

I hear what you see: Effects of audio description used in a cinema on immersion and enjoyment in blind and visually impaired people

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Introduction

According to the United Nations Convention on the Rights of Persons with Disabilities (CRPD), people with disabilities have the right to participate in all aspects of society such as political, social and work life (UN-CRPD, Art. 30). Because access to information or cultural activities often requires a visual approach, an impaired vision or blindness makes it challenging to participate. Thus, assistive technologies are a crucial factor in participation

(Ellis & Kent, 2011, p. 2). Although there are different levels of sight loss, individual challenges of participation possibilities and diverse coping strategies, most people who are visually impaired or blind benefit from auditory information. Not surprisingly, a recent study on the use of braille and assistive technologies in Germany and Switzerland showed that most of the braille readers – regardless of age – use speech-output technologies such as screen-reading-software for reading (Lang, Hofer & Schweizer, 2016). Furthermore, aural media is crucial for access to information and participation in cultural activities such as going to the cinema.

Films, as a very popular media, play an important role in social participation and although they are mostly a visual medium, they are an aural medium too. Modern technologies provide a gate to access film for blind and visually impaired people. In the audio-visual media sector, access can be achieved with audio description (AD), currently “the only existing accessibility system for visually impaired people wanting to watch film and television” (Lopez, Kearney & Hofstädter, 2018, p. 2). It consists of a narrator talking through the presentation of the film, describing what is happening on the screen, mostly during natural pauses in the audio. This helps to understand and enjoy films even if one cannot see what is happening on the screen. A survey in the UK “indicated that 78% of

visually impaired participants use AD and that the greater the sight loss, the more they depend on access services” (Lopez, Kearney & Hofstädter, 2018, p. 15).

As DVDs or Blu-rays, TV-programmes can also be made accessible in the domestic environment, but this often means that the AD is audible to everyone. To avoid this, there are special apps for smartphones (such as Movie Reading, Actiview, Earcatch, Audible Magic, Youdescribe or Greta – the app used in this study; see the list at the end of the references section) or devices available at cinemas, which can be used with headphones.

Traditional AD is giving way to integrated AD in which media accessibility is no longer an add-on as in traditional AD but built in from the start in collaboration with the artistic team (Fryer, 2018). To implement the right to participation as stated in the CRPD and guarantee access to films for blind and visually impaired people, it is crucial that producers provide their material with AD. In many European countries, the law guarantees a minimum of programmes and productions with AD. In Switzerland, films that are funded by public sources (FiFV, Art. 65, §1) must be accessible for people with disabilities. Also, “television broadcasters with a national or regional-language program service must prepare an appropriate proportion of programmes in a form suitable for the hard of hearing and the

visually impaired” (RTVA, Art. 7). However, there is no specific percentage mentioned in the law. Furthermore, international events such as the Locarno film festival or Berlinale provide AD.

Theories of immersion

Accessibility is only one side of the coin. The aim must be that persons with sight loss experience a film similar in emotions and comprehension to sighted persons. Films that are still mostly a visual phenomenon offer the possibility to dive into worlds that are not one's own (the diegesis of the film). Films only become meaningful by taking shape within the person, through connecting with their own experiences, needs, thoughts, and fantasies. Theories that capture this and are very often used in film reception studies are those of immersion – including the theory of transportation (Green & Brock, 2000) and the theory of narrative engagement (Busselle & Bilandzic, 2009). Transportation is defined as "a distinct mental process, an integrative message of attention, imagery, and feelings" (Green & Brock, 2000, p. 701). Transportation is to be understood as a convergent process in which all mental systems and capacities of a person focus on the narration and the person is

afterwards in a changed state. The real world is forgotten, a new world has been entered. In this new world, strong emotions are felt, and motivations experienced, even knowing that this is not real. The feelings that are evoked by the narrative of the story are due to empathy for the characters and imagination of the plot. Busselle and Bilandzic (2009) criticise the Transportation Theory because its theoretical basis in the mental imagery for a film is difficult to interpret. The extent to which transportation succeeds depends on how easy it is for the recipient to construct and modify a mental model of events in the context of narrative processing, which is the focus of Busselle and Bilandzic's theory of narrative engagement. They identified four dimensions: *Narrative Understanding*, *Attentional Focus*, *Emotional Engagement* and *Narrative Presence* (Table 1).

