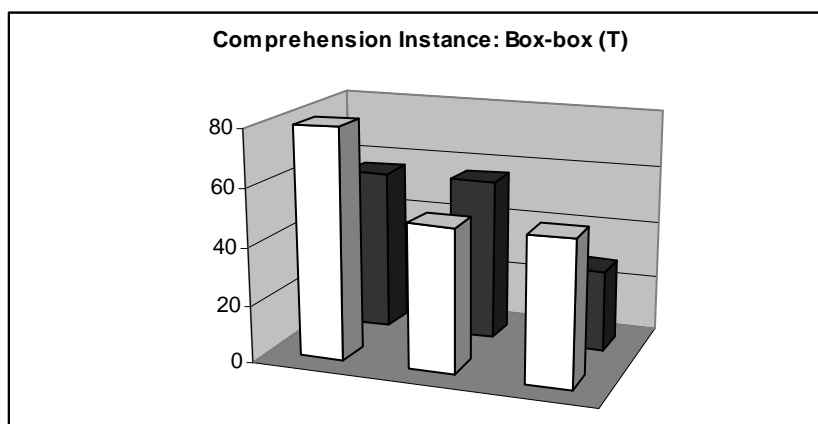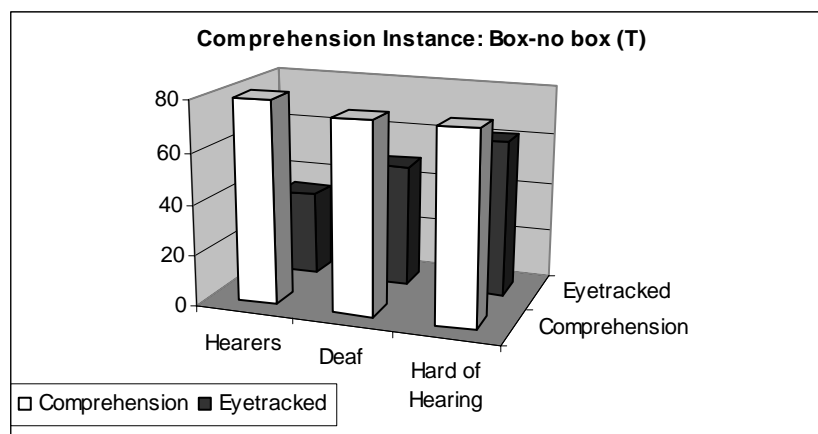
Comprehension Instance: Box-no box (T)

Comprehension Instance: Box-box (T)

- **Borders**

This technical parameter is not included in the Spanish standards. The technical restrictions of analogue subtitling, via teletext, make it unnecessary to specify the presence of borders, due to its inclusion being impossible.

However, in this case two different variables were tested for subtitle placement:

- Border – border: Using a black border is expected to improve legibility, as subtitles would be more easily differentiated from coloured backgrounds.

- Border - no border: This variable tries to represent the current SDH written standards, in which "Border" is not mentioned.

Having a look at the reaction times, once again we find faster "Times to first fixation" in users with hearing impairments.

It is surprising, though, that both Hearers and Hard of Hearing viewers have longer reaction times in subtitles with borders than in subtitles without them. As for Deaf users, differences are almost non existent.

Time to first fixation: Border

	Hearer	Deaf	Hard of Hearing
Border	0,355414436	0,226071078	0,25489916
No border	0,322755133	0,225293422	0,201599107
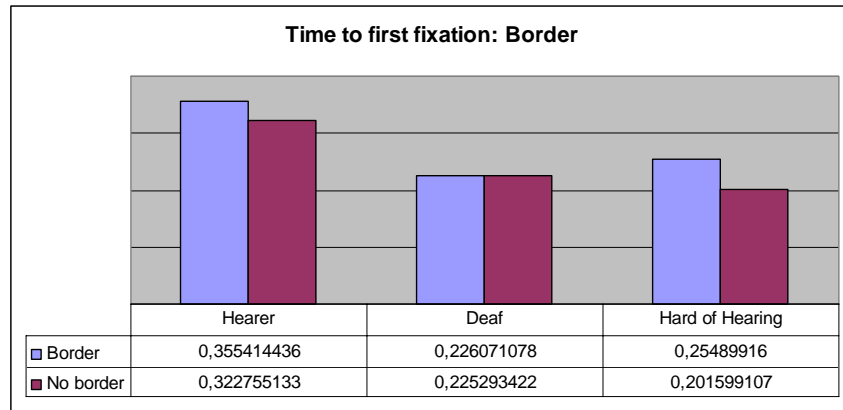
However, when it comes to the reading time, results change, and all users invest longer time in reading subtitles with no borders – especially Deaf viewers, 4% longer – although comprehension patterns do not correspond to this change: users with some hearing capacities (H, HoH) do have a better text comprehension reading texts with borders, whereas Deaf viewers achieve a better comprehension with no bordered texts.

Again, due to the small number of participants in the text, further research would be necessary for this specific variable.

Mean reading time: Border

	Hearer	Deaf	Hard of Hearing
Border	48,60	63,41	55,63
No border	50,56800734	67,26548381	58,20866753

Comprehension Instance: Border-border (Text)

Comprehension Instance: Border-no border (Text)
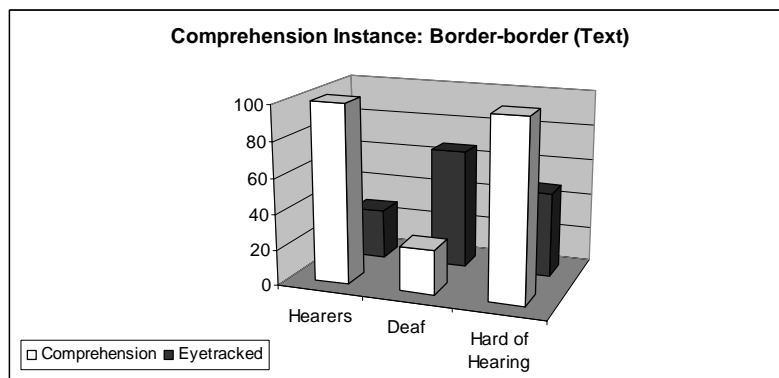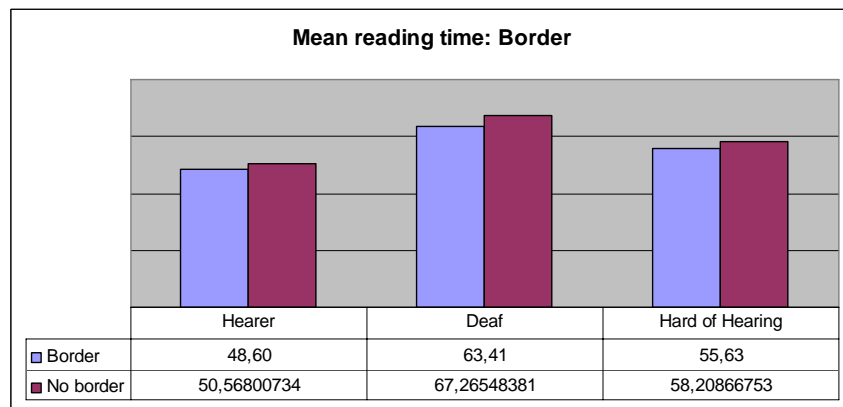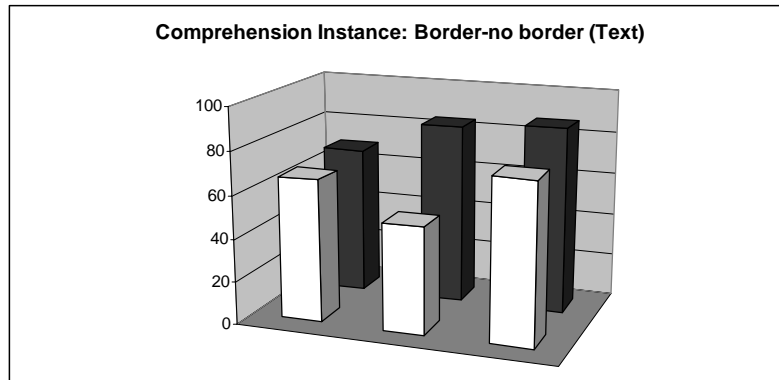
- **Shadows**

As in the case of "Borders", this technical parameter is not included in the Spanish standards. The technical restrictions of analogue subtitling via teletext make it unnecessary to specify the presence of shadows, due to it being impossible to include.

However, once again in this case two different variables were tested for subtitle placement:

- Shadow – shadow: Including a small shadow to every letter is thought to improve subtitle contrast from the background when no boxes are included. This is the general pattern for DVD subtitling. However, this aspect is not included in any written / oral standard.

Te pareces un poco a un ogro,
y Shrek...

- Shadow - no shadow: This variable tries to represent the current UNE-153010 Standard, in which "Border" is not mentioned – unnecessary due to the use of black boxes.

(Cantando)
Dos no es que sea mejor...

Given the slight perceptual difference between both styles, it is remarkable the fact that users could not tell the difference between both variables, and so questions on preferences were randomly answered due to the lack of awareness of the participants of this issue.

However, minor – but unexpected – differences could be identified in the analysis with the Eye-tracker. It was possible to find, for example, that subtitles with "No Shadows" caused longer reaction times in users with hearing impairments – specially among Hard of Hearing viewers, but that the mean reading time pattern was inverted for this group, having longer reading times for texts with "Shadows".

Mean Reading Time: Shadow

	Hearers	Deaf	Hard of Hearing
Shadow	48,37	56,98	56,74
No shadow	50,59	60,05	49,01
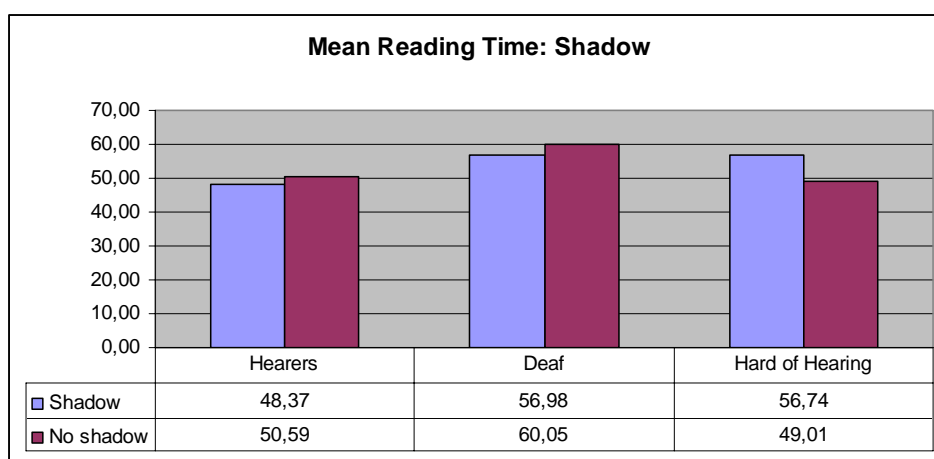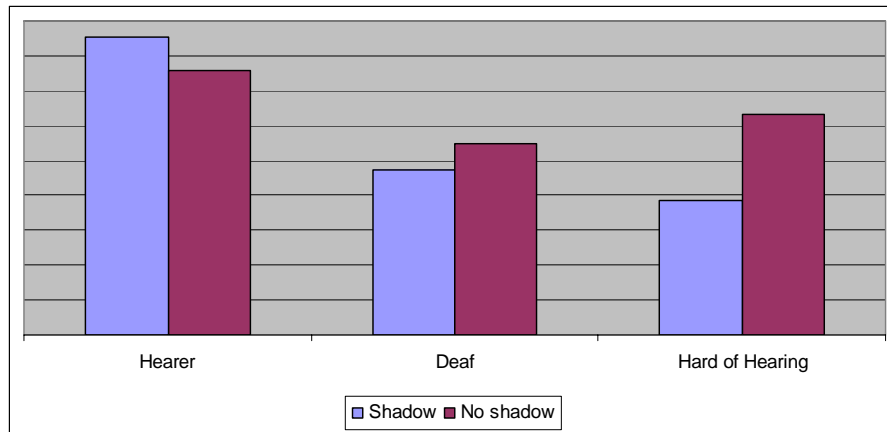
Given the unexpected results, and the lack of a possible explanation for this situation, further research would be necessary in order to identify the potential causes.

In the meantime, and considering the standards in practise – borders and shadows for texts with no boxes, results extracted from the "Border" and "Shadow" categories were also considered "Mass Data" for another part of the analysis.

With these two categories, we tried to identify the average number of characters per fixation with the help of the Eye-tracker.
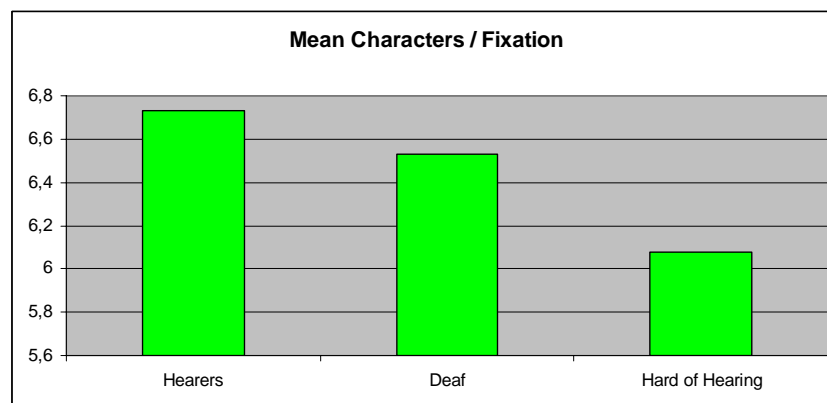
It was then surprising to find that Deaf users go through more characters per fixation, but we can easily understand the reason: in many cases Deaf viewers scan the scene without reading the subtitle – as per the results in comprehension tests - , whereas Hard of Hearing viewers do make more of an effort to read, and so the number of characters per fixation decrease.

- **Emoticons**

Three different variables were tested for subtitle placement:

- Description: Specified in the UNE-153010 subtitling standards. This form is the pattern generally applied to most TV subtitles and other subtitling formats.

- Emoticons: Accepted by the UNE-153010 subtitling standards, their use is not widely generalised – reduced to some TV channels. Never present in any other subtitling format. They have been represented as in the national standards.

- None: Although not included in the national subtitling standards, due to the restrictions in SDH materials, most Deaf and Hard of Hearing viewers are used to watching materials with ordinary subtitles – not SDH This was found in pre-preference questionnaires, where even 50% of Deaf users rejected "mood information" to be represented in any format at all.

¡Pues sí!
Tal vez por la comida.

Time to first fixation: Emoticons

	Description	Emoticons	None
◼ Hearers	0,468218821	0,663984444	0,20417619
◼ Deaf	0,397875	0,394229167	0,143344444
◻ Hard of Hearing	0,445630952	0,8610625	0,153375
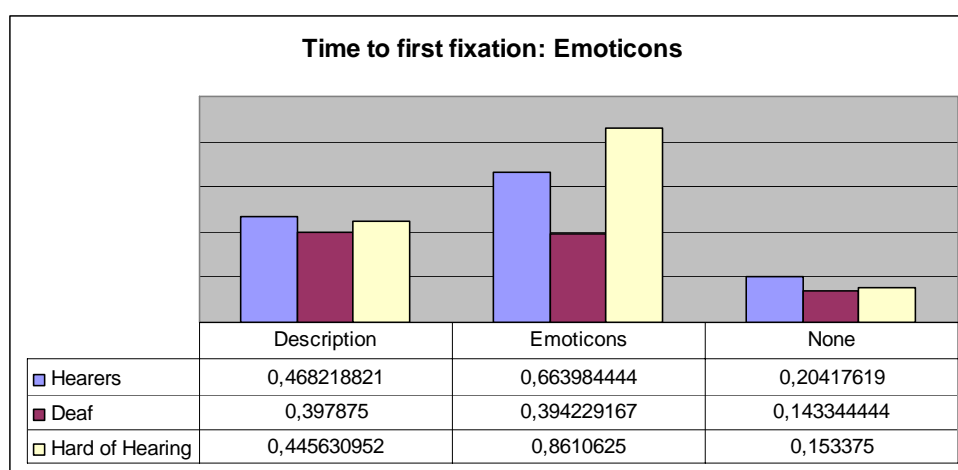
As with previous examples in which further information was made available – i.e. "Identification: Tags" - , both "Description" and "Emoticons" show longer reaction times –"Time to first fixation" – making the omission of "mood information" – "None" – the quickest first fixation option.

Although both in "Description" and "Emoticons" further information is provided – getting similar results among Deaf users - "Emoticons" seem to be the most time-consuming option. This is conditioned by the fact that the information of both options – "Description and Emoticons" – as it happened with "Identification: Tags" is only processed as part of regressions, or once the subtitle has been read.

It is also necessary to remark that the information provided through "Emoticons" is only "seen" in **39 / 30 / 25 %** of the occasions for the three groups – Hearers / Deaf / Hard of Hearing -, making it difficult to examine comprehension results in this part, as in most cases we cannot even speak about an underlying reading process as not seen equals not read.

On the other hand, "Descriptions" are "seen" in **88 (H) to 94 %** (HoH, D) of the occasions.

First fixation length: Emoticons

	Description	Emoticons	None
■ Hearers	0,295886338	0,30356	0,268753061
■ Deaf	0,339576389	0,312479167	0,238642857
□ Hard of Hearing	0,296833333	0,1949375	0,284892857
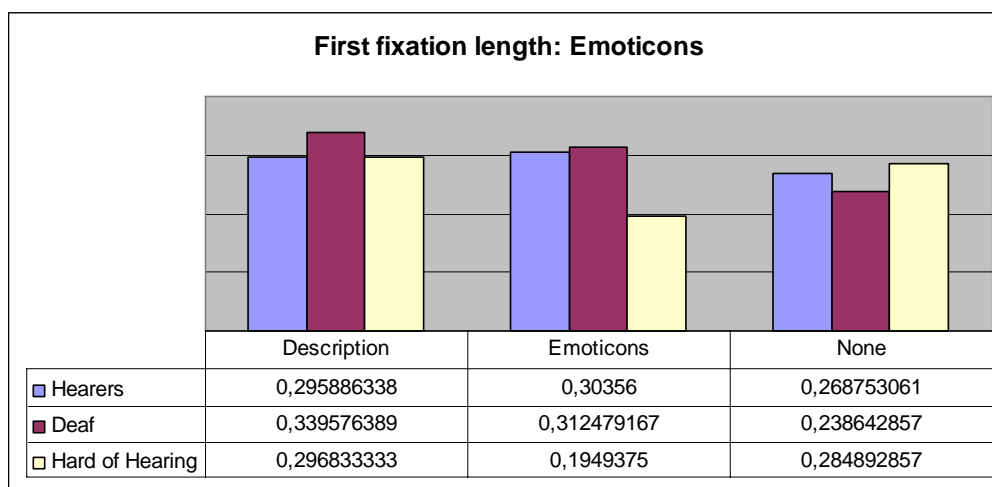
Taking into account the "Mean Reading Time", but not ignoring previous data, results reveal that most users – mainly the Deaf and the Hard of Hearing – spend a longer time reading subtitles with no context information – "None" - whereas subtitles with "Emoticons" take users a shorter time to read, especially among Deaf users.

Mean Reading Time: Emoticons

	Description	Emoticons	None
■ Hearers	58,87452029	48,51	56,79040293
■ Deaf	57,53580297	44,74	75,99562676
□ Hard of Hearing	53,63387764	54,81	67,36063555
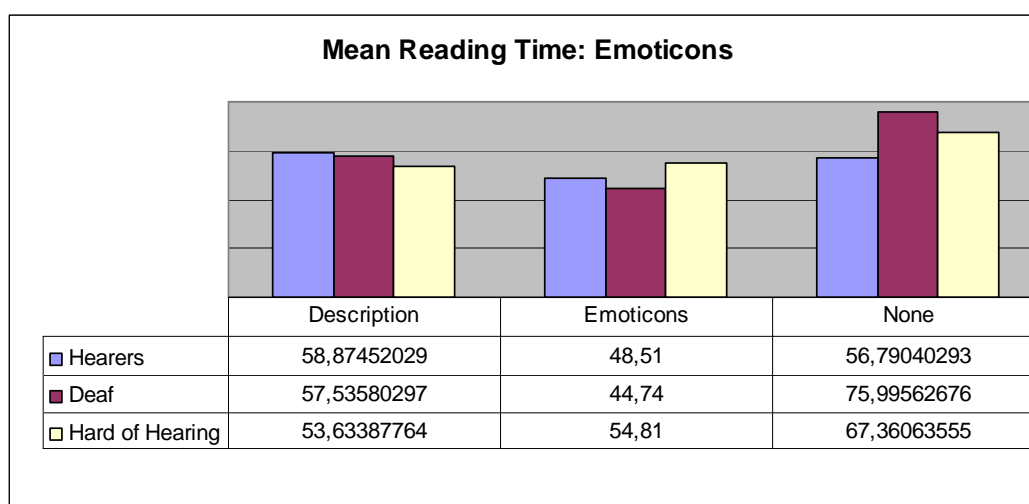
However, when it comes to comprehension, results highlight the need to take all previous data into consideration: results drawn by comprehension tests show that Hearers achieve a perfect comprehension when subtitles do not provide further information – "None" -. This could be explained by the additional information provided by the soundtrack – also available for them.

Given that little information could be retrieved with the eyetracker in the "Emoticon: emoticon" video due to specific reading habits – remember than less than 30% of the

information was perceived - (This should be part of a further study), it is necessary to handle the following data with care.

Hard of Hearing users would obtain very high comprehension results – close to 100% - , whereas Deaf users would process information in a similar way to "Description". However, it would necessary to analyse why Hearers' comprehension is far poorer than in the other two examples.

Nevertheless, taking into account the real data obtained in the present test, subtitles with description would be the most adequate option in terms of perception and comprehension.
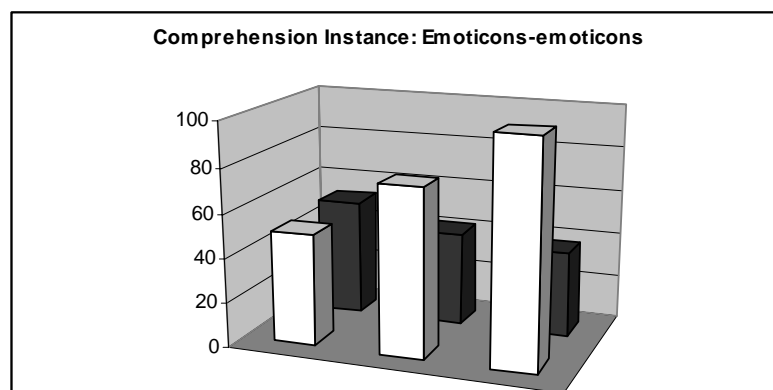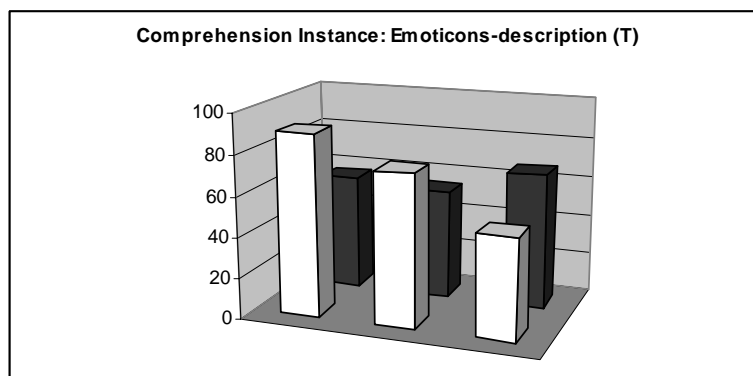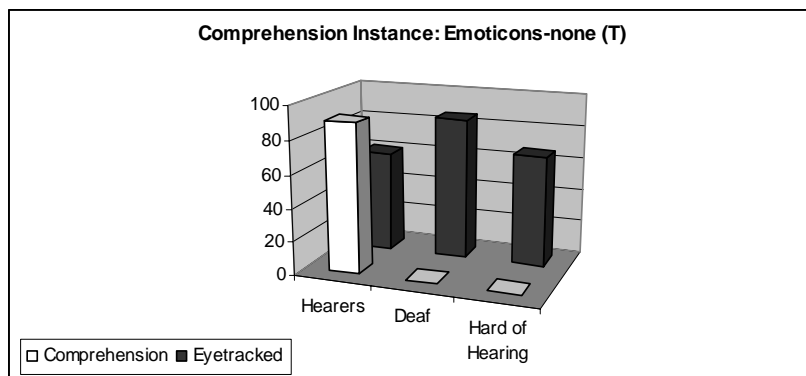
- **Icons**

Three different variables were tested for subtitle placement:

- Description: Specified in the UNE-153010 subtitling standards. This form is the pattern generally applied to all TV subtitles – teletext – and all SDH formats.

- None: Although not included in the national subtitling standards, due to the restrictions in SDH materials most Deaf and Hard of Hearing viewers are used to watching materials with ordinary subtitles – not SDH -. This was found in pre-preference questionnaires, where even 40% among Hearers, and 20% among Deaf users rejected "sound information" to be represented in any format at all. However, this was not the case of Hard of Hearing users, who would prefer some kind of representation – icons / lyrics / etc.

- <u>Icons</u>: Already used in other non-SDH styles and visual translations, "Icons" are not present in the Spanish Standards. This option was included as an attempt to introduce a "graphic" representation of sound information. Only 20% of the Deaf users went for this option in pre-preference questionnaires.

The time elapsed to the first fixation is always shorter when no additional information is provided, whereas when "Descriptions" or "Icons" are used, reaction times are impacted especially in the case of "Icons".

It is especially remarkable that Deaf viewers have longer reaction times than the other two groups in the special case of "Icons". It is also interesting that only 50% of the icons presented were satisfactorily "seen", whereas 53% among the Hearers and 68% among the Hard of Hearing went through this information. Moreover, the length of the first fixation in this group – HoH – is also longer than for "Descriptions" or "None" formats.

