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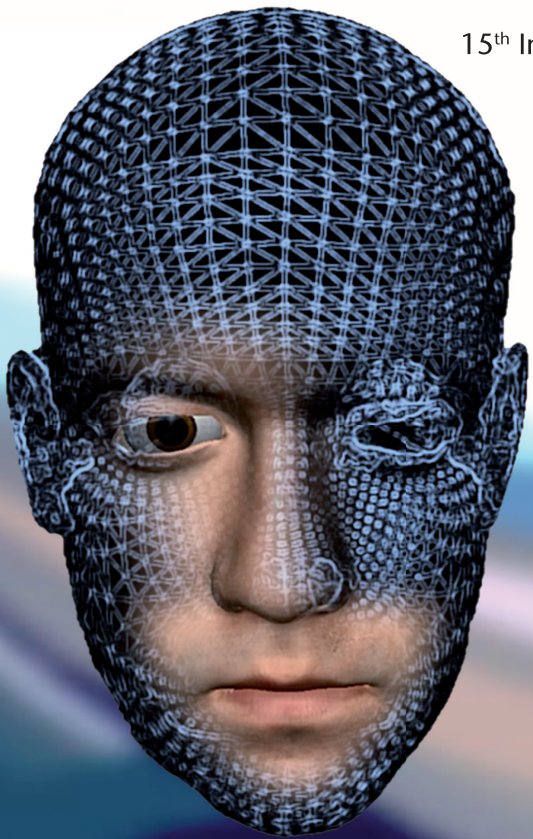

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Can you feel what I'm saying? The impact of verbal information on emotion elicitation and presence in people with a visual impairment

Louise Fryer[1] & Jonathan Freeman[1,2]

Abstract. For people with a visual impairment access to audiovisual media can be enhanced by Audio Description (AD). AD gives visual information in verbal form. Previous research we have conducted has demonstrated that for AD users, words can be as effective as non-verbal sounds (sound effects) in eliciting presence. However, it has been argued that, to experience emotion and empathy, contextual cues from the soundtrack may suffice. This study explored the extent to which verbal information conveying emotional cues affected blind and partially sighted people's experience of film, using clips known to elicit fear and sadness in sighted viewers. We tested the impact of AD on dimensions of social presence (affect and empathy) as well as spatial presence, ecological validity and engagement. Results differed between emotion category (sadness/fear) but showed the addition of verbal information did not lead to a reduction in 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 emotion elicitation. This suggests prosody is an critical element of AD content. Another implication is that, for blind and partially sighted people, sound effects and emotive music may be redundant where sufficient information can be accessed from film dialogue. With regard to guiding AD practice, the findings suggest providing suitably emotive AD is a more important consideration than avoiding masking the non-verbal element of film soundtracks.

Keywords. Presence; Emotion; Audio Description; Blindness; Film

Introduction

If presence is the "response to a mental model of an environment that takes shape in the mind of the individual based upon a combination of cues that originate both externally and internally" (Jones, 2007, p. 64) how is it affected by a major sensory deficit? People with a visual impairment increasingly gain access to low-immersive, mediated environments such as cinema and television (TV) by means of audio description (AD). Woven between existing dialogue and critical sound effects, AD provides a verbal picture for those unable to perceive visual images (Whitehead, 2005). Despite extensive presence research in sighted audiences, few studies have explored presence in people who are blind or partially sighted. This study explores the links between presence and emotion elicitation in this neglected subsection of the audience.

Kreifelts, Wildgruber and Ethofer claim that "when judging their social counterpart's emotional state, humans predominantly rely on non-verbal

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signals" (2012, p. 225). These are mostly visual (e.g. facial expressions, gestures and posture) but also include non-verbal vocalisations and prosody i.e. the rhythm, emphasis and intonation of speech. In an fMRI study Kreifelts and colleagues (2007) showed that, for sighted people, a combination of auditory and visual information led to higher success in classifying emotions than the auditory or visual component alone. This suggests that, for people who are blind or partially sighted (B&PS) lack of access to the visual element of bimodal cues may result in less effective emotional processing. A verbal commentary, the AD, may offer compensation.