Table 1. Description of the dimensions of the theory of narrative engagement (Busselle & Bilandzic, 2009, p. 341).

Narrative Understanding	"ease in comprehending a narrative, or from a mental model perspective, ease in constructing models of meaning"
Attentional Focus	"a truly engaged viewer should be unaware of focused attention, and should become aware only if attention drift or must be refocused"
Emotional Engagement	"feeling for and with characters" that is presented as an "arousal component of narrative engagement, but not as a specific emotion"
Narrative Presence	"sensation that one has left the actual world and entered the story"

Suckfüll and Scharkow (2009, p. 361) point out that the type of reception differs not only between various people – they define "involvement in fictional films [...]" as a

multidimensional construct of qualitatively different, interdependent modes of reception" – but also that a single person can change their mode of reception (Suckfüll, 2013, p. 316). They created a four-factor model, using the following latent factors: *Identity Work* with subfactors Ego-Involvement and Socio-Involvement; *In-Emotion* divided into Diegetic Involvement and Emotional Involvement, *Imagination* and *Production* (Table 2).

Table 2. Four-factor model of mode of reception (Suckfüll, 2013, p. 316).

1. Identity Work: contemplation of the self and important personal issues
(a) Socio-Involvement: comparison of the self with the characters in the film
(b) Ego-Involvement: comparison of one's own life with the content of the film
2. In-Emotion: specificity of the emotions that recipients experience in the fictional world
(a) Diegetic Involvement: the willingness to get into the film without forgetting the outside world
(b) Emotional Involvement: the never-ending control over the situation, so that one can indulge oneself in their own feelings
3. Imagination: ideas on how the film could be otherwise
4. Production: thoughts about the production process

Studies of immersion

Some studies have tested the theories of immersion in the cinema (Das, Nobbe & Oliver, 2017; Hall & Bracken, 2011; Sukalla, Bilandzic, Bolls & Busselle, 2016), but none of them have high ecological validity nor were they conducted under real-life circumstances. The

same is true for the few studies that have tested if people with sight loss using AD understand the content and enjoy the film as much as fully sighted people. Jekat, Prontera, and Bale (2015) conducted two studies: one study examined the effect of AD in describing the two main characters of the film *Happy Go Lucky* (Leigh, 2008). The second study examined the AD effect in creating a mental image of two different rooms in the film *The Reader* (Daldry, 2009). Visually impaired persons using AD showed similar results as sighted recipients in the semantic differential in the case of descriptive attributes but not in abstract attributes. Walczak (2017a) assessed usability, utility, and quality of AD during a film festival setting. The results indicated positive ratings on all assessed features. In a further study, Walczak (2017b) and Walczak and Fryer (2017) tested the effect of AD-type and vocal delivery on the immersion of film clips. In the first study, the creative type of films (using a more poetic or flamboyant language) compared to a standard type, yielded a higher presence. In the second study, AD read by a human compared to a synthesized voice prompted significantly higher immersion in the case of a fictional film but not in the case of a documentary. Fryer and Freeman (2013) showed the final seven-and-a-half minutes of *Brief Encounter* (Lean, 1945) to blind, partially sighted people and fully sighted volunteers in three conditions: with no AD, with standard AD and with 'cinematic' AD. Blind and partially sighted people preferred the cinematic AD, but there was no difference in

