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What do gamers look at in a localized game? Eye-tracking analysis of three language versions of Shadow of the Tomb Raider

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Abstract

Both the process of creating new language versions of video games and eye-tracking methodology became a part of international translation studies discourse at the turn of the 21st century. The present paper discusses an experiment which utilized eye tracking to juxtapose the perception of the original English version of an action-adventure game *Shadow of the Tomb Raider* (Eidos-Montréal: 2018) with the perception of its partial and full localization into Polish. The study involved 39 BA and MA students of applied linguistics, Polish native speakers, with vast and very vast experience with video games, who differed from one another in the levels of translation experience and formal university translation training. The eye-tracking analysis found no considerable difference in the character of gaze patterns for the subtitles used in the three language versions, although the highest values of eye-tracking parameters were observed for the full English language version. While playing, the participants devoted much more visual attention to the imagery of the game than to dialogue subtitles, overlays or auxiliary screens. In all versions, the dialogue subtitles were read more intensively for cutscenes than for in-game conversations and active gameplay. For BA program and between the BA and MA programs, some positive connection was noticed between the grade of university training and the levels of eye tracing parameters.

Keywords: video game localization, video game translation, eye tracking, video game subtitles, translation errors

Introduction [1]

For a particular video game to be positively received by all users in a particular market, regardless of their command of English, its local language version needs

[1] This paper presents an eye-tracking experiment that the author conducted while completing their PhD dissertation and published in a revised version in Polish in 2020 (Kudła, 2020). This monograph planned to be translated into English and published, however, due to personal reasons and procedural issues such translation

to be prepared with considerable care. Every title conducts a dynamic dialogue with its user because of the level of interactivity unparalleled by that provided in other media (cf. Giddings & Kennedy 2006, 142–143). The gamer not only watches the plot passively but also participates in unfolding it and (if the game allows that) creating their own version of the story. In numerous games, the mechanics constantly require an instant reaction from the users, which is followed by an immediate response from the game algorithms. Such a situation forms an emotional bond between the player and the result of the game (cf. Juul 2005, 34). Consequently, one of the primary functions of all the elements of a video game is to provide the user with a coherent and believable in-game world with which the user is supposed to identify. Creating such a feeling of submerging the user in the game events, known as "immersion" (e.g., Celleja 2007, 85; Adams 2010, 641) is also important for all the language versions of a particular game. The process of providing the target market users with a version meticulously tailored to meet their needs may involve all the components of a video game: linguistic, cultural, legal, game-mechanics-related and promotional ones is referred to as "localization" by many members of both the industry and academia (for a detailed juxtaposition of various names used to refer to that process cf. O'Hagan & Mangiron 2013, 87–99; Bernal-Merino 2015, 85–92; Pettini 2022, 12–19).

There is a variety of views on classifying this type of translation activity. Some authors perceive it as a separate type of translation (e.g., O'Hagan & Mangiron 2013; Bernal-Merino 2015), some as a variety of audiovisual translation (e.g., Sajna 2013, Drab 2014; Tarquini 2014; Mejías-Climent 2017; Sarıgül & Ross 2020), while others assign it to the written translation category (Kuipers 2010). In the present paper, the first approach is adopted, as apart from sharing multiple similarities with literary translation, AVT, specialized translation and software as well as online localization video game localization combines them in one translation project (O'Hagan & Mangiron 2013, 39; Bernal-Merino 2015, 84).

Apart from being one of the distinctive characteristics of video game localization, the primary nature of player's immersion in the translated material is also the rationale not only for the scope of the modifications allowed in video game localization but also for their depth. While, with the target market in mind, characters may have their looks and social roles changed, some elements of the plot might be censored or removed from a title, and humor or cultural references might be created anew, the notion of linguistic fidelity suggested by Chesterman (1995) as one of the elements of translation ethics is no longer the primary

had never been completed. Nevertheless, the author presented the results of the study at three Polish and four international conferences where both researchers and localization practitioners expressed interest in having access to a thorough analysis of the experiment also in English. Consequently, this paper constitutes a revised translation and summary of the major fragments of the monograph extended with some more recent contributions to the state of the art in translation studies after the dissertation and monograph were published.

indicator for the localized game quality (O'Hagan & Mangiron 2013, 150; Bernal-Merino 2015, 86).

Also, the classic notions of source text and target text become blurred in video game localization as their content belongs to the class of "new media" proposed by Manovich (2001, 36). Such types of media can be improved, modified and extended ad infinitum and be distributed in multifarious forms (due to patches, expansions or different platform builds). This has also implications for the localization process that has not only become one of the integral elements of the game development process but might also last long after the game release date.

Video games constitute multisensory, highly immersive multimedia experiences utilizing numerous communication channels to create their message (cf. Bernal-Merino 2015, 47). Apart from the visual verbal (subtitles, GUI text), visual non-verbal (image), auditory verbal (speech) and auditory non-verbal (sound effects, soundtrack) channels, which are important in audiovisual texts (Kruger et al. 2015, 11), the message is co-created by the user who through interactivity participates in the game plot and shapes the game events. As a consequence, various stimuli compete for the visual attention of the player. Their efficient processing is important for successful gameplay. Throughout the last two decades, eye tracking has become one of the tools utilized to analyze the character of this process. It provides the researcher with a precise and unbiased insight into the gamer navigation through the graphic user interface (GUI) and various elements of the game screen (Zammitto & Steiner 2014, 291).

One of the main assumptions concerning eye movements and cognition is the "eye-mind hypothesis", formulated by Marcel A. Just and Patricia A. Carpenter (1980), that the timespan of processing a particular object is directly correlated, or at least similar, to the timespan of the eyes being focused on it. In the late 19th century, it was discovered that visual perception consists of two basic types of movements, fixations and saccades (Wade 2007). Fixations are motions stabilising an object of interest in the fovea to clarify its image (Duchowski 2017, 44). This is when a stimulus can be consciously processed and transmitted to the brain. Saccades constitute rapid movements of the eyeball to move from one point of attention to another (Jadanowski et al. 2010). Various parameters can point to different characteristics of visual perception.

Zammitto & Steiner (2014, 295) divide the graphic elements of a video game into low-input, medium-input, and high-input depending on the type of interaction they require from a user. Cutscenes belong to the first of the categories as they are just watched by a player. The user interface, which consists of menus and overlays (auxiliary elements displayed against the background of the game world, informing the user of the most important in-game indicators or possible interactions), implies medium input as usually they do not require instantaneous

interactions. Other elements of the main game screen are associated with the highest levels of input as they constitute the core of the gameplay.

As there are numerous game genres and their manners of presenting information differ notably from one another, in the analysis of eye-tracking studies, it is rarely possible to attempt to generalize and formulate conclusions about video games as such. For this reason, studies have most of the time focused on conclusions about a specific game or a specific game genre. The results of most studies conducted by game developers are not publicised due to the ever-increasing competition between different companies. However, numerous academics have also analyzed video games using eye tracking, e.g., Alkan (2006), Kallinen et al. (2007), Jennett et al. 2008, Caroux et al. (2011), Almeida et al. (2016), and Moreira & Okimoto (2019).