Time to first fixation: Icons

	Description	Icons	None
■ Hearers	0,466991213	0,691678571	0,227246145
■ Deaf	0,429128472	0,8025	0,105349405
□ Hard of Hearing	0,476006944	0,60925	0,226391667
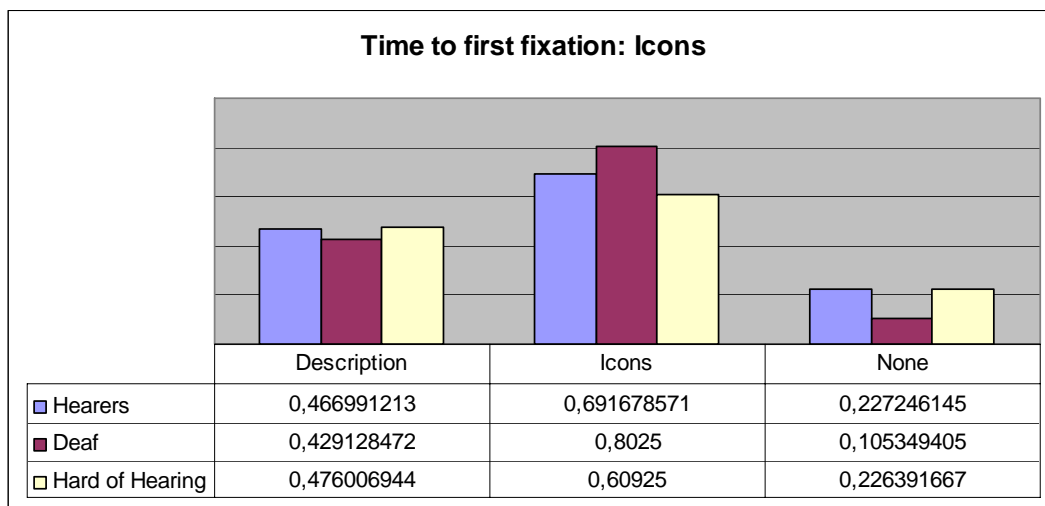
In the case of "Descriptions" all the groups went through the sound information in 80 – 100% of the cases, although the first fixation length is much longer for all groups, the Deaf participants' results are quite representative – almost 50% longer. This could be explained by the fact that the information provided in this format comes in the form of text – subtitle - , nevertheless, as in the example of "Emoticons: emoticons", further research should be requested on this issue.

First fixation length: Icons

	Description	Icons	None
■ Hearers	0,277095238	0,200428571	0,256095238
■ Deaf	0,407694444	0,2210625	0,286208333
□ Hard of Hearing	0,246055556	0,2831875	0,232020833
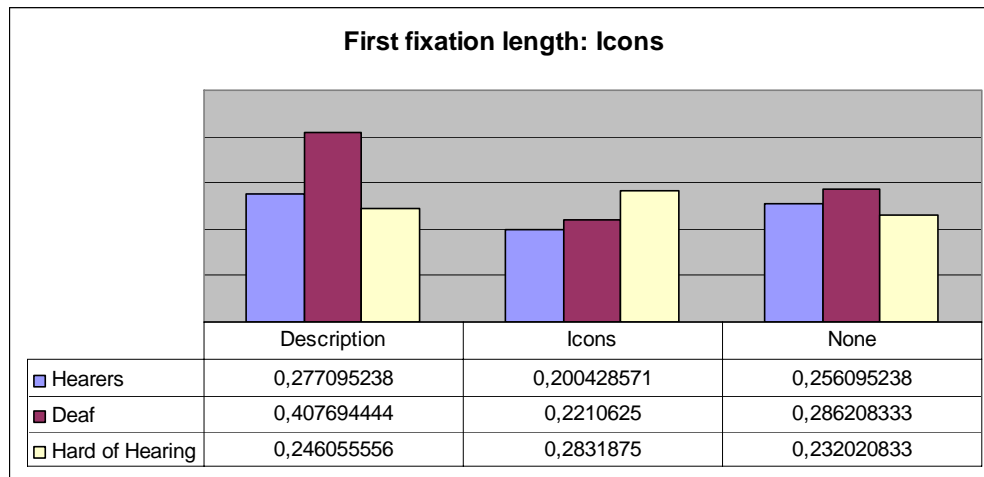
Although the comprehension instances analysed for previous parameters did not draw significant results for visual comprehension and overall meaning, all comprehension instances – text, image and sense – reveal important data in this case.

Considering Overall Comprehension, subtitles including "Icons", achieve a better comprehension in all groups, and mainly among Deaf and Hard of Hearing users. Even subtitles with no context / sound information – "None" – provide better comprehension results in all groups than subtitles with "Description".

As it happens with "Emoticons: None", Hearers achieve better comprehension levels reading subtitles with no additional information than reading subtitles with description or iconic representation. The answer to this could come from the fact that context / sound information not provided by the subtitle / icon is conveyed through the soundtrack.

Comprehension Instance: Icons

	Description	Icons	None
■ Hearers	43,70016501	46,51	53,66208871
■ Deaf	53,56070041	61,97	58,73578544
□ Hard of Hearing	36,42062432	76,70	40,0032198

□ Hearers ■ Deaf □ Hard of Hearing
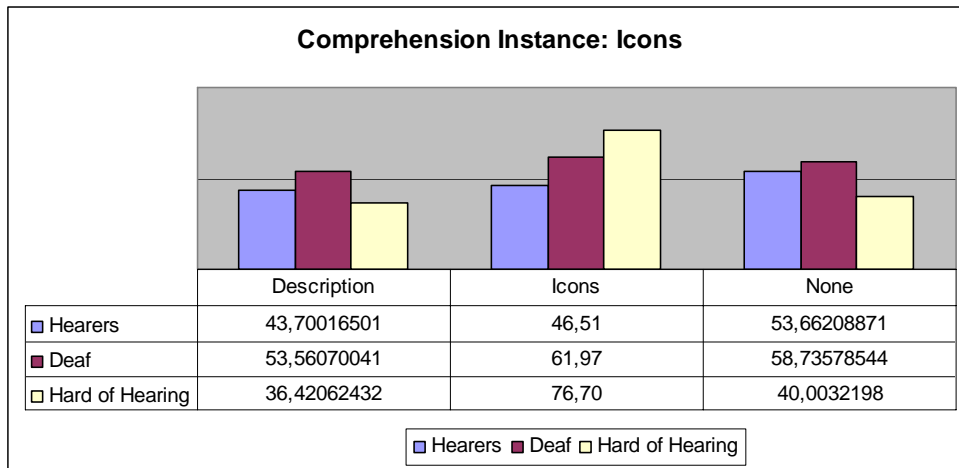
As for text information, "Description" obtains the best comprehension results for all groups. Hearers are the group with higher scores.

Comprehension Instance: Icon-description (Text)

□ Comprehension ■ Eyetracked

Comprehension Instance: Icons-none (Text)

Comprehension Instance: Icon-icon (Text)
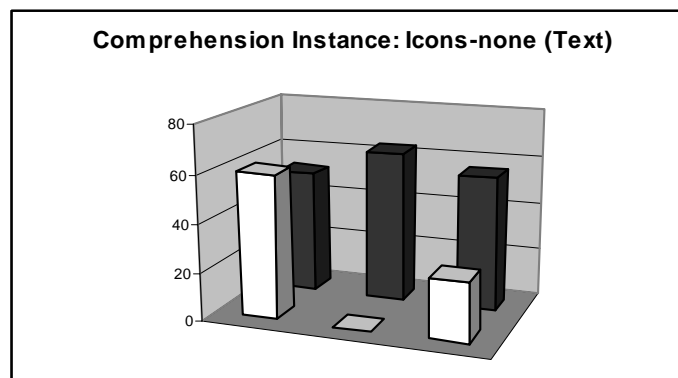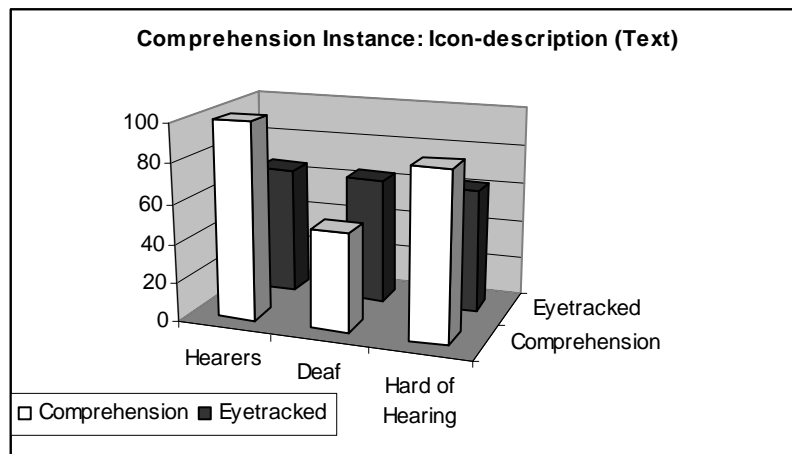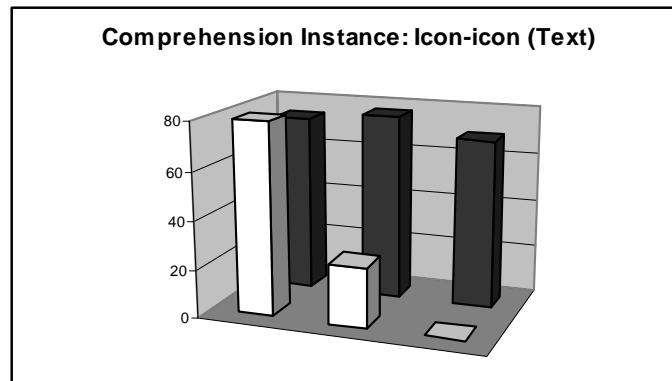
When it comes to visual information – Image – results vary considerably.
As with context information, Hearers achieve their better understanding with iconic representation, whereas the Hard of Hearing would prefer "Description".

Deaf Users, however, seem to obtain a better understanding when no context information is provided, and this follows the general tendency of this group. (See overall comprehension results)

Comprehension Instance: Icon-description (Image)

Hearers   Deaf   Hard of Hearing

☐ Comprehension ☐ Eyetracked

Comprehension Instance: Icon-none (Image)

Comprehension Instance: Icon-icon (Image)
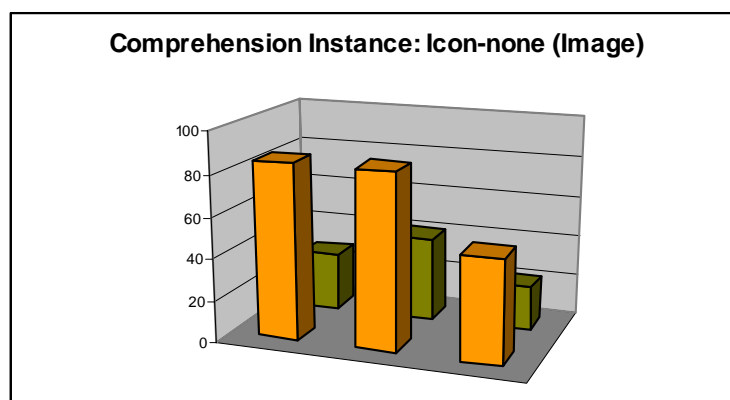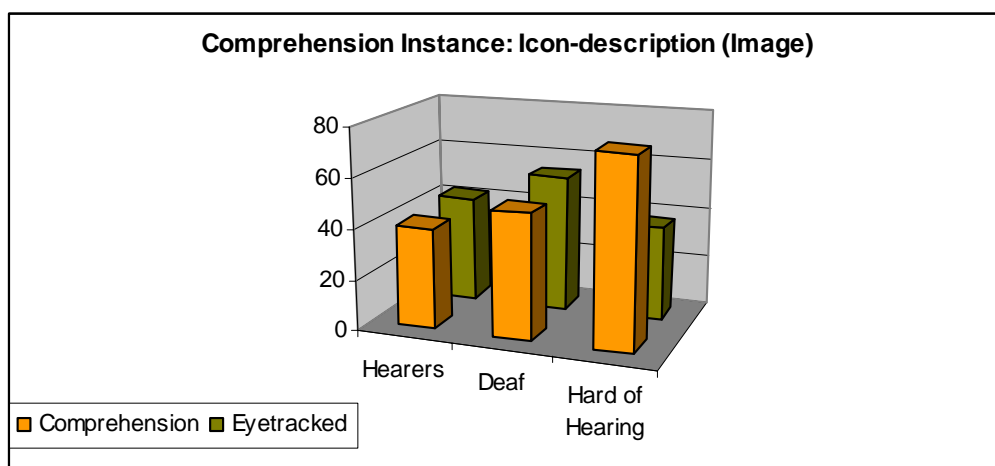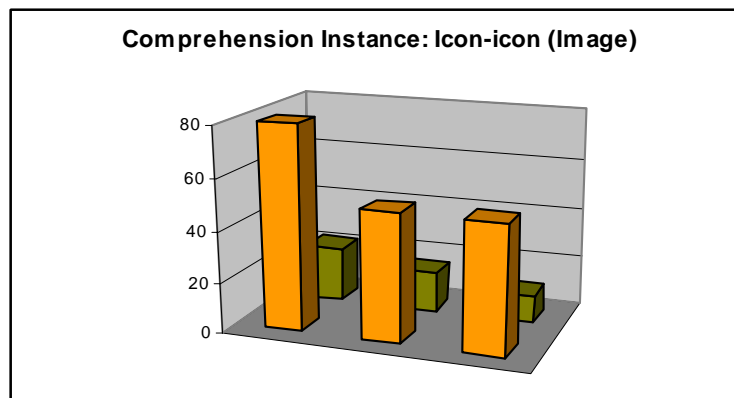
Finally, for general meaning – "Sense" -, we find again co-concurrent results: "Icons: None" provide better comprehension data both among Hearers and the Hard of Hearing. This could also be influenced by the remaining hearing of the target group. Again, further research should be carried out on this point.

However, the best mean comprehension is achieved with the "Icon-icon" format, possibly relying on the "Comprehension balance" already mentioned.

Nevertheless, 50-68% of the iconic information represented through "Icons" was perceived by the final users.

Comprehension Instance: Icon-description (Sense)

Comprehension Instance: Icon-none (Sense)

Comprehension Instance: Icon-icon (Sense)
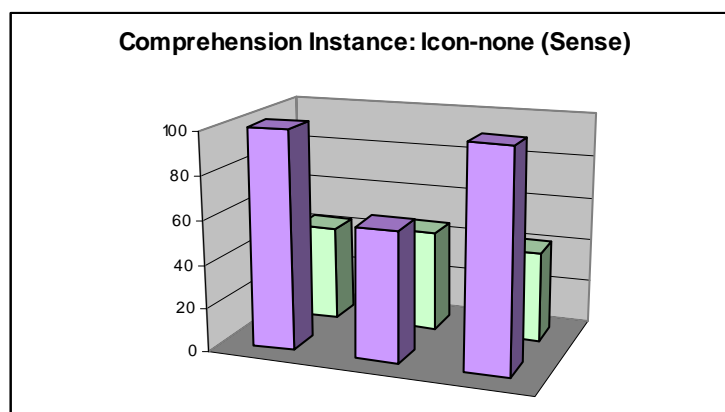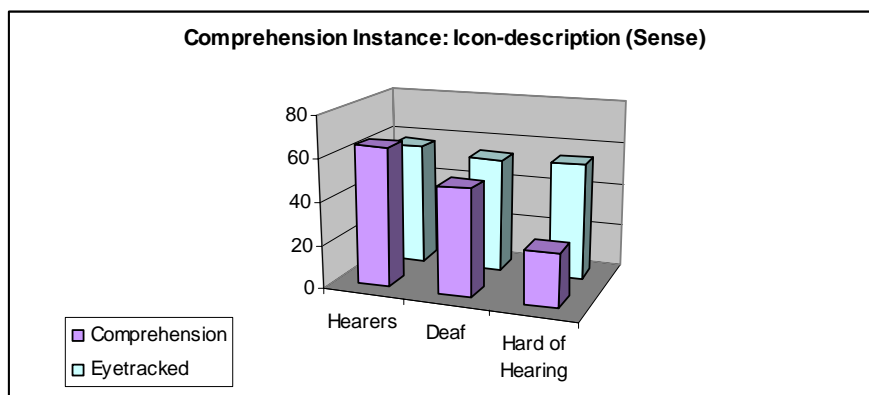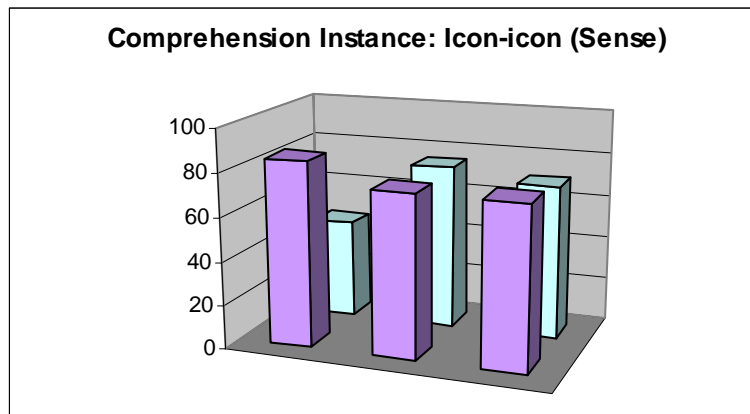
• **Subtitle Type**

Three different variables were tested for subtitle placement:

- Standard: Not directly referred to in the Spanish standards, this is the most standardised subtitling practise, partly due to the time-space restrictions of this audiovisual transfer system. The Spanish Standard recommends a maximum speed of 19 characters per second and 35-37 characters per line.

- Edited: It is only accepted in the Spanish Standards under the category of "Subtitling for people with reading / writing disabilities". This "marginal" form of subtitling respects almost the same patterns of the SDH standards, but drops reading speed to 12 characters per second. Nevertheless it is necessary to remark that this "Subtitling style" is not present either on TV or any other audiovisual format.

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- Verbatim: A "preferred technique" by the UNE-153010 Standards, "Verbatim" subtitling is non-technically viable due to the time-space restrictions in use; however, 100% of the Hard of Hearing participants taking part in the test chose "Verbatim" as their ideal subtitling speed.

Time to first fixation: Speed

	Standard	Edited	Verbatim
■ Hearers	0,360520388	0,387652231	0,385020306
■ Deaf	0,243490079	0,316457676	0,209323603
□ Hard of Hearing	0,240166912	0,247319617	0,208011216
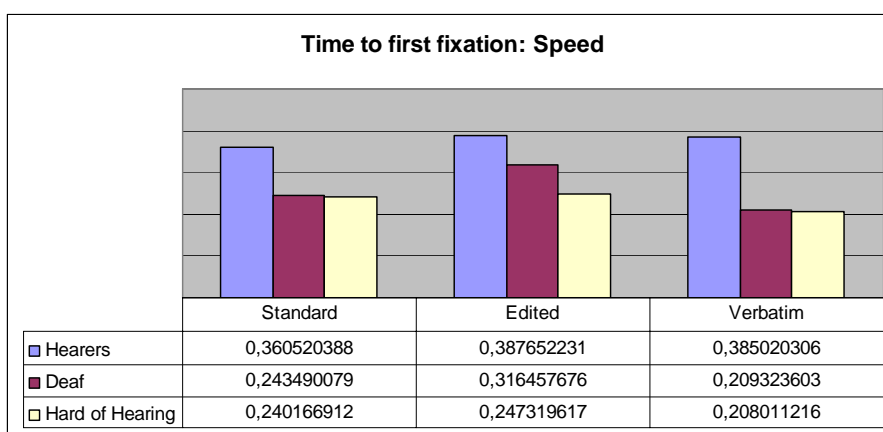
It is significant that with "Verbatim" subtitles the time to first fixation is considerably shorter for Deaf and Hard of Hearing users, especially when compared to "Edited" or even "Standard" subtitles. The reason could lie in the reading process developed for each type: the speed at which subtitles are passed forces readers to adopt faster eye movements and reading times.

However, it is also significant that "Standard" subtitles do show similar reaction times – Time to first fixation – both among Deaf and Hard of Hearing Participants, whereas "Edited" subtitles reveal longer reaction times among Hearing and Deaf participants.

Deaf participants are the group with the longest first fixation result for all types.

First fixation length: Speed

	Standard	Edited	Verbatim
■ Hearers	0,207455046	0,236594779	0,196165722
■ Deaf	0,253320602	0,267552963	0,258883547
□ Hard of Hearing	0,22251458	0,23852849	0,20051291
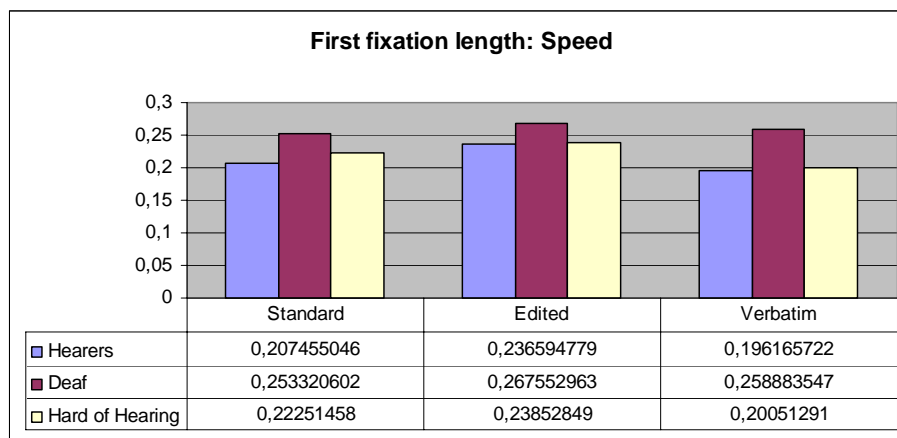
The mean reading time highlights important data to support the nature of every modality: "Verbatim" subtitles require 55 – 70% of the reading time, leaving a 45 – 30% of the viewing time for the rest of the scene.

"Edited" subtitles are the modality that requires less reading time – 38-49% of the viewing time – by Hearers and Hard of Hearing users. However, the Deaf invest longer time with "Edited" than they do with "Standard" subtitles. This could be considered an error in our test, but the data derived from comprehension tests support this result.

Mean Reading Time: Speed

	Standard	Edited	Verbatim
■ Hearers	51,36536573	49,16663018	55,85664042
■ Deaf	47,97097493	55,40865196	70,95258985
□ Hard of Hearing	48,50530121	38,08802652	60,01552976
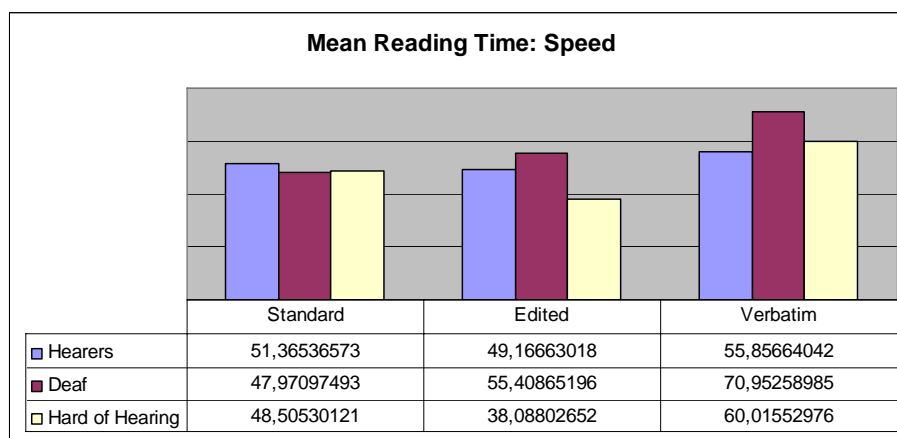
"Verbatim" subtitles, as previously seen, require longer fixation and reading times than "Edited" and "Standard" subtitling. However, comprehension does not improve even though the reading time rises, with comprehension rates that only reach 60% in the case of Hearers.

"Adapted" subtitles also draw unexpected data: whereas Hearers and Hard of Hearing Users invest longer reading with "Standard" than with "Adapted" subtitles, it takes Deaf users longer to read "Edited" subtitles. This could imply a better overall comprehension achieved through a more detailed reading process, but that is not the case, as comprehension rates, only reach 40% (H), 50% (D) and 25% (HoH).

Although the comprehension levels reached by Deaf viewers are the highest ones for this subtitling format among the three groups, the mean Text Comprehension rate is the lowest one – 38'3% - . Furthermore, Deaf viewers, as happens with Hearers and Hard of Hearing users, achieve higher comprehension rates with "Standard" subtitles – 75%.

Comprehension Instance: Speed-verbatim (Text)

Comprehension Instance: Speed-standard (Text)

Comprehension Instance: Speed-adapted (Text)
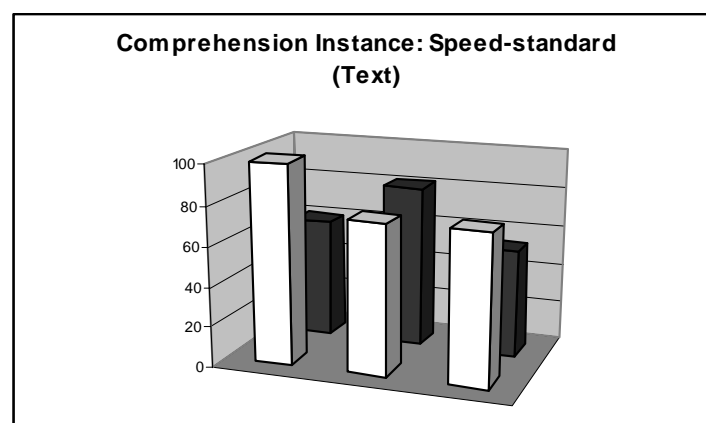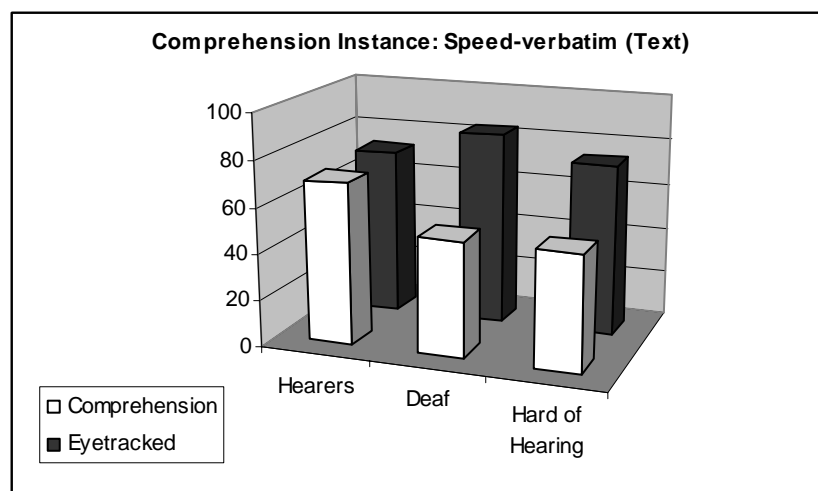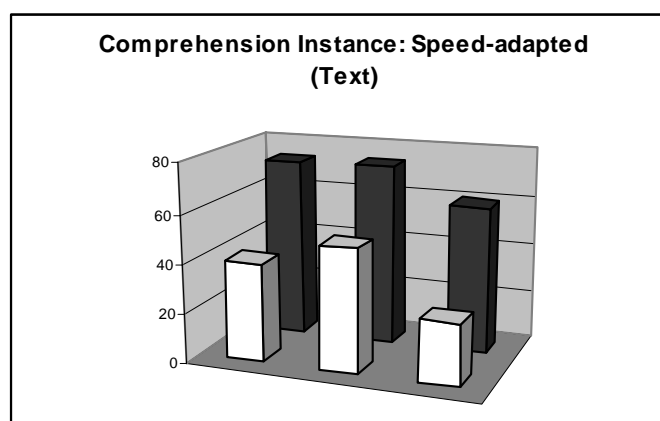
3) CONCLUSIONS

The present study has she some light into some of the current subtitling practices.