understanding and satisfaction. By showing six clips of films known to elicit fear and sadness to explore the extent to which verbal information conveying emotional cues affected blind and partially sighted people's experience of the film, the study of Fryer and Freeman (2014) found that sadness had a greater effect than fear. They also showed that the addition of verbal information did not lead to a reduction in the presence or in levels of elicited emotion, despite AD partially masking the soundtrack. Comparing text-to-speech delivery with delivery by a human voice, only human voice AD positively enhanced presence and elicitation of emotion. Because time constraints limit the quantity and type of information conveyed in AD for films, Romero-Fresco and Fryer (2013) tested an audio introduction incorporating information about the film's visual style, fuller descriptions of characters and settings, a brief synopsis, and cast and production details. Participants who are blind or have low vision felt this helped bring the films to life and made them easier to follow, facilitating the AD. Ramos (2015) presented 15 film scenes shown on a laptop and compared the emotional impact of these scenes in three different versions (normal films, films without images and films with AD) to 70 sighted and visually impaired people. Results showed statistically significant differences between the three versions for disgust and fear, but not for sadness. In another study Ramos (2016) compared a neutral version and an emotional version of AD in sighted and blind people: blind people show more

emotional impact with the emotional AD in sadness and fear, but not disgust. These studies all show the potential of AD, but each has its shortcomings: no control group, no real-life setting, only short clips, no measures of the film experience in total and in itself.

These studies all show the potential of AD but could be taken further by having a real-life setting, focusing on full films and measuring the film experience itself. This was accomplished in the here presented Project “Film reception of people with autism and sensory impairments: Total immersion through apps and autism-friendly cinema screenings”, called FASEA (Filmrezeption bei Personen mit Autismus und Sinnesbehinderungen: Eintauchen durch Apps und autismusfreundliches Kino).

We explored whether the same level of immersion and comparable emotions were present in visually impaired audiences using the AD app 'Greta' and sighted people when experiencing the same film in a cinema.

Methodology

Participants

The FASEA study was established to test the film reception of people with sensory impairments or autism as a case-control study. In total, 161 people participated - 112 had no disability, 12 were blind, 13 visually impaired, 17 had autism, and 7 people had other diverse disabilities. The volunteers were recruited through social media, email invitations to different universities and organisations of film lovers. Blind or visually impaired people were recruited through self-help organisations, personal acquaintances and presentations of the project in meetings of blind or visually impaired persons. All 25 participants with sight loss were interviewed by scientific assistants, who were instructed beforehand because it was not possible to provide an accessible questionnaire, that they could fill out independently right after the film. Table 3 shows the distribution of the age of onset of the disability for the visually impaired and blind participants.

Table 3. Age of onset and distribution of blindness and visual impairment ($n = 25$).

Time of onset	Blind	Visually impaired
Since birth	5	4
As a child	4	3
As an adult	3	6
Total	12	13

Stimulus

The research project was set in Zurich, Switzerland, in a commercial cinema between January and March 2018. The cinema was rented and reserved specifically for volunteers of the scientific project, to avoid disruptions. Every session included a mix of sighted people and people with vision loss in the cinema. The film was selected according to several criteria:

- no mentioning of disability: people with disability are more sensitive to this, according to the Differential Impact Hypothesis (Schweisberger, Billinson & Chok, 2019) or the Differential Susceptibility to Media Effects Model (Beyens, Valkenburg & Piotrowski, 2018).
- presenting a whole range of emotions: to test as many emotions as possible and to generalise more accurately.
- not a well-known, or even better, an unpublished film: this decreases the probability that the participants have seen the film before: Seeing a film before changes cognition and emotion to it (Ahn, Jin & Ritterfeld, 2012, also Loschky, Larson, Magliano & Smith, 2015; Schramm & Wirth, 2010);
- availability on the AD-app.
- a current film to replicate the actual cinema experience.

- neutral according to sex, religion, sexual orientation, politics: these factors can be unpleasant, no one should be embarrassed if one of these factors is overemphasized.
- not overlong, so that it fits into the schedule of the cinema.
- not a film in a foreign language, otherwise the audience with sight loss would have to understand the foreign language. This is less problematic with sighted people where there is no difference between those who see the dubbed and those who see the subtitled version of a film in immersion or comprehension (Kruger, Doherty & Soto-Sanfiel, 2017; Perego, Orrego-Carmona & Bottiroli, 2016; Wissmath, Weibel & Groner, 2009).