There are numerous studies focusing on the quality of subtitles in video games (e.g. Deryagin 2017, Costal 2018, Sciberras 2021, Deckert & Hejduk 2022). To the best of the author's knowledge, there were two eye-tracking analyses of localized video games, described by academia. In 2010, Minako O'Hagan and Marian Flanagan conducted a study using an eye tracker, heart rate measurement, facial expression recording and GSR equipment (described in O'Hagan & Mangiron 2013 and O'Hagan 2016). This was a pilot study to test the capabilities of the measurement equipment used in studying the reception of game localization. Seven native English speakers, eight native German speakers and six native Japanese speakers took part. Each of them played a localized version of *Plants vs. Zombies* (PopCap Games: 2009) for 40 minutes. However, the researchers were unable to read the results of the eye tracking measurement because "the particular type of eye tracker used was not optimized for use with multimedia content containing constantly moving high-resolution graphics" (O'Hagan & Mangiron 2013, 317).

Mangiron (2016) is most probably the only academic eye-tracking study devoted exclusively to video game subtitles. It focused on the reception of various types of subtitles modified in a ten-minute adventure game, *Casa Encantada* ("Haunted House", cf. Mangiron 2016, 77) created for this purpose. This was not a translation of the game, but subtitles are an extremely important part of localization, especially if it is a partial localization (in which case it is the only piece of game software in the target language). Based on a survey and eye-tracking experiment conducted on 25 participants (12 hearing and 13 deaf), Mangiron (2016, 87) found that hearing users preferred more imaginative forms of captions (e.g., comic-like balloons or artistic frames), while deaf users preferred dialogue captions without any additional graphic elements. Most users in her study preferred centred subtitles located in the lower half of the screen. An analysis of the eye-tracking data obtained in the experiment showed that regardless of the type of captions,

deaf people took longer to read them than hearing people. No other eye-tracking studies into localized video games were found in a literature review in 2023.

Materials and methods

The study sample originally involved 45 participants, all Polish native speakers, registered in the applied linguistics program (both BA and MA) at the Institute of Specialized and Intercultural Communication (Faculty of Applied Linguistics, University of Warsaw). All the participants were recruited after volunteering as a response to a brief description of the study that was distributed among all students of this program. For most participants, their language of study was English, combined with German, Italian or Russian (there were only two participants who studied Italian and Russian but declared proficient command of English, both played the full localization involving only elements in Polish). All of the participants reported having vast and very vast video gaming experience. This parameter was determined not only by their declaration but also their stated favorite video game genres and the number of titles they provided in response to a question in the pre-study questionnaire.

Due to the methodological limitations of the eye-tracking recordings, the results from 6 participants were excluded from the analysis. To ensure the reliability of the analyzed eye tracking data, the accepted user calibration error was up to 0.5°, while the minimal tracking ratio was 80% (indicating the portion of recording time over which the eye tracker recognized the participant's eyes). Consequently, the final analysis included 39 participants (17 women and 22 men), representing various academic levels: 5 in the first BA year (B2+ CEFR English proficiency level), 7 in the second year (B2+ level), 15 in the third year (close to C1 level), 6 in the first MA year (C1 level), 6 in the second year (close to C2 level). The participants were also asked about their translation experience, which was determined on the basis of not only the declarative question but also questions addressing the scope and types of translation/interpreting activities they engaged in outside of university classes). There were 4 participants without any translation experience, 16 with minimal experience, 13 with moderate translation experience and 6 with extensive experience in this area (cf. Kudła 2020, 274–275 for a detailed description of the study sample).

As for the materials, a fragment of an action-adventure game *Shadow of the Tomb Raider* (Eidos-Montréal: 2018), the 21st instalment of a globally popular series telling the story of a British archaeologist, Lara Croft, was chosen for the study. It features one of the initial scenes of the game taking place in the town of Cozumel during *Día de los Muertos*, a very vivid Mexican festival devoted to the deceased. This scene was utilized for the study as it presents one whole task of the main quest

(with all the accompanying graphic elements from its emergence to its completion) and is spatially limited. The fragment is framed by two cutscenes (lasting 2 min. 39 sec. and 59 sec. respectively) and takes place at a crowded square. This enabled the participants to move freely around the area while simultaneously providing experimental data which would be comparable for all the participants (the playthroughs did not differ significantly from one another even though they were unique for each subject). To further unify the participant gameplays, apart from completing the main task of the game sequence (finding Doctor Dominguez), they were asked to conduct at least three conversations with non-player characters (NPCs; there were five such conversations possible, which was also one of the reasons for choosing it) and explore the setting as long as they wished. Completing the fragment might take from slightly more than 4 minutes to around 15 minutes as it also involves an obligatory cutscene lasting 16 seconds and finding Dr Dominguez using the shortest path takes around 20 seconds, while roaming freely through the town square finding all the collectables and reading all their descriptions takes approximately 10 minutes. The title was released nine months before conducting the experiment, which means that it was a relatively recent title presenting the state of the art in game development. The game is designed for more dedicated players (it is visually exquisite and is focused on storytelling, exploration and survival). One of the characteristics of the graphic user interface is that by default, it features a "clean UI", so only the game world is visible, while other elements (e.g., the quest marker) are displayed only if they are necessary or after customization by the user. The game world is shown from a third-person perspective, while the user can rotate the view around the avatar. Such in-game camera angle change is also possible during some conversations initiated by the user (including two of the conversations in the examined fragment, while the three others are displayed as cutscenes).

Fig. 1. ***"Clean UI" function and various overlays displayed in Shadow of the Tomb Raider (Square Enix: 2018).***

In order to present how localization is perceived visually, three language versions of the fragment were chosen: the full localization into Polish (with both subtitles and voice acting in Polish), partial localization into Polish (English voice acting

and Polish subtitles) and the original language version (fully in English). To render this comparison complete, full subtitles were chosen. As the participants had no hearing impairment, the subtitles of the deaf and hard of hearing were disabled. To check whether the participants would notice that fact, one accessibility functionality was enabled: using separate colors to distinguish between the characters. In fact, the examined game was one of the first titles to introduce this element as a customisable function and a few participants mentioned it as a positive feature of the game. The language versions of the analyzed game fragment were distributed evenly: 13 participants played the original version, 13 played the partial localization and 13 played the full localization.

The fragment comprised 113 dialogue subtitles in the Polish version and 116 in the English one (they are all thoroughly shown in Kudła 2020, 399). Not all of them were displayed by all the participants, as it was not obligatory to complete all the possible conversations and walk around the whole location (some comments were uttered by Lara Croft or her friend Jonah Maiava only while passing by some objects of the game world). Importantly, the background conversations between NPCs (e.g. people sitting in a café talking to one another) were not subtitled in either of the language versions. The five possible dialogues included three cutscenes: with a boy selling sparklers, a man selling grilled snacks and a souvenir stallholder; and two active gameplay dialogues: with an elderly lady and the mother of a drunken boy near the fountain. There were also 18 background conversations between Lara and Jonah: 7 activated in specific places and 11 appearing occasionally to enliven the scene. Additionally, there were seven textual overlays providing information about the current location, quest updates, tutorials into game mechanics, and game journal updates. They are often accompanied by prompts on what key could be pressed to display more details regarding a particular quest or journal entry.

The game also includes multiple auxiliary screens, e.g., world map, an artefact menu and a survival guide. The participants were not instructed on how to use them but instructions on how to access them were provided in some overlays.

