School of Applied Linguistics

Proceedings of the 3rd Swiss Conference on Barrier-free Communication (BfC 2020)

Winterthur (online), 29 June – 4 July 2020

ZHAW Zurich University of Applied Sciences
Institute of Translation and Interpreting

Swiss Research Centre
Barrier-free Communication

#BfC2020

Zürcher Fachhochschule

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This work is a joint effort of the ZHAW Zurich University of Applied Sciences and the University of Geneva. It is approved by swissuniversities and funded by federal contributions in the framework of the Project "P-16: Proposal and implementation of a Swiss research centre for barrier-free communication" (2017–2020).

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Preface

The 3rd Swiss Conference on Barrier-free Communication was the third and final conference to be held as part of the project entitled "Proposal and implementation of a Swiss research centre for barrier-free communication" (2017–2020). This project, a cooperation between the Institute of Translation and Interpreting of the Zurich University of Applied Sciences (ZHAW) and the Faculty of Translation and Interpreting of the University of Geneva, was funded by the State Secretariat for Education, Research and Innovation, the ZHAW and the University of Geneva, and was supported by the Swiss University Conference.

The main goal of the project was to investigate how access to higher education in Switzerland can be facilitated for students with disabilities. The project aimed to develop sustainable methods and processes to provide as much barrier-free or "low-barrier" access to information and learning materials as possible. The project further explored how people with visual, hearing, or intellectual disabilities, as well as speakers with little knowledge of the local language, can be generally supported to communicate effectively, gain barrier-free access to information and thus live safe and independent lives.

The first edition of the conference was held on 15–16 September 2017 in Winterthur, Switzerland. It set out to offer both a theoretical and an empirical perspective on the state of the art in the field (cf. BfC 2017 Proceedings). One year later, the 2nd Conference on Barrier-free Communication, which took place in Geneva, Switzerland, on 9–10 November 2018, looked further into accessibility in educational settings (cf. BfC 2018 Proceedings).

Building on the 2017 and 2018 events, the 2020 conference provided a wider international forum for over 130 participants from all over Europe, the USA and Australia to debate the most recent progress and future challenges in barrier-free communication. As these proceedings clearly show, the conference was centred on all aspects of the field. Over 80 internationally renowned and early career researchers, academics, practitioners and members of the target groups from 15 different countries shared their latest findings from inclusive research and some of the best practices in audio description (AD), intralingual live subtitling, Easy and Plain Language, web accessibility and Sign Language.

Accessibility in inclusive primary and tertiary **educational settings** is explored in the first section of this volume. *Casalegno* discusses the potential of Easy Language as a tool to support pupils with special educational needs, while *Girard-Groeber, Parpan-Blaser, Lichtenauer and Antener* propose action principles that should guide research and further education in audience-oriented communication. *Hohenstein and Zavgorodnia* close this section by examining the role of Sign Language and complementary hybrid practices in assisting deaf and hard-of-hearing students in higher education settings in Switzerland.

Section 2 concentrates on accessible **healthcare communication**, a very well represented research area at BfC 2020. *Zhao and Lyu* emphasise the crucial role of health communication materials in promoting public health awareness and evaluate the readability and comprehensibility of salt intake and health-related digital news in Australia. Similarly, *Ahrens, Hernández Garrido, Keller, Kröger, Rink and Schulz* introduce current research carried out by the BK-Med group at the University of Hildesheim and focusing on the comprehensibility and acceptability of different medical text types for a variety of target groups. The authors in this section also look at ways to ensure equity of access to primary healthcare for vulnerable populations, including

refugees, migrants and deaf people. *Liu, Ji and Bouillon* draw attention to the increasing need for interlingual communication in medical service settings and point out how the higher cost of human translators has driven the development of machine translation technologies and tools. In this context, both *Bouillon, David, Strasly and Spechbach* and *Norré, Bouillon, Gerlach and Spechbach* present the BabelDr patient response interface — an online speech-enabled fixed-phrase translator specifically designed for medical dialogue — and report findings from two preliminary surveys on user perspective of avatar technology and patient comprehension of Arasaac and Sclera pictographs respectively.

Accessibility in **culture and tourism** is the focus of Section 3. *Gandin* reports that accessible tourism services will be needed by 27% of the European population by 2030. However, as she points out, there is still a significant divide between provision and demand of accessible tourism services in Europe. Against this backdrop, *Gandin* analyses linguistic and structural features that could improve accessibility in tourism, including augmentative and alternative communication (AAC) and Easy and Plain Language. Likewise, *De Appolonia, Rocco and Dattolo* concern themselves with a bottom-up, inclusive approach to art and culture dissemination in both tourism and educational settings, and show how their Talking Map® of the UNESCO site of Aquileia in north-eastern Italy can enable access to, and ease the understanding of, historical and archaeological contents.

The authors in Section 4 look at **audiovisual accessibility for blind and visually impaired people** from several perspectives. *Snyder* provides an insight into the tenets of inclusive design, emphasising that access techniques can be incorporated within the actual development of a film and not just in the post-production stage. *Snyder* claims that, in this way, AD would not be simply an "add-on" but an aesthetic innovation and an organic part of the work that can benefit all people. The section then moves on to two reception studies by *Gzara* and *Karantzi* respectively. *Gzara* deals with ethnicity and race in AD and argues that the very act of describing the ethnicity of a character poses a series of politically charged issues to which there is no straightforward answer. For her part, *Karantzi* introduces her research on AD and audio subtitles of foreign animation films in Greek and explores the integration of touch in the target audience's filmic experience. To close this section, *Schaeffer-Lacroix, Mälzer, Berland and Schulz* identify procedures for semi-automatic translation of AD scripts using corpus-driven data, while *David and Pajonczek* describe a VIDEO TO VOICE all-in-one platform — comprising a text-to-speech AD authoring tool and a virtual recording studio for audio post-production — which facilitates time savings and leads to reduced costs in AD production.

Section 5 is entirely dedicated to linguistic issues in **text simplification**. The first three papers are concerned with *Leichte Sprache* (or Easy German) and claim that (a) findings from information structure research should be taken into full account to determine what is more beneficial for the target groups, that is to say the 'subject-first-recommendation' or, alternatively, a more flexible word order (*Fuchs*); (b) in Easy and Plain German, the colon serves mostly as a means for syntactic simplification, whereas in Standard German it tends to have a pragmatic function (*Jablotschkin and Zinsmeister*); (c) compound segmentation helps to effectively reduce cognitive processing costs for people with low literacy skills and compounds with an interpunct (or *Mediopunkt* in German) are generally processed faster than those with a hyphen (*Deilen*). *Carrer* moves on in this section to place a focus on Easy Italian, an under-researched area which, she argues, deserves greater attention from the academic community. In her paper, she analyses three health-related texts in Easy Italian and measures the impact of translators' strategies on text comprehension by people with intellectual disabilities. Finally, *Stodden* examines noisy user-generated content on social network sites and

gives evidence that text simplification is required to facilitate access to user-generated texts for people with low literacy skills.

Web accessibility is addressed in Section 6 of this volume. *Pontus and Rodríguez Vázquez* present findings from a recent large-scale accessibility study of localised, corporate websites in English, French and German, and identify several language-related accessibility issues for multilingual content that require attention from localisation professionals. Similarly, *Pacati and Rodríguez Vázquez* concentrate on web accessibility conformance and assess the impact that computer-aided translation tools have on the degree of accessibility achieved during the localisation process.

Weber and Weber open Section 7 by offering an overview of the GINKO study, which surveyed how deaf and hard of hearing people in Germany communicate at their workplace. The other five papers in this last section deal with **audiovisual accessibility for the deaf and hard of hearing**. *Mälzer and Rose* consider how linguistic changes and reductions in live subtitles can influence the presentation of politicians in TV debates, while *Wünsche* shifts her focus to a younger target group and discusses whether speed and reductions may have an impact on understanding the content of subtitled TV programmes for children. Further, *Marmit and Hansen-Schirra* recommend that the heterogeneity of the target group of subtitles for the deaf and hard of hearing (SDH) be taken into full consideration and suggest that integrated titles in Easy Language should be provided, especially for the benefit of the prelingually deaf. In addition, an empirical evaluation of speech-to-text interpreting techniques is offered by *Eichmeyer-Hell*, who concludes that respeaking scores higher in both content transfer and formal quality. Finally, *Eugeni, Gerbecks and Bernabé* give an account of the EU-funded project "Live Text Access" (LTA), which aims to create ad-hoc training materials for real-time intralingual subtitlers and promotes the professional recognition of live subtitlers across Europe.

We would like to emphasise that one third of the conference papers were submitted to the student track and that several other presentations drew data from research carried out in the context of a postgraduate final thesis. This looks extremely promising for the future of our discipline and confirms that, in recent years, barrier-free communication has been attracting increasing attention and interest worldwide.

To our knowledge, BfC 2020 was the first international conference to ensure full access for participants with hearing and/or visual disabilities and for sign language users. Due to the Coronavirus outbreak, designing a fully accessible online event required a high degree of commitment and dedication from all organisers and speakers over a very short period of time.

First of all, a virtual conference platform had to be selected. The ideal platform had to provide the highest levels of accessibility and usability for all target groups and, at the same time, guarantee the greatest possible data security. In the selection process, the organising committee greatly benefited from the inputs of Dr Steffen Puhl, co-editor of these proceedings.

A further important issue concerned whether conference presentations should occur in real-time or be pre-recorded as asynchronous videos. Our decision to opt for the latter proved successful for three reasons. First, real-time presentations would have not accommodated conference participants in different time zones. Second, video recordings were progressively released online over the first three days of the conference, allowing us not only to simulate an in-person conference schedule, but also to provide participants with the opportunity to watch or listen to individual presentations (or sequences) multiple times over the conference week. Based on the participants' feedback we received, this approach can be deemed successful. In fact, more recent

accessibility-related events, such as ICCHP 2020 and ARSAD 2021, were based on a similar conference format. Finally, the asynchronous mode allowed us to ensure high-quality closed captioning and sign language interpretation services ahead of the conference. Captionists and sign language interpreters had the possibility to prepare themselves, which seems particularly relevant in the context of a specialist conference where novel concepts and terminology are presented.

Nonetheless, it should be emphasised that conference budgeting may often limit the extent to which accessible communication can actually be implemented. At BfC 2020, for instance, we were able to provide interpretation into International Sign only. In future international conferences, at least one more target sign language should be considered to accommodate the needs of a larger number of sign language users.

For the benefit of participants with visual disabilities, video recordings, PowerPoint presentation slides and further conference materials were also made available on the ZHAW Moodle learning platform. Documents included alternative texts for all images and graphics, and additional measures were taken for data protection. This initiative was generally appreciated by participants from the target group. One of them commented as follows: "I was very satisfied, the presenters made an effort to describe what was on their PowerPoint slides and the idea of making all documents and presentations available on Moodle was great. The Moodle platform was very clear, and the individual presentations were easy to find" (editors' translation).

The organisation of a barrier-free in-person conference poses several challenges for which a comprehensive frame of recommendations already exists (see, for instance, the Stuttgart Media University guidelines, available in German only). The barrier-free (or low-barrier) design of a virtual conference raises the bar even higher and presents new, complex challenges. Our experience suggests that these can only be met through the inclusion of, and collaboration with, the target groups.

Based on participants' feedback, it is our belief that BfC 2020 has contributed significantly to making fully accessible online conferences a reality. We would like to thank our keynote speakers, Dr Steffen Puhl and Prof. Christine Meng Ji, for their support in making BfC 2020 the great success it was. We are also very grateful to the Scientific Review Board and to all the panelists for believing in our event and for sharing their insights and experience. Finally, our special thanks go to the conference participants for their valuable contributions, and to our sponsors and exhibitors for their excellent cooperation and generous support.

Susanne J. Jekat, Steffen Puhl, Luisa Carrer and Alexa Lintner
April 2021

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Elisa Casalegno

The potential of Easy-to-Read in the inclusive classroom: Teachers' perspectives

Research track

Abstract

Successful lower education is crucial for the well-being of people with disabilities and for their access to higher education. This paper presents the result of a preliminary study that investigates the practices of inclusive education in the canton of Vaud and explores the opinions of special education teachers on the use of Easy-to-Read (EtR) material in the inclusive classroom. The collected data paint a positive picture of EtR's potential as a tool to support students with Special educational needs (SEN).

1 Credits

The survey described in this paper was carried out within the framework of a project in collaboration with the Association *Handi-Capable*. It was supervised by Prof. Pierrette Bouillon and Dr Silvia Rodríguez Vázquez, as well as the project committee.

2 Introduction

Research indicate that inclusive lower education is a crucial predictor for both obtaining a qualification and accessing higher education (Baer et al. 2011; Myklebust 2006; Schifter 2016). Although segregation and inclusion still coexist in the Swiss Special education system, with various differences between cantons (Ramel et al. 2016), a political commitment towards more inclusion has emerged over the past few years in the Canton of Vaud. The cantonal Law on Compulsory Education (LEO), which prescribes that "teachers use different teaching methods to make their teaching accessible to all of their students" and that "integrative settings are preferred to segregated settings" (Canton of Vaud 2011, Art. 98, my translation), underpins this change of direction. In the framework of this development, learning methods that enable students with Special educational needs (SEN) to be taught alongside their peers in mainstream schools are extremely valuable.

Research on Easy-to-Read (EtR) and language simplification has gained more attention in recent years, and several guidelines on the production of EtR content have been published (Inclusion Europe 2009; Nomura et al. 2010). Since its potential has been demonstrated for various target groups (Inclusion Europe 2009; Nomura et al. 2010), we would like to investigate whether such guidelines can be applied to the learning material of students with SEN. Although most studies on EtR have focused on enhancing participation in society for adults with impairments or low literacy (Sutherland and Isherwood 2016), there are some examples of graded lexicons for educational purposes (Gala et al. 2015; Lété et al. 2004). Empirical evidence on the implementation of lexical simplification in learning material for children with SEN, however, is scarce.

3   The survey

The goal of the survey was twofold: (1) to collect data on current practices to support students with SEN in inclusive classes, and (2) to explore the special education teachers' opinion on the potential of EtR material in the classroom. Its content validity was checked by the project committee and by a special education teacher.

The survey was distributed among special education teachers through the Cantonal school for deaf children (ECES), which is responsible for assigning teachers to students with severe SEN who are included in mainstream schools in the Canton of Vaud.

3.1   Questions

Respondents were asked their demographics, their highest qualification, their teaching experience and how many students they had taught during the school year 2018/2019. The survey was then divided into two sections. In the first section, teachers were asked to provide information about each student they had been following, such as their age, sex, type(s) of disability, whether their needs had been formally assessed through a Standardised assessment procedure (PES) and the kind of support, tools and adaptations they had been given. In the second section, teachers were asked whether they knew what EtR was and whether they had used it in their teaching. If they claimed they did, they were asked to briefly explain what they meant by EtR and how they had used it. If, on the other hand, they claimed they had never used it, they were briefly explained what EtR is and were asked whether they thought it would be useful in their teaching and why. Finally, an open question gave them the opportunity to voice their opinion on any matter related to the survey.

4   Findings

4.1   Respondents' profiles

Although the survey was opened 36 times, only 21 answers were considered valid because they contained more than just demographic information. However, two of them were incomplete and were only included in some of the analysis. Out of 21 respondents, 90% (N=19) were female, 81% (N=17) had Swiss nationality, 48% (N=10) were above the age of 45, 52% (N=11) had more than 10 years' experience in Special education. The most common higher education title was MA in Special Education (71%, N=15) and 62% (N=13) taught 4 or less students.

4.2   Students with SEN

In section one, we collected data on 83 students with SEN who were enrolled in compulsory education (years 1–11). 92% (N=76) of them attended primary school (as per the Swiss education system) and 69% (N=57) were male. Teachers were free to indicate more than one disability or disorder per student and categories were not mutually exclusive. Table 1 illustrates the respondents' answers by frequency: the most frequent one was dyslexia and related disorders (21%, N=27), followed by speech disorders (20%, N=26) and learning disabilities (17%, N=22). 12% (N=15) of the students were reported to have behaviour disorders and 9% (N=12%) to have autism spectrum disorder (ASD). Other impairments included motor impairment, intellectual disability, sensory impairment and cerebral palsy.

Impairment	N	%
Dyslexia and related disorders	27	21
Speech disorders	26	20
Learning disabilities	22	17
Behaviour disorders	15	12
Autism spectrum disorder	12	9
Other impairments	7	6
Motor impairment	6	5
Intellectual disability	5	4
Sensory impairment	4	3
Cerebral palsy	3	2
Total	127	100

Table 1. SEN students' disorders reported by respondents

According to the respondents, only 31% (N=26) of the students had their needs assessed through a PES, while 57% (N=47) had not (12%, N=10, did not know). Regarding the special measures taken to support students with SEN, pedagogical reinforcement (*renfort pédagogique*) appeared to be the most frequent one (53%, N=70), followed by integration support (*aide à l'intégration*) (32%, N=43). Other measures included specialised pedagogical support (*support pédagogique spécialisé*), development classes (*classe de développement*), official classes for special education (*classe officielle d'enseignement spécialisé*), speech therapy and psychomotricity. Another question in the survey investigated the accommodations offered to the students: 60% of these adaptations applied directly to tests and exams (extra time, extra resources or different settings). Other adaptations included extra breaks, extra tools, help by a third party and typing instead of handwriting. Teachers were also asked whether their students' curricula had been adapted (Table 2). According to their responses, 54% (N=45) of the students did not follow an adapted curriculum. The remaining 46% (N=38) had an adapted curriculum in one or more subjects. French (15%), Maths (11%) and German (10%) were the most frequently adapted subjects, followed by English, History, Science, Geography and Arts. 4% (N=3) of the students had an adapted curriculum for all the subjects.

Curriculum adaptation	N
No adaptation	45
French	14
Maths	11
German	10
English	3
All subjects	3
French (speaking only)	2
History	2
Environment	2
Arts	1
Singing/poetry	1
Sciences	1
Geography	1
Total	96

Table 2. SEN students' curriculum adaptations reported by respondents

Finally, 58% (N=48) of the students were not allowed to use any extra tools, while 42% (N=35) had one or more tools. The most frequently used tools were tablets (21%, N=20) and laptops (18%, N=17), followed by software, speech synthesiser, eye tracking, and scanning pen.

4.3   The potential of Easy-to-Read

In the second section of the survey, 35% (N=7) of the teachers stated they had never heard of EtR (*Facile à lire et à comprendre* or *FALC* in French), 45% (N=9) said they knew of it, but did not know what it was, 15% (N=3) reported that they knew what it was, but they had never used it in their teaching, and 5% (N=1) said they had used it (Table 3).

Have you heard about Easy-to-Read?		N	%
No, never		7	35
Yes, but I do not know what that is		9	45
Yes, I know what that is but I have never used it		3	15
Yes, I know what that is and I have used it		1	5
	Total	20	100

Table 3. Respondents' knowledge of Easy-to-Read

The only teacher who reported using EtR material in their teaching was later contacted to find out more about her experience. She first learned about EtR in a workshop during her Master's in special education at the University of Lausanne and then applied it to a Maths problem for a student with dyspraxia. The teachers who had never used EtR were briefly explained what it is and then were asked whether they thought it could enhance comprehension and learning for students with SEN. As shown in Table 4, 79% (N=15) strongly agreed, 16% (N=3) agreed and 5% (N=1) disagreed.

Do you think Easy-to-Read material could enhance comprehension and learning in students with SEN?		N	%
Strongly disagree		0	0
Disagree		1	5
Agree		3	16
Strongly agree		15	79
	Total	19	100

Table 4. Respondents' opinion on the potential usefulness of Easy-to-Read learning materials for students with SEN

The respondents who agreed or strongly agreed (95%, N=18) were then asked to explain in what situations they thought EtR could be useful for students with SEN. Since it was an open question, some teachers mentioned categories of students for whom it could be useful, such as the ones with dyslexia and related disorders, attention deficit hyperactivity disorder (ADHD), intellectual disability, autism spectrum disorder (ASD) or speech disorder. Some teachers, on the other hand, focused on the type of material that could be simplified, such as texts, instructions or exercises. Several teachers observed that EtR learning material could benefit the whole class, and not just students with an official decision of SEN.

5   Discussion

The survey collected data on a large number of students with SEN in the Canton of Vaud, as well as the opinion of several special education teachers concerning the potential of EtR learning material for children with SEN.

In order to plan the next phase of the study, i.e. an empirical validation of EtR learning materials for children with SEN, some findings are particularly relevant. Firstly, the reaction of the special education teachers to EtR material was positive. This is encouraging because a test in a real-life scenario would require the collaboration of the teaching staff. Secondly, a large number of students are following an adapted curriculum. They constitute a good pool of candidates who could benefit from the simplification of learning materials. Finally, the input of some teachers regarding the potential for EtR material for the whole class (as opposed to only students with SEN) needs careful consideration.

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Simone Girard-Groeber, Anne Parpan-Blaser, Annette Lichtenauer & Gabriela Antener

Action principles for providing services and further education in Easy Language

Professional track

Abstract

This paper deals with the potential and limitations of Easy Language, and proposes action principles that should guide Easy Language projects in which texts are created and translated, and services and further education courses are provided. These action principles are derived from the results of the pioneering project "Easy-language texts in adult protection procedures" (2015–2018) and related work by the same project team in the areas of further education and services.

1   Introduction

Easy Language has been the focus of a growing number of studies in different disciplines in the past five years. As is the case for barrier-free communication in general, according to Maaß and Rink (2019), there is a pressing need for texts in Easy Language, but the quality of offers is very uneven, due to a lack of professionalisation and, often, a lack of resources.

As members of a university of applied sciences, we operate at the interface between science and practice. Besides our research and teaching activities, and further education classes for practitioners, we also provide services for institutions and organisations, for example developing products in cooperation with the latter and then accompanying or studying their use in practice. The "Easy-language texts in adult protection procedures" project, which ran from 2015 to 2018 at the School for Social Work at the University for Applied Sciences and Arts Northwestern Switzerland (FHNW), was such an undertaking. It pioneered a growing interest and expertise in audience-oriented communication among social work professionals and scholars. In this article, we report on the findings from that project, and how these are informing further text development and implementation, as well as service provision and further education offers.

2   About the initial project

"Easy-language texts in adult protection procedures" was a collaboration between the School of Social Work Olten (FHNW) and a local Child and Adult Protection Authority (*Kindes- und Erwachsenenschutzbehörde*). The long-term aim of the project was to improve participation among the authority's clients, especially those who, due to reading difficulties, are liable not to understand written texts and can thus end up excluded from various processes that affect them (cf. communication-vulnerable groups according to Blackstone and Pressman, 2016). The project consisted in providing Easy Language (EL) texts, and developing and evaluating procedures for the provision of EL services. It had three main parts:

a) *Text production and implementation.* The team first translated existing templates of letters from the Child and Adult Protection Authority (CAPA) to their clients into Easy Language. Given the amount of background information that should have been included into the letters, thereby making them unreasonably long, the team decided, in consultation with the CAPA, to produce a new brochure, which contains information about adult protection laws and procedures. These texts were produced in close cooperation with the Authority and, after staff training, they were integrated into its professional practice. CAPA employees used the EL letter templates and brochure especially when clients were older than 65, or presented signs of learning disability, dementia or other cognitive impairment.

b) *Qualitative study.* A qualitative research study consisted of guided interviews with six recipients (i.e. clients, close relatives) of the letters and brochure and nine professionals (i.e. CAPA employees, people involved in the assessment of clients' support needs and deputies, the latter being persons who are given the mandate to assist or represent an individual in certain areas). The discussions focused on clients' perceptions of the Easy Language documents (comprehensibility, clarity, layout, etc.), and their perceived impact on participation in specific procedures and general cooperation between the parties. The data was transcribed and analysed according to grounded theory methodology (Strauss and Corbin 1996). Such a qualitative approach was appropriate for the exploratory nature of the project because it allowed investigation of certain assumptions that the CAPA staff and the research team made, but was also open to phenomena hitherto unknown in the field.

c) *Evaluation.* The entire project was evaluated. The aim was to determine the advantages and drawbacks of the translation and text-production processes, as well as the requirements for a successful project. The formative evaluation was based on the field notes made by team members during the research; the summative evaluation was based on interviews with reviewers, moderators of review sessions and CAPA staff). The partial results of the formative evaluation enabled adaptations of our ongoing processes, including those for producing texts in Easy Language (Parpan-Blaser et al. 2019).

3   Accessibility through Easy Language texts — Insights from the project

The purpose of providing texts in Easy Language is to enhance people's access to information and processes that concern them, and thereby increase their potential for participation (cf., inter alia, Bock 2015). To qualify as "accessible", a text or other service must fulfil certain criteria. Maaß and Rink (2019, 24), for example, propose a "process of accessibility" that describes five criteria. An accessible text must be:

1) Retrievable: can the addressee find the text?

2) Perceptible: can the addressee perceive the text?

3) Comprehensible: can the addressee understand the text?

4) Linkable/retainable: can the addressee integrate and retain the content?

5) Action-oriented: can the addressee act in consequence of having heard/read a text?

Both the qualitative study and the evaluation provided information about the potential of EL documents according to these criteria. What could the documents achieve in terms of accessibility and reduction of language barriers?

3.1 Strengths of Easy Language texts

Easy Language makes an important contribution to the perceptibility (Göpferich 2008) and comprehensibility of texts. Most obviously, the larger font size makes them easier to read, which older clients, in particular, appreciate. In addition, the layout (i.e. design structure, colour, lists, summaries, and the like) enhance perceptibility of a text's information (cf. Alexander 2019) and is experienced as helpful by clients and professionals. Today, the information brochure is accessible in a graphically improved version (Lange et al. 2019), and online as a barrier-free PDF, viewable via screen readers for people with visual impairment (Hochschule für Soziale Arbeit 2019a,b).

Putting information about adult protection law and procedures in a brochure makes it easier to retain. This brochure is the first printed information in Easy Language in the sector that is accessible to those affected and their relatives, independently of direct communication with people at the CAPA. Deputies involved reported that they used the information brochure in discussions with their clients, that it improved client understanding of their tasks and gave the clients a memo about the matters discussed, possibly along with notes of the conversation. This use of EL texts accords with the aim of Easy Language, namely that people with low reading skills should not have to rely exclusively on volatile oral information. As adult protection procedures still rely heavily on oral transmission of information, this increased retainability is an important and new aspect of accessibility.

Regarding action orientation, the interviews showed that service users felt empowered to actively prove or assert their potential to participate. One of the interviewees, for example, demanded to see her case file after having read the brochure.

3.2 What barriers remain?

Two aspects of accessibility proved particularly challenging for the project team: retrievability of information, and action orientation. How the EL texts were used was entirely decided by the local authority. Employees were not advised to systematically send out the Easy Language letters and brochure; they chose to do so, or not, on the basis of their own assessments of clients' needs. Thus, clients had no way of retrieving the information by themselves. Retrievability has since been enhanced through the online accessibility of the brochure.

Action orientation represents the ultimate goal of an accessible offer (cf. Section 3). A text can be retrievable, perceivable, understandable and retainable, but in the end it may not be useful. For example, its purpose may not be sufficiently clear, and the addressee may not know what to do with it (cf. Bock 2015). As mentioned, during our research, the action-enabling potential of the documents could be observed to the extent that individual clients became active as a result of reading them. In other cases, however, and since the documents' primary function was informative, which per se does not require any follow-up action, it was difficult to verify the extent to which the documents were useful.

Finally, the data revealed that client attitudes to the CAPA constitute a major obstacle to their using a communication service at all, no matter how accessible that service might be. Where this is the case, the potential gains of EL cannot be realised, even when the five criteria of accessibility are met. This shows that aspects of the communication situation itself – in particular, the relationship between sender and recipient – can build barriers (Lutz 2017).

4 Current action principles

Currently, our activities in research and development, services and further education are guided by a number of action principles, derived from the project under discussion, as well as sub-sequent work on text development. The action principles respond precisely to the problems that we observed (cf. Section 3.2). They thus go beyond the core processes of writing, translating and designing. The action principles are spelled out in a range of recommendations that address the following matters:

- the framework conditions for the text creation process (e.g. a written agreement between all parties involved, integrating coordination tasks into the project plan, clarifying terms of use);

- procedures and cooperation (e.g. ensuring a balance in the team between Easy Language proficiency and technical expertise);

- text implementation (e.g. informing service customers in detail about the use of the texts).

While the detailed recommendations can be requested from anne.parpan@fhnw.ch (currently only available in German), we present here a selection of the action principles.

4.1 Customer involvement

A key principle for us is that we create Easy Language documents only within projects in which the sender or user of the texts (i.e. our customer) is involved as a partner, and as early as possible, in the process of text creation. In this way, senders/users of EL texts not only "own" these texts, but they can also gain a more general understanding of accessibility and participation. Concretely, this is reflected in a purposeful use of the texts. In sum, involving our customers in the process prevents the risk of EL texts being used merely to pay lip service to the idea of accessibility.

For example, for the development of a brochure on child protection for the Zurich, Berne and Solothurn cantons, we created a service contract that included establishing a working group with canton representatives, whose task was to prepare the source text. We encountered difficulties with the scope of the brochure because the institutional perspective of the CAPA differs from the information needs of their clients. However, the procedure had a positive influence on aspects beyond the text, as the canton representatives not only accepted the final product, but even identified with it. Moreover, we gained partners in these authorities, who were also interested in the careful implementation of the brochure into practice.

4.2 Promoting Easy Language as but one element of barrier-free communication

Another key principle is that Easy Language should always be used within a broader, comprehensive framework of barrier-free and audience-oriented communication. That is, when we provide services to our customers such as an CAPA, we aim to prevent them from simply adopting existing EL texts. For EL's full potential to be realised, it is crucial that customers and participants in further training courses engage in a general reflection on participation and accessibility, and that they reconsider some of their attitudes to communicating with certain client groups. We believe that only through a general understanding of accessibility and a commitment to it can client and addressee participation grow. Only with an awareness that EL texts cannot remove all barriers (and that, e.g., spoken communication, too, must be adapted) can addressees' needs be better met.

In practice, this principle is anchored, for example, in an agreement on the use of existing brochures about adult and child protection procedures. The agreement states that these should only be used if accompanied by a short introduction by the School for Social Work that informs participants about the background and goals of barrier-free communication.

4.3 Involving addressees

Given the key objective of increased participation, it is essential to think about the role of the addressees and to ensure that they are involved as soon as possible in the process. Easy Language is not only an instrument of barrier-free communication, but also a means of building competences (Antener et al. 2018). Another of our principles then is that addressees of a text or another service should be involved in its production from the earliest stages. From our perspective, this sensitises future senders of EL texts (e.g. our service customers or participants in a further education course) to the needs of the people for whom they are intended. Involving representatives of the target group means that those who can benefit from audience-oriented communication are given a face. Thus, the competencies of the target group representatives, and their views of what they need (i.e. what information, which language level, which visualisations, etc.) are recognised. In turn, being involved in the various processes gives target group representatives the opportunity to expand their skills, which can have an empowering effect (Antener et al. 2018). Finally, involving the intended audience in these ways increases the likelihood that the customer's product, i.e. the text, will be genuinely tailored to the client group. In line with this principle, the texts developed in our project were checked by representatives of the target group. Current practice is that a text is checked in a group session by an experienced moderator who checks for individual understanding (see Bergelt 2018 on text-checking practices). Also, in EL further education courses, people with learning disabilities are invited to review texts and provide feedback on the understandability of texts created during the seminars.

We pointed out above that EL texts do not automatically meet all criteria of accessibility. Text production and adaptation must involve discussions of the communicative situation as a whole, and improve accessibility beyond the perceptibility and comprehensibility elements. Relevant questions to be asked are: What is the communicative function of a text? What is the text asking the reader to accomplish? Who is being addressed and in what situation might the communication offer be used? What attitudes do sender and recipient have to each other? Can intermediaries be involved in the use of the text in appropriate ways? These are mainly extra-textual issues that are not strictly addressed by the recommendations or rules of Easy Language, but they play a significant role in the larger process of text creation (see Göpferich 2008; Lutz 2017) and thus influence the quality of the final product and its use in practice.

5 Concluding remarks

Our remarks on this selection of action principles that frame current EL activities at the School of Social Work show that we consider it crucial that all relevant actors be involved in the development of services and products. This demands significant investment in coordination and therefore resources, but the impact of awareness raising and capacity building of both practitioners and representatives of the target group is crucial, especially for the mission of social work. The full potential for Easy Language to contribute to barrier-free communication can only be achieved when it is considered in the broader context of participation and inclusion of all people in all sectors of society. Each service

provision, project collaboration or further education course is thus an opportunity to further promote the topic of Easy Language.

Acknowledgements

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Christiane Hohenstein & Larysa Zavgorodnia

The role of Sign Language in tertiary education

Research track

Abstract

This paper is concerned with the functions of sign language (SL) and complementary supportive measures at university level. It aims at providing insights into inclusive teaching and learning environments at tertiary level by exploring how deaf and hard-of-hearing/hearing-impaired (DHH) students experience their learning conditions and teaching environments in Swiss Higher Education. A focus is on data drawn from in-depth interviews with current and former DHH students in the German-speaking part of Switzerland, building on results from a Swiss-wide survey conducted in 2018 (Hohenstein and Zavgorodnia 2019; Hohenstein et al. 2018; Rodríguez et al. 2018).

1 Credits

This paper is based on the BfC 2020 conference presentation by Christiane Hohenstein and Larysa Zavgorodnia. Adrienne Geiser has contributed invaluable support to the project in carrying out the interviews in Swiss-German Sign Language (DSGS), as well as in helping transcribe and analyse the data. This study is indebted to her and all the deaf scholars, deaf and hearing-impaired students and experts who took part in the survey and who were willing to give in-depth interviews. To all of them, the authors wish to express their deep gratitude. Any remaining errors are the sole responsibility of the authors.

2 Introduction

In Switzerland, students who are deaf, hard of hearing or hearing impaired (hereafter, DHH students) are still met with barriers when accessing and pursuing higher education at tertiary level, e.g. at universities. Impediments encountered start in primary school and continue up to tertiary education (cf. Hohenstein et al. 2018; Rodriguez et al. 2018).

According to studies reporting the situation in anglophone countries (i.e. US, UK, Australia and New Zealand, cf. Powell et al. 2014; Napier and Leeson 2016), the perception of academic subject materials and lectures pose specific challenges for DHH students. A shortage of qualified interpreters who can provide interpreting at an academic level contributes to that situation. Against this backdrop, our questions are, (a) what are the actual uses and functions of sign language/s at university level, and (b) which communicative support is needed and can be provided in addition to sign language/s? Furthermore, (c) to what extent are specific technologies and digital tools in use and useful? Our research is focused on Swiss DHH students, taking into account the situation of SL (non-)acknowledgement.

2.1 Data

Our study is based on quantitative and qualitative data from (1) a Swiss-wide survey conducted in 2018 which was aimed primarily at revealing barriers or roadblocks that DHH persons encounter in their educational course up to tertiary level (N=92;

Hohenstein et al. 2018; Rodríguez et al. 2018); and (2) subsequent interviews with deaf and hearing-impaired persons who experience(d) tertiary education at university level. In-depth-interviews with current and former DHH students were conducted in Swiss German Sign Language and partly in spoken language (Hohenstein and Zavgorodnia 2019a,b).

2.1.1 Interview design

Survey respondents who had indicated their willingness to participate in an interview were contacted. Until September 2019, interviews with six female DHH respondents aged 26 (1 person), 32 (2 persons), 35 (1 person), 38 (1 person) and 65 (1 person) were carried out.

All six female interviewees in our study passed successfully through the Swiss education system into tertiary level. Three completed BA studies, although one does not hold a BA degree because a mandatory internship was not possible; one was finishing her MA degree work when interviewed; one interviewee gained a university degree equivalent to a master's degree before the Bologna reform. One person was in the middle of her BA studies and one was about to complete her BA studies.

Four interviewees identified themselves as deaf and two as hard of hearing. Three persons are cochlear implant (CI) users, one of them uses a hearing aid and CI; one person uses a hearing aid and had used a CI for a short time. Two deaf persons do not use any hearing aids.

Additional interviews with seven male interviewees aged 38 (1 person), 39 (1 person), 47 (2 persons), 50 (1 person), 52 (1 person), and 71 (1 person) were carried out in 2020. All seven male interviewees in our study passed successfully through the Swiss education system into tertiary level. Two completed BA studies, five persons gained an Advanced Federal Diploma of Higher Education.

Six interviewees identified themselves as deaf and one as hard of hearing. Two persons are CI users, one of them uses a hearing aid and CI; one person had used a hearing aid for several years. Four deaf persons do not use any hearing aids.

Interviews were conducted in the language requested by each interviewee, that is, either in Swiss German Sign Language (DSGS) or in spoken Standard German. Nine interviewees who explicitly identified themselves as "deaf" preferred sign language (SL). Four interviewees preferred to use spoken language in the interviews, but used hybrid forms of signed and spoken language as well.

All interviews were conducted using a semi-standardized approach with open questions eliciting narrative responses. The questions targeted language acquisition, preferred modes of communication, school and university education, learning strategies developed, opinions regarding good practices in education and barriers experienced in learning environments. The interviews lasted between 44 and 90 minutes.

2.2 Methods

We were interested in how and where sign language was used in an academic context, and when supportive technical aids and digital technologies were used. We were also interested in finding out what support was provided by teachers, coaching, tutorials, audiopedagogical services and the interviewees' social environment. To that end, the interviews were paraphrased and coded for content analysis. In addition, they were analysed for pragmatic units that included complex linguistic actions, e.g. descriptions, explanations, narratives about academic subjects and learning and comprehension strategies used for study purposes. Excerpts from interviews which included such complex linguistic actions were multimodally transcribed according to the HIAT scientific

transcription standard (cf. Rehbein et al. 2004). They were analysed for pragmatic functions expressed in sign language, spoken language, and accompanying gestures or signs. Linguistic micro-structures in actual use by signers were then compared with practices mentioned by DHH students in the survey and interviews. They can shed a light on resources for educational purposes and academic communication (Hohenstein and Zavgorodnia 2019a). We are focusing here on how sign language was experienced in tertiary education, along with technical aids, digital technologies and other forms of support.

3 Findings and discussion

In the following, we compare results from the 2018 survey relating to SL use in educational settings with findings from the in-depth interviews carried out with deaf and hearing-impaired students and scholars in 2019 and 2020.

3.1 Linguistic diversity in DHH students

A certain degree of linguistic diversity could be observed in self-identified deaf students, hard-of-hearing and hearing-impaired students. While the former preferred SL as their primary medium of learning, the latter two were more orally oriented and worked primarily with spoken and written language(s), using their residual hearing ability, hearing aids and lip-reading. This means that SL is not an option to the same extent for all DHH students. However, those relying on CI and/or hearing aids plus lip-reading reported high stress, exhaustion and cognitive overload from trying to work effectively in lectures, discussions and group work. They stated that they still did not understand everything. In addition, in the interviews, we could detect hybrid uses of SL by those interviewees who identified themselves as hard of hearing and preferred spoken German instead of SL. Their choice of supplementary SL communication in the interviews may point to a new direction for research in bimodal bilinguality for adult DHH students. The practice of translanguaging between SL (DSGS) and spoken language (German) may support learning and create a more inclusive academic environment for both deaf and hard-of-hearing students, as well as non-deaf students (cf. also Holmström and Schönström 2018).

3.2 Sign language as a medium of instruction and DSGS obstacles

According to the interview responses, SL can carry specific functions in academic discourse: (1) SL can act as a tool for improving reading skills. One interviewee reported that due to a course in American sign language (ASL) and SL as a medium of instruction, they were able to improve their reading skills considerably; (2) SL use may generate an interest in science and academic subjects; (3) lecturers or teachers using SL may provide role models, triggering motivation for academic development and professional choices. One interviewee reported this because their English instructor used SL in a manner that was helpful to the learning process and, ultimately, motivated their career choice to become an English teaching assistant.

On the other hand, there are limitations in using sign language. In addition to the time used for studying the subject matter itself, learning the technical terms in both SL and spoken language was considered very time-consuming by an interviewee. This points to the fact that DHH students using SL are required to spend more time than non-deaf students acquiring academic terms and register, since they need to do it bilingually.

Some respondents considered specific academic subjects as hard to be signed or translated because of a lack of specific terms in SL. Several interviewees commented on that lack of subject-specific signs and academic register in DSGS. For example, in

one SL-interview, the interviewee could not talk about the topic of her BA thesis in SL and resorted instead to a hybrid form of German and Signed German. Two interviewees were not able to sign a description of their thesis because of a lack of specific expressions and terms. One person who graduated in SL (DSGS) reported on her thesis by using a rather general, descriptive sign language vocabulary.

In line with those observations, SL was also described as an inappropriate medium for deepening scientific knowledge because many specialist signs for technical terms were still missing in DSGS. Even though corpus planning and standardisation for DSGS is taking place in a deaf-non-deaf collaboration, e.g. for the daily news programs, these efforts seem not enough — and not quick-paced enough — in order to provide a full-fledged academic register. Results from projects such as Justisigns and Medisigns provide examples of DSGS corpus planning in academic and technical fields like medicine and justice, but a full academic register is not yet in place.

The difficulties observed around academic SL use in German-speaking Switzerland point to a problem specific to DSGS, i.e. comprehensive language policy and corpus planning are urgently needed for Swiss German Sign Language DSGS in order to expand its scientific vocabulary and academic register. In consolidated and standardized SLs (e.g. American, British, German SLs), a full-fledged register enables the full range of interactional pragmatics and linguistic patterns in academic discourse. Deaf lecturers using SL as an academic medium of instruction can not only adequately communicate academic content, but also make use of translanguaging and other multilingual and bimodal bridging procedures, thus helping the students' understanding and knowledge transfer (cf. Holmström and Schönström 2018 on Swedish SL).

3.3   Sign language interpreting in education

Despite the shortcomings of DSGS with regard to academic SL use, the role of SL interpreting for DHH students in the German-speaking part of Switzerland seems important. From both the survey and the interviews, sign language interpreting emerged as a crucial tool for accessible teaching from primary through to tertiary education. For example, SL interpreting could be used in order to clarify subject-specific terms. As an interviewee stated, a technical term that could not be understood in a tutor's written German explanation could be clarified immediately by a SL interpreter after the lecture. Another interviewee expressed absolute satisfaction with their studies because all courses were interpreted into SL.

Issues with the level of interpreter training can be seen in mixed statements, e.g. while some professionals interpreted correctly and clearly, others made it difficult to understand what was going on. Instances of dysfunctional academic interpreting were reported several times. In this line of argument, the following issues with SL interpreting for DHH students in the German-speaking part of Switzerland were mentioned, both in the survey and interviews: (1) a straightforward or correct translation between German and DSGS was not always provided, (2) difficulties arose with technical terms in English when SL interpreters were not additionally trained in sufficient English skills, and (3) issues with SL interpreting for study purposes were experienced as too strenuous, so that speech-to-text-interpreting was chosen instead.

Nonetheless, almost 47% of the deaf and hearing-impaired survey respondents indicated that a lack of interpreters was an obstacle at tertiary level. Several respondents expressed the opinion that SL interpreting at university level requires the interpreter to hold a master's degree as a minimum standard. SL studies highlight the fact that, in educational settings, interpreters face multiple challenges (cf. Leeson 2011; Napier and Leeson 2016, 116–17, 129–30, 133–34, 203–4; Wit 2017). After three years of study (i.e.

the equivalent of a BA degree), interpreters cannot be expected to master the skills necessary to render an academic register and reproduce scientific facts appropriately in SL.

In Switzerland, SL interpreters cannot be required to hold a master's degree in SL interpreting since no relevant MA programme is currently provided in the country. Accordingly, sign language provision is not yet sufficiently in place in universities and tertiary education institutions. Switzerland, in this regard, is lagging behind most European countries where MA programmes in SL interpreting/translation and SL education have been established (e.g. Germany, Austria, Netherlands, UK, Ireland, Norway, Sweden). Advancing SL studies onto MA level is therefore urgently needed in the German-speaking part of Switzerland.

3.4   Speech-to-text interpreting

One reason for choosing speech-to-text interpreting was based on unsatisfactory experiences with SL interpreting. Two interviewees reported positive experiences with speech-to-text interpreting, stating that it helps to perceive information and provide a reliable back-up copy for later use. However, speech-to-text interpreting, as well as respeaking and subtitling, seem to play a minor role in DHH students' academic experiences in Switzerland so far. They were rarely mentioned in both the survey comments and the interviews, compared to other supporting techniques (including coaching, tutoring etc.). DHH students who used speech-to-text interpreting noted limitations to equitable participation in group work interaction and discussions. In addition, technologies based on written language require a high level of competence and fast reading abilities in German, which DHH students often struggle with (cf. Volpato et al. 2018, 163–64).

These shortcomings indicate that speech-to-text interpreting, as well as other script-based assistive technologies (ATs), e.g. subtitling and respeaking, cannot be an alternative to SL interpreting in tertiary education. Visual comprehension shapes DHH students' primary access to information. It is oriented to situatively embodied, three-dimensional, simultaneous spatial and gestural information, that is, not to two-dimensional linear representation in script (cf. Wehmeyer 2014). ATs based on the written/spoken language may offer useful additional access to academic content, provided the students receive the transcripts and are supported by SL coaching or tutoring in working with those materials. Thus, a combination of technological solutions (ATs), SL and written/spoken language may offer inclusive communication modes that take into account specific visual abilities of DHH students while fostering their reading skills in written/spoken language.

3.5   Communication modes using SL and ATs

Due to varying language biographies and a range of linguistic diversity, DHH students with and without residual hearing abilities, and with and without hearing aids or CI, make use of multiple communication modes. Our data show that there is no one-fits-all solution, but that different communication modes, with and without Ats, can complement each other.

Communication modes that lacked in or excluded SL were mentioned by 80% of the survey participants as linguistic barriers to DHH students' education. Regarding tertiary education, a lack of multilingualism, that is, no SL translation services, no bimodal-bilingual resources in SL and German, videos without subtitling, and inappropriate SL skills on the teachers' part were cited slightly more often than at secondary and primary levels. This picture reflects expectations on the part of DHH students regarding a

linguistically versatile learning environment that includes SL in academic communication.

DHH students also reported difficulties experienced with inclusive measures while studying at a university. They reported facing various communicative barriers, even when SL interpreting was provided. Several times, experiencing a cognitive overload due to multitasking was mentioned. Watching explanations on a flipchart or computer presentation and, at the same time, following SL interpreting proved too great a burden, because simultaneous visual stimuli were presented at different locations in space, conferring interrelated pieces of information in a time-delayed manner.

One DHH student recalled experiencing a cognitive overload when trying to absorb all information visually and write it down at the same time. Another DHH student stated that it was impossible to know which content belonged to which lecturer after a day of classes, as all the lectures were interpreted into SL by the same interpreter. Another one recounted frustration with his efforts to memorise as much as his hearing colleagues, working hard at maintaining concentration over a whole day of studies. Coping with a fast-paced schedule of lectures, group work and discussions, and the absence of written handouts or glossaries also posed challenges, in particular when many new technical terms came up and needed to be clarified first. Relying on lip-reading and hearing aids was also mentioned as a challenge and an ineffective way to access complex academic lectures. In turn, one DHH student was grateful they had someone transcribing the lectures.

These responses provide insights into the interdependency between DHH students' communication modes and their own knowledge transfer processes, and they highlight the necessity to take socio-pragmatic aspects into account. That means inclusive communication modes are not per se inclusive, but require adaptation and accomodation in the learning environment in order to be functional for an equitable knowledge transfer. Communicative modes using ATs, too, may be rejected by those they are aimed at, because they do not adequately reflect situative and pragmatic needs, social context and purposes of use (cf. Nierling and Maia 2020).

A lack of considering the learner's social context when designing and implementing ATs may be one of the reasons why, up to now, DHH students seem to profit less from ATs than students with Autistic Spectrum Disorder or blind and visually impaired students (cf. Nierling and Maia 2020). Novel assistive technologies directed at the improvement of DHH persons' participation — such as, smart glasses with live captions (Watanabe et al. 2018), realtime captioning in meetings (Fume et al. 2018), or subtitles on personal devices (Kushalnagar and Kushalnagar 2018) — reflect, on the one hand, specific social contexts of communication. On the other hand, they employ communication modes based on written language. The developers presuppose a high reading proficiency in the spoken language without considering bridging the language gap to SL. Closer to many deaf students' needs may be communication modes using ATs that include SL, such as computer-generated sign language animation graphics (cf. Azuma et al. 2018, on SL animation for weather forecasts).

3.6   Inclusive Communication and Universal Design (UD)

From the perspective of deaf students, inclusive communication may be conceived as an environment where SL is used as a common, joint language for interaction and as a medium of instruction, as was mentioned by two interviewees relating to their experiences at Gallaudet University. Gallaudet University, Washington D.C., focuses on deaf students and is the only bimodal-bilingual university worldwide. At Gallaudet, (American) SL is the predominant medium of instruction, complemented by English as an L2 or secondary language. Such an all-over bimodal-bilingual approach may not be

feasible for mainstream universities and institutions of tertiary education, since the population of DHH students using SL is too small there.

At tertiary level, instead of focusing on individual support and compensation for special needs, institutions are required to be inclusive, and universities should strive for inclusion following Universal Design principles (cf. swissuniability n.d., OPEN n.d.). Universal Design (UD) aims for materials, resources and learning environments that can accomodate the needs of all students. This means that students with an impairment, along with fast-track students and slow-paced students, those who are using a second language (L2) and those who are studying in their first language (L1) all need to be equally integrated in inclusive learning environments. This necessitates an expanded concept of inclusion which surpasses the notion of 'integration' and promotes equitable quality education and lifelong learning opportunities for all (UN n.d., Bylinski et al. 2018, 116–62). Inclusive communication in that sense encompasses forms of intercultural learning and communication, and requires specific forms of cooperation and collaboration and a capacity for taking each other's perspective.

The intercultural ability to take various perspectives, or identify with a point of view alien to one's own, is a challenging part of inclusive communication. Ultimately, it is possible only when opportunities are given to collaborate with DHH and non-deaf students, when non-deaf lecturers engage in cooperation with deaf lecturers, and when tutors and coaches employ ATs and SL in order to foster both DHH students' knowledge transfer and their communicative interaction in academic discourses. A prerequisite for that is that hearing staff and students alike become aware that they are living and taking for granted an academic culture that is audistic, i.e. a culture of (the) hearing (cf. O'Brien et al. 2015).

In addition, if ATs, as has been critiqued, are not sufficiently adapted to the social needs of their users (Nierling and Maia 2018), they may not meet UD requirements either. In the process of implementing UD for teaching, reflecting the needs and desired outcomes of the students is a crucial starting point, followed by identifying a checkpoint or principle addressing their needs (OPEN, n.d., Nelson 2021). It includes investigating new methods, teaching with their help and assessing the outcomes in terms of the students' gain in knowledge and skills. As a circular process, UD is ending and starting again with reflection (OPEN, n.d., Nelson 2021). It is a process that, even though the students and their needs are at the center, the faculty staff responsible for curricula, teaching, coaching, tutoring and administration is required to take on. While there is evidence that shortcomings of faculty staff can increase barriers for DHH students and students with an impairment in general, it has also been shown that faculty members who employ an inclusive approach can make a decisive difference (Moriña et al. 2020). More than 40% of the impairments in a Spanish study sample were said to be sensory disabilities (Moriña et al. 2020). While it does not become clear how many DHH students were involved and how SL may have played a role, an important takeaway from Moriña et al.'s study (2020) was that adapting to students with disabilities was reported to affect presentation of content, methodologies and learning activities, changes which in turn led to improvements for all students and were experienced as enriching.

4   Conclusion

Based on the above findings, it seems that measures of inclusion addressing DHH students' needs in Swiss higher education are adopted case-by-case, with an overall strategy and/or UD approach missing. The Swiss German SL (DSGS) plays a role mainly in SL interpreting for knowledge transfer in lectures, seminars, group work and, to an unknown part, in tutoring and coaching.

One pathway for implementing inclusive communication modes in tertiary and university education would be to expand the role of sign language in Swiss Higher Education. Employing SL as a medium of instruction for DHH students and as a second language for hearing students, within the framework of university curricula, can provide opportunities for interaction in academic discourses, as well as foster bimodal-bilingual language development and multilingual, multimodal communication modes in general. It can also trigger much needed DSGS corpus planning for academic purposes. Developing ATs with SL as well as written language captions can improve reading and writing skills for DHH students and motivate non-deaf students to cross over the language gap.

Inclusive communication can be achieved, provided all participants in the education process — lecturers, administration, supporting staff and students alike — are willing to make use of various communication modes, including signing, SL interpreting, ATs, digital tools and plurilingual resources in spoken and written languages, thus creating a common ground for interaction between those who identify themselves as deaf, hard of hearing, non-deaf or hearing, and beyond.

Acknowledgements

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Mengdan Zhao & Ziqing Lyu

Translating health knowledge to Plain Language: Assessing the readability of health digital news in Australia

Student track

Abstract

Excessive dietary salt-intake has become one of the major dietary health risk factors in the current world, the severity of which is associated with various non-communicable diseases. Towards the target of salt-intake reduction, mass media communication has been recommended as one of the effective population-level dietary interventions. It is well acknowledged that health communication materials play an indispensable role in promoting public health awareness, shaping health-relevant daily behaviors and increasing the use of health services for a variety of populations. For the purpose of facilitating the reception of health knowledge among a wide general readership, readable and comprehensible texts are generally required. This research conducts a corpus linguistic study of salt intake and health-related digital news in Australia to examine the readability of the news. This study aims to raise awareness of readability of health materials for communication professionals and to provide suggestions from a linguistic perspective.

1   Introduction

A discrepancy in public health communication exists between the sender's expertise and the lay audience. The public health promotion materials are usually packed with complicated jargons and professional terminologies, which discourages a wide general readership to understand information about health and make informed decisions. This discrepancy calls for an urgent transformation in the writing style of public health communication materials from "write for literates" to "write for all".