A lot of time and effort went into selecting the appropriate film, satisfying the criteria listed above. In the end, the German culture-clash comedy *Highway to Hellas* by Aron Lehmann (2015) was chosen. The whole 88-minutes film was shown. This happened during morning hours and without a break, but people had the opportunity to leave the cinema hall if needed. None of the participants indicated having seen the film before. After an introduction and the collection of sociodemographic variables, there was a check that the app was ready to use. The rest of the interview was conducted immediately after the end of the film when the memory was still fresh, and the distractions were minimal. Beginning with anchor points the range of possible answers for each scale was explained to blind and

visually impaired participants. For example, the participants were asked to rate themselves on a scale from one to five: 1 (not at all), 2 (a little), 3 (medium), 4 (strong), 5 (very strong). The sighted participants just filled out the questionnaire. Food and drinks were offered to everyone.

In the German-speaking area, the most popular app for AD is called ‘Greta’, available from the company Greta & Starks. It is completely free of charge. After the registration, one can download the AD for the film to be watched. The app will automatically synchronise the AD with the audio from the film and can be listened to on the smartphone via headphones. The participants with sight loss downloaded and used the application on their own, if needed help to install the app was provided. The AD was spoken by a human voice and not by text-to-speech (TTS) software. ‘Greta’ provides AD for the most popular films and a lot of Arthouse films.

Measures

We tested the theories of immersion and a scale for emotions. The test statistics for the whole original group and the match groups of sighted people and people with sight loss are shown for the used scales including the subscales in table 4.

Table 4. Test statistics of the used scales, for total sample ($n = 161$), matched groups with sight loss ($n = 25$), and sighted people ($n = 25$).

	Total sample			Sight loss		Sighted group	
	<i>M</i>	<i>SD</i>	Cronbach's alpha	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Narrative Engagement Scale							
Narrative Understanding	6.38	1.09	.772	5.44	1.51	6.60	0.99
Attentional Focus	6.04	1.29	.908	5.91	1.58	6.60	0.69
Narrative Presence	3.81	1.53	.656	3.65	1.65	4.01	1.68
Emotional Engagement	4.88	1.53	.762	4.65	1.78	5.04	1.42
Audience Response Scale							
Fun	5.94	1.29	.933	5.49	1.55	6.35	1.23
Thought-Provoking/Moving	5.04	1.46	.839	4.44	1.66	5.72	1.07
Lasting Impression	4.20	1.63	.916	4.12	1.70	4.65	1.53
Suspense	3.52	1.33	.742	2.94	1.39	4.04	1.26
Modes of Reception							
Socio-Involvement	2.57	1.00	.774	2.32	1.04	2.51	0.87
Ego-Involvement	2.81	1.03	.791	2.47	1.12	2.53	1.04
Diegetic Involvement	3.45	0.97	.763	3.36	1.21	3.57	0.91
Emotional Involvement	3.94	1.03	.697	3.40	1.09	3.46	0.81
Imagination	2.21	1.00	.807	2.10	1.14	2.04	0.88
Production	2.36	1.11	.802	2.06	1.12	2.07	0.86
Emotions in Media							
Positive Emotions	3.50	0.68	.866	3.29	0.86	3.86	0.55
Negative Emotions	1.47	0.53	.808	1.44	0.57	1.38	0.51

To measure transportation, the Narrative Engagement Scale (NES) (Busselle & Bilandzic, 2009) was used, using a seven-point Likert scale (from 1 “Don’t agree at all” to 7 “I agree

totally”), consisting of 12 items. To explain the differences between the reception processes of people watching the same film, the Modes of Reception Inventory (MOR) (Suckfüll & Scharkow, 2009) was applied with 18 items on a five-point Likert scale (from 1 “meets not at all” to 5 “meets completely”). The Audience Response Scale (ARS) was used to measure entertainment gratification (Oliver & Bartsch, 2010). It consists of 12 items on a seven-point Likert scale (from 1 “reject strongly” to 7 “approve strongly”).