The subtitles included some minor issues which did not affect the gamer experience considerably (this stems from the results of the post-game survey, which due to length limitations of the text were not discussed here). There were some discrepancies between voice acting and subtitles. Usually, those involved a different wording of a message which had the same meaning. However, in the full Polish localization there was one more severe issue, as in three utterances the voice acting includes misinformation. Whereas in English the characters were talking about a constellation which points to the *West* or *South West* in the Polish voice acting the words *wschód* and *południowy wschód* were used (which in fact mean *East* and *South East*). However, the Polish subtitles included the right translation, namely *zachód*

and *południowy zachód*. Most probably, the error (potentially caused by the fact that the Polish and English words start with the same letter) was noticed after the Polish dialogue recordings were finished and before the game release, it was changed only in subtitles (which are the same in Polish regardless of the sound language), as re-recordings are expensive and not viable shortly after the error detection. Notably, this error in the Polish voice acting was corrected into the correct Polish translation in one of the patches to the game after the experiment was conducted. There were also 4 other such issues in the full Polish localization (in total 5), 2 in partial localization and 3 in the English language version.

For the partial localization, some semantic shifts were noted in 6 Polish subtitles: in 3 instances these were omissions of clauses or phrases with minor influence on understanding the overall sense of the fragment, once it is connected with better synchronising the recording with the lip movements, while in 2 instances the overall sense of the English fragment was changed slightly in the Polish translation.

The subtitles also involved technical issues: wrong segmentation (involving conjunctions, prepositions and multi-word proper names) – 17 instances in the Polish version and 15 in the English version; subtitle changing its position when a background conversation started automatically while the user has already started one of the NPC conversations (1 instance in all versions). In the English subtitles, there are 8 instances of a typographic issue (instead of a dash "–" two hyphens "--" are used).

Equipment-wise, an SMI RED 500 table-top eye tracker with a 22-inch computer screen was used for the study. The maximum 500Hz sampling rate was utilized. Due to the license provisions and to reduce the possibility of any of the programs stopping functioning, a two-computer setup was adopted with one computer utilizing the *iViewX* software to control the eye tracker and another to operate the game and the *Experiment Center* and *BeGaze* software (both developed by SMI) for conducting the eye-tracking procedure and analysing the eye-tracking data.

The experiment juxtaposed eye-tracking data with questionnaire answers. Firstly, the participants completed a six-question questionnaire related to their translation- and gaming-related experience (shown in Kudła 2020, 411). Secondly, they read a description of the game controls (Kudła 2020, 412). Thirdly, a five-point calibration of the eye tracker was conducted. The next slide of the experiment involved a short introduction into the plot of the fragment as well as the in-game task description (Kudła 2020, 413). When the participant declared their readiness, a gaze-recording sequence of the fragment gameplay followed. After completing the in-game task, the participants completed a follow-up questionnaire. The Game User Experience Satisfaction Scale (GUESS) designed by Phan et al. (2016, 1243) was considered for that purpose. However, a shorter set of

questions was utilized for the post-experiment survey due to the fact that the GUESS scale questionnaire consists of 55 questions. Answering such a number of questions was considered excessively burdensome for the participants after completing the cognitively demanding eye-tracking task. Using a questionnaire conducted immediately after performing the experimental task is perceived as providing the experimenter with more reliable answers, which are based on immediate experience. In similar experiments (e.g., the one described in Grucza et al 2019) the authors reported that participants are not as willing to complete questionnaires hours or days after finishing the experimental task. Consequently, the questionnaire was designed not to discourage the participants from filling in with its excessive length. It involved 15 questions. The first 4 questions related to the plot details (Kudła 2020, 414) with points of various relevance that were included in the cutscenes and gameplay fragments obligatory for every walkthrough. The following 11 questions concerned the game overall and its language version quality assessment with six Likert-scale closed questions (overall impression, willingness to play further, declarative level of immersion, quality of the language version, voice acting and subtitles) and five open questions (asking participants to specify the aspects that positively or negatively influenced their opinion about a specific aspect of the game or its localization; all the questions are listed in Kudła 2020, 415–416 and translated in the Appendices 1–5).

The data analysis involved a thorough examination of each participant's recording to find any possible patterns in their gameplay and walkthrough behavior. It was followed by setting areas of interest (AOIs) for elements important for localization: dialogue subtitles, overlays and auxiliary screens. Most types of AOIs were distinguished for subtitles, as they involve the most linguistic meaning available visually. As each screen recording was perceived by the analysis software as a separate stimulus, all the AOIs needed to be determined separately for each participant even in the sequences of the game which were exactly the same for all the walkthroughs. Due to the time-consuming character of manually setting and analysing the AOIs for each dialogue subtitle separately (there were more than 100 subtitles per language version and 39 participants and the analysis was performed by the author alone), it was decided to distinguish separate categories of subtitles, which were later juxtaposed. One of the criteria was the presence of localization issues in a subtitle: 2 types of subtitles including no errors (single- and double-line subtitles were established to distinguish the latter ones from the ones involving errors) and 5 types of errors. Not all of the errors were present in every language version (and some of them were present in only one of the three versions of the fragment). As some patterns were noticed in the initial visual analysis, the subtitles were also divided according to the game sequence into 5 classes: intro cutscene, outro cutscene, all the other cutscenes of the fragment, active gameplay

and conversations with the free game mode. Consequently, the full localization involved 12 AOI types for subtitles, partial localization included 19 types, while the full English version also had 19 (but those were not the same classes). There were also 7 AOIs denoting overlays (quest-related, experience points, game saving and four referring to different parts of the game journal) and 4 AOIs for various auxiliary screens.

Four eye-tracking parameters were chosen for the analysis. *Dwell Time* was used in order to assess the overall time devoted to a particular element juxtaposed with other elements. *Fixation Count* and *Average Fixation Duration* as various authors (e.g., Płużyczka 2015, 190; Duchowski 2017, 186) associate it with possible difficulties in reading or more intense processing. To check how many participants decided to revisit the AOIs, *Glances Count* was utilized, as *Revisit Count* is not reliable for AOIs that appear more than once. These parameters were later compared with respect to the independent variables (study grade, translation experience, language version). All the statistical computations were conducted using *IBM SPSS Statistics 25* software. Since the described analysis involved variables divided into more than two categories (three language versions, five studies grades, four translation experience levels, five game sequences), the participants' properties are not distributed normally throughout the research sample, while the variables are nominal, Kruskal-Wallis test was used to verify the eye-tracking data statistically.

As the literature review has shown, no successful attempts to conduct an eye-tracking analysis of the perception of translated video game subtitles have been documented prior to this experiment (May 2019) or before submitting this paper for review (October 2023). Consequently, the study was exploratory in nature.

The first research question formulated on the basis of the designed experiment concerned the differences in visual perception depending on the language version of the video game fragment. Since, in partial localization the message reaching the recipient through the verbal visual and verbal auditory communication channels are in different languages, this version may cause a greater cognitive load. Since the number of fixations is frequently indicated as a determinant of cognitive load, it was assumed that the eye tracking parameters, especially Fixation Count, would take the highest values for the version with Polish subtitles and English voice acting.

The second research question referred to whether the participants would be attentive to errors in the subtitles and how this might manifest through eye tracking measures. Depending on their level of engagement with the game, subjects may pay more or less attention to the subtitles as such. Undoubtedly, participants looking at the subtitles are more likely to identify errors. Noticing an error may cause them to focus on a passage for longer or revisit it with their eyes

to verify the passage in question. It was then assumed that higher Fixation Count and Average Fixation Duration values could indicate the identification of errors in subtitles and their translation.

The third research question addressed the fluctuating visual attention throughout a game session mentioned by Zammitto & Steiner (2014, 295). It was presumed that the Glances Count, Dwell Time and Average Fixation Duration for the subtitle area would be higher for the cutscenes than for other game sequences.