In a study of mental imagery, Eardley and Pring (2006) showed that emotion was an important encoding factor that may explain why blind people retrieved as many autobiographic memories as sighted people when prompted by words high in visual imagery. "Sunset", for example, was linked by one blind participant not to a visual image of pink-streaked clouds but to an occasion shared with her husband on a boat at twilight, bringing to mind the excitement audible in his voice, as well as other, non-visual, perceptual experiences such as the sound of the rippling water and the feel of the air on her skin. Recall of embodied perceptual experience makes it easier to create a first-person perspective and thus a primary egocentric reference frame (PERF) that has been directly linked with presence (e.g. Vogeley & Fink, 2003; Wirth et al., 2007). More emotive content may therefore increase ratings of presence in B&PS people. A positive correlation between emotive content and presence has certainly been demonstrated in sighted people (Baños et al., 2004; Freeman et al., 2005). Dillon (2006), for example, showed that video clips from emotionally arousing films generated higher levels of presence than neutral footage.

A previous study exploring presence and audio drama (Fryer, Pring & Freeman, 2013) showed that for B&PS people, words can be as effective as non-verbal sound for creating Spatial Presence and Ecological Validity, but does that extend to experiencing emotional content as real? Lopez & Pauletto (2006) argue that the interaction between the visuals and soundtrack leaves the B&PS audience (and the audio describer) in an impossible bind. While the AD may compensate for information carried by the visual stream, it simultaneously reduces access to the auditory stream by masking the non-verbal auditory cues (such as music and sound effects) that also contribute to emotional and contextual understanding.

Sander et al. (2005) point out that while a large amount of research has focused on processing visual emotion cues, particularly faces, relatively little study has been made of emotional signals in the voice. Emotional information is carried not just in the words of the dialogue but in the prosody of the actors' delivery, including pitch, pace, emphasis and inflection. Similarly AD is received not as a written text, but as a spoken one. It therefore also consists of more than just semantic information. To what extent might AD users infer emotional meaning from the content of the description, and to what extent from the affective prosody of the describer's voice? The current study presented a selection of movie clips assembled by Gross and Levenson (1995) known to elicit specific target emotions in sighted people. The same AD script was trialled in two conditions: human voice (HV) and text-to-speech (TTS). If AD obscures emotional cues from the soundtrack then the target emotions should be elicited more strongly with no AD. This is in line with the sensory compensation model (e.g. Röder & Rösler, 2004) whereby blind people are thought to have enhanced ability in non-visual modalities. Alternatively, affective visual information (e.g. facial expression) replicated in words may enhance the emotional impact. The paralinguistic emotional information contained in delivery by the human voice may strengthen this further. In line with Dillon's study, positive presence ratings should increase in line with strength of emotional response. We tested the following hypothesis: For levels of presence (positive subscales) and the target emotion: No AD $<$ TTS AD $<$ HV AD.

Methods

Participants

Participants were recruited through the Royal National Institute of Blind People's social media channels and personal contacts. This resulted in the following sample: N = 19 (Male = 10), aged 24 – 77 years (m = 48.53 years, SD = 13.64). Participants demonstrated a range of sight characteristics: Congenitaly Blind (CB)/Early Blind (EB) = 4; Late Blind (LB) = 11 (4 = no vision; 7 = light perception); Partially Sighted (PS) = 4. Participants received £10 for taking part.

Materials

The film clips are listed in Table 1. Five were selected from two emotion categories (Fear and Sadness) taken from Dillon's (2006) revised corpus based on Gross & Levenson's original selection. Another Fear clip was added (The Ring) to give three in each category. The first author, a professional audio describer, wrote and voiced the AD script for each clip. The same scripts were also "voiced" using the Text-to-Speech feature in the Mac Operating System 0SX 10.8 (Mountain Lion). The English voice "Emily" was chosen to match that of the researcher as closely as possible in accent and timbre. With the non-described versions of each clip, this resulted in a total of 18 stimuli: i.e. 3 clips x 3 styles (No AD/ HV AD/ TTS AD) x 2 categories (Fear/Sadness).