Emotion in Media Scale: For measuring the experienced emotions while watching the film, the **Emotion in Media Scale** (EMS) was established, a modified adaptation of the Modified-Differential Affect Scale M-DAS (Renaud & Unz, 2006), an 18 items five-point Likert scale, from 1 “not at all” to 5 “very strong”. All items were factor analysed (principal component analysis, Varimax rotated) and a two-factor solution yielded the best result. All items had sufficient factor loadings, except sadness which was therefore dropped. The factor for positive emotions consists of 9 items and negative emotions of 8 items.

The participants were asked how well the AD-app functioned and how appealing the film was. The answers to both questions were rated on a ten-point Likert scale from very bad to very good.

Data Analysis

Due to the small number of blind and visually impaired people participating, they were matched with sighted people to exclude influences like age or sex, that could not be included as determining factors due to a high probability of very small numbers in combinations of factors. To each person with sight loss, a participant who is sighted was matched in age, education, nationality, and sex. The sighted person who was closest to a blind or visually impaired person in these criteria was chosen to include in the analysis. Table 5 shows the characteristics of the group of matched people.

Table 5. Characteristics of the sample, 25 people with vision loss and 25 sighted people.

	Vision loss	Sighted
Age (average) in years	54.08	51.92
Sex		
Female	16	16
Male	9	9
Education		
Compulsory school	6	1
Apprenticeship/professional training	14	15
Baccalaureate/university	5	9
Nationality		
Swiss	23	22
Not Swiss	22	23
Index film consumption (average)	8.4	6.92

None of the comparisons in Table 5 were statistically significant, so blind/visually impaired and sighted people in this study were comparable.

To avoid Type I errors, a MANOVA was performed with SPSS 25, instead of several ANOVAS for each of the 16 scales. In the analyses 47 people were included, 3 people were excluded because of missing data.

To analyse subgroups of the audience with sight loss, Shapiro-Wilk and Kolmogorov-Smirnov tests were used to determine if the scales are normally distributed. Only the scales that were normally distributed were used to conduct t-tests for independent samples in the analysis.

Results

The results of the MANOVA (Table 6) show a Pillai-Spur of $F=2.646$ and a significance of $p=.010$, which indicated a moderately significant group effect: participants with sight loss and sighted people show differences in the immersion and emotions in the experience of watching a film.

Concerning the Narrative Engagement Scale, only Narrative Understanding (blind: $M=5.44$, $SD=1.51$ vs. $M=6.60$, $SD=0.99$) was significant. People with sight loss had a significantly lower score than sighted people; no differences were found in Attentional Focus, Narrative Presence and Emotional Engagement. A very similar result was attained with the Audience Response Scale: In Suspense ($M=2.94$, $SD=1.39$ vs. $M=4.04$, $SD=1.26$) and Thought-Provoking ($M=4.44$, $SD=1.66$ vs. $M=5.72$, $SD=1.07$) there were significant differences between people with sight loss and sighted people, with higher scores for the sighted group. There were no differences in Lasting Impression and Fun. There were no

significant differences between people with sight loss and sighted people in any of the subscales of Modes of Reception.

Table 6. MANOVA results: Comparison of immersion and emotion scales in blind/visually impaired and sighted people.

Subscale	F	Significance	η_p^2
Emotions in Media (EMS)			
Positive Emotions	5.868	0.020	0.115
Negative Emotions	0.217	0.643	0.005
Narrative Engagement Scale (NES)			
Narrative Understanding	7.902	0.007	0.149
Attentional Focus	4.003	0.051	0.082
Narrative Presence	0.530	0.470	0.012
Emotional Engagement	0.562	0.457	0.012
Audience Response Scale (ARS)			
Fun	3.152	0.083	0.065
Thought-Provoking/Moving	7.257	0.010	0.139
Lasting impression	0.675	0.416	0.015
Suspense	6.397	0.015	0.124
Modes of Reception (MOR)			
Socio-Involvement	1.097	0.301	0.024
Ego-Involvement	0.118	0.733	0.003
Diegetic Involvement	0.274	0.603	0.006
Emotional Involvement	0.034	0.854	0.001
Imagination	0.011	0.918	0.000
Production	0.035	0.851	0.001

MANOVA: multivariate analysis of variance.