The fourth research question focused on the influence of translation experience on visual perception. It has been assumed that, participants with greater translation experience (especially in audiovisual translation or game localization) will record higher values of Dwell Time in the subtitle area than those with less translation experience.

Results

The mean in-game task completion time of the 39 participants amounted to 7:37.32 (SD = 1:05.85). The lowest time was recorded for one of the participants playing partial localization (5:37.20) and the highest time for a participant playing full localization (11:14.66). The mean times for the three language versions of the experiment were 7:29.07 for the partial localization; 7:35.48 for the original English version; and 8:16.28 for full localization. No significant difference was found for the mean completion time and the study grade and translation experience, $\chi^2(4) = 0.531$, $p = 0.873$). This has shown that for a group with similar gaming experience the language version, years of formal training, or type of translation experience do not affect the task completion time (various possible reasons for longer or shorter completion times were specified in Kudła 2020, 292–295). The average total Dwell Time for all the AOIs amounted to 10.90% of the overall in-game time (with 11.79% for the original English version, 10.49% for the full localization and 10.27% for the partial localization) showing that other graphic elements of the game attracted the vast majority of the participants' visual attention.

The first research question revolved around the influence of the fragment language version on the character of the gaze behavior of the participants. The first step of a Kruskal-Wallis test is verifying a null hypothesis that there is no significant difference between the values of a particular measure (completion time, study grade, translation experience) between the analysed groups (three language versions). For the four chosen eye tracking indicators divided into the three language versions, the null hypothesis was not rejected: the mean values of Dwell Time, Average Fixation Duration, Fixation Count and Glances Count the values are similar (cf. Table 1).

Table 1. ***Eye tracking parameters for all AOIs depending on the language version***

Eye Tracking Parameter	Language version	M	SD	Range
Dwell Time [ms]	Polish	50935.242	4599.968	65034.500
	partial	44980.954	3034.430	23017.200
	English	53656.969	3457.943	21132.600
	experiment	49857.722	3812.808	65034.500
Average Fixation Duration [ms]	Polish	86.346	86.388	405.000
	partial	78.557	105.863	1438.700
	English	81.237	91.052	707.300
	experiment	81.138	95.105	1438.700
Fixation Count	Polish	9.801	20.687	252.000
	partial	8.200	16.239	109.000
	English	8.900	17.172	128.000
	experiment	8.822	18.265	252.000
Glances Count	Polish	3.880	6.194	32.000
	partial	3.005	5.567	31.000
	English	3.333	5.821	46.000
	experiment	3.335	5.815	46.000

Interestingly, across all the discussed eye tracking parameters, the highest mean values were achieved for the full Polish localization and the lowest for partial localization. However, these differences are small and, moreover, none of the results is statistically significant (for all four parameters, the statistical significance is greater than 0.05: for the Fixation Count $p = 0.114$; for Dwell Time $p = 0.087$; for Glances Count $p = 0.073$; for Average Fixation Duration $p = 0.108$).

However, it should be underlined that those values were calculated for all the AOIs within a particular language version: subtitles, overlays and auxiliary screens. The value distribution is different for a single subtitle (cf. Table 2). To show such values, three of the parameters – Dwell Time, Fixation Count and Glances Count – were also divided by their number in a particular language version (113 for both Polish and 116 for English, a similar procedure was also conducted for the 19 overlays and 4 additional screens that were viewed by the participants). The average total Dwell Time for all the subtitles amounted to 8.52% of the overall in-game time (with 10.73% for the original English version, 8.01% for the full localization and 6.89% for the partial localization), showing that among the AOIs dialogue subtitles attracted the greatest attention.

Table 2. ***Comparison of eye tracking parameters for single subtitle and overlay depending on the language version***

Eye Tracking Parameter	Language version	M subtitle	SD	Range	M overlay	SD	Range
Dwell Time [ms]	Polish	337.544	353.844	5002.654	46.205	503.916	7226.056
	partial	265.013	233.418	1770.554	35.060	382.523	3859.756
	English	421.117	216.121	1320.788	35.803	336.476	2348.067
	experiment	336.030	353.844	5002.654	39.023	503.916	7226.056
Average Fixation Duration [ms]	Polish	133.842	86.388	405.000	93.366	56.998	270.000
	partial	116.169	105.863	1438.700	79.242	70.576	959.133
	English	139.069	91.052	707.300	63.148	58.981	471.533
	experiment	129.693	105.863	1438.700	78.586	130.056	959.133
Fixation Count	Polish	0.188	1.591	19.385	0.167	2.270	28.000
	partial	0.178	1.249	8.385	0.128	1.922	15.222
	English	0.231	1.073	8.000	0.086	0.631	5.111
	experiment	0.199	1.591	19.385	0.127	0.429	2.333
Glances Count	Polish	0.098	0.476	2.462	0.076	0.665	3.556
	partial	0.082	0.428	2.385	0.059	0.596	3.444
	English	0.099	0.364	2.875	0.040	0.631	5.111
	experiment	0.093	0.476	2.875	0.059	0.193	1.000

The analysis showed that contrary to one of the hypotheses the highest values of the eye-tracking for all the subtitles together and the mean value for a single subtitle are the highest for the original language version of the experiment (even though in total there were three more subtitles for this version than in the other two), and not for the language version involving both English and Polish. As expected, the values of Dwell Time and Average Fixation Duration for overlays (playing an auxiliary role) were noticeably lower than the ones for subtitles. Fixation Count and Glances Count were much more similar for both AOI categories. Interestingly, the highest values of all the eye-tracking parameters for overlays were recorded for the full Polish localization. However, the difference for all of them was marginal. The values for auxiliary screens were not analyzed in detail as most participants (27 out of 39) did not use this class of AOIs while playing.

The highest values of eye-tracking parameters for the English version of the game (which was a foreign language for all the participants), noticeable especially for Glances Count and Average Fixation Duration, might indicate a slightly different processing manner of subtitles in different languages for a relatively homogeneous group. This might have been caused by a slight difference in reading

proficiency between a native language and a foreign language. In fact, a much more probable reason was underlined by the participants themselves in the questionnaires and conversations after finishing the in-game task. Six participants playing the English version claimed that regardless of their general low attention devoted to subtitles they purposefully looked at the subtitles for clarification in the case of atypical words (e.g., Spanish *abuela* or *ofrenda*). Some participants also pointed to an abundance of sound effects and peculiarities of non-native English pronunciations of some voice actors.

Another focus of the study was various types of errors present in the analysed subtitles which are shown in Table 3.

Kudła, Dominik. 2023. What do gamers look at in a localized game? Eye-tracking analysis of three language versions of *Shadow of the Tomb Raider*. In: L10N Journal 2(1), pp. 34–65.

