CoMe

rivista scientifica edita da

SSMLPISA
SCUOLA SUPERIORE MEDIATORI LINGUISTICI

Anno VII - Numero 1

CoMe
Studi di Comunicazione e Mediazione linguistica e culturale

Anno VII/2022

N. ISSN 2531-9809

rivista scientifica edita dalla
Scuola Superiore per Mediatori Linguistici di Pisa

www.comejournal.com
come@mediazionelinguistica.it

INDICE

KATELL DROUET

Institut de Recherche en Sciences et Technologies du Langage, Mons

katell.drouet@student.umons.ac.be

Using Eye-tracking to Study the Reading Pattern of Subtitles and Cognitive Load in Video game Players: A Pilot Study.

Abstract

Subtitles have long been investigated in the field of audio-visual translation as a potential source of Cognitive Overload (Sweller, 1988; Sweller & Chandler, 1991). If literature tends to confirm that films with subtitles do not cause any Cognitive Overload, and could sometimes improve learning, (Baranowska, 2020), no studies have been conducted evaluating the effect and relevance of subtitles in video games. There would be much to be found on the needs of video games players, particularly with the focus of accessibility for deaf and hard of hearing audiences who need subtitles to follow the dialogues. To investigate the effect of the interaction variable, we conducted an experiment which uses eye-tracking to measure the fixation times and follow the movement of the pupil of five male subjects who were familiar with video games and have observed a significative behavioural difference between sequences with and without interaction, as subjects were all ignoring the subtitles at the bottom of the screen when active in gameplay. This preliminary study shows promising results that need confirmation by a larger study with a larger sample size and more diversity in the background of the subjects.

Keywords: *Cognitive overload, Media accessibility, Eye-tracking, Video game subtitles, Subtitling*

Introduction

If the available literature on audio-visual translation has already explored the topic of cognitive load in relation with subtitles at large, this very same theme applied to subtitles in video games remains unknown. Yet, there would be much to investigate in terms of cognition when a subject is faced with subtitles in an environment where they are intended to interact. Indeed, most of the literature, if not all, available on the relation between cognition, specifically the concept of Cognitive Overload as theorised by John Sweller in 1988 (Sweller, 1988: 276) treats the ability to read subtitles and its impact on the cognitive load of a subject within the framework of static and passive video observation. Despite our best effort, we were not able to find any article in the available literature investigating the differences that might exist between simply simultaneously watching a video and reading text and the cognitive requirements of video games.

According to Sweller (1988), the 'Cognitive Overload' theory suggests that the human brain is only capable to receive and treat so much information at once. Once received through the different sensory organs, the sensory stimuli will access the 'working memory', also called 'short term memory', whose task is to analyse and transmit this information to the 'long term memory'. A 'Cognitive Overload' happens when the number of stimuli arriving to the 'working memory', which can no longer analyse every information received, will shut down a number of stimuli prioritising quality of treatment over quantity of treatment. In a Cognitive Overload scenario, the subject will simply ignore those shut down stimuli, which will never reach long term memory (Sweller 1988: 261). In the case of subtitles, there has been several inquiries investigating the possible involvement of subtitles on Cognitive Load in videos and films, since a spectator will have to watch, listen, and read at the same time. So far, most of the literature seems to disprove the idea that subtitled films and videos add to the cognitive load in a detrimental manner, both in the case of intra and inter-

lingual subtitling. A few studies, notably Kruger, Hefer & Matthew (2013), Baranowska (2020) and Szarkowska & Gerber-Morón (2018) tend to confirm the absence of Cognitive Overload in subjects confronted with subtitled video streams, both inter and intra-lingual, and even a reduced Cognitive Load in foreign language learners (Baranowska, 2020: 110). According to Szarkowska & Gerber-Morón (2018), the human eye is even capable of following a subtitling speed up to 12 characters per second (most norms advising to keep to a 15 character per second speed for improved comfort of the viewer, with Netflix norms allowing up to 20 characters per second when it comes to English subtitles for the deaf and the hard-of-hearing).