Table 1. Stimuli for Emotion Study

Fear	**Scene**	**Duration**	**Details**
Silence of the Lambs	Basement chase	3m 28s	1991, Director: Jonathan Demmer BFI classification: 18
The Ring	Opening scene	5m 31s	2002, Director: Gore Verbinski BFI classification: 15
The Shining	Boy playing in hallway	2m 11s	1980, Director: Stanley Kubrick BFI classification: 15
Sadness			
Bambi	Death of Bambi's mother	3m 7s	1942, Disney animation BFI classification: U
Truly, Madly, Deeply	Woman in Counselling	3m 14s	1991, Director: Anthony Minghella BFI classification: PG
Four Weddings and a Funeral	Funeral Speech	5m 29s	1994, Director: Mike Newell BFI classification: 15

Design

Each participant watched one clip from each film (6 clips in total). The order and condition of presentation was randomized such that one clip from each emotion category was presented with no AD; one with HV AD and one with TTS AD. Measures were taken at the start of the session (Elicited Emotion Scale only) and 30s after the end of each clip (all).

Elicited Emotion Scale

Emotional experience was judged using Gross and Levenson's Elicited Emotion Scale (EES, 1995). Participants rate, on a 0 – 8 scale, the greatest amount of an emotion experienced at any time during the clip (0 = "not feeling even the slightest bit of the emotion"; 8 = "the most you have ever felt in your life"). Of the original 16 items, 6 relevant to this study were used: Arousal; Interest;

Fear; Sadness; Tension; Confusion. Participants were asked whether they had previously watched[1] the film. If yes, was it with or without AD?

ITC-SOPI short form

To avoid fatigue, the ITC-Sopi (Lessiter et al., 2001) was presented in the short form used by various other studies (e.g. Dillon, 2006; Hammick & Lee, 2013). This takes three items from each of the positive presence subscales: Sense of Physical Space ("I felt I was visiting the places in the scenes"; "During the clip I had a sense of being in the scenes"; "I felt surrounded by the scenes"); Engagement ("I felt myself being drawn in"; "I lost track of time"; I paid more attention to the scenes than to my own thoughts") and Ecological Validity ("the scenes seemed natural"; "The content seemed believable to me"; "I felt the environments in the clip were part of the real world"). A single, composite question addresses Negative Effects: "I experienced sensations such as dizziness, disorientation, nausea, a headache, eye-strain or tiredness". The ITC-SOPI uses a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

Identification and Empathy

As identification and empathy with characters can determine emotional response to narrative film (Plantinga & Smith, 1999) two questions from Dillon's study (2006) addressed this: "How much did you identify with the concerns of one or more of the characters; that is to what extent did the clip address issues relevant to you?" and "How much did you empathise with the characters; that is feel the same emotions they were experiencing?" Responses were given using a 7-point Likert scale (1= not at all; 7 = very strongly). In order to separate emotional engagement from recognition of an emotion, participants were asked: "What emotion do you think the clip was trying to make you feel?"

Results

Comments on the analysis

As the two emotion categories were expected to yield different results (e.g. ratings of Fear were likely to be higher than ratings of Sadness for the Fear clips, and vice versa), each category was analysed separately. Scores within each category (Fear/Sadness) were combined and means calculated for each condition (No AD/TTS AD/HV AD). Results are shown in Table 2. Large individual variation was indicated by high SDs. Consequently, a within-subjects design was chosen using Bonferroni corrections for multiple comparisons. Scores on the EES were calculated as an increase/decrease from baseline. As all participants (19/19) showed a high degree of interest (rated 4 or above) and most showed a high degree of Arousal (14/19) and Tension (13/19) before beginning the task, scores for these emotions are correspondingly low. One session was disrupted while the participant was viewing his final Fear clip. His data has been excluded in comparisons of Fear clips, but retained for the Sadness clips that had all been viewed before the incident.

Fear clips

The Fear clips were designed to elicit Fear more strongly than other emotions. However, in the No AD condition, paired samples t-tests showed that Fear was elicited significantly more strongly only than Interest: $t(18) = 3.05$, $p = .007$. This was the same in the TTS AD condition: Interest: $t(18) = 2.86$, $p = .011$. By contrast, with HV AD, Fear was elicited significantly more strongly than 4 other emotions: Arousal: $t(18) = 2.09$, $p = .05$; Sadness: $t(18) = 3.58$, $p = .002$;

[1] Blind and partially sighted people use the term "watch" in this context. That usage has been respected in this paper.