Table 3 ***Eye tracking parameters for subtitle errors and the language version***

Eye Tracking Measure	Subtitle	Experiment M	SD	Range	Polish M	SD	Range	partial M	SD	Range	English M	SD	Range
Dwell Time [ms]	no errors	324.828	3885.684	21132.600	311.306	2947.604	11252.700	279.227	3339.287	12658.200	383.951	4898.258	21132.600
	segmentation	804.218	4726.143	23017.200	669.727	4632.164	21804.900	685.514	5080.107	23017.200	1057.413	4310.733	16614.900
	moving up	1304.662	769.949	2985.200	1072.777	665.846	2566.800	1426.792	826.826	2985.200	1414.415	804.608	2815.000
	typographic										890.740	4409.275	16614.900
	dub. /sub.	629.818	1675.488	8139.400	583.850	2368.821	8139.400	1193.465	1131.179	4416.300	112.138	414.967	1490.000
	meaning shift							385.476	804.275	3010.100			
Average Fixation Duration [ms]	no errors	129.693	44.614	239.000	133.842	44.632	239.000	116.169	41.930	181.600	139.069	43.967	231.800
	segmentation	98.485	73.140	280.000	80.737	75.689	234.100	73.921	71.519	224.100	140.798	53.999	280.000
	moving up	57.829	77.227	231.900	63.749	78.037	231.900	54.574	76.903	226.800	55.164	76.390	230.800
	typographic										96.015	82.095	280.000
	dub. / sub.	88.754	74.870	246.100	72.292	79.777	196.400	111.600	76.299	246.100	82.369	58.051	162.600
	meaning shift							83.677	84.954	252.100			
Fixation Count	no errors	1.810	19.591	128.000	1.764	14.766	59.000	1.640	17.958	68.000	2.026	24.182	128.000
	segmentation	4.207	24.094	111.000	3.579	24.286	111.000	3.774	26.802	109.000	5.269	20.331	88.000
	moving up	6.718	3.770	12.000	5.538	3.286	10.000	7.462	4.100	12.000	7.154	3.862	12.000
	typographic										4.404	20.785	88.000
	dub. / sub.	3.340	8.335	38.000	2.955	11.716	38.000	6.346	5.767	21.000	0.718	2.381	8.000
	meaning shift							2.013	3.763	13.000			
Glances Count	no errors	0.808	7.376	46.000	0.894	6.335	29.000	0.684	7.228	28.000	0.847	8.241	46.000
	segmentation	1.401	6.865	32.000	1.294	7.754	32.000	1.265	7.499	31.000	1.643	4.890	24.000
	moving up	2.077	1.228	6.000	1.769	0.973	3.000	2.154	1.381	6.000	2.308	1.292	4.000
	typographic										1.158	5.492	24.000
	dub. / sub.	0.998	2.493	11.000	0.981	3.704	11.000	1.654	1.215	4.000	0.359	1.071	4.000
	meaning shift							0.876	1.838	8.000			

A certain trend can be observed regarding the types of subtitles that could be noticed for Fixation Count, Glances Count and Dwell Time regardless of the language version of the game fragment. The relatively lowest mean values were recorded for subtitles containing no errors. Values almost twice as high were recorded for subtitles that were incorrectly segmented. This difference is most likely because the incorrectly segmented subtitles always appeared longer on the screen than the former ones (only isolated two-line subtitles were divided correctly, so the vast majority of this category were single-line subtitles, displayed for a shorter time). Some effects of the error appearing in such subtitles on the higher eye-tracking values cannot be ruled out, but the adopted method of analyzing the collected data provides insufficient insight into this issue.

Even higher values were found for subtitles moving instantaneously upwards or downwards relative to their previous position on the screen. This is presumably due to the nature of such subtitles, which are a dynamic element, even within dialogue subtitles, which are themselves described as an element that potentially draws visual attention to itself by its mere appearance (cf. comments by d'Ydewalle & De Bruycker 2007; Bisson et al. 2014; Kruger et al. 2015). Any movement of an element of the visual scene triggers an almost reflex response to direct the gaze towards it.

The most considerable discrepancy between these parameters was found for AOIs where subtitling did not match the voice acting. In the case of these parameters, the highest mean values were recorded for the version with the original sound and Polish subtitles (for all three indicators, the value oscillates between those recorded for incorrectly segmented AOIs). A lower value was found for the full Polish version of the game (in this case, the values belong to the range determined by the values for AOIs at flawless and wrongly segmented subtitles). The lowest value was found for the full English version. Such significant discrepancies in the values for AOI for the same error are probably not due to differences in the perception of the subtitles in the language versions (in which case similar differences would also appear for other classes of dialogue subtitles). This is presumably because in the English excerpt of the game, all subtitles unmatched with the actor recordings are within the active gameplay, whereas in the full and partial localisation, all of them appear in the introductory cinematic sequence, and in the subtitled version, additionally, one of them belongs to a cutscene ending the gameplay. Moreover, the reception of this category of subtitles was also influenced by the sequence of the game in which they appeared. The only parameter that noted lower values for this category of errors was the Glances Count. This was probably due to the fact that although such subtitles are more likely to attract attention, they are not processed in detail by most players.

The values recorded for subtitles containing typographical errors (full English version only) are similar to those for incorrectly segmented subtitles. In contrast,

the means for subtitles containing semantic errors (partial game localization version only) are comparable to those recorded for subtitles containing no errors. It is also noticeable that for all three parameters (as well as for average Fixation Duration) for wrongly segmented subtitles, the highest means were found in the full English version. This may be due to the aforementioned issues highlighted for this audio version of the game by the respondents themselves.

Some trends have been discovered in the perception of specific types of defects encountered in the localization of games. However, the differences between the various types of dialogue subtitles and the language versions studied are insignificant in the vast majority of cases.

A further question to be scrutinized by the study described was the distribution of attention to subtitles within a single game and the possible factors influencing it. In relation to this question, the areas of interest for the dialogue subtitles were categorized not only by the presence or absence of technical and translation mistakes in the subtitles, but also by the input intensity that a particular fragment requires from the player. The most noticeable distinction is the one into active gameplay and cutscenes suggested by Zammitto & Steiner (2014, 295). Due to the differences in the length of the cutscenes, this category was divided into the opening cutscene, the closing one and all others (which were similar in length).

Table 4 ***Eye tracking parameters for each game sequence***

Eye Tracking Measure	Language version / Game sequence	Experi-ment M	SD	Range	Polish	SD	Range	partial	SD	Range	English	SD	Range
Dwell Time [ms]	intro	980.416	5518.527	23017.200	928.943	5236.317	21804.900	909.015	5505.341	23017.200	1092.995	5686.604	21132.600
	active play	106.648	2012.770	13279.400	111.919	1815.962	10153.100	51.036	1379.556	8188.600	144.403	2641.765	13279.400
	cutscenes	125.162	2466.744	10696.300	107.429	1709.956	6070.800	123.430	2488.604	9529.400	164.092	3019.211	10440.200
	active convers.	706.020	1860.379	9724.800	694.686	1245.133	4904.200	612.888	1641.759	5532.100	810.487	2401.211	9724.800
	outro	882.499	2901.849	13548.100	744.940	2934.072	11182.500	905.760	2392.820	12219.700	943.191	3229.447	13548.100
Average Fixation Duration [ms]	intro	140.647	55.386	252.100	143.331	53.450	231.900	135.986	57.147	252.100	143.162	54.810	250.300
	active play	54.365	65.900	234.100	53.372	69.162	234.100	37.463	53.712	178.100	72.258	68.734	190.400
	cutscenes	85.451	69.485	204.800	66.531	65.820	173.000	74.719	69.804	181.500	144.754	35.607	119.400
	active convers.	121.997	52.788	232.100	129.865	51.838	232.100	100.081	45.595	156.400	136.046	53.422	229.000
	outro	106.580	68.595	280.000	116.812	60.991	239.000	111.369	64.198	241.600	96.675	74.889	280.000
Fixation Count	intro	5.050	28.312	128.000	4.815	27.229	111.000	4.859	29.076	109.000	5.429	28.196	128.000
	active play	0.624	11.072	63.000	0.615	10.699	55.000	0.359	8.426	49.000	0.829	13.491	63.000
	cutscenes	0.726	13.509	52.000	0.646	10.341	38.000	0.717	13.852	48.000	0.904	15.274	49.000
	active convers.	3.913	9.268	39.000	3.933	7.002	27.000	3.663	9.316	32.000	4.142	10.835	39.000
	outro	4.602	14.523	61.000	3.950	14.361	49.000	4.782	12.901	58.000	4.798	15.525	61.000
Glances Count	intro	1.648	9.103	46.000	1.653	9.149	32.000	1.626	9.251	31.000	1.666	8.766	46.000
	active play	0.306	5.264	29.000	0.311	6.201	29.000	0.224	4.215	22.000	0.365	5.207	20.000
	cutscenes	0.373	5.818	20.000	0.328	5.333	20.000	0.379	5.911	20.000	0.454	4.906	15.000
	active convers.	1.510	2.961	14.000	1.740	3.238	14.000	1.250	2.172	8.000	1.538	3.023	11.000
	outro	1.439	5.796	29.000	1.496	5.930	21.000	1.444	4.621	19.000	1.393	6.306	29.000