We have checked that many of the subtitling standards currently in use are in fact really meeting the needs of their final audiences, whereas some standards could be improved by adopting more accurate practices.

"**Colour Identification**" has proved to be the best technique in terms of comprehension for all groups, as both "Tags" and "Displacement" - also present in the Spanish written Standards - require longer reading times and do not show better comprehension results.

Placement results reveal that although "Mixed" subtitles have good comprehension results for Hard of Hearing viewers, Deaf and Hearing participants showed poorer comprehension levels. "**Bottom**" subtitling, currently in use only in DVD subtitling, is the best style in terms of viewing time and comprehension for all three groups.

Justification points in two different directions: "**Centred**" texts – as recommended by the UNE-153010 – are more performant among Hearers and Deaf participant, whereas the Hard of Hearing have better comprehension results with "**Left**"-aligned texts.

The use of "**No Box**" – generalised practise in DVD subtitling and possibly reconsidered in the next revision of the Spanish Standards – has been demonstrated as the most beneficial option for comprehension purposes, although it may force Hard of Hearing participants to read subtitles for a bit longer – taking time from "Scene Perception".

Emoticon and **Icon** analysis, results seem to reveal that the use of "Emoticons / Icons" could improve reading comprehension and reduce the Mean Reading Time among Deaf and Hard of Hearing participants. However, given that only 30% to 50% of the information was perceived among the users with Hearing Impairments, "**Description**" is the option that best meets comprehension levels for both parameters.

The options "**Borders**" and "**Shadows**" seem to get better results than the "No Border" / "No Shadow" option among Hearers and Hard of Hearing participants, but in contrast

to this, the Deaf spend longer time reading subtitles with no borders / shadows, but they do also achieve a better comprehension result.

Finally the study of the different **Subtitle Speeds** (Standard, Edited, Verbatim), prior to the test we expected that "Adapted" –Edited- subtitles would best meet the needs of Deaf participants. However, we found that all participants invested longer reading times in this subtitle style but that their textual comprehension was worse than with other types, including Verbatim subtitles. **Standard subtitles** are therefore the option that best met the needs of all three groups in terms of comprehension.

So, then, according to the results drawn by our analysis, the "Perfect" subtitling standards would include the following parameters:

	Ident.	**Place.**	**Justi.**	**Boxes**	**Border**	**Shad.**	**Emot.**	**Icons**	**Speed**
Hearers	Colour	Bottom	Centre	No Box	Border	Shad.	Descr.	Descr.	Stand.
Deaf	Colour	Bottom	Centre	No Box	No Border	No Shad.	Descr./ (Emot.)	Descr.	Stand.
Hard of Hearing	Colour	Mixed	Left	No Box	Border	Shad.	(Emot.)	Descr.	Stand.

As a result of this study, we can see that there is not a single format that meets the needs of all subtitle users. So, in the future, who are we going to subtitle for?

However, further research would need to focus on whether the combination of these parameters would really improve the current subtitling practices.

4.7   University of Roehampton Report

Description of the experiment

The aim of this study was to find out how much visual and verbal information hearing, hard of hearing and deaf viewers obtain from news programmes in the UK. For this purpose, four clips from the *Six O'Clock News* broadcast on 4 July 2007 by BBC1 were shown to 30 hearing viewers, 15 hard of hearing viewers and 15 deaf viewers. The hearing participants were between 20 and 45 years old, native or near native in English, proficient readers and habitual subtitle users. Half of them were postgraduate students currently doing an MA on Audiovisual Translation at Roehampton University and the other half was formed by lecturers and professional subtitlers. The hard-of-hearing participants were over 60 years old, the most common age range for viewers with this type of hearing loss, and all of them but two became hard of hearing after the age of 50. Most of them were frequent readers and subtitle users. Finally, the deaf participants were between 20 and 45 years old. Most of them were oralist (i.e. use English as their first language) and only two were signing (use British Sign Language as their first language). All 15 were university students, frequent readers and habitual subtitle users.

As far as the methodology is concerned, participants were shown two clips with two news items each and were asked to answer questions about one of them. The clips were subtitled by respeaking at two different speeds, 180 wpm, the usual speed in the UK, and 220 wpm, so as to ascertain the effect of speed on comprehension.

In order to carry out a quantitative analysis of the amount of information retrieved by the viewers, the two news clips were notionally divided, drawing on Chafe's (1980) concept of *idea units*, into 14 semi-units: 8 verbal units and 6 visual units. In (very few) cases in which participants retrieved in their answers a semi-unit that was not included in these 14, the new unit was also factored in the analysis. For the purpose of the analysis of the findings, a simple division was made whereby any result between 0% and 25% is regarded as zero to poor information retrieval, 25%-50% goes from poor to sufficient, 50%-75% from sufficient to good and 75%-100% from very good to perfect information retrieval.

Finally, a further problem was posed by the absence of a yardstick with which to compare the results obtained by participants watching subtitled news. Can we indeed expect viewers under normal conditions (no subtitles) to obtain 100% of the visual and acoustic information of a news clip? In order to answer this question, a preliminary test was run with 15 other students (from the above-mentioned class at Roehampton University) who watched the same clips with sound but no subtitles and were asked the same questions.

Findings

The following graphs and tables show the results obtained in the study, firstly with hearing participants and no subtitles and then with hearing, hard-of-hearing and deaf participants and subtitles at 180wpm and 220 wpm:

- No subtitles (hearing viewers)

No subtitles	
Performance	
Perfect	0%
Very good	93.3%
Good	6.7%
Almost good	0%
Sufficient	0%
Less than sufficient	0%
Poor	0%
Very poor	0%

- Subtitles at 220 wpm (hearing, hard-of-hearing and deaf viewers)

	Hearing		Hard-of-Hearing		Deaf	
Good	0%		0%		0%	
Almost good	6.7 %	20%	6.7%	20%	6.6%	13.3%
Sufficient	13.3 %		13.3%		6.6%	
Less than sufficient	20%		30%		26.7%	
Poor	30%	80%	30%	80%	26.7%	86.7%
Very poor	30%		20%		33.3%	

- Subtitles at 180 wpm (hearing, hard-of-hearing and deaf viewers)

	Hearing		Hard-of-Hearing		Deaf	
Good	3.3%		3.3%		0%	
Almost good	6.7%	46.7%	6.7%	46.7%	6.7%	46.7%
Sufficient	36.7%		36.7%		40%	
Less than sufficient	20%		20%		13.3%	
Poor	20%	53.3%	13.3%	53.3%	20%	53.3%
Very poor	13.3%		20%		20%	

Discussion

As may be expected, hearing viewers watching the news with no subtitles did not manage to retrieve 100% of the visual and verbal information conveyed in the clips. Short term memory plays an important factor here. Yet, their results show very good comprehension (an average of 80%), particularly of the images (90.5%, as compared to 73.2% of the verbal information), which is normal considering that no subtitles were displayed.

As far as the study with subtitles is concerned, two elements are particularly striking: The overall poor average comprehension obtained and the similarity of the results across viewers regardless of the type hearing loss. The latter may be due to the fact that all participants taking part in the experiment were very used to watching subtitles on TV, be it because they study them or produce them (hearing) or because they use them as a means to access the news on a daily basis (deaf and hard-of-hearing). In any case, this makes the low overall score regarding comprehension even more puzzling.

As for the test with subtitles at 220 wpm, only 20% of the participants obtained sufficient information and none obtained good information. Besides, 60% could only give a poor or very poor account of the news. Although not surprising, given the high subtitle speed, these results warn against the possibility of producing verbatim subtitles for certain programmes such as debates, interviews and weather reports, which are sometimes spoken at this rate. Indeed, most viewers (76%) considered these subtitles to be too fast. Many of them also added that it caused them 'stress' and 'headache' and pointed out that the images were too fast, which, although not true (they were as fast as in the other clips), goes to show how the speed of subtitles can affect the overall perception of an audiovisual programme.

The test with subtitles displayed at 180 wpm is more significant, as respoken subtitles are often displayed at this speed in some sport programmes and many news programmes, interviews and debates. In this case, most participants (66%) were happy with the speed of the subtitles and yet more than half of them (51%) did not obtain sufficient information. This suggests that viewers may be unaware of how much information they are losing due to the speed of respoken subtitles. Thus, although most of them regarded the speed as OK or even too slow, only 3% obtained good information and 31% got poor or very poor information. More worryingly, 1 out of 3 participants acquired incorrect information, believing, for example, to have seen the President of Nicaragua or Tony Blair, none of whom appeared on the news.

Considering that these participants were highly literate and frequent subtitle users, viewers who are not used to subtitles or signing deaf viewers, for whom English is a second language and whose reading skills are often regarded to be poorer (Torres Monreal and Santana Hernández, 2005), can hardly be expected to obtain better results. Why do programmes with these respoken subtitles trigger such mediocre comprehension results? A possible answer to this question may lie in how viewers read and process these subtitles, which can be done by means of eye-tracking technology.

Viewers' processing of respoken subtitles

Eye-tracking and subtitling

Despite its obvious potential for the study of Audiovisual Translation and more specifically for that of subtitling, eye-tracking research in this area is still in its infancy. Following the initial studies by D'Ydewalle *et al*. (1987, 1991) and Jensema *et al*. (2000), it seems that an increasing number of scholars are turning their attention to this technology in order to find out how viewers read and comprehend subtitles and to assess their quality. Looking precisely at how subtitles are read, Jensema *et al*. (2000:284) found that

When captions are present, there appears to be a general tendency to start by looking at the middle of the screen and then moving the gaze to the beginning of a caption within a fraction of a second. Viewers read the caption and then glance at the video action after they finish reading.

Yet, reading is far from being a smooth process. Rather than moving continuously across the page/screen, our eyes pause and focus on specific parts and then jump across words and images. The visual information necessary for reading is obtained during those pauses, known as fixations, which typically last about 200–250 ms (Liversedge and Findlay, 2000). The jumps between fixations are known as saccades, which take as little as 100 ms and are the fastest movement the human being is capable of making (Rayner and Pollatsek, 1989). During saccades, vision is suppressed and no useful information is obtained, which is known as the saccadic suppression (Wolverton and Zola, 1983). But even though we cannot read during saccades, the eyes need not fixate on every word when reading a subtitle. In the following pictures, for example, reading the subtitled line in four fixations (picture 1) enables the viewer to turn quickly to the image (picture 2):
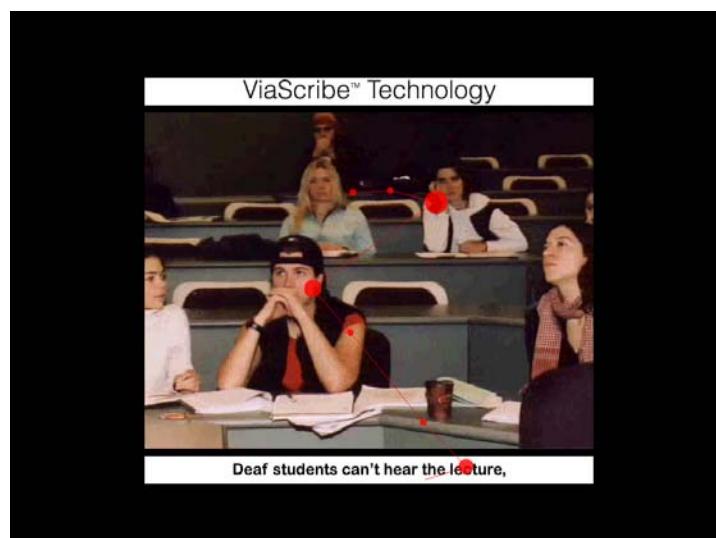
There has been no need to fixate on the words "students" or "hear" because a) they may be guessed by the context, particularly by the preceding words ("deaf" and "can't"), and b) they can be seen with peripheral vision, given that our global perceptual span, the area from which useful information is obtained during a fixation, comprises up to 14 or 15 characters to the right of a given fixation. In this regard, Rayner (1998) explains that with the fovea (part of the eye responsible for sharp central vision) we determine the location of a fixation, the foveal area, which spans 6 to 8 characters around the fixation point. But then, the so-called parafoveal area extends up to 15 characters to the right of fixation (Häikiö *et al.*, 2009). This peripheral vision, which allows faster reading by not having to fixate on every word, applies to print and block subtitles. But what happens when we are reading subtitles that are displayed scrolling word-for-word on the screen, as is the case in respoken TV subtitles in the UK and in the above experiment on comprehension? How are these subtitles processed by the viewers?

Although not exactly applied to subtitles, the news coming from the field of psychology in this regard is discouraging. Experiments conducted by Rayner et al. (2006:321) demonstrate "the importance of the continued presence of the word to the right of fixation […] in order for fluent reading to occur". It would seem that when our eyes are fixated on the foveal word (n), we have enough preview benefit of the next word, the parafoveal word (n+1), to pre-process it, which is crucial to maintaining normal patterns of reading behaviour. Needless to say, in scrolling subtitles, this word to the right of fixation, the n+1 word, is often unavailable for viewers, as words are displayed one at a time. In Rayner et al.'s (2006) study, the absence of this word causes regressions (the eye moves back to previous words already read) and considerable disruption to reading, slowing down reading speed significantly.

The aim of the following experiment is precisely to look at how viewers process respoken subtitles displayed in scrolling mode (as opposed to respoken subtitles displayed in blocks) and to determine whether this may have any effect on the poor results obtained in the comprehension tests.

Description of the experiment

Conceived as an initial application of eye-tracking to research in respeaking, the present experiment was conducted with 30 of the 60 participants who took part in the comprehension tests described above: 10 hearing, 10 hard of hearing and 10 deaf viewers. Participants were shown two news clips from *Six O'Clock News* (4 July 2004) subtitled by respeaking. The first clip was subtitled in scrolling mode (word-for-word); the second, in blocks. Eye movements were monitored via a non-intrusive tracker, which was used to determine a) the number of fixations per subtitled line and b) the amount of time spent on images as opposed to the time spent on subtitles. The equipment used was Tobii X120 series eyetracker, at a frame rate of 50Hz and 35 ms latency. Viewing was binocular and the images were presented on a 17" monitor at a viewing distance of 60 cm. The computer kept a complete record of the duration, sequence, and location of each eye fixation, as well as a video recording of the participants. Tobii Studio was used to analyse all data recorded.

Findings

The following two tables show the results obtained in the study, namely the number of fixations per subtitled line and the time spent on both block subtitles and scrolling subtitles:

Number of fixations

	Blocks	Scrolling
Hearing	3.75	6
Hard-of-Hearing	3.75	6.5
Deaf	3.9	6.5

Time spent on subtitles

	Blocks	Scrolling
Hearing	33.3%	11.7%
Hard-of-Hearing	33.2%	11.4%
Deaf	31.7%	14.3%

Discussion

In line with what was described regarding the comprehension test, the results are fairly consistent across hearing, hard of hearing and deaf viewers. Scrolling subtitles cause almost twice as many fixations as block subtitles. The number of fixations per subtitled line in scrolling mode ranges from 3 to 10, with an average of 6 for hearing viewers and 6.5 for hard of hearing and deaf viewers. Given that the average number of words per line in the clips analysed is 6, it would seem that hearing viewers fixate on every word of every scrolling subtitle and deaf and hard of hearing viewers feature even more fixations than words. In contrast, the number of fixations in block subtitles ranges from 2 to 6, with an average of 3.75 fixations for hearing and hard of hearing viewers and 3.9 for deaf viewers. In other words, viewers skip almost every other word of the subtitle when reading it. Needless to say, this has a direct impact on the time viewers spend looking at the subtitles and the time they devote to the images. As shown in the above table, viewers of the scrolling mode spend most of their time reading the subtitles (an average of 87.5% versus 12.5% spent on the images), whereas viewers of block subtitles have more time to focus on the images (an average of 67.3% on the subtitles and 32.7% on the images).

The analysis of the reading patterns of every participant reveals another interesting element. Rather than differentiating the participants in hearing, deaf and hard of hearing, the results seem to establish a distinction between fast and slow readers. Besides, there seem to be two phenomena, astray fixations and regressions, that may explain the viewers' difficulty reading scrolling subtitles and perhaps the poor comprehension results obtained in the previous experiment. As for fast readers, they often get ahead of the subtitles and cast their eyes on gaps where no word had been displayed yet, which results in astray fixations. Instead of finding solid ground (a word or a whole line), the viewers' gaze falls on a sort of quicksand, which results in the loss of precious time in their reading process. In the following example, this "quicksand effect" occurs in four out of five attempts of the viewer to read the line 'at least one is in the operating room'. The viewer ends up wasting a whole second (0.250 ms per each of the four astray fixations) when reading this line:

On average, these fast readers incur in 2 astray fixations per subtitled line. Half of the times this happens, they go back and re-read at least one word, which means they incur in 1 regression per subtitled line. The other half of the time, they decide to go on reading the subtitle.

In contrast, slow readers do not get ahead of the subtitles (they usually lag behind them) and therefore their patterns do not feature astray fixations and the quicksand effect.

However, their eyes often "land" on words in the middle of a subtitle which are not meaningful enough to make sense of what is being said. In order to go on reading, they have to go back and re-read previous words, which has happened 1.5 times per line in the subjects analysed.

In the following example, the viewer, who has been looking at the images, casts his/her eyes on the word "patients". Not being able to retrieve the information of the subtitled line by reading this word, s/he goes back to the previous one ("several") and yet one more time to ("we've got"), which finally provides enough information to go on reading after "patient". By then, though, the viewer has spent over a second reading a subtitle backwards:
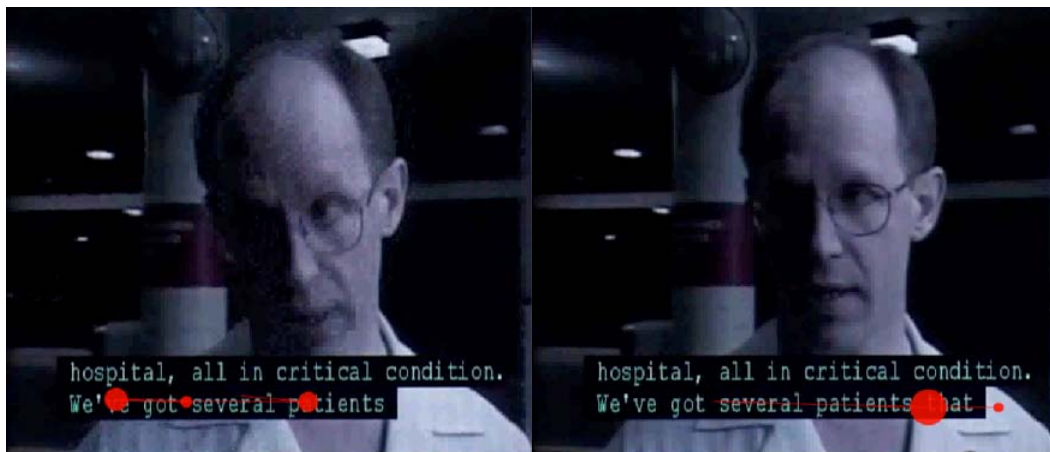
In contrast with the chaotic patterns shown in scrolling subtitles, the reading pattern of block subtitles seems faster and more organised. Corroborating Jensema et al.'s (2000) observations, viewers' gaze turns quickly to the subtitles, where this time they find firm ground on which to cast their eyes before looking up to the images. Thus, the same line as before ('we've got several patients that are') displayed in a block is read by this viewer in only four fixations (on 'we've', 'several', 'patients' and 'that'). There is no need to read all words and considerably less time is spent on the subtitle, which allows more time to focus on the image:

In other words, as anticipated in the literature on psycholinguistics and corroborated by the experiments included here, it would seem that scrolling word-for-word subtitles cause very chaotic reading patterns. Fast readers get ahead of the subtitles and cast their eyes on gaps without words (astray fixations), whereas slow readers lag behind and constantly go back to re-read words (regressions). Either way, they all waste precious time chasing subtitles which seem to be playing hide-and-seek with them and which prevent them from looking at the images.

Needless to say, this chaotic reading pattern and the almost non-existent time left to look at the images may go some way towards explaining the poor comprehension results obtained by these participants in the comprehension test described in above.

What remains to be seen now is what viewers think about this and other types of respoken subtitles. Are they happy with them? Do they realise that this display mode may be hindering their comprehension of live programmes?

Viewers' opinion about live respoken subtitles

Introduction

Very often, many of the decisions adopted by broadcasters regarding subtitling features are based on the viewers' preferences. This sounds logical and certainly preferable to adopting decisions without consulting the audience, but there are still some aspects to be taken into consideration. On the one hand, it may be useful to conduct comprehension studies and perhaps even eye-tracking studies, such as the ones included in this section, to ascertain whether (and how) viewers understand subtitled programmes. On the other hand, viewers' preferences are not set in stone, which means that surveys need to be conducted periodically.

To name but one example, the choice of scrolling versus block subtitles in the UK has traditionally been based on two arguments, namely that scrolling subtitles have less delay than block subtitles and that viewers prefer them over the latter for live programmes. The first argument can now be easily refuted. SwissTxT in Switzerland have shown that respoken subtitles produced with Dragon 10 usually have a 3-5 second delay, the same as scrolling subtitles produced with Viavoice. As for the second argument, it may be necessary to revisit viewers' preferences, especially considering the lack of reception studies on live subtitling.

One of the most recent surveys is the one carried out in early 2009 by the Royal National Institute for the Deaf in the UK:
http://www.rnid.org.uk/howyoucanhelp/join_rnid/_member_community/volunteering_campaigning/volunteering_campaigning_news/tvaccessresults.htm.
Although this survey was focused generally on TV access, participants identified subtitling as the main issue they wanted the RNID to campaign on. Almost 80% of the participants had had problems with subtitles and more than half had to stop watching a programme as a result. The two main problems were the delay of subtitles with regard to the audio (25%) and their inaccuracy (17%), identified as more important factors than having no subtitles available (7%). In other words, viewers seem to prioritise now

quality over quantity and, judging by their main concerns (delay and accuracy), it is the quality of live subtitling they are particularly worried about.

In view of the lack of data regarding viewers' preferences about live subtitling, we decided to conduct a survey which was disseminated through the RNID website. The following section includes a description of the participants and a discussion of the results, thus completing the last part of this section on the quality of respoken subtitles.

Description of the survey

Out of a total of 400 viewers who participated in the survey, 210 were hard-of-hearing and 134 were deaf, of whom 27 were BSL users. Only 12 viewers were hearing, so the results included here will focus mainly on the first two groups. More than half of the participants (58.7%) were over 60 years old, 33% were between 35 and 59 and 8.3% were between 17 and 34. This reflects the reality of the UK, where the largest group of SDH viewers are hard of hearing over 60. As for education, most participants in the survey (72.6%) attended university or a technical college. Finally, with regard to subtitle use, 70% of the participants use subtitles all the time, while 20% watch them some of the time, 6.5% only occasionally and 2.5% never. Deaf viewers proved more likely to use subtitles as the only way to access the audio of the programmes, whereas in the case of hard of hearing viewers, the results were more evenly split among those who use them to understand the original soundtrack better and those who rely on them completely.

Participants were asked 14 questions regarding live subtitling. The first three questions covered general aspects, namely how live subtitles are produced (questions 1 and 2) and the viewers' opinion on their quality (3). The next six questions (4-9) asked for the viewers' opinion of live subtitling in the main UK channels: BBC, ITV, Channel 4, Channel 5 and Sky. Finally, the last 5 questions (10-14) dealt with specific respeaking issues such as mistakes, delay and display mode.

Results of the survey

- <u>Awareness of how live subtitles are produced</u> (questions 1 and 2):

The survey shows that most participants don't know how live subtitles are produced. Out of the few (26.7%) who claim to know, only 13.3% identify current live subtitling methods. In this sense, there seems to be a general belief that live subtitles are produced by automatic speech recognition (SR), with little or mostly no human intervention. In other words, viewers' expectations of current SR technology is unrealistic, which may go some way towards explaining some frequent complaints about live subtitles not being error-free or in perfect synchronisation with the original soundtrack. As for respeaking, only 3.5% of the participants knew this method. Overall, deaf participants proved more knowledgeable about live subtitling methods than hard of hearing, and so did frequent subtitle users. According to this, the more viewers rely on subtitles, the more likely they are to know about them and perhaps to take an interest in how they are produced. In any case, the very low figures regarding knowledge about live subtitles in general and respeaking in particular send a worrying message about the visibility of this discipline.

- <u>General opinion of live subtitles in the UK</u> (question 3)

There is overall dissatisfaction about live subtitles in the UK. Most participants (55%) think they could be better, many (30.6%) find them unsatisfactory and only 11.2% consider them satisfactory. Deaf viewers seem to have a more favourable opinion than hard of hearing viewers, and so do frequent subtitle users as compared to occasional users, 50% of whom find live subtitles unsatisfactory. In other words, it would seem that the more viewers watch, or rely on, live subtitles, the happier they are with them. However, it must be noted that this difference is only reflected in more viewers choosing the "could be better" option rather than the "unsatisfactory" option. The percentage of viewers regarding live subtitles satisfactory remains worryingly low at 11-12%.

- <u>Opinion on subtitles as shown in the BBC, ITV, Channel 4, Channel 5 and Sky</u>
(questions 4-9)

As shown in this survey, BBC live subtitles are rated slightly more favourably than those shown in other UK channels, 28% of the participants considering them satisfactory. Yet, in line with what was explained in the previous section, most participants (52.2%) think they could be better and 19.7% find them unsatisfactory. In general, participants seem to be very familiar with live subtitles on the BBC and deaf viewers have a better opinion of them than hard of hearing viewers.

As for live subtitles on ITV, the general opinion is slightly worse than that of BBC subtitles. Although there is a similar result regarding those who think they could be better (56%), fewer viewers find them satisfactory (18.6%) and more find them unsatisfactory (25.3%).

As for live subtitles on Channel 4, Channel 5 and Sky, participants do not seem to be very familiar with them. 25.5% chose the "I don't know" option for Channel 4, 38% for Channel 5 and as many as 62.9% for Sky. In general, viewers seem to have a better opinion of live subtitles on Channel 4 than those on ITV, whereas Channel 5 and Sky obtain the lowest scores (with a dissatisfaction rate of 32.3% and 38.5% respectively).

More specific comments made by some participants show criticism of the subtitles provided in some sport events, many regional news programmes (where subtitles seem to disappear or to be very poor), and especially talk shows. In this sense, programmes such as *Question Time*, *Have I Got News for You*, *Mock the week* and *The One Show* are singled out as particularly problematic. Of all the issues identified, the main concern seems to be the delay of the subtitles followed by the number of mistakes, which seems particularly noticeable in regional news. Other complaints refer to not being able to see the speakers' faces to lip read what they say, excessive editing, the volume of commercials being too loud, unnecessary on-air corrections and failure to indicate in the subtitles that a new topic is being introduced.