Media serves as a critical link between health-related knowledge and information for the general public. Mass media campaigns have been evaluated as one of the effective population-level dietary interventions (Grilli et al. 2002) due to their powerful dissemination of information. Non-communicable diseases caused by dietary health risk factors are impacting the health conditions of a large number of the population and are collectively responsible for almost 70% of all deaths worldwide. However, an unhealthy diet has been suggested as one of the modifiable risk factors that influence both the physical and mental health of human beings. This study focuses on the dietary health risks of excess salt-intake as a case study of dietary risk communication from the linguistic perspective.

Excess dietary salt-intake has become one of the major dietary health risk factors in the current world. The severity is associated with various non-communicable diseases and health damage. In this regard, this paper focuses on the discussion of excess salt-intake and health as a branch of dietary health issues in Australian mainstream digital news. This research aims to examine the predominant linguistic features and the performance of textual readability of Australian digital news on excess salt-intake and health. The results of this study may foster the promotion of English public health materials from the perspectives of readability and comprehensibility.

2   Research data and methods

Readability is the ease with which a reader can understand a text. The traditional readability formulas applied to investigate the readability of English texts are usually criticized for restricted validity, especially when applied to analyze specific genres, for example, news coverage. Therefore, this research adopts a corpus-driven approach to examine the predominant linguistic features of health-related digital news and aims to construct an analytical framework on how to measure news readability.

2.1   Research questions

This study investigates the following three questions.

1) As a specific text genre, what are the predominant linguistic features of "excess salt-intake and health" news in Australia?

2) How to examine the performance of textual readability of digital health news?

3) What is the implication for readability enhancement of English health communication materials?

2.2   Research data

The research data comprises digital news coverage reporting on the health impacts of excess salt-intake in mainstream digital newspapers in Australia from 1990 to 2019. Only mainstream news was collected to avoid fake news and misinformation, since nowadays the fake news issue has become pervasive all around the world. In addition, only newspapers that have high circulations and are published in six states and two territories were selected; circulation is one of the most convincing indicators of a newspaper's influence and audience size. This selection procedure aims to ensure a more objective reflection of research data.

Eighteen Australian digital newspapers were selected as data sources. The research data collection was conducted in the database FACTIVA (Dow Jones n.d.). FACTIVA is a Dow Jones global news database with licensed global news and data sources dating back to the 1980s and is regarded as a reliable source of research data. The selected 18 Australian digital newspapers are listed in Table 1. In total, 1194 pieces of eligible digital news of 1,933,279 words were obtained and compiled into the corpus.

	Newspapers	Locations	Websites
1	The Australian	National	www.theaustralian.com.au
2	The Canberra Times	Canberra (ACT)	www.canberratimes.com.au
3	The Sydney Morning Herald	Sydney (NSW)	www.smh.com.au
4	The Sun Herald	Sydney (NSW)	www.sunherald.com.au
5	The Daily Telegraph	Sydney (NSW)	www.dailytelegraph.com.au
6	Sunday Telegraph	Sydney (NSW)	www.dailytelegraph.com.au
7	The Age	Melbourne (VIC)	www.theage.com.au
8	Herald Sun	Melbourne (VIC)	www.heraldsun.com.au
9	Sunday Herald Sun	Melbourne (VIC)	www.heraldsun.com.au
10	The West Australian	Perth (WA)	www.thewest.com.au
11	Sunday Times	Perth (WA)	www.perthnow.com.au
12	Courier Mail	Brisbane (QLD)	www.couriermail.com.au
13	Sunday Mail	Brisbane (QLD)	www.couriermail.com.au
14	The Advertiser	Adelaide (SA)	www.adelaidenow.com.au
15	Sunday Mail	Adelaide (SA)	www.adelaidenow.com.au
16	The Mercury	Hobart (TAS)	www.themercury.com.au

	Newspapers	Locations	Websites
17	The Examiner	Hobart (TAS)	www.theexaminer.com.au
18	Northern Territory News	Darwin (NT)	www.ntnews.com.au

Table 1. Data sources: 18 Australian digital newspapers

2.3   Research methods

This study includes a random sampling of research data, linguistic profiling, and a principle component analysis. The single stages are explained as follows.

1) Stage 1: Random sampling. In Stage 1, the size of research data was reduced. 5% of the research data, i.e. 60 pieces of Australian English news texts were selected randomly to form into a sample.

2) Stage 2: Linguistic profiling. This stage aims to describe the linguistic features of the selected 60 news texts. Drawing on previous research about readability and comprehensibility of English texts (Chall and Dale 1995), 27 linguistic features were selected to describe each piece of news based on their contributions to text readability and comprehensibility. For example, "difficult words" is one of the linguistic features selected referring to words beyond the 3000 most common English words. The 27 linguistic features were used to carry out a statistical analysis on the 60 pieces of news. Next, a principal component analysis on the linguistics features of news texts was conducted.

3) Stage 3: Principal component analysis (hereafter PCA). This study used PCA as an exploratory statistical technique to compute and identify the latent similarities of the 27 linguistic features variables. It transformed the 27 correlated variables into a small number of irrelevant variables which is termed as the procedure of dimensionality reduction. Based on the similarities of the distributions of linguistic features, the 27 linguistic features variables were assigned to three determined conceptual dimensions (explained below). The linguistic features attributed to the same dimension are believed to share similar communicative functions. The linguistic features attributed to positive loadings in each dimension imply that these features contribute to the corresponding conceptual dimension. On the contrary, negative loadings imply that these features are less likely to contribute to the conceptual dimension. In each list of positive and negative loadings, the sequence of linguistic features represents the weight, namely the degree of contribution to each dimension. The statistical analysis process of PCA was conducted using SPSS statistics 25.0 (IBM Corp. 2016).

Three dimensions have been detected on the basis of the 27 linguistic features variables, which are shown as follows:

1) Dimension 1 is text readability and comprehensibility. Positive loadings of linguistic features are simple sentences, monosyllabic words, numerical words, idioms/fixed expressions, conjunctions, auxiliaries, time expressions, punctuations, modal verbs, interrogative pronouns, and compound sentences. Negative loadings comprise the linguistic features of difficult words, disease related nouns, compound-complex sentences, complex sentences, passive sentence structures, polysyllabic words, and impersonal pronouns.

2) Dimension 2 is geographical and cultural proximity. Positive loadings are Australian domestic names, risky food and drinks nouns, recommended food and

drinks nouns, and idioms/fixed expressions. Negative loading is foreign names in news texts.

3) Dimension 3 is practicability and interactivity. Positive loadings comprise action verbs, dietary habits verbs, numerical words, 1st and 2nd personal pronouns, risky food and drink nouns, recommended food and drink nouns, interrogative pronouns, time expressions. Negative loadings consist of stative verbs and third personal pronouns.

As a result of PCA, the 27 linguistic features were assigned to the three dimensions, as presented above. Each dimension was labelled according to the similarities the linguistic features variables share. Dimension 1 was labelled as text readability and comprehensibility. The linguistic features of positive loadings contribute to readability and comprehensibility, while negative loadings are less likely to contribute to the readability and comprehensibility.

Built on the conceptual dimension 1, this research constructs an analytical framework to investigate the readability and comprehensibility of digital news reporting on "excess salt-intake and health" in Australia. The analysis was conducted based on the English corpus consisting of 1194 eligible Australian digital news articles.

3 Results and discussion

A corpus-based discourse analysis of the research data which applies the analytical framework elaborated in this study was conducted to examine the performance of readability and comprehensibility of news coverage reporting on "excess salt-intake and health" in Australia. The quantitative analysis was conducted with the assistance of the corpus tool WordSmith 6.0 (Scott 2014).

The research results comprise two parts, at lexical level and syntactic level. The results at lexical level include the proportions of words and phrases in the corpus, i.e. monosyllabic words (36%), numerical words (2.2%), idioms/fixed expressions (0.5%), conjunctions (5.4%), auxiliaries (4.8%), time expressions (8.4%), modal verbs (5.5%), interrogative pronouns (1.6%), difficult words (34%), disease related nouns (1.3%), polysyllabic words (64%), and impersonal pronouns (0.6%). The results at syntactic level include the proportions of sentence structures, i.e. simple sentences (12.9%), complex sentences (8%), compound sentences (35.7%), compound-complex sentences (43.4%), and passive sentence structures (7.7%).

As recommended by Cheng and Dunn (2015), the reading level for health information in Australia should target an eighth-grade competence level or below. Comparing the research results to an eighth-grade reading level, it is suggested that the density of difficult words and compound-complex sentences are beyond the reading skills of eighth-graders, which therefore should be decreased to enhance the readability and comprehensibility of health news coverage.

Text simplification, e.g. Plain or Easy-to-Read language, is important for public health communication materials. One of the significances of this study is to demonstrate the method of analytical framework construction for text readability and comprehensibility based on the linguistic features. By applying the PCA, linguistic features contributing to the readability and comprehensibility of news texts were identified. This approach could be applied as a supplement to the readability calculation formulas. Meanwhile, the research findings may encourage journalists and communication professionals to reduce communication barriers and therefore generate wider reception of health texts. A more effective dissemination of health-promoting materials is of value to enhance the comprehension and behavioral intention among people with limited health literacy.

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Sarah Ahrens, Sergio Hernández Garrido, Loraine Keller, Janina Kröger, Isabel Rink & Rebecca Schulz

Medical communication in Easy and Plain Language: On understanding, retaining and accepting specialised medical communication in comprehensibility-enhanced formats

Research track

Abstract

Low health literacy is related to factors like chronic disease, communication impairments, low socioeconomic status and/or non-native background (Schaeffer et al. 2016, 41). Easy Language, a language variety with maximally enhanced comprehensibility, is a powerful instrument in this respect, as it proposes a solution to improve comprehension and recall of health information (Maaß and Rink 2017). Plain Language is more acceptable and less stigmatising, but it is also less comprehensible than EL (Bredel and Maaß 2016b, 186). The research projects of the BK-Med group (in German: "Forschungsgruppe Barrierefreie Medizinkommunikation", Research Group Accessible Medical Communication) of the Research Centre for Easy German at Hildesheim University focus on the comprehensibility and acceptability of different medical text types for different target groups who need optimised communication. Maaß (2020) proposes a balanced variety in form of an enriched version of Easy Language called Easy Language Plus to meet the need for comprehensible and acceptable texts.

1   Accessible communication

Accessible communication is an important issue in today's society. While there are many laws and regulations in Germany to improve inclusion for people with disabilities (for an overview, see Lang 2019 and Maaß 2020), accessible communication is not limited to one target group or one area of life. In reality, it is highly relevant for everyone, because "we are [...] surrounded by a myriad of dysfunctional texts that do not address users in a way that allows them to properly understand or use the information derived from the texts" (Maaß 2020, 19). In order to create accessible texts, it is necessary to systematically reduce the barriers they often pose (for types of barriers, see Section 2). Thus, comprehensibility-enhanced formats are needed to provide accessible information. Rink (2020) states that depending on the target situation, (written and oral) texts may pose different types of barriers for recipients and that specific strategies are needed to overcome these barriers. Those barriers derive from various textual features (Maaß 2020, 23).

As Maaß (2020, 24) points out, "in order to make communication accessible, the barriers that prevent access to the content have to be removed". Therefore, accessible texts must have the following features (cf. Maaß 2020, 27):

- Texts have to be **retrievable** in order for users to be able to retrieve them.

- Texts have to be **perceptible** in order for users to be able to perceive them through different sensory channels.

- Texts have to be **comprehensible** in order for users to comprehend them.

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- Texts have to be **linkable** to users' previous knowledge so that they can recall the information.

- Texts have to be **acceptable**, meaning that the texts are presented in a way that users accept.

- Finally, texts have to be **action-enabling**, meaning the information is provided in a way that enables the recipients to act.

One strategy to ensuring access to texts is to present the information in Easy or Plain Language. These accessible texts are designed to reduce processing costs — i.e. the cognitive resources needed for perception, information processing and recall — as they "are easy to perceive, easy to comprehend and linked to previous knowledge in order to facilitate recall" (Hansen-Schirra and Maaß 2020, 18).

According to Hansen-Schirra and Maaß (2020, 17), "Easy and Plain Languages can be considered language varieties of different national languages with reduced linguistic complexity, which aim to improve readability and comprehensibility of texts." Language can thus be described as a continuum, as can be seen in Figure 1.
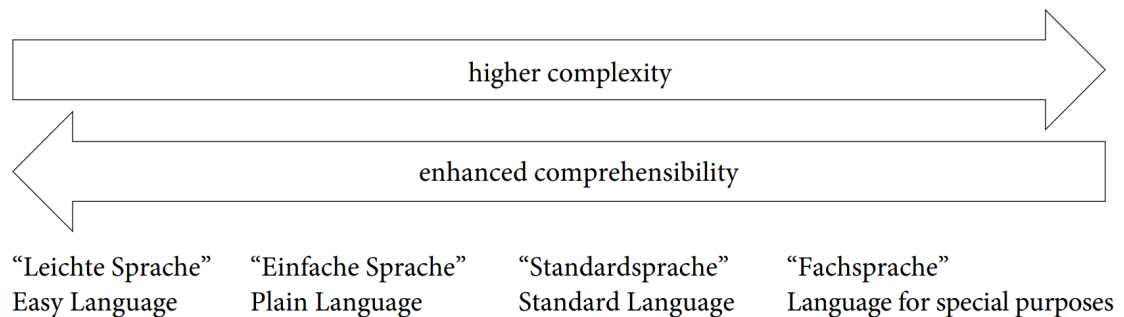
Figure 1. Easy and Plain language as pillars in the Easy Language/standard language continuum (Hansen-Schirra and Maaß 2020, 18)

Located on the far left is Easy Language ("Leichte Sprache"), which "is the term for the variety with maximally enhanced comprehensibility" (Maaß 2020, 50). Plain Language ("Einfache Sprache") "is the somewhat more enriched, complex form", and can take different characteristics, ranging from "somewhat enriched forms of Easy Language to forms somewhat below average standard German" (Maaß 2020, 50). In contrast, the most complex varieties are languages for special purposes used in expert communication.

Easy Language describes a variety of German that "aim[s] to improve readability and comprehensibility of texts" (Hansen-Schirra and Maaß 2020, 17) through its reduced linguistic complexity. It is "used to address people with communication impairments and communication difficulties, whether they have disabilities or not" (Maaß 2020, 88). Easy Language features a strict rule system and thus is "restricted to pre-planned communication", i.e. written texts (Maaß 2020, 88). There are several rule sets for Easy Language in Germany (for an overview see Bredel and Maaß 2016a; Maaß 2020) which derived from practice, as well as scientifically founded rulebooks, which provide a linguistic perspective for professional translators (Maaß 2015, Bredel and Maaß 2016a). Easy Language is limited with regards to the use of vocabulary, morphology, and other grammatical features (Maaß 2020, 89) and was developed specifically for people with limited reading abilities (Maaß and Rink 2017, 51). One of its main functions "is to make content accessible, and to simultaneously ensure participation for people with

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communication impairments" (Hansen-Schirra and Maaß 2020, 17). However, due to its reduced linguistic features, Easy Language may contribute to the stigmatisation of its readers (Hansen-Schirra and Maaß 2020; Maaß 2020). Some features of Easy Language, e.g. the ban of genitive and pronouns in the German-speaking context, have a negative impact on the aesthetics of Easy Language texts and, thus, on their degree of acceptability (Bredel and Maaß 2016a, 534; Hansen-Schirra and Maaß 2020, 21). This "has the potential to trigger stigmatisation as it highlights communication impairments and accentuates the disparity between text sender and recipients" (Hansen-Schirra and Maaß 2020, 21).

In contrast, Plain Language "does not primarily address people with disabilities. In its original state, it is primarily a means to open expert contexts for lay people" (Maaß 2020, 12). Plain Language is less comprehensible than Easy Language but at the same time "offers less stigmatising linguistic structures and layout options" (Hansen-Schirra and Maaß 2020, 17). It is therefore not suitable for some of the Easy Language target groups, as Plain Language requires additional reading competence. Plain Language is a "dynamic variety that adapts to the needs of specific user groups in target situations" (Maaß 2020, 150). There is no stringent rule set for Plain Language but rather a "dynamic system to gradually disburden or enrich" the texts (Maaß 2020, 150). Bredel and Maaß suggest conceptualising Plain Language as a variety "departing from the maximum reduction level of Easy Language and enriching it according to the respective text purpose" (Maaß 2020, 159; see also Bredel and Maaß 2016a,b).

Maaß (2020) introduces a new language variety that balances comprehensibility and acceptability: Easy Language Plus. It is defined as "an intermediate version between Easy and Plain Language that renounces some of the least acceptable features of Easy Language and, at the same time, maintains comparatively high levels of perceptibility and comprehensibility" (Maaß 2020, 14). It could be a means "to enhance acceptability and lessen the danger of stigmatising the target groups while, at the same time, keeping the texts at a high level of perceptibility and acceptability" (Maaß 2020, 231).

2   Health literacy and comprehensibility

According to Schaeffer et al. (2016), 54.3 % of the German population has only limited health literacy (for similar results, see Jordan and Hoebel 2015; Zok 2014). Almost half of the adult German population has difficulty making health-related decisions in their everyday lives (Jordan and Hoebel 2015, 947). Health literacy can be defined as follows:

> Health literacy is linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course. (Sørensen et al. 2012**,** 3)

According to this definition, health literacy is not only related to literacy per se, but also competences such as the ability to access, understand and act on health information (see Section 1).

Health literacy is not only an issue on the level of the individual, but also on an institutional level (Brach et al. 2012; Nutbeam 2000, 261). Nutbeam (2000, 265) distinguishes between functional health literacy, interactive health literacy and critical health literacy. Functional health literacy denotes the literacy and numeracy required to access and comprehend information. Interactive health literacy encompasses cognitive, literacy and social skills to "derive meaning from different forms of communication, and

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apply this to changing circumstance [*sic*]" (Sørensen et al. 2012, 4). Critical health literacy requires more enhanced cognitive skills to critically assess the consumed health information. Other models add literacy forms like media literacy (Manganello 2008, 843) or cultural literacy (Zarcadoolas et al. 2005, 197), that is, the ability to assess media messages and to recognise social cues to interpret and act on health information (Sørensen et al. 2012, 5).

To enhance health literacy in the population, we must focus on accessible, understandable, retainable, acceptable and action-oriented texts, including audio-visual texts. These criteria overlap with the accessibility features described in Section 1 (i.e. retrievable, perceivable, comprehensible, linkable, acceptable, action-enabling). Satisfying these criteria is essential to enabling the population to access information, as well as understand, appraise and apply information in order to make own judgements and decisions. The National Action Plan for health literacy (NAP) (Schaeffer et al. 2018, 39) recommends that Plain Language (see Section 1) and multimedia options be implemented to make health information more accessible to people with lower reading abilities. The NAP thus acknowledges that comprehensible communication makes health literacy possible or strengthens it for the target groups (Maaß and Rink 2017).

As already stated, there are specific barriers equally present in both oral and written texts that make health information difficult to access for certain target groups (cf. Rink 2019; Rink 2020; Nutbeam 2000, 264; Lang forthcoming; for an overview in English, see Maaß 2020). These barriers are:

- Sensory barrier: One or more senses required for text perception are impaired.

- Cognitive barrier: The text is too abstract or complex for a recipient.

- Motor barrier: The text is offered in a form that a recipient cannot navigate due to an impairment in motor skills.

- Language barrier: The text is produced in a language that a recipient does not understand.

- Expert knowledge barrier: Health and medical texts contain expert information that a recipient does not possess and that therefore requires further explanation.

- Expert language barrier: The text uses expert language that a recipient cannot understand due to expert language features such as medical terminology.

- Cultural barrier: The text entails or presupposes cultural knowledge that a recipient does not possess. In the case of health and medical texts, they often presuppose knowledge of the health care system in which they are produced.

- Media barrier: The text is distributed via a medium that is inaccessible to a recipient or unlikely to be used by them. The NAP addresses this issue by recommending multimedia texts instead of written texts for readers with low literacy.

- Motivational barrier: Individuals have had adverse experiences with a text type or the text is unacceptable to a recipient. Texts in medical communication usually contain expert language and readers thus experience them as being inaccessible.

Low health literacy is furthermore related to factors like chronic disease, age, low socioeconomic status and/or a migration background (Schaeffer et al. 2016, 41; Jordan and Hoebel 2015, 942; Sørensen et al. 2012, 7). These are the defining factors for

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vulnerable groups; many need comprehensibility-enhanced communication formats in order to access information. The doctoral projects introduced in this article (see Section 3) focus on groups who traditionally have been at the core of accessible communication research, i.e. people with cognitive impairments, but also on other vulnerable groups, who are also target groups of Easy and Plain Language but have not yet been at the centre of Easy and Plain Language research such as the elderly and recipients with German as a second language.

3 Research projects

3.1 What makes health information accessible? A corpus-based analysis

In her study, Janina Kröger focuses on the accessibility of online health information texts. The internet is an important means of gathering information. While the physician remains the first source of health-related information, Schaeffer et al. (2016) have shown that 25% of users search for health information online (see also Rossmann and Stehr 2018; Horch and Jordan 2019). Patients may search for information to prepare for a doctor's appointment or to gather further information after receiving a diagnosis. Nevertheless, studies also indicated that finding, understanding and evaluating health information can be difficult for some people (Schaeffer et al. 2016). The information offered online to lay persons can pose various barriers, especially to those with communicative impairments (cf. Rink 2020). Thus, it is necessary to examine the information offered online to lay persons to better understand the barriers deriving from these texts. The aim of Janina Kröger's study is to analyse standard German health information texts and their translations in Easy Language Plus in order to describe the text type and its possible barriers. The research aims to define Easy Language Plus in its use in expert-lay person communication in the medical field. To achieve this, a corpus is being developed that consists of standard German texts and their Easy Language Plus translations. The texts were selected from the online pages of the *Apotheken Umschau* (Wort und Bild Verlag). The Wort & Bild publishing house offers online information texts about diseases, disease prevention and medication for lay people in standard German as well as Easy Language Plus. The analysis focuses on grammatical and conceptual features as well as the mediality of the texts. The aim is to understand how health information texts in Easy Language Plus need to be modelled in order to reduce barriers for different target groups.

3.2 Enhanced comprehensibility through multicodal and multimodal texts as a way to tackle (health) illiteracy in Colombia

In his dissertation project, Sergio Hernández Garrido undertakes a corpus-driven study based on muticodal and multimodal material created in Colombia during the COVID-19 pandemic. In March 2020, Colombian authorities launched a campaign to promote health literacy concerning the coronavirus while taking into consideration the socio-economic reality of the country. Colombia's social and economic history has led to high functional illiteracy rates, especially amongst traditionally vulnerable groups, such as persons from poor rural areas, indigenous and Afro-Colombian ethnic minorities (Castellanos 2001; Rinesi 2016). Health illiteracy is also a major issue in this context (ECLAC 2014). Therefore, the government and large media companies produced and broadcasted videos about the global pandemic as part of the crisis management measures during this time. It is evident that accessibility was a major concern in video production and that accessibility features (Maaß and Rink 2019; Maaß 2020; Rink 2020; see Section 1) were

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considered when addressing the vulnerable groups. This was key in order to have an effective health literacy campaign, as recent studies in public health have repeatedly indicated (Schaeffer et al. 2016). The project builds on a systematic, descriptive analysis of material created for the COVID-19 health literacy campaign broadcasted through television on a national, regional and local level. The ultimate goal is to draft a profile of the corpus in terms of accessibility, portraying which features made health information during this time accessible. Afterwards, the analysis will focus on approaches that can be implemented across languages and national barriers.

3.3   Health texts in Plain Language for migrant women

In her research study, Sarah Ahrens evaluates the comprehensibility and action-enabling potential of health texts in standard German for migrant women, as well as which features Easy Language Plus health texts should contain for this target group. Results of German and international studies indicate that among people with a migration background, more people have a low health literacy level in comparison to the majority population (Schaeffer et al. 2016, 41; Jordan and Hoebel 2015, 942; Quenzel et al. 2016, 708; Sørensen et al. 2012, 7). Quenzel et al. (2016, 709) conducted a survey on health literacy among the following vulnerable groups: adolescents with low education level, the elderly and people with a migration background. Among these groups, Quenzel et al. found that people with a migration background scored the lowest. People with a migration background have worse access to the healthcare system than the majority population of a country (Razum et al. 2004). This can be due to many different reasons, including the language and the culture barrier (Rink 2019; Rink 2020, 138–39; Schubert 2016, 18; Razum et al. 2004, 2885). To improve health literacy for this target group, current health information texts need to be assessed for comprehensibility and their action-enabling potential. In a study by Gutermuth (2020, 194) (see also Section 3.4), Easy Language has been shown to improve comprehensibility for people with a migration background. It is, however, criticised in terms of adequacy and acceptability for migrants (e.g. Kilian 2017). In an interview study, comprehensibility and action orientation of current written health information texts and their Easy Language Plus translations will be assessed. The aim is to find out which additional information people with a migration background in Germany require not only to comprehend German health texts, but also to act on the information therein, as well as how to effectively present the texts on the language level. More suitable information will lead to more comprehensible and more action-oriented health texts that will, in turn, help to improve the health literacy of migrants in Germany.

3.4   Medical communication in Easy and Plain Language — an empirical study on understanding and retaining medical information

According to Schaeffer et al. (2016), more than 50% of the German population have limited health literacy, which means, among other things, that they have difficulties in understanding health-related information. The National Action Plan to improve health literacy (Schaeffer et al. 2018) recommends providing medical information in Plain Language. In her study, Rebecca Schulz aims to answer the question whether Easy Language and Plain Language lead to a higher level of health literacy. The target groups are seniors (65+) who are among the vulnerable groups (Schaeffer et al. 2016) and people with cognitive impairments, who are the primary target group for Easy Language. Depending on the different needs of the target groups, the study will determine whether Plain Language is sufficient or if Easy Language is needed. The test persons' eye movements while they read health-related texts will be recorded via eye tracking. The second step will be free recall, which means that the test persons will orally reproduce

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the message of the text. In order to find out whether the texts are understood, there will be a questionnaire containing questions regarding the content of the text. The results of the different varieties will be compared to see which one is understood and retained best.

3.5 Acceptance of comprehensibility-enhanced medical information texts

Insufficient health literacy is a problem that is especially apparent in elderly people (65 years and more; cf. Schaeffer et al. 2016, 41). As disability increases steadily with age (Destatis 2020), the older a person gets, the more health information he or she may need. Elderly people without cognitive impairments such as dementia may also experience reading-related issues, as they often have to deal with an impairment of the senses, i.e. a visual impairment (cf. Rink 2020). This group also has special needs related to media, as they do not use digital applications or the internet as a source of health information as much as other recipient groups (Maaß 2020, 193–94; cf. Link and Baumann 2020). A pioneer study (Gutermuth 2020) shows that enhanced comprehensibility and effective recall of information of Easy and Plain Language texts in the field of legal communication were achieved for this target group, while, at the same time, the acceptance of the comprehensibility-enhanced texts was very low. The present study by Loraine Keller focuses on the following research question: Which features of Easy and Plain Language health information texts make them acceptable for elderly people (65+)?

4 Conclusion

Accessible medical communication is an important means to improve health literacy. Lay persons need to find, perceive, comprehend, recall and accept information in order to make self-determined, informed decisions (Maaß 2020; Maaß and Rink 2019; Maaß 2019). This is only possible if information as a part of complex communication processes is retrievable, perceptible, comprehensible, linkable and acceptable — all prerequisites to being action-enabling (Maaß 2020; Maaß 2019). Until recently, the need for accessible medical communication has not been at the forefront of accessibility regulations in Germany. However, this situation is currently changing with focus being shifted to accessible medical communication as a form of crisis communication that affects society as a whole and therefore requires due attention.

The doctoral projects presented above attempt to determine how information has to be designed in order to meet the needs of lay persons, especially those with communication impairments who often disproportionately belong to medically vulnerable groups (Schaeffer et al. 2016).

Acknowledgements

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Yanmeng Liu, Meng Ji & Pierrette Bouillon

Getting across in medical communication: A corpus-based approach to analyze and improve the comprehensibility of machine translation

Student track

Abstract

In medical service contexts, especially in migrant- and refugee-receiving countries, the increasing need for inter-lingual communication and the higher cost of human translators has driven the development of machine translation technologies and tools. However, these tools' reliability and efficiency are questioned (Patil et al. 2014; Bouillon et al. 2017), which calls for objective evaluation to ensure and improve the quality of translation results. The present study aims to provide a data-driven empirical evaluation of the linguistic similarity of the French source speech data and their English translations produced by machine translation and identify the main areas in which MT output deviates from natural oral English. Using corpus statistical methods, the evaluation of machine translation outputs can provide concrete and objective feedback for future machine translation improvement. For future research, this model can be trained with larger datasets.

1 Introduction

In medical communication settings, inter-lingual communication frequently happens because doctors and patients are often from different language backgrounds. As machine translation (MT) has evolved rapidly in recent years, MT tools have a great potential to help medical staff have multilingual preliminary examination dialogues with their patients.

The difficulty of translating medical dialogues lies in maintaining precision while being comprehensible for the patient (Cardillo 2015). Much attention has been paid to ensuring the fidelity of translation, while the comprehensibility is underexplored from a patient-oriented perspective.

"Comprehensibility" is traditionally a major concept in second language research that denotes listeners' perceptions of how easily they understand L2 speech (Isaacs and Trofimovich 2012). In this research, it refers to the degree to which a translation can be understood by the target audience (Matsuura 2007). However, it has to be emphasized that analyzing comprehensibility in medical communication is rather challenging, as it raises issues regarding privacy, time and monetary costs.

Corpus-based translation studies (CTS) shed some light on the issue of analyzing comprehensibility in medical communication by providing a large quantity of original and translated material and providing appropriate conceptual and linguistic information without the risk of invading patient privacy nor financial burden. Moreover, CTS is a principled way to achieve representativeness and objectivity (Ji and Oakes 2019). Corpus material collected from the general public can represent the general literacy level of the patient as laymen. Besides, linguistic statistics extracted from corpora can be objective support for the analysis of comprehensibility.

To facilitate barrier-free communication between doctors and patients through MT, this article focuses on the comprehensibility analysis for medical discourse and gives suggestions for further improvement of MT in this communication setting.

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2 Corpus-based analysis

As a new research paradigm, corpus approaches provide translation studies with unprecedented language resources and linguistic data processing tools. Therefore, this study uses corpus-based approaches to analyze MT translation in a more quantitative and objective manner, while the statistical evidence could support improvement suggestions.

2.1 Corpus-based profiling

This research introduces a new concept of corpus-based profiling to integrate corpus-based translation studies and comprehensibility analysis. Profiling is originally defined as "the activity of collecting information about someone to describe them" (Cambridge English Dictionary 2019). This paper borrows the concept of "profiling" to describe the process of representing a certain type of text, be it a translation or original text, with the statistics extracted from corresponding corpora. Furthermore, it can be assumed that the source texts (written in the original languages) present linguistic features which facilitate comprehensibility for readers in the target languages. Therefore, comprehensibility can be analyzed through the comparison between original texts and corpus-based profiles of the corresponding translations. As the linguistic features of translations are similar to those of original texts, it can be argued that the translations would have good comprehensibility by the target audience. Corpus-based profiling specifies the complex and abstract concept of comprehensibility and simplifies qualitative analyses using statistical comparisons.

2.2 Multi-level statistical comparison

In this research, a set of profiling variables are designed to be compared for comprehensibility analysis. The variables are identified at three levels (see Table 1). Both the profiles of MT translations and original target languages are profiled with the nine variables listed below. A multi-level comparison will be implemented among corpus-based profiles.

Levels	Variables
Lexical	Type/token ratio (TTR)
	Word length (WLS)
	Lexical frequency profile (LFP)
Syntactical	Sentence length (SLS)
	Frequency of Complex sentences (CSC)
	Frequency of Conjunction (CONJ)
Grammatical	Frequency of Preposition (PREP)
	Frequency of Modal words (MD)
	Frequency of Determiners (DTM)

Table 1. Multi-level variables

2.3 Lexical frequency profiling

Lexical frequency profiling (LFP) divides a text into four different frequency layers: first 1000 most-frequently-used words, second 1000 most-frequently-used words, 570 most-frequent 'academic' words, and the rest not in these three lists (Laufer and Nation 1995). Even though these layers refer to lexical frequency testing for writing skills, LFP serves

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as a 'ruler' to compare the lexical distributions of MT translations with texts originally written in English drawn from the British National Corpus 64 (BNC64). The BNC64 serves as a reference corpus in this research. It is a corpus of informal British speech, which consists of 1.5 million tokens.

3   Method

3.1   Sample selection

As source texts, this research randomly selects 100 frequently used French medical questions from doctor-patient communication data gathered by Gerlach et al. (2018). Examples are as follows:

- En cas d'hospitalisation, la couverture d'assurance est-elle en chambre commune?

  ("As for hospitalization, does the insurance cover the shared room?")

- Avez-vous été vacciné contre la rougeole?

  ("Have you been vaccinated against measles?")

- Pouvez-vous énumérer ou écrire les noms de médicaments auxquels vous êtes allergiques?

  ("Can you list out the drugs you are allergic to?")

For the language pair to be studied, this paper focuses on French to English translation as a case. Furthermore, Google Translation (GT) will be used to provide MT. As one of the statistical and neural-based MT tools currently available, GT has advantages of easy and free accessibility, wide popularity, and advanced MT techniques.

3.2   Data collection

The selected 100 canonical sentences are translated into English by GT. The translations are compiled as a small-scale corpus study. Both the translated and the original English are processed in LancsBox 4.5, a software for analyzing language data and corpora developed at Lancaster University (Brezina et al. 2018). All the variables are directly extracted from the corpora via LancsBox 4.5, except for LFP. For LFP, the MT-translated English texts from the study corpus and the texts originally written in English from BNC64 are input into the software Range (Heatley et al. 2002) to examine the distribution of English words in four-layer lists.

4   Results

The translated English by MT and the BNC64 English are profiled based on variables extracted from the corpora. The results are as follows (see Tables 2 and 3; frequency = the number of corresponding variable/the total word number of the texts):

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Variables	MT	BNC64
TTR	0.1831	0.0143
WLS	3.2662	1.9567
SLS	11.1893	20.8870
CSC	0.0031	0.0032
CONJ	0.0031	0.02891
PREP	0.0579	0.0652
MD	0.0282	0.0105
DTM	0.0720	0.0673

Table 2. Comparison of MT and NBC64

Word List	MT/%	BNC64/%
One	70.58	88.22
Two	3.60	2.81
Three	0.31	1.19
Not in the list	25.51	7.78

Table 3. Lexical Frequency Profile Result

Table 3 compares the LFP of MT and BNC64. In the translated English by MT, more words are falling into the category of 'Not in the list', over three times more often than in BNC64. As words listed in Word List One and Two are almost the same for both of them, BNC64 has more words listed in Word List One, about 18% higher than MT does.

5   Discussion

This research compares corpus-based profiles of translated English by MT and original English to analyze the comprehensibility of MT in medical discourse and improve barrier-free communication in a medical context. According to the results, translated English by MT differs a lot from original English in BNC64, resulting in great potential to improve its comprehensibility from the following aspects.

MT translations and BNC64 English display differences at lexical, syntactical, and grammatical levels to various extents. Table 2 indicates that MT bears higher lexical complexity at the lexical level than BNC64 does, as TTR and WLS are much higher for MT. Besides, the number of sentences with complex structure is almost the same for both corpora at the syntactic level. However, sentence length and number of conjunctions demonstrate that English with better comprehensibility features an appropriate sentence length of around 20 words. The number of conjunctions reasonably goes up with the sentence length (Reid, 1992). This may lie in the situation that articulations tend to be shorter for time efficiency (Mauksch et al. 2008).

At last, the two texts share similar features at the grammatical level. The higher number of modal words aligns with the fact that medical discourse has more stance devices to express obligation or permission (Staples 2016). Therefore, except for inherent characteristics for medical discourse, the major difference between MT and BNC64 is at the lexical level, which implies that the lower comprehensibility of MT is at the lexical level.

Furthermore, as shown in Table 3, MT translations bear over three times of words in 'Not in the list' than BNC64, which means that the MT translations use more words that are not frequently used by the public oral communications. Also, the fewer percentage

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in Word List One supports the argument that higher comprehensibility features using more words that are most frequently used in daily life.

Therefore, the results suggest that the main barrier in MT of medical translation is the overuse of complex words. So, we suggest that, whenever possible, more layman expressions be applied in medical dialogues. Table 4 provides some examples:

Medical terms	Lay terms
cardiac	heart; involving the heart
dermatologic	of the skin
hepatitis	inflammation of the liver
hypertension	high blood pressure
meningitis	irritation around the brain
oncology	the study of tumors or cancer
pulmonary	lung
respiratory	breathing

Table 4. Layman Expression Examples

6   Limitations

The present study is limited from two perspectives. First, GT is not designed to translate oral language, which may influence the research results. As the samples collected are originally dialogues between doctors and patients, while the GT is not specifically for oral translation. This may influence the translation results of the samples to some extent. Secondly, comprehensibility analysis is limited at the linguistic level in the present study. The present study analyses the readability of medical translation from a linguistic perspective. Thus, lexical, syntactical, and grammatical features are considered in the study. However, authors are conscious that readers' understanding capability may be influenced by medical literacy, cultural background, etc. Finally, these factors are suggested to be studied in future research.

7   Conclusion

Overall, this research explores a corpus-based approach to analyze MT comprehensibility in a medical context. The automatic analysis shows that it is lexical complexity that compromises the comprehensibility of MT. Moreover, suggestions are given to improve the lay-friendliness of machine-translated texts in medical discourse. Finally, it is hoped that this research could encourage more corpus-based research for barrier-free medical communication.

Acknowledgments

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Pierrette Bouillon, Bastien David, Irene Strasly & Hervé Spechbach

A speech translation system for medical dialogue in sign language — Questionnaire on user perspective of videos and the use of Avatar Technology

Research track

Abstract

This paper summarizes the findings of a questionnaire conducted with the Deaf community in francophone Europe. It aimed to gather feedback on specific features to be included in the sign language videos of BabelDr, a medical speech-to-sign translation platform. The results show that the whole sentence should be subtitled, the signer should be shown front-on only, and the background should be of a light colour. Explanatory images can be added to clarify the medical content. Lastly, human videos are preferred to avatars in this specific context, even if more than a third of the respondents think that an avatar could be useful in this context.

1   Deaf people's access to health care

WHO statistics indicate that one in every 1000 people in high-income countries is born deaf (Cantero 2016). These people are particularly vulnerable in terms of health. This vulnerability is due to several factors, including poor access to information and a lack of training for the medical staff. Another important factor in this context is the difficulty that they face in accessing care, both logistically (inability to make an appointment by telephone) and in communication (difficulty in understanding the caregivers, inadequate means of communication). These difficulties lead deaf patients to experience stressful and frustrating situations, which are frequently reported in the literature (Chastonay 2018).

The current legal framework in Switzerland sets conditions that make it easier for people with disabilities to participate in social life fully and equally. In particular, we here refer to the Federal law on the elimination of discrimination of persons with disabilities (DDA) that was enacted on December 13, 2002, as well as the UN Convention on the Rights of Persons with Disabilities (UNCRPD), which came into effect in 2014. Moreover, the Geneva canton has officially recognized sign language in its Constitution in June 2013.

In order to be in line with recent legal requirements, the BabelDr project aims to improve accessibility in hospitals. We developed a new type of fixed-phrase translator for triaging patients belonging to minority communities, including refugees, migrants and deaf people (Spechbach et al. 2019). Similar to other fixed-phrase translators (such as Medibabble or UniversalDoctor), the system relies on a predefined list of human-translated sentences in order to insure translation reliability, but instead of searching for sentences in this list with keywords, doctors can ask their questions orally, which improves the ergonomics (Spechbach et al. 2019).

This paper summarizes the findings of a questionnaire conducted to form an initial view of how Deaf people living in European francophone countries perceive the sign language videos elaborated for the BabelDr application, and the use of avatars in such videos (Chiriac et al. 2015). In particular, we wanted to know which factors affect their video quality preferences in order to decide how to present the videos in the BabelDr application.

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In the next sections, first we briefly describe the BabelDr tool (Section 2) and how the sign language videos were realized (Section 3). We then focus on the questionnaire and the main findings of our research.

2 The BabelDr platform

BabelDr is an online speech-enabled fixed-phrase translator, specifically designed for medical dialogue (Spechbach et al. 2019). The system was developed based on four different criteria.

[Cost-efficiency] Machine Translation (MT) systems are not yet accurate enough to translate medical dialogues, especially into and from poorly supported languages (Patil and Davis 2014; Bouillon et al. 2017). For this reason, BabelDr is based on a set of pre-translated core sentences (including medical questions and instructions), organized by medical domains (type of pain). Although an ideal tool would have the flexibility of machine translation systems, different studies show that today fixed-phrase translation systems can be a good alternative to machine translation for this type of safety-critical domain (Turner et al. 2019).

[User-friendliness] To improve the flexibility and user-friendliness of this type of fixed-phrase translation tool, BabelDr uses speech recognition and neural methods to link the recognized sentence to the closest core sentence (Mutal et al. 2019). The core sentence is then translated for the patients by looking up in the translation memory. Although this type of fixed-phrase translator can be perceived as a constraint by doctors, the findings of the studies we made demonstrate that speech improves both satisfaction and usability (Boujon et al. 2018; Spechbach et al. 2019).

[Reliability] The reliability of the system is ensured by the back translation to the core sentence, which provides the doctor with the exact meaning of the spoken target sentence. The doctor must approve it before translating the sentence, meaning that they always know what will be translated.

[Flexibility] Content must be easily expandable. The translation memory of BabelDr contains around 13,000 core sentences and is constantly extended based on the system usage data. These core sentences are productively generated from a set of rules (patterns with variables) and mapped to more than one billion of source variations, which are used to train the speech recognizer and the neural matching algorithm. Human translation of core sentences can be done in different formats: written, spoken (for dialects), or video-based (for example, for sign languages). It is also possible to define different registers; for example, BabelDr translates specifically for female or male patients. The translation is done online in different ways, depending on the format. For written languages, the translators directly translate the patterns with a translation memory (Gerlach et al. 2018); If the translation is spoken or in the form of sign language videos, they translate the complete sentences.

At the time of writing, the BabelDr platform is accessible online at the address http://babeldr.unige.ch (see Figure 1) and is in use at Geneva University Hospitals (HUG) for translation between French and six migrant languages, with a high satisfaction from doctors and patients (Janakiram et al. 2020). French Sign Language (LSF) translation is currently under development, both with human and avatar videos (JASigning) in order to compare quality, satisfaction and development time, as described in more detail in the next section.
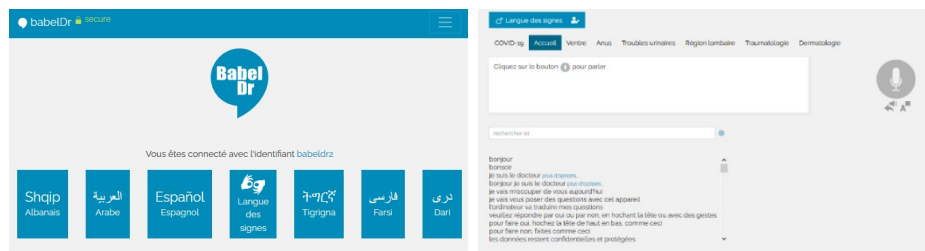
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Figure 1. a) BabelDr Platform Home page, b) Doctor interface
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3 Sign language videos

The LSF translation with human and avatars videos is currently being produced in two steps. A human translation is first carried out by a group of specialists (Deaf people and doctors) who work in a professional setting at the University of Geneva (Strasly et al. 2018). These human translations are then used as reference to produce the code for the JASigning avatar, using the grammar formalism described in Rayner et al. (2016). Figure 2 gives an example of human and avatar videos for the core sentence *Je suis l'infirmier* ("I am the nurse").

At present, 2,453 medical sentences have been human translated. The code used to generate sentences with JASigning avatar includes a glossary with 570 HamNoSys items used for describing manual signs (Smith 2013) and a grammar for linking glosses together and adding non-manual features.

During the human translation process, three main issues were raised by the translators: 1) translating medical terminology that did not have an exact equivalent in sign language; 2) translating using a video format (2D format) that does not allow the signer to make certain parts of the body easily visible, like the back; 3) translating of medicines (nouns): using the manual alphabet was not deemed appropriate by our translators since it would be very tiring for the person who would watch the videos. To face these issues, different solutions were adopted: 1) the use of paraphrases to explain the meaning of specific terminology, if that term had only one meaning that could be explained rapidly and in a clear way; 2) adding subtitles to the video and 3) adding explanatory images to give a clearer understanding of the sentence.

In the next sections, we describe the questionnaire aimed at gathering feedback on some of these different quality aspects (visual aspects, subtitles, and dimensionality), both for the human and the avatar videos.

4 Questionnaire methodology

4.1 Aims

The questionnaire aimed at gathering feedback on how Deaf people living in francophone European countries perceived specific elements of sign language videos produced as part of the BabelDr project, including the possible use of avatars.

4.2 Content

The questionnaire was conducted in French using the platform LimeSurvey. It was translated into French Sign Language (LSF), Swiss-French Sign Language (LSF-CH) and French Belgian Sign Language (LSFB) by professional translators, who were asked

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to sign an informed consent form before being filmed.

It included 32 questions (Appendix) and covered six main themes: (i) background of the videos, (ii) additional images added to clarify the content, (iii) subtitles, (iv) screen format and size, (v) advertisements and logos displayed on the screen, and (vi) perception of the use of three-dimensional avatars. Each section consisted of three to six questions, not all of which were compulsory to answer. Our respondents first watched a short video summarizing the theme of the questions, then answered a series of Yes/No or multiple-choice questions (Haug et al. 2015).

The questionnaire was sent to potential participants from mid-October 2019 and closed at the end of November of the same year. In total, 61 associations in French-speaking European countries were contacted by email or via social networks (15 French-speaking Belgian associations, 39 French associations and 7 French-speaking Swiss associations). Private Facebook groups related to deafness or medical accessibility were also involved, sharing the link to the questionnaire with their members as part of a snowball sampling method.

5   Results

5.1   Respondents

A total of 111 people opened the questionnaire and started answering it: 47 LSF, 41 LSF-SR and 23 LSFB. Amongst them, thirty-three [N=33/111] gave consent for their data to be used. Of this group, 25 participants (13 LSF, 9 LSF-SR and 3 LSFB) completed the questionnaire.

34 comments were made by 13 different participants. Five main themes were addressed in the comments: "Avatars as an alternative means of communication" (7 items), "Comments on visual elements" (9), "Comments on Expressiveness" (4), "Adding written information or images" (15) and "Understanding signs" (7). We will report some of these comments in the original language (written French, sometimes with mistakes) alongside an explanation of their content in English.

Figure 2. "BE NURSE" signs: a) Human videos, b) Avatar videos.
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5.2 Background of the video

54% of participants [N=18/33] considered the background of the video to be important for comprehension (Question 2.a [single-choice]). One of the participants said that when he answered he thought of those who have an usher syndrome: he suggested we avoid a white background or too many details on the background of the screen ("En ce qui concerne les fond écran, j'ai essayé de penser au usher donc à éviter le fond écran blanc ou trop de chose derrière"). Light colors (light grey) and plain backgrounds were clearly preferred (see also Zhao et al. 2000). As an example, one of the comments clearly stated that sometimes backgrounds hinder the understanding of what the avatar is signing because there is not enough contrast between the avatar and the background colours ("Parfois les arrière-plans empêchent une meilleure compréhension des propos de l'avatar en raison du contraste").

5.3 Additional images

54% of participants [N=18/33] considered explanatory images to be important for medical term comprehension, for example for locating an organ in the body (Question 3.a [single-choice]). To indicate a particular organ or the location of body pain, a vector graphic showing the whole body and a particular organ (42%, N=11/26) is preferred to anatomical drawings (31%, N=8/26) or a real picture (27%, N=7/26) (Question 3.b [single-choice]). Warm colours (orange, 57%, N=8/14, and red, 21%, N=3/14) are preferred for highlighting an organ in a vector image of a human body (Question 3.d [single-choice]). Explanatory images should be next to the signer and should take up no more than half of the screen (70%, N=14/20) so that signed information can be more clearly understood (see Figure 3.a).

5.4 Subtitles

86% of respondents (N=24/28) requested that subtitles be integrated into the videos to assist understanding of the signs (Question 4.a [single-choice]). Almost unanimously, respondents felt that the sentences should be fully subtitled (92%, N=22/24) and should be placed below the character (87%, N=21/24). One of our participants commented that adding subtitles below the signer could be useful for those who do not sign or who use Cued Speech ((…) "*ajouter des sous titre au dessous cela pourrait être utile pour les sourds qui ne signent pas ou qui utilise la LPC*").

Concerning the subtitle font colour, a white font with transparent background was preferred by the participants to other possibilities, for example black font with transparent background (33%, N=8/24 (Question 4.d [single-choice]) (see Figure 3.b).

For terms that are difficult to sign, respondents' opinions are divided between adding subtitles [N=19/24] and adding images [N=19/24] (Question 4.e [multiple-choice]). One of the participants stated the following:

I was unsure whether I wanted to see more manual alphabet being used..: I would say yes, for those who find it difficult to read on the lips, but I think it is not so useful if there is already an image and a subtitle…knowing that images are stronger than anything --> DEAF PEOPLE = VISUAL PEOPLE ("j'étais partagée si oui ou non pour épeler en plus.. : je dirais oui pour ceux qui ont du mal à lire mais je pense que c'est pas très utile si il y a image + sous-titre .. sachant que l'image est plus fort que tout ---> SOURDS = VISUEL").

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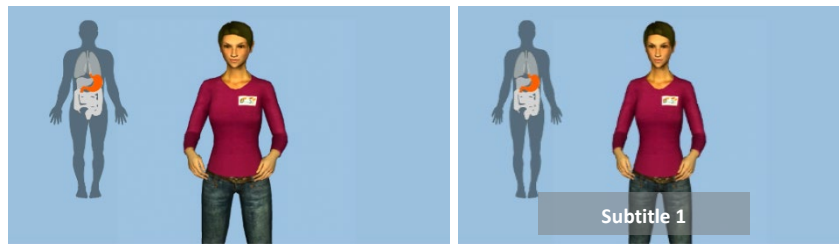
Figure 3. Selected images by participants: a) Explanatory picture, b) Incrusted subtitle
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5.5   Screen format and size

Concerning the orientation of the screen, 87% of the participants [N=18/25] prefer a landscape view. The character should be shown from the waist up (80%, N=20/25) and when preparing the camera, a small space should be left above the head (84%, N=21/25) (Questions 5.d & 5.e [single-choice]). Images of the whole character are not appreciated and considered useless (see Figure 4.a).

5.6   Perception of three-dimensional avatars

A number of studies focussing on the perception of virtual avatars have shown that subjects experienced some difficulty in understanding the avatar (Huenerfauth et al. 2008; Kipp et al. 2011). Our results demonstrate that videos with real interpreters are more popular (64%, N=16/28) than the JASigning avatar, even if we were surprised to find that more than a third of the respondents think that an avatar could be useful in this context (36%, N=9/28). In particular, one comment that was added to this section states that avatars make it possible to avoid discrimination based on origin, age and gender ("(…) l'avatar est intéressant, car on peut choisir enfant, homme, femme, blanc, noir, etc. selon l'éthique auquel certains peuvent s'identifier sans aucune discrimination."). For the negative aspects, subjects had difficulty distinguishing between instructions and questions since the avatar was unable to use non-manual features to sign the difference ("Pour toute interrogation, on hausse les épaules quand il s'agit des questions", "je trouve qu'il manque des expressions faciale pour montrer que c'est une question"). Three other comments mention the robotic aspect of the avatar and the fact that they hope technology will improve ("Les avatars vous pouvez faire mieux, car ces avatars j'espère que c'est en test car je trouve comme les robots").

We also gathered feedback on how to the avatar should be displayed: 64% of the respondents [N=18/28] prefer the signer to be shown front-on only (Question 7.c [single-choice]). They generally do not want to see the avatar turned on the side, nor to have multiple perspectives of the same avatar on the same screen, as shown in Figure 4.b.
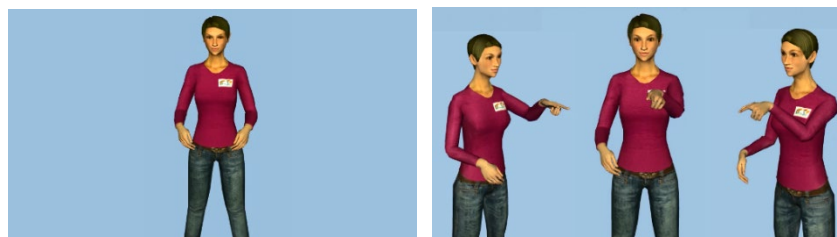

Figure 4. Non-selected images by participants: a) Full-length character, b) Multiple perspectives
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6   Conclusion

In conclusion, the findings allowed us to gather the preferences of sign language users concerning the BabelDr tool. The results show that the whole sentence should be subtitled using a white font, the signer should be presented front-on only, and the background should be of a light colour. The signer should be filmed from the waist up above the head. Explanatory images can be added to clarify the medical content of the sentences. Human videos are preferred to avatars, but we were surprised to find that more than a third of the respondents think that a virtual human could be useful in this context (36%, N=9/28).

This experiment allowed us to present the project to the target audience and get their feedback on sign language videos and the use of an avatar. The next step will be to compare the comprehensibility of human and avatar videos in real emergency settings on a diagnosis task.

Acknowledgements

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A speech translation system for medical dialogue in sign language — Questionnaire on user perspective of videos and the use of Avatar Technology

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Evaluating the comprehension of Arasaac and Sclera pictographs for the BabelDr patient response interface

Research track

Abstract

This paper summarises some of the findings from a preliminary survey conducted to evaluate the comprehension of pictographs for patient responses in the speech-to-speech translation tool BabelDr, a system designed to improve communication between doctors and allophone patients or minority groups. Despite the relatively low number of respondents, the gathered data could serve as a starting point for discussion in future decision-making processes about how to design a bidirectional interface for patients with a range of pictographs and how to evaluate their comprehension.