The hypothesis formulated for the third research question stated that the Glances Count, Average Fixation Duration and Dwell Time values would be higher for cutscenes than for active gameplay. The results suggest that this can be partially assumed to be correct. This is because it transpired that two manners of reading subtitles can be distinguished for cutscenes and active gameplay in the analyzed action-adventure game. While longer and shorter cutscenes were processed differently, in the regular active gameplay, much less visual attention was devoted to the subtitles than to the player-initiated conversations with a free camera mode. The values of eye-tracking parameters were noticeably lower for shorter cutscenes than for the opening and closing video sequences, yet they were only slightly higher than those for active gameplay. In conversations where the player has full control of the camera, the eye tracking parameters recorded significantly higher values than in active gameplay and noticeably higher than within the short cutscenes. They are, however, lower compared to those noted for long cutscenes. Therefore, the hypothesis was confirmed only for core gameplay and long cutscenes. The values for the active conversations could potentially be influenced by the wording of the in-game task formulated (apart from the quest task, talking to at least three encountered characters was required).

Since no clear correlations were found between the values of any of the analyzed eye tracking indicators and the translation experience of the subjects (cf. Kudła 2020, 329–331), it was decided to test whether the different length of formal translation preparation (i.e., their study grade) impacts the manner of visual perception of the game. Accordingly, the mean values of the four analysed parameters were calculated for the five study grades. A summary of these results for the entire experiment and the individual language versions is shown in Table 5.

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Table 5 ***Eye tracking parameters for study grade and the language version***

Eye Tracking Measure	Study grade	M	SD	Range	Polish	SD	Range	partial	SD	Range	English	SD	Range
Dwell Time [ms]	1 BA (n=5)	1326.315	2566.711	18963.900	1257.514	1988.111	9936.400	1700.498	3307.092	18963.900	715.553	908.629	3813.500
	2 BA (n=7)	2293.314	3805.413	17744.900	2535.847	3156.243	11857.200	251.984	374.393	1137.500	2731.225	4692.616	17744.900
	3 BA (n=15)	2510.884	3608.944	21804.900	2884.127	4015.441	21804.900	1801.215	3417.062	16976.600	2853.446	3434.023	17437.500
	1 MA (n=6)	3874.957	5245.695	23017.200	2468.533	4185.347	19777.400	3683.255	5177.397	23017.200	5473.086	5727.392	21132.600
	2 MA (n=6)	2249.746	3168.030	14913.300	3285.944	3973.899	14913.300	1827.954	2751.821	12052.200	1442.724	2241.352	8549.800
Average Fixation Duration [ms]	1 BA (n=5)	84.636	66.444	224.100	75.342	67.755	222.900	100.735	70.768	224.100	71.029	43.392	129.500
	2 BA (n=7)	96.961	80.587	280.000	107.373	81.970	239.000	31.200	37.018	94.000	108.469	79.824	280.000
	3 BA (n=15)	100.293	69.605	246.100	106.544	66.813	231.900	75.626	68.321	246.100	116.674	66.176	220.300
	1 MA (n=6)	108.147	72.523	233.400	97.767	78.198	232.100	103.897	69.879	218.100	122.756	67.802	233.400
	2 MA (n=6)	98.451	71.519	252.100	87.883	62.905	206.400	106.261	74.260	252.100	96.153	73.597	195.600
Fixation Count	1 BA (n=5)	0.188	13.722	100.000	0.366	11.046	54.000	0.084	17.366	100.000	0.047	6.298	26.000
	2 BA (n=7)	0.097	16.727	70.000	0.114	15.642	59.000	0.014	2.454	9.000	0.107	19.364	70.000
	3 BA (n=15)	0.149	18.771	111.000	0.143	21.062	111.000	0.092	18.573	90.000	0.199	17.055	86.000
	1 MA (n=6)	0.183	27.932	128.000	0.119	22.272	102.000	0.175	27.057	109.000	0.254	31.014	128.000
	2 MA (n=6)	0.111	17.116	82.000	0.163	20.787	82.000	0.092	15.494	69.000	0.067	11.310	43.000
Glances Count	1 BA (n=5)	0.037	5.750	28.000	0.040	6.687	28.000	0.037	5.658	23.000	0.031	3.788	14.000
	2 BA (n=7)	0.037	5.578	29.000	0.050	7.034	29.000	0.009	1.538	5.000	0.034	4.482	19.000
	3 BA (n=15)	0.049	6.823	32.000	0.065	7.850	32.000	0.031	5.856	31.000	0.052	6.579	32.000
	1 MA (n=6)	0.057	8.696	46.000	0.042	6.340	20.000	0.053	8.059	28.000	0.076	10.513	46.000
	2 MA (n=6)	0.050	7.179	29.000	0.065	7.503	25.000	0.048	7.455	29.000	0.031	4.511	14.000

Although a slight upward trend can be observed for the Fixation Count between 2nd and 3rd grades BA, and 1st grade MA for the partial localization version and the original language version, it is not noticeable for the full Polish language version. The positive association between the year of study and the mean Fixation Count is also disturbed by the fact that in the case of the full Polish version for the 1st grade BA, one participant (P53) was found to have a Fixation Count on a single subtitle several times higher than the means noted for all other subjects. This result significantly increases the mean for the full localization and, consequently, also for the entire 1st grade BA. Consequently, only a partial association between these variables has been found.

A slightly more noticeable upward trend can be found between the 1st, 2nd and 3rd grades BA for the other three parameters (Dwell Time, Glances Count, Average Fixation Duration). It is also visible for the full localization and the original language version. However, it has not been found for the partial localization, where the values for 2nd grade BA are several times lower than the others. This was caused by the fact that for this language version, the mean is at the same time the result of a single person (P32) who paid almost no attention to the subtitles (in the interview she admitted that she did not read the subtitles at all). Also, the results of 1st grade BA students for the mean Glances Count and mean Dwell Time for a single subtitle are higher for partial localization than those for 3rd grade BA students. As can be seen in Table 5, for all three parameters, the upward trend is continued among 1st grade MA students for partial localization and the original language version. Such an increase was not found for Fixation Count in full language localization.

An increase in the mean values was also not found for MA degree program, since for all parameters and regardless of language versions, the mean values for the final year of study are lower than those recorded for the previous year. Therefore, no such trend can be found for the entire course of study. It is worth mentioning at this point that, at MA program involved, students who have completed their bachelor's degree at this faculty are joined by those who have studied at other universities or in other related fields of study (primarily philology or studies of a specific language area). Accordingly, those studying at 1st or 2nd grades MA may or may not have experienced more years of formal translation preparation than those in their 3rd grade BA. This was the reason why no research hypothesis was formulated within this characteristic of the subjects. Therefore, some trends noted when juxtaposing the students at 1st and 3rd grades BA are even more interesting.