Participants with sight loss experienced fewer positive emotions than people without disability, there are no differences in the experience of negative emotions. The differences in positive emotions were due to four emotions, people with sight loss experienced less joy ($M=3.33$ vs. $M=3.96$; $F=5.61$; $p=.022$), less interest ($M=3.33$ vs. $M=3.92$; $F=5.63$; $p=.022$),

less affection ($M=2.83$ vs. $M=3.67$; $F=9.91$; $p=.003$) and less happiness ($M=2.88$ vs. $M=3.56$; $F=5.32$; $p=.026$). There was also a statistically significant difference in boredom ($M=1.88$ vs. $M=1.28$; $F=4.46$; $p=.040$), which people with sight loss experienced more.

Concerning subgroups of people with sight loss, the normally distributed scales (NES: Narrative Presence, Emotional Engagement; ARS: Thought Provoking/Moving, Lasting Impression, Suspense; MOR: Ego-Involvement, Diegetic Involvement, Emotional Involvement, Imagination; EMS: Positive Emotions) were compared. Between blind and visually impaired people the only difference found is Ego involvement, where blind people had a higher score ($M=3.00$ vs. $M=1.94$; $T=2.94$; $df=22$; $p=.017$) than visually impaired people. There were no differences found in all the scales between congenitally blind people and people with acquired blindness (results not shown).

There is neither a difference between blind and visually impaired people in the rating of the functionality of 'Greta', the AD-app (Kolmogorov-Smirnov $Z=.816$; $p=.518$) nor in the attractiveness of the film (Kolmogorov-Smirnov $Z=.448$; $p=.988$). The same was true for the congenital and acquired blindness, there were no differences in functionality of the app (Kolmogorov-Smirnov $Z=.527$; $p=.944$) or attractiveness of the film (Kolmogorov-Smirnov

$Z=.633$; $p=.817$). Narrative Understanding was the only scale that correlates significantly and positively with the functionality of the app ($r=.464$; $p=.022$).

Discussion

For blind and visually impaired people, to enjoy and understand a film at the cinema as much as if they were sighted, an app providing AD is necessary. ‘Greta’ is such an app and in this study, we tested whether the audience with sight loss enjoyed a film and was immersed in it as much as sighted people. The focus of the study was not on the functionality of the app ‘Greta’ itself or the AD on the app, but on the combination of the two and if this can achieve an entirely satisfying cinema experience for individuals with sight loss. This relates directly to the experience of the film. The primary goal was to measure the experience of a film. Therefore, we applied theories of immersion and enjoyment. To deliver the full experience of a film it is not sufficient that an app with AD is technically well-functioning, it also has to guarantee immersion and enjoyment. This was proven in this study, the AD provided on the app is mostly capable of delivering enjoyment and immersion: in most scales of transportation and immersion, there were no differences

between people with sight loss using the app with AD and sighted people in watching a film in a cinema. Modern technologies make it possible that they can enjoy the film and be nearly as immersed as a sighted audience.

Because we conducted our study in a cinema, the inclusive effect of the cinema became visible too. Not only is the cinema the best place to see a film (size of the screen, superior technique), but it is also a place to meet other people. It was an additional aim of the study that people with sight loss and sighted people should meet. Necessary to accomplish this is that the AD mustn't be heard by the sighted people. This is made possible only using an app on the smartphone and (in-ear) headphones (compared to the home cinema where headphones are not necessary). To state that watching a film in a cinema with an app and headphones is not complicated should encourage blind and visually impaired people to go to the cinema and be among sighted people. This could lead to a better mutual understanding.

There was a significantly lower score in Narrative Engagement for people with sight loss. They need a higher grade of concentration due to both channels of communication, the dialogue in the film and the AD. However, the Narrative Engagement Scale is a global

measure. If we asked specific questions about the comprehension of the film (such as: what is the main topic?), there are no differences. Correlations of the self-assessed functionality of the app with all scales were all not significant, except for Narrative Understanding. Those who rated the functionality of the app as insufficient also showed a lower narrative understanding.