1 Introduction

The BabelDr project is a collaboration between the Faculty of Translation and Interpreting (FTI) in Geneva and the Geneva University Hospitals (Bouillon et al. 2017). The aim of the project is to design a reliable translation system for emergency settings to improve communication between doctors and allophone patients (e.g. refugees) or minority groups (sign language users). Until recently, BabelDr had a unidirectional interface. The doctor had to ask closed questions and the patient must then respond nonverbally with a gesture or by pointing. The aim of this paper is to evaluate different open source pictograph sets that could be used for allowing patients to answer more precisely to the doctors' questions. This bidirectional version could improve the communication and possibly reduce doctors' feelings of being constrained by the unidirectional version (Spechbach et al. 2019). In particular, it would allow doctors to ask open questions which is more natural in the diagnostic task and is known to encourage patients to report any and all problems. It could also save time, reducing the number of necessary questions for the diagnosis (one open question replacing multiple yes/no questions).

Even if pictures are used in medical settings to communicate with patients with special needs (Eadie et al. 2013), online medical applications which use pictographs are very limited and remain technically unsophisticated (Wołk et al. 2017). In the Medipicto AP-HP mobile application, the patient chooses pictographs labelled in his language to communicate with the caregiver who can ask questions by choosing a pictograph translated into the patient's and caregiver's languages from a predefined list. The caregiver is limited in terms of questions and this application does not offer speech functionalities (recognition or synthesis), as opposed to BabelDr. Subject to certain conditions, medical images and pictographs are available, e.g. SantéBD, Widgit Health or a graphic chart for symptoms (Alvarez 2011). There are also different pictograph sets that are designed for augmentative and alternative communication used by people with disabilities (Cataix-Nègre 2017; Beukelman and Mirenda 1998).

In this study, we describe the result of the survey set up to evaluate two large pictograph sets that are freely available to represent patient responses: Arasaac and Sclera. These two sets were already used in different pictograph-based systems in other domains, in particular Schwab et al. (2020) build a semantic resource to e.g. design a

translation system from speech into Arasaac pictographs. Sevens (2018), Vandeghinste and Schuurman (2014) used the Sclera set in their Text-to-Picto and Picto-to-Text systems for people with an intellectual disability. Although pictographs were already evaluated in some studies (Wołk et al 2017), this is the first study which evaluates pictographs in the context of a speech application for diagnostic interviews.

In Section 2, we present in more detail BabelDr and the new bidirectional interface which includes pictographs for patient responses. Section 3 focuses on the design and implementation of the questionnaire (available here). Section 4 summarises the findings and results by question types (4.1), response groups (4.2), and pictograph sets: Arasaac or Sclera (4.3). Finally, Section 5 draws conclusions and describes our plans for future developments.

2   The bidirectional version of BabelDr

BabelDr is an online speech-enabled fixed-phrase translator, specifically designed for medical dialogue. Similar to other fixed-phrase translators (such as Medibabble or UniversalDoctor), the system relies on a predefined list of human-translated sentences in order to insure translation reliability, but instead of searching for sentences in this list with keywords, doctors can ask their questions orally, which improves the ergonomics (Spechbach et al. 2019). The doctor speaks freely and the system links the recognition result to the closest human-translated sentence using neural methods (Mutal et al. 2019). At the time of writing, the BabelDr platform is accessible online at the address http://babeldr.unige.ch and is in use at Geneva University Hospitals (HUG) for translation between French and six migrant languages, with a high satisfaction from doctors and patients (Janakiram et al. 2020).
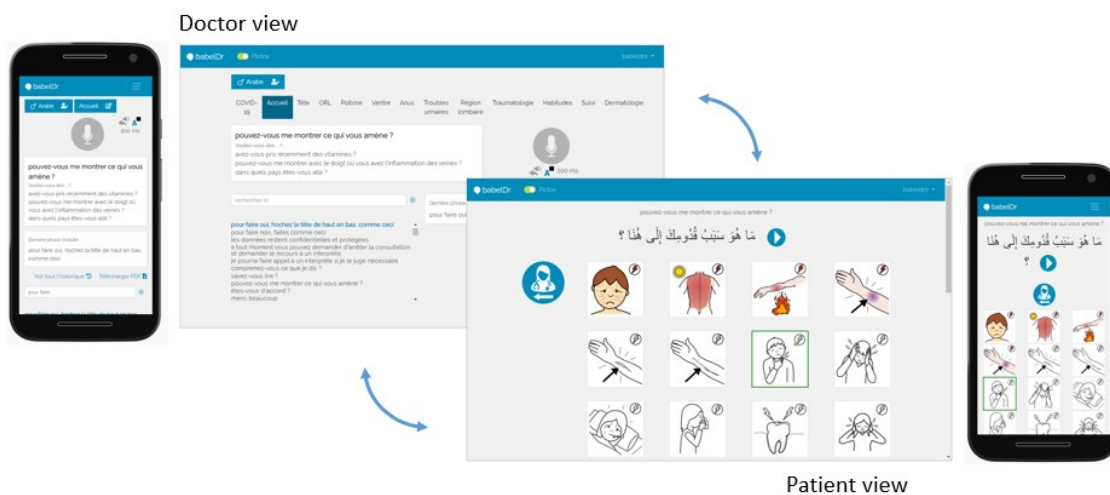

Figure 1. BabelDr bidirectional interface

The bidirectional interface includes two different views, one for the doctor and one for the patient (see Figure 1). The doctor view allows doctors to ask questions orally or to search for questions in a list with keywords. When the doctor confirms the recognition result after speaking, or picks a question in the list, the system switches to the patient view and speaks the question for the patient in the target language. The patient view presents a selection of clickable response pictographs corresponding to the question, among which the patient can select his answer. All questions and answers are saved for

the doctor. If necessary, the doctor can ask a new question in order to confirm the patient's answer.

One of the aims of BabelDr is to make its content easily expandable in order to follow demographics. An online interface allows doctors or developers to link BabelDr questions with different sets of pictographs, as shown in Figure 2. This allows to easily integrate different sets of pictographs in the system depending on the needs. Evaluation can also be done directly on the task.
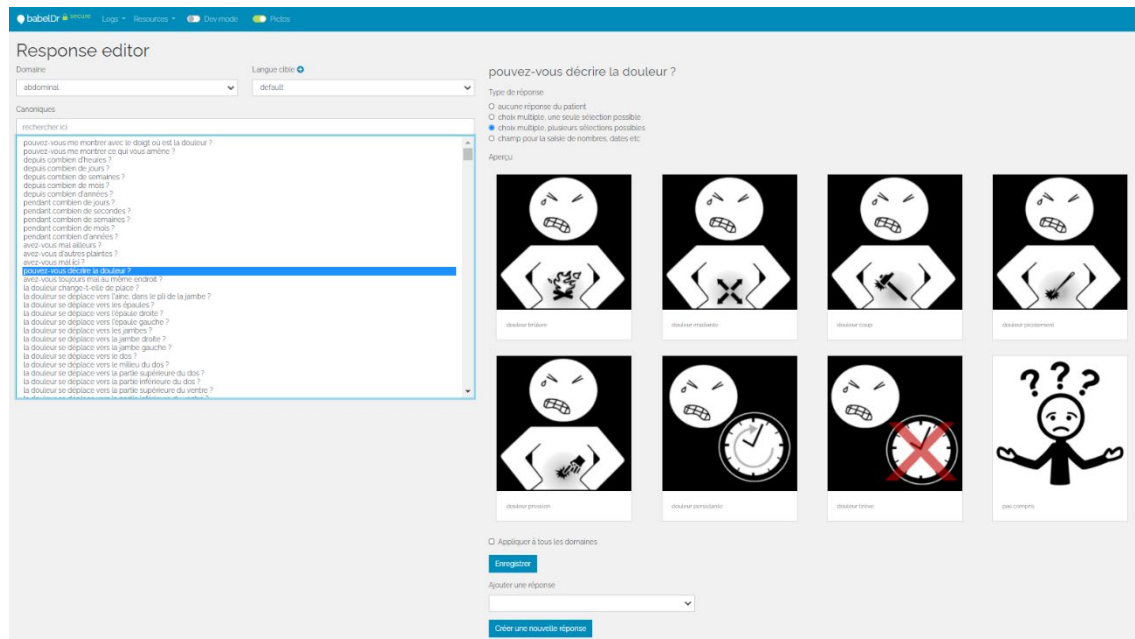

Figure 2. BabelDr response editor

3 Questionnaire design and implementation

This preliminary study aimed (1) to evaluate the comprehension of different sets of pictographs for patient responses in the BabelDr bidirectional interface and (2) to investigate how comprehension can be assessed. The survey was launched in three languages (French, Spanish and Arabic) in order to get the most diversified audience as possible and was implemented using Google Forms, an accessible online survey administration platform.

A snowball sampling method was used to recruit respondents, who were given two weeks to complete the online survey. It featured 33 questions and covered seven response groups, corresponding to frequent types of medical questions in BabelDr: (i) yes/no (for example, "Do you have pain?"); (ii) location of the pain ("Where is your pain?"); (iii) pain description ("Can you describe your pain?"); (iv) time of day; (v) cause of the pain (activity, etc.); (vi) pain evaluation ("Can you evaluate your pain on a scale of 0 to 10?"); (vii) and visual field ("What do you see?"). Figure 3 gives an example of Sclera and Arasaac pictographs for pain description.
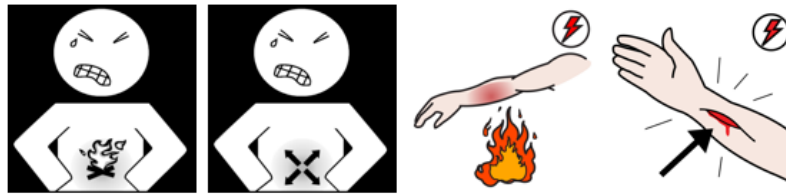
Figure 3. Sclera and Arasaac pictographs for pain description: "burning sensation", "radiating pain", "burn" and "cut"

The respondents had to guess the meaning of a pictograph response associated with a BabelDr question, for example the Sclera *"say no"* pictograph as response to "Avez-vous mal au ventre?" ("Do you have pain in the abdomen?"). The survey contained three different types of questions, as shown in Figure 4:

(a) 10 multiple-choice questions with several distractors where respondents had to select the correct meaning of a pictograph in the context of a specific question (for i/ii response groups and Arasaac and Sclera sets);

(b) 20 open questions where respondents had to describe the pictograph with a short text (for iii/iv/v groups and Arasaac and Sclera);

(c) 3 multiple-choice questions without distractors (for vi/vii groups, Arasaac only). In this case, respondents had to link a BabelDr sentence to a picture that we created with Arasaac pictographs (for example, "Have you lost your sight in your right eye?" with the picture 1). They could choose several possible responses, contrary to question type (a).

Figure 4. Example of three question types with Sclera and Arasaac pictographs

4   Findings

A total of 67 usable responses were collected through all language versions of the survey from three countries: 44 in Belgium, 18 in France and 5 in Switzerland. All were French-speaking (for 88.1%, it was their mother tongue), with the majority having always lived in Europe (85%) and speaking English as second language. The other mother tongues were: Arabic (10.4%), Spanish (4.5%), Armenian (1.5%), Czech (1.5%) and English (1.5%). In addition, some also spoke other languages such as Dutch or German. The age of respondents ranged between 18 and 66 years. Almost half were students (47.8%). Their fields of study or work were very diverse: literature, science, speech therapy (Norré et al. 2020), etc.

4.1   Question types

To investigate how to assess pictograph comprehension with different BabelDr sentences, we tested three types of questions.

In multiple-choice questions with distractors (a), we defined a single correct response per pictograph, which made it easy to obtain quantitative results. We obtained an average of 75.2% (percentage of correct responses). For open questions (b), we often noticed several possible interpretations for the same pictograph in a given context, especially for pain description. Open questions are more complex to evaluate, but we obtained a core meaning and some interesting variations for each case which can also be useful to identify possible interpretation problems. For example, for the "*radiating pain*" Sclera pictograph (Figure 3), responses included "diffuse pain", "cramps", "swelling" or "vomiting". For multiple-choice questions without distractors (c), we obtained an average of 86% (percentage of correct responses) for the three questions.

4.2   Response groups

We observed differences in comprehensibility between the response groups (i-vii).

Pictographs representing a part of the human body (82.5%) were recognized more easily than yes/no pictographs (64.1%). We obtained more different interpretations for pictographs for pain description, than for activity pictographs such as "*eat*" or "*go to bed*" ("Is belly pain triggered/relieved by something/anything?"). For time of day, we evaluated only one pictograph for the question: "Quand avez-vous-mal?" ("When does it hurt?"). More than 85% of participants responded correctly "matin" ("morning") or "quand je me réveille" ("when I wake up") for a sunrise representation with an upwards arrow (Figure 4). Some people confused this with "midi" ("noon") or "soir" ("evening"). For pain evaluation, correct responses by sentence ranged between 62.6% and 98.5%. The sentences at the first and last position on the scale (0: "I am not hurt", 2.5: "The pain is bearable", 5: "I am in pain", 7.5: "I am in a lot of pain", 10: "The pain is unbearable") obtained the best results. The visual field pictographs were very comprehensible (93.6%). However, no response group was recognized by all the participants; this shows that it is difficult to design "universal" pictographs.

4.3   Arasaac versus Sclera

For the multiple-choice questions with distractors, we obtained a score of 82% correct responses for Arasaac set and 68.3% for the Sclera set.

Several pictographs were comprehensible in both sets because the pictorial symbols are very similar (e.g. "*go to the toilet*" or "*morning*"). Other pictographs were less precise or more difficult to guess. For example: the "*belly*" Sclera pictograph had a good score (100% of correct responses) while the "*back*" pictograph in this set got a low score (55.2%) because of confusion with the "chest" distractor (41.8%) in the same question, due to the lack of the face and buttocks (Figure 5). In Sclera, pictographs are mainly black-and-white and often have few distracting details (Sevens 2018).
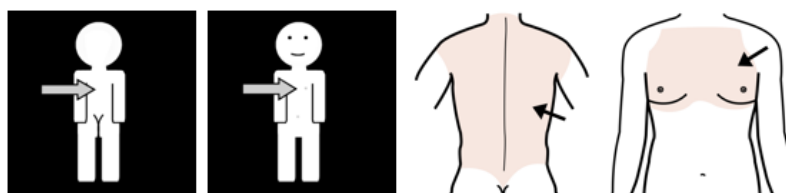

Figure 5. Sclera and Arasaac pictographs for human body: "back" and "chest"

For pain description, the Sclera set uses a human grimacing with a specific symbol in the belly, while the Arasaac set depicts pain on a specific part of the human body and includes a red lightening symbol, as shown in Figure 3. For the Arasaac "*chest pain*" pictograph, there was a majority of correct responses (74.6%), but 23.9% chose the bad interpretation "I have electricity in my chest". Alvarez (2011) had observed that lightening was a symbol often used for pain. However, it does not seem universal since in open questions we had an interpretation of "electric choc" for the "*cut*" pictograph (Figure 3).

There was also a large difference between yes/no pictographs (Figure 6) in Sclera (50%) and Arasaac (78.3%). In the medical context, the Sclera pictographs for "yes" and "no" are more difficult to understand because they combine the representation of yes/no movement and a happy/not happy face (mouth pulled down/up). If the doctor asks: "Avez-vous mal au ventre?" ("Do you have pain in the abdomen?"), the happy face of the "*yes*" pictograph was confusing: 17.9% did not know, 38.8% chose the wrong response, and 43.3% chose the correct.
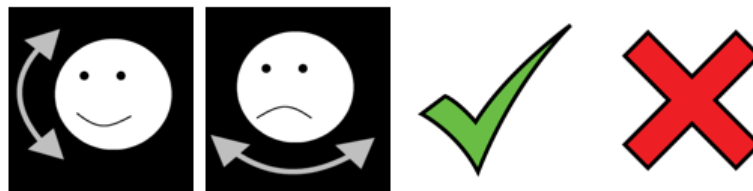

Figure 6. Sclera and Arasaac pictographs for yes/no: "say yes", "say no", "yes" and "no"

5   Conclusion

This preliminary study did not show that one set is globally better than the other for all types of questions. The survey has also provided insight into the difficulties to represent responses to specific questions in medical settings with pictographs (or pictures) and showed the need to give the doctor the possibility of checking whether the patient has understood correctly. Since we had a heterogeneous group of participants, we could not observe if there were any cultural differences concerning the acceptance of pictographs.

Regarding methods for assessment of the pictographs, results for all three question types reveal the difficulty of evaluating pictures with textual glosses, which introduce ambiguity, the language being ambiguous. It is also possible that the respondent understands the pictograph but uses an incorrect word in the case where open questions are used. The choice of a single interpretation among several responses in a questionnaire remains limited. In BabelDr, the patient must choose one or more pictographs among several, which could help him to better understand the meaning of the pictographs in context. For example, if all the pictographs represent lightning, the patient can infer that the lightning probably does not mean "electricity", but "pain".

It would be interesting to conduct another study with more participants and the same pictographs for the three types of evaluation methods even if some pictographs do not exist in all the sets or with different names. Evaluating pictographs is often costly and time-consuming (Kim et al. 2009). To solve this problem, one possibility would be to use a crowdsourcing approach to validate images by a larger community (Christensen et al. 2017; Yu et al. 2013).

Future work will consist of evaluating the BabeldDr interface with Arasaac and Sclera pictographs directly with allophone users. This work started in August 2020. Another aspect that we are working on is the patients' satisfaction regarding pictographic

responses. More future studies need to be carried out with respect to the translation of questions into pictographs to allow bidirectional communication between doctors and more allophone patients in hospitals.

Acknowledgements

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Stefania Gandin

Barrier-free Communication in tourism: Linguistic and structural features of accessible tourism discourse

Research track

Abstract

The research presented in this paper will try to investigate the main linguistic and structural features that allow (or could improve) a higher degree of barrier-free communication in tourism by taking into account two specific case-studies involving aspects of web accessibility, Augmentative and Alternative Communication (AAC) and Easy-to-read and Plain Language, fully or partially inspired to the principles of Universal Design recommended by the World Tourism Organization (2016b).

1   Introduction

Accessible tourism can be defined as a form of tourism that "enables people with access requirements, including mobility, vision, hearing and cognitive dimensions of access, to function independently and with equity and dignity through the delivery of universally designed tourism products, services and environments" (Darcy and Dickson 2009, 34). In the last years, there has been an increasingly growing interest for the needs of disabled travellers on behalf of many tourism operators that have finally started to specialise in accessible tourism services by offering package-holidays, facilities and destinations tailored to respond (or at least partially meet) the requests and needs of tourists with disabilities.

Accessible tourism represents a valuable sector for the tourism industry, both in a contemporary and future perspective, considering the current and ever-increasing rate in population ageing and age-related disabilities, particularly in western developed countries. Indeed, accessible tourism audience encompasses a wide range of beneficiaries, including both people with permanent physical or sensory disabilities, or cognitive impairments, and other population groups that may experience accessibility issues at some point in their lives (i.e.: people with injuries or temporary disabilities, caregivers, people with pushchairs or prams, persons with obesity, food intolerances and/or allergies, and so on) (World Tourism Organization 2016a). Several studies and economic reports estimate that accessible tourism stands at about 12% of the European tourism market, generating incomes for over 400 million Euros, and that accessible tourism services and facilities will be needed by 27% of the European population by 2030 (cf. Ambrose 2014; European Commission 2015; World Tourism Organization and United Nations Development Programme 2017). However, there is still a significant divide between provision and demand of accessible tourism services in Europe, since there are currently more than 3 million tourism businesses that are unable to effectively support the accessibility market. Furthermore, the degree of accessibility of tourism information and booking systems is still rather inadequate, thus creating an additional communication barrier to those who seek accessible tourism information and travel possibilities (European Commission 2015). Actually, even language can become a barrier in the tourism experience, particularly in the way its services and promotional texts are linguistically conveyed and designed. Full dimensions of inclusion and accessibility in tourism could be achieved also by means of a more detailed consideration

and awareness of the linguistic and structural features characterising tourism services and promotional materials.

To date, there are not many studies on the linguistic and structural features characterising accessible tourism discourse. Research in the field focuses mainly on issues of physical accessibility to tourist attractions and relating economic implications (Cruces Portales 2015; Darcy et al. 2010; Shaw and Coles 2004), with a quite varied range of specific case-studies dedicated to the management of travellers with physical or sensory disabilities in specific tourist sites, or the employment of Sign Language(s) or Braille in tourism communication, describing site-specific analyses or accounts of tourists' experiences (Buhalis et al. 2012; Dann 2001; Naniopoulos et al. 2015; Richards et al. 2010). There are some studies dedicated to language and disability, but they are mainly focused on generic reflections on the terminology used to define disabled people and disabilities in everyday communication (Coopman 2003; Goodwin et al. 2004; Iwarsson and Ståhl 2003).

Therefore, this research will try to investigate the main linguistic and structural features that allow (or could improve) a higher degree of barrier-free communication in tourism, by presenting two specific accessible tourism case studies and related textual materials, namely:

- the *Airport4All* app;

- the *AccessAble* website.

The analysis will focus in particular on aspects of web accessibility, Augmentative and Alternative Communication (AAC) and Easy-to-read and Plain Language, fully or partially inspired to the principles of Universal Design. Universal Design (from now onwards abbreviated to UD) refers to "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design", with "the intent […] to simplify life for everyone by making products, communications, and the built environment more usable by as many people as possible at little or no extra cost" (Center for Universal Design 2020). Some of the principles of UD include:

- equitable use, to make a product useful and marketable to people with diverse abilities;

- flexibility in use, to accommodate any possible range of individual preferences and abilities;

- simple and intuitive use, to ensure a product is easy to understand, regardless of the user's experience, knowledge, language skills, or concentration abilities;

- perceptibility of information, to provide the amount and type of information effectively needed by the user, regardless of ambient conditions or user's sensory abilities;

- low physical effort, to make sure the product can be used efficiently and comfortably by any user.

This study will take into consideration the above-mentioned UD principles in a linguistic and translational perspective involving English and Italian, focusing in particular on:

textual and layout accuracy, which should be designed in order to ensure that contents are easy to understand by a large number of readers, including people with visual, hearing or intellectual disabilities (i.e. font and/or image size and

readability; balanced employment and distribution of textual and /or audiovisual contents, etc.);

- employment of multimodal and inclusive forms of communications (e.g. AAC, apps and smart technologies), which may be used along with, or to integrate, the most common textual typologies employed in tourism promotion, such as leaflets, guides, websites, and so on;

- accuracy and consistency of translations, a feature that is often undervalued in accessible tourism discourse (Gandin 2017, 2019; World Tourism Organization 2016a,b);

- balanced employment of English as a lingua franca, which on one hand increases the international promotion of accessible tourism services and destinations but, on the other hand, may become a further 'invisible barrier' in tourism, particularly for people with language disorders or intellectual disabilities, who may not have the necessary linguistic competence to understand a text written in a foreign language.

2 Analysis

2.1 The *Airport4All* app

Airport4All is a free mobile application developed to "ensure the accessibility of Sardinia airports' flights information to all travellers, whether they are impaired or no-impaired people, thanks to real-time updates on their smartphone and ad-hoc messages that support them from check-in to take-off, from landing to baggage pickup" (Airport4All web site 2020). *Airport4All* provides updated flights information to/from the three main Sardinian airports (Alghero, Cagliari and Olbia) and some tourism information about Sardinia, to promote the island and make it become "the preferred destination of accessible tourism" (Airport4All web site 2020). The app can be downloaded on any Android or IOS mobile device through the standard download systems, thus conforming to the UD principles of equitable and flexible use.

From the start menu, users can select:

- the preferred font type, choosing between default, easy reading or AAC font;

- airport of departure/arrival, clicking on the relevant airport icon in an interactive map of Sardinia;

- language of contents, available in Italian (source language), English, French, German, Russian and Spanish.

Figure 1. Airport4All start menu – ENG display

These simple and intuitive options in the start menu can be changed at any time by the user and, from the very beginning, reveal a very inclusive design of the app, addressing the needs of travellers with sensory disabilities and/or cognitive impairments by means of perceptible, flexible and easy to use commands, content-display options and the translation of all textual contents from Italian into 5 other languages, as well as ACC.

After setting the initial preferences*, Airport4All* is able to provide real-time information on any flight, or specifically selected ones, to/from the chosen Sardinian airport, accompanied by other important flight-related data, such as weather conditions, flight status, boarding times and procedures, and so on. The app employs a clear layout characterised by a plain, white background, adequate colour contrast between the text (in black), intuitive symbols (used to indicate, for instance, specific air companies, weather conditions etc.) and AAC icons (see Figures 2 and 3 below). These layout features further increase the legibility and accessibility of information, thus fully complying with the UD principles of perceptibility, equitable use and low effort in use.
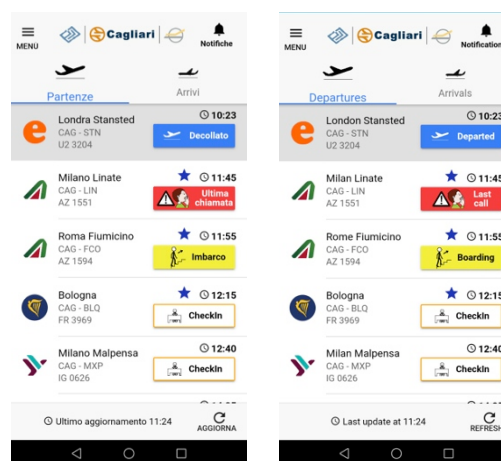
Figure 2 & 3. Flight information screenshots on the Airport4All app: multiple flights selection with AAC options (ITA and ENG displays)

Moreover, the app allows users to receive vibrating notifications on selected flights, which can be also processed by speech synthesizers, thus ensuring full perceptibility and usability of information to people with hearing or visual disabilities.

From a closer linguistic perspective, all relevant details of flights and tourist

information are expressed by means of plain language — free of technical jargon and abbreviations, with short and syntactically simple sentences. Italian source texts borrow some English terms, but mainly in the semantic domain of air travel (e.g. *check-in, gate* etc.), thus balancing the employment English as lingua franca and not hindering textual understandability on behalf of Italian target readers. The corresponding English translations are highly literal, due to the simple syntactic structure of Italian source texts, previously mentioned, and to the level of equivalence of terms and expression related to the semantic field of air travels in the two languages. Besides English, *Airport4All* contents are translated also into German, Russian and Spanish, thus allowing the inclusion of a larger number of users and, consequently, ensuring a higher level of accessibility and barrier-free communication, in compliance with the UD principles of equitability, flexibility and low effort. Barrier-free communication is also achieved by means of the *AAC* option provided by the *Airport4all* app and performed through the dynamic display of 14 drawings accompanied by short explicative texts, related to significant flight information such as security checks, boarding procedures, take-off and landing times and so on (see Figures 4 to 7 below).

Figures 4–5 & 6–7. AAC symbols caption in the Airport4All app – ITA & ENG displays

For these reasons, The *Airport4All* app represents a good example of accurate and inclusive employment of barrier-free language, which employs modern and easy to use technologies along with alternative forms of communication, available free of charge and designed by applying and implementing the UD principles of equitable use, flexibility in use, simple and intuitive use, perceptible information and low physical effort. The only weakness in the author's opinion, is the lack of information concerning the actual physical accessibility of the airports, in terms of information on how to reach the airports and the list of dedicated services for people with disabilities (e.g. information about potential access obstacles, location of accessible toilets, support services and trained staff available on site, and so on).

2.2   The *AccessAble* website

AccessAble is a website dedicated to the promotion of detailed access guides describing tourist venues and attractions located in the UK. Accessibility information is checked by trained surveyors, who visit every location promoted on the website in order to gather pertinent accessibility data and photographs through which any user can assess the actual degree of accessibility of a specific tourist site. The online guides available on the *AccessAble* website are written in a clear style and with plain language, accompanied

by intuitive accessibility symbols that can be also employed as search filters on the website (see Figures 8 and 9 below), thus allowing a faster and more simple operability and complying with the UD principles of simple and intuitive use and perceptibility of information.
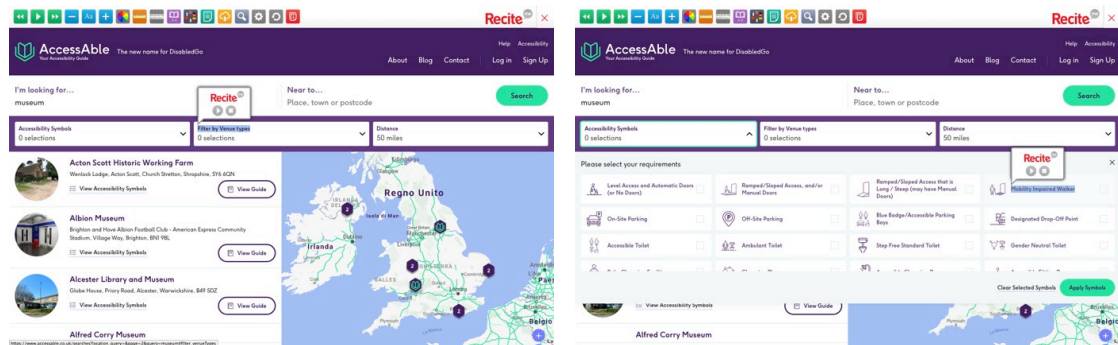
Figures 8 & 9. AccessAble web site – home page display with accessibility symbols and search options bar

The *AccessAble* digital guides can be read through highly flexible access options, such as the *Easy-read* format, or the conversion of the guides contents into downloadable *PDF* and *MP3* files, thus ensuring a high degree of compatibility with a wide range of electronic devices, as recommended by the World Tourism Organization (2016b) in compliance with the UD principles of flexibility, simple and intuitive use and low physical effort. In particular, the *Easy-read* option adapts the website guides into shorter texts, with simpler syntactic patterns free of jargon, acronyms and/or any other kind of difficult term or expression which could hinder textual comprehension on behalf of readers with cognitive impairments (see Figures 10 and 11 below).
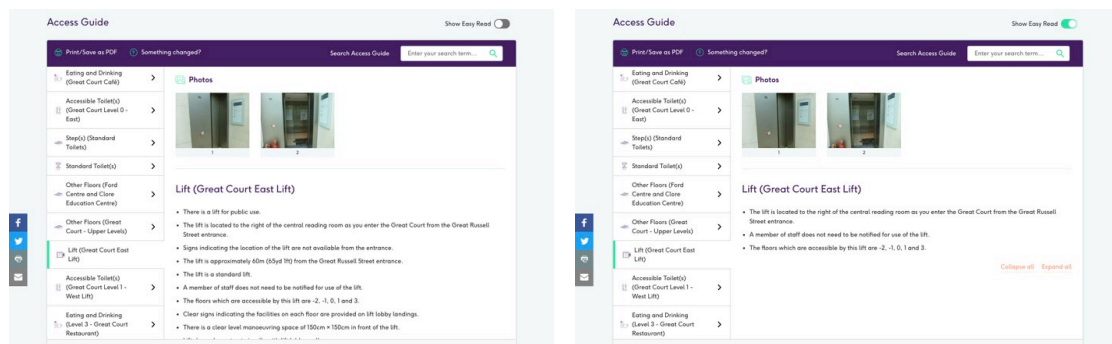
Figures 10 & 11. AccessAble web site – example of plain language text and corresponding conversion into easy-read format

Moreover, the *AccessAble* website and its tourist information can be consulted also with a web-accessibility software called *Recite me. Recite me* is a cloud-based software that allows users to customise a website according to their needs, to ensure that its textual and visual contents can be understood and perceived by everyone, regardless of their impairment (Recite me website 2020). The assistive functions provided by this software are indicated by intuitive icons and symbols on a tool bar located in the upper section of the web page, and can be autonomously operated by any user, thus applying the UD principles of flexibility, simple and intuitive use, perceptibility and low effort in use. More specifically, the *Recite me* assistive functions include:

- Screen reader options, comprising the _Reading aloud_ function, performed in a natural voice, either with a male or female voice, available in 35 different languages besides English; speed controls; download commands, to save these audio contents as MP3 files and allow offline listening.
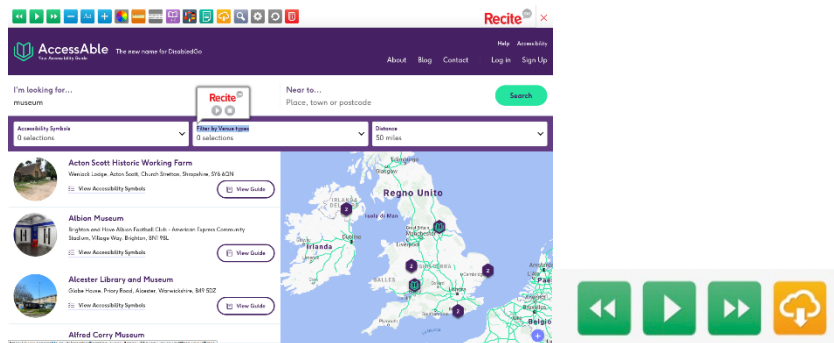
Figures 12 & 13. AccessAble website – read aloud option on selected text (highlighted in blue) and other screen reader commands

- Styling features, including intuitive commands to edit text size and colour, website background colour and text font type, among which users can also select the _Open-Dyslexic font_ and _text-only mode_, to further decrease any potentially disturbing reading option.
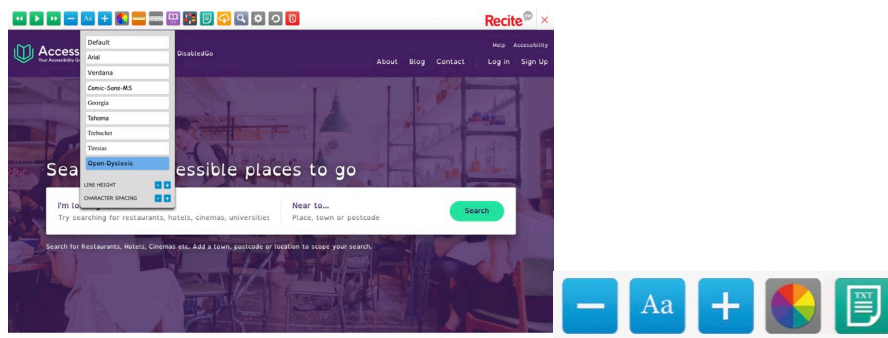
Figures 14 & 15. AccessAble home page, with open-dyslexic font type and other styling commands

- Reading support tools, such as: the _ruler_ option, to read line by line; a _digital Magnifier_, to zoom in to specific parts of text; the _Reading Mask_ feature, to eliminate distraction; an online _dictionary and thesaurus_; an automated _Translation tool_, available in over 100 languages, including 35 text to speech voices.
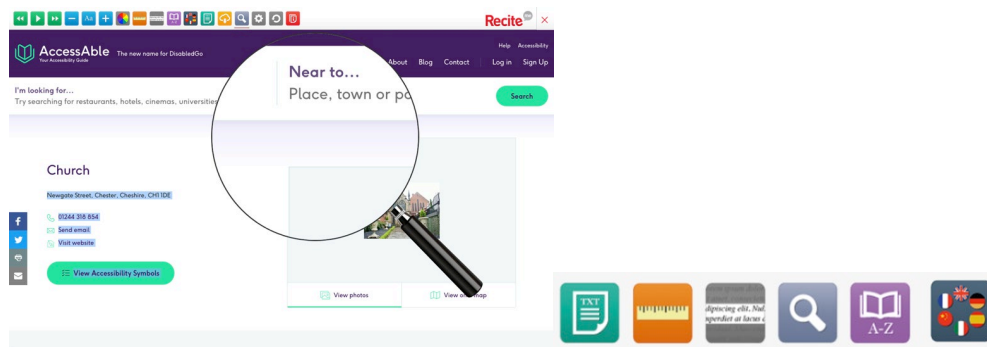
Figures 16 & 17. AccessAble website, with magnifier tool and other reading support tools commands

This kind of linguistic and layout features are extremely useful to people with physical or sensory disabilities, learning difficulties or intellectual disabilities. In particular, the *Read aloud* option may effectively assist people with visual impairment, as well as the digital *Magnifying glass* and the tools allowing users to customize text font, colour, sizing and spacing, colour of the website background. The *Read aloud* option at different speeds and in different languages, either with a male or female voice, is particularly helpful to people with autism. The digital *Screen mask* and *Ruler* allow people with dyslexia or with Attention Deficit Hyperactivity Disorder (ADHD) to better focus on the text and stop being distracted by other contents on the page, such as images or videos. The *Text only* and different *Colours effect* features are very useful to people with serious epilepsy issues, since they allow to hide away any media or graphics that may cause a seizure. The *Dictionary and thesaurus* option is useful for people with hyperlexia, who will thus be able to read words and understand their meanings without leaving the website. Finally, the *Translation tool* can support people with limited knowledge of English, thus addressing an even larger audience of users comprising both people with and without learning difficulties.

The *AccessAble* website, its compatibility and high degree of assistive and adaptive customizable options, which are all available free of charge, make it an excellent example of barrier-free and inclusive communication, addressing and effectively supporting a wide range of disabilities, thus fully applying the UD design principles of equitable use, flexibility simple and intuitive use, perceptibility of information and low physical effort.

3   Conclusions

The analysis carried out on the linguistic and structural features of the *Airport4All* app and the *AccessAble* website showed that universally designed tourism texts can become a powerful tool of inclusion and accessibility, particularly when integrated with assistive technologies, solutions for electronic devices and barrier-free communicative and stylistic approaches. The application of UD principles to the linguistic and structural features of accessible tourism discourse may strongly and positively increase the level of accessibility and readability of tourist services and promotional materials, thus also contributing to the business growth of this sector and, not secondarily, to the development of a more inclusive and egalitarian society.

Far from being exhaustive, the future developments of this research will need to comprise larger analytical scenarios, also in a didactic perspective, in order to collect more consistent and comparable linguistic data, discover new tools and solutions to

overcome those visible and invisible communicative barriers that still hinder people with sensory or physical disabilities, or with cognitive impairments, and raise further awareness on the themes of linguistic accessibility and inclusion.

Acknowledgements

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Giovanna De Appolonia, Elena Rocco & Antonina Dattolo

The #smARTradio® project and the Talking Map® of Aquileia (Italy): How to make a UNESCO archaeological site accessible to all

Professional track

Abstract

#smARTradio® is a project by the Radio Magica Foundation in collaboration with Ca' Foscari University of Venice and the University of Udine, Italy. The project aims to disseminate and promote knowledge of the Italian cultural heritage to a targeted audience of families with children — including those with visual, hearing and/or intellectual disabilities — through audio and video stories penned by renowned Italian authors. In this paper, we will focus on the UNESCO archaeological site of Aquileia in north-eastern Italy to show how the use of a Talking Map® can enable access to and ease the understanding of historical and archaeological contents.

1 The #smARTradio® project

The #smARTradio® project by the Radio Magica Foundation was launched in 2016 and was inspired by the *History of the world in 100 objects* by British Museum director Neil McGregor (2010). The project complies with the Faro convention principles of 2005 (Council of Europe 2020), which were ratified by Italy in September 2020. These principles were developed by the Council of Europe to recognize the existence of Europe's generations-long cultural heritage. They emphasize aspects of heritage which deserve to be preserved, recognized, and shared, as they relate to human rights and democracy, and promote a wider understanding of heritage in relationship to communities and societies (Interpret Europe 2017). According to the Faro convention, citizens of each nation must recognize this heritage as their own, without arrogance but with legitimate pride, so that they can protect and valorise it. In line with such principles, the project's methodology put in first place a participatory approach, involving children, teachers, and families in the choice of the objects of the cultural heritage to be promoted. As Navracsics (2016) maintains, "bringing citizens closer to their heritage means to bring them closer to one another, and this is a fundamental step into a more inclusive society".

The project, which is funded by the Friuli Venezia Giulia Region, aims to disseminate and promote knowledge of Italian cultural heritage through storytelling. The use of storytelling offers an accessible channel for education and learning because it does not only activate rational, descriptive, and analytical thinking, but it also uses emotions and metaphors to stimulate imagination. In fact, high-quality storytelling is able to activate the so-called "story-listening trance experience" (Sturm 2000), a state of mind in which the listener experiences the same type of alterations of consciousness (trance) that occurs in the case of hypnosis; the listener perceives the story as real and forgets the surrounding world. Trance experience can make the story memorable and enjoyable for any reader/listener, including people with linguistic or cognitive barriers to comprehension (Matos et al. 2015).

At the moment, the project platform hosts over 120 stories and 40 fun facts dedicated to tangible and intangible objects of the Italian cultural heritage. All texts were penned by renowned Italian authors and aim to reduce communication barriers through (1) engaging content (use of storytelling) that appeals to a wide audience; (2) simplified

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writing (Plain Language) (Agorni 2016); (3) a variety of digital formats (i.e. audio, video, video in Italian Sign Language); (4) texts in multiple languages; (5) paper maps with a QR code taking the user to an interactive web-based map which, in turn, gives access to on-line audio and video stories.

The project targets families with children, including those ones with visual, hearing and/or cognitive disabilities. Nowadays, family tourism is one of the most important sectors of the tourism industry around the world, accounting for about 30% of the leisure travel market (Minnaert 2018). Recent market analyses confirm that family tourism is driven by the increasing importance placed on promoting family togetherness, keeping family bonds alive and creating family memoirs. For this reason, family travels are predicted to grow at a faster rate than any other leisure travel (Schänzel and Yeoman 2015). Therefore, our project sets out to respond to a growing demand in the travel industry.

Since its inception, the #smARTradio® project has proven to be a very successful tool for the dissemination of the national cultural heritage not only for the tourism industry, but also for the primary and lower secondary education channel (cf. Section 3). Through ad-hoc interactive workshops with Italian authors and heritage experts, children and young persons of lower grade schools of Friuli Venezia Giulia and other regions across Italy are given the opportunity to suggest and explore objects of their own cultural and natural heritage, which they find particularly interesting or fascinating, and have thus the chance to contribute to phase 1 and 2 of the story production process (cf. Figure 1). By doing so, they become project ambassadors.

Figure 1. The #smARTradio® methodology

Following these workshops, well-known authors, illustrators, actors and video makers are engaged by the Radio Magica team to produce short fictional texts (phase 3 and 4), which are then converted into audio and video stories (phase 5), to disseminate knowledge of select objects to the wider public (phase 6). Dissemination is approached through multiple channels, i.e. web and FM radios, museum educational services, online newspapers and magazines, schools, tourist offices, libraries, theatres, literary festivals and live storytelling events. Furthermore, #smARTradio is a touring project: once the production of texts and relevant audios and videos for any given geographical area has been completed, new lower grade schools based elsewhere are invited to experience the project first-hand and be the propeller of a new cycle of stories.

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2   The Talking Map® of Aquileia

One year after the project's launch, a user experience survey conducted in museums, tourist offices, schools and municipalities highlighted the need for a tangible product associated with the stories on the platform. A new product called Talking Map® was therefore designed to meet this need. Each paper Map consists of a front and a back and is made in collaboration with a professional illustrator to ensure a graphically attractive and accessible design product. On the front, the reference area (e.g. a region, a city, a museum) is drawn together with the cultural heritage objects narrated in the corresponding audio and video stories. On the Map's back, there are learning games and quizzes linked to the stories and to the cultural heritage objects to engage and entertain the younger generations. Moreover, a QR code allows a quick access to the digital version of the Map, which is accessible from the #smARTradio® platform. Each Map is browsable from any mobile device through a dedicated web app developed by the University of Udine (Corbatto et al. 2019).

In this paper, we are presenting the Talking Map® dedicated to the UNESCO site of Aquileia in north-eastern Italy (cf. Figure 2). It is an illustrated map of the town of Aquileia, in which all monuments and buildings of historical, archaeological and artistic importance, from the Roman age to the first half of 1900, are shown. Moreover, there are decorative elements, which are meant to capture children's and adults' attention, and make the Map as fascinating as an illustration or photograph, rather than a simple topographic tool. For instance, a nineteenth-century train is represented to indicate the now disused railway, which connected Aquileia with the hinterland. The east side of the map is decorated with plants, flowers and animals such as deer, a turtle, a hare, and a rooster to indicate a rural area, but also to recall some of Aquileia's mosaic subjects. At the top of the map, two big seagulls recall the proximity of the sea.

Figure 2. The Talking Map® of Aquileia

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On its back, the paper Map lists the titles of 15 stories and 25 so-called fun facts. Fun facts are short texts that answer specific questions, such as "Do you know why Aquileia is famous in history?" (Radio Magica Foundation 2020a), "Do you know who Jupiter Ammon and Medusa were?" (Radio Magica Foundation 2020b), and "Do you know the secret of the bell tower?" (Radio Magica Foundation 2020c). Both the stories and the fun facts, which can be downloaded in *easy-to-read* font (Biancoenero edizioni 2014), have been converted into multimedia formats including 35 audios, 9 videos, and 2 videos with Italian sign language, and can therefore be accessed through the web app.

Involving a target of children, families and people with disabilities requires agile, fun, and family-friendly tools, which are able to catalyze attention while, at the same time, ensuring accessibility. With this Map, storytelling plays a valuable role in every single moment of the site visit. In fact, before and after the visit, it is possible to navigate the Map through the web app, while during the visit, anyone with a cell phone can use the QR code to access the web app and simply enjoy listening to the stories or fun facts and watching the videos on site. In this way, families are encouraged to visit places of historical and cultural interest, while children are stimulated to enjoy the experience of discovery.

2.1 Text accessibility

In 2009, the Manifesto for the promotion of Accessible Tourism (Ministero del Turismo 2009, para. 6) underlined the urgency of "positive communication that [...] must be spread in formats that are accessible to everyone and through all the information and promotional channels of the world of tourism". The #smARTradio® project and the Talking Maps® were born with the aim of reaching out to a large and heterogenous target group, including children with disabilities. In order to give an extended audience the chance to enjoy the beauty of a UNESCO site, it was important to invest on communication strategies and create accessible but, at the same time, appealing texts in multiple formats (i.e. audio, video, video with Italian sign language).

As already stated before, the Map texts are intended not just to convey simple basic information regarding a selected object, which would most likely be unappealing to many visitors; there is rather a mix of informational segments — presented as fun or nice-to-know facts — as well as fictional stories involving a major monument, object, or site of the cultural heritage. Fun facts may not necessarily capture the listener's attention by hooking him/her on an emotional level, but they do have two advantages: they arouse interest with curious questions, and they present shorter texts than stories, facilitating therefore comprehension for shorter attention spans. The following fun fact, for example, answers the question "Do you know why a rooster is fighting a turtle?"

> One of the most famous mosaics in Aquileia shows the fight between a rooster and a turtle. It symbolizes the battle between good and evil. The rooster, the creature which announces the beginning of each new day with a cock-a-doodle-doo, here represents the light and all that is good.
> In contrast, the turtle, which is shown retreating into its shell, represents darkness and thus evil. In fact, the word 'turtle' comes via old French from an Ancient Greek word which meant "house of Tartarus", or the dwelling of the wicked.
> In Aquileia, archaeologists have discovered not just one, but two mosaics portraying this battle: one on the floor of the basilica, near the entrance, while the other is in the crypt. These images weren't just chosen by chance: their purpose was to tell stories, which would teach people how to become good Christians and so become closer to God. (Radio Magica Foundation 2020d)

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The storytelling methodology, on the other hand, allows to create entertaining and captivating texts at the same time. For instance, in order to explain to a young audience the importance of the Roman thermal baths in Aquileia, the Map gives access to a video story titled "Murder at the Roman Baths" (Radio Magica Foundation 2020e). After an introductory paragraph, which describes the protagonists, the story continues as follows:

> The two criminals had travelled in from the countryside. When they entered the bath house, they couldn't believe their eyes: they had never seen such luxury. The whole place had been designed to strengthen the body and cheer the spirit: the rooms were decorated with colourful mosaics, there were gyms to do exercise and a number of swimming pools full of hot water, warm water and cold. There was even a library!" "This place is huge, brother," Tarquinius exclaimed, his mouth gaping open like a fish on a hook. "Of course, it is. Didn't you know that Emperor Constantine had these baths built in Aquileia to be as big as the ones in Rome?" replied Cornelius. "Come on, let's go and warm up in the *calidarium,"* he said pointing to the big pool full of hot water […]. (Radio Magica Foundation 2020e)

Since we believed that the creation of the texts was the most important step that would determine the success of the whole Map project, heuristics for a simplified Italian were written to guide the authors in their writing process (Rocco et al. 2018). Our goal was to create texts that would not be oversimplified, so that they could still appeal to the general public.

Due to the COVID-19 emergency, it was not possible to collect significant results from a series of accessibility tests that we had planned to run for both the paper and digital Map in 2020. However, it was still possible to carry out some work on text accessibility. The Italian version of "Murder at the Roman Baths" (Radio Magica Foundation 2020e) was used to run a quantitative text analysis. The first tool used was Gulpease (Lucisano and Piemontese 1988, via Corrige.Leggibilità), a readability index that is calibrated for Italian language content. The index works on two linguistic variables: the length of the word (in characters) and the length of the sentence (in words). This assessment method shows some limitations, in that a word length does not necessarily coincide with its difficulty; the same applies to sentence length, since we assume that longer sentences are always grammatically more complex, but this is not necessarily the case. The Gulpease scale of readability value goes from 0 (minimum readability) to 100 (maximum readability). The readability value obtained is measured with respect to three levels of schooling: elementary (80 and up), middle (60 and up) and high school (40 and up). The readability value we obtained for "Murder at the Roman Baths" (Radio Magica Foundation 2020e) was 69, which suggested that the text might be difficult for elementary school readers, easy for middle school readers, and very easy for high school readers (cf. Figure 3).
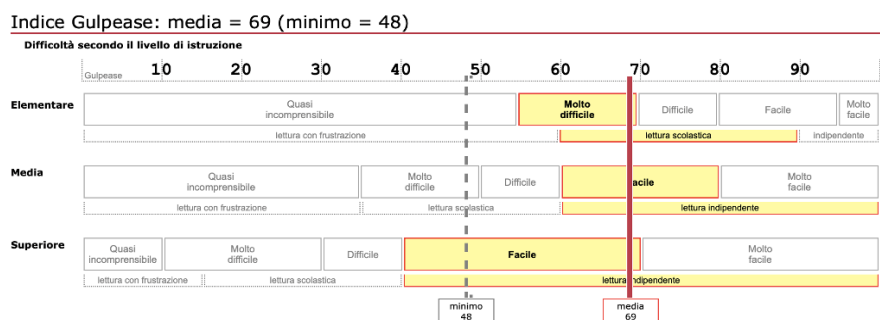

Figure 3. Gulpease readability value for "Murder at the Roman Baths" (Radio Magica Foundation 2020e; graphic representation by Corrige.Leggibilità)

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The Gulpease value indicated, therefore, that a further simplification of the text in question might be necessary. The READ-IT readability assessment tool (demo version; Dell'Orletta et al. 2011) confirmed that the text might pose comprehension barriers, particularly to lower grade school readers. As can be observed in Figure 4, the tool measured a global level of text difficulty of 83.5%, suggesting that the text might not achieve maximally enhanced comprehensibility.

indice di leggibilità	livello di difficoltà	
READ-IT Base	5,8%	
READ-IT Lessicale	89,3%	
READ-IT Sintattico	48,9%	
READ-IT Globale	83,5%	

Figure 4. READ-IT readability indexes for "Murder at the Roman Baths" (Radio Magica Foundation 2020e)

It is also worth mentioning that "Murder at the Roman Baths" (Radio Magica Foundation 2020e) scored a very high percentage on the READ-IT lexical assessment (i.e. 89.3%), thus hinting that the text has a high probability to pose lexical barriers to less experienced target readers. A type/token ratio (TTR) of 0.700 further confirmed that the lexical variety in this text is above average levels as compared to the average TTR obtained from the READ-IT reference corpora.

Following this readability assessment, results might suggest that an intervention to further simplify the text should be taken into consideration. However, excessive simplification, or maximally enhanced comprehensibility, might result in a non-appealing or even stigmatising text for the larger audience (Maaß 2020). The challenge for us is thus to find the right balance between text accessibility and text acceptability for the ultimate success of the project (cf. Maaß 2020). More reception studies are thus urgently needed.

3   Final remarks

The #smARTradio® project and the Talking Maps® have been widely acknowledged as offering a bottom-up inclusive approach to art and culture dissemination in both educational and tourism settings. In 2018, the project was included in the Italian Agenda of the European Year of Cultural Heritage by the Italian Ministry of Cultural Heritage and Activities (MiBAC) and, in 2019, the project won the Tullio De Mauro award at the Global Junior Challenge in Campidoglio (Rome) with the following motivation: "A project with the aim of telling the Italian cultural heritage in a smart way to bring families, young people and non-experts to the world of art. A portal inspired by the British programs of the BBC and the British Museum to bring the History of Art to everyone". This recognition encourages us to continue our efforts to provide innovative solutions, which might result informative and entertaining at the same time, involving both the educational and the tourist fields.

The COVID-19 emergency has rapidly transformed the way cultural activities are perceived by tourists, schools, and general end users. Although this outbreak may be temporary, we should keep in mind that this world emergency has for sure accelerated the move towards digital engagement. It is therefore essential to keep investigating how to create appropriate contents, which could be enjoyed by large audiences.

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Joel Snyder

Audio description as an aesthetic innovation

Professional track

Abstract

In his introduction to the second edition of *The Mastery of Movement*, Rudolf Laban (1950, 6) wrote: "What really happens in a theatre does not occur only on the stage or in the audience, but within the magnetic current between both these poles." He suggests that the performers on stage form the "active pole of this magnetic circuit [and] are responsible for the integrity of purpose" in the performance that determines the quality of the "exciting current between stage and audience" (Laban 1950, 6).

But what happens when the exchange between performer and audience is interrupted or incomplete, not by lack of clarity on stage or screen, but rather by an audience member's lack of access to full perception. How can a blind person "see" a film?