In summary, participants are no longer placing the emphasis on quantity but on quality, which seems very much to be needing improvement.

- <u>Extent to which errors affect comprehension of respoken subtitles</u> (question 10)

The results obtained for this question show that participants are split between those who think that it is often possible (45%) to understand the original meaning when there is a mistake in live subtitles and those who think it is only sometimes possible (45.5%). A noticeable difference is found here between deaf and hard of hearing viewers. Whereas the former struggle to restore the original meaning more than half of the times, the latter tend to find it easier. This makes sense considering that many hard of hearing viewers can mentally correct a misrecognised word by thinking of the similar-sounding word that was meant to be in its place. Many deaf viewers, particularly pre-lingually deaf, who have no recollection of sounds, may not be able to do so.

- <u>General opinion on delay, considering that it is currently impossible to eliminate</u> (questions 11, 12 and 13)

Most participants (49.6%) find the current delay of respoken subtitles on UK TV channels unsatisfactory. Although a significant percentage (35.5%) finds it satisfactory, there are more who consider it very unsatisfactory (10.2%) than very satisfactory (2%). When asked whether it is possible to relate the subtitles to the images despite the delay, results are worse than in the question about mistakes and a similar distinction between deaf and hard of hearing may be found. Whereas hard of hearing participants are evenly split between those who can often relate images and subtitles and those who can only do it sometimes, most deaf participants choose the later option. In any case, it seems that most people find more difficult to relate the subtitles to the images than to mentally correct mistakes. This may explain why, in question 13, when asked whether it is more important to reduce the delay or to reduce the mistakes in respoken subtitles, 2 out of 3 participants chose delay over mistakes, with very similar results among deaf and hard of hearing viewers.

- <u>General opinion on the display mode of live subtitles</u> (question 14)

The viewers' preference for word-for-word subtitles is often posited as one of the main reasons why live subtitles in the UK are not displayed in blocks. Yet, the results obtained in this survey question this assumption. Far from showing a clear preference for scrolling subtitles, the results are very even and, if anything, more favourable to block subtitles (45.6% versus 44.8%). A more thorough analysis reveals that word-for-word display is mostly preferred by deaf viewers, particularly those who use BSL or who have lost their hearing at birth or in the first years of their lives. Many of them cannot hear the original soundtrack but they can see how people speak and they know language is not spoken in blocks, but word for word. Some of these viewers specified in the survey that subtitles displayed in blocks look manipulated, edited or tampered with, whereas scrolling subtitles look like the real thing, giving them the impression that they are listening with their eyes in real time. Yet, this does not apply to all deaf viewers and certainly not to hard of hearing viewers, who seem to be more favourable towards blocks. In this sense, the strongest preference for blocks is registered among those participants who may be described as "most different" from the above-mentioned deaf viewers, that is, hard of hearing viewers who are not BSL users, who resort to lip-reading and who have lost their hearing after the age of 50.

In any case, what is interesting here is that, contrary to what has been held for a long time now, there is no overall preference of word-for-word subtitles over subtitles in blocks. Taking into account the potential negative effect that scrolling subtitles may have in terms of comprehension (see study included above), their choice for live subtitles seems no longer justified.

5   Key Findings

5.1   Viewer Awareness of Access Services

One of the six prerequisites for the successful take-up and use of access services for television is viewer awareness of the existence of a given access service. In a previous deliverable on the Pilot, mention was made of Ofcom's UK research into awareness levels for Audio Description[10].

"...Ofcom facilitated a substantial communications campaign involving 16 broadcasters and the RNIB, aimed at raising awareness of audio description services. The Audio Description Awareness Campaign consisted of promotional trails broadcast across the schedules of more than 70 channels over a 6 week period during February/March 2008, and was supported by a range of off-screen activity including continuity announcements and BBC local radio trails. The RNIB provided additional support for the campaign through press and radio advertisements, radio and print features, digital forums and direct mail.

Ofcom commissioned GfK NOP Media to conduct bespoke quantitative research to assess the impact of the broadcasters' campaign. The primary objective of the research was to test audio description awareness levels within both the UK population as a whole and more specifically the visually impaired community. Research was conducted before and after the campaign, to measure how successful the initiative had been in raising awareness.

Prior to the campaign 37% of the UK population and 43% of the visually impaired community were aware that audio description was available on some TV programmes. Immediately following the campaign, 60% of UK adults were aware of this service. Awareness remained higher among people with all levels of visual impairment, with 72% of the visually impaired community aware of the service following the campaign."

Henrik Gottlieb of the University of Copenhagen complements this study with his questionnaire survey on awareness levels for intra-lingual Subtitles for the Deaf and

Aware of existence of SDH in Danis	Deaf	Hard-of-Hearing	Hearing	Total
Knows	79%	73%	45%	61%
Do not know	21%	27%	42%	33%
Missed the question	0%	0%	13%	6%
Total	28	44	60	132

Hard-of-hearing (SDH) in Denmark. The figures have been converted to percentages:

"Here we see that the very prerequisite for accessibility, viewer knowledge of the services available to them, is not fully present. More than 20% of the deaf respondents and more than 25% of the hard-of-hearing respondents do not even know that all Danish public-service TV stations offer this service. With more than 80% of the domestic

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[10] Access Services Audio Description: Research into awareness levels. 2 July 2008, OFCOM, UK.

programs now intra-lingually subtitled on the five DR channels, still as many as about one quarter of the targeted viewers may not know of this service. It may even be argued that the respondents in this questionnaire, for reasons explained above, are more aware of the subtitling practices than the average person with a hearing impediment."

5.2 The viewer must have an appropriate (digital) receiver to receive the service

Analogue shut-off in Europe started more than 7 years ago in Europe and is due to be complete by 2012. Set-top-boxes and integrated digital television receivers did not always comply in full with the requirements for features such as DVB-subtitles or Audio Description (receiver mix).

One of the incidental issues of the RBB study was that DVB-subtitles did not work without the occasional technical issue at the time the study was conceived. This is sometimes the argument given for continuing with invision subtitles (e.g. commercial broadcasters in Finland have done this until recently although the public service broadcaster YLE migrated to DVB-subtitles).

In spite of such teething troubles, one should remember that the move from using Teletext to DVB-subtitles is potentially a major step forward in the quality and flexibility of access services.

While Teletext had the advantage of being cheap, familiar and quite reliable, the broadcaster had no control over the positioning of the subtitles delivered by this means. The font used was selected by the CE manufacturer, as was the case for boxing the text in black or dark grey.

DVB-subtitles allow the broadcaster to regain control over the look-and-feel of subtitles as it is the broadcaster that selects the fonts and decides on the other aspects including positioning and centred text. RBB offers a compelling case for checking the acceptability of fonts and the issues this raises not only locally but at national level, as well as for the off-air distribution of series on DVD with subtitles.

DVB-subtitles also have the advantage of allowing for the delivery of interlingual subtitles in a number of languages as well as intra-lingual subtitles for the Deaf and Hard-of-hearing.

5.3 The viewer must be able to set up the receiver or ask someone else to do so in order to receive the service in question

The experience of the RBB study was that it was desirable that someone visited each of the subjects at home to ensure that the set-top-box was correctly installed and that the user could handle the somewhat different interface conventions compared with analogue television.

The DR study also revealed that installing a wireless link between the television monitor and the subject's hearing aid (so that they can hear the audio directly) had been overlooked. For those with hearing impairments, this service is provided free-of-charge by Danish municipalities when installed in the subject's home.

Those most likely to have difficulties are the elderly with no family or friends living near by. UK studies from 2003 onwards indicated the need for some kind of Digital Switchover scheme was needed to help those with impairments. By November 2009, more than 150,000 had received help from the scheme.

5.4   The viewer must be able to find the programme and service on the receiver

One of the issues facing viewers is that they should be able to find a programme and watch it with the related access service. Depending on the viewer's age and media habits, he or she may know when there are programmes with, say, Subtitling for the Dead and Hard-of-hearing, or Audio Description. If not, the viewer will need to refer to some kind of programme guide: programme listings printed in a newspaper or weekly magazine or in the Electronic Programme Guide (EPG) of the digital service used.

In the case shown below, there is listing information for about half of the channels and it is not self-evident where the viewer would look to see whether the programme had
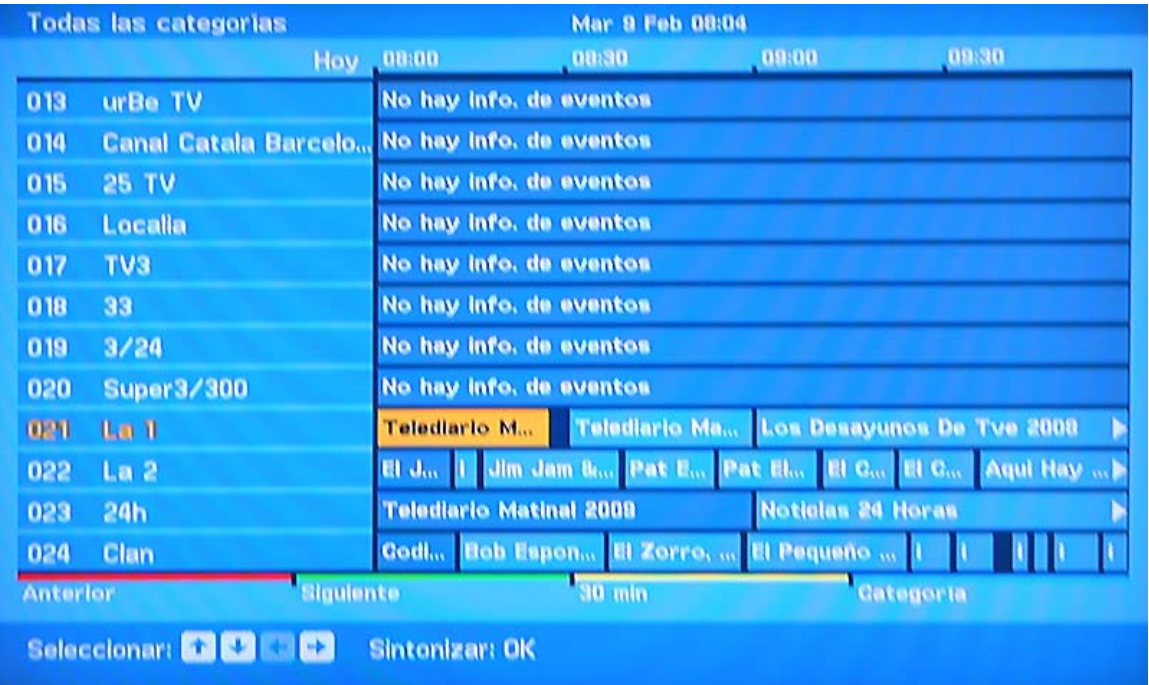
some kind of access service.

The issue of look-and-feel and the broadcaster's control - or lack of it - raised by RBB is also important here. Whereas broadcasters have considerable control over the interface of their teletext services and digital text service (if any), this does not apply to EPGs and other kinds of on-screen overlays which are specific to a given manufacturer.

It requires quite considerable effort on the part of the broadcaster to agree positioning conventions and rules for where subtitles, captions and other kinds of on-screen displays are located so that the various "virtual" planes to not mask one another.

5.5   The viewer must have the necessary motivation to use the service

There are three metrics affecting user motivation:
- The attractiveness of the access service.
- The usefulness of the access service and
- The ease of use of the access service

Most of the work in the Pilot focuses on these three metrics. RBB's studies on the attractiveness and acceptability of subtitles of different sizes, fonts and presentation formats, Vero's UAB study using eye-tracking and subtitles with Schrek, the Roehampton University study of television news, the University of Copenhagen survey and the DR study on live subtitles when read together reveal the complexity of the viewing experience, dependent as it is not only on whether the subject is deaf or hard of hearing, but also on the subject's reading speed and prior experience of subtitling.

The first element is that of the *social acceptance* or *stigma* associated with using an access service in a given group. Subtitles for the deaf and hard-of-hearing are perceived very differently in different territories. Where they have been in use for many decades as the main means of inter-lingual communication for the cinema and television there is clearly no stigma associated with selecting SDH subtitles, which might well be the case in some homes in territories where inter-lingual communication normally involves dubbing. One would therefore expect that viewers in the Benelux and the Nordic countries would easily make the transfer from inter-lingual to intra-lingual subtitles and actively choose to use the service with other people present whereas this might not be so easy in dubbing countries.

The second element is *arriving at a measure of acceptability* for, say, DVB-subtitles. Here RBB's approach can be used more generally in selecting solutions:

RBB comments on the fact that there are differences in tastes and on occasions requests from subjects that are counter-intuitive in terms of their views on subtitles. These differences in opinion and taste are echoed elsewhere in the studies (for instance, viewers wishing verbatim subtitles which require a greater reading speed than they can handle). This lead RBB to propose the least-contentious solutions, rather than the ones which have the highest scores:

"Our original approach therefore was to find out about the most popular solutions (those that were marked "very good" [1] and "good" [2]). Soon we saw that popular solutions often tended to have a strong opposition (shown through marks "bad" [4] and "very bad" [5]). This impression of a strong polarity in judging some layout options was confirmed when we held our workshop with the testers in July 2009: If we opted for a solution that was very popular with a majority of the testers, there would be a great chance that we would leave a good few testers behind, disappointed and probably in the worst case even unable to perceive the subtitles. The most praised combination of parameters may as well be among the most discussed or even the most disapproved. As avoiding dissatisfaction is more important for a Public Service Broadcaster than fancy design, combinations with remarkably negative marks have to be handled very carefully.

Therefore, we decided it would be good to find out which solutions found the broadest acceptance among the testers, of course also taking into consideration their popularity and finally also having a look at the level of negative criticism concerning these

solutions. This means that the statistical results will be described along the following criteria:

- *In order to find the solutions that find the broadest acceptance we use a Delta Value: Statistical values for marks "very good" [1], "good" [2] and "average" [3] minus statistical values for "bad" [4] and "very bad"[5]). Best delta values show the broadest acceptance.*
- *Popularity is deduced from marks "good" and "very good" (leaving out completely "average", "bad" and "very bad").*
- *Controversy / antagonism are deduced from marks "bad" and "very bad".*

In all cases we took mid-point values, the average based on the respective number of test weeks for one certain parameter or combination of these. This was done to safeguard maximum objectivity over a long testing period; just like with our focus on the broadest acceptance, in the worst case one parameter setting might have been very popular in one week and much less in another, while another might have had better overall marks over a longer period even though it never reached a peak in popularity."

A third element is that *the studies* taken together *challenge two assumptions underpinning live subtitles produced using re- speaking*. The figures from the Roehampton University eye-tracking study of television news, the RNID survey of subtitling conducted in 2009 and the DR study of television news all demonstrate that:

- The delay between the person speaking on the screen and the subtitles appearing of anywhere between 3-5 seconds (UK), 7-8 seconds (DK) and as much as 14 seconds (ES) destroys any potential synergies of listening, watching and reading among those trying to follow the programme.
- The presentation of subtitles one or two words at a time reduces the efficiency of reading among both good and weak viewers.

Several members of the panel in the DR study indicated that they had tried to use live subtitles but had given it up, focusing on fine-tuning their hearing aids instead. This points to metrics for motivation and benefit that go further than awareness and where there are useful analogies from the health care sector. According to the Transtheoretical Model[11], there are five stages in behavioral change, 1: precontemplation, 2: contemplation, 3: preparation, 4: action, and 5: maintenance. If we adapt this for, say, the use of SDH on digital television this would mean:

- Precontemplation stage: individuals who do not intend to use SDH during the next six months (don't know it exists or have tried it and stopped again as it did not meet their requirements).
- Contemplation stage: individuals who intend to use SDH in the next six months.
- Preparation stage: individuals who currently use SDH infrequently.
- Action stage: individuals who have been using SDH regularly for less than six months.
- Maintenance stage: individuals who have been using SDH regularly for more than six months.

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[11] The model was formulated in Prochaska, J.O., Velicer, W.F.: The transtheoretical model of health behavior change. American Journal of Health Promotion 12, 38–48 (1997). The use of the model was discussed in: Kaori Fujimura, Masahiro Shiraishi, Kenji Ogura, and Yuji Maeda. Study on Motivation in Healthcare Treatment Using a Networked Healthcare Guidance System. NTT Service Integration Laboratories, 3-9-11 Midoricho, Musashino City, Tokyo 180-8585, Japan

In the coming years, as broadcasters are requested to scale up the proportion of their programmes provided with SDH and an increasing proportion of viewers come to depend on them, a solution will have to be found to mitigate the delay and to present live subtitles in blocks (as is the case for pre-recorded subtitles).

5.6 The viewer must be able to derive benefit from the access service.

The various studies included in this report indicate that, while pre-recorded and pre-prepared subtitles for the Deaf and Hard-of-hearing can help a significant proportion of their intended audiences, live subtitling for TV genre such as news, debates and live shows fall short of their intended impact. Apart from the issues reported in the previous section, there are also difficulties in assuring the availability of re-speaking languages in the less-commonly spoken European languages and assuring that the language models can be set up and continually updated.

6 Conclusions of the Pilot of Mature Access Services

This section builds on the key findings covered in the previous sections which were derived from a wide range of user studies of mature access services. It draws conclusions about the extent to which the demand for access services is currently being met by the provision of access services in the countries covered by the studies and inferences about the current situation for those with impairments wishing to watch television across Europe. We can start with the original research question underpinning all our work with strategy and policy: Who needs to know what in order to be able to plan, produce, deliver, promote and successfully use mature access services by the end of 201x?

6.1 Television viewers with impairments

The studies highlight a truism that there is no one-to-one relationship between a given service and a group of viewers at risk of exclusion.

It is often the case that a given access service addresses multiple target groups, leading to some kind of design trade-offs, so that as many as possible benefit from the service.

In terms of the issues identified by the Pilot Study of Mature Access Services, we can conclude that:

- Interlingual subtitles and dubbing for prerecording television programming are truly mature access services where the issues with service provision are well-understood and where ongoing optimisation is possible

- Interlingual subtitles could do an even better job of reducing exclusion of viewers of programming in foreign languages by as many as 10-20% of the adult population who either have receptive aphasias or weak reading skills by offering spoken subtitles produced centrally using speech synthesis

- Intra-lingual subtitles for prerecording television programming face some challenges, depending on whether the country belongs to a region that traditionally offers dubbing or subtitling for foreign language television programme. As the service is not in-vision but optional, closed subtitling, the major challenge is the lack of awareness of their existence. Awareness level studies demonstrate this among the deaf, the hard-of- hearing, those who find it difficult to follow spontaneous, fast-paced dialogue in their own language and immigrants for whom subtitling could facilitate comprehension and indirectly promote social cohesion.

- Intra-lingual subtitles for live television programming face major challenges; the existence of a delay between the subtitles and the dialogue to which they refer is the major issue identified independently in three different studies (RNID, Roehampton, DR); the presentation of subtitles one or two words at a time rather than in blocks has a negative impact on reading; unresolved issues to do with the accuracy of subtitles produced through re-speaking; unresolved trade-offs between reading speed and the degree of text compression (ranging from verbatim transcriptions to considerably compressed subtitles that match the reading speed of a greater proportion of the audience)

- Visual signing is a truly mature access service where the issues with service production are well-understood, but where there are challenges, usually due to resistance from hearing viewers who resent in-vision signing in prime-time programming and who make their opinions felt to broadcasters and regulators. There are currently two kinds of visual signing programmes: assistive programmes made specifically for deaf viewers whose mother tongue is visual signing and inclusive programmes, where visual signing is added so that deaf viewers whose mother tongue is visual signing can also benefit from watching (e.g. news and current affairs programmes). Being able to offer opt-in visual signing solutions (delivered on emerging hybrid digital broadcast/broadband television receivers) represents an avenue could release resources from distribution budgets that could be re-invested in increased visual signing services.

- Audio Description for prerecording television programming faces some challenges, depending on whether the country belongs to a region that traditionally offers dubbing or subtitling for foreign language television programme. As the service can be either an opt-in Broadcaster Mix or Receiver Mix, the major challenge is the lack of awareness of the existence of such a service, compounded by the lower availability than, say, intra-lingual subtitles (even in the UK, less than 15% of programmes on major channels have AD compared with 99% SDH).

- Spoken Subtitles (Audio Subtitles) are more mature than is generally realised and can supplement interlingual subtitling to reduce the exclusion of persons who do not benefit fully from such subtitles because of poor reading skills or impairments such as receptive aphasias.

- Raising awareness should be the first but not the only metric for the success of an access service; a more adequate list of metrics would include:
  - Proportion of target group/population aware of existence of the service
  - Proportion of target group who intend to use the service in the next six months.
  - Proportion of target group who currently use the service infrequently.
  - Proportion of target group who have tried the service and stopped using it.
  - Proportion of target group who have been using the service regularly for less than six months
  - Proportion of target group who have been using the service regularly for more than six months.

- The role of other stakeholders in creating awareness and providing relevant and up-to-date information to citizens coming to terms with their impairments after accident or illness should be examined. In some Member States this is predominantly bodies and associations representing those with disabilities. In others, there are professionals in adult education and healthcare whose job it is to help individuals. There would seem to be synergies of working both on television campaigns and on information and dissemination activities targeting these other stakeholders who may have a significant impact on awareness of impairment and access services for digital television.

7   Appendix A: Exclusion and Digital Television –an overview of Groups at Risk

Problem	Cause	e-Inclusiveness Options	Examples
1. Exclusion of viewers born deaf whose mother tongue is sign language. The viewer finds it impossible to understand the sound track of a TV programme.	The viewer's mother tongue is sign language. (This may or may not be recognised as an official language on a par with the spoken language in the state or territory in question). The presence of subtitles for the Deaf and Hard-of-hearing may be of little or no use to the viewer.	Visual Signing, also known as Deaf Signing (DS), provided for pre-recorded and live TV programmes. - in-vision (open) or closed. - Closed DS delivered using "picture in picture" or a separate video stream with the interpreter super-imposed but with the original audio.	Portugal: RTP offers in-vision DS for many live programmes in early prime-time (news, live studio shows) UK: Early morning show with video clips offers DS for young adults (signer dancing at bottom of screen). Please see (reference/link) Denmark: DR and TV2 have a virtual channel with DS which appears late afternoon/early evening. The signer is full-screen and stands to the left of a flat panel display showing the programme.
2. Exclusion of deaf viewers (those who lost their hearing in childhood or adulthood). The viewer finds it very difficult/impossible to understand the sound track of a TV programme in his/her own language.	The viewer's mother tongue may be the same as that of the sound track of the TV programme, but the viewer has to rely on reading in order to follow the programme. This makes demands on his/her reading skills. For viewers with multiple impairments see other sections.	Subtitles for the Deaf and Hard-of-hearing (SDH) provided for pre-recorded and live TV programmes. - In-vision (open) or closed SDH. - Closed SDH delivered using either Teletext or DVB subtitles	

Problem	Cause	e-Inclusiveness Options	Examples
3. Exclusion of viewers who are hard-of hearing. The viewer has some degree of difficulty understanding the sound track of a TV programme in his/her own language.	The viewer's mother tongue is usually the same as that of the sound track of the TV programme but the viewer has to rely on reading in order to follow the programme. This makes demands on his/her reading skills. For viewers with multiple impairments see other sections.	Subtitles for the Deaf and Hard-of-hearing (SDH) provided for pre-recorded and live TV programmes. - In-vision (open) or closed SDH. - Closed SDH delivered using either Teletext or DVB subtitles - Pre-recorded or pre-produced subtitles can be delivered in synch with the programme - Live subtitles produced using stenography or re-speaking. Both usually lag the speech to which they refer to by between 3-14 seconds.	
4. Exclusion of viewers who have difficulty in following spontaneous speech with significant background noise. The viewer has some degree of difficulty under-standing the dialogue of a TV programme in his/her own language.	The viewer's mother tongue is usually the same as that of the sound track of the TV programme. However, the use of unfamiliar dialects or sociolects coupled with a fast delivery and background noise makes the sound track hard to follow.	Subtitles for the Deaf and Hard-of-hearing (SDH) provided for pre-recorded and live TV programmes. (as for previous section) Clean or clear audio. Available for all programmes in the receiver (or in some cases in the viewer's hearing aid linked to the TV set by some wireless connection).	

Problem	Cause	e-Inclusiveness Options	Examples
5. Exclusion of viewers of TV programmes in a foreign language. The viewer has some degree of difficulty understanding the dialogue of a TV programme in a foreign language.	The viewer's command of the foreign language is such that he/she cannot be expected to understand the sound track and/or the cultural connotations of the video.	Dubbing: Usually provided for pre-recorded TV programmes only. The original soundtrack is re-recorded with voices in the national/regional language(s). Lectoring/partial voice-over provided for pre-recorded and live TV programmes. The interpreter speaks over the top of the original soundtrack the volume of which is lowered. Interlingual subtitles: Usually provided for pre-recorded TV programmes only. Audio subtitles (AS), also known as spoken interlingual subtitles. This can be done centrally by the broadcaster using speech synthesis based on the subtitles (Finland, Sweden) or in the TV receiver itself (Netherlands) using speech synthesis driven by various means including teletext, and text extracted from the DVB subtitles using Optical Character Recognition, OCR.	Dubbing: Lectoring/partial voice-over: Audio subtitles Finland Sweden Netherlands.
6. Exclusion of young viewers (0-6 years) of TV-programmes in a foreign language. The viewer finds it very difficult/impossible to understand a TV programme in a foreign language where interlingual subtitling is offered.	The viewer cannot yet read his/her mother tongue and cannot be expected to cope with interlingual subtitles.	Dubbing, lectoring and audio subtitles (AS). See above.	

Problem	Cause	e-Inclusiveness Options	Examples
7. Social exclusion of immigrants or refugees The viewer finds it very difficult/impossible to understand the sound track of a TV programme.	The viewer's mother tongue is not the official language of the state or territory in question and therefore the TV programme is in a language which he/she may not understand. In some cases, the viewer may be illiterate.	Subtitling in immigrant language(s) using DVB-subtitles. Provided for pre-recorded TV programmes. Subject to bandwidth availability, there can be as many as 8 different languages. No constraints in terms of language (i.e. Roman or other characters) as the subtitles are broadcast as bitmaps.	Catalonia: TV3 offers subtitles in English and Arabic for prime-time programmes (English as a lingua franca; Arabic for immigrants from north Africa). Finland: YLE offers subtitles in a number of immigrant and refugee languages.
8. Exclusion of viewers who have receptive aphasias such as dyslexia and/or cognitive impairments affecting their short-term memory (caused by accident, illness or substance abuse). The viewer finds it very difficult/impossible to understand a TV programme in a foreign language where interlingual subtitling is offered	The viewer's mother tongue is different from the sound track of the TV programme. The viewer cannot follow the interlingual subtitles (too many characters per minute etc.)	Audio subtitles (AS), also known as spoken interlingual subtitles.	
9. Exclusion of viewers who are blind. The viewer finds it very difficult/impossible to understand a TV programme with a sound track in his/her own or a foreign language.	The viewer is missing visual cues including captions that are a prerequisite for being able to follow the programme in question.	Audio description (AD) Pre-recorded only. Can be offered as a sound track mixed by the broadcaster (broadcast mix) or in the receiver (receiver mix) Audio subtitles (AS) If speech synthesis is used, it can be offered for pre-recorded and live programmes.	