Discussion

The literature review presented in the introductory sections proved that the described study was the only one conducted and publicized by a member of the academia and

comparing the visual perception of dialogue subtitles in a video game developed in the L2 language of the users and localized partially or fully into their L1 language.

The only one similar eye tracking analysis known to the author at the moment of publication concerned various forms of presenting video game subtitles in games played and designed in the L1 by hearing and deaf users.

Some studies (e.g. Bisson et al. 2014, Perego et al. 2016, Baños & Díaz-Cintas 2017, Muñoz 2017, Nikolić 2018, Perego et al. 2018, Szarkowska & Bogucka 2019, Liao et al. 2021, Szarkowska et al. 2021, Lång 2023) have focused on dubbed and subtitled versions of the same translated audiovisual material (usually a film or a fragment of a TV show). Their results are, however, not fully comparable with the present study, as video games differ noticeably from watched audiovisual material where the interaction and influence on the on-screen activities is considerably limited in comparison to playing a video game. The visual perception in video games is also related to making and planning gameplay decisions, e.g., where to go or what route to take to avoid obstacles.

In order to be able to form statistically significant conclusions, a more numerous research sample should have been compiled. This would help balance the subgroups of different study grades and levels of translation experience.

However, even with the sample being insufficiently representative of all the study variables, the analysis of the study's fragment reached such a depth that its scale is highly labor-intensive. The analysis was performed by one person (the author). Consequently, it took a considerable amount of time to complete. Accordingly, to efficiently perform the analyses of such datasets, a larger team of analysts is necessary or some automation algorithms, potentially using AI solutions that are currently developing rather rapidly, should be used.

Another limitation of the study conclusions is the fact that it focused on one video game only. Consequently, studies into video games representing other genres might potentially provide a valuable comparison with the study findings.

Conclusion

As the analysis proved, in computer action-adventure games, the visual attention of the subjects was focused less on separate dialogue subtitles as well as overlays, and much more on other elements of the game screen, e.g. characters and surroundings (approx. 90% of task completion time).

Moreover, the language version of the game fragment (original, partial or full localization) seems to have no considerable influence on the character of dialogue subtitle perception in the case of computer action adventure games by people for whose target market the game has been localized. In fact, generally, the highest values of eye-tracking parameters were recorded for the original language version, which refuted the first hypothesis. The questionnaires and conversations with the participants pointed to

the willingness to clarify their understanding of the voice acting (especially for non-standard English pronunciation). The differences between the separate variants of the experiment were not significant enough to conclude that, irrespective of the number of subjects, the distribution of eye-tracking parameter values would be the same. Another reason for replicating the study with a slight change of the setup is that it is highly probable that this tendency would also be noted for other languages foreign to the recipient.

Subtitles changing their position attracted the most visual attention of all the analyzed faults in video game localization fragment (others were incongruence with voice-acting, incorrect segmentation, typographic issues, sense shifts). Irrespective of the language version of the video game fragment, the highest mean Fixation Counts, Glances Counts and Dwell Times were noted for subtitles that moved up or down in relation to their original displaying position. Only for Average Fixation Duration were the highest values recorded for subtitles containing no errors. A potential explanation might be that a player is already processing such subtitles, they are more focused on the content than in the case of subtitles that only attract their attention by changing their position. For both the total mean encompassing all types of subtitles and for most of the subtitle error categories of this study, the highest values were recorded for the full English language version.

Dialogue subtitles in the computer action-adventure game were read most intensely for longer cutscenes, slightly less intensely during conversations (especially those displayed in free camera mode), and least intensely for active gameplay when the conversation is not initiated by the players. Those game sequences, distinguished using the input required from the player, exhibited noticeable differences in the values of the analyzed eye-tracking parameters on dialogue subtitles. The highest values for these AOIs were found for longer cutscenes (of one minute and longer), slightly lower on conversations conducted during active gameplay, much lower on conversations presented in the form of cutscenes shorter than 30 seconds, and the lowest for active gameplay. The differences observed within the traditional classes of active gameplay and cutscenes may have been caused by the task the respondents had to perform (conversation with at least three NPCs).

No considerable difference was found for the values of the eye-tracking parameters depending on the participants' greater or lesser translation experience (regardless of its subject area). However, formal translator training potentially influences the intensity of processing subtitles in video games and the frequency of errors in the language versions. For the number of fixations, a slight increase was recognized between 2nd and 3rd grades BA and 1st grade MA for both versions using English (partial localization and original). An increase in eye-tracking parameter values between 1st and 3rd year BA can be found for the Glances Count and the Average Fixation Duration. This was not fully confirmed for MA programs, but in this case, it may also be influenced by the fact that

some of the MA programme students may have had less formal translation preparation than those completing the BA programme. An increase in values between 1st and 3rd grades BA for the Glances Count and the Average Fixation Duration was observed.

The evaluation of the quality of the language version had a minor impact on the overall evaluation of the entire action-adventure game analysed. It should be noted that in the case of all the three versions, localization did not raise any objections from the participants. The present study focused on a localization involving a limited number of errors that were not noticed often by the participants (only 8 among 39, Kudła 2020, 328). Accordingly, the quality of localization was not mentioned often among factors influencing their overall evaluation of the analyzed game fragment. Perception results for this type of localization could in future research be juxtaposed with the one for a game in which localization involves a greater number of fallacies that are easily noticed by the participants.

As suggested before, the examination of localization reception in games representing other genres and quality with poor localizations would provide further insights to a fuller understanding of reading the dialogue and other textual elements in localized and foreign-language versions of video games. Studies in the future may also focus on localized games on other platforms, e.g. home consoles, handheld consoles, virtual reality and mobile devices, as the eye tracking studies to date focused on PC games.

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Appendix 1 Pre-experiment Survey (in Polish)

How do you asses your video gaming experience?

I have a very vast video gaming experience.
I have a vast video gaming experience.
I have some video gaming experience.
I have little video gaming experience.
I have no video gaming experience.

What game genres do you choose most frequently? [in alphabetical order in Polish]

action
educational
puzzle
MMORPG
MOBA
music
adventure
RPG
strategy (RTS/ tactics)
shooter (FPS/ TPS/ battle royale)
simulation
text
racing
arcade

Please name the game titles that you played over the last year.

Do you have any translation experience (apart from the university classes)?

I have a very vast translation experience.
I have a vast translation experience.
I have some translation experience.
I have little translation experience.
I have no translation experience.

If you have any translation experience, what type of translation was it?

What language version do you choose to play video games that were developed in languages other than Polish?

original language version (e.g. English, Geman, Spanish) without subtitles
original language version with subtitles in the foreign language
version with Polish subtitles
version with Polish voice acting (dubbing) without subtitles
version with Polish voice acting (dubbing) with Polish subtitles

Kudła, Dominik. 2023. What do gamers look at in a localized game? Eye-tracking analysis of three language versions of *Shadow of the Tomb Raider*. In: L10N Journal 2(1), pp. 34–65.

Appendix 2 Controls description in Polish and English

PL

Sterowanie w grze *Shadow of the Tomb Raider*

Do kierowania postacią służą przyciski „**W**” (↑), „**S**” (↓), „**A**” (←), „**D**” (→).
W interakcję z innymi postaciami wchodzi się **prawym przyciskiem myszy**.
Możliwe jest to tylko jeśli nad daną postacią pojawi się „dymek”.
Interakcję z otoczeniem (podniesienie przedmiotu/ otwarcie drzwi, itp.) umożliwia **lewy przycisk myszy**.
Kamerę w grze można obracać za pomocą **ruchu myszy**.