The theory of inclusive design describes one common approach to accessibility. The main tenets are: 1) the designers consider as many different human abilities, limitations and needs as possible; and 2) these factors should be included from the beginning of the design process (Cremers et al. 2013). Innovative practice suggests how access techniques can be incorporated within the development of a film. It is then not an "add-on" but an aesthetic innovation and an organic part of the work that can benefit all people.

1   Introduction

Audio Description (AD) is a translation of images to words — the visual is made verbal and aural, and oral. AD makes visual images accessible for people who are blind or have low vision. Using words that are succinct, vivid, and imaginative, media describers convey the visual image from television and film content that is not fully accessible to a significant segment of the population (more than 32 million Americans experience significant vision loss (American Foundation for the Blind 2018). AD also provides benefits for the sighted audience who may never fully realize all that can be perceived with the eyes — who see but who may not observe. On television, it is for people who are blind or have limited vision *and* sighted people who want to be in the kitchen washing dishes while the show is on.

2   "Traditional" audio description — *The Color of Paradise*

First, let's consider the power of AD as an access technique with an example of traditional audio description.

In presentations on AD, I ask participants to "see" what description is all about by having them close your eyes (figuratively) and experience only the original *soundtrack* of an excerpt from a major motion picture, *The Color of Paradise* (Majidi 1999; the audio described video is available here). What can you glean about the film when you're limited to listening only.

The original audiotrack of the two-and-one-half excerpt consists almost exclusively of bird sounds. Reactions include: "That was long!", "What was going on?" The listeners experience the frustration that is encountered by a person who is blind.

Next, I have people experience the same excerpt again — they are all still "blind" as

there is still no picture, but I add the audio description I wrote and voiced when the film was broadcast on national television in the United States. Will it make a difference? I ask participants to see by listening.

What follows is an annotated version of the AD script for the excerpt. (Cues in CAPS; descriptions preceded by ">>". Annotations are at right, keyed to numerals in description text.) Note: The appearance of the character "Mohammed" is described earlier in the film.

AD script	Comments
1 01:01:36:12 00:00:10:26 >> Mohammed kneels and taps his hands through the thick ground cover of (1) brown curled leaves	(1) – Color has been shown to be important to people with low vision, even people who are congenitally blind.
4 01:01:52:19 00:00:00:23 ... [GASP/CHIRPING :02] (2)	(2) – Timing is critical in the crafting of description. We weave descriptive language around a film's sound elements.
5 01:01:54:19 00:00:15:00 >> His palm hovers above the baby bird. He lays his hand lightly over the tiny creature. Smiling, Mohammed (3) curls his fingers around the chick and (3) scoops it into his hands. He stands and strokes its nearly featherless head with a fingertip.	(3) – Vivid verbs help conjure images in the mind's eye.
7 01:02:09:12 00:00:17:19 >> Mohammed starts as the bird nips his finger. He (4) taps his finger on the chick's gaping beak. He (4) tilts his head back, then drops it forward. Mohammed (4) tips the chick into his front shirt pocket. Wrapping his legs and arms around a tree trunk, Mohammed climbs.	(4) – Description, like much poetry, is written to be heard. Alliteration adds variety and helps to maintain interest.

Note: Throughout this excerpt, for the most part, descriptions are written to be read "in real time," i.e., as the action being described occurs on screen. However, in many films, descriptions may precede the action on occasion. This is a useful convention — it accommodates timing required in films with a great deal of dialogue and allows description users the opportunity to know "what happened" moments before the action occurs.

AD script	Comments
13 01:03:18:15 00:00:10:15 >> (5) An adult bird flies from a nearby branch. Mohammed extends an open hand. He touches a branch and runs his fingers over wide, green leaves.	(5) – What to include? This image is important – the adult bird returns in the next scene.
21 01:04:03:04 00:00:13:04 >> He rubs the top of the chick's head with his (6) index finger. Mohammed (7) wiggles his finger like a worm and taps a chick's open beak. Smiling, he slowly lowers his hand.	(6) – Be specific -- precision creates images! (7) – Similes paint pictures!

3 Audio description as a part of the whole

But how does one incorporate accessibility — AD in particular — as an essential part of the piece being described? As an aesthetic innovation?

The theory of inclusive design describes one common approach to accessibility. The main tenets are:

1) the designers consider as many different human abilities, limitations and needs as possible; and

2) these factors should be included from the beginning of the design process.

While AD may benefit a wide audience, it is rarely considered from the beginning of the process. As a post-production activity (similar to other localization accommodations like subtitling or dubbing) many filmmakers have limited awareness of the existence of AD and even less understanding of the latest research which suggests how the access technique can be incorporated within the development of a film. It is then not an "add-on" but an aesthetic innovation and an organic part of the work that can benefit all people.

When I coordinated funding from the Interdisciplinary Arts Projects category of the National Endowment for the Arts, I wrote guidelines that read in part: "This category encourages experimentation in the area of accessibility as an aesthetic innovation, e.g., interdisciplinary work with sound elements that are visually accessible through the use of computer-graphic technology; visual elements that are tactile or aural; innovative use of signing or audio description; movement involving older or disabled people, etc." (National Endowment for the Arts 1988, 21).

The following links will take you to several recent video projects which have included access as a part of the whole following the tenets of inclusive design; members of these creative teams took responsibility for accessibility as part of the production process eliminating the need to add a separate layer after the fact. The production then become accessible to a wider audience. This notion allows filmmakers to meet an obligation for inclusion while incorporating innovative techniques thus increasing the production's aesthetic viability. I think that these examples demonstrate how video can incorporate alternative audio description from the perspective of inclusive design as well as its use as a novel media production technique.

Example 1: Odd Job Jack "Donut Jack"

Audio description for this animated video has been included as a part of its overall narration.

Example 2: Hamlet "Ballroom"

In this brief, dialogue-free excerpt, the audio description provided has been written in iambic pentameter, matching much of the dialogue.

Example 3: Stevie Wonder's "So What The Fuss"

Mr. Wonder commissioned the audio description for the first-ever audio described music video and instructed that it be written in the style of the video; rapper Busta Rhymes was hired as the voice talent for the audio description.

4 Conclusion

A true story: a blind fellow visiting a museum with some friends was once asked, "Excuse me, but what are you doing in a museum? You can't see any of the exhibits." His response? "I'm here for the same reason anyone goes to a museum. I want to learn, I

want to know and be a part of our culture." His inability to see should not deny him access to our culture and I believe it the responsibility of our arts institutions to be as inclusive as possible. It is all about access to our culture and that is everyone's right. There simply is no good reason why a person with a particular disability must also be culturally disadvantaged.

In the United States, the principal constituency for AD has an unemployment rate of about 70%. I am certain that with more meaningful access to our culture and its resources, people become more informed, more engaged with society and more engaging individuals — thus, more employable.

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Audio description and ethnicity

Research track

Abstract

This paper deals with the delicate issue of the description of ethnicity and race in audio descriptions. While the aim of audio description is to provide blind and visually impaired viewers with as much information as possible, the very act of describing the ethnicity of a character brings with it a series of politically charged challenges which admit of no straightforward solution. Little has been written on this topic so far, yet it is an everyday problem for audio describers. This paper draws on the existing literature, but also interviews conducted with four blind audio description users as well as three members of interest groups representing non-Caucasian people in Germany. While the four blind interviewees answered fairly similarly, there were some discrepancies in the replies of the members of the interest groups, which highlights the need for further research, as well as the fact that there is no easy solution to this problem, and it might not be possible to accommodate the needs of all the groups concerned.

1 Introduction

In our increasingly globalised world, there is a growing need to describe characters of different ethnic backgrounds. This paper aims to explore the two main issues audio describers face when dealing with a multi-ethnic cast (or possibly even with an ethnically homogenous cast): 1) should a character's ethnicity be mentioned, and 2) how should it be described? The reasons for describing — or not describing — a character's ethnic background shall be investigated. The terms "ethnicity" and "race" are used here to describe skin colour and/or ethnic traits, i.e. it refers only to visual information a sighted viewer is provided with, not to nationality, ethnic affiliation etc.

This paper draws on the existing literature, but also on interviews which I conducted with members of the two groups most affected by this problem: representatives of interest groups of people of non-Caucasian backgrounds in Germany, as well as blind audio describers and users of audio description. I interviewed the former as representatives of the respective interest groups and the latter as individuals. Of course, the number of audio describers/users of audio description is not representative, but the responses of all four individuals were surprisingly similar and can be seen as supplementing the findings of, for example, Elaine Gerber (2007, see Section 3.1).

2 Methodology

In order to gain a better insight into the current situation in Germany and to gather information more specifically tailored to my research question, in addition to consulting the literature on the topic, I conducted interviews with the two groups I considered most affected: a) blind or visually impaired recipients of audio description and b) people with a non-Caucasian background.

The interviews were structured with open questions and conducted on the phone due to distancing under Covid measures. All interviews were recorded. None of the interviewees received an honorarium.

The group of blind people consisted of four blind white German men and women over the age of 50, all of whom are users of audio description as well as experienced audio describers.

The group of non-Caucasian interviewees consisted of three representatives of interest groups of people with non-Caucasian ethnic backgrounds in Germany (i.e., *Each One Teach One*, *Initiative Schwarze Menschen in Deutschland Bund*, *Korientation*, and *Türkische Gemeinde Deutschland*). Two of them were women, one was a man. They did not disclose their ages. A fourth interview, with a representative of *Neue Medienmacher*innen*, could only be conducted after finalisation of this paper and was therefore not included.

In addition to the interviews, I gathered information from academic literature as well as literature and podcasts by people from the two most affected groups mentioned above.

This paper constitutes a first approach to the subject of the description of ethnicity, providing a foundation for much needed further research.

Over the course of the interviews conducted, it became clear that while both groups were keenly aware of the way in which the issue impacted on their own interests, they were not fully aware of the needs and concerns of the other group. In future, it could prove productive to conduct preliminary talks in advance of the main interviews in order to provide members of both groups with a brief insight into the other group's perspective. This would allow for a greater level of dialogue between the affected groups.

3 Describing ethnicity

3.1 Whether or not to describe

Creating an audio description means taking decisions: which of the many visual aspects should be described, which can be omitted, which are important, how should they be described, how should a description be phrased to be concise and to the point and yet fit into the space between elements of dialogue? A character's appearance is one of the pieces of visual information audio describers are advised to describe (e.g. ITC Guidance 2010; FFA 2017; Landesrundfunkanstalten 2015), and this is coupled with the decision of how to deal with the visual aspect of a character's ethnicity. The general rule for audio describers to just describe what they see or, in Snyder's (2008) words, to make the visual verbal does not make the decision any easier or clearer, as different people see different things, and the outcome will depend on the individual watching a film as well as the context (Gerber 2007, 29).

While the guidelines of German broadcasters and the German Federal Film Board (FFA 2017; Landesrundfunkanstalten 2015) deem it necessary or advisable to mention a character's ethnicity, Benecke (2014, 17) calls for a more cautious approach and advises against the description of ethnicity unless it is necessary for understanding the film, furthermore warning that the utmost caution has to be applied "in some countries". Several guidelines suggest describing a character's racial traits only when they are relevant to the plot (see for example Media Access Australia 2012; ITC Guidance 2010, 21; Bittner n.d.), yet some add that if ethnic traits of one character are mentioned, the ethnicity of the other characters must be described accordingly (e.g. Snyder 2010, 11; Netflix 2020).

None of the works mentioned above go into much detail as to why it may or may not be advisable to describe ethnicity, although Snyder (2010, 11) explains that citing only

non-white traits would lead to the assumption that whiteness is the default.

According to Guess (206, 653–54), the concept of race in its social significance is more of a social construct than a biological reality and is "informed by historical, social, cultural, and political values". Therefore, it seems only logical to ask, as Gerber (2007, 27) does: "What is culturally salient in the visual field?" Gerber (2007) conducted a telephone survey in the US with three focus groups consisting of 39 blind people of different ethnic backgrounds — although most of them were white.

Asked whether or not they wanted the audio description to include the description of race, the majority of the participants replied that they did indeed want to know the characters' races (Gerber 2007, 32).

This corresponds to the replies I was given in my interviews with blind audio describers/users of audio description (i.e., Eberl, Fickert, Kaminski, Röding). All of them stated they wanted to know the characters' ethnicities. However, when asked whether or not that included white characters, it emerged that they were only referring to non-white characters. The reason they gave for expecting this description was that sighted people had this visual information, and they wanted to be on the same page as the sighted audience, and to have access to the same information. Kleege (2018, 103), herself legally blind, takes a similar view and talks of "withheld information". Fryer (2016, 152) even claims that omission "equates to censorship".

The replies of the interviewees of the interest groups were not quite as unanimous. Della (of *Initiative Schwarze Menschen in Deutschland Bund*), when asked whether or not ethnicity should be described, was adamantly against describing race. His approach was like that mentioned above: ethnicity should not be described; at least not if white characters aren't also described as white. The only exception is if a character's ethnicity is of relevance to the plot. Then it can be described. But if ethnicity is described, all ethnicities must be described, including white characters. According to him, there is no value in providing information on a character's ethnicity. On the contrary, describing (only) non-white ethnicities perpetuates the idea that whiteness is the norm and everything that is not white is "different". Rather, we should strive to eventually get away from these (racial) markers, such that using them in an audio description does not make a lot of sense.

Suda (of *Korientation*) takes a slightly ambivalent approach. In response to the question of whether or not ethnicity should be described, she replied that this is a difficult question, and that it depended on the respective film or series. If, for example, the main character is "read" as non-white or deviating from the mainstream, this will have an impact on their worldview, therefore the ethnicity ought to be described. If it is a minor character, their ethnicity should not be mentioned, unless they interact with the main character. Generally, ethnicity should be described where people of different ethnicities interact, particularly when the nature of their relationship deviates from the stereotype. (For example, in the Western world, people of East Asian descent are often perceived as docile or obsequious. So, in a film where the boss is of East Asian descent and the subordinate is white, this needs to be described.)

Suda, too, cites plot relevance as an indicator for describing ethnicity. She considers mentioning a character's ethnicity where it is of no relevance to the plot as being potentially confusing.

On the other hand, she points out the importance of non-white people becoming more visible, so that, from that point of view, ethnicity ought to be described.

This is an approach that Steinbach (of *Each One Teach One* and *Türkische Gemeinde Deutschland*) also takes. Without hesitating, she replied in the affirmative when asked whether ethnicity should be described. She is aware of a certain ambiguity,

the challenge to find a balance between saying "forget it, we are just a colourful mass" so that a description is not necessary, and the fact that people of non-white origin experience the world differently, and are "read" differently. Therefore, it is important to describe ethnicity so that the audience knows that those characters will have a different reality from that of white characters. She quotes a poem by P. Parker (n.d.), which deals with that very dilemma: "The first thing you do is to forget that i'm Black. / Second, you must never forget that i'm Black." Like Della, she is of the opinion that all ethnicities ought to be described, including white, in order to avoid setting whiteness as a norm. But unlike Della, she claims that "colour blindness" (i.e. not "seeing" and hence not describing race) is a kind of racism, as it ignores the different realities people of colour have to deal with.

To her, it is not just plot relevance which has to be considered, but relevance to the entire film as a whole. So, a character's ethnicity may not be relevant to the plot as such, but it may be important to the film that the cast is not all white. A film set in Berlin, for example, could aim to show the reality of Berlin's multi-ethnical environment. Therefore, while the characters of colour may only be extras with no impact whatsoever on the actual plot, describing their ethnicity is still important to the film as a whole, as it sets out to represent present day Berlin and a multi-ethnical normality. This corresponds with the findings of Gerber (2007, 34): "[…] race is always salient, regardless of whether it is central to the plot, because it is central to our culture."

But according to Steinbach there is yet another reason for the mentioning of a character's ethnicity. She is not talking of "visibility" like Suda, but of "representation". It is important to show that there are characters of different ethnical backgrounds in a German movie. A great number of inhabitants of major German cities have what in Germany is called a "migration background" ("Migrationshintergrund"), and this may be mirrored in audiovisual media. To people with such a background, it can be important to find themselves represented in films. And this is also true of a blind audience of a non-white background.

This aspect, the aspect of representation and identification, is a subject I have also come across elsewhere. For example, it is discussed at length in Twayna Mayne's podcast (2019), explored in Eddo-Lodge (134ff.) and also mentioned in Thomas Reid's podcast (2018). Being represented, finding public figures and celebrities of one's own ethnic background to identify with is of vital importance (Twayna Mayne 2019).

Steinbach gives the example of a black police detective who can now be seen in a famous German detective series ("Tatort", Buch 2019, 2020; Oetzmann 2020). This corresponds with what Suda said about making hierarchies visible which differ from the stereotypical standard. As Frankenberg (1999, 70) found, in certain settings (as domestic workers) non-white people can easily be "invisible". So it may be all the more important to describe casts which differ from the standard role models, like the black woman as the care giving "mammy" type (Jones 2019). This is of major importance as all three representatives of interest groups stated they assumed that the viewers' expectations regarding a character would differ depending on the ethnicity they would be described as having.

Fryer (2013) warns against giving unnecessary information in an audio description as this could lead to "an expectation of its [the described item's] importance" and waste the blind or visually impaired viewer's cognitive effort. Couldn't this include the (potentially unnecessary) description of a character's ethnicity? The ITC Guidance (2010, 21), too, suggests that often mentioning a character's ethnicity might lead to the audio description recipient thinking it could be of importance. Asked whether they would expect a minor character whose ethnicity has been described to become more important later in the film, all four blind interviewees replied in the negative. Getting a description

of a minor character's race would not lead them to expect anything and would not distract them from following the plot.

3.2 Terminology

Obviously, terminology differs from language to language and from culture to culture. This isn't just a matter of the words (i.e. the language); moreover, what may be acceptable in one language may be an absolute "no go" in another. (Being German, for example, I struggle to use the term "race", as this word — or rather its German equivalent "Rasse" — was used to justify all kinds of crimes in Germany's not-so-distant past and is now more or less taboo, unless used to refer to a breed of animal.) Also "the importance of race is likely to vary from one culture to another and even from one individual to another" (Fry 2016, 150–51). Or, as Gerber (2007, 31) puts it: "Cultural categories of race vary from place to place: people sort one another into racial categories according their local culture's instructions."

Yet practical experience has shown that describers are struggling with the terminology and need guidance on acceptable terms. Their ignorance can lead to the usage of highly inappropriate and offensive words when all they mean to do is to be considerate. Some of the freelancers I work with, for example, are under the impression that the term "schwarz" ("black") may not be used, in spite of our reassuring them that that is the correct terminology. So instead they use terms like "farbig" ("coloured") or "dunkelhäutig" ("dark-skinned"), both of which are absolutely taboo and offensive (Amnesty International 2017; Der braune Mob et al. 2006, 4). One describer describing a film set in South Africa even decided to describe a group of black women sitting on the back of a pick-up truck as "Einheimische" ("natives"). This is wrong on several levels, chief among them: a) it is not a useful description, as there are natives of all kinds of different skin colours in South Africa, so describing someone as "native" does not say anything about their ethnicity; b) describers should describe what they see, they should not guess or interpret. You cannot see that someone is a "native". What you see is that they are black women, what you don't see is where they come from. They could be exchange students from Bavaria, trainees from Sweden or tourists from Zimbabwe.

This example shows a strange assumption: black people are from Africa, people of East Asian appearance are from East Asia. This assumption is, of course, wrong. A certain skin colour or a certain ethnic trait does not allow us to deduce a person's origin. You can be black and British, of East Asian appearance and German, mixed race and Japanese. It is therefore not correct to describe somebody with the certain features as "East Asian", because they may not be Asian at all, but rather European or African. Describers therefore have to be very careful with regards to how they phrase their descriptions and, as Della pointed out, use phrases like "appearing to be", "of xx appearance" etc.

This is the case even more in a day and age where "blackfishing", i.e. posing as a person of colour, seems to be on the increase (Elan 2020). Just because somebody looks black, does not mean they necessarily are black.

I asked the three representatives of interest groups about their thoughts on terminology. They all agreed that a terminology should be used which has been approved and is used by the respective ethnic group themselves. Some terms are easy to use, others appear a bit clumsy. In German, at least, it is difficult to find appropriate terminology for people of a mixed raced background (as I explained earlier, "race" is a taboo term). Describers might have to get a bit creative. Also, it can be tricky to describe black people of various shades. While politically and from an activist point of view, black people are black, no matter what shade of black their skin, from an audio description

point of view this can be of importance, as it may play a role in the plot. Steinbach suggests "light skinned black person" and "dark skinned black person", but concedes that these terms could be improved on.

Both Steinbach and Suda consider the usage of terminology which evokes stereotypes or exoticism (e.g. "with almond-shaped eyes" for a woman of East Asian origin) as absolute "no gos".

According to a text for journalists regarding adequate terminology when writing about people of colour, published by several interest groups of people of colour in Germany, the use of "terms stemming from the food or wood industry", like "cappuccino coloured" or "ebony coloured", is out of the question (Der braune Mob et al. 2006, 5, my translation). Della also counts all terms pertaining to a "colour scheme" (like "coloured") among the taboo terminology.

Media Access Australia (2012) simply stipulates that describers should never use "racist or offensive terms".

4   Discussion and conclusion

As I have shown above, the issues are manifold and multi-layered, and there is no "one size fits all" solution to the problem at hand. Even the representatives of the various interest groups have different approaches and requirements, and for many aspects of this issue, there is no "right" or "wrong" way of dealing with it. The interview with Steinbach made clear that "colour blindness" is not necessarily in the interest of the people described. Also, what is pertinent to (the plot of) a film cannot easily be determined, as film characters of a non-Caucasian background, while having no impact on the plot development as such, may, for example, be meant to reflect the ethnic reality of Germany today. Furthermore, the blind interviewees made it clear they feel it their right to know a character's ethnicity. Yet at the same time, mentioning ethnicity may put emphasis on this one trait of a character which plays no role whatsoever in the context of a film. And describing only non-Caucasian ethnicities marks them as "other", as both the existing literature as well as the interviews with the representatives of interest groups established.

Whether and how ethnicity should be described has to be decided individually for each individual film or series. But it is of vital importance that the describers be aware of the sensitivity of the issue and the dilemmas involved. They must always use a non-offensive vocabulary, a terminology used and sanctioned by the respective ethnic group(s). They must take informed decisions rather than use "well meant", but entirely inappropriate terminology. This they should keep in mind and describe accordingly.

Let me end with a quote by Justice Harry Blackmun (n.d.), which, like the poem earlier cited, sums up the dilemma audio describers are faced with: "In order to get beyond racism, we must first take account of race."

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Ismini Karantzi

Barrier-free access to audiovisual content for blind and visually impaired people: A case study

Student track

Abstract

When it comes to barriers in accessing information and culture for people with disabilities, accessibility becomes immediately multifaceted, since access to audiovisual content is vital and its importance is paramount to our fundamental right to freedom of expression and information (Cappello 2014). By virtue of being an intersemiotic activity, which involves making verbal what is non-verbal, audio description (AD) transforms images into vivid narration (Matamala and Orero 2007), being a "verbalisation of visual codes" (Kruger 2012). In the case of non-dubbed foreign films, the original dialogue or narrative should be audio subtitled. This paper presents part of our wider research on AD and audio subtitles (AST) of foreign animation films in Greek and aims to find the best strategies in synchronisation and voice delivery to provide an optimal filmic experience for blind and visually impaired people (B/VIP). The work explores also how to integrate touch as a secondary communication channel to deliver additional information along with AD.

1 Credits

2 Introduction

Audiovisual texts consist of a combination and interaction of verbal elements, non-verbal elements, audio and visual elements (Zabalbeascoa 2008, 24–25). Films, as multimodal texts, combine several semiotic modes, such as language, visual images and sound. To make them accessible for people with sensory and visual impairments, the content has to be adapted to another medium and another modality, that is, audio description for blind and visually impaired people (B/VIP). Audio description (AD) is an intersemiotic translation in which images are translated into words (Mangiron and Maszerowska 2014). As Zabrocka argues,

> [s]ince AD is classified as a type of translation, an audio describer has the same aim as the translator who translates from language A to language B, in order to make any given text comprehensible for a person with linguistic or other barriers. However, for an audio describer the difference is that the source code is a language of images and the target code is any language understood by the AD receivers. (Zabrocka 2018, 212)

The words to be used in the AD scripts should be well and carefully chosen to convey the meaning of each scene of the film. As Snyder (2008, 196) explains, "AD is considered a form of audiovisual translation — a way to translate information that is perceptible in one sense (visual) to a form that is comparably accessible with another (aural)". This is normally done using words that are succinct, vivid, and imaginative in order to convey the visual image that is not fully accessible to B/VIP. Besides, B/VIP's alternative senses are predominantly hearing and touch.

Since AD of foreign audiovisual content is still under-researched in Greece, the goal of this study is to investigate the linguistic challenges and analyse the linguistic features of both audio description and audio subtitles. Moreover, there is an attempt to integrate touch as an active sense in the filmic experience of the audience. The research is user-oriented and deals with AD of foreign animation films projected to a Greek B/VIP audience with the use of audio subtitles (AST) in Greek. The screening was followed by the distribution of questionnaires including questions based on a sensory and linguistic point of view and discussion.

3 Audiovisual material under investigation

Animation as a medium is generally effective for conveying dynamic information and combines different modes of expression (images, different types of sound, music, speech) to create meaning. Marrying together words and imaginary may be a highly creative procedure in AD and requires not only a source text analysis, but also a close contact with the director to understand the artistic direction, which includes the decisions made by the director, such as the colour palette, background details and cultural elements.

One of the animation techniques is stop-motion. It is the process of filming puppets and other objects one frame at a time while incrementally moving or modifying them, giving the illusion of lifelike motion when the captured film frames are viewed in rapid sequence. Stop-motion animation is used to describe animation created by physically manipulating real-world objects and photographing one frame of film at a time to create the illusion of movement (Solomon 1989). Stop-motion, as a technique, evokes a tactile perception by the use of materials and textures that appeal to the audience experience and address the sense of touch.

The animation film used in this case is *Projection sur canapé/Projection on Sofa* (Delvoye 2016), a graduation project developed at La Cambre in Bruxelles. Lucie and Manu start a conversation about the idea of travelling. While smoking and drinking wine, they exchange their ideas, needs and expectations. This film has been screened at many animation festivals worldwide, such as Annecy Festival, Golden Kuker in Sofia, Animanima in Serbia, Festival Stop-Motion Montreal, Fantoche in Switzerland, Manchester Animation Festival and others. It has also received awards such as the RTBF-La Trois Award at the 36th Anima – Brussels International Animation Film Festival in 2017, and the Laity Award at Reggio Film Festival in 2017. Its original language is French, and its duration is 6 minutes and 35 seconds. The limited running time of the film along with the features of animation as a medium pose numerous challenges in making it accessible to the B/VIP audience, given the fact that there is much visual information that must be conveyed but not overload the user.

4 Methodology

After analysing the film and contacting the director for further details, the AD script was written from scratch in Greek, a visually impaired person was consulted and, finally, the script was timed in order to be recorded by voice talents. It should be emphasised that the original animation short film was not previously accessible to B/VIP. It is a fact that the wording and style of an AD depend on the time constraints imposed by the dialogue, musical background and other sounds of the film. As Taylor puts it (Remael et al. 2014), even if the AD script is prepared in written form, it is meant to be spoken and listened to. AD texts have thus different requirements than written communication in terms of sentence length, structure and vocabulary. Two AD scripts were thus written for our reception study: one with many adjectives and direct clauses, and another with less adjectives and relative clauses. Our aim was to investigate the target audience's perspectives on different AD styles and to assess the use of adjectives in AD, since they describe the characteristics of the visual elements in the film in high detail.

As for the AST, it was decided not to use synthetic voices. This decision was based on the results from a pilot study which we conducted with members of the Association of the Blind in Patras. More specifically, the pilot study respondents underlined that even if they were used to synthetic voices in mobile apps, in films they did not prefer such voices since they believed that synthetic speech could be an obstacle to film enjoyment. Therefore, the AD was drafted and recorded by an actor, while the subtitles were translated and recorded by two different female voice talents as voice-over, so the audience still had access to the sound of the original dialogues for character identification, but the volume of the original dialogue was adjusted accordingly.

What is more, handcrafted puppets were made as per director's instructions to achieve a multi-sensory approach to AD. After the pre-screening touch tour, the screening of the film with AD and AST followed. Then, questionnaires were read to the audience to collect answers. Fifty B/VIP aged 18–70 years participated in the reception study. They were members of the Pan-Hellenic Association of the Blind (Athens), Lighthouse for the Blind of Greece (Athens), Regional Association of the Blind of Western Greece (Patras), Regional Association of the Blind of Northern Greece (Thessaloniki) and the Association of the Blind Ludwig Braille (Thessaloniki). Fifty-two percent of them were born blind and/or visually impaired and 48% acquired a vision loss and/or impairment in the course of their life. Some of them had previous AD experience, either as part of reception studies or in own film experiences, and some of them had none. The questionnaires included personal questions, questions on sensory approach, questions on content and use of language, questions on voice delivery and questions on synchronisation.

5 Results

The touch tour took place prior to the screening. Among the 50 participants, 65% liked this experience, evaluating it from useful to very useful according to a Likert scale, while 35% said that it was not necessary for them, since they had partial vision loss. However, it is interesting to underline that of those who responded positively to the question regarding the touch tour (i.e. 65%), blind people said that they really needed the touch tour and visually impaired people said that it allowed them to feel the protagonists, their clothes and all those features that may not be described in detail in an AD due to time constraints. In other words, for the vast majority of the study participants, the touch tour added information to the overall experience without overloading the user, as direct touch

is the best way to explore an object. Lacking sight, blind and visually impaired people rely on touch to "measure" dimensions (e.g. small), forms (e.g. rectangular) and other physical features of objects around them. Besides, animators themselves conceptualise animation films through touch and real-life objects. Moreover, the pre-screening touch tour stimulated the audience's imagination. Such an approach reduced also the over-reliance on a single medium to convey information.

As described in Section 3, two AD scripts were written for our reception study: one with many adjectives and direct clauses, and another with less adjectives and relative clauses. Ninety percent of the audience preferred the former version. The audience unanimously pointed out the significance of adjectives in the AD, since they provided further description (Chatman 1990, 16). Adjectives make language more descriptive and precise, playing a vital role, since they are meant to convey carefully selected features of a visual content to people who cannot see. More specifically, the description of appearance was characterised by adjectives — which allowed to prevent indefinite interpretations — nouns and adverbial phrases (Arma 2011), while the description of positions was characterised by adverbs that, along with adjectives, "seem to expand and elaborate the information presented" (Biber et al. 1999, 37). Also, time limitations promoted the use of short sentences. For the sake of comprehensibility, the active voice was used in our AD. What is more, the use of main clauses was more frequent than subordination. In general terms, the adjective-enriched audio description of the film was well received.

Regarding other paralinguistic aspects, the audio description script was recorded by an actor, whose voice had been assessed as 'acceptable' by the audience in our previous audio described films by 91% (in terms of intonation, style, tone, diction, articulation, rhythm, versatility, clarity). The audience in this film was satisfied with the actor's voice by 90%, while the remaining 10% found his voice very robust, causing distractions in the comprehension process. His reading rate was assessed by the respondents as normal and his voice as not too pervasive (i.e. it did not fill every pause), so as to leave room for imagination. However, as the audience also indicated, it is not advisable to allow more than 20 seconds going by without any audio description (Georgakopoulou 2008). Furthermore, 93% of the audience stated that hearing both the beginning of the original dialogue and its end made it clear that it was a foreign film and that did not bother them, since there was no overlapping with the dialogues and important background sounds, and the volume of the original dialogue was adjusted accordingly. Eighty-one percent of the audience was satisfied with the synchronisation. Regarding dialogues with very short pauses, it was suggested to determine if the visuals are important enough to be audio described. If not, the dialogue should always be a priority in AD. This is also one of ADLAB audio description guidelines (Remael et al. 2014) we followed. The audience underlined that AD should be loud enough to be heard clearly but, at the same time, should not overwhelm the background sounds. Finally, the respondents also noted that if AD is too detailed, then the reading rate may be higher, which means that the AD can become tiring and annoying.

6 Conclusion

To sum up, the complete loss or severe impairment of vision is compensated through sensory substitution, namely the use of an alternative sense. Given that a few well-chosen words can conjure vivid and lasting images, it is important to weave descriptive language around the film's sound elements. As the above-presented study results show, our sample audience in fact expressed a clear preference towards a more adjective-

enriched AD. Furthermore, voice delivery (i.e. intonation, style, tone, theatrical elements, diction, articulation, rhythm, versatility, clarity) played a crucial role in the presence of our sample audience and could communicate a range of emotions. AD 'should not impose itself' on its target audience, since AD needs to be a calm companion in order for the viewer to enjoy the film.

Vision is not a purely optical process, but involves a visual language, requiring the co-ordination of optical and tactile impressions in order to construct a coherent, stable visual field (Mitchell 2005). According to Wells (1998, 90), the fabrication of objects is about "the re-animation of materiality for narrative purposes". Since animators, too, view the potential of the object or puppet, using animation as a method to reveal the emotive narrative, touch and hearing can enhance the film watching experience for B/VIP audiences. As our study clearly suggests, a multi-sensory approach can be part of the AD experience in animation films, giving the audience a more engaging and entertaining experience. Due to the lack of research on the AD for foreign films in Greece, there is an obvious need to conduct more reception studies among larger samples of target viewers to increase AD production and enhance its quality for the audience.

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Eva Schaeffer-Lacroix, Nathalie Mälzer, Kirsten Berland & Saskia Schulz

Purpose and features of the TVseriesAD corpus

Research track

Abstract

This paper is related to the TADS (Translation of Audio Description Scripts) project, designed by a team of French and German researchers from Universität Hildesheim and Sorbonne Université. It focuses on the purpose and the features of the French-German TVseriesAD corpus. In our presentation, we outline the role this corpus is supposed to play for the development of a technology-assisted translation method for audio description scripts. With the help of one of our pilot datasets, the Buettenwarder subcorpus, we will demonstrate the way our complete data set will be tagged, and we will explain what sort of items can be searched in the corpus.

1 Introduction

Audio description (AD) scripts are texts composed of film script prompts, time indications, speaking or acting indications for the audio describer, and the text he or she has to record in order to create an AD audio track. Inspired by López Vera (2006), Jimenez Hurtado and Soler Gallego (2013), and Jankowska (2015), our project aims to identify procedures which support the semi-automatic translation of AD scripts. One of our research interests is to develop a method to distinguish between standardised features of French and German TV series AD scripts likely to be mastered by machine translation and other features needing human post-edition or direct human translation.

2 Research questions and hypotheses

Our research project relies on two assumptions:

1) The translation of AD manuscripts is a relevant option to increase the AD offer for the language pairs French-German, German-French.

2) There are AD script contents which are suited for machine translation and others which should better be translated by humans to maintain a high-quality standard.

This is our research question: To which extent can the AD script translation workflow be optimised with the help of machine translation without loss of quality?

Table 1 presents our hypotheses linked to this question and it lists the methods which will be applied to test them.

Hypothesis	Applied method
AD scripts, especially those of TV series, contain strongly standardised, recurrent elements (Kleege 2016).	Create an AD script corpus to identify and compare the linguistic characteristics of AD scripts of TV series with AD scripts of movies and short feature films.
Machine translation (MT) leads to good results for translating recurrent elements of AD scripts (Fernández-Torné 2016).	Use of a translation memory containing recurrent AD-specific chunks identified in the AD script corpus to translate a dubbed video in three different ways: HT with viewing the video, HT without viewing the video, MT.
Localisation tasks (cultural adaptation and user orientation) are better handled by human translators (HT) (Fernández-Torné and Matamala 2016).	Translate a sample of selected AD script parts containing localisation issues or elements referring to emotion. Apply three different translation methods: HT with viewing the video, HT without viewing the video, MT.

Table 1. Hypotheses and applied methods

3 The TVseriesAD corpus

3.1 Content

In order to study the potential benefits of machine translation, Fernández-Torné and Matamala (2016) compared the efforts required to create, translate, and post-edit audio descriptions. Their conclusions open the field for several studies, amongst them the output quality of machine translations compared to the quality of human translations. Our project includes the study of lexical databases for audio describers, AD guidelines (e.g. those edited by Remael, Reviers, and Vercauteren n.d.), and audio description analysis methods (Fix 2005). These steps are followed by the corpus-based exploration of the linguistic features of AD scripts written by humans (cf. Salway 2007). Finally, our results will be compared to those obtained by the semi-automatic translation method to be developed.

At the present stage of our research, the corpus includes two German datasets, made available for teaching and research purposes by the regional broadcasting channels NDR (Norddeutscher Rundfunk) and BR (Bayerischer Rundfunk): (1) the Buettenwarder corpus, containing the audio description scripts of 69 episodes of the German TV series *Neues aus Büttenwarder* (Eberlein 1997) telling rural stories from Northern Germany, provided by Ursula Heerdegen-Wessel; (2) the Dahoam corpus, containing 605 episodes of the Bavarian family series *Dahoam is Dahoam* (Schmidt-Märkl *et al.* 2007) provided by Bernd Benecke. This starting corpus contains 1,888,393 tokens, punctuation marks included.

German original	English translation
10:00:38 s Am Dorfteich sitzen Adsche und Brakelmann auf einer Bank. 10:01:26 "Was ist das wieder herrlich ..." ("heute" übersprechen)	10:00:38 s Adsche and Brakelmann are sitting on a bench at the village pond. 10:01:26 "Isn't it lovely…?" (override "today")

Table 2. AD sample from the Buettenwarder corpus, episode 73

The TVseriesAD corpus will be supplemented by French audio descriptions of TV series. In a second step, a more general corpus will be created, containing parallel and comparable German and French AD scripts for TV series, movies, and short feature films. To obtain relevant data, we started a collaboration with the broadcast companies Arte, France TV, NDR, KiKa, and SWR.

3.2 Data pre-processing

The pre-processing stage of AD scripts of television series involves significant challenges: they are composed of heterogeneous text elements, which are presented and distinguished from one another in various manners. In addition, the AD norms applied may vary throughout the files, in particular if their episodes are written by different authors, which is the case in the Buettenwarder data set.

In order to enable consistent and valid corpus queries, we did editorial interventions (e.g. correct typos) and we normalised a certain number of symbols (e.g. quotation marks). We detected varying AD conventions in the files corresponding to the episodes of the TV series. Based on the advice given by the German AD specialist Anke Nicolai, we made some modifications helping to reduce these differences: we deleted the scenery numbers; we inserted missing scenery change hash tags; we normalised the AD signs <s> and <ss> by deleting surrounding brackets; we replaced the plus signs surrounding dialogue prompts with double quotation marks; finally, we replaced the plus signs surrounding speaking instructions with round brackets.

3.3 Data annotation

We used the Buettenwarder subcorpus as a sample to develop our data annotation procedures. For analysing our German and French data and our planned parallel subcorpora (e.g. the audio description scripts of Sven Taddicken's movie Emmas Glück [Emma's Bliss] and the French translation of these scripts), we decided to use TXM (Heiden 2010), an interoperable open source platform for text analysis. During the upload of our Buettenwarder data to TXM, they were automatically annotated on the part-of-speech level with the help of the TreeTagger (Schmid 1994).

Item	Tagging mode	Tool or technique
parts of speech	automatic & post-editing	TreeTagger
AD-specific items	manual or semi-automatic	TreeTagger, XML

Table 3. Tagging choices

In addition, to structure the Buettenwarder dataset, we enriched it with XML-TEI tags (Burnard 2014), in order to distinguish between film script prompts, time indications, speaking or acting indications for the audio describer, and the text to be recorded (see Table 4). Thanks to the provided structure, these different parts can be searched and described separately.

element	XML-TEI tag	Buettenwarder sample (episode 12)
time indications	<time>	10: 06: 50
parts to be recorded (*speaker*)	<sp>	Brakelmann fährt durchs Dorf. [Brakelmann drives through the village.]
instructions what to do or not during AD recording	<stage>	(Rest übersprechen) [Talk over the rest]
pace	<stage type="delivery">	s, ss, n [fast, very fast, normal]
displayed text (titles, signboards)	<caption>	Schild am Straßenrand. "Goethe Eier 5 Euro 10" [Sign at the roadside. "Goethe-eggs for 5.10 Euros"]
(end of) dialogue lines	<prompt>	"Goethe gehört mir!" [Goethe is mine!]

Table 4. XML annotation sample

4 Linguistic features

To identify the idiosyncratic linguistic features of the Buettenwarder subcorpus, we adopted a procedure based on results of Reviers et al. (2015), who identified part-of-speech features which characterise Dutch AD film scripts. They conclude that "there is a 'language of audio description' that differs considerably from general language" (Reviers et al. 2015, 17). Some of our findings are in line with those cited by Reviers et al. (2015, 5–6): the Buettenwarder corpus contains a high proportion of short sentences, and subordinates are rare. Salient features are verb particles, prepositions, compound adjectives and present participles. Verbs (except those used in the prompts) appear nearly exclusively in the third person of the present indicative tense, and some of the utterances do not contain any verb: "Jürgen in die Kamera: (...) [Jürgen towards the camera: (...)]".

We decided to concentrate not only on AD-specific parts-of-speech but also on n-grams and word sketches, informing on the words' collocational behaviour. This is motivated by our research focus, namely (besides evaluating AD script quality) identifying standard-like elements in the corpus (Kleege 2016) suited for machine translation. The n-gram function provides the corpus user with a list of frequent continuous word sequences.

n-gram	abs. frequ.	n-gram	abs. frequ.
ss sehr schnell sprechen	69	zieht die Augenbrauen hoch	15
ss speak very quickly	69	raises the eyebrows	15
durch Betonung deutlich machen	69	kommt auf dem Mofa	15
stress through intonation	69	arrives on his moped	15

Table 5. Absolute frequency of n-grams

We searched the Buettenwarder corpus for n-grams (length: 4 to 6 words). The left column in Table 5 presents items corresponding to speaker instructions and the right column lists items to be recorded by the AD speaker.

5 Preliminary results

Normalising the Buettenwarder data was a long, but necessary and insightful pre-processing task. We had to take a close look to the text and sometimes even to compare a text part with the corresponding moment in the film. We were struck by the wide variety of AD conventions in the 69 episodes and we understood that it is a big challenge to establish national (or even international) formal standards for AD script creation. The post-editing effort for automatic annotation was bigger than expected, whereas the semi-automatic annotation process was relatively easy to cope with.

6 Further steps

On the basis of the results obtained, we plan to improve our procedures (how to annotate the data and to identify standardised features) before applying them to the whole AD corpus. These tasks will be followed by the analysis of non-standardised features, e.g. localisation issues and elements linked to emotion.

Acknowledgments

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TV series

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Efficient and cost-effective production of accessible video content for blind and low vision audiences

Professional track

Abstract

Due to audio description (AD) production and recording being a relatively expensive process, there is a considerable lack of audio described television, film and web productions. As a result, the blind and people with low vision do not enjoy the same levels of access to media as people without visual impairments. In order to overcome budgeting challenges, VIDEO TO VOICE developed a browser-based platform for creating ADs. The platform comprises a virtual recording studio for automated audio post production and an authoring tool for creating transcripts. The system provides a live preview where the AD is read aloud by a synthetic voice. Once the text is finalized, it can be exported as a transcript. Alternatively, an audio mix is generated within a few minutes. This is known as text-to-speech audio description (TTS AD), which can be downloaded directly as an audio or video file.

With this new system, VIDEO TO VOICE lowers the production time and costs involved with AD production, expanding the possibilities of making videos accessible to blind and low vision audiences.

1 Introduction

Most visual media is of limited use for blind and visually impaired people. If you can only hear the sound of a video, it is often difficult to comprehend its content. AD is a proven method that closes this information gap and improves a low vision audience's understanding of the action on screen.

AD, also known as described video, video description, descriptive narration or visual description, is a form of narration that provides information on visual elements in a media work for the benefit of consumers with visual impairments and/or intellectual disabilities. These narrations are usually placed during natural pauses in the audio, typically delivered using a secondary audio track.

1.1 History of audio description

In 1974, Gregory Frazier, then a graduate student at San Francisco State University, developed the first concepts behind AD while working on his master's thesis exploring television for the blind. Prior to that, blind and low vision audiences were not catered for despite watching television to the same levels as sighted people (cf. Berkowitz 1979). In the 1980s, AD programs for television and theatre started to develop, notably Dr Margaret Pfanstiehl's audio described simulcasts of the PBS television show *American Playhouse* on US radio (cf. Ellis 2019).

Since then, the amount of productions featuring an AD has gradually expanded, spurred on by the introduction of legal requirements and quotas. For example, UK broadcasters BBC, ITV and S4C must meet the statutory minimum of 10% AD provided for their programming (cf. Reviers 2016). In the US, AD equipment needs to be provided for all first run movies in order for cinemas to comply with federal laws (American Council of the Blind 2020). In the European Union, updates to the Audiovisual Media Services Directive came into effect in September 2020, requiring member states to ensure

"continuous and progressive improvements" in accessible media provision (European Blind Union 2018).

1.2   Audio description availability

Despite changes in the legal landscape, AD availability remains wholly insufficient. In 2016, an impact assessment from the European Commission showed that the number of productions broadcast with an AD ranged between 4% and 11%, with EU member states such as the Netherlands and Finland failing to provide any ADs at all (European Blind Union 2016).

Moving away from professional television and film productions, the lack of AD is even more apparent online. As video sharing platforms such as YouTube and Vimeo have boomed in popularity, visual content is being uploaded on the web at an ever-increasing rate, most often without an AD.

1.3   Traditional audio description workflow

The lack of availability, especially when considering the web format, can be primarily attributed to the way ADs are conventionally produced. Here is the typical workflow for creating an AD:

- The audio describer receives the video for which an AD is required from the client
- The audio describer watches the video to determine gaps in dialogue where the AD can be placed
- The audio describer writes the time coded script, often with multiple viewings of the video
- The audio describer sends the script to the client
- If necessary, the client returns the script to the audio describer with corrections
- Once approved by the client, the script is exported to the relevant format(s)
- The script is read out by a professional voice artist
- If necessary, the AD is sent back to the audio describer or rerecorded in studio in the case of further corrections from the client
- Once approved, a sound engineer mixes the audio in a recording studio to create a usable file
- The audio file is converted to whichever media are required.

The various stages and personnel involved make AD production a complex and costly process. From start to finish, production can take many weeks. At the same time, expenditure increases when steps need to be repeated and equipment rehired. Low budget productions with strict deadlines usually lack the financial means to provide an AD. As a result, AD is primarily limited to well-funded cinema and television productions.

The following explains how VIDEO TO VOICE's tools and TTS AD can significantly reduce production times and costs, making AD a viable option for visual content creators and media service providers with varying budgets.

2   Working environment of VIDEO TO VOICE's tools

VIDEO TO VOICE provides an all in one platform comprising a TTS AD authoring tool and virtual recording studio for audio post production. With the software, audio describers can carry out the entire production process for creating an AD on a single platform. From writing the text through to creating a mastered audio mix that is suitable for broadcasting, all stages of production can be controlled centrally on the tool.

As the entire production process can be carried out by a single audio describer, personnel costs are significantly reduced. This creates an environment where ADs can be created for productions with tight budgets and time critical formats, such as news videos.

2.1   Viability of text to speech for audio description

Text to speech (TTS) converts written text into a synthesised voice, i.e. the artificial production of human speech. People with visual impairments have been using speech synthesis for internet access and assistive computer technology at home and at work for decades (cf. Möbius and Haiber 2010). Therefore, blind and low vision consumers are generally well acquainted with TTS, making it a viable option for AD.

TTS AD provides a solution for increasing the number of audio-described productions through lower expenditure. In terms of human labour costs, TTS AD eliminates the need for voice artists and sound engineers. Recording studios are also no longer required.

In the 2010s, TTS AD has been tested on blind and visually impaired audiences to examine its viability. For example, a Polish case study (cf. Szarkowska and Jankowska 2012) demonstrated that low vision participants were generally satisfied with TTS AD, with 95% of respondents regarding it as an interim solution and 70% considering it as a permanent one. These findings were supported by a study conducted at the Autonomous University of Barcelona (cf. Fernández-Torné and Matamala 2015), where 94% of the blind or partially sighted participants found TTS AD to be a viable alternative.

Modern TTS engines use deep learning strategies to continually optimise their service. Global players such as Amazon, Google and Microsoft provide access to their TTS engines as part of their cloud architecture, making it affordable for everyone.

2.2   Software availability

To make the system widely available, the software was designed as a cloud-based platform. The only requirements are a modern browser and a stable Internet connection.

The platform is currently available in German and English. Further languages will follow shortly. VIDEO TO VOICE offers a free trial to interested parties.

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Efficient and cost-effective production of accessible video content for blind and low vision audiences
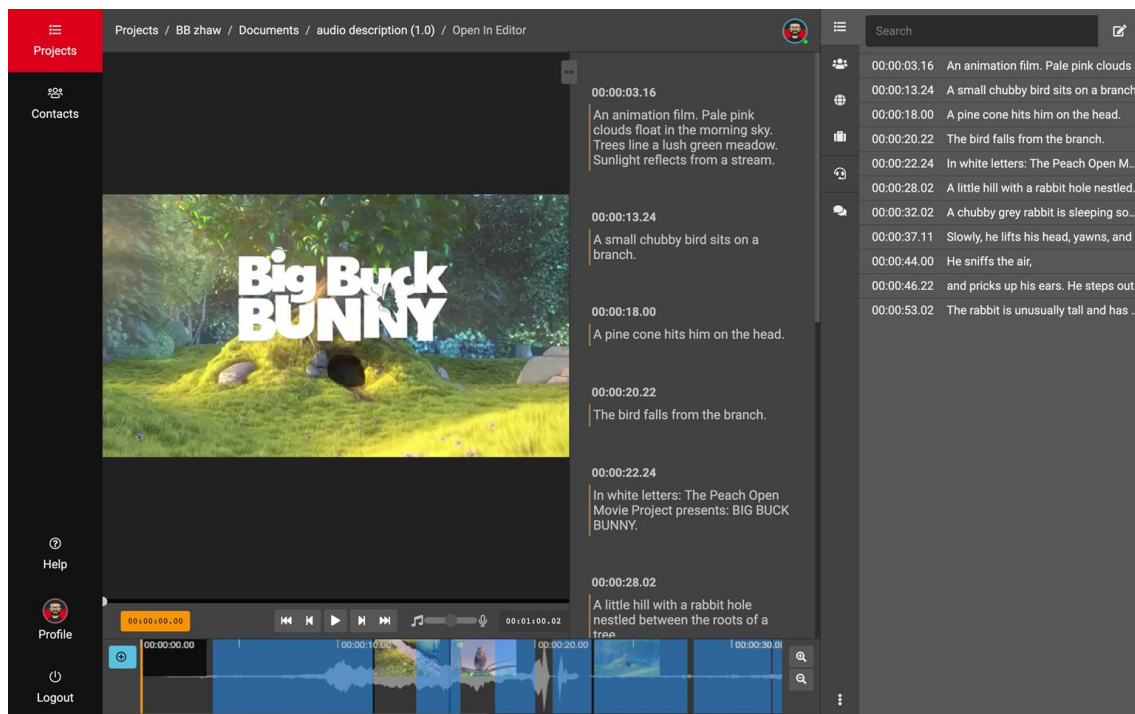
Figure 1. Screenshot of the software interface showing the AD text on the right, the video preview in the centre and the timeline at the bottom

3 How VIDEO TO VOICE's tools work

In comparison to conventional AD production methods, VIDEO TO VOICE provides a simplified workflow on a single platform.

3.1 Audio description workflow with VIDEO TO VOICE's tools

Once an account has been created for the audio describer, it is possible to log into the platform online. Here are the steps the audio describer needs to follow to create a script and TTS AD:

- The audio describer creates a new project, giving it a title and working language
- The audio describer uploads the video for which an AD is to be provided
- If there is a time code burned into the video, the audio describer specifies the offset
- The audio describer adds the frame rate required from the dropdown menu
- The audio describer writes the script, using the live preview and frame-accurate editor to determine the correct positioning and length
- The audio describer exports the script in the format required.

Once the script is ready, the audio describer can generate a TTS AD by performing the following simple steps:

- The audio describer selects whether ducking is required from a dropdown menu
- The audio describer selects the mastering settings from a dropdown menu
- The audio describer selects the export settings and creates the final mastered audio file that is ready for broadcast.

With just a few clicks of the mouse, the platform eliminates hours of laborious export work and time spent in the recording studio. The system also supports teamwork amongst audio describers, as multiple users can work on the same AD in real time. Proofreading and final approval can also be performed on the platform.

3.2 The features of VIDEO TO VOICE's tools

The following provides an overview of the key features of VIDEO TO VOICE's tools, and information on how they support script and TTS AD production:

3.2.1 Frame-based authoring tool

The authoring tool is frame-based, ensuring the timing of the AD is precise. The audio describer can set cue points on the exact frame that is required.

3.2.2 Frame rate selection

The audio describer can select and adjust the frame rate for the project from a dropdown menu. This ensures there is no time code "drift" in the AD, i.e. when 23.98 fps are required instead of 24.00 fps.

3.2.3 Voice activity detection

With voice activity detection (VAD), the audio describer can see where there is space to add their text in between dialogue. This saves the audio describer time having to re-watch the video to determine where these gaps are located.

3.2.4 Automatic scene recognition

The video can be split up into individual scenes, which is useful for longer projects.

3.2.5 Audio visualisation

Each section of text is displayed with the audio track. If necessary, sections of text can be moved around using the drag and drop function.

3.2.6 "Sounds like" feature

The audio describer can adjust the pronunciation of heteronyms. A common example in the English language is the pronunciation of the word "lead" in different contexts.

3.2.7 Live preview

The system reads aloud the text, helping the audio describer to determine immediately whether the phrasing and timing are correct.

3.2.8 Tagging

The audio describer can tag people, objects and places to have a better overview of what is happening in the video.

3.2.9 Search

The search function is particularly helpful for navigating and making corrections to longer scripts.