Table 2. Means (SD) for EES (difference from baseline); Empathy and Identification, and Presence

	No AD		TTS AD		HV AD	
	Fear clips	Sadness clips	Fear clips	Sadness clips	Fear clips	Sadness clips
Arousal	0.33 (3.61)	1.05 (2.97)	0.94 (1.86)	1.21 (3.02)	1.94 (1.76)	1.15 (4.23)
Interest	-1.22 (3.64)	0.21 (3.07)	-0.61 (2.17)	0.05 (2.61)	-0.33 (2.95)	0.00 (2.87)
Confusion	3.17 (2.64)	1.42 (2.22)	1.22 (3.26)	0.32 (3.27)	1.11 (3.22)	-0.63 (2.69)
Fear	1.67 (3.66)	-0.42 (2.36)	2.00 (3.40)	0.16 (2.63)	3.44 (2.45)	0.42 (3.47)
Tension	1.89 (3.07)	1.37 (2.73)	2.22 (2.78)	0.79 (2.97)	2.28 (2.63)	0.89 (3.14)
Sadness	-0.17 (3.40)	4.42 (3.53)	-0.11 (2.87)	3.58 (3.44)	0.11 (3.03)	4.31 (3.67)
Empathy	2.39 (1.54)	5.74 (1.76)	2.77 (1.26)	5.79 (1.58)	3.22 (1.48)	5.84 (1.74)
Identification	2.11 (1.41)	5.47 (1.87)	2.00 (1.19)	5.37 (1.54)	2.39 (1.54)	5.53 (1.92)
Spatial Presence	3.04 (1.18)	2.84 (1.36)	2.59 (1.29)	3.32 (1.68)	3.04 (1.18)	3.00 (1.67)
Engagement	3.00 (1.21)	3.88 (1.18)	3.00 (1.21)	3.93 (1.44)	3.87 (0.81)	3.94 (1.41)
Ecological Validity	2.39 (1.27)	3.77 (1.13)	2.87 (1.54)	3.75 (1.26)	3.26 (1.03)	3.75 (1.46)
Negative Effects	1.78 (1.17)	1.21 (.713)	1.61 (1.20)	1.26 (0.65)	1.17 (0.38)	1.10 (0.46)

Interest: t (18) = 3.78, p = .001 and Confusion: t (18) = 2.50, p = .022. Only the difference between Fear and Tension was not significant: t (18) = 1.40, p = .178.

A within-participants repeated measures ANOVA showed a main effect of condition on three emotions: Fear: F (2, 34) = 4.21, p = .024; Arousal: F (1.34, 22.8) = 3.61, p = .038; and Confusion: F (2, 34) = 5.16, p = .014. Mauchly's Test indicated that the assumption of sphericity had been violated for Arousal ($\chi 2$ (2) = 10.802, p < .001) so a Greenhouse-Geisser correction was used. Planned paired comparisons showed that HV AD (but not TTS AD) elicited significantly higher ratings of Fear than No AD: mean difference (m.d.) 1.78 p = .016. HV AD (but not TTS AD) was also significantly more arousing: m.d. 1.61 p = .039. Both TTS AD and HV AD were significantly less confusing than No AD: TTS AD/No AD m.d. = -1.94, p = .027; HV AD/No AD m.d. = -2.06, p = .003. A MANOVA for EES ratings showed that, in all conditions, which clip was viewed and whether participants had seen the clip before (either with or without AD) had no significant effect.

A one-way repeated measures ANOVA showed a main effect of condition on all dimensions of presence: Spatial Presence: F (2, 34) = 3.48, p = .042; Engagement: F (2, 34) = 6.60, p = .004; Ecological Validity: F (2, 34) = 4.42, p = .019; Negative Effects: F (2, 34) = 3.44, p = .044. Adjusting for multiple comparisons, the effect on Spatial presence was no longer significant (p = .079). However, HV AD was more significantly more engaging than either No AD or TTS AD (m.d.

= .87, p = .02). For Ecological Validity, HV AD (but not TTS AD) was significantly more "natural" than watching with No AD (m.d. = .87, p = .002) and participants reported significantly fewer Negative Effects with HV AD (m.d. = -.611, p = .035).

Condition did not affect how strongly participants identified or empathised with the characters. Although ratings of empathy were higher with HV AD, the difference was not significant. In answer to the question "What emotion do you think the clip was trying to make you feel?" participants scored 2 points for an accurate answer (i.e. "Fear"/"Scary"); 1 point for a related emotion (e.g. "Tension"); 0 points if they were unable to name an emotion or named an unexpected one (e.g. "Sadness"). A within-subjects repeated measures ANOVA showed no difference in score across conditions: $F(2, 34) = 1.71$, $p = .196$.