Problem	Cause	e-Inclusiveness Options	Examples
10. Exclusion of viewers with visual impairments. The viewer finds it very difficult/impossible to understand a TV programme in a foreign language with interlingual subtitling and/or SDH for same language content.	Exclusion may have one or more causes including: - poor usability (on-screen, remote control device) - lack of consistency in the presentation and positioning of subtitles from one subtitler/channel/ broadcaster to the next - lack of consistency in the conventions for producing subtitles - social stigma associated with subtitles - weak reading ability and/or high presentation rate (characters per minute)	Improving the usability of SDH Scaleable/legible fonts for subtitles Improving the usability of the remote control device (RCD) Compliance with existing design guidelines for RCDs Compliance with existing guidelines for OnScreen Displays (OSDs). Audio description As for AD for blind viewers Audio subtitles (AS) As for AD for blind viewers	
11. Exclusion of viewers getting started with digital television The viewer finds it difficult/impossible to set up, configure or reconfigure his/her set-top box or digital TV receiver	Exclusion may be caused by one or more of the following: - lack of familiarity with a point-and-click interface - poor usability of the device - poor documentation (content and/or presentation) - lack of access to technician, family or peers to help them get started - lack of self-confidence	Inclusive design of the equipment and documentation for setting up, configuring/reconfiguring television receivers in the home.	UK digital switchover project.

Problem	Cause	e-Inclusiveness Options	Examples
12. Exclusion of viewers from using digital television on a regular basis The viewer finds it difficult/impossible to discover, select and view a given television programme using one or more remote control devices	Exclusion may be caused by one or more of the following: - mobility impairment (unable to get up and go over to the television set) - limb impairment (lacks a limb or the use of it) - dexterity (lacks the ability to hold and use a remote control, even one designed to be inclusive) - lack of familiarity with a point-and-click interface - poor usability of the device - poor documentation (content and/or presentation) - lack of access to technician, family or peers to help them get started - lack of self-confidence	Inclusive design of the Windows, Icons, Menus and Peripherals such as remote control devices	UK digital switchover project and their work on RCUs for the visually impaired.

8 Appendix B: Questionnaire Analysis Denmark

DTV4All, Denmark: "Er fjernsynets undertekster gode nok?"
Deliverable 2: Long questionnaire. Interim report
Finished in Cochabamba, Bolivia, December 2009

Henrik Gottlieb, University of Copenhagen

The Danish questionnaire

As part of the Danish DTV4All Project, including also the research conducted by Peter Looms and his associates (from Danmarks Radio, DR), I have carried out a questionnaire on Danish viewers' attitudes and habits regarding subtitles on Danish TV. In accordance with the aims of the European mother project, special emphasis has been put on the needs of deaf and hard-of-hearing viewers, who comprise some 10% of the Danish television audience.

The questionnaire itself is based on the template developed communally by the research team representing Spain, Italy, the UK, Poland and Denmark. In contradistinction to the other four member countries, Denmark has a long-standing tradition of subtitling foreign-language programs on TV. This means that the Danish notion of subtitling differs considerably from that of the other countries, in which the term 'subtitling' to most people will mean intralingual subtitles, i.e. subtitles in the domestic language (aimed at the Deaf and Hard of Hearing).

The fact that Denmark has subtitled foreign-language dialogue ever since the introduction of sound film in 1929 means that most Danes, certainly nearly all normally-hearing television viewers, will associate interlingual subtitles with the Danish term for subtitles, undertekster. (For Danish subtitling traditions and techniques, cf. Gottlieb 2005.)

This, in turn, has meant that I had to incorporate both types of subtitles into the Danish version of our pan-European questionnaire, while at the same time keeping the focus on the intralingual type of subtitles. For this reason, several questions had to be specified, and questions concerning interlingual subtitling had to be included in order to maintain the interest of the normally-hearing persons among our respondents.

After several initial drafts made in the spring of 2009, I and my student assistant, Maria Olsen, started testing the questionnaire - in a version 3 - in the fall of 2009. This led to further adjustments, including additions of answers of the type 'Don't know' for questions that test persons did not feel they could answer yes or no to, for instance.

Although the common goal of the DTV4All research group was minimum thirty completed questionnaires, we wanted to reach one hundred - partly because, as explained above, subtitling on Danish television is found with both foreign and domestic-language programs. So instead of 30 completed questionnaires in total, we aimed at 30 questionnaires from each of our three groups of respondents, namely the Deaf, the Hard-of-Hearing, and the normally hearing.

Data collection

We started contacting potential respondents on October 28, who received version 5 of the questionnaire (generated that day). From October 29, all subjects received the final version (version 6, which only differs from version 5 in that question 4p is rephrased). As mentioned in the previous section, the questionnaire is based on the European tem– plate, but adapted to the Danish situation. Most interested subjects have received it as a 5-page printed and stapled document, typeset in an easily legible Tahoma font.

Page 1 is dedicated to background questions, under the heading "Sporgsmal om dig selv" (questions about yourself). These 15 questions are numbered 1a through 1o, and first of all they serve to identify the subject in terms of hearing (loss), sex, age and educational background. All questions are closed and can be answered by ticking one or more boxes.

Page 2 deals with respondents' ways of (not) using subtitles on TV, under the heading "Sporgsmal om dine fjernsynsvaner" (questions about your television habits). Again, respondents are presented with 15 questions, 2a - 2o, relating to issues like people's daily consumption of TV and other media, as well as their response to programs (not) being subtitled. Again, all questions are closed.

Page 3 focuses on respondents' attitudes to the existing types of subtitling on Danish TV. Here the heading says "Sporgsmal om din oplevelse af tv-tekstning" (questions about your impression of TV subtitling). The 10 questions here are numbered 3a - 3j and concentrate on more subjective matters than dealt with on the previous pages. For instance, respondents are asked to rate the quality of subtitling in the nine daily Danish public-service news programs - something which turned out to be difficult for most respondents. In this section, four of the questions are open - so that respondents can write their opinion on the given issue.

Pages 4 and 5 present 20 questions relating to technical, aesthetic and communicative aspects of subtitling in general. The heading (on page 4) reads: "Sporgsmal om din oplevelse af tekstning i ovrigt" (questions about your impression of subtitling in general). Questions asked include additions (in relation to the other European questionnaires) caused by the fact that many Danes are so proficient in English that - even for Deaf viewers - English subtitles for anglophone productions might be seen as sufficient. In this final section of the questionnaire, two of the twenty questions are open.

There is no formal introduction or presentation printed on the questionnaires, as all questionnaires were distributed (mostly in hardcopy, but in electronic format if respondents so wished) to people to whom we had explained the purpose of the research project and the role of the questionnaire. However, on the bottom of page 5 of the questionnaire, it says in bold captions what now follows in English translation:

Thanks a lot for your contribution, which we hope will pave the way for even better subtitles for the Deaf and Hard of Hearing in Denmark - and in the rest of Europe.

Knowing that questionnaires sent unsolicited to potential respondents often do not get answered, and as we wanted to make sure to have a high completion rate, we first

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presented the questionnaire at a conference on accessibility jointly organized by the Danish Ministry of Culture and the confederation of Danish handicap organizations, and held at DR-Byen, the headquarters of Danmarks Radio, on October 30, 2009. In this way, we made direct contact with members and chairpersons of various interest groups, including Landsforeningen for Bedre Horelse (the national society for improved hearing; the leading Hard-of-hearing organization in Denmark) and Danske Doves Landsforbund (the Danish association of the Deaf). At the conference, we handed out some 50 questionnaires to interested parties, including normally-hearing participants. With the questionnaires, potential respondents received a stamped and labeled envelope - as a courtesy to respondents (who were not paid) and in order to increase the response rate.

As we wanted to avoid the often-seen overrepresentation of students (or subjects who otherwise share educational or sociolinguistic features with the researchers testing them), we went for (also) getting in touch with Danish viewers who were not university graduates, did not live in the city, were not members of interest groups, etc. This was done by offering questionnaires to borrowers at a provincial library, members of a choir, students' family members, etc. – always with an emphasis on reaching our core group: Danes with a hearing loss. (As 99% of Danes have access to television, 'Danes' in this context equals 'viewers'.) And indeed, from the data to be presented later in this report, it is obvious that we managed to include 'normal' Danish television viewers, although their response rate was lower than that of the more motivated groups (including members of the hearing associations). Still, as this research is of an exploratory nature, there have been no attempts (and certainly, no budgets that would have made it possible) at obtaining absolute representativeness, neither within nor between our three groups of respondents, i.e. the Deaf, the Hard-of-Hearing or the normally hearing Danes.

Data collection was finished on December 1, 2009, when we had received 132 completed questionnaires.

Respondents
In terms of sex and age (cf. questions 1a and 1b) our respondents are distributed as follows:

	Male	Female	Total
15-24	7	18	25
25-39	6	19	25
40-59	14	29	43
60-69	11	13	24
70 or above	8	6	14
Age not stated	0	1	1
Total	46	86	132

Regarding the key parameters 'hearing' and 'education', cf. questions 1g and 1e, respectively, our respondents are distributed as follows:

	Deaf	Hard-of-Hearing	Hearing	Total
Unskilled /pupil	4	4	6	14
Skilled	2	11	11	24
Medium-length education	11	10	15	36
Further education	6	18	27	51
Not stated	5	1	1	7
Total	28	44	60	132

As is obvious from this table, we have avoided gross overrepresentation of university graduates among our respondents, though respondents are still better educated than the average Danish population.

Finally, when combining age and hearing, the following picture emerges:

	Deaf	Hard-of-Hearing	Hearing	Total
15-24	9	2	14	25
25-39	4	11	10	25
40-59	8	14	21	43
60-69	5	7	12	24
70 or above	2	9	3	14
Age not stated	0	1	0	1
Total	28	44	60	132

Regarding age, more than half of the Hard of Hearing in Denmark are 60 or more, while our HoH respondents are typically middle-aged.

Results: Television habits

Among the results of the second part of the questionnaire, the one dealing with TV habits especially regarding the use and usefulness of subtitles, some of the most interesting data are presented in the table below – those relating to the two types of subtitles on Danish TV: the closed, intralingual subtitles (for domestic programs; generated in the TV receiver as monospace teletext subtitle blocks) and the open, interlingual subtitles (for foreign-language productions; broadcast as part of the (analogue) TV signal in the form of blocks consisting of proportially spaced letters).

First, let us have a look at how much television, video and DVD our respondents report to watch every day:

Hours of daily watching	Deaf	Hard-of-Hearing	Hearing	Total
Less than 1	3	3	10	16
1-2 hours	10	18	25	53
2-3 hours	6	17	18	41
3-4 hours	5	4	3	12
4 or more	4	2	2	8
Not stated	0	0	2	2
Total	28	44	60	132

We can see that the typical category for all three main groups is the same: 1-2 hours a day. This is significantly lower than the statistical average for all Danes (age 15 and above), which is 167 minutes a day (as much as 2 hours and 47 minutes), according to Danmarks Radio (DR 2009: 10) – a figure that solely covers TV viewing.

Let us now see whether the target groups for the intralingual subtitles know that these exist:

Knowledge of optional domestic subtitles on TV	Deaf	Hard-of-Hearing	Hearing	Total
Knows	22	32	27	81
Does not know	6	12	25	43
Missed the question	0	0	8	8
Total	28	44	60	132

Here we see that the very prerequisite for accessibility, viewer knowledge of the services available to them, is not fully present. More than 20% of the deaf respondents and more than 25% of the hard-of-hearing respondents do not even know that all Danish public-service TV stations offer this service. With more than 80% of the domestic programs now intralingually subtitled on the five DR channels, still as many as about one quarter of the targeted viewers may not know of this service. It may even be argued that the respondents in this questionnaire, for reasons explained above, are more aware of the subtitling practices than the average person with a hearing impediment.

Next, we wanted to investigate something which - as I mentioned earlier - is not as relevant to the other DTV4All partner countries: How do deaf and hearing-impaired viewers use interlingual subtitles, compared with normally hearing persons?

Subtitles on foreign programs	Deaf	Hard-of-Hearing	Hearing	Total
Without them I don't understand the dialogue	23	19	10	52
They help me understand the dialogue	3	25	36	64
They improve my foreign-language skills	1	7	19	27
No answer	1	0	0	1
Total	28	51	65	144

Here one should notice that several respondents have ticked more than one of the three boxes, which is perfectly okay, as the answers are not mutually exclusive: (passively) understanding the foreign dialogue is definitely linked to the feeling of improving one's (active) language skills. Not surprisingly, the deaf respondents are more dependent on the subtitles than are the viewers with complete or partial hearing abilities. It is perhaps also worth noticing that only one sixth of the hearing respondents admit that without the interlingual subtitles, they would not understand the dialogue. The reason is, of course, that what they think of when answering this question is dialogue in English, a language which no less than 88% of the Danes claim to understand. (European Commission 2005).

Turning finally to intralingual subtitling, we will look at the same questions as above, relating this time to the way subtitles for Danish programs are perceived:

Subtitles on domestic programs	Deaf	Hard-of-Hearing	Hearing	Total
"I never select subtitles for Danish programs"	2	11	44	57
"Without the subtitles I don't understand the dialogue"	21	9	0	30
"The subtitles help me understand the dialogue"	5	23	16	44
No answer	0	1	0	1
Total	28	43	60	132

Interestingly, all groups benefit from the (optional) Danish subtitles for Danish-language productions on TV. Of the majority (44 out of 60) of our hearing respondents that never use the intralingual subtitles, 25 (as we saw earlier) do not even know that these titles exist. This means that of the 35 hearing respondents who do know of the intralingual subtitles, nearly half of them (16 persons) use these subtitles to support their comprehension of the domestic-language dialogue.

In conclusion, it seems that just as deaf and hard-of-hearing Danes have always enjoyed subtitles on foreign-language films and TV productions – which together cover some 50% of the total reception of film and TV in Denmark – hearing TV viewers often use intralingual subtitles to increase their comprehension of Danish programs. With present-day television practices, including live-recorded dialogue on TV dramas and background music in several TV genres, we may all need to share the domestic subtitles with the deaf and Hard of Hearing.

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9   Appendix C: Questionnaire Analysis Italy

QUESTIONNAIRE REPORT - Italy

In this introduction to the report on the submission of the long questionnaire to a group of 90 respondents (composed for one third of hearing people, one third of deaf people and one third of hard-of-hearing people), we will focus our attention on the situation of Italian deaf people and of the Italian Sign Language. The main reason for that is that the countries taking part in the DTV4All project each have so many peculiarities that the data emerging from the analysis of the answers given by respondents to this questionnaire would be hard to decipher without background knowledge. This may be helpful in interpreting differences or even similarities that may emerge from country to country. So, first of all we will focus on the medical definition that the Italian legislation gives of deafness. Then, the communication of deaf people, legislatively named "deaf-mute" until 2006 (law 95/2006), will be considered. Finally, an overview on the state of the art of the Italian Sign Language in three major sectors (education, university and TV) will be made.

In Italy, the loss of hearing is subdivided into four main categories by a decree of the Ministry of Health (5/2/1992):
-   Mild, between 20 and 40 decibels of hearing loss;
-   Moderate, between 40 and 70 decibels.

Up to this stage the legislation recognizes in the hard-of-hearing person a certain degree of civil disability, but not the status of deaf (see law 381/70 page 27):
-   Severe, between 70 and 90 decibels.

From 75 decibels, the Italian legislation recognizes the status of (prelingual) "deaf" (100% disability) to those whose better-hearing ear lost more than 60 db of hearing before the age of 12.
-   Profound, 90 decibels or more.

Three types of deafness are recognized:
-       deafness to frequencies between 125 and 4000 Hertz played at the amplitude of 90 decibels
-       deafness to frequencies between 125 and 2000 Hertz played at the amplitude of 90 decibels
-       deafness to frequencies between 125 and 1000 Hertz played at the amplitude of 90 decibels;

As for demographic data, in Italy there are roughly 7 millions of hearing-impaired people, mainly composed of people who are aged between 60 and 80 (25%) and over 80 (50%). These people are not officially assessed as deaf or hard-of hearing, have not the right to a pension related to their hearing status and are not registered to an association. People aged between 13 and 60 suffering from hearing impairments are roughly 15%, only 3% of hearing impaired people are aged between 0 and 12 and less than 2 % were

born deaf. These data tend to arise because of the population living older and older, of the general social behaviour of the youngsters and of the breaking of widespread fears and prejudices. The national association for research on deafness, in fact, states that every year, 35% of those who undergo a free medical check-up discover that they suffer from a hearing impairment and that, every year, 1.000 babies are born with congenital deafness. 500,000 of these 7 millions suffer from severe or profound deafness and are mainly registered to ENS (National Association in Defense of Deaf People, mainly devoted to the promotion of the Italian Sign Language) and to FIADDA (National Association of the Families of Deaf People, mainly devoted to the promotion of oralism). As for hard-of-hearing people there are no such national associations that can provide data or can play the role of spokespersons.

Despite the lack of official data, it is common knowledge that an average of 10 % of these 70,000 prelingual deaf have signing parents while 60% of them on average can be considered Italian Sign Language natives. If we consider more in detail (rough non official) data regarding people under the age of 40, it is possible to realize that the situation changes a lot: only 10% of them (mainly people who were born to deaf parents or in a family with signing deaf members) are Italian Sign Language natives and speak Italian as their second language or as their first foreign language; and 90% of them (mainly people who were born in hearing families) are Italian natives. Noteworthy is also the fact that deaf youngsters (both oralist deaf and signing deaf) start being interested in being able to master both languages in such a manner that they can fluently communicate with both hearing and oralist deaf people from the one side and with signing deaf people from the other.

However, even if bilingualism is becoming more and more popular above all among adults (until the age of 18, the young deaf person is generally influenced by the policy carried out by the national association that represents him or her), it still remains a dream among the "deaf community as a whole. The main reason for the above mentioned difference between people who are over 40 and people who are under 40 lays in the legislation on education. Until 1880, the education of deaf children was carried out in special institutes where teachers used the Italian Sign Language to communicate with them. All those who received any form of education could be considered Italian Sign Language natives. In 1880, the International Congress of Milan decided "since the simultaneous use of the word and of gestures has the disadvantage of hindering the use of the word, lip-reading and the exactitude of ideas, states that the oral method should be preferred" (my translation). Since then, Italian was the only official language to be admitted in the education of deaf children in Italian institutes for the deaf. However the Italian Sign Language kept on being accepted during spare time and in the communication among deaf. So, it did not disappear as a way of communication even if it lost its status of official language of deaf people. In 1976 and in 1977, laws number 360/76 and 517/77 sanction that the disabled person has no more to be educated in special institutes but has to be integrated in public schools and universities. In particular, these laws engage the Welfare State in assigning specialized teachers and operators to schools and universities with disabled students. In 1977 the President of the Republic's Decree number 616 sanctions the assistance for autonomy and personal communication of the disabled person. In 1992, law number 104 introduces the professional figure of the communication assistant for sensory disabled people (mainly deaf and blind people). Even if communication assistants play a different role compared to conference interpreters, the latter are more and more employed as communication

assistants after an *ad hoc* training. Finally, in 2007 the Italian legislation has started receiving the EU directive of 1988, the EU resolution of 1998 and the UN recommendation of 2007 with the specific aim in favour of deaf people of removing all barriers to bilingualism and of recognizing the Italian Sign Language as a minority language.

As has just been said the above mentioned communication assistant is not a conference interpreter, but is a simultaneous (sometimes consecutive) interpreter working in a social setting (university, school, health services, courts of justice, etc.). At university, since deaf people have historically been rare, accessibility to seminars and lectures is limited to very few services. Most of times a hearing student (not always knowing the content nor the terminology used in the specific seminar or lecture he or she is making accessible to the deaf student) is paid for taking notes for the deaf student who mutely assists to the seminar or lecture. Occasionally the university pays an operator or a student to transcribe the recording of a lecture or of a seminar (with higher exactness in terms of content, but with a delay that makes it impossible for the deaf student to follow that lecture or seminar in question). As for real-time accessibility, a few universities offer real-time subtitling or transcribing for a few hours a year. Anyhow, a course is never entirely subtitled.

As far as TV is concerned, the so-called Stanca Law and the national contract between the State-owned broadcaster (RAI) and the Government state that by the end of 2009 at least a news programme per day in each of the three public channels has to be subtitled and translated in Italian Sign Language and that at least 60% of RAI programmes have to be subtitled.

As for the Italian Sign Language, it has not yet been recognized as a minority language and its teaching is limited to some courses paid by the local entities in the frame of the activities carried out by the local associations in defense of deaf people or by universities. Research on the Italian Sign language is still scant, but a few researchers mainly from the National Research Center have published extensively and are working a lot to promote its use thus overcoming those cultural barriers that, even within the deaf community, make people believe that any signed language is no more than a code and cannot be considered as a fully righted language.

After this short overview on the state of deafness in Italy, it is possible now to understand better some of the answers reported below. The report is subdivided into four sections. Since the questionnaire has been submitted to 90 people (30 hearing people, 30 deaf people, 30 hard-of-hearing) first of all the data related to all respondents will be reported. Subsequently, data related to every single group is considered (hearing people, deaf people, hard-of-hearing people).

ALL RESPONDENTS

1. Name

2. Gender
46 males
44 females

3. Age
24 between 15 and 24 years of age
25 between 25 and 39 years of age
11 between 40 and 59 years of age
30 over 60 years of age

4. Education
10 primary school (5 years of schooling in mainstream schools, 10 in deaf schools)
29 middle school (8 years of schooling in mainstream schools, 16 in deaf schools)
32 high school (13 years of schooling in mainstream schools, 26 in deaf schools)
19 university students/graduated people (from 1 to unlimited years of schooling) *

*since university certificates are not so accessible in Italy as in many other European countries, I decided to put into the same category university students and graduated people. In the case of deaf and hard-of-hearing people this all the more true.

5. Years of education
21 for 13 years of schooling
16 for 16 years of schooling
12 for 21 years of schooling
12 for 18 years of schooling
12 for 8 years of schooling
10 for 5 years of schooling
3 for 19 years of schooling
2 for 20 years of schooling
2 for 12 years of schooling

6. Deaf school or mainstream school
63 mainstream schools
16 in deaf schools
10 got their primary and middle school certificates in deaf schools and the high school certificate in a mainstream school
1 got a primary school certificate in a deaf school and the middle school certificate in a mainstream school

7. Occupation
24 students
26 workers
11 unemployed
29 retired

8. Are you…?

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30 hearing
30 deaf
30 hard-of-hearing

9. When did you become deaf ?
25 were born deaf
4 before they were 2
1 between 2 and 4 years of age

10. When did you become hard of hearing ?
7 after the age of 30
23 after the age of 50

11. Hearing aid
18 yes
69 no
3 did not answer

12. The language you use more often
61 Italian
23 Italian Sign Language
6 both

13. Sight
56 use contact lenses or glasses
34 need no visual aids

14. Difficulties reading Italian
21 yes
69 no

15. Difficulties watching TV or reading subtitles
12 yes
28 no
50 sometimes

16. How many deaf people live with you ?
69 none
6 one
1 two
2 three
12 four or more

17. How many hard-of-hearing people live with you ?
60 none
25 one
5 two

18. Which of the following do you have at home ?
84 TV

50 PC
64 DVD/VHS player
48 Internet
79 mobile phone
1 I-pod
1 other: Sky
1 did not answer

19. How many hours a day do you spend reading newspapers, books…?
14 do not read
28 people 1-2 hours
22 people 2-3 hours
20 people 3-4 hours
4 people 4-5 hours
2 people 5-6 hours

20. How many hours a day do you watch TV?
3 do not watch TV
12 less than 1 hour
33 between 1-2 hours
13 between 2-3 hours
16 between 3-4 hours
13 more than 4 hours

21. If you watch TV, who do you usually watch TV with?
34 deaf and hard of hearing friends / family
21 alone
32 hearing friends / family

22. What programs do you usually watch on TV?
81 films and series
72 the news
44 talk shows and quizzes
40 documentaries
29 sports

23. Do you choose the programmes you watch based on whether they are subtitled or not?
27 yes
63 No

24. What do you use subtitles for?
50 because they help them understand
8 to learn a foreign language
7 because they are the only way to access the programme
2 both because they help them understand and to learn a foreign language
23 did not answer

25. How do you know which programmes / films include subtitles?
68 teletext

21 TV announcements
23 TV guides
2 teletext, TV announcements and friends
1 TV announcements, friends
1 teletext, TV announcements, TV guides
1 friends
2 did not answer

26. What do you do when a programme doesn't offer subtitles?
37 try to guess by context
15 flick the channels and look for a subtitled programme and try to guess by context
13 switch off the TV
3 put the volume up
2 flick the channels and look for a subtitled programme
1 switches off the TV or tries to guess by context
1 flick the channels + look for a subtitled programme and try to guess by context and read the lips
1 flick the channels + look for a subtitled programme and someone translates for him
17 did not answer

27. What do you think is the best way to make audiovisual material accessible?
44 dubbing
21 sign language interpreter
12 both sign language interpreting and subtitling
9 subtitling
1 both subtitling and dubbing
3 did not answer

28. What do you think of subtitling in general ?
37 it is better than nothing
42 it is satisfactory
11 it is unsatisfactory

29. What would you like to have changed in subtitles?
19 are not slow enough
8 are not clear enough
5 prefer shorter subtitles
3 prefer bigger characters
3 don't love subtitles
2 nothing
2 prefer more correspondence between subtitles and the original dialogues
2 prefer more synchronisation between image and the reading of the subtitles
30 did not answer
1 doesn't understand the use of colours
15 don't know

30. Are you aware of any conventions on how subtitles should be done?
83 no
6 yes
1 did not answer

31. If you know any mention them
2 know general technical and linguistic rules to create subtitles
4 did not answer

32. What difficulties do you think are involved in producing subtitles?
39 don't know
6 to be succinct
5 to be faithful to the original dialogues
2 to translate
1 speed of the dialogues
1 social and economic difficulties
36 did not answer

33. Is it easy to find information on teletext about which programmes are subtitled?
60 yes
15 don't know
14 no
1 did not answer

34. Which channels offer the best subtitles for hearing audiences?*

*In Italy RAI teletext offers subtitles into English of their programmes in Italian and MTV offers open subtitles into Italian of their programmes in English. Apparently, none of the respondents are aware of that or have ever watched at these subtitles.