3.2.10 Script import and export

The system supports script import and export in a variety of formats. For example, a Word document can be imported and converted into a TTS AD within minutes. The export file works for studio production and across all media service providers.

3.2.11   Machine translation

The platform uses machine translation technology through DeepL to support multilingual productions.

3.2.12   Voices and languages

Currently, the audio describer can choose from over 300 male and female voices in 40 languages provided by Google, AWS and Microsoft. From 2021, the selection will be expanded to include over 400 voices in 45 languages.

3.2.13   Collaboration

Several audio describers can work as a team on a project at the same time. The live edit feature and live chat within the system allows for easy collaboration and communication between team members.

3.2.14   Automated mix

The ducking of the original audio track can be adjusted to accommodate the AD. The audio describer can choose the ducking level from a dropdown menu.

3.2.15   Automatic level control

The AD is mastered to ensure the loudness conforms with various official standards, such as EBU R 128 (EU television), ATSC A/85 (US television) and web format.

3.2.16   Final export

The AD can be exported as a mixed audio file (WAV) or as a video file (MP4).

4   History of VIDEO TO VOICE's tools

The development of the platform started in 2016. A first prototype was presented in 2017. Since then, the ZHAW Zurich University of Applied Sciences and the University of Hildesheim have accompanied the development process and have regularly used the platform in their BA and MA courses.

TTS AD was introduced in 2018. Testing started in 2019 with the "100percentme" series from funk.net (Freundt 2019).

Since the beginning of 2020, TTS AD created with VIDEO TO VOICE's tools has been used regularly on German television and online. One recent example is "How to Tatort", a mockumentary commissioned by Radio Bremen, which was broadcasted on ARD (Hellenthal 2020).

In particular, TTS AD is a cost-effective solution for the web series format, since budgets are generally low and turnaround times are pressing. For example, TTS AD created with VIDEO TO VOICE's tools was used in "2 Minuten", a web series produced by Mitteldeutscher Rundfunk MDR for the ARD Mediathek library (Miller 2020). On the platform, Februar Film created ADs for over 70 health films in two weeks appearing on the website for Allgemeine Ortskrankenkasse, a German public health insurance company.

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Authors

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Julia Fuchs

The German *Vorfeld* (prefield) in texts in German Easy Language: Syntactic and information-structural considerations

Research track

Abstract

In German, the first position in a declarative sentence, i.e. the position preceding the finite verb (prefield), can be filled by the subject of a sentence, but this is by no means obligatory. The prefield can also be occupied by other syntactic categories. Which syntactic category appears in the prefield is determined by information-structural aspects. With regard to German Easy Language, the existing guidelines tend to recommend filling the prefield with the subject of the sentence. However, it is an open question what the prefields of sentences in authentic texts in German Easy Language do de facto look like, i.e. by which syntactic categories they are really filled, and which information-structural reasons might account for possible deviations from the 'subject-first-recommendation'. A corpus study shows that in nearly three-quarters of the cases, the prefields of sentences in authentic texts in German Easy Language are indeed occupied by subjects, realised in diverse, partly quite complex forms. However, adverbials as well as objects also appear in the prefields, the latter often being part of the common ground; the information-structural effect of fronting those objects often is that the communicatively important or new piece of information is delayed and, this way, highlighted. Future Easy Language research is confronted with the challenge to take findings from information structure research into account and to find out what is more beneficial for target groups: a constant sentence structure adhering to the 'subject-first-recommendation' or a more flexible word order ensuring a more natural information flow.

1 Introduction

In standard German, the first position in a declarative sentence, i.e the position immediately preceding the finite verb — the so-called *Vorfeld* (prefield) —, is usually occupied by one single syntactic constituent. This constituent can be the subject of the sentence, but this is by no means obligatory. Other syntactic categories, like adverbials or objects, can in principle also appear in the prefield. The occupation of the prefield in German depends on information-structural aspects (Speyer 2007, 2008). *Information structure* is a multifaceted notion (Fuchs 2020, 27–35). A prominent definition has been proposed by Chafe (1976, 28) who used the term *packaging* to grasp the main idea of information structure: the relevant phenomena "have to do primarily with how the message is sent and only secondarily with the message itself". Several researchers, like Féry and Krifka (2008, 123; emphasis in original), follow Chafe and define information structure as "the *packaging* of information that meets the immediate communicative needs of the interlocutors, i.e., the techniques that optimize the form of the message with the goal that it will be understood by the addressee in the current attentional state". Word order is one of the techniques serving the optimization of the form of the message.

With regard to German Easy Language, Inclusion Europe guidelines (2009) do not formulate any specific recommendation concerning word order. The "Netzwerk Leichte Sprache" guidelines (2009, 17) indirectly recommend opening a sentence with its subject. For the rule "Use a simple sentence structure", a 'bad' (1a) and a 'good' (1b) example are given:

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(1) a) Zusammen fahren wir in den Urlaub.
        ('Together, we go on holiday').

   b) Wir fahren zusammen in den Urlaub.

      ('We go on holiday together').

As can be seen, in the sentence considered to be a good example (1b), the prefield is occupied by the subject, which is not the case in (1a). On the other hand, the guidelines from the University of Hildesheim (Maaß 2015, 108; Bredel and Maaß 2016a, 499–500; Bredel and Maaß 2016b, 151) formulate more detailed and differentiating recommendations concerning word order in German Easy Language. According to Bredel and Maaß' view (2016a, 499–500), the use of subjects in the prefields facilitates structure recognition on the part of the reader, but on the text level, it is not possible to indicate topic or frame shifts by word order variation. In Bredel and Maaß (2016b, 152), the authors explicitly state that sentences in German Easy Language should generally start with the subject and that deviations from this 'subject-first-recommendation' should always be connected to a specific function, for example the indication of a topic shift.

Against this background, the question arises whether the prefields of sentences in authentic texts in German Easy Language are consistently occupied by subjects, and if this is not the case, which other syntactic categories occur and — concerning objects — what might possibly be the reasons for their use.

After a brief explanation of the prefield in German (Section 2), the research questions are introduced in more detail in Section 3. The corpus study conducted in order to shed light on these questions is presented in Section 4. Section 5 contains the conclusion and an outlook on future research desiderata.

2   The prefield in German: Syntactic and information-structural considerations

2.1   The prefield in the topological field model

German sentence structure can be described with the topological field model, sketched in a reduced form in Table 1. The left and right sentence brackets partition the sentence into three fields: the prefield, the middle field and the post-field (often occupied by subordinate clauses and not further considered here). The detailed form of the topological field model also includes a pre-prefield, i.e. the position preceding the prefield, that can, for instance, be occupied by coordinating conjunctions.

	Prefield	Left sentence bracket	Middle field	Right sentence bracket
(2a)	Der Arzt	muss	Ihnen einen Arm	abnehmen.
(2b)	Ihnen	muss	der Arzt einen Arm	abnehmen.
(2c)	Einen Arm	muss	der Arzt Ihnen	abnehmen.
(2d)	Abnehmen	muss	der Arzt Ihnen einen Arm.	

Table 1. Field model. Translation of sentence (2a): The doctor must take off one of your arms.

In a declarative sentence, the left sentence bracket is occupied by the finite verb, the right sentence bracket by the infinite rest of the verbal complex; the middle field contains the elements not belonging to the other fields or brackets (Eisenberg 2013, 375–79). The prefield can but does not necessarily have to be occupied by the subject, as is the case

in example (2a). Other syntactic categories such as the indirect object (2b), the direct object (2c) or even the infinitive part of the verbal complex (2d) can appear in the prefield.

2.2   The prefield from the perspective of information structure

Information structure is a very complex linguistic field, and the present article does not claim to clarify exhaustively the complicated interplay between the syntactic position of prefield and the information-structural aspects determining its occupation in German. However, some general tendencies that found consensus in research on information structure and several recent findings concerning the occupation of the prefield in German will be sketched in what follows.

Information structure theory distinguishes three language-independent dimensions: givenness, topic and focus (Krifka 2008). Very often, two complementary terms are used to designate the dimensions in question: new-given, topic-comment, and focus-background (Musan 2010). Krifka (2008) is generally considered to be the main reference for the definition of these dimensions:

- Givenness: "A feature X of an expression α is a Givenness feature iff X indicates whether the denotation of α is present in the CG [Common Ground, J.F.] or not, and/or indicates the degree to which it is present in the immediate CG" (Krifka 2008, 262). This means that the denotation of an expression is either categorically present in the common ground or not (new versus given), or gradually present. New information is often introduced with an indefinite noun phrase in German. Information can be given because it has been mentioned in the previous discourse, or because of its direct presence in the text-external world, or because it can be inferred from a previous referent (as in *a bus – the driver*) (Lambrecht 1994, 99–100). Common devices in German for the verbalisation of given referents are pronouns or definite noun phrases. For a detailed description of different taxonomies of givenness, see Fuchs (2020, 43–70).

- Topic: "The topic constituent identifies the entity or set of entities under which the information expressed in the comment constituent should be stored in the CG content" (Krifka 2008, 265). In other words, topics are like file cards with a particular heading under which information expressed in the comment is stored. Topics are also often defined as "what the sentence is about" (Götze et al. 2007, 162).

- Focus: "Focus indicates the presence of alternatives that are relevant for the interpretation of linguistic expressions" (Krifka 2008, 247). This definition originates from alternative semantics. There are several somewhat different definitions of the dimension of focus — for example, focus as the communicatively most important or highlighted part of the sentence (for an overview of the concept of focus, see Fuchs 2018).

With regard to information-structural characteristics of the prefield in German, there are some general tendencies: subjects often appear in the prefield, as do topics (the phenomenon that topics appear sentence-initially is a universal tendency; Götze et al. 2007, 163). Topics are often, but not always, given. The subject and the topic of a sentence can be described as competitors for the prefield. If subject and topic coincide, the case is unproblematic (Musan 2010, 32). Several recent findings, however, postulate the existence of a prefield hierarchy that ranks phrases according to their tendency to occur in the prefield. Speyer (2008) formulated three Vorfeld-constraints, similar to the argumentation in optimality theory: 1.) The topic is moved to the Vorfeld. 2.) The contrast

element is moved to the Vorfeld. 3.) The scene-setting element is moved to the Vorfeld. Without going into details, a contrast element is prototypically a part-of relation, i.e. a referent is a part of a previously mentioned referent, as in the example *a bus – the driver* introduced above. Scene-setting elements are often local or temporal adverbials and also called *frame-setting topics* in the literature (Götze et al. 2007). If a sentence contains more than one candidate for the prefield, the prefield is occupied by the one ranked highest in the following hierarchy: scene-setting ≫ contrast ≫ topic. Based on the prefield hierarchy proposed by Speyer (2007, 2008) and results from acceptability ratings and a corpus study, Bader (2020) suggested a more fine-grained extended prefield hierarchy, presented in (3), in order to grasp the discourse conditions and formal properties triggering object fronting. Note, however, that this hierarchy is based on sentences in which the subject was always realised as the personal pronoun *er* ('he') and in which subjecthood and topichood were intertwined.

> (3)   scene-setting > given (demonstrative, d-pronoun), p-kontrast > topic, given(definite) > brand-new

Scene-setting elements have the strongest tendency to appear in the prefield. Given objects denoting evoked referents also show a strong inclination to appear in the prefield if they are realised as demonstrative noun phrases or d-pronouns (that are "form-identical to the definite article with few exceptions" and "have referential properties that put them somewhere between personal pronouns and demonstrative pronouns", Bader 2020, 29). An object related to the previous discourse by a p-kontrast, in turn, is ranked lower than a given object realised as a demonstrative noun phrase or a d-pronoun. Brand-new referents appear at the end of the extended prefield hierarchy. Brand-new referents are hearer-new, i.e. new to the hearer, and discourse-new, i.e. they have not been mentioned previously. According to Dalmas (2013), the fronting of an object that is already part of the common ground can serve as a means to delay and, this way, highlight the communicatively important or new piece of information.

As a result of the main points discussed so far, writers of texts in German Easy Language might find themselves in a dilemma: on the one hand, there is the 'subject-first-recommendation', but on the other, there might be the desire to produce information structurally adequate texts with a more natural information flow. Thus, it cannot be predicted apodictically that the prefields of authentic texts in German Easy Language are occupied by subjects without exception. Therefore, it is interesting to investigate what the prefields in texts in German Easy Language do de facto look like, and this leads to the research questions introduced in the following section.

3   Research questions

1.   Prefield occupied by subject:

   a) How frequently is the prefield of sentences in authentic texts in Easy Language occupied by the subject?

   b) How are the subjects formally realised?

2.   Prefield <u>not</u> occupied by subject:

   a) Which syntactic functions do the constituents in the prefield fulfil?

   b) How might the presence of objects in the prefields be explained?

4 Corpus study

4.1 Material and design

The corpus — already used in the study by Fuchs (2019) — is made up of texts in German Easy Language and contains 31,044 words. In order to represent the range of different styles of German Easy Language, the corpus comprises subcorpora of approximately equal sizes with texts following the rules from Inclusion Europe (2009), Netzwerk Leichte Sprache (2009), Hildesheim (Maaß 2015, Bredel and Maaß 2016a,b) and with two election manifestos not explicitly written according to a certain guideline but prepared by established translation agencies. News, information brochures, election manifestos and fairytales are represented in the corpus.

In order to identify and annotate the contents of all the prefields in the corpus, the software UAM CorpusTool (O'Donnell 2019) was used.

4.2 Results

The corpus contains 3,121 prefields occupied by one constituent without a coordinative structure (coordinative structures in the prefield occur 18 times). Figure 1 illustrates the percentages of the represented syntactic functions.
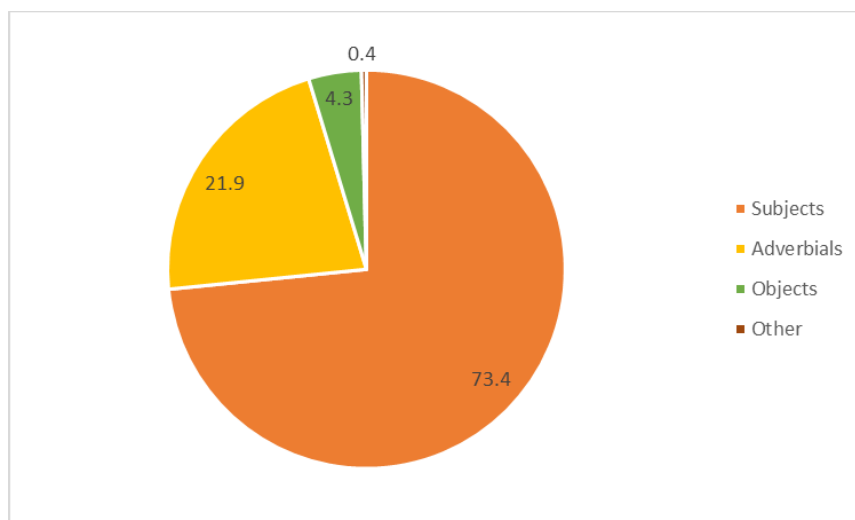
Figure 1. Frequency of different syntactic functions in the prefields in %

With 73.4 %, subjects represent by far the biggest syntactic category. Adverbials and their subtypes (see Table 2) are the second-biggest group. Objects and their respective subtypes (see Table 2) make up a relatively small proportion of 4.3 %, followed by a negligible proportion of other categories (e.g. predicative expressions).

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Syntactic category	Subtype	Absolute frequency (n)
Adverbials	local	181
	conditional	165
	temporal	84
	modal	82
	sentence adverbial	53
	causal	44
	final	43
	consecutive	31
	concessive	1
Objects	direct	94
	prepositional	29
	indirect	12

Table 2. Subtypes of adverbials and objects in the prefields and their absolute frequencies

With regard to the subjects, their formal realisations are extremely diverse. Table 3 gives an overview of the formal realisations of noun phrases (with authentic examples taken from the corpus) and their respective frequencies. Noun phrases occurring less than ten times in the corpus were assigned to the category "other". Note that articles accompany a noun, whereas article pronouns (like *einige* 'some') can accompany or represent a noun (Eisenberg 2013). In addition to noun phrases, nine subordinate clauses functioning as subjects could be observed in the prefields.

Formal realisation	Example	Frequency in %
Pronoun	*Sie* (polite form of address)	43
(focus particle +) article + noun	*Auch das Studium*	26
proper noun	*Rotkäppchen*	7
(focus particle +) noun	*auch Frauen*	6
(focus particle +) article pronoun + noun	*Auch deine Freunde*	6
(focus particle +) article + noun + pp	*Auch die Familie von einem Alkoholiker*	4
(focus particle +) adj. + noun	*Nur wenige Menschen*	2
Other	*Immer mehr Dinge*	2
noun + pp	*Menschen mit Behinderungen*	1
article pronoun + noun + pp	*Diese Bescheinigung vom Arzt*	1

Table 3. Formal realisations of noun phrases (subjects) in the prefields (n = 2,170) (with authentic examples from the corpus) and their frequencies in %

A total of 135 objects appear in the prefields. In the majority of the cases, the objects represent old or inferable information. An example is presented in (4), where the occupation of the prefield is in line with Bader's (2020) extended prefield hierarchy:

(4)   Damit Globalisierung gut für die Menschen ist,
         muss man gute Regeln finden.
         Diese Regeln machen wir.

         ('In order that globalisation is good for people, you must find good rules.
         These rules are made by us' [active voice in German].)

In the second sentence of (4), the direct object in the prefield, printed in bold, represents information that is part of the common ground (because it has already been mentioned in the previous sentence); in line with the extended prefield hierarchy, the prefield is occupied by the given object realised as a demonstrative noun phrase (*Diese Regeln).* An effect triggered by the word order in the second sentence in (4) might be that the subject (*wir*), appearing at the end of the sentence, is communicatively highlighted. The example in (4) is taken from an election manifesto written in German Easy Language and therefore, it is not surprising that the information that it is the political party that makes rules that are good for people is the most important one.

In other cases, brand-new information appears in the prefield, without evident reasons, as in (5), an example being part of a brochure on alcohol, taken from the corpus:

(5) **Manche Informationen für dieses Heft**
haben wir auf Internet-Seite [sic] oder in Büchern gefunden.

('Some of the relevant information for this booklet we have found online or in books.')

The referent *Manche Informationen für dieses Heft* represents new information, as it neither has been mentioned previously, nor can it be inferred from a previously mentioned referent. This word order is not in line with the general tendency that the prefield is rather occupied by given referents (with topic status) than by new referents.

Finally, there are cases of objects in the prefield serving as a cataphoric announcement of the following information (as in "Das tun wir dafür:" / 'That's what we are doing for this purpose:').

5   Conclusion and outlook

The point of departure of the present study was the observation that the existing guidelines for German Easy Language either do not discuss word order at all (Inclusion Europe 2009), or they indirectly make a 'subject-first recommendation' (Netzwerk Leichte Sprache 2009), or they recommend explicitly opening sentences by their subjects whenever possible; in the latter case, exceptions should be linked to a specific function (Hildesheim guidelines). On the other hand, authentic texts do generally not consist of a series of structurally identical sentences, but of sentences integrated adequately in the information flow. So, there is a tension between the rather 'normative-oriented' ideas of what word order in German Easy Language should look like, as expressed in the guidelines, and the linguistic knowledge about word order generated by information structure research. Consequently, it is an open question which syntactic categories do de facto appear in the prefields of sentences in authentic texts in German Easy Language. The present study set out to shed light on the questions as to how frequently the prefields are de facto occupied by subjects (question 1a), how the existing subjects are formally realised (question 1b), which other syntactic categories appear in the prefields apart from subjects (question 2b) and, regarding objects in particular, due to which information-structural reasons they might appear in the prefield (question 2b). A corpus study conducted in order to shed light on these questions yielded the following results:

- In nearly three-quarters of the cases (73.4 %), the prefields in the corpus are indeed occupied by subjects (answer to question 1a).

- The formal realisation of the subjects, however, is extremely diverse, ranging from simple noun phrases with article and noun to complex noun phrases with several attributes (answer to question 1b).

- Adverbials in the prefields amount to 21.9 % and thus constitute the second-biggest class of syntactic functions in the prefields. It would have been interesting to elucidate which information-structural dimensions the adverbials fulfil. However, in most of the individual cases, it was difficult to decide and annotate in an intersubjectively verifiable way which information-structural dimension was realised, in particular whether the adverbials represented aboutness- or frame-setting topics. With 4.3 %, objects appear relatively rarely in the prefields (answer to question 2a).

- If objects appear in the prefield, they mainly represent given or inferable information and this word order often serves the highlighting of the following new or relevant ('focused') piece of information. On the other hand, there are also cases where brand-new information appears in the prefield, without evident reasons, and cases where an object in the prefield serves as a cataphoric announcement of the following information (answer to question 2b).

The role of information structure in texts in German Easy Language has so far been neglected, apart from a corpus study conducted by Fuchs (2017), who investigated focus marking in authentic texts in German Easy Language. A challenge Easy Language research is currently confronted with is, amongst others, to shed light on what is more beneficial for targets groups: a constant word order in line with the 'subject-first-recommendation' at the expense of a more natural information flow, or a more flexible word order not always satisfying the 'subject-first-recommendation' at the expense of possible comprehension problems. On the basis of the results of future experimental studies and, thus, on empirical evidence, the existing rules concerning the occupation of the prefields of sentences in German Easy Language might be revised and reformulated.

Acknowledgements

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Julia Fuchs

The German Vorfeld (prefield) in texts in German Easy Language: Syntactic and information-structural considerations

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Sarah Jablotschkin & Heike Zinsmeister

Annotating colon constructions in Easy and Plain German

Research track

Abstract

Syntactic simplification plays an important role in the rule sets for simplified German which enable accessible communication. As a consequence of this, we observe an increased use of the colon in addition to the full stop as marker of syntactic units which leads to the research question as to whether the colon is used with the same functions in simplified German as in the standard variant or whether new functions have emerged. In this paper, we introduce an empirical investigation of the use of the colon in variants of simplified German (Easy German or *Leichte Sprache* and Plain German or *Einfache Sprache*) compared with Standard German. To this end, we developed annotation guidelines for colon constructions, which we introduce in detail in this paper. The results of the annotation suggest mostly quantitative differences: In Easy/Plain German it is confirmed that the colon most often serves as a means for syntactic simplification, whereas in Standard German it tends to have a pragmatic function. Further studies will show whether these findings can be confirmed in larger samples of text and what effect colon constructions have on the comprehensibility of a text.

1   Introduction

Information conveyed in syntactically complex structures is harder to comprehend than the same information encoded in syntactically simpler structures. Syntactic simplification plays an important role in the rule sets for Easy German (cf. Netzwerk Leichte Sprache 2014; Inclusion Europe n.d.; Bredel and Maaß 2016, 383–402) as well as in the recommendations for Plain German (cf. Ismaiel 2018; Baumert 2019, chapter 5) all of which are concerned with rendering written information more accessible. Avoiding hypotaxis is an important part of this simplification process, because subordinate clauses syntactically enlarge their matrix clauses and also have deviant word order from main clauses in German, i.e. the finite verb occurs in 'second position' in main clauses but at the end of the clause ('verb final') in subordinate clauses (e.g. Bredel and Maaß 2016, 415–19). The rule of avoiding subordinate clauses in simplified German is supported by psycholinguistic evidence which shows that sentence processing in general is complicated by increasing the number of propositions, i.e. clauses, expressed in a sentence (Kintsch and Keenan 1973), by their syntactic form in the sense of embedding depth (Wang 1970), and by non-canonical word order including the clause-final position of the finite verb (Weyerts et al. 2002; see Clahsen 2007, Section 3 for a discussion of criticism to their findings; see Christmann and Groeben 2019, 130 for a summary on the comprehensibility of subordinate structures in German).

It is important to note that the rule sets mainly address the syntactic surface form of hypotaxis and not the underlying relations such as verbal dependencies and causal relations among others. To illustrate this, Example (1) shows an ad-hoc created example of hypotaxis in Standard German, in which the main verb *denkt* 'thinks' selects a sentential object which is expressed in the form of a verb-final subordinate clause (the finite verb *geht*, literally 'goes', here: 'feels' is highlighted in bold) and is separated from its matrix clause by a comma. Example (2) is a corresponding corpus example for Easy German in which the structure is transformed into a paratactic sequence of two main clauses separated by a colon.

(1) Man denkt dann, dass es Menschen mit seelischen Krankheiten immer schlechter **geht**.
'You then think that people with mental illnesses always feel bad.'

(2) Man denkt dann: Menschen mit seelischen Krankheiten **geht** es immer schlecht. (taz leicht, our emphasis)
'You then think: People with mental illnesses always feel bad.'

Corpus evidence has special relevance in the case of Easy German because many texts are individually approved for their quality in making written information more easily comprehensible by readers in the target group. It is all the more interesting that corpus studies show that Easy German texts do not generally dispense with syntactically subordinated structures (cf. Jablotschkin 2017 and Fuchs 2019 for two corpus studies on causal relations). It is future research to evaluate whether avoiding syntactic subordination makes texts more easily comprehensible in all cases of semantic dependencies or whether there is a processing trade-off that makes syntactic subordination preferable under certain conditions.

Note that the word order in example (2) is grammatical even in Standard German in the case of verba dicendi like *think* and similar predicates (cf. Meinunger 2004). An important difference is that the object clause would normally be separated by a comma in Standard German. The insertion of a colon or full stop between two semantically dependent segments instead of a comma — creating a paratactic structure on the text surface — is typical for texts in Easy/Plain German. In this study, we concentrate on the usage of colon, leaving an investigation of the (non-standard) use of full stop for future research.

As mentioned above, a consequence of avoiding syntactic subordination is that simplified German includes more colons than Standard German. Table 1 displays the average numbers of colon occurrences per 100 finite verbs in subcorpora of LeiKo (Jablotschkin and Zinsmeister 2020), a corpus of simplified German texts, compared to a reference set of Standard German texts. The number of colons is almost twice as high on average in the simplified versions than in Standard German. For details on the corpora see Section 3.

Language variant	Number of colons per 100 finite verbs
Easy German	15.03
Plain German	14.05
Standard German	8.02

Table 1. Average number of colons per 100 finite verbs in LeiKo and Standard German reference texts

In this paper, we describe in detail the syntactic and pragmatic contexts in which a colon is used in Easy/Plain German **—** combining dependent clauses as in example (2) and also in other constructions. Our goal is to create an empirical basis for linguistic and computational linguistic modelling of simplified German as well as for further psycholinguistic studies on text comprehension.

To this end, we developed guidelines for the annotation of colon constructions and applied them in a pilot study on a sample of 122 items. The manual annotation was

independently carried out by two annotators. After comparing the annotations, the guidelines were improved for the annotation of a larger sample of colon constructions (n=195) by different annotators (plus 27 items Standard German annotated in the pilot study). We evaluated our final annotation categories (n=222) on the level of fine-grained syntactic categories and on the level of broader functional categories (cf. Section 4).

In Section 2, we describe the use of colon in Standard German and in the rule set for Easy German by Bredel and Maaß (2016). Section 3 provides more details on LeiKo (Jablotschkin and Zinsmeister 2020) and the reference texts, which is the empirical basis from which we sampled the LeiKo$_{colon}$ set. Section 4 sketches the annotation procedure. In Section 5, we present our findings. Section 6 concludes the paper with an overview of open questions.

2 The use of the colon in German

The colon in Standard German is a means for creating coherence by announcing that some relevant information is following such as verbatim speech, enumerations or explanations, summaries of what has been said before or conclusions drawn from this (cf. Grammis n.d.; see also Duden 2009, §1726; Bredel (2011, 84–89) explains these usages by a syntactic and a pragmatic function. The syntactic function of the colon is to connect two syntactically "autonomous" units like the full stop does. In contrast to the full stop, the colon opens a semantic slot and can thereby link two propositions without any additional linguistic marker such as a complementiser. Bredel (2011, 87–88) argues that the colon can also trigger a pragmatic function by which the reader is instructed to identify the part preceding the colon as an announcement for new information that is presented after the colon such as a switch from one activity to another. A special construction involves "disintegrated" elements preceding the colon, which often consist only of a single adverb or connective such as *Trotzdem* 'however' (cf. Breindl 2009, 277–78; Karhiaho 2003, chapter 4, Duden 2009, § 1749).

Karhiaho (2003) conducted an extensive empirical study on the use of colon in Standard German analysing six different syntactic, pragmatic and text-structure related categories. Among others, her corpus study on approx. 3,000 colon instances in different written registers attests colon usages to link sentences: Subject and object relations (including direct and indirect speech) that fill a semantic slot according to Bredel (2011) constitute the largest group (Karhiaho, 2003, 54–57), causal relations which require inferences the second largest one (Karhiaho, 2003, 57–60). However, Karhiaho (2003) does not provide any absolute or relative frequencies nor does she analyse her findings according to the different subcorpora so that we cannot compare our results directly with hers.

The linguistic rule set for Easy German by Bredel and Maaß (2016, 254) concentrates on the colon functions of marking the syntactic autonomy of the connected units and opening a semantic slot that are described above. It does not elaborate on further functions and does not point out any differences in comparison to Standard German.

3 Corpus

For our study, we sampled data from LeiKo (Jablotschkin and Zinsmeister 2020). LeiKo is a comparable corpus of Easy German and Plain German news and newspaper texts from 2018 and 2019. The Easy German texts were published by NDR, a north German

public broadcaster whose Easy texts are written according to the rule set by Bredel and Maaß (2016) (p.c. NDR 2020), and taz, a German daily newspaper that publishes some of their articles in an Easy German translation according to the capito rule set (capito Netzwerk 2019). Note that this rule set is only available to partners of the capito franchise network. The Plain German texts were published by the two broadcasters Saarländischer Rundfunk (SR) and deutschlandfunk. On their websites, they do not explicitly refer to a specific rule set they adhere to, but there is a strong indication that they have taken into account the rule set by Bredel and Maaß (2016), because they use a middle point in order to separate compounds instead of the otherwise common hyphen.

LeiKo is systematically compiled and linguistically annotated for linguistic and computational linguistic research. The corpus consists of 216 texts (approx. 56,000 tokens) and their metadata and is structured in four sub-corpora according to the websites they were published on. All texts are automatically tokenized, lemmatized, part-of-speech tagged and dependency parsed. A core corpus of 40 texts is manually corrected on all levels.

For the present annotation study, we compiled the LeiKo$_{colon}$ set which consists of 222 annotated colon constructions based on a random sample of approximately 40 colon constructions per LeiKo subcorpus and 58 colon constructions from the Standard German newspaper taz.

4 Guidelines and annotation procedure

Our initial motivation for having a closer look at colon constructions in our corpus was to distinguish syntactic colon uses (where there is a syntactic relation between the segments before and after the colon) from non-syntactic uses. With syntactic colon uses, we deemed the segments before and after the colon to form one sentence. With the non-syntactic uses, we regarded the colon as standing between two independent sentences. In contrast to Karhiaho (2003)'s study on Standard German, we took semantic and pragmatic aspects of colon constructions only into secondary account.

4.1 Guidelines

From that starting point, we inductively derived the following four main annotation categories.

4.1.1 Signal of coreference

One expression from the segments before and after the colon refers to the same extralinguistic object, respectively. The coreferential expressions can vary in length and syntactic category. For example, they can be noun phrases with a nominal head, demonstrative pronouns, pronominal adverbs or they can comprise one or several sentences. A subset of this category includes constructions in which one of the segments contains a discourse-deictic anaphor (or non-nominal antecedent anaphor, cf. Kolhatkar et al. 2018; Roussel et al. 2018), such as the pronominal adverb *davon* 'on this' (in bold) in example (3), which corefers with the subsequent sentences introduced by the bullet points. For writers, this category of colon construction is beneficial for reducing syntactic complexity because they can avoid a subordinate clause structure in the second segment which would be dependent on the adverb in the first segment in Standard German. In that case, the pronominal adverb would function as a correlate in the main clause for the follow up subordinated clauses. For the readers, however, identifying the complex antecedent of the pronominal adverb that follows the colon is still a challenging task.

(3) Das hängt zum Beispiel **davon** ab:
- Wie viele Arbeits·plätze hat die Firma?
- Wie viele Menschen mit einer Schwer·behinderung arbeiten in der Firma?   (SR, highlighting added by us)

'That depends for example on this:
- How many jobs does the company have?
- How many severely disabled persons work in the company?'

4.1.2 Separation of connective

The colon visually separates an initial connective from the rest of the sentence as *Aber* 'but' in example (4). In Standard German, syntactic disintegration of the connective is usually associated with connection on the pragmatic rather than the propositional semantic level, that is, disintegrated connectives link speech acts or epistemic units rather than propositions (cf. Breindl 2009, 277–78; Sweetser 1990, Chapter 4) and are sometimes considered as discourse markers (Imo 2016, 111–12). Evaluation of discourse relations will show whether this is true for simplified varieties of German, too, and whether connectives with and without colons are used consistently for one of the readings respectively.

(4) Aber: Manche von den Ärztinnen und Ärzten haben schon lange keinen Schwangerschafts-Abbruch mehr gemacht.   (taz leicht)

'But: Some of the doctors haven't done an abortion for a long time.'

4.1.3 Signal of pragmatic relation

The colon stands between two sentences and expresses a specific semantic relationship between them, e.g. a discourse relation (see for example Webber et al. 2019) such as causality as in example (5). The relation is not marked by any means other than the colon itself. The exact relationship that the colon expresses in each of the occurrences has to be inferred by the reader. Consequently, constructions like these can help reduce syntactic complexity because they do without connectives and possibly subordinate sentence structures, but at the same time they increase ambiguity and require the reader to make inferences based on prior discourse information or on world knowledge.

(5) Aber auch Mieter müssen mitbezahlen: Ein Teil von der Grund-Steuer gehört zu den Neben-Kosten bei der Miete.   (nachrichtenleicht)

'But tenants have to pay as well: Part of the property tax belongs to the extra costs of the rent.'

4.1.4 Signal of syntactic dependency

The segment after the colon complements or modifies the segment before the colon. Often, the first segment is fragmentary, like in example (2) in the introduction, repeated here as (6). In Standard German, we would be more likely to expect a comma rather than a colon in this position. Using this construction in simplified German allows the writer to avoid the use of commas and possibly subordinate sentence structure. It still has to be investigated to what extent this facilitates text comprehension, since syntactic complexity cannot be reduced by simply replacing the punctuation mark.

(6) Man denkt dann: Menschen mit seelischen Krankheiten geht es immer schlecht.

(taz leicht)

'You then think: People with mental illnesses always feel bad.'

4.2   Annotation procedure

The guidelines are operationalised as a decision tree with authentic examples for the different annotation categories. In a pilot study, two annotators (who did not author the guidelines themselves) independently carried out the annotations on 122 items of colon constructions. After measuring inter-annotator agreement, evaluating the annotations in detail and refining the guidelines, two annotators different from the first ones annotated 195 new items of colon constructions. In both studies, the respective annotators carried out the task following the enumerated steps in the following decision tree:

Step 1: *Determining the markable*: Every markable consists of two segments separated by a colon. Seg1 is the segment before the colon and Seg2 the segment after the colon.

Step 2: *Determining the syntactic form of Seg1*: Is Seg1 a complete sentence or not? *Complete sentence* is defined as a verb with at least those arguments that are needed to form a grammatical sentence (i.e., subject and obligatory object(s)). If Seg1 is not a complete sentence, the annotator specifies to what extent it is incomplete, i.e., whether it consists of merely a connective or another syntactically incomplete structure.

Step 3: *Determining the syntactic form of Seg2*: Is Seg2 a complete sentence or not?

Step 4: *Choosing a category describing the relation between Seg1 and Seg2*. Having traversed the decision tree describing the syntactic forms of Seg1 and Seg2, the annotator has to choose from a set of different syntactic and pragmatic categories for describing the colon use.

The category set was organised in a hierarchical form. There were the above-mentioned four main categories, each of which contained several more fine-grained categories making more detailed syntactic distinctions, e.g. for coreferential use, the annotators had to specify whether one or both of the segments constituted full sentences or smaller syntactic units like noun phrases. All in all, our annotation scheme comprises ten fine-grained annotation categories.

5   Findings

We report the findings of the second run of the study, which we carried out after the guidelines had been evaluated and refined.

5.1   Annotation scheme

We obtained low inter-annotator agreement on the ten fine-grained categories mentioned in Section 4.2 because it turned out the two annotators often disagreed on the exact syntactic form of the segments. However, this mismatch has no effect on the distinction between the four major functional categories described in Section 4.1, for which we obtained medium inter-annotator agreement (80% accuracy; Cohen's κ=0.58). This means that the annotators mostly agreed on the function the colon had in a specific example.

5.2   Distribution of colon types

After assessing inter-annotator agreement, we performed adjudication and created a gold annotation for the colon constructions in order to evaluate the distribution of the colon types across subcorpora. In addition to the 195 items from the second run of the annotation study, we included 27 annotated Standard German instances from the first run in order to increase the number of Standard German items. Figure 1 summarises these results on the overall 222 colon instances of the LeiKo$_{colon}$ set.
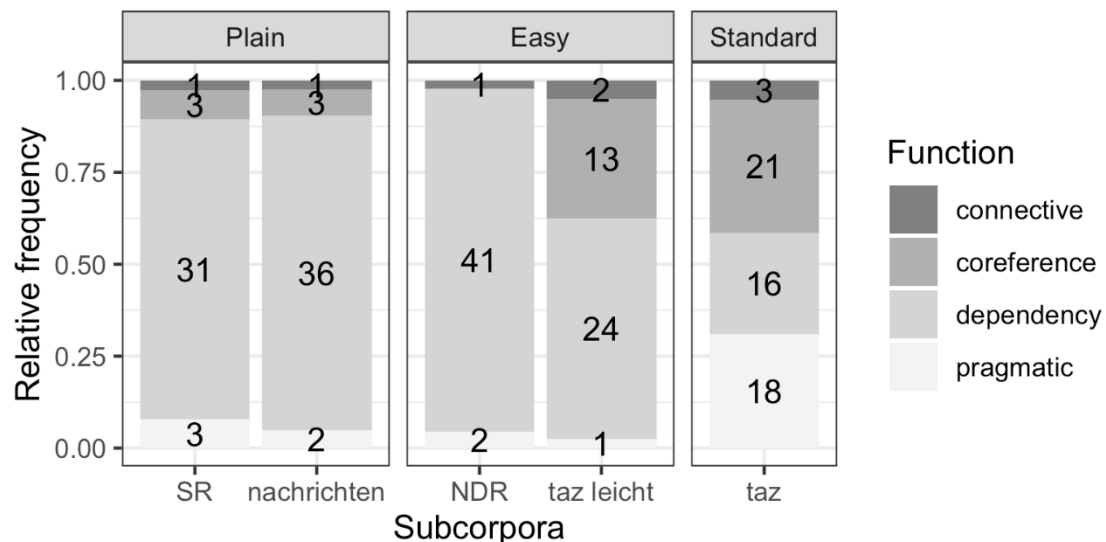
Figure 1. Types of colon constructions in LeiKo$_{colon}$ across subcorpora (n=222)

One of our main findings is that the syntactic use of the colon — signalling that there is a syntactic dependency relation between the segments before and after the colon — constitutes the largest group of colon usage across all subcorpora: 148 of 222 items (67%) belonged to this category.

Considering the different variants, we found that in the two Plain German subcorpora, the distribution of the different colon types is very similar to each other: in the majority of colon constructions there is a syntactic dependency across the colon, signalling coreference or pragmatic relations is rare, and there are only individual instances of colon constructions where the colon visually separates the connective from the rest of the sentence.

In contrast to the rather similarly distributed Plain German subcorpora, the two Easy German subcorpora differ considerably from each other: In the NDR subcorpus, almost all items imply a syntactic dependency relation across the colon. In taz leicht, there is also a proportion of coreferential uses, which does not exist in the NDR subcorpus at all.

In the Standard German corpus, the different types of colon constructions are more evenly distributed than in the simplified varieties. Just like in Plain and Easy German, the separation of a connective with the help of the colon is rare, but all three other categories are relatively frequent, even the signalling of a pragmatic relation, which hardly exists in any of the other subcorpora.

Considering the function of signalling a coreferential relation, the difference between the proportions taz and taz leicht is not significant (proportion test: $X^2=0.026576$, df=1, p=0.87). Whether this can be explained by the fact that taz leicht consists of translations of taz texts needs to be further investigated. However, considering the proportion of

dependencies across colons, both subcorpora differ significantly (proportion test: X^2=8.9983, df=1, p=0.003).

6   Implications and future work

The aim of our annotation study was to gain insight into how the colon is used in Easy German and Plain German in comparison to Standard German. Our findings indicate that the colon has the same functions in the simplified variants as in Standard German to the exception of the Easy German subcorpus NDR which does not employ the colon for signalling coreferential relations. Given that this function occurs in other texts of simplified German, we assume that its non-occurrence might be due to editorial rules imposed by the broadcaster NDR. Even if the repertoire of functions is the same, we observed a significant difference in the distribution of colon functions in simplified German and Standard German. As expected, the colon frequently replaces a comma between two syntactically dependent segments in order to suggest syntactic simplification in the simplified variants, whereas in Standard German it is also often used to signal a coreferential or pragmatic relation.

It is still an open question as to what extent texts are more comprehensible if the colon separates two units that are autonomous by their surface form but dependent due to a syntactic dependency relation or a pragmatic discourse relation (see also Bredel and Maaß 2016, 385 who cite Lasch 2013 for "(hidden) complexity" in cases like this). To answer this question, it will be necessary to conduct psycholinguistic and/or neurolinguistic studies with relevant target groups such as prelingually deaf people or people with learning difficulties. Authentic data and frequency information from the LeiKo corpus could serve as input data for such studies.

Further open questions relate to the comparative analysis of other punctuation signs given that the colon shares functions with comma and full stop in Standard German. Even if comma use is dispreferred for simplified German in the rule sets, it is attested in the corpus. It is future research to analyse functions and distributions of comma and full stop in corpora of Easy German and Plain German and compare it to the use of colon.

Finally, a larger corpus sample annotated with colon functions could be used to train a classifier for refining sentence segmentation as input for further automatic processing of simplified German with state-of-the-art tools trained on (large amounts of) Standard German texts. For instance, segments separated by a colon that signals syntactic dependency should be presented as one syntactic unit to a dependency parser that otherwise would not only miss attaching the second segment but very likely misanalyse the first segment as well due to it being incomplete with respect to expected dependents.

Acknowledgements

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Silvana Deilen

Segmenting compounds in German Easy Language: Does facilitated perception lead to reduced cognitive processing costs?

Student track

Abstract

In German Easy Language, it is generally agreed that compounds are to be optically structured to facilitate lexical access and comprehension. The present study uses eye-tracking data to infer differences in the cognitive processing of compounds that are segmented with a hyphen, segmented with a mediopoint or not segmented at all. Four experiments were conducted to determine whether the theoretical advantages of the mediopoint can be supported with empirical evidence. In addition, background assessments, such as a neuropsychological test battery and a reading test, were conducted to evaluate subjects' neuropsychological skills and reading proficiency as well as to determine whether there is a relationship between cognitive performance and the need for segmentation. Both the results of the study and of the background assessments will be introduced and discussed in this paper.

1   Introduction

German is well-known for its propensity for compound words. In contrast to other languages such as English, German compounds are always concatenated, i.e. the individual morphemes are written as a single word without spaces (*Sonntagnachmittagsspaziergang*, *Sonn+tag+nach+mittag+spazier+gang* ['*Sunday afternoon stroll*']). To facilitate lexical access and comprehension, the first sets of rules and regulations for German Easy Language (Inclusion Europe 2009; BITV 2.0 2011; BMAS 2013) recommend separating compounds with a hyphen (*Apfel-Baum*). However, using the hyphen as an optical structuring sign has numerous linguistic and educational disadvantages (see Bredel and Maaß 2016, 2017). One of the most notable disadvantages of segmenting compounds with a hyphen is that it is orthographically incorrect and therefore contradicts one of the main principles of German Easy Language which is to avoid using incorrect German (see Maaß 2015, 179). This incorrect spelling in turn leads to reduced acceptability of the concept of German Easy Language and increases the danger of stigmatising primary target groups that are dependent on texts in German Easy Language to participate in society and make informed and autonomous decisions. Therefore, the linguistically founded guideline (Bredel and Maaß 2016) suggests structuring compounds with a mediopoint (*Apfel·baum*), which is considered "as a more neutral solution" (Maaß 2020, 241). Using the mediopoint as a structuring sign offers several theoretical advantages. In contrast to the orthographically incorrect hyphen, the use of the mediopoint, combined with the lowercase character after the mediopoint, complies with German orthography. Since the mediopoint is smaller than the hyphen, it is also assumed that it is less invasive than the hyphen and, consequently, that the compound structured with a mediopoint does not optically deviate from the standard version to the same extent as the compound structured with the hyphen does. Notwithstanding, the morpheme boundaries are still visible, hence facilitating access to the compound structure. Thus, Bredel and Maaß (2016) expect that both the target groups of German Easy Language and the broader population will more willingly accept

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compounds structured with a mediopoint than compounds structured with a hyphen. However, it is important to point out that even though the mediopoint is expected to be more neutral than the hyphen, it nonetheless marks the texts as being different and therefore still carries a certain risk of stigmatising the primary target group (see Hansen-Schirra and Maaß 2020; Maaß 2020). The extent to which the mediopoint is capable of reducing the risk of stigmatising German Easy Language users remains to be determined.

The advantage of segmenting compounds is accounted for by results of prior studies (e.g., Inhoff, Radach, and Heller 2000; Placke 2001), which have shown that the marking of constituent boundaries reduces processing costs as it facilitates lexical access to the compound's constituents. When marking constituent boundaries, however, it is important to remember that studies have previously shown that visual segmentation of compounds enforces morphological decomposition, meaning that, prior to processing the compound as a whole, recipients first decompose the compound into its constituent units (e.g., Pfeiffer 2002; Geilfuß-Wolfgang 2007). Empirical evidence for the relationship between morphological decomposition and semantic transparency is contradictory. While some studies have shown that only transparent and especially low-frequency and multimorphemic transparent compounds are accessed via a decomposition route and that decomposition hampers processing of opaque compounds, i.e. compounds that are not directly related to their constituent meanings (*Löwenzahn* ['*dandelion'*]) (cf. Isel, Gunter, and Friederici 2003; Sandra 1990; Zwitserlood 1994; Koester, Gunter, and Wagner 2007), other studies have shown that both transparent and opaque compounds are processed via morphological decomposition (cf. Monsell 1985; Dohmes, Zwitserlood, and Bölte 2004; Smolka and Libben 2017).

The results of the latter studies, which were conducted with unimpaired speakers, are supported by findings from studies conducted with representatives of target groups of German Easy Language revealing that representatives of these groups decompose compounds irrespective of length and semantic transparency (cf. Lehmhöfer, Koester, and Schreuder 2011; Lorenz and Zwitserlood 2014; Pappert and Bock 2019). However, Bredel and Maaß (2017) assume that decomposing opaque compounds would encourage the reader to process the separated morphemes individually which, in turn, would initiate unintended decoding processes. Thus, they state that the mediopoint should only be used if decomposition does not lead to increased cognitive processing costs due to a conflict between possible meanings. Bredel and Maaß (2017) point out, however, that both requirements and advantages of the mediopoint are so far purely theoretical and still need to be examined and supported by empirical evidence — a research gap which constitutes the starting point for the present eye-tracking study.

2   Study design

The study presented here was conducted within the research project "Simply complex! A multimodal and interdisciplinary approach to examine linguistic complexity within Easy Language". By using neuroscientific methods, such as EEG, eye-tracking, and fMRI, the project's main objective is to investigate the empirical validity of the postulated rules for Easy Language and to contribute to an evidence-based development of these rules. The present eye movement study focuses on the effects of visual, morphological, and semantic factors on the processing of noun-noun compounds. In particular, this study seeks to determine whether compounds structured with a mediopoint are processed faster than compounds either separated with a hyphen or not optically structured at all.

The four eye-tracking experiments undertaken for this study, the first and second of

which testing the number of morphemes and the third and fourth of which testing the semantic transparency in addition to the visual structuring sign, were conducted on word and sentence level respectively. By presenting compounds both with and without context, the study also investigates whether segmented and unsegmented compounds are processed faster if read in context and whether the need for segmentation is dependent on the cues provided by the context. In each of the four eye-tracking experiments, subjects read the presented words and sentences silently while their eye fixation patterns were recorded. By measuring several reading time variables, such as number of fixations, first fixation duration, total reading time, and eye movements jumping backwards in the sentence (so-called regressions), researchers are able to track what a subject is focusing their attention on at any given time and to correspondingly develop a detailed representation of the time-course of cognitive processing.

The study was conducted both with neurologically unimpaired speakers as well as with deaf and hard-of-hearing pupils, who were selected to represent one of the several target groups of German Easy Language. Even though several studies have shown that, on average, deaf and hard-of-hearing pupils read at approximately a fourth-grade level at the time of their graduation (10th grade) (e.g., Chamberlain and Mayberry 2000, 221; Hennies 2018, 207), there is still a notable heterogeneity within the group of deaf and hard-of-hearing pupils. Consequently, it was necessary to collect not only metadata, such as type and degree of hearing impairment, but also to evaluate subjects' neuropsychological performance and their reading proficiency. For this purpose, a psycholinguistic test battery was implemented to measure cognitive processing speed, cognitive flexibility, working memory capacity, word fluency, and verbal intelligence of each subject. Reading skills were assessed by the Salzburg Reading Screening for Grades 2 to 9 (Wimmer and Mayringer 2014/2016). By linking eye-tracking data to neuropsychological test scores and reading skills, the study ultimately sets out to determine whether or not there is a relationship between the possible need for segmentation of compounds and an individual's level of cognitive performance and reading proficiency, respectively.

3   Results

The reading test revealed that even within the group of deaf and hard-of-hearing pupils there is still a strong heterogeneity when it comes to reading proficiency: Even though the reading skills of 80% of the hearing-impaired pupils were classified as "below average" (Wimmer and Mayringer 2014/2016, 21), there were also some hearing-impaired pupils who had a reading quotient that was classified as "average" (Wimmer and Mayringer 2014/2016, 21) and even one pupil who had a reading quotient that was classified as "good" (Wimmer and Mayringer 2014/2016, 21). Further analysis did not reveal any significant correlation between reading proficiency and degree of hearing loss, nor did it reveal any significant correlation between reading proficiency and grade. Consequently, it is quite possible that pupils from grade 10 had poorer reading skills than pupils from grade 7. However, reading proficiency was significantly correlated with test battery scores, which showed that pupils with better reading skills also scored higher in the psycholinguistic subtests.

Analyses of the main processing measures showed that, as expected, the unimpaired speakers did not benefit from segmentation. However, their gaze behaviour also clearly revealed that they processed compounds segmented with a mediopoint significantly faster than compounds segmented with a hyphen. Furthermore, analyses yielded a significant effect of transparency, indicating that the processing advantage for

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zh
aw

the mediopoint is higher for opaque compounds than it is for transparent compounds. Analyses of the target group's gaze behaviour also demonstrated that compounds with a mediopoint are processed faster than compounds with a hyphen.

The data also revealed that the need for segmentation is strongly dependent on subjects' reading proficiency. While deaf and hard-of-hearing pupils with higher literacy skills did not process the segmented compounds significantly faster than the unsegmented compounds, less-skilled readers benefited significantly from the segmentation of compounds. Moreover, analyses yielded a facilitating effect of compounds presented with context for both unimpaired speakers and deaf and hard-of-hearing pupils. For unsegmented compounds and compounds segmented with a mediopoint this facilitating contextual effect became significant for both transparent and opaque compounds. For compounds structured with a hyphen, however, the facilitating contextual effect only appeared for transparent compounds, whereas opaque compounds were processed with context even slower than without context.

4   Discussion

This paper has outlined the empirical research project on segmentation of compounds in German Easy Language and has provided insights into main results. One of the main findings of the present study was that for individuals with low literacy skills reducing linguistic complexity by marking constituents' word boundaries helped to effectively reduce cognitive processing costs. Furthermore, the study revealed that, overall, both skilled readers and readers with low literacy skills generally processed compounds with a mediopoint faster than they processed compounds segmented with a hyphen.

However, the study also yielded some contradicting results in subjects' eye fixation patterns, which in turn raises some doubts as to whether data collection via eye-tracking alone is sufficient in providing a substantial insight into cognitive and linguistic processing during word and sentence reading. Even though eye-tracking allows researchers to draw conclusions about a subject's viewing behaviour, it does not allow for valid conclusions about the underlying motivation of this behaviour. In other words, researchers are able to track *what* a subject is focusing their attention on, but not *why* a subject is focusing their attention on that specific section of the sentence or word. Online methods such as eye-tracking consequently allow us to measure processing costs to some extent, however, we still cannot exclude that eye fixation patterns, and especially fixation durations, are not influenced by other factors such as tiredness, motivation, or concentration on auditory, tactile, or olfactory stimuli. These boundaries of online methods from cognitive science must be considered when interpreting the results.

It is therefore apparent that there are still several questions that remain unanswered in respect to this topic of enquiry. Answering these questions requires further research which is beyond the scope of this study. In particular, a data triangulation whereby the online method of eye-tracking is complemented by other offline data collection approaches, such as questionnaires or retrospective interviews, may allow us to gain a better insight into how differently segmented compounds are cognitively processed and may provide a promising avenue for future research.

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Luisa Carrer

The case for Easy Italian: An empirical study on the impact of translators' strategies on text comprehensibility

Research track

Abstract

Easy Language is an essential instrument of inclusion for people who would otherwise be excluded from access to written information and full participation in society. Translation into Easy Italian is still under-researched. This study aims to fill this gap and advocates for greater attention from the academic community. Both quantitative and qualitative methods are used to analyse (1) what strategies translators employ when translating from Standard into Easy Italian, and (2) whether these strategies facilitate reading comprehension of Easy Italian texts to people with intellectual disabilities. It is concluded that, on the one hand, standards for Easy Language are essential to guide the translator's work. On the other hand, high comprehensibility can only be achieved through a careful consideration of the target communicative situation.