Sadness clips

There was a very different pattern for the Sadness clips. Paired samples t-tests showed that the target emotion (Sadness) was elicited significantly more strongly than any other emotion in all three conditions. A one-way, within participants repeated measures ANOVA showed a main effect only on Confusion: $F(1,17) = 5.23$, $p = .01$. Planned paired comparisons showed that HV AD (but not TTS AD) was significantly less confusing than No AD: m.d. = -2.05, p = .008. The Sadness clips also showed no main effect of condition on levels of empathy or identification with the characters. A one-way repeated measures ANOVA also showed no main effect of condition on any dimension of Presence.

Fear and Sadness clips compared

In the No AD condition, paired samples t-tests showed ratings for the Sadness clips were significantly higher than the Fear clips for four variables: Interest: $t(19) = -2.43$, $p = .03$; Sadness: $t(19) = -5.89$, $p < .001$; Empathy: $t(19) = -4.52$, $p < .001$ and Identification: $t(19) = -6.25$, $p < .001$. That pattern was reversed for Fear: $t(19) = 2.94$, $p = .01$ and Confusion: $t(19) = 2.77$, $p = .01$. There was no difference between the two categories (Fear/Sadness) for Arousal or Tension. This was replicated whether comparing raw scores or the increase from baseline. There was also no difference between categories for Spatial Presence. However, Engagement ($t(19) = -2.49$, $p < .02$) and Ecological Validity ($t(19) = -3.91$, $p = .001$) were significantly higher for the Sadness clips. Negative Effects were significantly lower: $t(19) = 2.38$, $p = .03$.

Discussion

This is the first study, as far as the authors are aware, to explore links between emotion and presence in participants with a major sensory disability. It measured the impact of an additional verbal commentary (AD) on emotion elicitation, empathy and presence in people with a visual impairment. As well as comparing the experience of "watching" emotive movie clips with and without AD, a further comparison was made between AD delivered by a human voice (HV), and the same script delivered by an electronic voice (TTS) devoid of affective paralinguistic content. Results revealed major differences in response between the two emotion categories, Fear and Sadness.

The first question was whether clips known to elicit particular emotions in sighted people would elicit those same emotions in people with a visual impairment. With No AD, Fear clips failed to elicit the expected response i.e. the target emotion (Fear) was experienced no more strongly than four of the five other emotions. The exception was Interest. Arguably, without access to visual information, Interest was particularly low. This might also account for lack of Fear. Yet the same result was found for TTS AD which replaced missing visual with verbal information.

This suggests prosody is critical in conveying emotion, as with HV AD, clips elicited Fear significantly more strongly than any other emotion except Tension. As a strong correlation has previously been found between these two emotions (Dillon, 2006), and Tension is a key constituent of horror films, this result was not surprising. Comparing between conditions, the level of Fear elicited by HV AD was significantly greater than watching without AD and participants found the clips significantly more arousing. By contrast, Sadness clips successfully elicited their target emotion (Sadness) which was experienced to the same extent whether watched with No AD, TTS or HV AD. For Sadness clips then, there was no support for the hypothesis No AD < TTS AD < HV AD. For the Fear clips, results suggest it should be modified: No AD = TTS AD < HV AD.

What might explain the difference between the two emotion categories? In the No AD condition, participants found Sadness clips less confusing and more emotive than Fear clips (with the exception of Fear itself). They also felt greater empathy with characters in the Sadness clips and identified with them more strongly. Content is known to be an important determinant of presence (IJsselstein et al., 2000). For those with a visual impairment, content can be thought of not only in terms of subject matter but also the relative balance between auditory and visual information. The Fear clips were particularly difficult to follow with sound alone. The Shining, for example, is underscored throughout by non-diegetic music and has only a couple of short interjections of dialogue. By contrast, the Sadness clips were largely self-explanatory, although there were still elements that caused confusion. Interestingly, although HV AD significantly increased understanding of Sadness clips, it gave no additional benefits of emotion elicitation.