35. Why ?

The same as before

36. Which channels offer the best subtitles for deaf and hard-of-hearing audiences?
55 did not answer
25 prefer RAI (public) subtitles
8 prefer Mediaset (private)
2 prefer Mediaset or la 7 (private)

37. Why ?
54 did not answer
12 prefer RAI subtitles and 2 prefer Mediaset subtitles because subtitles are written in a clear way
6 prefer RAI, 4 Mediaset and the two who did not answer to the previous question say they prefer these or those subtitles because of other, not specified, reasons
4 prefer RAI subtitles, 2 prefer Mediaset subtitles and 1 prefers private channels' subtitles (generally speaking) because subtitles say everything
3 prefers RAI subtitles because subtitles are well synchronized

38. Which channels offer the best subtitled news ?
46 prefer RAI 2 (public)
12 prefer RAI 1 (public)
8 la 7 (private)
4 prefer RETE 4 (private)

2 prefer CANALE 5 (private)
18 did not answer

39. Why ?
23 prefer RAI 2 and 10 prefer RAI 1 subtitles because they are literal
22 did not answer
3 prefer RAI 2, 3 prefer RETE 4 and one prefers RAI 1 subtitles because they have the right speed and are written in a clear way
5 prefer RAI 2, 2 CANALE 5 and 1 prefers la 7 subtitles because they have the right speed
4 prefer RAI 2, 1 RAI 1 and 2 la 7 because subtitles are written in a clear way
3 prefer RAI 2 because subtitles are well synchronized
3 prefer RAI 2 because they are written in a clear way and because they are well synchronized
2 prefer la 7 and 1 prefers RETE 4 for other not specified reasons
2 prefer RAI 2 because they don't know of other subtitled channels
1 prefers RAI 2 because it offers sign language interpreting
1 prefers la 7 subtitles because they are literal and because they are written in a clear way

40. Where can you find information about which DVDs include SDH?
39 did not answer
29 by the cover
22 by the menu

41. Do you choose the films you watch based on whether they offer subtitles for Deaf and Hard-of-Hearing people or not?
41 did not answer
35 yes
11 no
3 don't know

42. Finding subtitle options in DVD menus is:
86 easy
1 difficult
3 did not answer

43. What type of SDH do you find easier to read / understand?
83 DVD
3 TV
4 did not answer

44. Why ?
- Those who prefer DVD subtitles:
19 because they are written in a clear way and because there is the possibility to rewind and read subtitles twice
14 because they are written in a clear way
8 because they are more complete
6 have only seen DVD subtitles

5 because they have the right speed and because of the possibility to rewind and read subtitles twice
31 did not answer

- Those who prefer TV subtitles:
3 because they are written in a clear way

45. Do you find the font used in teletext easy to read?
63 yes
20 no
3 don't know
4 did not answer

46. Do you find the font used in open subtitles easy to read?*
53 yes
22 no
13 don't know
2 did not answer

*To answer to this question respondents have been made think of cinema subtitles

47. Do you find the font used in DVD SDH easy to read?
61 yes
18 don't know
9 no
2 did not answer

48. When characters need to be identified, what system do you prefer?
28 prefer the subtitles be positioned under the character speaking
21 did not answer
20 only colours
11 combining colours and position under the character speaking
10 only name tags

49. The number of colours used is:
41 enough
16 too many and difficult to remember
8 could be more
13 did not answer
12 don't know

50. Where do you prefer subtitles to be shown?
74 bottom of the screen
8 only top of the screen
4 next to the character speaking
1 both top and bottom of the screen
3 did not answer

51. For live events, how do you prefer subtitles to be shown?
45 word for word

44 blocks
1 did not answer

52. How do you prefer descriptions of sounds to be reflected on the subtitles?
22 explain where the sound comes from
20 describing what the sound is like
20 using words reproducing the sound
20 pictograms
7 did not answer
1 both explain where the sound comes from and describing what the sound is like

53. Where do you prefer sound-related information to be shown?
61 bottom of the screen next to the subtitles
12 next to the source of the sound
9 top right of the screen
8 did not answer

54. Regarding information about the mood of the characters, how do you prefer it to be shown?
39 with emoticons
23 in brackets
21 don't explain
7 did not answer

55. When there is instrumental and background music in a film / TV series, what do you prefer?
47 only an icon with the word "music"
19 information on the type of music
19 nothing
4 the title of the song
1 did not answer

56. When there are meaningful songs in a film / TV series, what do you prefer?
54 subtitling the words of the song
19 only an icon with the word "music"
9 nothing
4 information on the type of music
3 the title of the song on the screen
1 did not answer

57. Which of the options below do you prefer?
65 not so literal subtitles but easier to read
23 literal subtitles that contain absolutely all the information
2 did not answer

58. If you choose "literal subtitles" in the above question, can you explain why you prefer them?
22 because they are more complete thus providing more information
1 did not answer

59. If it is not possible to represent everything in the subtitles, which is the most important thing to include?*
87 scored dialogue 1
49 scored expressions like well, ok… 4
8 scored names 4
1 scored sounds 4
2 did not answer

*The respondents never provided what is requested by the question but only very general answers. The respondents focused their attention more on "what is the most/least important thing" than on the request to draft a list. That is why not all elements provided are reported here.

60. What do you think about the usual speed of the subtitles on TV?
56 are too fast
29 are ok
2 are too slow
3 did not answer

61. What do you think about the usual speed of the subtitles in DVDs?
59 are OK
27 are too fast
1 are too slow
3 did not answer

62. What do you think about the usual speed of the subtitles in live programmes?
64 never saw live subtitles or were not aware they were reading live subtitles
11 are too slow (probably meaning they are in delay. "slow" in Italian also means "slow to appear"
8 are OK
7 are too fast

HEARING PEOPLE

1. Name

2. Gender
7 males
23 females

3. Age
18 between 15 and 24 years of age
12 between 25 and 39 years of age

4. Education
2 middle school
10 high school
18 university students/graduated people

5. Years of education
11 for 18 years of schooling
9 for 13 years of schooling
2 for 8 years of schooling
3 for 19 years of schooling
2 for 20 years of schooling
2 for 21 years of schooling
1 for 12 years of schooling

6. Deaf school or mainstream school
30 got their certificate in mainstream schools

7. Occupation
20 students
8 workers
2 unemployed

8. Are you…?
30 hearing

9. When did you become deaf ?

10. When did you become hard of hearing?

11. Hearing aid
30 no

12. The language you use more often
29 Italian
1 both Italian and Italian Sign Language

13. Sight
17 use contact lenses or glasses

13 need no visual aids

14. Difficulties reading Italian
30 no

15. Difficulties watching TV or reading subtitles
1 yes
17 no
12 sometimes

16. How many deaf people live with you ?
30 None

17. How many hard-of-hearing people live with you ?
30 None

18. Which of the following do you have at home ?
30 TV
27 PC
28 DVD/VHS player
26 Internet
30 mobile phone
1 I-pod
1 other: Sky

19. How many hours a day do you spend reading newspapers, books…?
1 does not read
9 people 1-2 hours
11 people 2-3 hours
4 people 3-4 hours
3 people 4-5 hours
2 people 5-6 hours

20. How many hours a day do you watch TV?
1 does not watch TV
5 less than 1 hour
14 between 1-2 hours
6 between 2-3 hours
3 between 3-4 hours
1 more than 4 hours

21. If you watch TV, who do you usually watch TV with?
8 with deaf and hard of hearing friends / family
2 alone
19 hearing friends / family

22. What programmes do you usually watch on TV?
25 the news
27 films and series
15 talk shows and quizzes

7 sports
10 documentaries

23. Do you choose the programmes you watch based on whether they are subtitled or not?
6 yes
24 no

24. What do you use subtitles for?
13 because they help them understand
8 to learn a foreign language
1 both of them
8 did not answer

25. How do you know which programmes / films include subtitles?
21 teletext
3 TV announcements
1 friends
2 teletext, TV announcements and friends
1 TV announcements, friends
1 teletext, TV announcements, TV guides
1 did not answer

26. What do you do when a programme doesn't offer subtitles?
20 try to guess by context
2 flick the channels and look for a subtitled programme
1 switches off the TV
1 put the volume up
1 switches off the TV or tries to guess by context
5 did not answer

27. What do you think is the best way to make audiovisual material accessible?
15 dubbing
7 sign language interpreter
6 subtitling
1 both subtitling and dubbing
1 did not answer

28. What do you think of subtitling in general ?
16 think it is better than nothing
14 it is satisfactory

29. What would you like to have changed in subtitles?
4 don't know
1 prefer dubbing
5 are not clear enough
2 nothing
8 would prefer slower subtitles
1 don't understand the use of colours
5 would prefer shorter subtitles

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2 would prefer more correspondence between subtitles and the original dialogues
1 would prefer more synchronisation between image and the reading of the subtitles
1 did not answer

30. Are you aware of any conventions on how subtitles should be done?
2 yes
28 no

31. If you know any, mention them
2 know general technical and linguistic rules to create subtitles

32. What difficulties do you think are involved in producing subtitles?
15 don't know
6 to be succinct
5 to be faithful to the original dialogues
4 did not answer

33. Is it easy to find information on teletext about which programmes are subtitled?
25 yes
4 don't know
1 no

34. Which channels offer the best subtitles for hearing audiences?

35. Why ?

36.Which channels offer the best subtitles for the deaf and the hard-of-hearing ?
23 did not answer
5 prefer RAI (public) subtitles
2 prefer Mediaset or la 7 (private)

37. Why ?
24 did not answer
3 prefer RAI subtitles because subtitles are written in a clear way
2 prefers RAI subtitles because subtitles are well synchronized
1 prefers private channels' subtitles because subtitles say everything

38. Which channels offer the best subtitled news ?
16 did not answer
11 prefer RAI 2 (public)
2 la 7 (private)
1 prefers RAI 1 (public)

39. Why ?
16 did not answer
3 prefer RAI 2, 1 RAI 1 and 2 la 7 because subtitles are written in a clear way
3 prefer RAI 2 because subtitles are well synchronized
2 prefer RAI 2 because they are written in a clear way and because they are well synchronized
2 prefer RAI 2 because they don't know of other subtitled channels

1 prefers RAI 2 because it offers sign language interpreting (the respondent has probably made confusion between "subtitled news" and "accessible news"

40. Where can you find information about which DVDs include SDH?
20 did not answer
6 by the cover
4 by the menu

41. Do you choose the films you watch based on whether they offer subtitles for Deaf and Hard-of-Hearing people or not?
17 did not answer
11 no
1 yes
1 don't know

42. Finding subtitle options in DVD menus is:
26 easy
1 difficult
3 did not answer

43. What type of SDH do you find easier to read / understand?
25 DVD
3 TV
2 did not answer

44. Why ?
- Those who prefer DVD subtitles:
14 because they are written in a clear way
6 have only seen DVD subtitles
5 speed and the possibility of rewinding and read subtitles twice

- Those who prefer TV subtitles:
3 because they are written in a clear way

45. Do you find the font used in teletext easy to read?
15 yes
11 no
3 don't know
1 did not answer

46. Do you find the font used in open subtitles easy to read?
25 yes
1 no
3 don't know
1 did not answer

47. Do you find the font used in DVD SDH easy to read?
26 yes
3 don't know
1 did not answer

48. When characters need to be identified, what system do you prefer?
11 did not answer
8 prefer the subtitles be positioned under the character speaking
5 combining colours and position under the character speaking
3 only colours
3 only name tags

49. The number of colours used is:
11 enough
7 too many and difficult to remember
2 could be more
10 did not answer

50. Where do you prefer subtitles to be shown?
24 bottom of the screen
4 next the character speaking
1 both top and bottom of the screen
1 did not answer

51. For live events, how do you prefer subtitles to be shown?
26 blocks
4 word for word

52. How do you prefer descriptions of sounds to be reflected on the subtitles?
9 describing what the sound is like
8 using words reproducing the sound
3 explain where the sound come from
3 pictograms
1 both explain where the sound comes from and describing what the sound is like
6 did not answer

53. Where do you prefer sound-related information to be shown?
16 bottom of the screen next to the subtitles
6 next to the source of the sound
2 top right of the screen
6 did not answer

54. Regarding information about the mood of the characters, how do you prefer it to be shown?
15 in brackets
6 don't explain
4 with emoticons
5 did not answer

55. When there is instrumental and background music in a film / TV series, what do you prefer?
12 information on the type of music
12 only an icon with the word "music"
3 nothing

3 the title of the song

56. When there are meaningful songs in a film / TV series, what do you prefer?
21 subtitling the words of the song
4 information on the type of music
2 the title of the song on the screen
2 nothing
1 only an icon with the word "music"

57. Which of the options below do you prefer?
23 not so literal subtitles but easier to read
7 literal subtitles that contain absolutely all the information

58. If you choose "literal subtitles" in the above question, can you explain why you prefer them?
7 to have more information

59. If it is not possible to represent everything in the subtitles, which is the most important thing to include?
30 scored dialogue 1
25 scored expressions like well, ok… 4
4 scored names 4
1 scored sounds 4

60. What do you think about the usual speed of the subtitles on TV?
21 are too fast
6 are ok
1 are too slow
2 did not answer

61. What do you think about the usual speed of the subtitles in DVDs?
20 are OK
8 are too fast
1 are too slow
1 did not answer

62. What do you think about the usual speed of the subtitles in live programmes?
23 never saw live subtitles or were not aware they were reading live subtitles
5 are too fast
2 are too slow (probably meaning they are in delay. "slow" in Italian also means "slow to appear")

DEAF

1. Name

2. Gender
19 males
11 females

3. Age
6 between 15 and 24 years of age
13 between 25 and 39 years of age
11 between 40 and 59 years of age

4. Education
17 middle school (8 years of schooling)
12 high school (13 years of schooling)
1 university student/graduated people

5. Years of education
16 for 16 years of schooling
10 for 21 years of schooling
3 for 13 years of schooling
1 for 18 years of schooling

6. Deaf school or mainstream school
3 in mainstream schools
16 in deaf schools
10 got their primary and middle school certificates in deaf schools and the high school certificate in a mainstream school
1 got a primary school certificate in a deaf school and the middle school certificate in a mainstream school

7. Occupation
4 students
17 workers
9 unemployed

8. Are you… ?
30 deaf

9. When did you become deaf ?
25 were born deaf
4 before they were 2
1 between 2 and 4 years of age

10. When did you become hard-of-hearing ?

11. Hearing aid
16 yes
11 no

3 did not answer

12. The language you use more often
23 Sign language
2 Italian
5 both

13. Sight
20 use contact lenses or glasses
10 need no visual aids

14. Difficulties reading Italian
18 yes
12 no

15. Difficulties watching TV or reading subtitles
8 yes
6 no
16 sometimes

16. How many deaf people live with you ?
9 none
6 one
1 two
2 three
12 four or more

17. How many hard-of-hearing people live with you ?
19 none
6 one
5 two

18. Which of the following do you have at home ?
24 TV
22 PC
20 DVD/VHS player
21 Internet
24 mobile phone
1 did not answer

19. How many hours a day do you spend reading newspapers, books…?
4 do not read
13 people 1-2 hours
4 people 2-3 hours
9 people 3-4 hours

20. How many hours a day do you watch TV?
2 do not watch TV
3 less than 1 hour
13 between 1-2 hours

4 between 2-3 hours
7 between 3-4 hours
1 more than 4 hours

21. If you watch TV, who do you usually watch TV with?
12 alone
9 hearing friends / family
7 deaf and hard of hearing friends / family

22. What programs do you usually watch on TV?
17 the news
26 films and series
8 talk shows and quizzes
13 sports
11 documentaries

23. Do you choose the programmes you watch based on whether they are subtitled or not?
21 Yes
9 No

24. What do you use subtitles for?
23 because they help them understand
6 because they are the only way to access the programme
1 both because they help them understand and to learn a foreign language

25. How do you know which programmes / films include subtitles?
17 teletext
12 TV guides
1 did not answer

26. What do you do when a programme doesn't offer subtitles?
9 flick the channels and look for a subtitled programme and try to guess by context
8 switch off the TV
6 both flick the channels + look for a subtitled programme and try to guess by context
4 try to guess by context
1 switches off the TV
1 both flick the channels + look for a subtitled programme and try to guess by context and read the lips
1 both flick the channels + look for a subtitled programme and someone translates for him

27. What do you think is the best way to make audiovisual material accessible?
14 sign language interpreter
12 both sign language interpreting and subtitling
2 subtitling
2 did not answer

28. What do you think of subtitling in general ?
16 it is satisfactory

10 think it is better than nothing
4 is unsatisfactory

29. What would you like to have changed in subtitles?
23 did not answer
3 don't know
3 are not clear enough
1 prefer more synchronicity and more details

30. Are you aware of any conventions on how subtitles should be done?
4 yes
25 no
1 did not answer

31. If you know any, mention them
4 did not answer

32. What difficulties do you think are involved in producing subtitles?
21 did not answer
8 don't know
1 social and economic difficulties

33. Is it easy to find information on Teletext about which programmes are subtitled?
20 yes
6 don't know
3 no
1 did not answer

34. Which channels offer the best subtitles for hearing audiences?

35. Why?

36. Which channels offer the best subtitles for deaf and hard of hearing audiences ?
20 prefer RAI (public) subtitles
8 prefer Mediaset (private)
2 did not answer

37.Why?
9 prefer RAI and 2 prefer Mediaset subtitles because they are written in a clear way
6 prefer RAI, 4 Mediaset and the two who did not answer to the previous question say they prefer these or those subtitles because of other, not specified, reasons
4 prefer RAI subtitles and 2 Mediaset subtitles because subtitles say everything
1 prefers RAI subtitles because they are well synchronized

38. Which channels offer the best subtitled news?
14 prefer RAI 2 (public)
8 prefer RAI 1 (public)
6 prefer la 7 (private)
1 prefers RETE 4 (private)
1 did not answer

39. Why ?
10 prefer RAI 2 and 8 prefer RAI 1 subtitles because they are literal
1 prefer RAI 2 subtitles because they are written in a clear way
1 prefers la 7 subtitles because they have the right speed
2 prefer la 7 and 1 prefers RETE 4 for other not specified reasons
1 prefers RAI 2 subtitles because they are written in a clear way and because they are well synchronized
1 prefers la 7 subtitles because they are literal and because they are written in a clear way
5 did not answer

40. Where can you find information about which DVDs include SDH?
13 by the cover
12 by the menu
5 did not answer

41. Do you choose the films you watch based on whether they offer subtitles for Deaf and Hard-of-Hearing people or not?
27 yes
2 did not answer
1 doesn't know

42. Finding subtitle options in DVD menus is:
30 easy

43. What type of SDH do you find easier to read / understand?
29 DVD
1 did not answer

44. Why ?
- Those who prefer DVD subtitles:
19 because they are written in a clear way and because there is the possibility to rewind and read subtitles twice
10 did not answer

45. Do you find the font used in teletext easy to read?
22 yes
6 no
2 did not answer

46. Do you find the font used in open subtitles easy to read?
22 yes
3 no
4 don't know
1 did not answer

47. Do you find the font used in DVD SDH easy to read?
26 yes
3 no

1 did not answer

48. When characters need to be identified, what system do you prefer?
11 only colours
7 only subtitles positioned under the character speaking
6 only name tags
6 both colours and position under the character speaking

49. The number of colours used is:
22 enough
6 could be more
2 did not answer

50. Where do you prefer subtitles to be shown?
23 only bottom of the screen
5 only top of the screen
2 did not answer

51. For live events, how do you prefer subtitles to be shown?
16 word for word
13 blocks
1 did not answer

52. How do you prefer descriptions of sounds to be reflected on the subtitles?
17 explain where the sound comes from
7 pictograms
5 describing what the sound is like
1 did not answer

53. Where do you prefer sound-related information to be shown?
20 bottom of the screen next to the subtitles
6 next to the source of the sound
3 top right of the screen
1 did not answer

54. Regarding information about the mood of the characters, how do you prefer it to be shown?
14 don't explain
8 in brackets
7 with emoticons
1 did not answer

55. When there is instrumental and background music in a film / TV series, what do you prefer?
15 nothing
9 only an icon with the word "music"
4 information on the type of music
1 the title of the song
1 did not answer

56. When there are meaningful songs in a film / TV series, what do you prefer?
23 subtitling the words of the song
5 nothing
1 the title of the song
1 did not answer

57. Which of the options below do you prefer?
16 not so literal subtitles but easier to read
12 literal subtitles that contain absolutely all the information
2 did not answer

58. If you choose "literal subtitles" in the above question, can you explain why you prefer them
11 to have more information
1 did not answer

59. If it is not possible to represent everything in the subtitles, which is the most important thing to include?
27 scored dialogue 1
15 scored expressions like well, ok… 4
4 scored names 4
2 did not answer

60. What do you think about the usual speed of the subtitles on TV?
8 are too fast
21 are ok
1 are too slow

61. What do you think about the usual speed of the subtitles in DVDs?
30 are OK

62. What do you think about the usual speed of the subtitles in live programmes?
11 never saw live subtitles or were not aware they were reading live subtitles
9 are too slow (probably meaning they are in delay. "slow" in Italian also means "slow to appear"
8 they are OK
2 are too fast

HARD OF HEARING

1. Name

2. Gender
20 males
10 females

3. Age
30 over 60 years of age

4. Education
10 primary school
10 middle school
10 high school

5. Years of education
10 for 5 years of schooling
10 for 8 years of schooling
9 for 13 years of schooling
1 for 12 years of schooling

6. Deaf school or mainstream school
30 mainstream schools

7. Occupation
1 worker
29 retired

8. Are you… ?
30 hard of hearing

9. When did you become deaf ?

10. When did you become hard of hearing ?
7 after the age of 30
23 after the age of 50

11. Hearing aid
2 yes
28 no

12. The language you use more often
30 Italian

13. Sight
19 use contact lenses or glasses
11 need no visual aids

14. Difficulties reading Italian
3 yes
27 no

15. Difficulties watching TV or reading subtitles
3 yes
5 no
22 sometimes

16. How many deaf people live with you ?
30 none

17. How many hard-of-hearing people live with you ?
19 one
11 none

18. Which of the following do you have at home ?
30 TV
1 PC
16 DVD/VHS player
1 Internet
25 mobile phone

19. How many hours a day do you spend reading newspapers, books…?
9 do not read
6 people 1-2 hours
7 people 2-3 hours
7 people 3-4 hours
1 person between 4 and 5 hours

20. How many hours a day do you watch TV?
4 watch TV less than 1 hour a day
6 between 1-2 hours
3 between 2-3 hours
6 between 3-4 hours
11 more than 4 hours

21. If you watch TV, who do you usually watch TV with?
19 hard-of-hearing friends/family
7 alone
4 hearing friends / family

22. What programs do you usually watch on TV?
30 the news
28 films and series
21 talk shows and quizzes
9 sports
19 documentaries

23. Do you choose the programmes you watch based on whether they are subtitled or not?
30 No

24. What do you use subtitles for?
14 because they help them understand
1 because they are the only way to access the programme
15 did not answer

25. How do you know which programmes / films include subtitles?
30 teletext,
18 TV announcements
11 TV guides

26. What do you do when a programme doesn't offer subtitles?
13 try to guess by context
12 did not answer
3 switch off the TV
2 put the volume up

27. What do you think is the best way to make audiovisual material accessible?
1 subtitling
29 dubbing

28. What do you think of subtitling in general ?
12 it is satisfactory
11 think it is better than nothing
7 is unsatisfactory

29. What would you like to have changed in subtitles?
11 are not slow enough
8 don't know
6 did not answer
3 they would prefer bigger characters
2 don't love subtitles

30. Are you aware of any conventions on how subtitles should be done?
30 no

31. If you know any of them mention them
30 did not answer

32. What difficulties do you think are involved in producing subtitles?
16 don't know
11 did not answer
2 the translational process
1 speed of the dialogues

33. Is it easy to find information on teletext about which programmes are subtitled?
15 yes

10 no
5 don't know

34. Which channels offer the best subtitles for hearing audiences?

35. Why ?

36. Which channels offer the best subtitles for the deaf and the hard of hearing?
30 did not answer

37. Why?
30 did not answer

38. Which channels offer the best subtitled news?
21 prefer RAI 2 (public)
3 prefer RAI 1 (public)
3 prefer RETE 4 (private)
2 prefer CANALE 5 (private)
1 did not answer

39. Why?
13 prefer RAI 2 and 2 prefer RAI 1 subtitles because they are literal
3 prefer RAI 2, 3 prefer RETE 4 and 1 prefers RAI 1 subtitles because they have the right speed and are written in a clear way
5 prefer RAI 2 and 2 CANALE 5 because they have the right speed
1 did not answer

40. Where can you find information about which DVDs include SDH?
10 by the cover
6 by the menu
14 did not answer

41. Do you choose the films you watch based on whether they offer subtitles for Deaf and Hard-of-Hearing people or not?
22 did not answer
7 yes
1 doesn't know

42. Finding subtitle options in DVD menus is:
30 easy

43. What type of SDH do you find easier to read / understand?
29 DVD
1 did not answer

44. Why?
- Those who prefer DVD subtitles:
8 because they are more complete
21 did not answer

45. Do you find the font used in teletext easy to read?
26 yes
3 no
1 did not answer

46. Do you find the font used in open subtitles easy to read?
18 no
6 yes
6 don't know

47. Do you find the font used in DVD SDH easy to read?
9 yes
6 no
15 don't know

48. When characters need to be identified, what system do you prefer?
13 subtitles next or under the character speaking
6 colours
1 name tags
10 did not answer

49. The number of colours used is:
9 too many and difficult to remember
8 enough
12 don't know
1 did not answer

50. Where do you prefer subtitles to be shown?
27 only bottom of the screen
3 only top of the screen

51. For live events, how do you prefer subtitles to be shown?
25 word for word
5 blocks

52. How do you prefer descriptions of sounds to be reflected on the subtitles?
12 using words reproducing the sound
10 pictograms
6 describing what the sound is like
2 explain where the sound comes from

53. Where do you prefer sound-related information to be shown?
25 bottom of the screen next to the subtitles
4 top right of the screen
1 did not answer

54. Regarding information about the mood of the characters, how do you prefer it to be shown?
28 with emoticons
1 nothing

1 did not answer

55. When there is instrumental and background music in a film / TV series, what do you prefer?
26 only an icon with the word "music"
3 information on the type of music
1 nothing

56. When there are meaningful songs in a film / TV series, what do you prefer?
18 only an icon with the word "music"
10 subtitling the words of the song
2 nothing

57. Which of the options below do you prefer?
26 not so literal subtitles but easier to read
4 literal subtitles that contain absolutely all the information

58. If you choose "literal subtitles" in the above question, can you explain why you prefer them
4 to have more information

59. If it is not possible to represent everything in the subtitles, which is the most important thing to include?
30 scored dialogue 1
9 scored expressions like well, ok… 4

60. What do you think about the usual speed of the subtitles on TV?
27 are too fast
2 are ok
1 did not answer

61. What do you think about the usual speed of the subtitles in DVDs?
19 are too fast
9 are OK
2 did not answer

62. What do you think about the usual speed of the subtitles in live programmes?
30 never saw live subtitles or were not aware they were reading live subtitles

We also asked <u>What do you think of subtitling of foreign films?</u>

All respondents have answered as follows
34 help them understand
23 help them learning a foreign language
32 don't help them understand
1 did not answer

Hearing people have answered as follows
14 help them understand
13 help them learning a foreign language
2 don't help them understand
1 did not answer

Deaf people have answered as follows
20 don't help them understand
8 help them learning a foreign language
2 help them understand

Hard-of-hearing people have answered as follows
10 don't help them understand
18 help them understand
2 help them learning a foreign language

10 Appendix C: Pear Tree Report, Poland

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Towards a common European quality audio description
Final report on the Pear Tree Project

1. Introduction

Audio description (AD) has been developing very unevenly across Europe. In some countries (such as the UK) AD has already come of age, whereas in others (such as Poland) it is still at the crawling stage. As a result, countries belonging to the former category have worked out national AD standards and practices (which, however, differ from country to country and so does the quality of ADs), whereas those in the latter group are lagging far behind with no principles in place to guide audio describers in their work.