1 Credits

2 Introduction and background

Recent studies show that low literacy affects large segments of the adult population, both in Switzerland and Italy. According to the Adult Literacy and Life Skills Survey (ALL) of 2003–2007 (OECD and Statistics Canada 2005), 15.9% of the Swiss population aged between 16 and 65 is lacking functional literacy skills. More recent OECD-PIAAC data (OECD 2018) indicates that approximately 39% of 25–65 year-olds (i.e. 13.1 million adults) in Italy score at the bottom of the PIAAC ranking measuring. These figures suggest that low-skilled adults both in Italian-speaking Switzerland and Italy struggle to understand written communication in Standard Italian.

Barrier-free communication is a prerequisite to guarantee everyone universal accessibility to information. Against the background of the UN Convention on the Rights of Persons with Disabilities (hereafter UN-CRPD; UN-CRPD 2006), Easy Language is an essential instrument of inclusion for people who would otherwise be excluded from access to written information and full participation in society.

In Northern Europe, inclusive communication has been at the core of government policies for decades, as well as, more recently, the focus of academic research. A notable example is Sweden, where the first easy-to-read books were commissioned by the National School Board as early as 1968 (Bohman 2017). In Germany, since the 1980s, the claims of the disability rights movements have been the propeller for a new legislative framework in the country (Bredel and Maaß 2016). Prolific linguistic research

on *Leichte Sprache* (or Easy German) confirms how well established the concept has become in the last ten years, both in Germany and German-speaking Switzerland (cf. Bock 2014; Maaß et al. 2014; Bredel and Maaß 2016; Bock 2019; Maaß and Rink 2019; Jekat et al. 2020, among others).

In Italy, high readability and comprehensibility of texts of public interest have been the focus of academic research since as early as the mid-1970s (cf. De Mauro 1974, 1980; De Mauro et al. 1986, 1988, among others). Nonetheless, in recent years, no experimental research has addressed the impact of Easy Italian on text comprehension by people with intellectual disabilities (ID). Drawing on research carried out in the context of my MA thesis (2021, forthcoming), this paper aims to fill this gap by combining insights from translation studies and accessibility studies.

3   Research purpose

Drawing on Nüssli's (2018) methodological insights, this paper addresses the following research questions:

(1) What strategies do translators employ when translating from Standard into Easy Italian?

(2) Do translators' strategies facilitate reading comprehension of Easy Italian texts to people with ID?

In my analysis, a translation strategy is understood as a "tool to tackle the possible problems that emerge during the translation process" (Gambier 2010, n.p.). Strategy in a translation event (which includes what happens before and after the translation) is achieved through tactics in a translation act (i.e. translation in a narrow meaning). Tactics may be subject to monitoring and modification adapted to a given communicative situation (Gambier 2010).

Furthermore, this paper sets out to promote dialogue between existing and future studies on *Leichte Sprache* and Easy Italian. This is particularly desirable within Switzerland's multilingual context.

4   Methods

To address the first research question, a small-scale corpus was compiled, including two health-related texts in Standard Italian (eHealth Suisse 2019b; SSN 2019) and their translations into Easy Italian (Text 1: extract from eHealth Suisse 2019a; Text 2: extract from SSN 2018), as well as one health-related text originally written in Easy Italian by representatives of the target population (Text 3: Villa Olimpia n.d.). Texts were analysed in the context of their adherence to European standards for Easy Language (Inclusion Europe 2009). For each corpus text, a quantitative analysis was first carried out to measure text *readability* at the lexical and syntactic levels using the READ-IT readability assessment tool (demo version; cf. Dell'Orletta et al. 2011). Secondly, a qualitative manual analysis was performed to measure text *comprehensibility*. This meant assessing "deeper obstacles" (Piemontese 1996, 105) related to text organisation and information structure. Finally, Jekat's (2014) Qualified Information Transfer (QIT) method was used to gain a richer description of the intralingual translation processes examined in Text 1 and Text 2, which are the two translated texts in my corpus.

The second research question was also explored using both quantitative and (albeit

marginally) qualitative methods. Data was collected through a reading comprehension (RC) test, which was administered to 26 participants with mild to moderate intellectual ID. Purposive sampling was used (a) to find instances that are representative or typical of a broader group of cases (i.e. people with ID), and (b) to set up comparisons among different types of cases (i.e. different types or levels of ID, as well as different reading expertise) (cf. Creswell 2003; Teddlie and Yu 2007). The demographic profile of the surveyed population is summarised in Table 1.

	Male	Female
Gender	13	13
Age (years)		
19–35	7	6
36–50	4	7
51+	2	–
Employment status		
Employed	11	11
Not employed	2	2
ID/Etiology		
Down's Syndrome	9	7
Other	4	6
Severity of ID		
Mild	2	4
Moderate	10	8
Not assessed	1	1
Independent living in group homes		
Yes	9	9
No	1	–
In training	3	4

Table 1. Demographic profile of surveyed population

As can be seen in Table 1, the sample included 13 females and 13 males, whose mean age was 35 years 8 months (range 19–55 years), with a standard deviation of 10 years 1 month. All 26 participants had a disability onset before the age of 18; 16 participants (61.5%) had Down's syndrome. Finally, Italian was the first language of all participants. Twenty-three of them were based in Italy and the remaining three were based in Ticino.

The aim of the test was to assess the actual degree of readability and comprehensibility of the corpus texts at both literal and inferential level (for detailed information on test instrument design, as well as ethical issues, cf. Carrer 2021, forthcoming). It was hypothesised that inferential questions require higher reading comprehension skills than literal questions. Furthermore, the test included four control items and eight experimental (or test) items. The latter aimed to measure respondents' comprehension levels of "problem constructions" (Balling 2013, 2) in each corpus text. Problem constructions are defined as those text passages which do not comply with Inclusion Europe guidelines. No hypothesis was made on respondents' performance on experimental questions as opposed to control answers. This non-hypothesis was based on the understanding that adherence to guidelines does not automatically produce 'easy' texts (cf. Balling 2013; Bredel and Maaß 2019; Bock 2015, 2019).

In order to obtain richer data, a self-report questionnaire was also administered, aiming to yield demographic data about the respondents, as well as to elicit participants' private behaviours as regards their own reading habits. Finally, post-test focus group interviews were conducted in order to elicit respondents' perception of the corpus texts. It is important to emphasise that this exploratory study incorporated one element of

participatory research, involving independent self-advocacy consultants from ANFFAS Onlus Udine in the test validation process.

5 Main findings

The text analysis showed that all three corpus texts contravened several European guidelines (cf. Carrer 2021, forthcoming). Complex syntax, as well as insufficient paraphrasing and exemplification of low-frequency, abstract or specialist vocabulary were identified in all three corpus texts. My analysis also revealed inconsistencies at both macro and micro-typographical levels, ranging from layout issues at the sentence and textual levels to ineffective text-image relationship. Text 1 and, most interestingly, Text 3 — i.e. the corpus text originally written by representatives of the target population — presented a particularly high number of problematic issues that might pose a barrier to comprehensibility.

More specifically, my analysis of Text 1 revealed a relatively 'conservative' translation strategy. Apart from a moderate reorganisation of contents at the macro-typographical level (e.g. addition of bold type emphasis, bulleted lists), the overall target text structure and its illustrations remained substantially identical to the source text (eHealth Suisse 2019b). In addition, it could be observed that variation techniques were preferred to substantial additions or reductions, thus suggesting a moderate implementation of paraphrasing and exemplification techniques. As for Text 2, my qualitative text analysis suggested a less conservative translation strategy. Substantial reduction was consistently emphasised, with a debatable impact on the overall information transfer from the source text (SNN 2019). As in Text 1, the low number of additions to the target text had also an impact on paraphrasing and exemplification, which in fact were kept to a minimum.

The RC test results consistently confirmed what emerged from my text analysis and suggested that translators' (or authors') strategies had an unsatisfactory or insufficient impact on comprehension by the sample population. Overall, the translation strategy implemented in Text 2 obtained the best results. On the other hand, the translation strategy behind Text 1 — or the writing strategy behind Text 3 — proved to be less effective, with respondents incorrectly answering 56% and 58% of the questions in Text 1 and Text 3 respectively. The data in Figure 1 indicates that experimental questions obtained a lower percentage of correct answers. This means that respondents' performance on problem constructions (i.e. not complying with Inclusion Europe guidelines) was poorer than on control constructions.
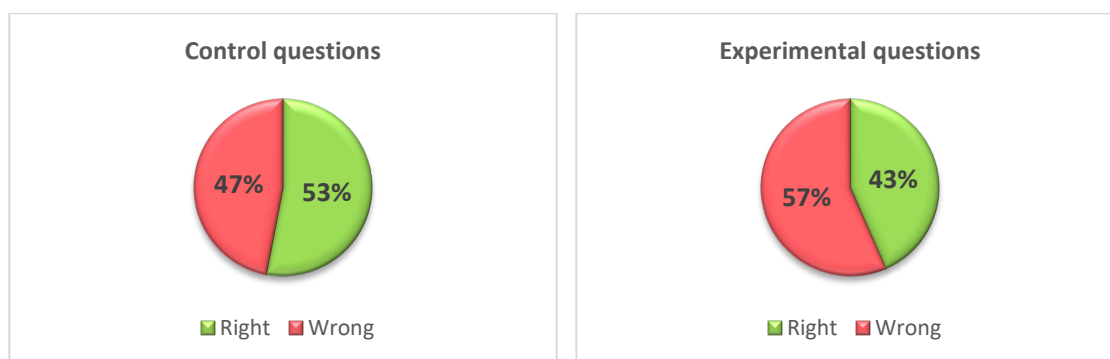
Figure 1. Percentage of correct answers to control (Q3, Q4, Q5, Q9) vs. experimental questions

Out of eight experimental questions (vs. four control questions), only three had over 50% of correct answers, with the remaining five having on average 26.9% (N=7) of correct answers each. More specifically, four out of eight experimental questions aimed at measuring respondents' comprehension of key low-frequency lexical items were not answered or were answered incorrectly by the vast majority of the sample group (cf. Table 2).

Experimental questions	No. of respondents giving blank or incorrect answers	Targeted lexical items
Q1 (Text 1)	22 out of 25 (=88.0%)	*CIP*
Q6 (Text 1)	18 out of 25 (=72.0%)	*facoltativa*
Q7 (Text 2)	22 out of 26 (=84.6%)	*servizio per la salute*
Q10 (Text 3)	21 out of 26 (=80.7%)	*limitare/salumi*

Table 2. Respondents' performance on four experimental questions (Q1, Q6, Q7, Q10)

The data drawn from my focus group interviews also confirmed that several respondents perceived targeted lexical terms as being particularly challenging.

It should be emphasised, however, that three out of eight experimental questions had more than 50% of correct answers. For instance, 69.2% (N=18) of respondents had no difficulty in comprehending a passage which contained a passive voice construction. This relatively high rate of correct answers provides further evidence that that non-adherence to European guidelines may not necessarily imply poor readability (cf. Piemontese 1996, Balling 2013; Bredel and Maaß 2019; Bock 2015, 2019).

Furthermore, during test design (cf. Section 4), it was hypothesised that inferential questions would require higher reading comprehension skills than literal questions. The data shown in Figure 2 proves that the sample group incorrectly answered 61% of inferential questions, as compared to 50% of literal questions.

Figure 2. Percentage of correct answers to literal vs. inferential (Q2, Q7, Q10, Q11) questions

Respondents' answers to Q10 (Text 3) offered particularly interesting results. As can be seen in Figure 3, two out of three correct options in Q10 (i.e. 'Mangiare cibo sano' and 'Fare sport e movimento') were chosen by the majority of the sample population (i.e. 22 and 20 respondents respectively), even though this question required readers to integrate different text segments, or text with prior knowledge, in order to be answered correctly. Nonetheless, I would argue that the presence of targeted lexical items *limitare* and *prosciutto* (the latter aiming to assess the comprehensibility of *salumi*) in the other two options (i.e. 'Limitare il formaggio' and 'Mangiare molto prosciutto') drastically

compromised the overall performance of the target group on this question (cf. Table 2 above).
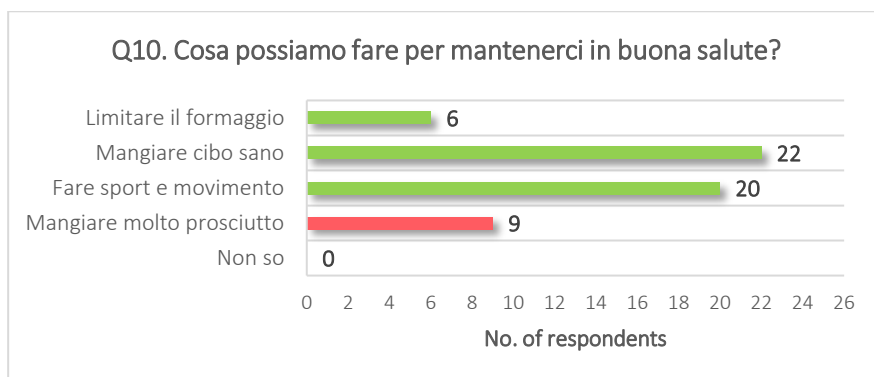
Figure 3. Respondents' answers to Q10 [red = wrong answer, green = right answer]

Analysis of variance (ANOVA) was used to determine the statistical significance of the relationship between specific parameters (i.e. age, gender, reading frequency, type and level of ID) and reading comprehension results. This analysis confirmed the relevance of the following two correlations:

- the correlation between type of ID and overall test performance, with people with Down's syndrome (N=16 out of 26) performing consistently worse than people with other ID on inferential questions;

- the correlation between level of ID and overall test performance, with people with mild ID performing consistently better than people with moderate ID.

A third less significant — and yet worth mentioning — correlation was verified between respondents' reading frequency and performance on inferential questions, proving that more experienced readers performed better than less experienced ones. It should be added that this correlation could be more visible (i.e. higher than 95%) if one outlier were excluded from the sample group.

Finally, it should also be reported that the data obtained from the self-report questionnaire showed that over 70% of the sample population find moderate, considerable or greater appreciation in reading (cf. Figure 4).
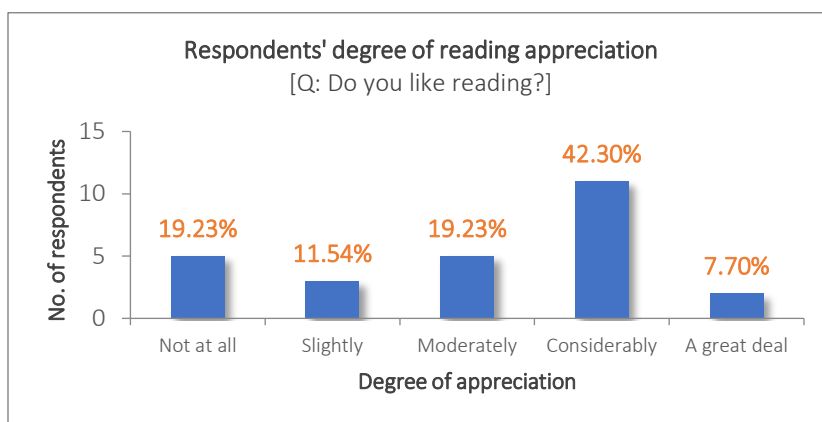
Figure 4. Respondents' degree of reading appreciation

A correlation between respondents' degree of reading appreciation and their reading frequency was verified by statistical techniques. Exceptions to this trend (that is, respondents reporting that they enjoy reading 'considerably' and yet only read 'monthly or 'never') might be explained by two main factors: on the one hand, from informal conversations during questionnaire administration it emerged that people in this population group live very busy lives (just under 85% of them are employed, cf. Table 1). Therefore, they may have limited free time for reading or related activities. On the other hand, the availability of simplified texts in Italy is simply extremely limited and this may discourage recipients with ID. As a matter of fact, 69.2% of respondents (N=18) answered affirmatively when asked if they would be interested in reading texts in Easy Italian. McQuillan and Au (2001) provide evidence that convenient access to reading material, regardless of a person's reading ability, is associated with more frequent reading and increased motivation to read. Very little or no availability of reading materials in Easy Italian may impede this virtuous process.

6 Concluding remarks

Based on the research findings discussed above, it can be concluded that, on the one hand, standards for Easy Language are essential to guide the translator's work. Test results suggested that non-compliance with guidelines did in fact hinder respondents' comprehension of the texts. On the other hand, it also clearly emerged that adherence to guidelines alone may not automatically lead to "good texts" (Bock 2015, 87). Therefore, high comprehensibility can only be achieved through a careful consideration of the target communicative situation (cf. Piemontese 1996; Balling 2013; Bredel and Maaß 2019; Bock 2015, 2019). As Piemontese argues,

> la chiarezza di un testo, di un qualunque testo, non [è] una qualità assoluta, ma relazionale. Essa risulta cioè dal rapporto che si crea tra destinatari, contenuti esituazioni di ricezione del testo […]. Questo vuol dire che alla minima variazione di uno (o più) di questi tre elementi può cambiare, cioè aumentare o diminuire, il grado di chiarezza del testo. (Piemontese 1996, 115)

This means that intralingual translations, just like interlingual ones, have to be fully functional. Function or functionality "is not a quality of a text in itself but one that is attributed to the text by the receiver in the moment of reception. Thus, it is the receiver who decides whether (and how) a text 'functions' (for her/him, in this situation)" (Nord 2006, 142). It follows that more experimental research is needed involving recipients from different target groups (Bredel and Maaß 2019). For instance, larger sample population including functional illiterates without ID would produce richer data (cf. Bock 2019).

In future studies, a wider range of testing methods should also be considered. Process-oriented techniques like eye-tracking, think-aloud protocols or speed measures would help to gain deeper insights into the recipient's internal cognitive processes (Stevenson 2010; Bock 2019).

Furthermore, following Jekat et al. (2020), the written language production by members of the target groups should be systematically analysed in the context of current EL guidelines and text comprehensibility research. Research findings pertaining to Text 3 corroborate the need for this change of perspective. Most importantly, Jekat et al. (2020) also suggest that future research directions should plan for more participatory studies. Involving people with ID collaboratively in the design and research questions prior to data collection, as well as actively seeking their support during all phases of the

research, would be crucial to gain insights into their needs and expectations (cf. also Bock 2019).

Finally, and crucially, this study highlighted the urge to produce more regular publications in Easy Language for the benefit of the Italian-speaking target readership. As the sample's reader profiles clearly indicated, the target population needs and seeks information in Easy Italian. Against the background of the above-discussed OECD-PIAAC data on adult literacy skills, this is a call to action that both Italy and Switzerland cannot ignore if they are to successfully implement the provisions of the UN-CRPD.

Acknowledgements

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Accessibility and comprehensibility of user-generated content: Challenges and chances for easy-to-understand languages

Research track

Abstract

Easy and plain languages (further called easy-to-understand languages) as well as text simplification often focus on informative texts. However, texts posted on online forums or social network sites are also an interesting domain because interacting with others is as important as informing oneself. Therefore, this work examines noisy user-generated content on social network sites in order to determine whether it is comprehensible for people with low literacy skills. The main focus lies on the content literacy instead of the already well-analysed usability and technical accessibility. The paper shows that at least a CEFR level B2 is required to understand user-generated texts and, hence, a simplification of these texts is necessary for people with lower reading and writing skills or people with a lower CEFR level than B2. These texts are more difficult to understand than other texts regarding and are so far not wholly considered in easy-to-understand standards.

1 Introduction

Many people cannot imagine everyday life without social network sites, e.g., online forums, or Facebook because their peer-to-peer environment facilitates easy communication and the acquisition of new knowledge and skills (cf. Collin et al. 2011).

Grotlüschen et al. (2019) found that 41.8% of German adults with low literacy read posts on social network sites daily or once a week and 23.5% of them regularly write own posts on social network sites. Even if the overall German adult population has nearly the same regular usage in reading (41.4%) and writing (19.4%) posts, they do more internet search regarding health or hobbies (50% vs 41.7%) and use more regularly a smartphone (89.4% vs 78%) than people with low literacy (Grotlüschen et al. 2019). These differences can be justified with many barriers, including technical access, user experience, as well as content-wise challenges.

According to Park (2012), users are not able to use a website if they are either faced with technical issues, the so-called *device literacy*, or cannot understand the content, the so-called *content literacy*. In order to lower these barriers, much research is carried out regarding web usability, e.g., Wentz et al. (2012), or Hafez, Wang, and Arfaa (2018). Also, instructions on how to use social network sites are published in easy-to-understand languages, e.g., German Federal Agency for Civic Education (2016) or Lebenshilfe Münster e.V. (2019). However, to the best of the author's knowledge, no research exists regarding the content literacy of social network sites of people with lower skills.

In this paper, I will examine whether content-wise barriers exist for people with lower reading and writing skills to noisy user-generated texts of social network sites. The primary research questions of this paper are:

1) Are user-generated texts less comprehensible than other texts for people with lower reading and writing skills?

2) Do easy-to-understand guidelines, e.g., Inclusion Europe (2015), Netzwerk Leichte Sprache (2017), or Baumert (2018), apply to user-generated texts?

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First, I will explain some relevant terms and concept in the scope of this paper (cf. Section 2). Then, I will examine (cf. Section 3) characteristics of user-generated texts and check to which extent they are addressed in easy-to-understand guidelines. Afterwards, I will determine which CEFR level (European Council for Cultural Co-operation 2001) is at least necessary to understand the texts. The analysis contains four essential characteristics of user-generated texts, i.e., a) sentence and word length, b) syntactic and lexical complexity, c) reciprocal comments in real-time, and d) emotions, humour, and verification. The analysis is illustrated using the results of English and German studies regarding user-generated texts and news text. News texts are added as an object of comparison because they are often automatically or manually simplified. In the analyses, the text complexity is determined with CEFR levels as, for example, in Boyd et al. (2014), Volodina et al. (2016), or Wilkens et al. (2018). CEFR levels mainly focus on language learners, but, in this paper, the CEFR levels addressed audience is extended to people with lower reading and writing skills.

On the one hand, this paper aims at bringing content-wise barriers to writers' attention so that they may consider simpler writing. On the other hand, it aims at raising text simplification researchers' awareness for the challenges of user-generated texts.

2 Related work and research gap

In this paper, the terms user-generated text, content literacy, CEFR level, text simplification and easy-to-understand languages are relevant. I will first define each term and then explain the state-of-the-art concerning the research questions.

2.1 Social network sites

Several terms and definitions exist for social network sites, e.g., social networking sites or social media. Boyd and Ellison (2007, 211) define social network sites as "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system." On these sites, people can share and discuss texts, images, videos, and other media. Famous examples of social network sites are messengers such as WhatsApp, online forums for particular interests, or social news aggregator such as Reddit. These sites contain user-generated content or more specific user-generated texts.

2.2 User-generated texts

User-generated texts are a subcategory of user-generated content. Krumm et al. (2008, 10) define user-generated content as content which "[…] comes from regular people who voluntarily contribute data, information, or media that then appears before others in a useful or entertaining way, usually on the Web – for example, restaurant ratings, wikis, and videos." In contrast to user-generated content, user-generated texts focus only on written texts and not on other media. Another example of user-generated texts are texts posted on social network sites. User-generated texts are often noisy because they contain spelling errors, improper casing, or ungrammatical sentences (cf. Dey and Haque 2009). Therefore, user-generated texts are also named noisy user-generated texts. These noises may make a text less comprehensible for persons with lower literacy.

2.3 Content literacy

Content literacy is the ability for the acquisition of unknown texts by reading and writing,

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which includes, e.g., literacy skills and prior knowledge of a topic (McKenna and Richard 1990). According to Park (2012), content literacy includes three interdependent levels: a) find & filter relevant content, b) understand & reflect about the content, and c) form & post opinions and other content. Rink (2019) names a similar concept as a cognitive barrier and a language barrier.

In social network sites, the (potentially) relevant content (see the first level of Park 2012) is often automatically filtered due to underlying algorithms (cf. Pariser 2011) or actively selected by the subscription of user or company profiles. Furthermore, the writing process is supported by some online tools, which facilitate writing own contents and may still writers' fears of writing incorrect texts (see the third level of Park 2012). For example, the tool by Steinmetz and Harbusch (2020) supports the writing of people with lower writing skills by providing symbols and converting them into a grammatical correct text. Tools such as LanguageTool (2021) or Grammarly (2021) correct grammar or spelling errors.

In contrast, research focusing on the understanding and reflection of content on social network sites should be intensified. Therefore, in this paper, the focus is on Park's (2012) second level, which regards the understanding of the content and reflection about the content.

2.4 CEFR levels and lower literacy

For the analysis of the complexity of the user-generated texts, I use CEFR levels (European Council for Cultural Co-operation 2001) as they are often used in literature to determine text complexity, e.g., Boyd et al. (2014), Volodina et al. (2016), or Wilkens et al. (2018). For each level, skills of language learners are specified, which are needed to understand a text or to phrase a text at that level. The higher the letter and the number of the level, the more advanced are the skills, so A1 is the lowest level and C2 the highest level. In this paper, people with lower reading and writing skills are also assigned a corresponding CEFR level. Following Grotlüschen et al. (2019, 4) and Grotlüschen and Riekmann (2011, 7), people with Alpha level 1 to 3 are able to comprehend words and simple, single sentences but no continuous text. Skills of Alpha level 1, 2 and 3 nearly correspond to CEFR level A1. Alpha level 4 indicates slow and error-prone reading and writing which nearly corresponds to CEFR level A2 or B1. The main focus of this paper is on people with an Alpha Level 1 to 4 or CEFR level up to B1. The target group is further called people with lower literacy.

2.5 Text readability

In order to estimate the comprehensibility or a CEFR level of a text, traditional readability scores can be used. These formulae are based on surface characteristics of a given text but neglect more sophisticated text characteristics, e.g., text ambiguity and cohesion (cf. Collin et al. 2011). In addition to an estimated score, tools, such as LanguageTool (2021) for German or Aluisio (2010) for Portuguese, can support writing simple texts. The tools validate a text against several easy-to-understand language rules and provide authors with suggestions on how to reduce text complexity.

2.6 Text simplification

Manual and automatic text simplification aim to reduce the complexity of a published text so that it gets easier to understand for a target group, e.g., people with lower literacy (cf. Alva-Manchego et al. 2020). Hence, a text with a higher complexity, which is only understandable for people with a high CEFR level, is translated to a text with lower

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complexity, which is also understandable for people with a CEFR level less or equal B1.

Manual text simplification relies on easy-to-understand standards to produce simplified texts. Automatic text simplification systems simplify a text based on many examples of difficult and simplified texts or based on hand-crafted implemented rules which can be similar to easy-to-understand standards. So far, manual simplification and automatic simplification focus on official texts such as newspaper articles or texts of public authorities. User-generated texts are not considered yet.

2.7 Easy-to-understand languages and easy-to-understand guidelines

Easy-to-understand languages, such as easy and plain languages, are designed to be more easily understandable for a target group, e.g., people with lower literacy or people with intellectual disabilities. As a guideline to simplify or estimate the complexity of a text, Inclusion Europe (2015) provides an easy language standard with recommendations in 15 European languages, including German and English. Besides Inclusion Europe, other guidelines exist, e.g., Bredel and Maaß (2016), Netzwerk Leichte Sprache (2017), or Baumert (2018).

In German, two levels of easy-to-understand languages exist, i.e., "Leichte Sprache" (engl.: easy language), and "Einfache Sprache" (engl.: plain language). Easy language is often assigned to the CEFR level A1. It follows strict rules and aims at least complex texts (cf. Bredel and Maaß 2016). In contrast, plain language also aims at simpler texts than everyday language but with a higher complexity than easy language (cf. Baumert 2018). Plain language is often assigned to a CEFR level A2 or B1.

Texts in easy-to-understand language exist for several topics and text types. Following Maaß and Rink (2020, 50–53), the text types can be assigned to four categories: 1) information texts, 2) interaction texts, 3) instruction texts, and 4) entertainment texts. Following their definitions, user-generated texts are not considered. Even if the category "entertainment texts" sounds suitable, the category comprises fictional texts, such as novels or comics but no social network sites' content.

3 Challenges to understand and reflect on user-generated texts

As the summary in the previous chapter shows, user-generated texts are not yet considered in the context of easy-to-understand languages or text simplification. These texts differ from previous named text types, e.g., news or other information texts, according to several characteristics. In the following sections, their most relevant characteristics, e.g., sentence and word length, or syntactical and lexical complexity, are analysed.

3.1 Sentence and word length

Following first impressions, noisy user-generated texts seem to be easier to understand than professionally written texts, if one considers only surface features, e.g., word or sentence length. According to traditional readability scores, e.g., Kincaid et al. (1975), or Senter and Smith (1967), and easy language standards, e.g., Inclusion Europe (2015), shorter sentences and shorter words are indications of better readability.

Baldwin et al. (2013) compared some English user-generated texts to English professionally-written texts regarding surface features. They use the following sources for user-generated texts: micro-blog posts from Twitter (further referred to as *Twitter*), user comments from YouTube (*comments*), and posts from forums (*forums*). The professionally-written texts are documents of the British National Corpus (*BNC*). Baldwin

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et al. (2013) confirm that the average sentence length and the average word length of BNC are higher than in user-generated texts. The distribution of word and sentence length per corpus is illustrated in Figure 1 and Figure 2.
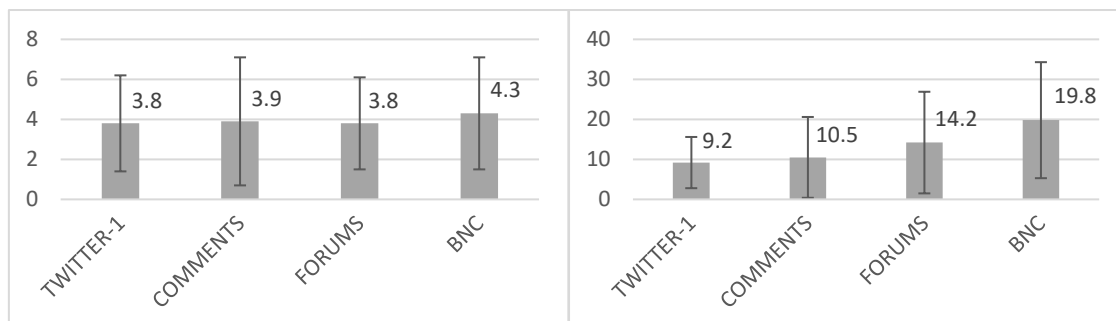
Figure 1: Average word length of user-generated texts and professionally written texts. The error bars show the standard deviation. I generated the figure myself using values from Baldwin et al. (2013).

Figure 2: Average sentence length of user-generated texts and professionally written texts. The error bars show the standard deviation. I generated the figure myself using values from Baldwin et al. (2013).

Based on the sentence and word length, a readability score named *automated readability index (ARI)* (Senter and Smith 1967) is measured. The higher the score, the more complex the text, e.g. the lowest score of 1 corresponds to the literacy skills of a 5–6 year-old and the highest score of 14 to those of a 24 year-old at least. BNC achieves the highest score of 8.7, which corresponds to the skills of a 13–14 year-old. The user-generated text corpora achieve a score between 1 and 3.5, which corresponds to the skills of a 9 year-old or younger. The ARIs are illustrated in Figure 3.
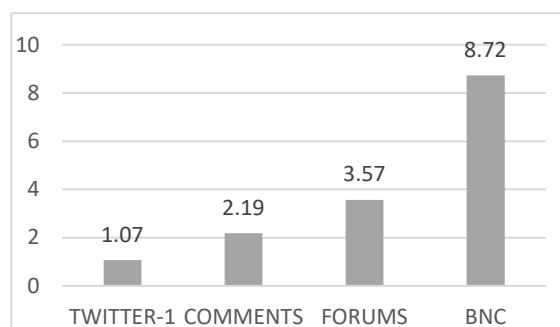
Figure 3: Automated Readability Index (ARI) per corpus. ARI is measured based on the values proposed in Baldwin et al. (2013).

Following word and sentence length as well as a readability score per corpus, user-generated texts seem to be simpler than professional written texts.

3.2   Syntactical and lexical complexity

Readability scores such as ARI are frequently criticised because they only focus on the word and sentence length and neglect other text features such as syntactical and lexical complexity (cf. Collins-Thompson 2014). Ungrammatical sentences are difficult to process for language learners. They are in the process of learning grammar rules and,

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thus, they are sensitive to untypical language usages (cf. Bingel 2018).

The syntactical complexity can be estimated with the amount of unparseable sentences. A sentence is determined as unparseable if its syntax is wrong or uncommon. The lexical complexity can be estimated with the amount of out-of-vocabular words and amount of spelling errors. Following Baldwin et al. (2013), the noisy user-generated texts contain more out-of-vocabulary words (see Figure 4), more spelling errors (see Figure 5), and more unparseable sentences (see Figure 6) than BNC. The higher error amount might be due to less proofreading or the usage of issue-specific terms or internet slang.
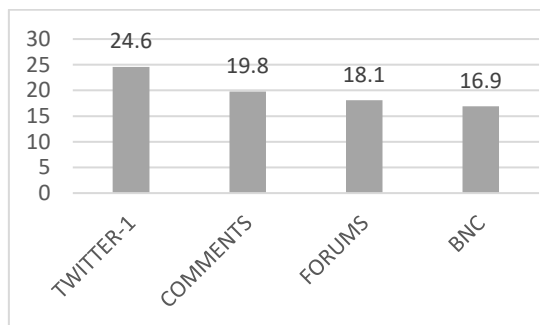
Figure 4: Out-of-vocabulary words per corpus in percent. I generated the figure myself using data from Baldwin et al. (2013).
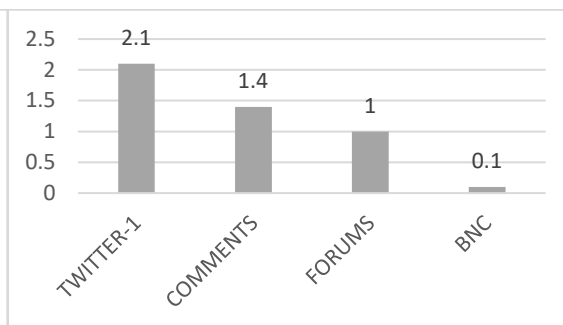
Figure 5: Automatically identified spelling errors per corpus in percent. I generated the figure myself using data from Baldwin et al. (2013).

Hence, in contrast to the previous arguments, noisy user-generated texts have a higher complexity than the BNC text concerning their syntax and lexicon.
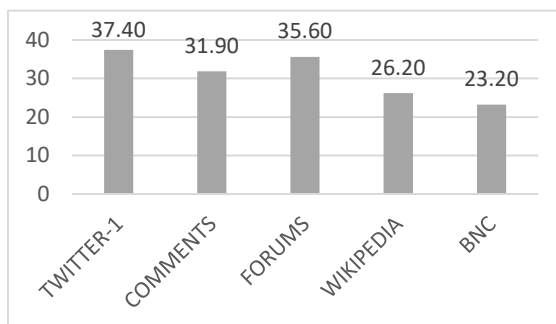
Figure 6: Unparseable sentences per corpus in percent. I generated the figure myself using values from Baldwin et al. (2013).

Thus, the vocabulary might not be clear or too uncommon to be readable for people with a lower CEFR level than B2. Even if most easy-to-understand standards recommend using common or frequently used words and less complex sentences, they have contradictory views on grammatical correctness. Some of the German easy-to-understand language guidelines, e.g., Netzwerk Leichte Sprache (2017), do not explicitly name grammatical correctness. However, some of their used examples are grammatically or orthographically wrong, e.g., compound segmentation with hyphens. In contrast, Maaß (2020) aims at grammatically and orthographically correct words, sentences, and texts. For example, she proposes that German compound nouns, which are composed without whitespace, should be segmented with an interpunct instead of a hyphen (Maaß 2020, 104–8).

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3.3   Reciprocal comments in real-time

Reciprocal comments posted near real-time are another barrier to content literacy in user-generated texts. The resulting amount of interlinked data could overwhelm people with lower literacy. To reduce content and structure the information, easy-to-understand standards recommend omitting less important information (cf. Inclusion Europe 2015, 17). Furthermore, they recommend bringing relevant information into a logical and coherent order (Inclusion Europe 2015, 11, 17). Anaphoras should also be replaced with their referents (Maaß 2020, 161–65).

According to a content analysis of German comments on Facebook, news media pages and an e-consultation forum (Frieß et al. 2017, 14), 23% of the Facebook comments were not topic relevant and could be removed. Nevertheless, more than 66% of the Facebook comments, as well as the e-consultation comments, refer to other comments (Frieß et al. 2017, 14). Hence, a reordering of the comments, as recommended in easy-to-understand standards, is not easily applicable. One solution might be to sort the comments by likes or references instead of the time of creation. The consideration of each comment as one text and the internal sort of their sentences or arguments could be an alternative.

Information or instruction texts (cf. Maaß and Rink 2020, 50–53) often contain anaphora whose referent is nearby in the same paragraph or at least in the same document. However, in user-generated texts, the referent of an anaphora is often in another comment. The inter-comment linking might be difficult to find for several persons since they have to find the referent, e.g., on another content page of a very long discussion. Hence, the ability to understand a discourse is required, which corresponds to a CEFR level B2 or higher. Compared to the comprehension of other texts types, a higher capability of discourse understanding is required to comprehend user-generated texts. Also current items of easy-to-understand standards are not applicable to reciprocal comments of user-generated texts.

3.4   Emotions, humour, and verification

In online discussion texts, emotions and humour are frequently expressed. According to Frieß et al. (2017, 14), more than 25% of the comments on Facebook and the e-consultation forum contain (positive or negative) emotions, and roughly 26% of the Facebook comments contain humour. User-generated texts are also well known for high usage of emojis, some of which are difficult to interpret. Following CEFR, emotional texts can be conveyed on a level higher than B2, so they need simplification to be accessible for people with lower literacy.

Inclusion Europe (2015, 37ff.) addresses emotions only in relation to audio material: Inclusion Europe recommends using emotions in a way that they can be easily perceived, but humour is not explicitly mentioned. Maaß (2020) simultaneously addresses irony with passive voice and figurative language. She recommends formulating a sentence in such a way "that the readers do not have to close a gap between what is said and what is meant […]" (2020, 81). This recommendation could also be helpful for user-generated texts.

Moreover, misinformation detection is more relevant for user-generated texts than for other texts. In former investigated domains, the authors of the original texts and also the translators are reliable, and the simplifications mostly originates from proofed public authorities or public charities. On the contrary, users of social network sites do not always aim at a serious discussion, e.g., by producing fake news or misinformation. Hence, a verification of the information given in the texts as well as a critical interpretation is required. Following CEFR, a critical interpretation of texts is possible when the highest

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competence level (C2) is reached. In line with the easy-to-understand standards, common rewriting strategies, such as indirect speech to highlight someone's opinion or subjunctive to highlight an alternative reality, are not applicable to user-generated texts.

4.   Conclusion

This paper investigated whether user-generated texts are less comprehensible than other texts for people with lower literacy, which CEFR level is necessary to understand these texts and whether easy-to-understand rules are applicable to these texts.

The analysis shows that at least a CEFR level B2 is required to understand user-generated texts. Hence, a manual or automatic simplification is needed to make these understandable for people with lower literacy and facilitate their participation. However, user-generated texts are more difficult to simplify than other text types, because a) they have a higher lexical and syntactical complexity, b) contain reciprocal content which needs discourse processing, c) contain references to emotional statuses and d) often contain fake news.

Easy-to-understand standards already address some of the content barriers of noisy user-generated texts, e.g., usage of uncommon words, usage of emotions, or content reduction. However, the guidelines are meant for professionally written (information) texts; therefore, in order to address noisy user-generated texts, the guidelines should cover grammar correction, spelling correction, ordering of comments, emojis, and misinformation.

Overall, user-generated texts have a high potential for more accessibility for persons with lower reading and writing skills, and should become one of the focuses of text simplification research and easy-to-understand standards.

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Volha Pontus & Silvia Rodríguez Vázquez

Language-related criteria for evaluating the accessibility of localised multilingual websites

Research track

Abstract

This paper presents a selection of the main findings from a recent large-scale accessibility study of localised, corporate websites in three language versions: English, French and German (Pontus 2019). The sites were evaluated with defined ad hoc manual criteria, largely based on the Web Content Accessibility Guidelines (WCAG) 2.1 (Kirkpatrick et al. 2018). Web accessibility levels observed were higher in most cases in the English version of the sample websites, in comparison with their localised French or German equivalent. The study also identified several language-related accessibility issues for multilingual content that may be overlooked by routine checks and deserve special attention by localisation professionals.

1 Introduction

Airline websites are heavily localised — i.e. linguistically and culturally adapted — to serve consumers in many regional markets. An airline serving Switzerland, for example, would have an English, French, German and Italian version, or a combination of these depending on which airports they operate in. This reliance on localisation practices brings forward interesting questions in relation to the multilingual aspects of web accessibility. Are all language versions of a site equally accessible or do accessibility outcomes sometimes vary across language versions? Similarly, given that corporate sites tend to be first developed in an international version (usually English) and then localised, do problems from the original version transfer to localised ones? If so, which accessibility standards are harder to meet?

This paper sheds light on some of the observations made in this regard after a large-scale web accessibility study on the performance of 50 localised airline company websites in multiple language versions; namely English, French and German. The study focused on the challenges of achieving accessibility for multilingual websites, and featured both automated and manual evaluation. The present paper summarises the main findings of this research. It presents ten ad hoc criteria for manual evaluation that were gathered and applied considering their special relevance for multilingual web content, and it seeks to encourage further discussion and analysis on the topic.

2 Motivation and related work

Accessibility is an acknowledged problem for professionals managing corporate sites, in addition to the other demands derived from the creation of multilingual and localised content (Sohaib and Kang 2016). However, the relationships between multilingual content, localisation processes and accessibility standards have been traditionally underexplored. While numerous studies have examined general web accessibility issues in the public sector (Beaudin 2001; Ellison 2004; Kuzma 2010; Gambino, Pirrone, and Giorgio 2016), only a handful of scholarly contributions have addressed accessibility with regard to multilingual content (Casalegno 2018; Rodríguez Vázquez 2016). To the

researchers' knowledge, there are no large-scale studies on the language-related aspects of accessibility. The few available studies suggest significant problems for accessibility outcomes in different language versions of a site (Quazzico 2016; Venkatesan and Kuppusamy 2017; Casalegno 2018; Minacapilli 2018; LeBlanc 2018). The two most recent studies of Minacapilli (2018) and LeBlanc (2018) deserve particular attention. Minacapilli (2018) concluded that Italian museum sites in their original language version (Italian) had fewer accessibility and usability problems than the (localised) English version of these sites. LeBlanc (2018), in a similar study of municipal government websites in Canada, made similar findings.

In contrast to the work on public institution sites, the private sector is largely neglected in the literature. The few available large-scale studies on private sector sites found that general accessibility levels were low in the period between 2004 to 2016 (Loiacono and McCoy 2004; Sohaib and Kang 2016; Leitner, Strauss, and Stummer 2016). This neglect should be addressed, however, with the introduction of specific accessibility requirements in EU, UK and US law that apply to businesses (see Pontus 2019 for a larger discussion on the topic). In the US, for example, transportation laws require that international airline sites are accessible to a certain level (Article 382.43, ACAA 1986). Airline companies can be fined by US authorities for non-compliance (ACAA 1986). Compliance is therefore one reason for greater interest in this area. In addition, private businesses could also have an important economic interest in ensuring that their content is accessible, in order to better reach a larger base of consumers and generate additional revenues.

Taking the above into account, we considered it pertinent to embark upon a large-scale study of private sector sites in an industry and market where localisation and multilingual accessibility requirements were challenging. The airline sector attracted our attention in this regard given that it must, by definition, reach and serve consumers across different languages and national or regional groupings. Switzerland, with four official languages, a developed economy and a large market for air travel was deemed appropriate as a geographical context for our research. A significant proportion of the Swiss population is reported as living with a disability and having visual impairments (Federal Statistical Office 2017). If a website is not fully accessible in the preferred language, for example, it may prevent users from accessing its services. The objective of our work was to identify common issues that may be encountered by this consumer segment and offer suggestions for the evaluation of multilingual sites.

3 Methods

In the context of our study, we sought to answer the following research question: "What is the degree of multilingual web accessibility achieved by the airline sector when assessed through manual testing?" Concretely, we formulated two hypotheses: 1) "Multilingual web accessibility performance of sites in the airline sector sample will vary depending on the language version tested" and 2) "There are fewer errors related to multilingual web accessibility in the English version than in the French and German versions of sites in the airline sector sample."

In order to test these hypotheses, a sample of 50 private sector (airline company) home pages was evaluated in two phases. First, we used automated testing to assess the whole sample for general web accessibility. The second phase, which consisted in manual testing, was conducted on a sub-sample of ten sites. The complete list of sites, including English, French and German versions, is available in Pontus (2019).

The study, which was carried out in September–November 2018, took the Web

Content Accessibility Guidelines (WCAG) 2.1 (Kirkpatrick et al. 2018) as the reference point for both phases of the evaluation and focused on issues of most relevance to individuals with visual impairments. The WAVE tool (WebAIM 2020) was selected for automated testing, given publicly available documentation on its algorithm. For manual testing, a selection of criteria were defined drawing from WCAG, usability principles and the literature on multilingual content. All home pages were first tested with WAVE, with errors being tabulated by each site language version and error type. A total of 150 home pages were therefore evaluated. Due to the practical limitations typically associated with manual evaluation (i.e. higher investment in terms of time, funding and human resources), however, a smaller selection of airline websites was chosen for manual testing.

Rather than randomly select airlines for manual checks, the study adopted a grouping approach similar to that used by Pribeanu et al. (2015). The decision was to manually test two airlines from each "performance bracket". Five performance brackets were defined based on the number of errors or known issues detected during the first evaluation phase through the use of WAVE (Pontus 2019, 67). Two sites from each performance grouping were then selected for manual evaluation on language-related aspects of accessibility. Manual evaluation was conducted in the form of conformance review by closely examining each page's source code. Table 1 outlines the manual criteria (MC) that were selected for the purposes of this study together with the corresponding WCAG 2.1 reference. A more detailed explanation of each MC can be found in Pontus (2019).

Manual Criterion (MC)	WCAG Reference/Equivalent/Criterion Level
MC1 Alt attributes for images	1.1.1 Non-text content (Level A)
MC2 Bypass blocks	2.4.1 Bypass blocks (Level A)
MC3 Page title	2.4.2 Page titled (Level A)
MC4 Links and buttons	2.4.4 Link purpose (in context)/ (Level A) 2.4.9 Link purpose (link only) (Level AAA)
MC5 Headings and labels	1.3.1 Info and relationships (Level A) 1.3.2 Meaningful sequence (Level A) 2.4.6 Headings and labels (Level AA) 3.3.2 Labels or instructions (Level A) 2.4.10 Section headings (Level AAA)
MC6 Language of page	3.1.1 Language of page (Level A)
MC7 Language of parts	3.1.2 Language of parts (Level AA)
MC8 Error identification/ error suggestion	3.3.1 Error identification (Level A) 3.3.3 Error suggestion (Level AA)
MC9 Language selector	N/A (localisation-related)
MC10 Abbreviations	3.1.4 Abbreviations (Level AAA)

Table 1. Manual Criteria

It is worth pointing out that the primary interest when using manual test criteria was not only to determine whether these best practices were followed, but also to evaluate if the solutions proposed were (i) appropriate in language terms (i.e., they corresponded to the primary language of the page being tested) and (ii) pertinent for the relevant web content, for example, an image, a link, a button, the page itself, etc. Similarly, applying these manual criteria was deemed necessary for different reasons. First, the tools usually used for automated testing do not support these types of checks in multilingual websites. For instance, it has been observed that automated evaluation software disregards more than half of the provisions of various standards, including those related to language that

appear in the WCAG (Rodríguez Vázquez 2016). Second, the definition of these manual criteria allowed for a more contextualised user-oriented evaluation, considering (i) issues that would mostly affect users with visual impairments and (ii) those identified in the literature as relevant in the case of multilingual content (Rodríguez Vázquez 2015; Venkatesan and Kuppusamy 2017).

4 Main findings

The results obtained indicate that accessibility varied considerably among airlines serving Switzerland. Accessibility outcomes also varied across language version, both when tested through automated means for general accessibility and when tested manually according to the criteria defined.

The results from automated testing support general consensus in the literature that web accessibility conformance is low in the private sector (Loiacono and McCoy 2004; Sohaib and Kang 2016). In the first phase of testing, 6% (N=3) of the 50 airline sites had no errors, according to WAVE's report. For these three airlines (Swiss International Air Lines, Icelandair and Eurowings), no errors were found on their English, French or German sites. Twenty-eight per cent (28%) of the sites (N=14) had one to ten errors across their English, French, and German versions. The remaining 66% (N=33) of the airlines' sites, had 11 or more errors. Of these 50 airlines, WAVE results were identical across language versions in 16 cases (32% of the sample) and results varied by language version in 34 cases (68% of the sample).

These results are in line with the findings of the existing literature concerning the types of problems that commonly occur (Ellison 2004; Gambino, Pirrone, and Giorgio 2016; Kuzma 2010) in relation to: (a) form labels, (b) empty links, (c) empty buttons, and (d) missing `alt` attributes. Contravening these best practices is likely to have a significant impact on the interaction of visually impaired users with airline websites. Greater awareness of these already well-known issues should prompt further checks in the airline industry. We contend that automatic testing, such as the one we conducted with WAVE, may be a simple and cost-effective method to identify obvious problems on critical pages, including issues that have an impact on transactional functionalities, such as the inaccessibility of form labels and buttons. A more exhaustive description of the findings resulting from the automatic testing phase of the study can be consulted in Pontus (2019).

As indicated in Section 3, a sub-sample of 10 sites was subjected to manual testing with defined criteria. Table 2 summarises the problems detected across the 10 airlines by error type, listing them for each language with percentages relative to the total number of errors for EN, FR and DE respectively, in descending order (from the MC in EN with the highest number of errors recorded to the MC with the fewest number of errors registered).

Manual Criterion	EN	FR	DE	Mean	Standard Deviation	% of Total	MC Total
MC5 Headings and labels (Level AA)	183 *32.5%*	260 *25.3%*	258 *24.5%*	233.7	43.9	26.5%	701
MC10 Abbreviations (Level AAA)	139 *24.7%*	189 *18.4%*	171 *16.2%*	166.3	25.3	18.9%	499
MC4 Link purpose (Level A, Level AAA)	105 *18.7%*	239 *23.2%*	274 *26%*	206	89.2	23.4%	618

Manual Criterion	EN	FR	DE	Mean	Standard Deviation	% of Total	MC Total
MC1 Non-text content ("alt-text") (Level A)	74 *13.1%*	129 *12.5%*	135 *12.8%*	112.7	33.6	12.8%	338
MC9 Language selector (Level N/A)	38 *6.7%*	37 *3.6%*	37 *3.5%*	37.3	0.6	4.2%	112
MC7 Language of parts (Level AA)	13 *2.3%*	113 *11%*	117 *11.1%*	81	58.9	9.2%	243
MC8 Error identification/ error suggestion (forms) (Level A, Level AA)	8 *1.4%*	28 *2.7%*	28 *2.7%*	21.3	11.5	2.4%	64
MC2 Bypass blocks (Level A)	2 *0.4%*	28 *2.7%*	29 *2.8%*	19.7	15.3	2.2%	59
MC6 Language of page (Level A)	1 *0.2%*	3 *0.3%*	3 *0.3%*	2.3	1.2	< 0.2%	7
MC3 Page title (Level A)	0 *0%*	2 *0.2%*	2 *0.2%*	1.3	1.2	< 0.2%	4
TOTAL	563	1,028	1,054			~ 100%	2,645

Table 2. Manual Testing Results by Error Category/Type

As shown in Table 2, problems with headings and labels (MC5, 26.5%), abbreviations (MC10, 18.9%), link purpose (MC4, 23.4%) and non-text content (MC1, 12.8%) represented most of the errors found in the airline sample in the second phase. Significant but fewer problems were found with language selectors (MC9), language of parts on a page (MC7) and error identification (MC8). There were effectively no problems with page language coding (MC6) or page titles (MC3). Some of the issues found, for example, incorrect headings or incomplete error identification notes within a flight booking form, may make a site's transactional functions unusable. In addition, mistranslated or inappropriate values were detected in manual testing; these would not have triggered any error or warning in current automated evaluation tools. These types of problems occur when headings and labels (MC5), link purposes or description text (MC4), alt-text values (MC1) and text content blocks (MC7) have not been translated into the language of the page or have been given the incorrect accessibility coding for a foreign language. One clear observation is that English values often 'travel' unmodified to the French and German sites, creating accessibility problems in the way Ó Broin (2004) described. These types of problems may easily be missed in superficial checks. It is worth mentioning that WAVE checks for accessibility features but cannot detect errors for untranslated or inappropriate values.

A key finding in our study was that accessibility levels varied by tested language. This was the case in the ten sites subjected to manual evaluation, supporting the first hypothesis ("Multilingual web accessibility performance of sites in the airline sector sample will vary depending on the language version tested"). Additionally, in 80% of cases, English sites had fewer accessibility errors than French or German site versions, which lead us to support our second hypothesis ("There are fewer errors related to multilingual web accessibility in the EN version than in the FR- and DE-language versions of sites in the airline sector sample"). More precisely, eight out of ten airlines had fewer errors on their English version. The disparity of outcomes between language versions was considerable: the English sites in the sample had 563 accessibility errors,

while the French and German sites had 1,028 and 1,054 errors respectively.

Our findings align with recent literature, which suggests that accessibility levels are affected by multilingual content and that problems may depend on the language of each site version (Casalegno 2018; LeBlanc 2018; Minacapilli 2018). Casalegno (2018), for instance, found a "definite prevalence" of language-related issues in localised site versions. Minacapilli (2018), in working with Italian source sites localised into English, also found that localised sites presented more usability problems related to accessibility than original versions. LeBlanc (2018) concluded that the "minority" language in her Canadian work, whether English or French depending on the scenario, was often mistreated with the result that accessibility principles were not respected.