Both HV AD and TTS AD made the Fear clips significantly less confusing but only HV AD significantly heightened the sense of fear. Emotion was effectively conveyed via the paralinguistic content of the describer's voice rather than the semantic content of the AD script. In no condition for either emotion category was there a correlation between Confusion (or lack of it) and the target emotion. Evidently, then, understanding every detail of what is going on is not essential to experience the emotional content. It is particularly interesting to note that the (verbal) addition of visual information, such as Bambi's eyes filling with tears when the Stag tells the little fawn that his mother is never coming back, made no significant impact even on LB/PS participants who might be expected to gain most from bimodal reinforcement. This corresponds to a study by Putzar et al. (2007) that showed no redundancy gains when adding a congruent visual stimulus to an auditory one for individuals who had been born with congenital cataracts and had had their sight restored.

If comprehension does not explain the difference between emotion categories, ratings of Presence may hold a key. In the No AD condition, Sadness clips showed significant correlations between all three positive presence dimensions: Spatial Presence, Engagement and Ecological Validity. The same was true in both AD conditions, and when HV AD was added to the Fear clips. All these stimuli successfully elicited the target emotion suggesting a clip achieves maximum emotional impact when it is cohesive i.e. triggering all dimensions of presence. Yet there was no direct correlation between the target emotion and Spatial Presence in any condition for either emotion category. This is perhaps understandable for Sadness clips: The sadness you feel listening to Matthew's speech at the funeral (in Four Weddings and a Funeral), for example, is unlikely to be enhanced by details of church architecture. Yet it is surprising that feeling more present in the gloomy basement during the chase sequence in Silence of the Lambs does not coincide with a heightened sense of Fear.

Instead emotion seems more closely linked to Empathy and Identification with the characters. Arguably the more the participants identified with the characters' situation and empathised with them, the more present they felt themselves to be. Scenes seemed natural and more engaging. Perhaps participants felt the target emotion more strongly when they could draw on their own experience. This is evidently more likely for a clip dealing with bereavement (Bambi, Truly, Wedd-

ings) than one confronting a mass murderer (Lambs) or threats from the supernatural (The Ring, The Shining).

Significantly higher ratings of presence were reported for the Fear clips presented with HV AD. We suggest this may be due to an increase in Social Presence. Mandryk et al. (2005) showed that playing a computer game against a friend, as opposed to the computer, induced a greater sense of presence. Perhaps, then, experiencing a scene in the company of a human voice rather than an electronic one had a similar effect. By giving the impression of a "shared" experience, HV AD may enhance psychological "transportation", in line with findings for sighted people (Shedlosky-Shoemaker et al., 2011). It may also seem more real as a viewing experience. Traditionally for B&PS watching TV relies on sighted family or friends improvising a descriptive commentary. Future research might explore whether Social Presence might be greater in live AD settings (where the describer is actually present) compared with recorded HV AD for screen-based media.

Limitations and Conclusion

The lack of consistent pattern across emotion categories demonstrates the difficulty of assessing emotional response. One blind participant spontaneously commented that there are good and bad types of Tension: good when induced by the narrative; bad when it arises from the frustration of not knowing what is happening. Another potential confound stems from individual differences. This led to the adoption of a within-participants analysis, which limited the extent of the study. It was not possible to examine differences in response to the same clip presented in different conditions. Clips were instead grouped in emotion categories. Within categories, however, clips still varied in terms of content. Furthermore, content varied even within a single clip. Most clips conveyed more than one type of emotion or were easier to follow at some points without AD than at others.

Nevertheless, our study showed that the addition of verbal information did not lead to a reduction in presence or levels of elicited emotion, despite AD partially masking the soundtrack. One implication is that, for B&PS people, sound effects and emotive music may be redundant where sufficient information can be accessed from film dialogue (including paralinguistic information such as the character's tone of voice). For some clips, AD actively enhanced presence and emotion elicitation. This was true only for AD delivered by a human voice and not by text-to-speech. This may be at least partly explained in terms of Social Presence: "sharing" the experience with a human voice leads to greater empathy, a stronger emotional experience, greater engagement and a feeling that the mediated environment is real. With regard to AD practice, the findings suggest providing suitably emotive AD is a more important consideration than avoiding masking the non-verbal element of film soundtracks. Ultimately for people with a visual impairment AD can do more than aid comprehension: It can help people with a major sensory deficit experience the emotional content of a film.

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