When it comes to those principles applied to the reading ability of viewers in an interactive environment as are video games, there is unfortunately no available literature investigating the effect of a new variable added to the already observed effects of subtitles on Cognitive Load.

The current trend in the video game industry is to display subtitles the same way it is usually provided in the film or television industry, at the bottom-centre of the screen. A set of guidelines based on factual data and relevant to the cognitive needs of players could help the industry a great deal to provide better inclusivity contents and meet the needs of a broader audience.

For the sake of simplicity, this research deals with the players' cognitive response to in-game subtitles with audio dialogues, as opposed to phylactery type subtitles that the player can skip and read at their own pace.

Based on Sweller's (1988) and Chandler and Sweller's (1991) Cognitive Overload Theory, and on the conclusions of the current literature on the relation between subtitles and cognitive load, we shall here evaluate the automatic behavioural response of video game players in an interactive game sequence, in order to determine if the way the industry currently displays subtitles allows the cognitive processes to follow both the action on screen and the scenario. We expect three possible outcomes to this experiment:

- Hypothesis 1: The player's gaze will be unequivocally drawn to the subtitle line and may distract the player.
- Hypothesis 2: The player's gaze will not always be drawn to the subtitles, and those will only cause minor distraction.
- Hypothesis 3: The player's gaze will not be drawn to the subtitles at all.

1. Methodology

1.1. Sample:

This preliminary research experiment used a sample of 5 adult male subjects aged 23 to 32 (m=26,4) who all declared having a high level of familiarity with the video game medium, and to play First Person Shooter type games less than 5 hours a week. All participants were selected from the IRSTL institute and ISIA Lab at the University of Mons, Belgium, and volunteered for the experiment. Of the participants, one was short-sighted, and another suffered from hyperesthesia, but orally declared it did not impede his ability to follow the experiment. All participants were Native French Speakers.

1.2. Material:

A 25-minute-long sequence was selected from the game *Borderlands: The Pre-Sequel* published in 2014 by Gearbox Software and developed by 2K Australia. It corresponds to the introductory sequence of the game. The sequence was presented with French audio and French subtitles.

Two questionnaires were filled by the participants, the first being a familiarity questionnaire aiming to sort the participants according to their gender, age, and level of proficiency and familiarity with video games. The second is an evaluation questionnaire and aims to receive the impressions and perception of the subjects when it came to the subtitles in the sequence. This questionnaire is composed of four items, with the goal to investigate the subjects' perception of subtitles situationally in an interactive and busy environment. For each item, some space was left blank to allow the participants to give their personal impressions related to its relevant item. The first offered to rate on a 5-point Likert Scale the feeling of the subjects had of needing the subtitles to understand the dialogues and the story (1=not at all, 5=absolutely). The second required the subjects to answer a 'yes' or 'no' question whether the subtitles in the game correspond, in their opinion, to the norms usually applied by various audio-visual media. The third and last item asked the subjects to rate on a Likert scale similar to the first item whether they felt their gaze was 'drawn' to the subtitles against their will, as a means to judge whether the feeling was confirmed by the factual observations or not.

The participants were equipped with a non-invasive 'Pupil Labs' eye-tracking device composed of a pair of lens-less glasses with a series of cameras on the side and at eye level to capture the movement of the pupils of the wearer in relation to the position of the side-camera. Participants were then placed in front of either a laptop screen or a television screen where the game could be seen. The screen was outlined by a series of QR codes aiming to mark out an AoI (Area of Interest), as seen in Figure 1, for the eye-tracking software to calculate various sets of data. This setup allowed us to measure in real-time the movement of the eye of the players all along the recordings, as well as their fixation time and spots on the AoI in the form of heatmaps at a given time *T*.