In the particular context of our study, this may suggest that the 'international' version of the sites tested was initially created in English and subsequently localised for Switzerland in French and German. If this assumption would be correct, improvements in localisation workflows for accessibility elements would be strongly advisable (Gutiérrez y Restrepo and Martínez Normand 2010; Rodríguez Vázquez 2016).

5 Conclusion

This research has aimed to contribute to the literature on web accessibility, with an emphasis on the underexplored interaction between general accessibility standards and multilingual content. Unlike other large-scale web accessibility evaluation studies, our work examined three language versions per website and applied a combination of automated and manual checks. The findings, which show a disparity in outcomes across languages and across a large number of private companies, support the view that multilingual accessibility is a specific problem requiring special attention, not only in the academic community but also from professionals who work in localisation or who maintain corporate sites. More specifically, English versions were found to have a higher degree of accessibility (with fewer errors) than the French- and German-language versions, for which necessary accessibility elements were often missing or insufficient.

In our study, we did not evaluate all transactional elements on the airline sites: it was not possible to test booking or check-in options all the way through to completion of a transaction. In the future, this could be done by having real users involved in a long-term study or in cooperation with the airline companies themselves. We are also aware of the limitations associated with the manual testing, particularly in relation to the reduced number of criteria and airlines tested. Notwithstanding these limitations, we contend that the results of our study shed light on the pertinence of manual evaluation for the analysis of accessibility on multilingual sites, given that mistranslated or inappropriate values may not raise any flags during automated testing. They also suggest that it is important to encourage further work on the interaction between accessibility, localisation practices and multilingual content.

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CAT tools' impact on the achievement of accessible HTML5 documents: A comparative study

Student track

Abstract

This paper aims at examining the impact that Computer-Aided Translation (CAT) tools have on the degree of accessibility achieved during the localisation process. More specifically, we report on the findings from a two-stage study consisting of 1) a descriptive analysis of two CAT tools, i.e. SDL Trados Studio 2017 and MemoQ v8.7, and 2) a user evaluation carried out by 10 participants to determine whether these tools can support and transfer accessibility features embedded in HTML5 files. Results of the first stage show that the two CAT tools studied do not offer sufficient features and functionalities to transfer all items correctly and, consequently, they can have an effect on the final level of accessibility conformance. In addition, conclusions drawn from the user evaluation highlighted the importance of the localiser's role in dealing with this type of elements, as participants with more knowledge of the subject were able to produce a more accessible target file.

1   Introduction

The Internet has become a channel to convey information about an endless number of topics, including health and education, as well as a place where people can have access to both public and private services. In particular, as highlighted by the World Health Organisation (WHO 2011, 183–84), "accessing general information online enables people with disabilities to overcome any potential physical, communication and transport barriers in accessing other sources of information". Consequently, information and communication technologies (ICT) and services should be designed to benefit not only the wider population but also people with impairments. Nevertheless, less than 10% of websites are accessible in Europe, and 5% of the European population does not use the Internet due to an impairment (European Commission 2019, 1).

In such context, a multi-sectoral and multi-stakeholder approach could be optimal to guarantee accessibility: "[g]overnments, industry and end-users all have a role in increasing accessibility" (WHO 2011, 186). We contend that it is fundamental for all actors involved in the web production chain — be it monolingual or multilingual — to gain a certain level of expertise on the topic to ensure an acceptable degree of accessibility.

Yet, web accessibility conformance does not only depend on the knowledge and know-how of those who create web content, but also on the technological aids they rely on to support them in their task. In the case of the multilingual Web, Computer-Aided Translation (CAT) tools are often employed by localisers to translate XML and HTML-based files. During web localisation, described as the process of adapting a web product to a particular linguistic and cultural context, these tools usually help identify and isolate the translatable or localisable information and protect the code that in principle should not be modified. The present paper aims at exploring how CAT tools deal with 'accessibility features' in particular. By this term, we understand the characteristics embedded in web pages in the form of mark-up elements, attributes, text units, and relations that help render content accessible. Our initial assumption was that, as certain

accessibility features are hidden in the web page source code, there is a high risk that they might be overlooked or even not supported by the CAT tool in use.

2   Related work

CAT tools features have been vastly studied and evaluated in prior work (Bowker 2002, Veiga Díaz and García González 2015, Amato 2016, Moujaes 2016). For the purposes of our study, we concretely focused on research related to web localisation aids. In her doctoral thesis, Morado Vázquez (2012, 8) investigated the "influence that translation suggestions' provenance metadata has in the behaviour of human translators during their work when using Computer-Assisted Translation Tools" and conducted a study on the main localisation data exchange standard, namely, XLIFF (XML Localisation Interchange File Format). She came to the conclusion that metadata does not have any impact on the translators' behaviour during the translation process, but the use of CAT tools (specifically of TMs) can have a positive impact on their work and on the final quality of the product itself (2012, 261–63). Sandrini (2008, 16) highlighted the importance of CAT tools in the localisation process and stated that a "good tool" should be able to display all the translatable elements. Their importance has also been underlined by Rodríguez Vázquez (2016), who suggested that CAT tools help process files containing mark-up language, as they isolate translatable data from non-editable strings. However, she also stated that they could hide certain attributes and not show them in the editor. Mata Pastor (2005, in Rodríguez Vázquez 2016, 130) also dealt with this aspect. According to his study, not all CAT tools retrieve all the translatable strings automatically and, consequently, localisers should (i) have the sufficient skills to assess how to deal with other localisable features that may be needed for other purposes, including accessibility and, (ii) if possible, customise the tool's settings. Yet, to the best of our knowledge, no studies examining these issues have been carried out in the past.

Similarly, research efforts devoted to investigating multilingual web accessibility are scarce. It is only in recent years that a number of studies have been conducted, showing that accessibility issues are also frequently encountered in localised websites, both in the public (Casalegno 2018) and private (Pontus 2019) sector. This may indicate that, although the information related to accessibility may be present in the source product, it may not be transferred correctly during the localisation process. As a result, the degree of accessibility achieved in the target product may be lower than in the source file, leading to a degraded user experience among the target audience, including for people with disabilities.

Prior work has attempted to explain why this might happen and how it could be avoided. Several studies suggest that there can be an improvement in the degree of accessibility achieved in the target product when localisers are familiar with this concept and its associated best practices (Rodríguez Vázquez 2013; 2016). Through their study on the transfer of accessibility through localisation and internationalisation standards, Torres del Rey and Morado Vázquez (2019) contributed to the research currently being conducted on localisation and accessibility by asking the following question: "does accessibility have a concrete form or clearly defining characteristics, and can the forms and characteristics that are culture and language-bound be 'captured' formally?" (Torres del Rey and Morado Vázquez 2019, 8). The authors underlined the fact that accessibility can be seen as a quality (Jiménez-Crespo 2013, 126–31; Rodríguez Vázquez 2016, 62–64; Torres del Rey & Morado Vázquez 2019) and may not be transferred as such. For this reason, they examined how accessibility could be transferred through localisation and internationalisation standards. Drawing upon a number of criteria from the

WCAG 2.1 (Kirkpatrick et al. 2018) (see Section 3.2), they observed that there is certain accessibility-related content and information included in the source code that can be transferred in an XLIFF document, but the tool used to extract that information should be able to recognise it and display it to the localiser. The study presented in the following sections focused precisely on this aspect.

3 Methodology

3.1 Research questions and study design

We designed a study aimed at answering the following research questions: (1) can CAT tools support and therefore transfer all the relevant accessibility features when processing an HTML5 file? (RQ1); and (2) is the resulting target file accessible? (RQ2).

The study was divided into two main stages: a tool descriptive analysis (Stage 1) and a user evaluation (Stage 2). The first stage consisted in examining both tools from a technical and functional point of view. We processed a test webpage including 80 accessibility features that we would later consider as 'measurable attributes' to obtain a performance score for quantitative analysis purposes. Based on the observation of these attributes, we determined whether the tools supported and transferred correctly all the selected accessibility features. More specifically, we carried out an observational study taking into consideration (1) the specific functionalities provided by the tools related to the file format (HTML); (2) the support of the accessibility features; and (3) how these features were displayed in the tool's editor. This first stage, carried out by the researchers themselves, served as a starting point to understand the overall tools' performance. Based on the existing literature and our expertise on the topic, we formulated the following hypothesis: CAT tools do not support and transfer all the accessibility features included in the source file (H1).

The second stage consisted of a user evaluation, designed according to the '7-step recipe' proposed by EAGLES (1999). We recruited ten novice web localisers to determine (1) the functional suitability (ISO/IEC 2011) of the tools and (2) the influence of the participants' degree of knowledge about accessibility (assessed through a preliminary questionnaire). Participants were divided into two groups: Group 1 had basic knowledge of accessibility and experience with accessibility issues, and Group 2 had no experience with accessibility issues and none or basic knowledge of accessibility. They were asked to localise the test webpage, as done by the researchers during the first observational stage, and modify manually the target file once exported, if they deemed it necessary. The following hypotheses were formulated in relation to the target product: (1) The functional completeness of the tool used has an impact on the final degree of the accessibility achieved (H2); (2) The functional appropriateness of the tool used has an impact on the final degree of accessibility achieved (H3); and (3) The participants' level of knowledge of accessibility has an impact on the final degree of accessibility achieved (H4). A more detailed description of the study's design can be found in Pacati (2020).

3.2 Selection of tools, test materials and evaluation criteria

Two CAT tools, namely SDL Trados Studio 2017 and MemoQ v8.7, were examined. The tools were selected to follow up on a prior study conducted by Castro Hernandez (2015), whose work sought to test whether CAT tools were prepared to localise web pages following HTML5 new semantics. She demonstrated that the previous versions of these CAT tools could localise HTML5-format files, and consequently, could be used for website localisation. However, she also pointed out that some improvements could have

been introduced. Our research follows up on Castro Hernandez's work by examining possible improvements in the tools, and by analysing a concrete aspect in more detail, that is, the processing of accessibility features.

To assess the degree of accessibility achieved when using the aforementioned tools, we selected a number of Success Criteria (SC) included in the WCAG 2.1 (Kirkpatrick et al. 2018), based on the study by Torres del Rey and Morado Vázquez (2019) on the transfer of accessibility through localisation and internationalisation standards (see Table 1). The authors made a distinction between 'neutrally transferable' (embedded in the code's structure) and 're-placed' features (in-line formatting), which are usually excluded or protected from editing by the localisation tool. In our study, we tried to include a representative number of both types of features.

Success Criteria	SC code	Example of Recommended Techniques
1.1.1 Non-text Content	SC1	*H37: Using alt attributes on `img` elements*
2.4.1 Bypass Blocks	SC2	*G1: Adding a link at the top of each page that goes directly to the main content area*
2.4.2 Page Titled	SC3	*H25: Providing a title using the title element*
2.4.4 Link Purpose (in Context)	SC4	*G91: Providing link text that describes the purpose of a link*
3.1.1 Language of Page	SC5	*H57: Using the language attribute on the HTML element*
3.2.1 Language of Parts	SC6	*H58: Using language attributes to identify changes in the human language*
3.2.2 On Input	SC7	*H32: Providing submit buttons*
3.3.1 Error Identification	SC8	*G83: Providing text descriptions to identify required fields that were not completed*
3.3.2 Labels or Instructions	SC9	*ARIA9: Using `aria-labelledby` to concatenate a label from several text nodes*

Table 1. Selected SC

Once we determined the SC to be studied, we selected two web pages from the Government of Canada featuring the techniques associated to the SC criteria shown in Table 1. The main reasons for choosing these web pages included the country's legal framework in terms of language policy and accessibility. As a bilingual country, Canada must ensure that all institutional websites are available in the two national languages (Secretariat, Treasury Board of Canada 2012, art. 6.6). Since we worked with the English-French pair, the published French version of the pages was used as a reference document during the study. Moreover, in the last few years, Canada introduced several legislations related to accessibility, such as the *Accessible Canada Act: An Act to Ensure a Barrier-free Canada* (ACA), which aims to prevent barriers in information and communication technologies (ACA 2019).

By manually inspecting the web pages selected for the study, we identified what we defined as 'accessibility features', as introduced in Section 1, i.e. elements such as coding elements, attributes or text units that are embedded in the source code to ensure accessibility. For instance, we considered as accessibility features the alternative text included in the `img` element or the language of the page attribute (`lang`). By treating these elements as measurable attributes, we could quantify accessibility and measure it. In order to calculate the percentage of accessibility achieved in the final product, we decided to count the unique instances of the accessibility features. However, since some

elements occur more frequently than others, we also considered the SC as 'tasks' that both the tool and the participants had to accomplish. This allowed us to calculate statistically the success rate.

In order to answer the second research question, we examined the *functional suitability* of the tools — namely, the product quality characteristic that "represents the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions" (ISO 25000 2019). This characteristic is composed of three sub-characteristics, that we interpreted as follows: (i) *functional correctness*, the degree to which the system produces an accessible target file; (ii) *functional completeness*, the degree to which the tool's features and functionalities cover all the tasks, namely the localisation of all the SC and associated techniques; and (iii) *functional appropriateness*, the degree to which CAT tools facilitate the accomplishment of the abovementioned tasks. We hypothesised that the last two sub-characteristics could have an impact on the final degree of accessibility achieved, i.e. on the functional correctness of the tools.

4   Main findings

4.1   Stage 1: Tool descriptive analysis

Through the first stage, we observed that the two CAT tools are not able to support and transfer all the selected requirements, that is, SDL Trados Studio 2017 can transfer correctly eight out of nine SC, while MemoQ v8.7 can only support seven (Table 2).

SC	SDL Trados Studio 2017	MemoQ v8.7
SC1	✓	✓
SC2	✓	✓
SC3	✓	✓
SC4	✓	✓
SC5	✓	✓
SC6	✗	✗
SC7	✓	✓
SC8	✓	✓
SC9	✓	✗

Table 2. Results of the tool descriptive analysis summary (✓ = supported; ✗ = not supported)

The main difference between the tools concerns the possibility to modify the settings. While SDL Trados Studio 2017 allows the user to add or edit several elements in the settings related to the file type, MemoQ v8.7 only offers the possibility to modify the import settings. However, it is important to notice that some of the elements are not detected by SDL Trados Studio 2017 by default. This was the case of SC5: *Language of Page*, for which the user has to modify the corresponding settings. This could lead to a lower degree of accessibility achieved in the final product compared to the one that we could potentially obtain with customised settings. For example, as illustrated in Figure 1, SDL Trados Studio 2017 users can modify the settings for the `lang` attribute and can choose among three options: 'change matching source language to target language', which is the default option; 'always change to target language'; and 'do not change'. The

default option does not automatically adapt the `lang` element to the target language. Therefore, to ensure accessibility, it is recommended that users tune the settings and select the second option.
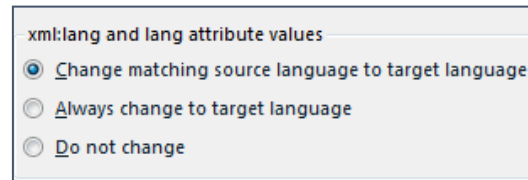
Figure 1. Settings related to the lang attribute

In general, we observed that, as the majority of the element and attribute values are detected as simple text units, the two CAT tools can retrieve the information and transfer it correctly. For instance, both tools displayed correctly the title of the page in the editor interface. When embedded content exists, such as in the case of text alternatives, both tools support it by default. However, in features related to the SC6: *Language of Parts*, the values could be modified only manually once the HTML file was exported from the tool.

Furthermore, in relation to additional information support, we noticed that SDL Trados Studio 2017 provides more information about the accessibility elements. Yet, users need to be familiar with the tool, as some of this guidance is not directly displayed in the editor interface, but rather in the document structure information tab. On the contrary, in MemoQ v8.7, the additional information is primarily included in the form of tags protecting the original source code. We also noticed that MemoQ v8.7 offers a built-in QA feature that displays errors related to the `alt` attribute, as seen in Figure 2. This function may be an additional instrument for localisers to deal with the localisation of text alternatives more appropriately.

Figure 2. Error message related to the `alt` attribute

The data gathered through this first stage led us to support our main hypothesis (H1): CAT tools cannot support and transfer all the accessibility features. However, although it is true that not all the accessibility features were supported, both tools did transfer the majority of them and offer the possibility of modifying certain settings or displaying additional information that could help users achieve more accessible target HTML-based document.

4.2 Stage 2: User evaluation

The results of the second stage confirmed our observations from the descriptive analysis, but they also underlined some positive factors. None of the participants could transfer all the accessibility features included in the requirements due to (1) the limited support offered by the tools, which we had already pointed out during the first stage; and (2) their limited knowledge of and experience with the topic. Only a small number of participants (N=2) in Group 1 obtained a higher performance score using SDL Trados Studio 2017 (being able to transfer 77 and 78 out of 80 accessibility features, respectively), while all

participants transferred the same number of features through MemoQ v8.7 (76 out of 80).

In the post-task questionnaire, participants indicated that both tools offered useful information about the feature's context in the form of tags (in the case of SDL Trados Studio 2017) and by showing the preview of the final target product (in the case of MemoQ v8.7). These two functionalities helped participants retrieve certain accessibility features easily and treat them accordingly. We also collected the participants' opinion on whether these tools could have a positive or negative impact on the achievement of accessibility. The majority agreed on considering these tools to be of great help in localising certain elements, but we still noticed a difference between the two groups, with Group 1 having a more critical opinion compared to Group 2. This difference can also be explained by the fact that, on the one hand, the majority of participants (N=4) in Group 2 did not know certain accessibility features, such as bypass blocks elements (SC2) or the `title` attribute (SC3), that were transferred by default. On the other hand, since participants in Group 1 were familiar with all the accessibility features included in the selected SC, they expected the tools to support and transfer all the elements. Through their answers, we were able to confirm H2 and H3, namely, both functional completeness and functional appropriateness have an impact on the degree of accessibility achieved.

The last step of this study consisted of an analysis of the impact of participants' knowledge of accessibility, in order to confirm or reject our last hypothesis (H4). They were asked to modify the document they exported from the two CAT tools if they considered it necessary. When examining the final product, we noticed that the average success rate of Group 1 was over 100%, as nearly all the participants correctly modified the selected SC and a few other elements related to accessibility that were not included in the study. On the contrary, in Group 2, only one participant modified an element (the `aria-label` attribute) and, therefore, the average success rate of the group was still below 100%. Overall, the data collected seems to indicate that the degree of accessibility achieved can be higher if localisers are familiar with accessibility best practices.

5   Concluding remarks

Our study concluded that the CAT tools examined — i.e. SDL Trados Studio 2017 and MemoQ v8.7 — cannot support all the accessibility features selected for the study. To sum up, the two CAT tools transferred more than 75% of selected requirements (around 77% per MemoQ v8.7 and 88% per SDL Trados Studio 2017). All SC except for SC6 (by both tools) and SC9 (by MemoQ only) could be correctly transferred. As we previously pointed out, the main difference lay in the possibility to modify the settings in SDL Trados Studio 2017 and tune the tool to detect more accessibility features.

Through the assessment of the tools' *functional correctness*, *functional completeness*, and *functional appropriateness*, we also confirmed that the tools' functional suitability had an influence on the final achievement of accessibility: the two CAT tools did not offer the sufficient features and functionalities to transfer all the selected SC. Although there are certain items that cannot be transferred through CAT tools, we noticed that the latter offer useful information about the features' context in the form of tags and by showing the preview. These are two factors that helped participants identify the accessibility features easily. According to our observations, another factor that can have an impact on the degree of accessibility achieved is the localiser's knowledge of accessibility. The most notable differences were noticed when comparing the two groups' final product. This finding proves that, when localisers are familiar with accessibility, the overall degree of accessibility achieved can improve. This goes in line

with the studies mentioned in Section 2.

This study presents a number of limitations, such as the limited number of selected SC and techniques included in the test website, and the inclusion of a small number of participants with only novice experience in the localisation field and basic knowledge of accessibility. Similarly, we could only analyse two CAT tools, which also share numerous similarities and produced similar results. Despite these limitations, our work aimed at contributing to the yet scarce literature on web localisation, accessibility and translation tools, focusing on the relation between accessibility standards and multilingual websites, and on the process of adaptation of certain accessibility features. It also sought to contribute to the discussion on the role of localisers in the achievement of web accessibility during the localisation process.

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Ulrike Weber & Andreas Weber

Barrier-free Communication for hard of hearing and deaf people at the workplace

Research track

Abstract

The GINKO study (2014) addressed the question of how deaf and hard of hearing people communicate at their workplace. The results of a survey of over 3,000 respondents showed that the majority of working participants with hearing loss communicate using spoken language with lip reading, regardless of the degree of hearing loss.

1   Credits

2   Introduction

The International Classification of Functioning (ICF) considers the ability to communicate, learn and apply knowledge and interact with each other as an important factor for participation in general or participation in working life (World Health Organisation 2001). People with hearing impairment are particularly threatened by a non-participation in working life within the meaning of the ICF, as they cannot — or only with severe restrictions — participate in workplace communication, which usually takes place in spoken language (Hogan et al. 2009; Kramer et al. 2006).

With any hearing disorder, the basic functions of hearing, such as orientation, alerting, responding and reception of information are affected and the participation in working life can be difficult. Irrespective of the onset, whether from birth or after language acquisition, hearing loss affects the reception and production of spoken language and, in the case of prelingual deafness, both spoken and written language (Schlenker-Schulte and Weber 2009).

Thus, the success of speech — or rather communication acts — is already endangered on a very basic level of the utterance act, be it the articulation, the choice of words, the construction of sentences and texts.

The barrier of hearing loss accompanies every reception, every communication. Without communication tactics, without communication aids of a technical but also personal nature, communication is often not possible. This is especially true for the communication of working people with hearing loss, who are mostly surrounded by "hearing" people (Hogan et al. 2009; Kramer et al. 2006).

For this reason, a nationwide project named GINKO addressed the question of how people with hearing loss communicate in their workplace (Nebe and Weber 2014).

Depending on the degree and beginning of the hearing loss, people with hearing loss use different receptive and expressive strategies based primarily on a visual perception of speech rather than on auditory processing of speech. These include, for example, lip reading, the use of Signed German, German Sign Language or finger spelling.

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3   Material and methods

In the GINKO project, deaf and hard of hearing employees aged 16–65 years were asked to complete a standardised questionnaire about the situation at their workplace. The questionnaire was also available online complemented by videos with sign language interpretation.

This questionnaire was developed within the GINKO project, in collaboration with the German Association of Hard of Hearing (DSB) and the German Deaf Association (DGB) as well as with the contact partners of the German Cochlear Implant Society (DCIG) and the Federal Association of Hearing Impaired Students and Graduates (BHSA). These collaborations aimed at guaranteeing comprehensibility and completeness from both an expert and patient perspective (Weber et al. 2012).

4   Results

The GINKO study involved n=3,189 working persons with hearing loss who either had a severely disabled person's identity card ("Schwerbehindertenausweis") (98.3%, n=3,134) or were equal to a severely disabled person (1.7%, n=55).

First of all, the sample presented hardly any socio-demographic differences with 50.7% (n = 1,616) female and 48.6% (n = 1,550) male participants.

In terms of age distribution, almost half of the working participants (46.4%; n = 1,480) were aged between 35 and 49. About one third of working participants (32.5%, n = 1,038) were between 16 and 34 years old. The 50–65 age group accounted for 20.7% (n = 661).

54% (n = 1,721) said that they were hard of hearing, making them the largest group of participants. Approximately one third of the respondents (33%, n = 1,039) were deaf, whereby the hearing loss was already present from birth or occurred before language acquisition (prelingual), i.e. there was no usual (phonetic) language acquisition. 14% (n = 429) of the participants had become deaf in both ears after speech acquisition (postlingual). This group usually has limited abilities in speech communication, depending on the beginning of the deafness.

The participants were asked which communication strategies or forms they use to communicate with others such as colleagues, superiors or customers (Table 1). With 81.1% (n=2,586), most of the working participants (n=3,189) stated that they communicate with spoken language with lipreading. Slightly more than half of the participants (55.5%, n=1,770) stated that they communicate through writing; with the groups of persons, who had become deaf (69.7%, n=299) and the prelingual deaf employees (75.5%, n=784) in particular using this form of communication. 48.0% (n=1,531) of the employed participants communicate through pointing, drawing and gestures, i.e. non-verbal aids. 36.4% (n=156) of the persons, who had become deaf and 35.7% (n=371) originally deaf workers communicate in German Sign Language.

	Hard of hearing n (%)	Become deaf n (%)	Deaf n (%)	Total n (%)
Spoken language without lip reading	378 (22.0)	35 (8.2)	51 (4.9)	464 (14.6)
Spoken language with lip reading	1.515 (88.0)	306 (71.3)	765 (73.6)	2.586 (81.1)
Writing	687 (39.9)	299 (69.7)	784 (75.5)	1.770 (55.5)
German Sign Language (DGS)	257 (14.9)	156 (36.4)	371 (35.7)	784 (24.6)
Signed German (LBG)	231 (13.4)	92 (21.4)	207 (19.9)	530 (16.6)
Finger spelling	186 (10.8)	96 (22.4)	250 (24.1)	532 (16.7)
Non-verbal aids (pointing, drawing and gestures)	631 (36.7)	233 (54.3)	667 (64.2)	1.531 (48.0)

Working participants, n=3,189, missing values=26 (0.8%)

Table 1. Communication strategies or forms

5   Summary

The GINKO study showed that the majority of working participants with hearing loss communicate using spoken language with lip reading, regardless of the degree of hearing impairment (hard of hearing, becoming deaf, deaf). These can be conveyed both by the gainfully employed persons with a hearing loss themselves and, for example, in communication training courses for colleagues.

On the other hand, a limited ability to communicate requires increased attention and concentration on the speech act, which can lead to increased psychosocial stress (Danermark and Coniavitis-Gellerstedt 2004).

Particularly in view of the trend towards longer working lives, which will be accompanied by an increasing number of employees with hearing loss (Weber and Weber 2015), "hearing-friendly" work opportunities must be created in the sense of Universal Design (Fok et al. 2009).

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Nathalie Mälzer & Annika Rose

Live subtitles of political TV debates

Student track

Abstract

To increase media accessibility for d/Deaf and hard-of-hearing people, German public broadcasting companies are offering more and more live subtitled programmes using a speech recognition software. Since different TV formats are subtitled live, the question arises whether common linguistic adjustments and work processes respect format-specific characteristics and how they could be adapted. In particular, subtitling political live debates is a demanding task as the politicians' strategies need to be reflected. That is why this project focuses on how linguistic changes and reductions in live subtitles can influence the presentation of politicians and contents in TV debates. An analysis of examples from the live subtitled German TV debate in 2017 with Angela Merkel and Martin Schulz shows problems that can occur when the live subtitled text is changed. Finally, these findings lead to ideas for a format-specific guide on what subtitlers need to take into account and be careful of when live subtitling a political TV debate.

1 Introduction

Due to legal measures, for example the German "Behindertengleichstellungsgesetz" (Deutscher Bundestag 2018), the number of live subtitled programmes is increasing. To ensure not only quantity but also quality, subtitling practices and guidelines have been developed mostly focusing on transferring all relevant information. Our hypothesis is that it is essential to differentiate between different TV formats and to have a closer look at their communicative specificities in order to decide which part of the given information might be relevant for subtitling. This project has the goal to contribute to the development of more format-specific guidelines for live subtitling. Therefore, in a pre-study, a qualitative analysis of a TV debate between politicians before an election is conducted. Kurch, Mälzer and Münch (2015, 160) point out that not only the propositional content is relevant for this format: since politicians aim for the viewer's approval (Girnth 2015, 38), the way politicians present themselves and their positions are also important. For this reason, the way how politicians speak and present themselves, in other words style and rhetoric, must be considered as important to transfer in subtitles of political debates as the propositional content, the objective facts. These characteristics can be found in the German TV debate with Angela Merkel and Martin Schulz broadcast on 3 September 2017 (ARD 2017). Our hypothesis will be verified though a qualitative analysis of the live subtitles (WDR 2017) for this debate. Furthermore, an analysis will be undertaken on how necessary text reductions (especially omissions or paraphrases) in live subtitles actually affect the style and rhetoric of the candidates. The findings of this pre-study, presented in this paper, are intended to contribute to the development of a format-specific guideline for live subtitling.

2 Subtitling strategies

Typical subtitling strategies to reduce the text according to Díaz Cintas and Remael (2007, 146) are linguistic changes, like reductions in form of omissions or paraphrases.

They are inevitable because of time and space constraints in the subtitling process (Romero-Fresco 2011, 117) and necessary for the viewer to keep up with reading. Jekat (2014) shows that respeakers often omit elements at the beginning of a sentence, for example discourse markers.

However, respeakers not only have to decide which strategies for text reduction might be more appropriate but also may make use of paraverbal features. As the subtitles are primarily made for d/Deaf and hard-of-hearing people and as there is an asynchrony between subtitles and image, subtitlers may use different colours for the speakers to facilitate the speaker identification for example. The colour of choice may be recommended by broadcasters' guidelines or may be format specific.

The examples presented and discussed in the next chapter refer to passages of the German TV debate (ARD 2017) in which characteristics of political TV debates are altered by the verbal and paraverbal aspects of the subtitles and may therefore be misleading for the target group, i.e. d/Deaf and hard-of-hearing people.

3 Analysis

To understand how these linguistic or paraverbal aspects of live subtitles may influence the perception and understanding of political TV debates, we first need to turn our attention to the characteristics of political debates.

Usually, politicians, presenters and sometimes also experts take part in a debate and talk about current political or social topics (Girnth 2017, 598). This includes periodic talk shows and, as analysed here, TV debates directly linked to an election.

Politicians follow several strategies in public television. In the following analysis, four strategies play a major role: According to Klein (2009, 2125), politicians try to present themselves as good and strong, that means to show themselves in a favourable light, here referred to as strategy no. 1, and to talk down the positions of the opponent, strategy no. 2. Strategy no. 3 is to try to convince as many people as possible and not to make any enemies. Moreover, strategy no. 4 is to keep options for action open, which often leads to a vague wording.

In the pre-study, excerpts from the live subtitled 2017 chancellor debate between Angela Merkel and Martin Schulz are analysed. In this paper, we will present and discuss five examples from a more comprehensive analysis. These examples illustrate some common subtitling strategies: the use of paraverbal elements to facilitate speaker identification, as well as the use of omissions and reformulations to reduce reading speed. We will show in each example, how these strategies may clash with the objectives of this specific TV format.

3.1 Analysis of the chosen strategy for speaker identification

The first example concerns a more general problem regarding the speaker identification. In the subtitles for this show, the two politicians are both presented in yellow, the four presenters in white. Sometimes initials are used when a turn-taking takes place. In Table 1, we use the initials AM for Angela Merkel, MS for Martin Schulz and SM for the presenter Sandra Maischberger. Having discussed the problem of extremist imams in German mosques, the politicians are asked about their own religious beliefs and when they went to church the last time. As the exact verbal content is not important for the analysis of the example, only the English translation (our translation) of the text is given here.

Translation of the Transcription	Translation of the Subtitles
AM: And there in the small church he had built himself I thought of him. SM: So then… MS: Probably we both prayed today in a quiet chamber. ((laughs))	And there, in the small church, he had built himself, I thought at him. But probably in a quiet chamber we both prayed.

Table 1. Speaker identification (ARD 2017, 00:28:23–00:28:33)

In the video and in the transcription of the spoken text, it becomes evident that Merkel speaks first and that a turn-taking occurs. In the subtitles, however, the speaker identification is not clear.

This is due to the use of the same colour for both politicians and because initials have not been inserted by the respeakers. The reason for the missing initials may be that the respeakers thought the audience can see who is speaking. However, due to the asynchrony between subtitles and images it is not given that the d/Deaf or heard-of-hearing audience is able to identify the right speaker. The asynchrony can reach up to several seconds, depending on the medium, e. g. live-streaming on the internet or TV via satellite or cable. Especially in a TV format in which several people take part in a discussion and numerous turn-takings can be expected, having a clear speaker identification is essential. The decision to make use of the same colour for both politicians may be related to the connotations of colours and their use in political contexts or to the broadcaster's conventions to use the same colour for the guests of a show and another colour for the presenters. However, this decision leads to a permanent ambiguity as to who of the two candidates is speaking during turn-takings.

3.2 Analysis of the chosen strategy for text reduction: omissions

The next example concerns omissions of sentences or clauses. In this example (see Table 2), Angela Merkel talks about how to deal with the refugee situation.

Transcription	Subtitles (WDR 2017)
AM: sondern dass, **und das haben wir ja jetzt auch gelernt in den letzten zwei Jahren**, wir Fluchtursachen bekämpfen müssen.	Sondern d.h., dass wir Fluchtursachen bekämpfen müssen.
Translation	Translation
AM: but that, **as you know we have learned that in the last two years**, we need to combat causes of flight.	But it means that we need to combat causes of flight.

Table 2. Omission (ARD 2017, 00:06:38–00:06:43)

To discuss this excerpt, the original German text is important. That is why both the transcription of the spoken text and the original subtitle text, and the respective translations are provided in Table 2. The clause "as you know we have learned that in the last two years" (in bold) is missing in the subtitle. As stated by Jekat (2014, 98), the sentence structure in subtitles is often simpler than in the original text. In this example, the missing parenthesis makes the sentence structure clearer. According to the strategies no. 1 and 2 stated by Klein (2009, 2125), politicians try to present themselves in a favourable light and to convince many people. This omitted sentence can be seen as a part of Merkel's self-presentation. She refers to her wealth of experience as she has been chancellor for many years and that she learned from the past. Furthermore, with

this clause she tries to support her argument that Germany needs to combat causes of flight. The German particle "ja" indicates that Martin Schulz already knows this. Due to the reduction strategy chosen here, her line of argument and her self-presentation are weaker so that she seems less convincing.

To convey this self-presentation, the respeaker could have tried to include the parenthesis by shortening it, leaving out the particle and the period, e.g.: "but it means, we have learned this, we need to combat causes of flight." However, as we do not know the exact live conditions of the respeakers for this debate, it is not clear if there was enough time to include the sentence at all.

Another effect that omissions can have is shown in Table 3. Schulz quotes a statement made by Merkel at the time of the refugee crisis 2015 to criticise her.

Transcription	Subtitles (WDR 2017)
MS: **Ich finde ja nur, Sie hätten, wenn Sie sagen können,** 2015 haben wir richtig gehandelt, aber wir haben nicht alles richtig gemacht.	2015 haben wir richtig gehandelt. Aber es ist nicht alles richtig gewesen.
Translation	Translation
MS: **I just think, you could have, if you could say:** 2015 we acted in the right way, but we did not make everything right.	2015 we acted in the right way. But not everything was right.

Table 3. Omission (ARD 2017, 00:13:17–00:13:23)

In the subtitle, the first element of the sentence (in bold) is missing, confirming Jekat's finding (2014, 100) that respeakers often omit the first part of a sentence: "Ich finde ja nur, Sie hätten, wenn Sie sagen können". In English: "I just think, you could have, if you could say".

The introduction of the direct speech with reference to Merkel is missing so that the recipients could think that Schulz presents his own opinion. Through the context, the audience could understand the proper meaning but the comprehensibility is still reduced. As Schulz tries to criticise Merkel's action, this omission weakens Klein's strategy no. 1, talking down the opponent. The recipients could even think that Schulz criticises himself when he says: "But not everything was right."

Table 4 illustrates an example for an omission that affects the strategy of vague wording. The participants of the debate talk about inhumane conditions in Libyan refugee camps and an agreement with the UN refugee agency.

Transcription	Subtitles (WDR 2017)
AM: Da haben wir vereinbart, **dass Deutschland das unterstützt**, dass die Menschen dort menschenwürdig sich aufhalten können.	Wir haben vereinbart, dass die Menschen dort menschenwürdig aufhalten können.
Translation	Translation
AM: We decided **that Germany supports it** that the people can stay there under humane conditions.	We decided that the people can live there under humane conditions.

Table 4. Omission (ARD 2017, 00:40:46–00:40:52)

In the first sentence, the clause "that Germany supports it" (in bold) is omitted. Because of the omission, the subtitled text is less vague than the original text. There is

also a slight information shift. It seems as if Germany is really going to take action to improve the conditions in refugee camps. In the original text, it was only decided that Germany supports it to create humane conditions. So, Klein's strategy no. 3, to leave options for action open, is not represented in the subtitles.

3.3 Analysis of the chosen strategy for text reduction: rewording

In Table 5, an example of rewording is discussed. Again, the presented example deals with the refugee situation. The passage is part of an attack on Merkel as Schulz refers to a discrepancy in Merkel's party. De Maizière is in Merkel's party and had a different opinion.

Transcription	Subtitles (WDR 2017)
MS: Und dann wurde von Herrn de Maizière **Ihrem** Innenminister gesagt, Dublin, die Dublin Konvention sieht vor, die müssen dort aufgenommen, wo sie ankommen.	Dann wurde vom Innenminister de Maiziere gesagt, die Flüchtlinge müssen dort aufgenommen werden, wo sie ankommen.
Translation	Translation
MS: Then Mr. de Maizière, **your** Minister of the Interior said, Dublin. The Dublin Convention provides that they have to be received where they arrive.	Then the Minister of the Interior de Maizière said, refugees have to be received where they arrive.

Table 5. Rewording (ARD 2017, 00:12:50–00:12:58)

In the original text, a possessive pronoun (in bold) is used, "your Minister of the Interior", whereas the subtitles contain a definite article.

Because of the rewording, the sentence becomes a bit shorter, but strategy no. 1 according to Klein is reduced. The possessive pronoun indicates an attack on the opponent. So, in the subtitles the criticism does not become clear and the text is more objective than the original text. Consequently, Klein's strategy no. 2, to talk down the positions of the opponent, is affected.

4 Discussion of results and conclusions

The analysis shows that some linguistic changes and reductions in the live subtitles affect information that is considered relevant for political TV debates and may influence the perception of the verbal contents and of the politicians.

Klein (2009, 2125) points out that politicians try to present their positions in a favourable and opposing positions in an unfavourable light. In the subtitles analysed in the presented pre-study, some sentences that contain the positive description of the involved politicians as well as criticism of the adversary are omitted. Sometimes, the omission of subordinate clauses can also lead to the impression that statements become more concrete in the subtitles. However, as Klein (2009, 2125) assumes, vagueness is part of the politicians' strategies to keep different options for action open. This is why respeakers should try to incorporate it as well.

In the analysed subtitles, also speaker identification is not always clear, as the main speakers are presented in the same colour and sometimes initials are missing to indicate turn-taking between Merkel and Schulz. The analysis also showed that introductory

sentences for direct speech were sometimes left out so that utterances could be matched to the wrong politician.

In accordance with these findings, the hypothesis presented in Section 2 is confirmed. The results clearly show that changes and reductions made through subtitling can lead to a different presentation of characteristics of political TV debates.

These findings may contribute to formulating recommendations for the live subtitling of TV debates. However, since politicians' strategies are not always obvious, and considering that respeakers have to coordinate several mental and technical processes (Martínez Pérez 2012, 136) simultaneously, changes in information and style cannot be avoided completely. Besides, in the pre-study, the subtitles of only one TV debate were examined. For that reason, it is too early to conclude precise subtitling recommendations.

To elaborate a new format-specific guideline for political TV debates, further research should extend the corpus to more political TV debates and their subtitles. Also, the recipients' perspective needs to be taken into account to verify the impact of the informational shifts in the subtitles. And finally, the new subtitling strategies deduced from the results of the study should be tested with respeakers to see if and how they can adapt their subtitling practice to the format or how they could rework the subtitles before making them available in the media centre of the broadcast company.

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Subtitling for children who are D/deaf and hard of hearing: A case for an interdisciplinary approach

Research track

Abstract

This article focusses on children who are D/deaf and hard of hearing as a specific target group for intralingual subtitling (SDH). It will discuss whether subtitling speed and method of text reduction have an influence on content comprehension of subtitled television programmes for children. This paper focusses not only on medical categories such as hearing loss, but also on underlying social and cultural-linguistic factors of the target group. It proposes an interdisciplinary approach drawing on perspectives from Translation Studies, Disability Studies and Deaf Studies. Data of 158 study participants between 8 and 12 years have been assessed in the context of an ERDF-funded research project. Results indicate that subtitling speed and method of text reduction do not have significant effects on content comprehension. However, these results differ slightly in subgroups filtered by language and age, which indicates the need for further research.

1   Introduction

Until now, relatively few works address children as a target audience for barrier-free communication in German-speaking countries. Important studies on subtitling for children who are D/deaf and Hard-of-Hearing have been conducted in Spain (Lorenzo 2010; Tamayo 2016), in the UK (Zárate 2010, 2014), in the US (Braverman and Hertzog 1980; Braverman 1981; Ward et al. 2007), and in Australia (Tyler et al. 2009). Since children are still in the process of learning to read, one unifying aspect in these studies is the comprehension of subtitled television programmes. In Translation Studies, the question therefore arises as to how subtitles need to be designed in order to be as comprehensible as possible for this specific but heterogeneous target group.

In this article, I will present factors that may affect comprehension levels of subtitled television programmes for children who are D/deaf and hard of hearing between the ages of 8 to 12. I will make a case for an interdisciplinary approach drawing on perspectives from Translation Studies, Disability Studies and Deaf Studies and show how taking into account not only medical factors such as the degree of hearing loss, but also social and cultural-linguistic factors, will lead to a more nuanced understanding of the target group. Furthermore, the effects on content comprehension of two extensively discussed criteria in subtitling research, the subtitling speed and the method of text reduction, will be analysed for the target group.

This paper is based in part on an ongoing PhD-project that focusses on comprehensibility factors for subtitled television programmes for children who are D/deaf and hard of hearing. The data presented here were collected in an ERDF-funded research project headed by Nathalie Mälzer and carried out at the University of Hildesheim, Germany, from 2017 to 2019. Over the course of the project, around 250 children participated and important data on social and linguistic factors, media and subtitle use, as well as on comprehensibility and acceptance of recently broadcast and enhanced TV-subtitles were gathered (Mälzer and Wünsche 2019a,b,c).

2 Theoretical background

2.1 Subtitling for children who are D/deaf and hard of hearing

Research on SDH for children has been conducted since the early 1980s. One of the focal points in this area has been the question of reading comprehension: Children are still in the process of learning to read. This process might be complicated further by an unsuitable educational setting and/or a hearing impairment. Therefore, several scholars conclude that children in their first school years do not yet fully benefit from subtitled television programmes (Shroyer and Birch 1980; Koolstra et al. 1999; Cambra et al. 2009). Others however point out that a frequent use of subtitles can increase reading comprehension (Kothari et al. 2002; Danan 2014). The question arises as to how subtitles need to be designed to be adequate for the target group. Considering children's reading comprehension levels and technical constraints of the subtitling process, two central aspects come to mind: the subtitling speed and the method of text reduction (omission or paraphrase). While there is already extensive empirical research on these aspects mainly for an adult target group (e.g. Jensema 1998; Burnham et al. 2008; Szarkowska et al. 2011; Szarkowska et al. 2016; Iriarte 2017; Szarkowska and Gerber-Morón 2018), the research results for children in this regard remain fragmented.

Several studies suggest that subtitling speed needs to be adapted to reading skills for younger target groups. This entails a reduced number of characters per second (CPS), or words per minute (WPM). There is however no consensus about the ideal subtitling speed. Recommendations range from 60 WPM for children between 8 and 15 years (Linde and Kay 1999, 52) to 120 WPM for children aged between 9 and 18 (Braverman 1981, 1033) or children aged between 9 and 16 (Tyler et al. 2009). Furthermore, the subtitling speed was not found to significantly affect comprehension levels (Braverman and Hertzog 1980, 946; Braverman 1981, 1033). However, acceptance levels seem to differ depending on the subtitling speed. A study with 83 D/deaf and hard of hearing children between the ages of 5 and 15 in Spain showed that half of the participants found a rather slow subtitling speed of around 9 CPS too fast to keep up with (Lorenzo 2010, 134). A study with 16 participants between 10 and 13 years in Germany showed that slower readers preferred a subtitling speed of 7 CPS while more experienced readers explained that they had no problems following subtitles displayed at 9 CPS or 11 CPS (Kramer 2016, 62).

The need for a reduced subtitling speed raises the question about how to edit the text from the original audio for the subtitle. One possibility is to use omissions to reduce text, thus keeping the syntactic structure and key words from the audio whilst omitting redundancies, markers of oral discourse, or information deemed negligible for overall content comprehension. Another possibility is to paraphrase the audio and adapt the language level to that of the target audience. While this technique raises questions on censorship and equal access to dialogues (Szarkowska et al. 2011, 364-65) it has been discussed as a means to facilitate subtitle comprehension for children. A study by Braverman and Hertzog (1980) corroborated this position, suggesting that a lower language level in subtitles leads to better comprehension levels for elementary and secondary school students between 8 and 20 years. A more recent study by Ward et al. (2007) however found no significant differences in comprehension levels between near-verbatim and paraphrased subtitles but found acceptance higher for the paraphrased version.

These studies provide an important insight into the research field. It must be noted however that they have been conducted in different countries, with participants of different age groups, and have made recommendations on subtitling speed and method

of text reduction that are far from unanimous. The study presented further below will therefore examine the effects of subtitling speed and method of text reduction on comprehension specifically for children who are D/deaf and hard of hearing between 8 and 12 years in Germany. In accordance with Zárate (2014, 23), the focus of the study lies on comprehension rather than on acceptance of subtitles, since "the ultimate aim is to assess [children's] understanding of the subtitles".

2.2   Interdisciplinary perspectives on D/deafness

In order to create adequate subtitles for a specific audience, it is of utmost importance to gain a proper understanding of the target group. In the case of children who are D/deaf and hard of hearing, at least three perspectives need to be considered: The medical model of disability, the social model of disability, and the cultural model of Deafness.

From a medical point of view, deafness can be defined as "the partial or total inability to hear sound in one or both ears" (Alshuaib et al. 2015, 29). Hearing loss may occur in different types, such as conductive hearing loss or sensorineural hearing loss. Classified according to the degree, hearing loss can be mild (26–40 dB), moderate (41–55 dB), severe (71–90 dB), or profound (>90 dB). It is seen as a condition that leads to a decreased quality of life and wellbeing and which needs to be treated appropriately, e.g. via hearing aids, cochlear implants, or surgery (Alshuaib, Al-Kandari, and Hasan 2015, 35). This model has been widely criticised as reductive since it focuses only on physical traits of a person and puts forth a concept of normalcy which simultaneously marks bodies that do not fit into said concept as "deviant" (Ugarte Chacón 2015, 63). Nevertheless, empirical research in the field of audio-visual translation (AVT) often still relies heavily on medical categories, using the degree of hearing loss as a main variable, or comparing performances of hearing persons with those of persons who are D/deaf. According to Allen (2015), this approach is based on normative conceptions of achievement and creates "a focus on reducing the gaps and on bringing deaf individuals 'closer' to hearing individuals on indicators of societal attainment" (Allen 2015, 22). This is not to say that medical categories are not relevant: Audio-visual material relies heavily on the auditory sense. Hearing loss will thus have an influence on how much acoustic information is perceived. Since several accessibility tools for people who are D/deaf and hard of hearing therefore rely on the written word, it is crucial to consider the underlying factors for literacy. However, medical categories such as hearing loss do not offer a sufficient explanation in this regard. This underlines the need for a model encompassing social factors.

The social model of disability emerged from activist and empowerment movements in the late 1960s and was brought into academic discourse by Oliver (1983, 1990). In this model, a distinction is made between *impairment* of the body as it is described in the medical model, and *disability*, which refers to the exclusion from full participation in society: "In our view, it is society which disables physically impaired people. Disability is something imposed on top of our impairments by the way we are unnecessarily isolated and excluded from full participation in society" (UPIAS 1976, 20). The social model thus shifts the focus from medical categories of impairment to societal factors of disablement. In this regard, the educational setting for children who are D/deaf and hard of hearing can be discussed: While various studies confirm that reading skills and hearing status tend to covary, it is also suggested that it is not the hearing loss itself, but rather the educational context in which the children learn the dominant oral language that has an influence on literacy (Hennies 2010, 2019). The educational method shows a significant influence on children's reading skills. Several studies conclude that oral deaf education was not as successful as anticipated (Knoors et al. 2014, 6), bilingual-bimodal education however can be beneficial for D/deaf children's reading skills (Hennies 2010). The social

model has been criticised for its dualistic vision on body and society as two distinct categories. Critics argue that impairment is also socially constructed (Hughes and Paterson 1997; Tremain 2005; Schneider and Waldschmidt 2012) and that the model focuses overly on impairment/disability as a problem that needs solving (Gugutzer and Schneider 2007, 35). Therefore, another perspective needs to be considered.

The cultural model does not define Deafness as a disability but refers to members of the Deaf community as a linguistic minority. In order to differentiate this perspective from the medical concept of deafness, the uppercase "D" is used (Ladd 2003). The exclusion from certain parts of society would not be defined as a disability, but rather a discrimination that other linguistic minorities face as well (Lane 2005, 296). The language therefore becomes the prominent factor. In terms of reading skills, it has been shown that D/deaf or hard of hearing children growing up with signing parents who are Deaf do have an advantage in learning to read compared to those growing up in families relying only on oral language (Chamberlain and Mayberry 2000; Holzinger and Fellinger 2014).

These three perspectives demonstrate the importance of an interdisciplinary approach to research on and/or with children who are D/deaf and hard of hearing. It becomes evident that not only medical categories such as hearing loss, but also social and cultural-linguistic factors such as educational setting and language used at home need to be considered.

3 Empirical analysis

The empirical analysis proposed in this paper will discuss whether subtitling speed and method of text reduction have an influence on content comprehension of subtitled television programmes for children between 8 and 12 years. It will examine whether medical, social, and cultural-linguistic aspects that are specific to the target group need to be considered in this regard.

3.1 Hypotheses

Based on the theoretical background presented above, the following hypotheses are formulated:

- (H1) Since comprehension of subtitled television programmes is intricately linked to reading skills, I predict that older participants will achieve higher comprehension rates than younger ones.

- (H2) Furthermore, and according to studies suggesting that frequent use of subtitles can increase reading comprehension, I predict that the frequency of subtitle use will have a positive effect on content comprehension.

- (H3) The comprehension levels of children growing up with spoken German are not expected to be higher than those of children growing up with German Sign language.

- (H4) Since the amount of information that can be perceived auditorily is thought to have an impact on content comprehension, a higher degree of hearing loss is expected to have a negative effect on content comprehension.

- (H5) In terms of subtitling speed, I predict that there will be no significant effect of subtitling speed on content comprehension: Although there are recommendations to reducing the subtitling speed for younger audiences, there

is no empirical consensus that a faster speed will limit comprehension levels. While slower subtitles might be easier to read, they also might contain less information, which might in turn affect comprehension negatively.

- (H6) In terms of method of text reduction, paraphrased subtitles have not yet unanimously proven to enhance comprehension levels. However, adapting the language level seems promising for a target group that is still in the process of learning to read. Therefore, I predict that paraphrased subtitles will enhance comprehension levels compared to subtitles where omissions are used.

3.2 Method and procedure

The study was carried out in an experimental setting in 10 schools for D/deaf and hard of hearing children in Germany. The participants were shown subtitled sequences of German or German-dubbed TV-programmes for children of the targeted age group (8 to 12 years). After each sequence, the children were asked to fill out a questionnaire containing multiple choice questions on content comprehension of the subtitled clips. Since the clips were not self-contained, the questions focussed on central narrative aspects such as the introduction of setting and characters or the explanation of a state of affairs (Branigan 1992, 14). The questions only addressed information that could not be deduced from the image. To avoid overstrain from extensive reading, the questions were read aloud by the researcher and repeated in German Sign Language and/or Signed German by teachers or interpreters. Before the experiment, the parents of the participating children provided information on the languages used at home, frequency of subtitle use, hearing status, and communication aids, also via questionnaire. The participants were divided into three groups, which were symmetrical in terms of language preferences, age, frequency of subtitle use, hearing status and use of communication aids.

The content comprehension (CC) rate for each subtitle version was defined as the dependent variable. The language used at home, hearing status, frequency of subtitle use, as well as age of the participants were defined as target group specific independent variables. Material specific independent variables are subtitling speed and method of text reduction. The collected data were analysed by means of Pearson's correlation analysis, t-test for paired samples, and two sample t-test, depending on the sets of variables involved.

3.3 Material

Three short sequences with a length of 3 to 6 minutes were used for the experiment. The sequences were taken from a German programme, "Die Pfefferkörner" (Schnell 2017), a German-dubbed programme, "Trio – Cybergold" (Bergheim 2015), as well as one animated show called "Tashi" (Wasik 2015). The material was provided by NDR and KiKA, two public German broadcasters associated with the ERDF-project. For each of the sequences, three subtitle versions were produced, varying in terms of subtitling speed and method of text reduction. CC rates were assessed for subtitle versions at 15 CPS compared to 9 CPS, and for a version using omissions for text reduction (9CPS_O) compared to a version using paraphrases (9CPS_P) with a controlled subtitling speed of 9 CPS.

3.4 Participants

The number of participants examined in this study was 158. They were between 8 and 12 years old and their hearing loss ranged from mild to profound. 47% of the children

used German at home, 12% German Sign Language, 18% German and German Sign Language, and 23% German and one or more other spoken languages. In terms of frequency of subtitle use, the majority (62.3%) never or rarely watch subtitled television. Only 13% of the children watch subtitled TV on a regular basis. A correlation analysis shows that the frequency with which children use subtitles on TV covaries with the degree of hearing loss ($r = .245$; $p = .005$). It is however not dependent on the age of the participants ($r = .116$; $p = .174$). Frequency of subtitle use is also affected by the language the children use with their parents: A two-sample t-test shows that families using German sign language ($M = 2.05$; $SD = .911$) watch subtitled television significantly more often than families using spoken German ($M = .81$; $SD = 1.011$): $t(85) = 4.837$; $p < .001$. The participants were also asked whether they lipread to facilitate comprehension, which 39.3% of the participants confirmed.