It is astonishing that the people with sight loss show no differences (even with scarce non-significance at a lower value) on attentional focus. Some studies show that they have better attention (Hugdahl et al., 2004; Zia et al., 2015). Interestingly sighted people had a ceiling effect in the Narrative Understanding and Attentional Focus scales, nearly everyone understood the film and was attentive to it. This was not the case with the participants with sight loss. The questions about Narrative Understanding were the first questions after the end of the film and because of this, participants with sight loss might not have been as prepared to be interviewed as sighted people. People with sight loss had to orient themselves a lot getting out of the seat and going to the lounge where the interviews were conducted. Additionally, they were not left to their own thoughts like sighted people but were confronted with the interviewers directly after leaving the screening hall.

It seems that it is harder for blind or visually impaired people to experience positive emotions through AD, such as joy. More research is needed to investigate why this is the case. There is some indication from the interviews that we have conducted. Five of the interviewed and other people with sight loss spontaneously gave their opinion about the app: it was often said that the voice of the AD was not very emotional, the voice of the AD sounded similar for the different characters of the story and was too monotonous. Often the asynchronicity of the AD was criticised. Technical problems with the app were reported. The description of sound and visual gags was mentioned as problematic too (see for this Fryer & Freeman, 2014). It seems that the AD on the App was not optimal in this respect, a hypothesis that is also supported by the gained data. According to Fryer (2010), AD is always received aurally, together with the existing dialogue and soundscape. AD therefore translates a film into a form of audio drama.

An effect of emotional contagion (Provine, 1992; Weber & Quiring, 2019) is worth considering because 23 out of 25 participants with sight loss were in the cinema together with an audience of not less than 25 sighted people. Because blind and visually impaired people must focus more and be more attentive when watching a film, that would divert the cognitive capacity to enjoy the film. Contrary to this, there are no differences in the

Emotional Engagement or the Fun scales as a global measure. Furthermore, the interview situation for people with sight loss should generate higher scores of positive emotions because people like to report more positive than negative emotions to an unknown person (Positivity effect: Reed & Carstensen, 2012). Moreover, some studies show that people with disabilities have a higher social desirability bias (Deshields, Tait, Gfeller & Chibnall, 1995; Langdon, Clare & Murphy, 2010). Interestingly, blind and visually impaired participants show lower scores on Suspense and Thought-provoking on the Audience Response Scale. To experience both emotions, one needs a certain degree of tension and concentration.

Blind and visually impaired people might have difficulties recognising emotional expressions based on hearing tones of voice, especially when the tones are presented without context and they might also have difficulties posing emotional expressions and controlling their intensity (Valente, Theurel & Gentaz, 2018). This was not the case in our study, as most people with sight loss enjoyed the film and did express this afterwards. Koster-Hale, Bedny and Saxe (2014) showed, that for congenitally blind adults representations emerge even in the absence of relevant first-person visual perceptual experiences. Nevertheless, Buimer et al. (2018) tested a wearable sensory substitution

device for people with sight loss to better recognise emotions in other people. They showed that vibrotactile cues are well suited to convey facial expressions to visually impaired persons in real-time, and the highest degree of accuracy was reached with videos with auditory stimuli, compared to silent videos and pictures.

In our study, it is remarkable that people with sight loss show lower scores in happiness and joy but not in fun. Former studies have shown that people with sight loss experience less happiness than sighted people (Pinquart & Pfeiffer, 2011; Raimule & Bhawalkar, 2015). The reason for this may reflect difficulties at the labour market or with mastering age-specific developmental tasks, feeling and being discriminated, or having more difficulties in mastering their lives.