Given the above considerations and in view of European Commission's Audiovisual Media Services Directive of 11 December 2007, which explicitly mentions the right of persons with disabilities to enjoy accessible media services, including through audio description, AD practitioners and researchers across Europe have become aware of the growing need to develop and standardize AD guidelines in Europe in order to ensure consistent high quality AD practice. However, before streamlining European AD standards and practices can be pursued, a number of issues have to be addressed, the most essential one being whether cross-linguistic and cross-cultural differences in Europe are not significant enough to prevent such common European AD guidelines from being developed. Another question posed by the researchers was whether it is possible to translate AD scripts.

In order to answer these questions a methodology proposed by Wallace Chafe (Chafe 1980) and concerning the way representatives of various cultures and languages perceive and describe moving images was adopted by a group of AD researchers across Europe in the so-called Pear Tree Project. In the report the results as well as their analysis will be presented, on the basis of which the authors will attempt to provide an answer to the question whether creating common European audio description guidelines is a feasible undertaking.

2. Project rationale and objectives

The Pear Tree Project (PTP) is concerned with uncovering the principles governing narrative production across the languages concerned and its two primary objectives are to answer the questions whether (1) it is possible to develop common European AD standards and guidelines, and whether (2) it is possible to translate AD scripts across

languages. The development of common European AD standards would by all means help improve and even out the quality of AD across Europe, whereas translation of AD scripts could increase the volume of audio described materials, as instead of creating AD from scratch, it could be translated from already existing scripts (primarily from English, as the UK is at the forefront of the audio description market with the greatest supply of audio described audiovisual materials). In order to answer the two questions mentioned above, it is essential to verify whether people living in different countries, with different linguistic and cultural backgrounds, perceive and interpret visual stimuli in a similar manner. To do that, the researchers involved in the PTP decided to employ a methodology developed for testing reception of the same visual input across languages and cultures, which methodology is described below.

3. Methodology and project design

The methodology used in the PTP was first developed by Professor Wallace Chafe of University of California in Berkeley. In mid-1970s Chafe and his co-workers conducted a study called the Pear Stories Project (Chafe 1980), whose primary aim was to find an interrelation between knowledge and manner of thought formulation. In particular the researchers wanted to find out how people talk about events they participated in as well as how they describe them after some time. An assumption was made that human knowledge is stored in the mind in part analogically, and not only propositionally (which can be supported by the fact that sometimes it is difficult for us to express what we think and that we rarely express the same thoughts in the same manner on different occasions).

The starting point for Chafe's experiment was a study conducted by Bartlett (1967), in which the subjects were asked to read a folktale and then write down what they remembered. Chafe and his co-workers, on the other hand, wanted the input to be provided in a non-verbal form and the subjects were to recount what they saw orally. Additionally, the study was to involve persons representing different languages and cultures in order to perform a cross-linguistic and cross-cultural analysis.

The researchers, however, could not find a film that would meet their research criteria, which included, among other things, presentation of a series of events, some of which would be in sequence and some simultaneous. What is more, some of the events were to be trivial, while other salient. Also, the visual input should provide for ambiguity of interpretation, but on the other hand should be interpretable by people representing different cultures. Due to the fact that none of the existing films met the above-mentioned criteria, the researchers decided to make a film especially for the purpose of the study (the so-called 'pear film'). The film was shot in California, in colour, with sound but with no dialogue. It lasted 6 minutes. It had simple editing and it referred to universal experiences and did not include any culture-specific or historic references so that representatives of various cultures could understand it and recount it. The exact sequence of events was as follows (after Du Bois 1980: xii-xiii):

> A man is on a ladder picking pears. He descends the ladder, kneels, and puts the pears from the pocket of his apron into one of three baskets below the pear tree. He removes a bandana from around his neck and wipes one of the pears. He then returns to the ladder and climbs back into the tree.

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Toward the end of this sequence we hear the sound of a goat, and when the picker is back up the ladder, a man approaches with a goat on a leash. As they pass the baskets of pears, the goat strains towards them, but the man pulls him past and the two of them disappear into the distance.

We see another close up of the picker at his work, and then a boy approaches on a bicycle. He coasts in toward the baskets; stops, gets off his bike; looks up at the picker; puts down his bike; walks toward the baskets, again looking at the picker; picks up a pear; puts it back down; looks once more at the picker; and lifts up a basket full of pears. He puts the basket down near his bike; picks the bike up and gets on; picks up the basket and places it on the rack in front of the handlebars, and rides off. We again see the man continuing to pick pears.

The boy is now riding down the road, and we see a pear fall from the basket on his bike. Then we see a girl on a bicycle approaching from the other direction. As they pass, the boy turns to look at the girl, his hat flies off, and the front wheel of his bike hits a rock. The bike crashes, the basket falls off, and the pears spill onto the ground. The boy extricates himself from under the bike, and brushes off his leg.

In the meantime we hear what turns out to be the sound of a paddleball, and then we see three boys standing there, looking at the bike boy on the ground. The three pick up the scattered pears and put them back in the basket. The boy sets his bike upright, and two of the other boys lift the basket of pears back onto it. The bike boy begins walking his bike in the direction he was going, while the three other boys begin walking off in the other direction.

As they walk by the bike boy's hat on the road, the boy with the table-tennis bat toy: sees it, picks it up, turns around, and we hear a loud whistle as he signals to the bike boy. The bike boy stops, takes three pears out of the basket, and holds them out as the other boy approaches with the hat. They exchange the pears and the hat, and the bike boy keeps going while the boy with the paddleball runs back to his two companions, to each of whom he hands a pear. They continue on eating their pears.

The scene now changes back to the tree, where we see the picker again descending the ladder. He looks at the two baskets, where earlier there were three, points at them, backs up against the ladder, shakes his head, and tips up his hat. The three boys are now seen approaching, eating their pears. The picker watches them pass by, and they walk off into the distance. (Du Bois 1980: xii-xiii)

In the study the subjects were shown the film and then were asked to tell what they saw (their speeches were recorded and then transcribed). The subjects were asked to recount the film again after some time. The original experiment, conducted by Chafe in 1975, involved a group of English-language students at the University of California in Berkeley. Later on data for other languages was gathered, including Japanese (Clancy 1980, Downing 1980 and 1996), German (Ehlers 1980), Greek (Tannen 1980), Malaysian (Azia 1980) as well as Chinese dialects (Erbaugh 1990).

Given the fact that the above-mentioned experiment concerned perception and description of visual input, the researchers in the DTV4All project assumed that its methodology could be applied in research on audio description with a view to answering the questions referred to in section 2 above.

To this end, a set of written instructions was developed and distributed among researchers conducting the study in their respective countries (see below). According to the instructions, the subjects were supposed to watch the film once and then write down what they saw (in longhand, so that any corrections or deletions could be identified). In

the instructions there was no reference to the blind or audio description as such, so the assumption was that the subjects were to recount the film as if describing it to a person that simply has not seen it.

Before the starting the actual study, the subjects were asked to fill in a questionnaire about age, sex, mother tongue, language used most often in their everyday communication and longer stays abroad. For each language included in the project there were approximately 20 subjects, the vast majority of them were female, aged 17-25, and they were all native speakers of the language in which they provided the descriptions.

Once the experiment was carried out, the descriptions were transcribed on a computer (including deletions and corrections, if any), and then – for languages other than English – they were translated into English in order to allow for a comparative analysis between the languages concerned. Then the researchers in the project were asked to analyse the data obtained for their respective languages according to an analysis template, which was based on data analysis in a study involving the pear film conducted by Tannen (1980) for American English and Greek, and which included the following 12 aspects: occurrence of the word 'film', allusions to film-viewer perspective, verb tenses used in descriptions, giving pears to the boys, explanation of the cause of fall, man with the goat, taking pears, pear picker's discovery, words used for the pear picker, objects mentioned in the fall scene, terms for the threesome, reference to the toy. The idea behind all of these aspects as well as their significance for audio description research will be explained when discussing results obtained for each of the aspects (see section 5).

4. Participants

The study was conducted in 11 countries and it involved 12 languages (including 10 European languages), which are listed below, along with the names of researchers involved in data collection and analysis and their affiliations:

- **Afrikaans** (J-L. Kruger, N. Wilken, H. Kruger; North-West University, Republic of South Africa)
- **Catalan** (A. Matamala, P. Orero, P. Igareda; Universitat Autònoma de Barcelona, Spain)
- **Dutch** (A. Remael, H. Rummens, G. Vercauteren; University College Antwerp, Belgium)
- **UK English** (T. Muller; Roehampton University, United Kingdom)
- **French** (A. Serban, T. Muller; Université Paul Valéry/Roehampton University, France/ United Kingdom)
- **German** (H. Gerzymisch-Arbogast, A. Gronek, A. Gorius, V. Hildner, J. Fickert and J. Kunold; Universität des Saarlandes, Germany)
- **Greek** (S. Sokoli, E. Rapti; Hellenic Open University, Greece)
- **Italian** (E. Di Giovanni, S. Giustozzi; Università di Macerata, Italy)
- **Irish English** (A. Salway; Dublin City University, Ireland)
- **Polish** (A. Chmiel, I. Mazur; Adam Mickiewicz University, Poland)
- **Spanish** (P. Igareda; Universitat Autònoma de Barcelona, Spain)
- **Spanish/US English** (J. Dávila; University of Texas at Brownsville, USA)

The data provided by the participants was then compared and contrasted across all the languages by the authors of this report, and the results of the analysis are presented below[12].

5. Results

Below we present data obtained for each of the 12 analysed aspects (see section 3 above) as well as the discussion of the results.

5.1. Occurrence of the word 'film'

In her analysis of American and Greek narratives (cf. section 3 above), Tannen notes that Americans tended to discuss the pear film as a film whereas Greeks simply recounted the events depicted in the film without mentioning that the events actually happened in a film (Tannen 1980: 54). In audio description the prevailing tendency is not to directly refer to the genre being described, be it a film or theatre performance. The researchers in the PTP therefore wanted to see whether the subjects in the respective countries would actually use the word 'film' or 'movie' in their narratives and if so, then audio descriptions should perhaps follow suit. Table A1 below presents percentages for the relevant data. Please note that a distinction was made between no reference to the word 'film' and one or more references to such word in a given description.

Table A1. Occurrence of the word 'film' – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
0	63.1%	65.0%	66.7%	80.0%	83.3%	45.0%	80.0%	70.0%	53.1%	45.5%	45.0%	80.0%	57.9%
<1	36.9%	35.0%	33.3%	20.0%	16.7%	55.0%	20.0%	30.0%	46.9%	46.9%	55.0%	20.0%	42.1%

The data show that in the vast majority of languages (i.e. 10 out of 12) most of the descriptions did not include the word 'film' or 'movie' (with the highest results for Catalan – 80.0%, German – 83.3%, French – 80.0%, and UK English – 80.0%). The two languages in which reference to the word 'film' was made at least once in most of the texts include Spanish and Polish (55.0% in both cases). These findings could suggest that in audio description references to the genre being described should be avoided, however it turns out that the differences among countries are significant ($p<.05$ in the Chi Square Test), which means that no generalisations can be made concerning this aspect.

5.2. Allusions to film-viewer perspective

This aspect is similar to the one described in section 5.1. Here the researchers looked at the use of film metalanaguage, which according to the prevailing AD guidelines, should be avoided. Such film metalanguage includes such cinema-associated jargon as "the camera pans", "protagonist", phrases like "it shows", and phrases that presuppose an audience, e.g. "then we saw", "you could see", "I noticed". According to Tannen, "all these references serve to remind the listener that what is being talked about is a film" (Tannen 1980: 60). In the PTP the researchers wanted to find out whether narratives in the respective languages include allusions to the film-viewer perspective. The results are presented in Table A2 below.

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[12] Please note that former coordinators of the project were Andrew Salway and Alicia Palomo López.

Table A2. Allusions to film-viewer perspective

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
0	41.5%	45.0%	20.8%	55.0%	33.3%	45.0%	40.0%	20.0%	50.0%	36.4%	15.0%	85.0%	50.0%
<1	58.5%	55.0%	79.2%	45.0%	66.7%	55.0%	60.0%	80.0%	50.0%	63.6%	85.0%	15.0%	50.0%

Contrary to the data obtained for references to the word 'film' (section 5.1 above), here the majority of the narratives (58.5%) did make one or more reference to the film-viewer perspective (with the highest percentages for Dutch – 79.2%, German – 66.7%, Greek – 80.0% and Polish – 85.0%). Again, this could suggest that such references could be made in audio descriptions, however, the Chi-Square Test result (p<.001) shows that the differences among countries are significant and thus no generalisations across countries are possible in this respect.

5.3. Verb tenses

In this aspect of data analysis the tenses used in each text were judged and classified as follows: present only, past only, a mixture of present and past, past → present (i.e. the text starts in the past and then switches to the present until the end). The aim was to specify which tenses are usually used in describing films in a given culture. Table A3 below presents percentages broken down by language. Some languages, such as Dutch and Polish, manifest a clear preference for present tense (87.5% and 70.0%, respectively) while other show a completely opposite result (e.g. German, French and Greek – in 75.0% of texts a mixture of tenses was used).

Table A3. Verb tenses – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
present	47.6%	65.0%	87.5%	33.3%	25.0%	60.0%	25.0%	25.0%	51.9%	36.4%	70.0%	35.0%	40.0%
past	7.3%	10.0%	4.2%	9.5%	0.0%	5.0%	0.0%	0.0%	18.5%	0.0%	5.0%	5.0%	25.0%
mixed	39.4%	5.0%	8.3%	57.1%	75.0%	25.0%	75.0%	75.0%	7.4%	59.1%	25.0%	55.0%	35.0%
past → present	5.7%	20.0%	0.0%	0.0%	0.0%	10.0%	0.0%	0.0%	22.2%	4.5%	0.0%	5.0%	0.0%

The statistical analysis reveals that these differences are significant among languages (p<.001 in a Chi-Square Test). To analyse the trends in more detail, a correspondence analysis was performed. This tool is used in statistics to analyse multi-way tables and results in a correspondence map or plot that presents the interrelations between variables and categories. The closer the categories on the map, the more correlated they are. Figure A1 below presents the correspondence plot for verb tenses.

Figure A1. Verb tenses – correspondence plot
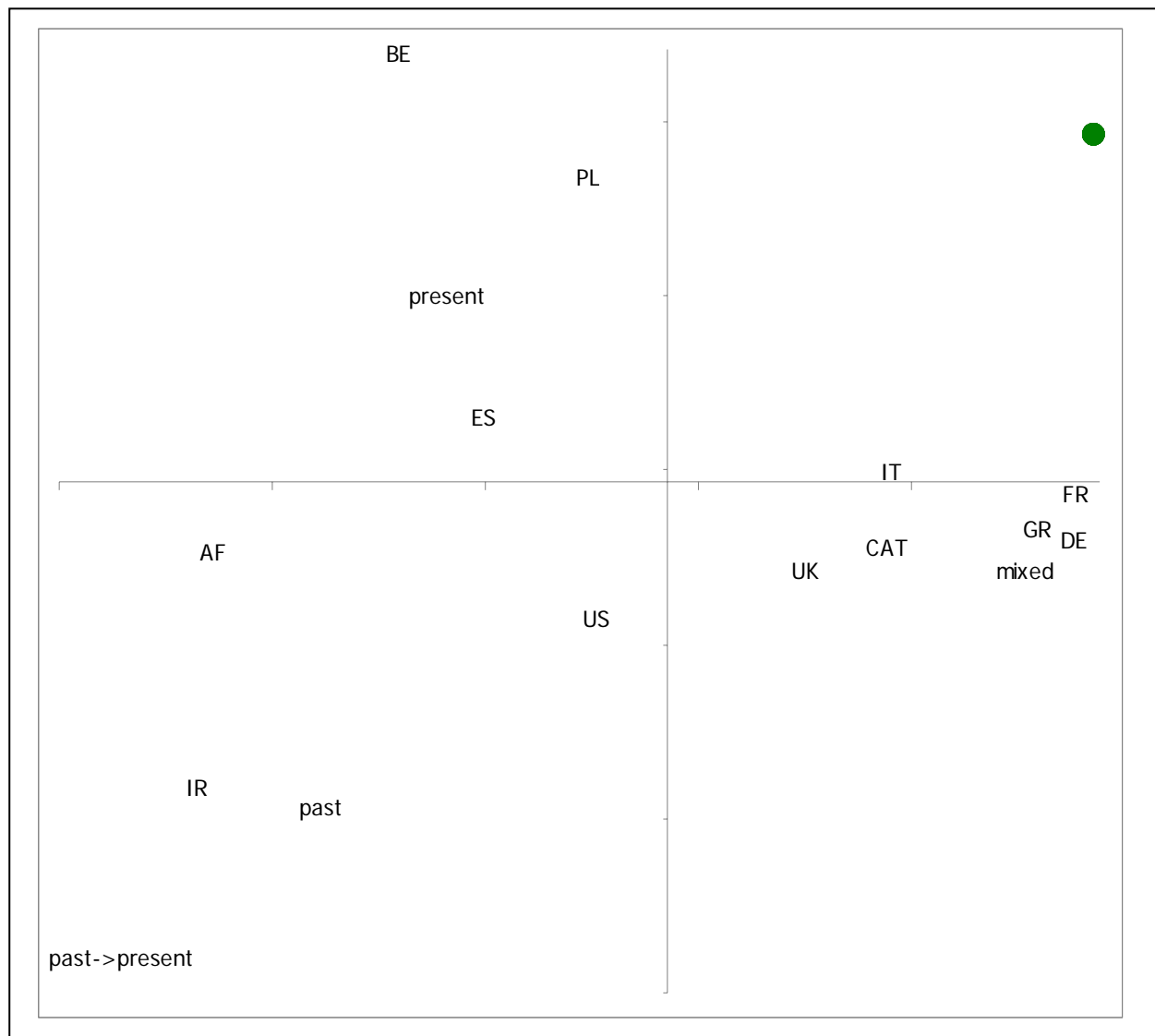
As you can see, the variation is huge and points representing various languages are quite far apart. Greek, French, German, as well Italian, UK English and Catalan texts use the majority of mixed tenses (but note that the three first languages are closer to "mixed" so their preference is stronger than in the case of the latter three languages). Dutch, Afrikaans and Irish English are most separated from the rest of the languages so they vary the most in the present analysis.

5.4. Giving pears to boys

This aspect is related to the interpretation of one event in the film, i.e. the boy giving pears to three boys. The results of the analysis provide information about:
- how many texts do not refer to this event at all (*no mention*),
- how many texts only give a basic description, e.g. "the boy gave them a pear each" (*basic*),
- how many texts refer to this being a gesture of thanks, e.g. "the boy gave them a pear in return for their help" (*thanks*),

- how many texts make a moral judgment, e.g. "as he should do, the boy gave them a pear in return for their help" (*moral jud.*).

Such an aspect is analysed in the current study to see if and how the participants described and interpreted various events. Subjective interpretation of what is happening on screen is a bone of contention among AD scholars, with some fervently opposing any traces of subjective description and others accepting interpretation in certain contexts.

Table A4 below presents the overall data and percentages broken down by language. The majority of participants chose to interpret the event as a gesture of thanks (57%). Variations in the results among languages are, again, quite large (p<.05 in the Chi Square Test). For instance, as many as 78.3% of Belgians interpreted this event as a gesture of thanks, while half of Americans (50.0%) did not mention this event at all.

Table A4. Giving pears to boys – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
basic	18.2%	30.0%	8.7%	20.0%	27.3%	25.0%	0.0%	25.0%	21.7%	38.1%	20.0%	11.8%	0.0%
no mention	22.7%	20.0%	13.0%	5.0%	36.4%	20.0%	21.1%	35.0%	17.4%	23.8%	20.0%	5.9%	50.0%
thanks	57.0%	45.0%	78.3%	70.0%	36.4%	45.0%	78.9%	40.0%	56.5%	38.1%	60.0%	82.3%	50.0%
moral jud.	2.1%	5.0%	0.0%	5.0%	0.0%	10.0%	0.0%	0.0%	4.3%	0.0%	0.0%	0.0%	0.0%

The differences are clearer when depicted as a correspondence plot (Figure A4). In fact, the distances between points for various languages are large, with the exception of German and Greek or Spanish and Afrikaans.

Figure A2. Giving pears to boys – correspondence plot

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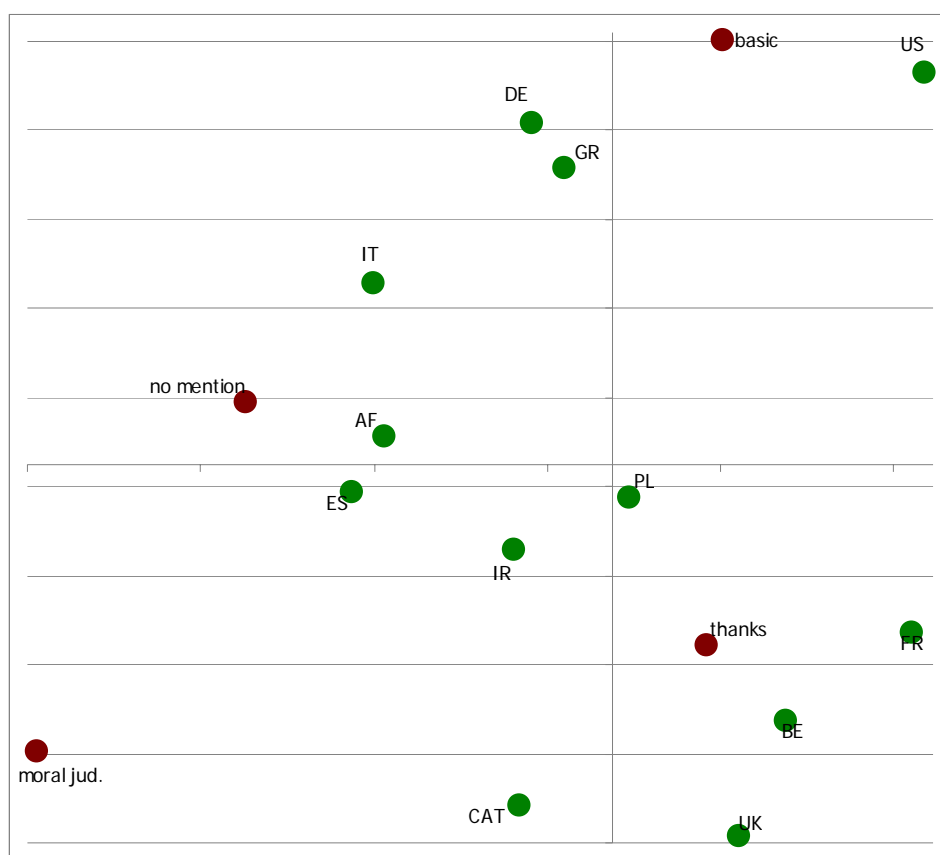
It is obvious that moral judgment was the least preferred solution, which (despite statistically significant differences among the data) can serve as a hint to audio describers.

5.5 Explanations of the cause of fall

This aspect is also related to the interpretation of events. The original pear film was recorded so that the cause of the boy's fall is ambiguous. As discovered by Tannen (1980: 73), "although causality is not clearly discernible in the film, most speakers (…) speculate about or impute causality in their stories". The same is true for our data, which manifests statistically significant differences among languages ($p<.001$ in the Chi Square Test). The respondents answers were classified, following Tannen (1980), as the following causes:
- turning and hitting rock,
- tripping on rock,
- looking at girl,
- meeting with girl,
- collision with girl,
- rushing,
- tipping hat.

Table A5 presents the respondents' answers.

Table A5. Explanations of the cause of fall – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
turn and rock	45.8%	80.0%	61.9%	35.7%	66.6%	16.7%	31.6%	0.0%	47.4%	17.6%	50.0%	63.1%	71.4%
tripping on rock	23.4%	20.0%	33.3%	35.7%	11.1%	33.3%	31.6%	0.0%	26.3%	29.4%	30.0%	21.0%	4.8%
looking at girl	10.7%	0.0%	4.8%	7.1%	11.1%	11.1%	5.3%	41.2%	0.0%	23.5%	15.0%	10.5%	4.8%
meeting with girl	4.7%	0.0%	0.0%	0.0%	0.0%	22.2%	0.0%	0.0%	21.0%	5.9%	0.0%	0.0%	4.8%
Collision	4.7%	0.0%	0.0%	7.1%	0.0%	11.1%	10.5%	0.0%	5.3%	5.9%	5.0%	5.3%	4.8%
Rushing	2.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17.6%	0.0%	5.9%	0.0%	0.0%	4.8%
Hat	8.4%	0.0%	0.0%	14.3%	11.1%	5.6%	21.1%	41.2%	0.0%	11.8%	0.0%	0.0%	4.8%

In total, the descriptions favoured the first cause (turning and hitting rock – 45.8%). Some languages manifested a preference for very few possible causes. For instance, only two causes were identified in texts written in Afrikaans (turning and hitting rock – 80.0% and tripping on rock – 20.0%) and only three causes were identified in Greek texts (looking at girl – 41.2%; rushing – 17.6% and tipping hat – 41.2%).