3.5 Results

3.5.1 Target group specific variables

In line with (H1), a positive correlation can be found between CC rates and age: $r = .358$; $p < .001$. There is however no significant correlation between CC rates and the frequency of subtitle use: $r = -.164$; $p = .066$. A two-sample t-test was performed to analyse whether the language the participants use with their parents had an influence on the overall content comprehension rates. The CC rates of two language groups were compared: German ($M = .576$; $SD = .255$) and German Sign Language ($M = .471$; $SD = .21$). There were no significant differences in CC rates between these groups: $t(77) = 1,524$, $p = .132$. Children who grow up in families using German Sign Language did not score lower CC rates than children growing up in families where spoken German is used, which confirms (H3). In line with (H4), the results on overall CC of the subtitled clips show a negative correlation with the hearing status ($r = -.283$; $p = .002$): the higher the hearing loss, the less questions were answered correctly.

3.5.2 Subtitling speed

The question whether subtitling speed has an effect on CC rates was examined via t-test for paired samples. The mean CC rate of clips subtitled at a slower 9 CPS ($M = .466$; $SD = .355$) were compared to that of clips subtitled at 15 CPS ($M = .486$; $SD = .354$). The data show a higher CC rate for the faster subtitling speed. T-test results show no significant differences between CC rates of both versions, which confirms (H5): $t(157) = -.683$; $p = .495$. This is applicable for almost every subgroup of the target audience. However, a tendency, albeit not statistically significant, can be observed in the group of 12-year-olds: CC rates for the faster subtitle version were noticeably higher than for the slower one: $M_{9CPS} = .583$ ($SD_{9CPS} = .299$) v. $M_{15CPS} = .688$ ($SD_{15CPS} = .342$) with $t(23) = -1.786$; $p = .087$.

3.5.3 Method of text reduction

Another topic that has been widely discussed in subtitling research is the method of text reduction. When the subtitling speed is set at a slow pace, the question arises as to whether to reduce text via omissions or via paraphrasing. For the purpose of the study, the CC rates of two subtitle versions with a controlled subtitling speed of 9 CPS were compared. For one subtitle version, text was reduced via omissions (9CPS_O) whilst keeping the syntactic structure and important key words. For the other version, paraphrases were used for that purpose (9CPS_P). This also meant adapting the language level by substituting complex words or syntactic structures. The CC rates of both versions ($M_{9CPS\_O} = .466$; $SD_{9CPS\_O} = .355$; $M_{9CPS\_P} = .502$; $SD_{9CPS\_P} = .342$) were compared via t-test for paired samples: $t(157) = -1.25$; $p = .107$. The results indicate that

although the mean CC rates are higher for the subtitle version where paraphrasing is used, there is no statistically significant difference between CC rates of both versions for the target group as a whole. Therefore, (H6) is rejected. However, by filtering the results according to language, a significant benefit of paraphrased subtitles for children growing up with German and one or more other spoken language(s) can be found: The mean CC rate for 9CPS_O in this subgroup is M = .41 (SD = .357), the CC rate for 9CPS_P is M = .57 (SD = .355): $t(36)$ = -2.64; p = .006.

3.6   Discussion

In the present study, data from children who are D/deaf and hard of hearing between the ages 8 and 12 were analysed. Although former research suggests that children in their first school years do not yet fully benefit from subtitles, the frequency of subtitle use was not dependent on the age of the participants in the present study. This means that younger and therefore possibly slower readers do not use subtitles less frequently than older children. However, and in line with hypothesis (H1), a significant correlation was found between content comprehension and age, which may not only be due to a higher reading proficiency for older children, but also due to cognitive development. Although a frequent use of subtitles is discussed to be beneficial for reading comprehension, no significant evidence could be found that it also leads to better content comprehension of subtitled television. This variable might not be as significant as expected since it covaries with hearing loss, which seems to be the dominant factor here. Hypotheses (H2) is therefore rejected. There are no significant group differences in content comprehension levels between children growing up with German and children growing up with German Sign Language, which confirms (H3). This result can be seen in line with research on reading proficiency underlining the benefits of early sign language use in this regard. In line with (H4), a significant connection between content comprehension and hearing loss was found. Since questions on content comprehension only addressed aspects that could not be retrieved by visual information alone, children with residual hearing likely had an advantage over children with profound hearing loss. Regarding the subtitling speed, hypothesis (H5) is confirmed: The subtitling speed does not have a significant influence on content comprehension. This might be because slower subtitles, while being easier to read, also tend to contain less information, which might affect comprehension negatively. Furthermore, there is a tendency towards faster subtitles leading to better content comprehension levels for pre-teens. Accordingly, but contrary to (H6), there is no significant difference in content comprehension between paraphrased subtitles and subtitles where omissions are used. One subgroup however, children growing up with German and one or more other spoken language(s), seemed to benefit significantly from paraphrased subtitles.

3.7   Limitations

One limitation of the study was the sample size of the subgroup of children growing up with German Sign language (N = 19). Since this is a too small sample in terms of statistical analysis, further research is needed to corroborate or dismiss the results presented for this subgroup.

Secondly, it was not possible to assess the reading skills of the participants quantitatively. Several studies have shown however that this is a relevant factor in terms of content comprehension (e.g. Burnham et al. 2008). Since the experiment took place in different cities in Germany with limited time and personnel, it was crucial to administer each experiment in one sitting without overstraining the participants. This unfortunately left no time for further tests.

Finally, another aspect that has yet to be analysed is whether the educational setting has an influence on content comprehension of subtitled television.

4   Conclusion

With the present study, I hoped to demonstrate that not only hearing status, but social and cultural-linguistic factors need to be examined in depth to gain a proper understanding of the target group. An interdisciplinary approach is required to create and analyse specifically adapted accessibility tools for children who are D/deaf and hard of hearing. In terms of SDH, the results indicate that otherwise central aspects to subtitling, such as speed and method of text reduction, are not as relevant as expected in terms of content comprehension for children who are D/deaf and hard of hearing between 8 and 12 years. However, these results differ in several subgroups filtered by language and age. This indicates the need not only for more than one subtitle version for the heterogeneous target groups, but also for further research on these target group specific aspects.

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Taking into account the heterogeneity of the SDH-target group: Creation of integrated titles using Easy Language for the prelingually deaf

Student track

Abstract

This paper deals with the creation of both linguistically and visually adapted subtitles for prelingually deaf addressees as a means to pave the way to audiovisual content that meets the needs of a specific subgroup of recipients. People with prelingual deafness are not only confronted with a sensory barrier but, in many cases, also with a linguistic barrier (Rink 2019, 49) when it comes to the decoding of text. Thus, Marmit (2018, 2021) recommends that the heterogeneity of the target group of commonly generated Subtitles for the Deaf and Hard of Hearing (SDH) be taken into full account by additionally providing integrated titles in Easy Language especially for the benefit of the prelingually deaf. Within the framework of the underlying project, integrated titles in Easy Language were implemented on an experimental basis. Although the main characteristics of Easy Language negatively correlate with the space and time constraints inherent to the medium of film, Marmit (2018, 2021) concludes that solutions are possible in this regard. In a further step, these experimental subtitles are to be tested empirically.

1   Credits

The data in this paper is drawn from Marmit's Bachelor thesis (2018), which was supervised by Prof. Hansen-Schirra and submitted to the Examination Office of the Faculty for Translation, Linguistics and Cultural Studies (FTSK) of the University of Mainz, Campus Germersheim, Germany, in May 2018.

2   Basic considerations

The basic considerations of the underlying project root inter alia in the legal requirements of communicative content as defined by the German Law on Equality for people with Disabilities, within which the concept of accessibility is also transferred to "acoustic and visual sources of information" (BGG 2002, para. 4). In addition, based on the EU Audiovisual Media Services Directive, the so-called "Rundfunkstaatsvertrag" (now "Medienstaatsvertrag") regulates the continuous and gradual expansion of accessible audiovisual content by both private and public broadcasters, which, since the renewal of the directive in 2020, are obliged to regularly report the measures undertaken to the European Commission (MOModStV 2020, para. 7).

For people with hearing impairments, accessibility of filmic material is primarily achieved by subtitles. However, the fact that the community of the hearing impaired is extremely heterogeneous seems to have drawn little attention. As a result, only one sort of subtitles, namely the commonly generated *Untertitel für Hörgeschädigte* (equivalent to *Subtitles for the Deaf and Hard of Hearing* in the English-speaking world), has been made available, while the specific needs of people with prelingual deafness as a subgroup of the hearing impaired have not been taken into consideration. As studies have shown, this subgroup often experiences comprehension difficulties with the linguistic complexity of standard written language (see Krammer 2001). The modifier

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prelingual refers to deafness that occurs before the acquisition process of spoken language is complete (Leonhardt 1999, 77). The point in a person's lifetime at which the hearing impairment occurs is inherently linked to first language acquisition and, later on, with reading comprehension ability. The absence of hearing ability results in the fact that the concerned subgroup cannot (fully) make use of their auditory sense during first language acquisition (Leonhardt 2019, 82). Consequently, they are also unable to map print to sound when it comes to the acquisition of literacy (Goldin-Meadow and Mayberry 2001, 222). Ideally, deaf children are offered sign language as a first language. As the visual mode is accessible to them unrestrictedly — absence of a visual impairment provided — first language acquisition can take place unhindered in this case (Allen et al. 2014 346–47). A soundly developed knowledge of sign language serves as a fundamental basis to learn written language as a second language, as long as adequate schooling based on the bimodal-bilingual approach is provided (Padden and Ramsey 2014; Hennies 2019, 210). However, as 97,7% of deaf children in Germany are born to hearing parents who rarely have any knowledge of sign language and are normally eager to integrate their child into the hearing culture, deaf children are usually raised verbally (Bredel and Maaß 2016, 152–53). In rare cases can a Cochlea Implant equip the child with a fully intact hearing ability, which is why, most of the time, only an impression of hearing can be achieved (Leonhardt 2019, 113). It becomes evident that in such cases, the acquisition of spoken language as a first language can only take place insufficiently. Thus, a fundamental basis involving both linguistic and world knowledge that can be referred to when learning written language is absent (Allen et al. 2014, 346). Combined with the so-called *oral method* of schooling, which primarily focuses on the concealment of the child's hearing disability (Ladd 2005, 12–13), this unsurprisingly results in limited reading and writing skills on the part of the prelingually deaf person.

In fact, the performance of deaf adult school-leavers is comparable to those of their primary-school aged, hearing counterparts (Hennies 2019, 207). Although sign language as a first language is an indispensable prerequisite for deaf children when it comes to the acquisition of literacy, written language can still pose a challenge to a number of native signers. The reason for this is twofold. Firstly, written language is based on a language system that differs greatly from the one sign language is based on (Bredel and Maaß 2016, 152; Hennies 2019, 211–12). To name only one aspect, spoken and written language are performed linearly while simultaneity is characteristic of sign language (Hennies 2019, 212). Secondly, and as already mentioned, written language can be regarded as a second language for deaf people whose mother tongue is sign language. Thus, not only the difference in language systems but also the fact that written language is learned as a second language can pose a challenge to a number of native signers when it comes to literacy skills, in the same way that a hearing person can face difficulties when reading or writing his/her second language (Hennies 2019, 212).

With regard to subtitles, the fact that they are displayed on screen only for a certain amount of time is another obvious reason that may account for possible comprehension difficulties. As the subgroup of people with prelingual deafness is in itself heterogenous, and as each person concerned has his/her own individual linguistic background, this may not necessarily apply to the whole group of prelingually deaf people. No matter which of the mentioned cases might be the reason for experiencing reading and writing difficulties on the part of a prelingually deaf viewer, it is evident that subtitles can pose a linguistic barrier to prelingually deaf people. Thus, it seemed essential to provide them with linguistically adapted subtitles — a desideratum also referred to by Neves (2009, 166). For this purpose, the concept of German Easy Language seemed to be a suitable means as it avoids complex grammatical structures and potential linguistic barriers. Furthermore, regarding Easy Language texts in general, people with prelingual deafness are in fact one of primary target groups (Bredel and Maaß 2016, 150–55). Thus, a further

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differentiation of the group of the hearing impaired was deemed necessary and adapted subtitles for the prelingually deaf were created. According to Bredel and Maaß (2017, 159), the application of Easy Language in subtitling has hitherto been rare. In order to further allow for a visually optimized perception on the part of the prelingually deaf viewer, the concept of *integrated titles* (Fox 2016) was applied.

3   Method: Combining the concept of Easy Language with the integrated titles approach by Fox (2016)

3.1   Theoretical underpinnings

German Easy Language can be defined as a linguistically reduced variety of Standard German (Bredel and Maaß 2017, 9). The concept as such already exists for many languages in various forms and always seeks to reduce the linguistic complexity of the respective source language (Bredel and Maaß 2016, 49; 169). By guaranteeing both grammatical and content-related simplicity and, hence, comprehensibility (Bredel and Maaß 2017, 96), German Easy Language obviates the potential linguistic barriers that many people with "communicative disabilities" (Rink 2020, 37–38) — amongst them, people with prelingual deafness — face on word, sentence and text level (Bredel and Maaß 2016, 154–55). Texts in German Easy Language further come in a structured layout and a reader-friendly typography in order to enhance perceptibility (Bredel and Maaß 2016, 211ff.). They are mostly translated from a text in standard language and thus represent an additional communication offer for readers (Bredel and Maaß 2016, 57; 140). Bredel and Maaß (2016) were the first authors to describe German Easy Language from a linguistic point of view. They formulated a set of rules for German Easy Language based on the existing pioneering work of several associations for people with disabilities and with reference to the current research concerning perceptibility as well as comprehensibility (2016; 2017). This set of rules was applied when creating the subtitles drafted within the framework of Marmit's thesis (2018, 2021).

Concerning the visual aspect of the subtitles, the integrated titles (IT) approach systematically described by Fox (2015, 2016) was used. As the name implies, the (sub)titles are no longer placed in the lower part of the screen but integrated into the image, close to preliminary defined main focal points, in order to ensure that the titles comply with the original image composition of the respective scene (Mercado 2010, 11; Fox 2015, 9). What is more, the layout of the titles is adapted to the overall filmic design (Fox 2016, 168–70). Fox was inspired in this approach by examples where subtitles were placed more creatively into the image (2016, 98). This is the case for films such as the English version of *Slumdog Millionaire* (Fox 2016, 98). Here, contributions in Hindi were subtitled in English, whereas the design of the subtitles was aligned with the colors and style of the filmic material and the position of the subtitles was detached from the bottom of the screen by turning the whole image into a possible placement area for the titles.

Within the framework of her study involving Eyetracking Technology, Fox could prove that the eye movements of IT users are comparable to the eye movements of a viewer watching a film without any subtitles, implying that IT follow the natural focus (Fox 2016, 175). Fox also found that in comparison to traditionally placed subtitles, integrated titles, inter alia, allow the user to spend more time exploring the image due to a reduced distance between title and image (2016, 172) and, thanks to a placement close to the speaker, enable the user to identify the speaker more easily, which is essential when it comes to subtitling for the (prelingually) deaf (2016, 126–27). Based on her findings, Fox designed a workflow for the creation of integrated titles (2016, 130). This workflow was adhered to when creating the integrated titles in Easy Language.

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3.2 Procedure

The integrated titles in German Easy Language were drafted for carefully selected scenes of the German trilogy *Ku'damm 56* (Bohse 2016) produced by *UFA-Fiction* and first broadcast in May 2016 on ZDF, one of the biggest public broadcasters in Germany. In order not to reproduce possible interlingual translation errors when translating into German Easy Language, it was essential to choose a German source text, hence a German production. Moreover, regarding the legal obligations concerning accessible broadcasting, it seemed crucial to choose a production screened by a public broadcaster, and thus focus on a potentially pioneering work in terms of this subtitling approach. A recent production was chosen in order to stress the particular importance of rendering new releases accessible. Furthermore, aspects such as high ratings for all three parts of the trilogy, as well as nominations, inter alia for the German Television Award, played a crucial role.

The scenes were selected on the basis of the trilogy's script (Hess 2015c, 2015a, 2015b). For this purpose, the scripts were screened for linguistic, as well as content-based characteristics that would require alternative wording in Easy Language. In doing so, the aim was to collect suitable and sufficient material that would justify the creation of subtitles in Easy Language for people with prelingual deafness. Moreover, some of the scenes were also selected on the basis of the challenges Fox defined concerning the placement of integrated titles (2016, 122–27). Lastly, the selection of dance scenes accompanied by vocal music seemed relevant to the demands of making the rhythm of the music accessible to the prelingually deaf with the help of titles displayed in line with the lyrics.

Regarding the space and time constraints that come with the filmic medium, the translations were aligned to the standard parameters of subtitling concerning the volume of text, that is, a maximum of 37 characters per line (Díaz-Cintas and Remael 2009, 84) and no more than 18 CPS (characters per second) (Karamitroglou 1998). Following Bredel and Maaß (2017, 159) concerning subtitling in Easy Language, every effort was made to stay below the value of 18 CPS in order to comply with the reading pace of the target group of Easy Language texts. This was facilitated by the subtitling software *AegiSub* which signaled a critical number of characters from 16 CPS onwards. The highest value that had to be worked with was 19 CPS in the case of very limited time constraints triggered by fast speech, whereby the time of display could not be extended due to another contribution of the same or a different speaker. Shortening the text would not have been possible in most cases without withholding information or interfering with the grammatical simplicity of Easy Language. As Bredel and Maaß (2017, 144–46) point out, the limitations of the grammatical structures of Easy Language often result in a higher volume of text. Combined with the space and time constraints inherent to the filmic medium, this can be considered as a clear shortcoming when applying Easy Language in the area of subtitling. Maaß and Hernández Garrido (2020) address this discrepancy in their article.

Contrary to common subtitling guidelines recommending two lines maximum (Ivarsson and Carroll 1998, 158; Karamitroglou 1998), it seemed appropriate to work with up to three lines, as the latter — within image compositions that offered a limited secondary area — interfered less with the image than the former. What is more, Bredel's and Maaß's (2017, 159) recommendation to use only one line at a time when creating subtitles in Easy Language was not implemented, as the exclusive use of single-lined subtitles would have proved disruptive to the image. Whereas a three-lined subtitle can possibly include three statements of a speaker displayed at only one fade-in, three single lines would have to be displayed one by one when exclusively working with one-lined subtitles.

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The guidelines for traditional subtitles recommend a pause of one sixth of a second between two subtitles, as the human eye does not register any changes of subtitle in the case of any shorter pauses (Ivarsson and Carroll 1998). As for integrated titles, however, it can be assumed that the minimum length of the pause is less relevant, as, even with regard to contributions of the same speaker, the position of the titles can vary. Thus, it can be stated that it is unlikely to miss a title due to a pause that has been too short.

The rhythm of the titles had been timed to synchronize with the spoken word, at least concerning the start of each speech act. Still, in some cases and where possible, it was necessary to keep the title on screen after the speech act had ended, in order to adhere to the CPS value and to guarantee an appropriate reading time.

Central elements of spoken language such as pauses/hesitations in speech (Koch and Oesterreicher 2011, 12; 54–57) were indicated with the help of horizontal ellipses as is also common in standard subtitling practice. This further helped to adhere to the rhythm of speech. In addition, paraverbal elements displaying the tone of voice were also included in the titles by applying emoticons, as suggested by Neves (2009). Paraverbal elements which could not be expressed with the help of an emoticon were described and put in parentheses.

Furthermore, "audio-nonverbal" elements such as sounds and instrumental music, as well as vocal music as part of "audio-verbal" signs, were subtitled (see Zabalbeascoa 2008, 23). In the case of vocal music, which was mostly in English, information on title and artist, as well as lyrics were given. Thus, the aim was not only to convey the rhythm of the song, but also to make the content of the song accessible to prelingually deaf viewers with knowledge of English written language.

In addition, in one case it seemed essential to translate "visual-verbal" signs, i.e., writing captured by camera, into Easy Language. This occurred when an official letter was displayed within which the linguistic complexity of the German language was applied to its fullest extent.

One aspect that had not been implemented was the creation of a glossary of technical and foreign terms, as suggested by Bredel and Maaß (2016, 496) on the condition that certain requirements are met. This would have been necessary in relation to some technical terms and nicknames occurring in the scenes. In case of a film being distributed via DVD, Marmit (2018, 2021) suggested making the glossary available via a separate menu item that could be accessed before watching the film. This also applies to films offered via streaming platforms. Concerning films shown on TV, it would be conceivable to make the glossary available on a teletext page.

Following the workflow designed by Fox, the titles were placed within the secondary area that resulted from the image composition in each corresponding scene. In doing so, and following the IT concept, it was essential to maintain the proximity to the main focal points. Furthermore, the titles were placed in speech direction where possible (Fox 2016, 114–30).

As for the layout of the titles, both the IT concept and the perceptibility-enhancing guidelines for the creation of Easy Language texts played a crucial role. In order to complement the latter, Arial Narrow, i.e., a sans serif, unconnected font, was chosen for all titles and the titles were left-aligned. In addition, in order to further facilitate the identification of the speaker by the prelingually deaf viewer, each speaker was assigned a separate color, as is also suggested in the standard SDH-guidelines (Ivarsson and Carroll 1998). However, contrary to the standard guidelines and following the creative approach behind IT, a wider color range was used in order to adapt the design of the titles to the appearance of each speaker. Each title was contoured in order to enhance legibility on a changing background.
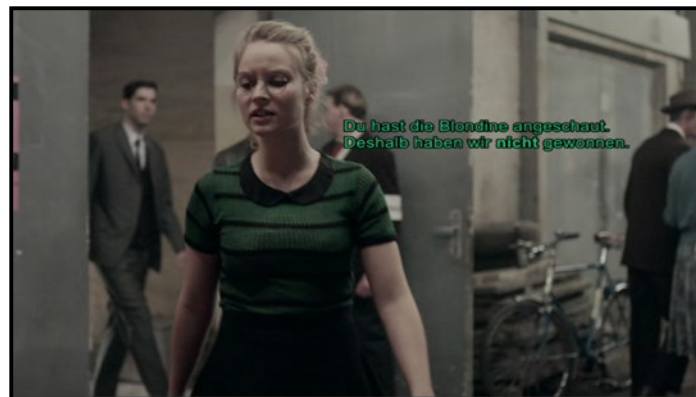
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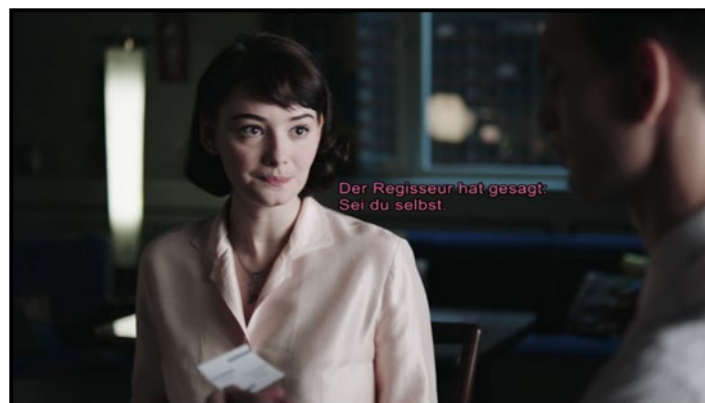*Figure 1. Integrated titles in Easy Language created by Marmit (2018). Screenshot from Bohse (2016).*

Figure 2. Integrated titles in Easy Language created by Marmit (2018) Screenshot from Bohse (2016).

Figure 1 and Figure 2 show examples of the created integrated titles. Titles for sound and music were colored white, while audio-nonverbal elements were highlighted by asterisks. In the case of vocal music, information on the song title and the artist were framed by two asterisks, while each line of the song was introduced by a hash. The last line of each song was framed by two hashes. Thus, with regard to musical titles, the subtitling guidelines provided by ARD et al. (2015) were largely applied.

4 Conclusion and outlook

Due to the fact that subtitles in standard written language can pose a linguistic barrier to a person with prelingual deafness, it is desirable to provide the target group with subtitles in Easy Language. In combination with the IT approach, an improvement concerning the visual aspect of the titles could also be achieved.

However, due to incompatibilities between the characteristics of Easy Language and the filmic medium, it would be more feasible to use a variety that is slightly more complex than Easy Language in order to reduce text volume. For this purpose, *Easy Language Plus* or *Plain Language* seem to be a more suitable means (see Maaß 2020). It can be assumed that the use of one of these varieties would further enhance acceptability (Maaß and Hansen-Schirra 2020, 20–21) for the prelingually deaf viewer.

The reception of this kind of titles will be tested empirically for the first time within the framework of Marmit's forthcoming MA thesis (Marmit 2021, forthcoming). On the one

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hand, it is planned — with the help of a questionnaire — to compare the comprehension of titles in Easy Language (i.e., titles in one comprehensibility-enhanced language variety) and titles in standard language by prelingually deaf viewers. On the other hand, comprehension will be tested by using Eyetracking Technology to compare the eye-movements of deaf users while reading titles in Easy Language vs. titles in standard language.

The general aim of providing subtitles in Easy Language is to increase the participation of the prelingually deaf in the world of entertainment, of which films constitute a major part. As is true for almost all Easy Language texts, subtitles in Easy Language should be provided in addition to the commonly generated subtitles for the deaf and hard of hearing. They should be seen as an option but never as an imposition. Deaf users with adequate knowledge of the German written language could always opt for the linguistically more complex subtitles for deaf and hard of hearing (SDH).

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Daniela Eichmeyer-Hell

Speech recognition (Respeaking) vs. the conventional method (Keyboard): A quality-oriented comparison of speech-to-text interpreting techniques and addressee preferences

Research track

Abstract

Speech-to-text interpreting (STTI) is — especially in the German-speaking area — still a young profession, but it is used more and more, not least thanks to the UN Convention on the Rights of Persons with Disabilities and the national legislations that derive from it. Over time, various STTI methods have been developed. In the early years, being able to provide STTI-services was challenging enough. More recently, the focus has shifted to the quality of the service and, in this context, the present paper aims to show whether any one method is to be preferred over the others and, if this is the case, which one. The recently conducted studies should help to settle the entrenched opinions that dominate the discourse about the quality of the STTI methods mainly used in the German-speaking countries.

1   Introduction

STTI has not always been a research-informed discipline but, like other areas of translation studies, has developed out of practice. STTI has only recently found its way into university curricula in the DACH area (Germany, Austria and Switzerland), such as the Master in Conference Interpreting and Community Interpreting at the University of Graz (since the winter semester 2017/18), the Master in Applied Linguistics, Barrier-free Communication at the ZHAW Winterthur (since 2019) and, since the winter semester 2019, the Master in Barrier-free Communication at the University of Hildesheim.

STTI-classes as part of the MA courses give students an overview of STTI and a first insight into the different techniques. The STTI-classes should serve as a stimulus for students to continue their education in this field and thus become professional STTInterpreters.

In addition, the winter semester 2019 saw the first university course at the Postgraduate Center of the University of Vienna, which is targeting professionals of translation and interpretation who hold at least a Bachelor's degree.

Upon successfully passing the final exam, graduates of the certificate course at the University of Vienna can start to work as professional STTInterpreters immediately.

Before this academic turn, which took place only just three years ago, STTI-training has been part of vocational training and professional development and has been offered on a part-time basis with a wide range of requirements and training plans. In particular, the focus and the valuation of the techniques used vary considerably. Some training courses offer only one technique, namely the so-called conventional method, touch-typing with a 10-finger system on a QWERTY keyboard (or QWERTZ for German keyboards). Other programs offer two techniques — speech recognition and conventional method — but focus on speech recognition. There are therefore hardly any STTInterpreters with certificates from these courses who have mastered both techniques in such a way that they could use them equally well in assignments.

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So far, there are only two certificate courses (both in Austria) which give both techniques exactly the same value and whose graduates are fully prepared to use both techniques in an assignment. However, the Master's curriculum in Applied Linguistics / Professional Translation at the ZHAW Zurich University of Applies Sciences offers students the opportunity to opt for a specialisation in Barrier-free communication (ZHAW 2021). Students can choose, amongst others, to specialise in STTI and focus on respeaking, conventional method or both techniques.

As for 2020, in Germany and in Austria, certified STTInterpreters use the techniques as shown in Figure 1. As there does not exist an official certification for STTI in Switzerland, and therefore there is no list of certified STTInterpreters available, no exact figures can be shown. However, to the best of my knowledge, speech recognition is the predominant technique being used in Switzerland when it comes to online STTI. In contrast, in presential settings, the conventional method is also frequently used.
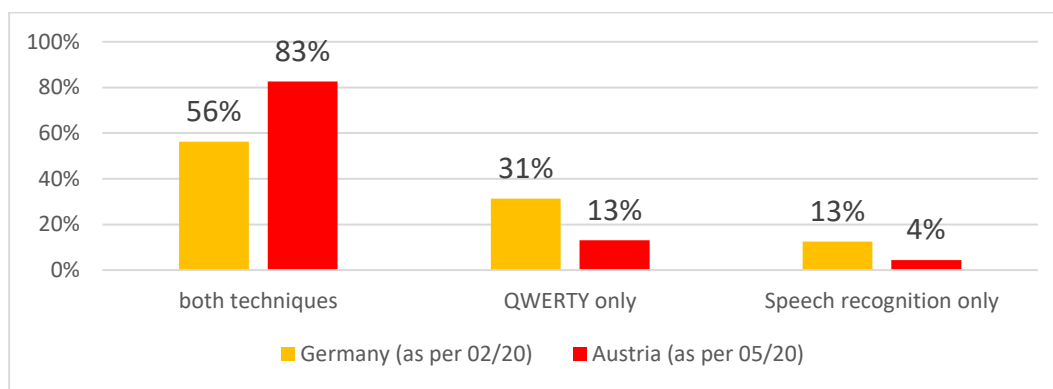

Figure 1. Use of STTI techniques in Germany and Austria (Eichmeyer-Hell, Forthcoming)

So far, no studies have investigated the quality that can be achieved by using those two methods. It is still a matter of opinion, not data, about which method might be preferable over the other. These opinions are formed mainly by the type of course someone has taken or by the method a person happens to be more familiar with as addressee.

Academic research regarding the advantages and disadvantages of each method is direly needed in order to standardize curricula, improve training and, eventually, improve output quality.

2   Research approach

The basis for the studies carried out on the evaluation of STTI provided by the two techniques under study was the development of an evaluation model. Until now, there have been no quality models specifically developed for STTI, but there have been for a closely related discipline, live subtitling on television.

The most broadly used evaluation tool is the so called NER-Model (Romero-Fresco and Martínez 2015) based on the WER (Word-Error-Rate) algorithm, which measures the accuracy of an automatic speech recognition as the ratio of word insertion, substitution, and deletion errors in a transcript to the total number of spoken words (cf. Park et al. 2008). It modifies and improves the evaluation introducing error weighted categories for recognition and edition errors.

Another way to evaluate the quality of intralingual live subtitles is using the IRA (Idea Rendition Assessment) developed by Eugeni (2017), which assesses the quality by

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calculating the percentage of the ideas rendered in the target text without taking into account formal errors.

Moores (2020, 192) used the NER model to evaluate live texts produced by STTInterpreters in live events and has found that adjustments of this evaluation model are necessary for such settings, precisely because the NER model was developed to evaluate TV subtitles.

For this reason, I developed an evaluation model specifically designed for STTI, i.e. the WIRA — Weighted Idea Rendition Assessment. It is based on the two evaluation models mainly used for live subtitling on TV: the NER model and the IRA. The two models — which have been adjusted for some identified opportunities for improvement regarding the assessment of live text produced by STTI — have been merged to form the WIRA (Eichmeyer-Hell Forthcoming). The WIRA introduces an additional error category to the ones introduced by Romero-Fresco and Martínez (2015), which are minor (weighted 0,25), standard (weighted 0,5) and major errors (weighted 1,0). The WIRA though includes also very minor errors, which are weighted with a factor of only 0,125. The aim is to include those very minor errors which do not hinder comprehension on the side of the addressees but still have to be considered as errors. Furthermore, both most common techniques of STTI in the DACH area are taken into account in the WIRA model. Therefore, typing and recognition errors are considered as technique-dependent errors, and for edition errors, the basic idea of the NER model is adopted. Also for the evaluation of the idea rendition another category was added. While Eugeni (2008) only proposes two possible assessments with the IRA — rendered or not rendered — the WIRA also offers to assess an idea as partially rendered. The output of WIRA are three partial results: one for content showing the percentage of the ideas rendered in the target text, one for the formal quality and an overall assessment. This makes it possible to determine how much of the content in the target text has been rendered (as a percentage of the idea units rendered), as well as the formal quality of the target text for the addressees. Only if both partial results meet the minimum requirements, the overall assessment shows a positive evaluation. A detailed description of WIRA and its proper application is given in Eichmeyer-Hell (Forthcoming).

The intercoder reliability of WIRA-evaluations was calculated and reached a level qualified as "substantial" according to Cohen's κ (cf. Mellinger and Hanson 2017).

3   Study design

The studies were designed as field research, where the situations for both lecturers and addressees were free of manipulation. The studies were carried out at the Klinikum Großhadern in Munich and consisted of evaluating STTI of three different lectures. In contrast to the usual setting, four teams (instead of one) were asked to provide STTI. The addressees were not aware of this change of setting.

The 46 addressees received an iPad each, on which the target text was delivered. 50% of the addressees received the target text produced using the conventional method first and the other half received the text produced by respeaking (STTI using speech recognition) first. Then, the methods were switched for the other lectures. The addressees did not know that they would receive target texts produced by different teams.

The other two teams interpreted as "silent booths", i.e., without direct addressees. The interpreters did not know that two teams would have no addressees.

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Figure 2. Setting on site for the study (Eichmeyer-Hell, Forthcoming)

The study used certified interpreters who have been working regularly for 2–5 years. Two teams used the conventional method, the other two applied respeaking using a speech recognition software.

The target texts of the four teams were evaluated and compared using WIRA. In addition, the addressees were asked to fill in a questionnaire in order to find out whether they had preferences for one of the two techniques applied for STTI and if they had a preference, which technique they would prefer.

In order to better understand and record the preferences of the addressees for one or the other technique and for the type of projection of the target text, a follow-up study was designed and executed.

4   Results

The three lectures for which STTI was provided had different characteristics. The first speaker was a male talking at very variable speech rate, on average 134 words per minute, the two other ones were females, talking at 114 words per minute on average the first one and at 115 words per minute the other one. Furthermore, for the first talk, there was no preparation material available for the STTInterpreters whereas for the two other talks, PowerPoint slides were made available beforehand.
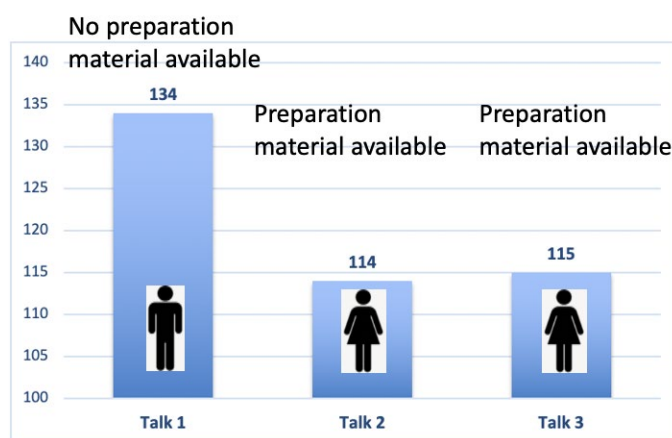

Figure 3. Characteristics of the three STTinterpreted talks (Eichmeyer-Hell, Forthcoming)

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For each lecture, four target texts that have been produced simultaneously were evaluated using the WIRA model. Two texts each were produced using conventional keyboard and 2 texts by respeaking. For the graph below (Figure 4), the arithmetic mean of the two teams of the same technique was calculated.
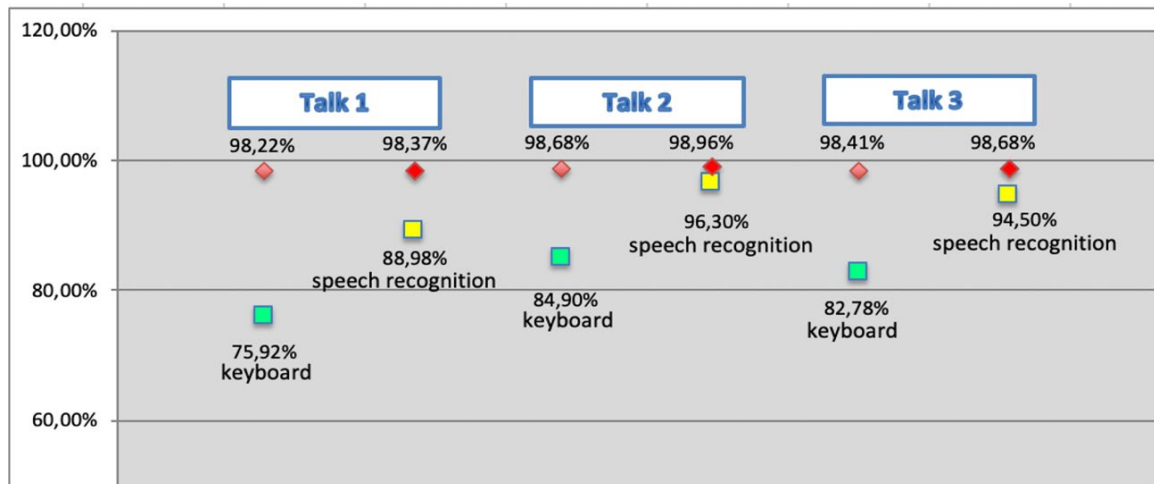

Figure 4. Result per technique and per talk (Eichmeyer-Hell, Forthcoming)

In talk 1, the lowest results were achieved for both techniques. The main reasons are probably that no preparation material was provided for this presentation, the content was very scientific in nature, and also, the average speaking rate was far above that of the other two presentations. However, both teams using speech recognition were able to exceed the minimum requirements of content rendition, reaching an average of 88,98% of content rendered, whereas the teams using the conventional keyboard only reached an average of 75,92%, which is below the minimum requirement of 80%. For the three talks, the respeaking teams reached on average 12% more content rendition than the typing teams.

In terms of formal quality, the four teams met the minimum requirement for all three talks, yet, the teams using speech recognition obtained better results.

As for the user preferences obtained in the follow-up study, 43% of respondents stated that they had no preference for either technique. 17% did not answer this question and 40% stated they had a preference for one of the techniques. Of these 40%, two thirds preferred speech recognition and one third preferred the conventional method (cf. Figure 5).
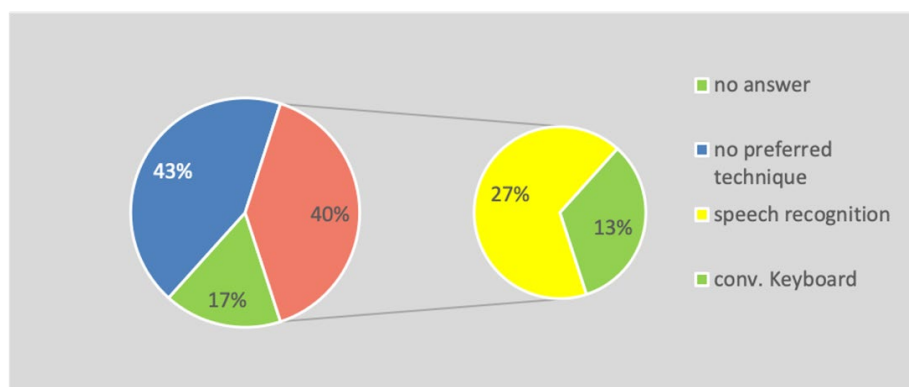

Figure 5. User preferences for STTI-techniques (Eichmeyer-Hell, Forthcoming)

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Finally, when asked about their preference regarding of how the target text is displayed, whether they preferred subtitles or continuous text, 60% reported no preference, 30% preferred subtitles, 3% preferred continuous text and 7% stated that their preference would depend on the situation. More detailed results can be found in Eichmeyer-Hell (Forthcoming).

5   Conclusions

The studies show that the results of STTInterpreters applying speaker-dependent speech recognition software surpass the results of those who type on conventional keyboards. One average, respeakers rendered 12% more of the content and also scored higher regarding formal quality. Out of the four STTInterpreter teams participating in the studies, the first and second ranking were respeakers. So, not only did respeaking score better on average, but also did each of the two respeaking teams surpass the two other teams that typed on a conventional keyboard.

With regards to user preference, the follow-up study showed a preference for speech recognition as technique and a preference for the target text to be displayed as subtitles.

6   Outlook

These findings apply to a lecture setting and might not be true for other kind of settings, such as medical settings for example. So, further investigation is needed for more differentiated findings on the topics covered in this paper. It would also be useful to conduct studies with larger audiences.

7   Acknowledgements

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Carlo Eugeni, Wim Gerbecks & Rocío Bernabé

Real-time intralingual subtitling through respeaking and Velotype: Cutting-edge theoretical and professional best practices

Professional track

Abstract

Real-time intralingual subtitles enable access to live audiovisual products, such as TV shows, conferences and educational settings. However, the provision and the quality of such services across Europe is uneven and sometimes insufficient because live subtitlers are untrained or only partially trained, and their professional status is hardly recognized. To bridge this gap, the EU-funded project Live Text Access (LTA) aims to create ad-hoc training materials and proposes the recognition of certified professionals. This paper will report on the advances of LTA. In the first part, the project and its intellectual outputs will be illustrated. In the second part, cutting-edge theoretical and empirical research work will be shown and discussed, as well as the most advanced best practices and technological solutions in the area.

1   Introduction

This paper deals with real-time intralingual subtitling through respeaking and velotyping. We are aware of shorter and more straightforward terminology (e.g., live subtitling, CART, speech-to-text interpreting, cf. Romero-Fresco 2018), but this lack of univocity has led to restricted views of the profession and consequently of the training, which only concentrates on some aspects. Every term seems, indeed, to limit the profession to a technique, a context, a target audience, or some other scopes, while all activities aimed at producing a real-time transcript of a speech share many similarities, at least in the process, and can then fall into the same category (Eugeni and Bernabé 2019).

In parallel, the number of real-time intralingual subtitlers has been steadily increasing, especially among freelancers, who enlarge their service portfolio, but also among professionals employed by broadcasters and companies. Since training is still lagging, many of them have partially specialized training or no training at all. Moreover, the provision and quality of such services across Europe are uneven and sometimes insufficient (Utray et al. 2012; EFHOH 2015), and there is no recognized professional status of real-time intralingual subtitlers.

To bridge these gaps, LTA gathers higher education institutions, service providers, broadcasters, end users, and certifiers, to create ad-hoc training materials for formal and informal education and to propose the recognition of certified professionals. LTA is co-funded by the ERASMUS+ programme of the EU and is a strategic partnership addressing inclusion and innovation in higher education with a focus on three European priorities: development of curricula to meet labour market and societal needs, open education in the digital era, and social inclusion.

Given that subtitlers lack specific training and the profession has no clear or recognised status, LTA aims to design an effective and certified curriculum according to the standards of the European Certification and Qualification Association (ECQA) for real-time intralingual respeakers and velotypists. The training materials that will be made available will be open source and suitable for in-house, vocational, and higher education

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training. Real-time subtitlers will be trained to provide high-quality subtitles in different contexts (i.e. cultural events, parliamentary assemblies, broadcasts, professional and educational settings) and under different working conditions (i.e. face-to-face, online, by relay).

In the following sections, we will present the intellectual outputs of the LTA project, in particular the curriculum design, the training materials, and the certification.

2   The curriculum design

The LTA curriculum designed for the training of real-time intralingual subtitlers through respeaking and/or velotyping is based on the Pedagogical and Methodological Curriculum proposed by Safar (1992) and adapted to audiovisual translation by Hamaoui (2015). The curriculum is divided into three main areas (Aims and Objectives; Tools and Teaching; Assessment) and has been designed according to the following criteria:

- Feasibility: the LTA curriculum is progressive so as not to discourage trainees.

- Adaptability: the course adapts to changing teaching and learning needs through an assessment system that monitors progress along the whole course. The assessment system includes several tests: a pre-assessment prior to the training, peri-assessments after completion of each unit, and a post-assessment upon completing all units (see Table 1 in Section 4).

- Modularity: the curriculum organizes the course subjects in four self-contained general units and two technique-specific ones (i.e., respeaking and velotyping). Each unit is composed of elements aimed at the acquisition of well-defined learning outcomes (LO).

- Effectiveness: the LTA curriculum has been designed to fit the needs of the job market, thus bridging an existing gap in training. To do so, we have envisaged ECQA-certified real-life materials — in English for general modules and language specific for the respeaking and Velotype modules.

Any course based on the LTA curriculum can be adapted to the needs of a training provider by, for instance, integrating single units in an existing course or by offering a whole 30-ECTS course, as we suggest here. The overall structure of a 30 ECTS course can be visually represented as a Doric Temple (see Figure 1):
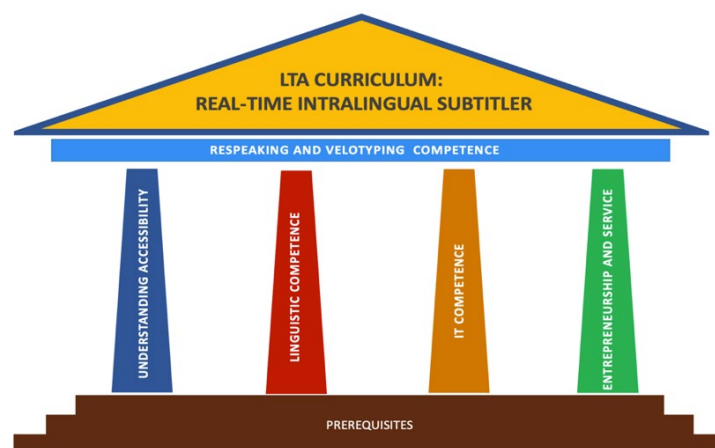

Figure 1. Simplified visual representation of an LTA course

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The six units of the LTA course proposed in the project address professional or theoretical aspects and lead to an ECQA certification exam. The units are:

- Understanding accessibility: it is an introduction to the course. Trainees will acquire specific knowledge of inclusion and accessibility concepts and an understanding of the target users, as well as how accessibility is embedded in the working environment.

- Linguistic competence: trainees will acquire competences to control both the use of language and the performance itself, according to different working settings and conditions.

- IT competence: trainees will acquire knowledge of the essential hardware and software that can be used in any setting, and recommended tools for specific applications.

- Entrepreneurship and service competence: it aims to train future freelancers, capable of intertwining entrepreneurial opportunities, resources, and actions.

- Respeaking competence: respeakers simultaneously listen to live input and repeat it in the same language to a speech recognition software which turns it into written words.

- Velotyping competence: velotypists simultaneously listen to live input and type it by means of an orthographic keyboard which creates syllables by pressing chords of keys.

The 30-ECTS LTA course and curriculum are not only certified because they meet the ECQA standards (Nájera Villar 2011) but also because they offer trainees the opportunity of undergoing a certification process. The certification exam will be available at the ECQA platform after completion of the project. The ability to provide a certification exam for both vocational and academic students, and the possibility for trainers and institutions to become certifying bodies allow LTA to meet the goal of providing a recognized international status for real-time intralingual subtitlers.

3   The training materials

For each unit mentioned above, we have defined specific LOs. The training materials will be created ad hoc in English, while some other materials, already available, have been selected to train trainees in language-specific situations. To do so, homogeneous materials for three working contexts have been identified: conferences and classes; assemblies and working scenarios; TV and live events. For each of the above contexts, the main principle adopted is 'cross-fertilization', meaning that free materials already available on the Web have been selected to fit the course's purposes. Given that some contexts make it hard to find appropriate training material for various reasons, sources available in all five languages of LTA (those of partners — Spanish, German, Dutch, and Italian — plus English, which is the LTA working language) have been identified, as well as three levels of "difficulty" per context, allowing for progressive training, i.e. beginners, intermediate, advanced.

For beginners, the speech repository of the Directorate-General for Interpretation of the European Commission (SCIC), a free resource exclusively for non-commercial purposes with speeches divided in levels of difficulty, will be used. Another important source for beginners is the Intersteno speech repository. It provides a free online software that shows a written text in a scrolling mode to be copied as quickly and

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accurately as possible; and competition texts that can be used for an advanced step in mastering the technique and for specific LOs.

For intermediate learners, the EU parliament TV channel fits the LTA needs because it contains two types of materials: commissions and plenary sessions. Commissions usually allow for longer turns, while plenaries usually contain very quick speeches normally read at a very high speed.

For advanced learners, TED talks will be used as training materials in different areas of content: tourism, science, politics, engineering. Moreover, trainees will work on those TV programs that are more likely to be subtitled in real time: documentaries and the news.

Overall, training materials may vary in nature and in number according to their role in the different implementation pathways identified:

- Class-work material: core material (whose nature and number may vary depending on the course) to be used "in the class" (be it physical or virtual) by trainers to achieve an LO;

- Self-study material: material (whose nature and number may vary depending on the course) to be used outside classes by the trainees to further develop a skill;

- Accompanying material: subtitles in SRT format, PPT presentations, PDF transcripts and other materials created during the LTA project;

- Suggested reading: websites, academic papers, laws, etc. providing information which can be useful in diverse settings and contexts, though not essential to acquire the skills aimed at in an LO;

- Tasks: material especially created by LTA partners or made available by third parties to be able and accomplish a technique-specific or general LO;

- Tests: material used to both assess the trainees' background (pre-tests), results achieved after a Learning Unit (peri-tests) and after the full course (post-tests).

4 Intellectual outputs

The LTA network has allowed the project to capitalize on both an established literature in the field and on the most advanced best practices and technological solutions. In particular, the focus was on the following innovative aspects:

- Applications: several interlingual live subtitling techniques, varying according to the amount of technology involved;

- Technologies: different solutions of Human-Machine Interaction used worldwide allowing for specific tasks in specific contexts, automating the process;

- Approaches: verbatim (word for word) and sensatim (concept for concept) approaches, such as Plain Language and Easy-to-Read, depending on contexts and suiting different audiences;

- Professions: live subtitlers do not always work on their own. They can be supported by live editors, whose job, however, is hardly recognized.

All these best practices have been merged into a training course that is in the process of being certified. To do so, ECQA recommends that a course should normally deliver

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30 credits, be they academic (ECTS) or vocational (ECVET). 30 credits correspond to 750 training hours (one training hour corresponds to 45 minutes), meaning 25 training hours per credit. These 750 training hours are to be distributed into 270 class hours (contact hours during which the student undergoes a class) and 480 independent self-study hours (independent study hours during which students either accomplish tasks, do homework or read literature or other materials which allow them to consolidate their skills and acquire knowledge).

To translate these hours into materials, we have first distributed the total amount of 30 credits into the different units. This has not been an easy task. The easiest solution would have been to divide the total number of hours by five, but units cannot be attributed the same amount of training hours because they are different. Additionally, some skills are easier or quicker to acquire than others, though they have the same importance, didactically speaking. For example, it may take longer to acquire technique-specific skills, such as respeaking or velotyping, compared to other skills in general Learning Units (e.g., Unit 1. Understanding accessibility or Unit 2. Linguistic competences). This is the reason why we have designed the technique-specific training in a way that specific LOs are taught simultaneously to general ones. Moreover, the respeaking and velotyping units are further subdivided into three proficiency levels so as to guarantee a gradual training and not demotivate trainees.

These three levels, as shown in Table 1 below, are: Beginner, Intermediate, and Advanced. These three levels of expertise correspond to three different parts of the course:

- Beginner (B): Learning Outcomes to be taught at the beginning of the course;

- Intermediate (I): Learning Outcomes to be taught in the middle of the course;

- Advanced (A): Learning Outcomes to be taught at the end of the course.

The following table illustrates that developing technique-related skills requires more time than acquiring general skills. To provide trainees with the necessary time, technique-related elements (right column) run parallel to the general units (left column). The idea behind the distribution presented in the table is purely practical. At the beginning, trainees learn the basic general concepts of the profession (left column), while gradually developing technique-specific skills (right column).

General Units and their elements	Technique-specific elements and LOs
Understanding Accessibility - Concepts of accessibility, disability, multimodality and Universal Design - Knowledge of target groups and their needs and expectations - Knowledge of how accessibility is embedded in the working environment	**Psycho-cognitive skills** - How to listen and speak simultaneously (B) - Psycho-cognitive skills: How to listen and speak simultaneously (I) - Psycho-cognitive skills: How to listen and speak simultaneously (A)
Linguistic Competence - Functionality: Accuracy, readability, and legibility - How to cope with speech-related challenges - Strategies to acquire and develop specific thematic knowledge	**Metalinguistic skills:** - How to turn non-verbal elements into verbal input (B) - How to turn non-verbal elements into verbal input (I) - How to turn non-verbal elements into verbal input (A)

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General Units and their elements	Technique-specific elements and LOs
IT Competence • How to set up the working environment • Input tools • Output tools	**Dictation/typing skills:** • How to write fluently, rapidly, and accurately (B) • How to write fluently, rapidly, and accurately (I) • How to write fluently, rapidly, and accurately (A)
Entrepreneurial and service • Competence Management + Interpersonal skills • Personal + Stress management skills • Business strategies	**Editing skills:** • When and how to correct oneself and another respeaker/velotypist (B) • When and how to correct oneself and another respeaker/velotypist (I) • When and how to correct oneself and another respeaker/velotypist (A)
	Developing factors for high performance: • Flexibility, and self-motivation (B) • Discipline, flexibility, and self-motivation (I) • Enhanced concentration, discipline, flexibility, and self-motivation (A)

Table 1. Details of the LTA 30-ECTS course

The suggested hours per unit are:

- Understanding accessibility: 3 credits = 27 class hours

- Linguistic competence: 9 credits = 81 class hours

- IT competence: 3 credits = 27 class hours

- Entrepreneurship and service competence: 3 credits = 27 class hours

- Respeaking/Velotyping competence: 12 credits = 108 class hours.

Lastly, as explained in Section 2, we recommend conducting a pre-assessment before the course starts as well as peri-assessments after each general unit and each technique-specific element. Similarly, a post-assessment upon completion should take place.

The intellectual outputs of the LTA project are available at the project website at https://ltaproject.eu.

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