EN

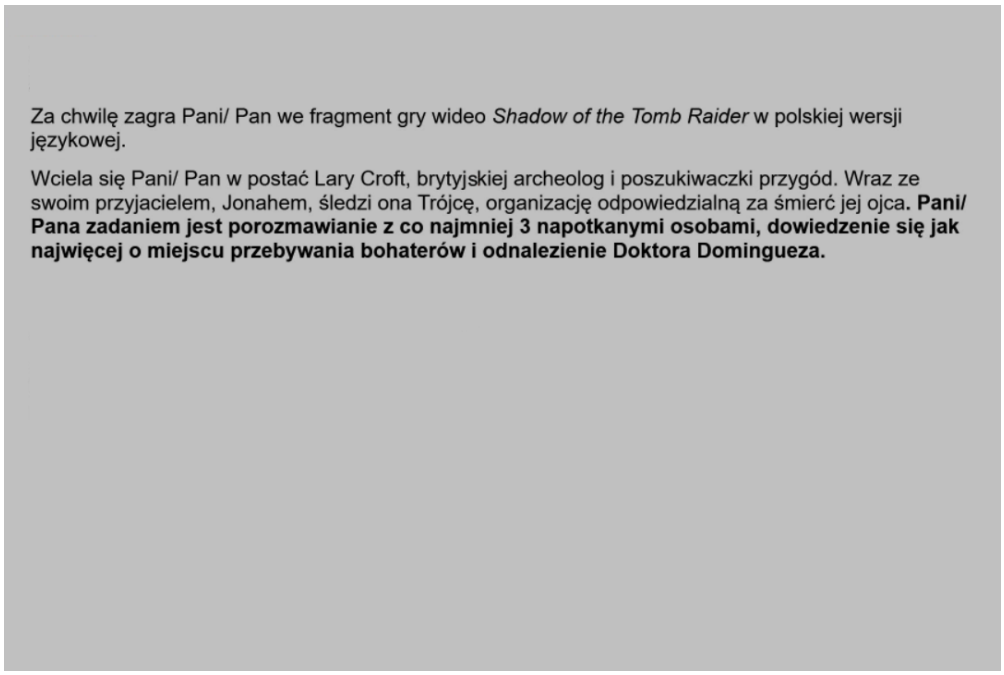
Controls in *Shadow of the Tomb Raider*

To move your character use the following keys: "**W**" (↑), "**S**" (↓), "**A**" (←), "**D**" (→).
To start a conversation with another character use **the right mouse button**.
It is possible only if there is a "bubble" above a particular character.
To interact with the surroundings (pick up an object/ open a door, etc.) use **the left mouse button**.
It is possible to rotate the in-game camera **by moving the mouse**.

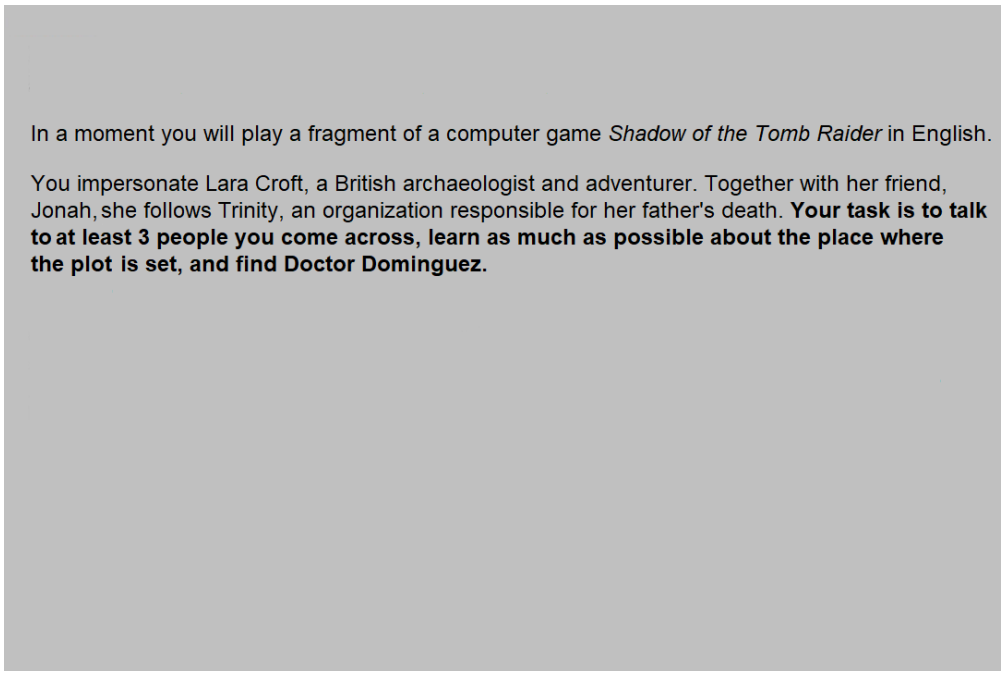
Kudła, Dominik. 2023. What do gamers look at in a localized game? Eye-tracking analysis of three language versions of *Shadow of the Tomb Raider*. In: L10N Journal 2(1), pp. 34–65.

Appendix 3 Task description in Polish and English

PL



EN



Appendix 4 Post-experiment survey questions regarding the fragment plot

(in Polish for localized versions or in English if the game was played full in English)

According to Lara Croft, which direction should they take from the Amazon river to look further?

What is wrong with Lara?

Who is Doctor Dominguez?

Do you remember any other details regarding the plot or the characters?

Appendix 5 Post-experiment questions on the game fragment reception (in Polish)

Did you like this fragment of the game ***Shadow of the Tomb Raider***?

5 (definitely yes)
4
3
2
1 (definitely no)

What aspects influenced your overall impression regarding this game?

Would you like to play this game further?

5 (definitely yes)
4
3
2
1 (definitely no)

How do you assess the overall quality of the Polish language version of this game fragment?

The participants playing the full English language version were asked about the overall quality of the English language version.

5 (very positively)
4
3
2
1 (very negatively)

How do you assess your level of immersion in this game?

5 (strong)
4
3
2
1 (weak)

How do you assess the quality of the voice acting (dubbing) present in this fragment?

5 (very positively)
4
3
2
1 (very negatively)

What aspects influenced your assessment of the voice acting?

How do you assess the quality of the voice subtitles present in this fragment?

5 (very positively)
4
3
2
1 (very negatively)

What aspects of the subtitles you liked (didn't like) the most?

Have you noticed any errors in the Polish [English] language version? If yes, please name them.

Would you like to play a different language version of this game? Why? If yes, what language version would that be?

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Assistant Professor at the Institute of Specialised and Intercultural Communication (Faculty of Applied Linguistics), University of Warsaw (Poland). He received his PhD in applied linguistics at the same faculty in 2020. He conducts classes concerning various aspects of English as well as translation from and into Polish, English and Russian. As he is also an active translator between those languages, he tries to bridge the gaps between the industry and the academia, e.g. by organizing a meeting cycle Applied Linguistic Students in the Labor Market since 2018. His current research focuses mostly on video game localization (challenges encountered by the translator, careful approach to cultural elements, translation and technical errors, user reception) and translator training. He is also interested in the themes of translation studies, eye tracking methodology, language of sport, and contact linguistics.