It is possible that the choice of the genre, a comedy, or the setting, in a cinema, had an impact on the results. Weinman *et al.* (2016) found evidence for configured, metric, and scalar invariance for the Audience Response Scale in different media formats. With a different questionnaire but the same dimensions, Odag, Hofer, Schneider, and Knop (2016) found cultural differences. However, mean scores of our study were comparable with Eden, Johnson, and Hartmann (2018).

Also, the different survey methods may have an influence. In our study, people with sight loss were interviewed and sighted people were asked to fill out a questionnaire. Harris and Brown (2010) found little consistency between those two methods but most studies they cite compare methods in which interview and questionnaire were carried out far apart in time or much more elaborately. Therefore, their results are not applicable because in our study the same content was asked with the two survey methods at the same time. We tested other techniques such as questionnaires in Braille or an online questionnaire, but they were not applicable.

Some studies report an influence of genre or different kind of films on emotions (Carvalho, Leite, Galdo-Álvarez, S. & Gonçalves, 2012; Codispoti, Surcinelli & Baldaro, 2008; Gross & Levenson, 1995; Johnson & Rosenbaum, 2018; Wei, Dimitrova & Chang, 2004). When the horror film *The Omen* (Donner, 1976) or the film about 9/11 *United 93* (Greengrass, 2006) were shown in the study of Bartsch, Appel and Storch (2010), there was no influence of the genre on the intensity and valence of emotions and ambivalent emotions. But *United 93* evoked higher levels of negative emotions than *The Omen*. Visch, Tan and Molenaar

(2010) do not find an influence of genre (non-fiction, drama, action, and comedy) on both types of emotional response (Fictional World emotions, Artefact emotions), but the degree of immersion was important.

Limitations

The small sample size of the study might be criticised. Only 25 people with sight loss participated in this study. For them, it was a big effort to come to the cinema in wintertime and to an unknown location in a big city. To make it as uncomplicated as possible, we offered a pick-up service from the central station.

To test a differentiating effect of the AD from the app was not the aim of the study, rather it was the effect on immersion and enjoyment of AD and the app combined. Nevertheless, both can have an influence that we did not test systematically. Altogether it was the first rigorous test of the app ‘Greta’ under real conditions in a cinema and it was difficult to foresee these complications.

The blind and visually impaired people we worked with may not be representative for all people with sight loss but a positive selection for participation (they were representative regarding age), Roughly two-thirds of the people with sight loss in our study were recruited through one of the 5 biggest self-help organisations of blind people in Switzerland, but their members represent only about 2% of the population with sight loss. Those who are a member of an organisation for the blind might be more out-going, interested, self-assertive and sociable. Only a small portion of them has been at a cinema before and most of them never heard of the availability of 'Greta' before. Nevertheless, these criteria are no confounders of our results.

Conclusion

This study conducted in a cinema showed that an app providing AD enables blind and visually impaired people to enjoy a film and be immersed just like sighted people. Nonetheless, there were differences in Narrative Engagement and positive emotions. The functionality of the app or the quality of the AD itself could perhaps explain this.

Nevertheless, we proved that enjoyment and immersion in the cinema are possible for people with sight loss, which is a promising achievement. It was carried out under real-life and most naturalistic circumstances in a cinema. As such, this study has high ecological validity and is meant to encourage blind and visually impaired people to go to the cinema (that does not exclude seeing films at home). This is recommendable because in a cinema the people with sight loss are visible and it is possible there to meet other people. It is also a call for film financiers, film producers and film distributors to provide AD as a must for all produced and broadcasted films. In addition to that it is necessary to achieve high quality standards for AD.

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Mentioned apps for audio description

<http://www.gretaundstarks.de/greta/GretaAndStarks>

<https://www.moviereading.com/>

<https://actiview.co/en/>

<https://youdescribe.org>

<https://www.audiblemagic.com>

<http://www.earcatch.eu/>

films mentioned:

Brief Encounter (David Lean, 1945)

Happy-go-lucky (Mike Leigh, 2008)

Highway to Hellas (Aron Lehmann, 2015)

The Omen (Richard Donner, 1976)

The Reader (Stephen Daldry, 2009)

United 93 (Paul Greengrass, 2006)