Figure A3. Explanations of the cause of fall – correspondence plot
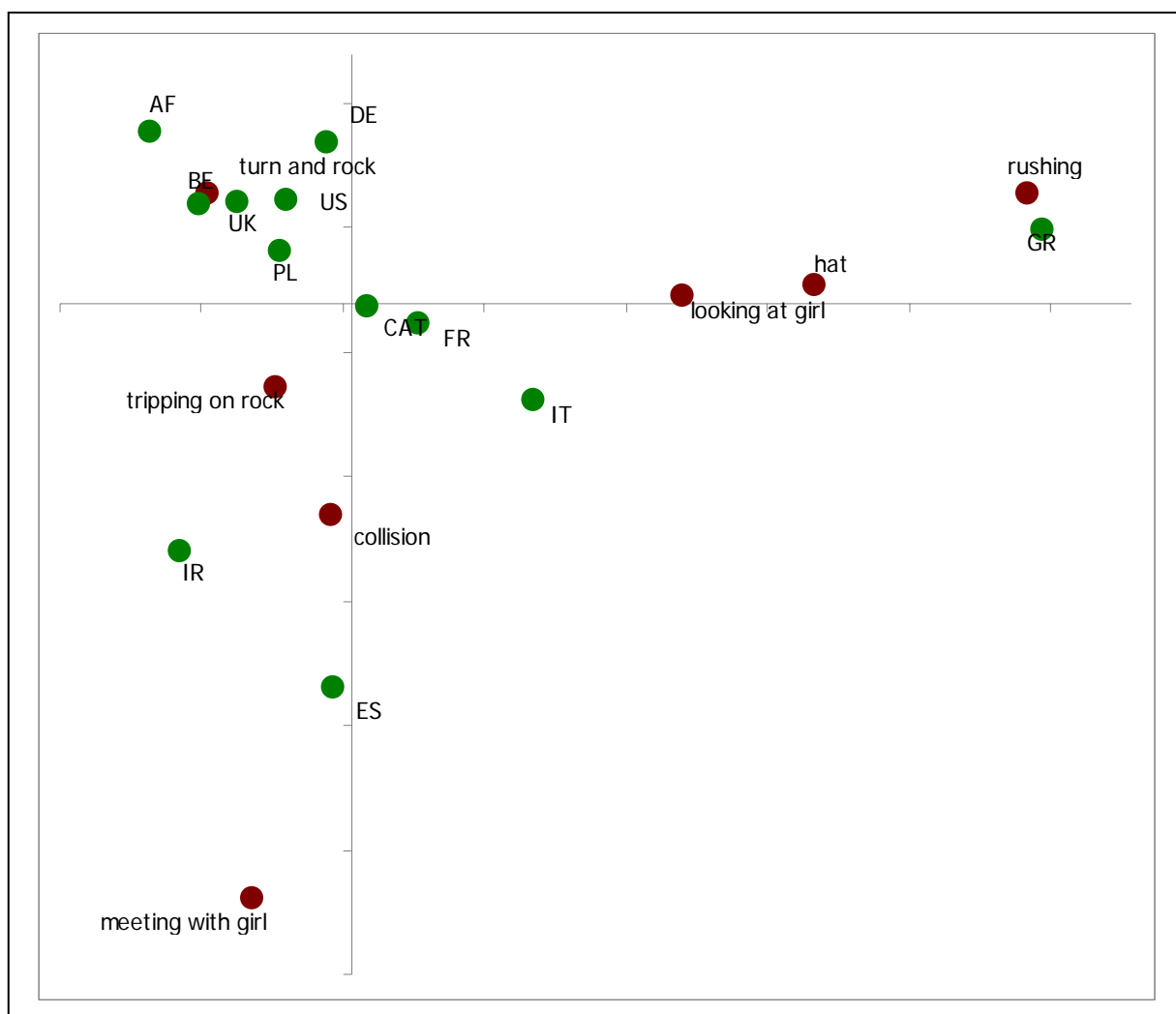
The correspondence plot looks interesting because we have a cluster of languages (UK English, US English, Polish, Dutch, German) near the cause "turning and hitting rock". Italian, Greek, Spanish and Irish data points are more separated and differ the most from the rest.

Due to the huge variation in results and many possible causes, it is difficult to draw any generalisations from the analysis of this aspect of the descriptions.

5.6 Man with the goat

At the very beginning the film depicts a man leading a goat. The man walks past the pear tree but has no influence on the film narrative. Due to time limitations (short breaks between dialogues) audio describers frequently have to choose what to describe and what to omit. Another question is whether events directly unrelated to the sequence of events in a film should be reflected in audio description, hence, this aspect of the analysis in quite interesting and useful in shedding more light on the issue. The Chi Square Test shows no statistically significant difference among languages (p=.77), which means that generalisations across countries are possible based on the obtained data.

Table A6. Man with the goat – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
Mention	42.7%	47.4%	50.0%	44.4%	50.0%	31.0%	44.4%	28.6%	41.2%	38.9%	50.0%	39.4%	39.4%
no mention	57.3%	52.6%	50.0%	55.6%	50.0%	69.0%	55.6%	71.4%	58.8%	61.1%	50.0%	60.6%	60.6%

However, as Table A6 above presents, the respondents are similar in their indecisive answer to this question. The majority (57.3%) of texts does not mention the event but the difference is not convincing enough and further studies are needed.

5.7. Taking pears

This aspect is similar to the one described in section 5.4, i.e. the study seeks to answer the question whether the descriptions mention the event of taking pears by the bicycle boy and if these descriptions are neutral (*basic*) or interpretive (*stealing, moral judgment*). The general results presented in Table A7 show that most texts include a basic description (54.0%) or an interpretation of the event as an act of stealing (42.4%). However, the differences between languages are statistically significant (p<.001 in the Chi Square Test) and a closer scrutiny reveals that the majority of Catalans interpret the event (75.0%) while Germans are much more objective and present a basic description in 83.3% of their texts (similarly to Poles – 90% of basic descriptions). Spaniards, the Irish, Italians and Americans are the only judgmental groups in this context (with 5.0%, 5.0%, 4.0% and 5.0% of texts with moral judgment of the event respectively).

Table A7. Taking pears – data

	TOTAL	AF	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
no mention	1.9%	0.0%	0.0%	0.0%	5.0%	0.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%
basic	54.0%	76.5%	25.0%	83.3%	30.0%	36.8%	60.0%	55.0%	44.0%	90.0%	44.4%	65.0%
stealing	42.2%	23.5%	75.0%	16.7%	60.0%	63.2%	25.0%	40.0%	52.0%	10.0%	55.5%	30.0%
moral jud.	1.9%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	5.0%	4.0%	0.0%	0.0%	5.0%

The correspondence plot in Figure A4 shows that Greek texts differ the most from the rest, while Poles and Germans are most objective.

Figure A4. Taking pears - correspondence plot
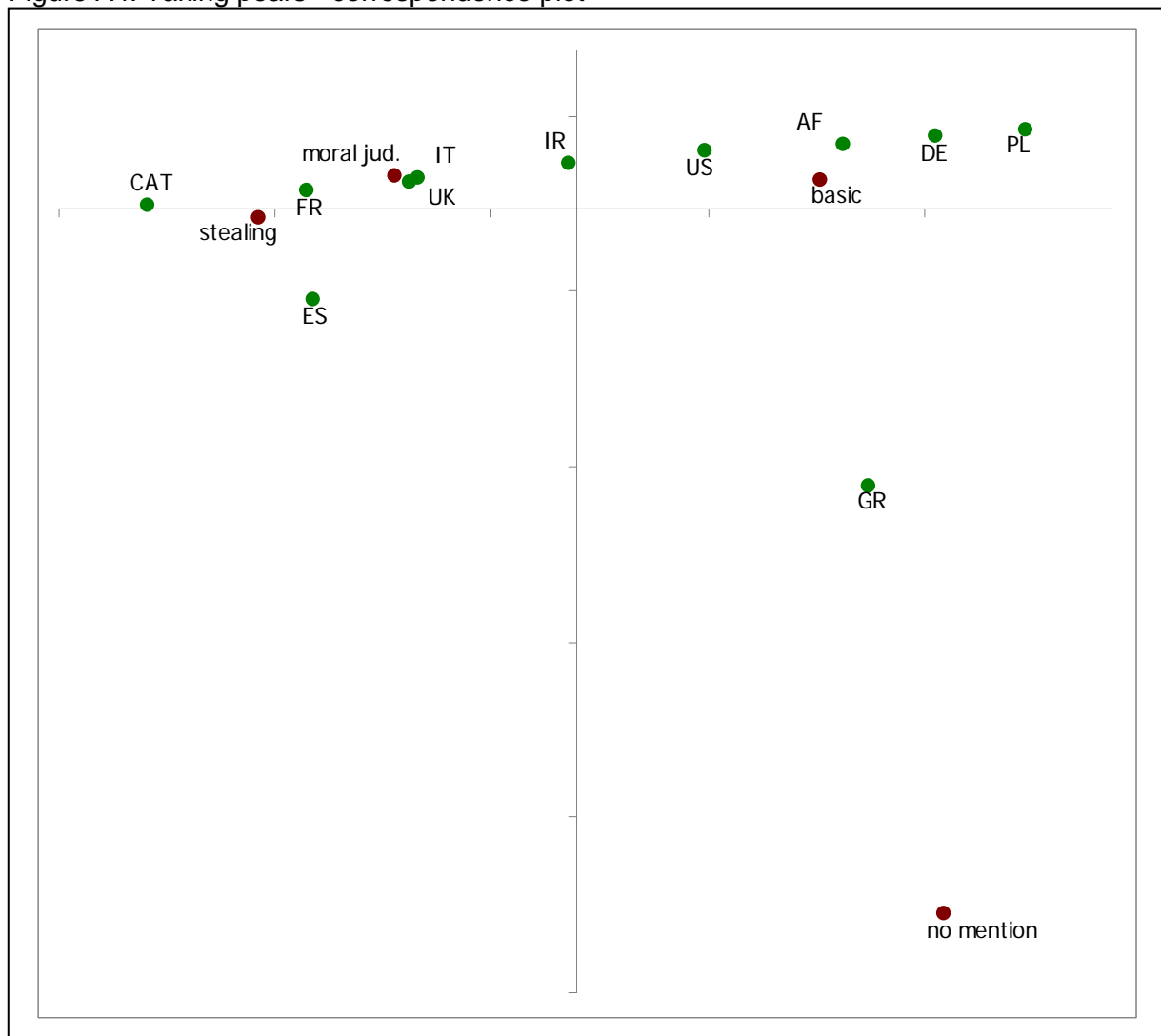
5.8 Pear picker's discovery

This aspect is similar to the previous one and pertains to the interpretation of events and emotions. The description of emotions, just like interpretation of events, is a controversial issue in audio description. The proponents of objectivity claim that blind audiences have the right to determine what emotions the character manifests by themselves. The opponents underline that the human face and mimicry is so complex and ambiguous that it is sometimes very difficult to verbalise a facial expression without explicitly naming it.

In the last scene of the film the pearpicker notices that one basket of pears is missing and immediately afterwards he sees three boys walking by and eating pears. The descriptions in the texts were classified as no mention, basic (when an objective description was given), describing emotions or reaction, interpretive or describing both the pear picker's emotions and reaction.

The Chi Square Test (p=.57) shows no statistically significant differences among languages which justifies generalisations across all groups of respondents. However, as

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in the case of the sixth aspect, the results are not decisive. On average, 35.0% of texts give basic descriptions, while interpretations are presented in 15.0% of them.

Table A8. Pear picker's discovery – data

	TOTAL	AF	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
no mention	8.7%	0.0%	5.0%	10.0%	10.0%	5.3%	20.0%	15.0%	22.2%	0.0%	10.0%	0.0%
Basic	35.0%	36.8%	20.0%	40.0%	35.0%	36.8%	25.0%	50.0%	50.0%	35.0%	30.0%	30.0%
describe emotions or reaction	32.0%	47.4%	40.0%	30.0%	40.0%	42.1%	10.0%	25.0%	11.1%	45.0%	30.0%	30.0%
interpret	15.0%	10.5%	5.0%	10.0%	15.0%	5.3%	35.0%	10.0%	5.6%	15.0%	25.0%	25.0%
emotions and reaction	9.2%	5.3%	30.0%	10.0%	0.0%	10.5%	10.0%	0.0%	11.1%	5.0%	5.0%	15.0%

Table A8 depicts detailed data broken down by languages. There are some differences in the percentage of texts with interpretations of the event. This solution is used by 35.0% of Greeks and by only 5.0% of Catalans. We may conclude that countries do not statistically differ in their indecisiveness when it comes to the description of such an ambiguous event. Once again, more studies are needed in this area.

**5.9 Words used for pear picker**

This aspect of the analysis focused on the words used to denote the pear picker. As Tannen (1980: 69) claimed: "narratives exhibit interpretation not only in their explicit statements about the actions and characters" but also through lexical choice. Like Tannen, we applied the following classification: non-interpretive (e.g. man, guy), particular (e.g. pear picker, protagonist) and interpretive (e.g. farmer, Chicano man).

Table A9. Words used for pearpicker – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
non-interpretive	49.5%	60.0%	50.0%	46.2%	76.9%	30.5%	56.7%	45.0%	72.2%	46.3%	60.5%	53.1%	0.0%
particular	20.9%	5.0%	37.5%	0.0%	23.1%	0.0%	43.3%	0.0%	22.2%	7.3%	34.2%	31.3%	71.4%
interpretive	29.6%	35.0%	12.5%	53.8%	0.0%	69.5%	0.0%	55.0%	5.6%	46.3%	5.3%	15.6%	28.6%

The differences among languages were statistically significant (p<.001 in the Chi Square Test) but the total results in Table A9 seem to suggest that most respondents selected non-interpretive words.

Figure A5. Words used for pearpicker - correspondence plot
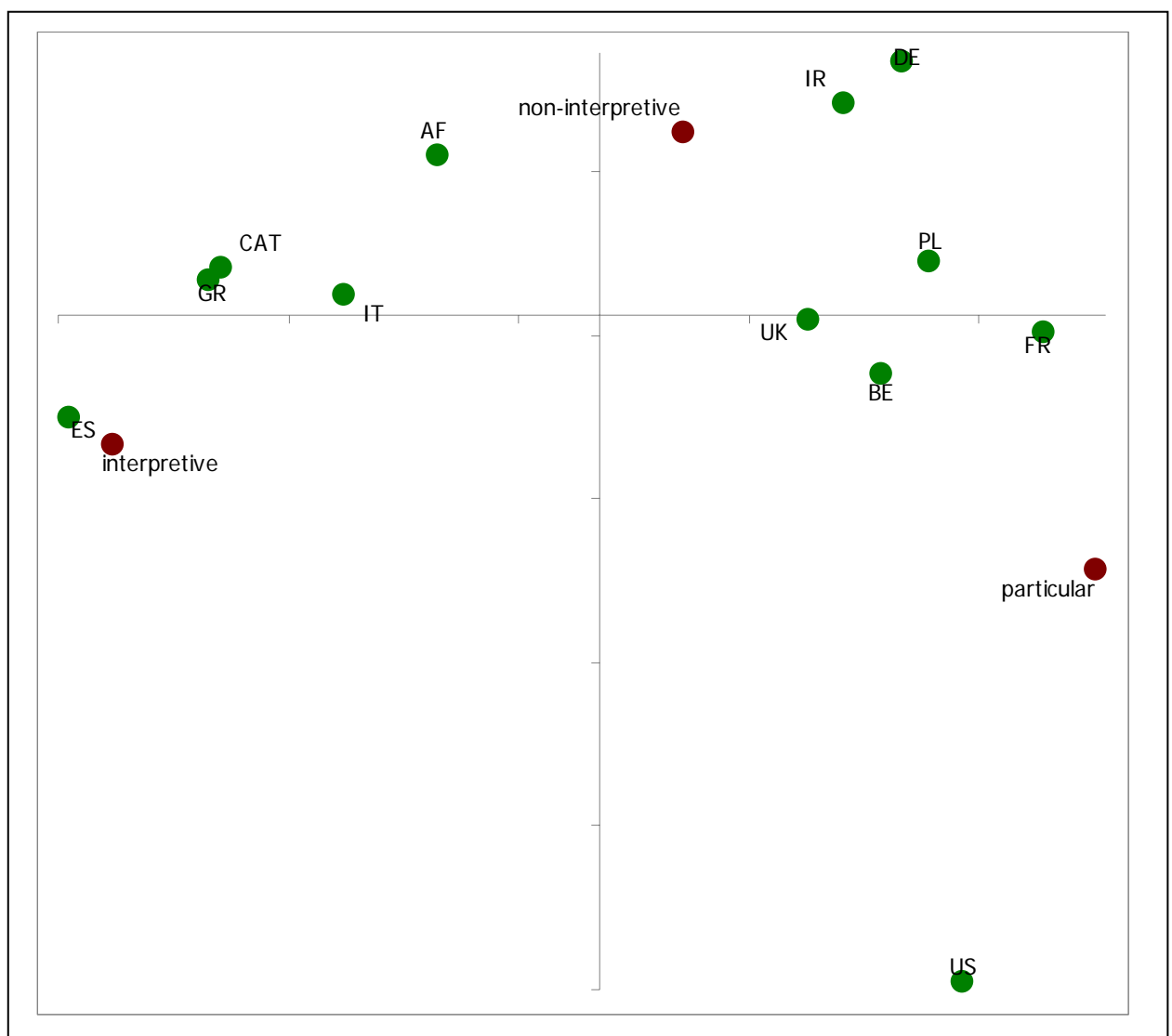
The correspondence plot in Figure 5 shows that Spaniards chose interpretive descriptions most frequently. Polish, British, Belgian and French respondents were rather similar in this respect. Speakers of US English differed the most from the other language groups.

5.10 Objects mentioned in fall scene

This aspect focuses on the objects mentioned in the boy's fall from a bike. The cause of the event is ambiguous, although most respondents attributed the fall to the boy's turning and tripping on rock (see section 5.5). It is interesting to see if the descriptions include additional elements (even if they are not interpreted as having caused the fall) simply because they were visible on the screen. The differences among countries are significant (p<.05 in the Chi Square Test), although the overall results in Table A10 seem to suggest that the respondents included all elements (girl, rock, hat) in their descriptions. This is especially true for Poles (85.0%) and Germans (66.6%).

Table A10. Objects mentioned in fall scene – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK
Fall	5.1%	0.0%	0.0%	5.3%	0.0%	15.8%	0.0%	11.8%	7.7%	10.0%	0.0%	5.0%
Girl	6.5%	0.0%	0.0%	5.3%	0.0%	10.5%	15.0%	0.0%	11.5%	10.0%	0.0%	15.0%
Rock	3.2%	5.0%	0.0%	5.3%	0.0%	5.3%	0.0%	0.0%	7.7%	10.0%	0.0%	0.0%
Hat	0.5%	0.0%	0.0%	0.0%	0.0%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
girl and hat	11.5%	0.0%	16.7%	15.8%	0.0%	15.8%	25.0%	17.6%	11.5%	15.0%	5.0%	0.0%
hat and rock	0.9%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%
girl and rock	19.8%	25.0%	8.3%	10.5%	25.0%	15.8%	0.0%	29.4%	23.1%	25.0%	10.0%	50.0%
girl, rock, hat	52.5%	70.0%	75.0%	57.9%	66.6%	31.6%	60.0%	41.2%	38.5%	30.0%	85.0%	25.0%

Figure A6. Objects mentioned in fall scene - correspondence plot
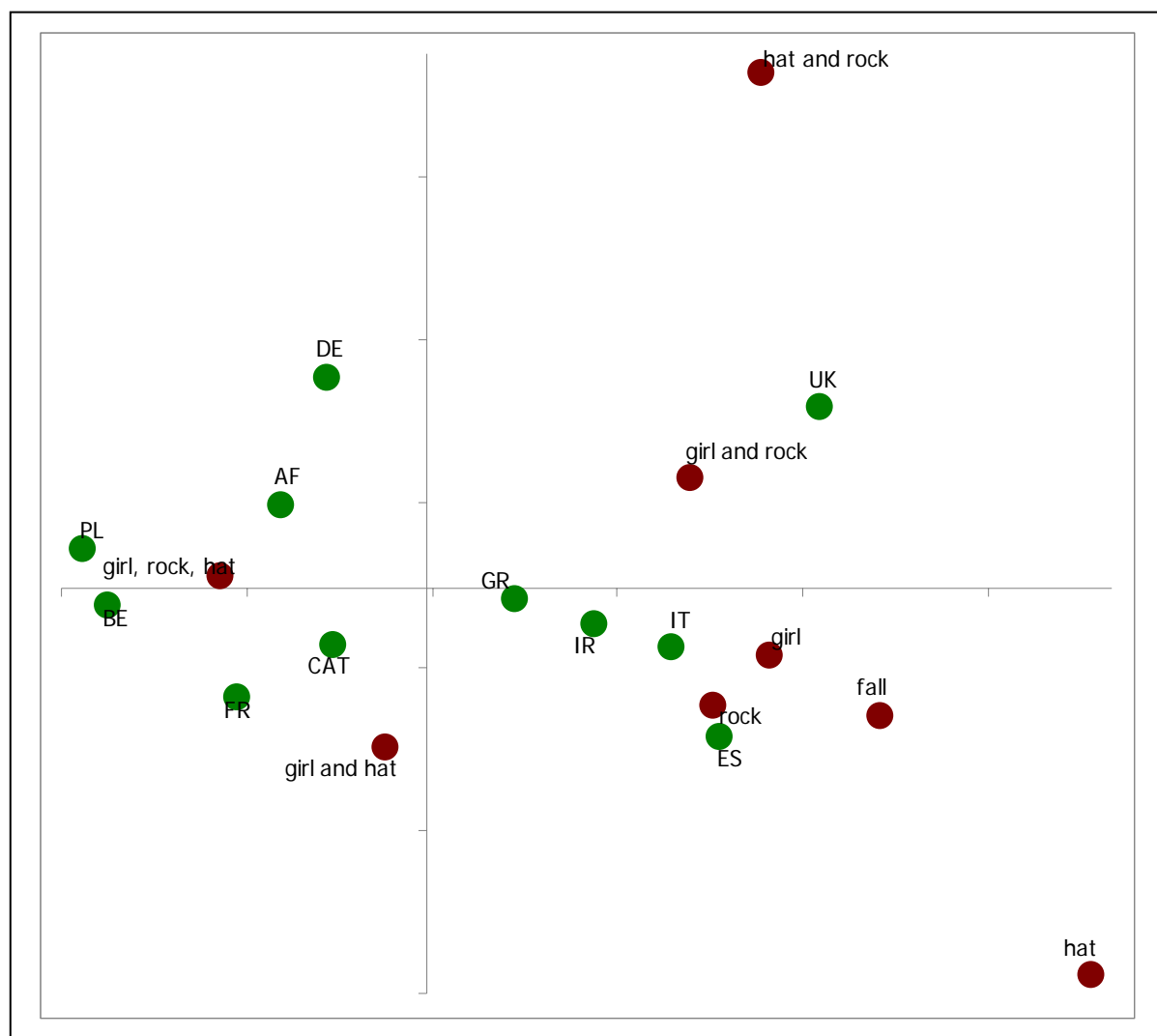
The correspondence plot in Figure A6 proves a great variation in the data across languages so once again, no sufficiently justified generalisations are possible.

5.11 Terms for the threesome

This aspect focuses on stylistic variation. The more terms for the three boys are used in the text, the more stylistically varied they are in this respect. Descriptions in various languages differed (p<.05 in the Chi Square Test) with some depicting huge variations (22 different terms in Italian texts, 18 in Dutch texts and 17 in German texts) and others using many repetitions (only 3 different terms used by Greeks) (Table A11).

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Table A11. Terms for the threesome – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
no. of terms used	138	8	18	10	17	8	7	3	10	22	11	8	16

This may offer some recommendations for audio descriptions in various countries as to whether to use synonyms and avoid repetitions. However, additional studies are needed since the data may be influenced by the respondents' writing and composition skills.

5.12 Reference to the toy

The final aspect of the analysis was to show what to do in audio description with objects that have no specific names in a given language. It turns out that Spaniards, the French and Italians were more willing to omit this detail (possibly because of the lack of a term) in their descriptions than Poles, for instance. Belgians used references to the toy most often and this can be explained by the fact that Dutch is the only language from among the ones present in the study with a simple term denoting the said toy (Table A12).

Table A12. Reference to the toy – data

	TOTAL	AF	BE	CAT	DE	ES	FR	GR	IR	IT	PL	UK	US
no. of references	91	9	22	10	6	1	2	4	5	3	16	6	7

5.13 Results – a summary

Table A13 below presents the results for Chi Square Tests conducted for all of the analysed aspects in the project.

Table A13. Chi Square Test results for all analysed aspects

Aspect	Chi Square Test
Occurrence of film	p<.05
Allusions to film-viewer perspective	p<.001
Verb tenses	p<.001
Giving pears	p<.05
Explanation of the cause of fall	p<.001
Man with the goat	**p=.77**
Taking pears	p<.001
Pear picker's discovery	**p=.057**
Words used for pear picker	p<.001
Objects mentioned in fall scene	p<.05
Terms for the threesome	p<.05
Reference to the toy	p<.001

The obtained p values show that in only 2 out of the 12 analysed aspects (i.e. 'man with goat' and 'pear picker's discovery') the differences across the languages were statistically insignificant, which means that certain generalisations as regards narratives (and thus audio descriptions) in the respective languages can be made for those two aspects.

6 Conclusions

The Pear Tree Project aimed at finding general characteristics of describing film narratives across 12 (including 10 European) languages in order to determine whether it is possible to develop common European AD standards, and whether it is possible to translate AD scripts across languages. The analysis shows that we cannot really generalise about film descriptions in these languages because the analysed texts manifested huge variations. The general assumption was that if there are no statistically significant differences among languages, the results may be interpreted as depicting characteristics common for all of them. However, statistically significant differences were found in 10 out of 12 examined aspects. The results were similar enough to lead to generalizations in references to the man with a goat (aspect 6) and in descriptions about the discovery of the missing pears (aspect 8). Unfortunately, the results of the analysis in these two aspects were inconclusive. The difference between the number of texts mentioning the irrelevant man with a goat and not mentioning him was small, although the majority of texts applied the latter option. When it comes to the pear picker's discovery – 35.0% of texts included basic descriptions and 32.0% described the pear picker's emotions or reaction. No solution was predominant and more research is required in this area.

The differences across languages in the ten remaining aspects are too huge to allow justified generalisations and, additionally, some opposing tendencies, or trends may be observed. For instance, the majority of descriptions did not include the word 'film' or its synonyms but, on the other hand, the majority of texts included allusions to film-viewer perspective. The act of giving pears was interpreted as a gesture of gratitude in 57.0% of texts but the act of taking pears was not interpreted in 54.0% of cases.

In general, variations disclosed in the statistical analysis of correspondence are extensive across languages. Where the texts from specific countries do not differ, the results are equally inconclusive. It appears that these differences are too huge to allow for similar recommendations and guidelines regarding audio description. However, it should be noted that the study under consideration is a reception-based study where a lot of variation exists not only among the languages involved but also among the subjects within the same language, as reception is very individual and depends on the subject's background, personal experiences or world-view. Thus, more research is needed, especially in the form of studies involving eye-tracking methodology, which could yield objective data concerning the perception of visual stimuli. What is more, more reception studies must be done with blind and partially-sighted populations in order to determine their preferences in the respective countries.

Irrespective of the findings obtained in the present study, we could assume that common European guidelines could be developed, provided they take into account linguistic and cultural differences as well as preferences of visually challenged audiences in the countries concerned. Along similar lines, we can assume that translation of AD scripts is possible as long as translated ADs comply with the prevailing norms and preferences in the respective languages. Nonetheless, by all means more AD research is needed both at the European and national level in order to determine such norms and preferences.

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