Five recordings, 00:24:59 to 00:30:47 (*m*=00:26:34) in length, were obtained with this setup. However, one video-test had to be completely excluded from the corpus due to myopia correction of the subject. This correction caused a warp in the line of view of the inner camera of the device, rendering the possibility to follow the movement and fixations of the eye impossible. Out of the four remaining recordings, only one was obtained in the optimal conditions to capture and measure the fixation heatmaps (Figure1). Two others allowed for usable measurements but were slightly too imprecise, due to being captured on a smaller screen, to serve as illustrations. The last recording can serve to measure the movement of the pupils on the full length of the video, but not AoI could be determined by the software. Three of the remaining recordings were captured on a 16' laptop screen at a distance of 40cm, and the last, which will be known as 'reference recording', or *RR*, was captured on a 55' television screen at a distance of about 1.5 metre. Unfortunately, no session could be allowed for any tests due to time constraints, so the configuration and details of the experiment setup were adjusted along the way.

1.3. Procedure

We have defined an Area of Interest (AoI) corresponding to the area delimited by the QR codes surrounding the projection screen, in order for the software to calculate the average gaze fixation time on the duration of a defined 'event'. The very centre of the AoI corresponds to the reticule of the game, or the pointer a player uses to determine the aim of their avatar. At the bottom-centre of the AoI are the subtitles, and at the top, right-hand corner is a mini map that needs to be defined as a way to recognise some eye-movement patterns. Various sequences, called 'even', were

selected on the RR due to their relevance in the behavioural observation of the player in terms of possible reaction to the usual stimuli that a First Person Shooter (FPS) game sends toward the player; this in relation to the subtitles on screen at the same time. We have divided those sequences in two axis: the 'Sequence Type', or the action involvement of the subject, that can be either 'Cutscenes' (where the player does not have control of their avatar, and act like films or videos), or 'Gameplay Sequences' (where the player is in control of the avatar and must react in real-time to the stimuli on screen); and the 'Cognitive Investment' of the subject, either 'Active' or 'Passive' depending on whether the player must immediately react to stimuli, or if their need to react is diminished or if they lose control of their avatar. Only three of the possible combinations appear in this study, 'Cutscene-Passive', 'Gameplay Sequence-Active' and 'Gameplay-Sequence-Passive'. The 'Cutscene-Active' combination is much more unusual in the video-game medium, since it would require the player to be fully cognitively invested in what abides to a film in order to interact with it, which is only observable in some genres like visual-novels or cutscene games. However, we can still draw some preliminary conclusions by inferring from the analysis of the other three combinations.

1.4. Data Collection

The fixation times of a subject's gaze on the AoI is defined by heatmaps delimited by the QR codes surrounding the area of the screen we want to study. These heatmaps are calculated by measuring the average fixation time of the eye on pre-determined 'events' and appear as coloured purple to yellow spots. The more the colour draws towards a light yellow, the longer the fixation time, meaning that the gaze of the subject stayed for a prolonged time on this specific spot of the AoI. On the entirety of the recording presenting the optimal setup, we have defined a series of these "events" and applied an enrichment provided by the Pupil Labs website to create the heatmaps.

This same software allows us to follow in real time the movement of the pupil of a subject in the form of linked numbered points showing the order in which the eye of the observer moved on the area captured by the lateral camera. Unlike the heatmap enrichment, this feature is not limited to the AoI, but covers the entirety of the field of view of the lateral camera. We used these points not as a way to measure an average behaviour, but rather to follow in real-time the movements of the pupil at any given time *T* within the already defined events and estimate the reaction behaviour and time whenever a line of subtitles appears on screen and compare it to the data of the heatmaps.

The events were as follows, in order of appearance:

- Full Recording
- Introduction Cutscene
- First Gameplay Sequence
- Second Gameplay Sequence
- Third Gameplay Sequence
- Cutscene 2 – Full
- Cutscene 2 – Jack Alone
- Cutscene 2 – Enemies
- Title Card
- Fourth Gameplay Sequence

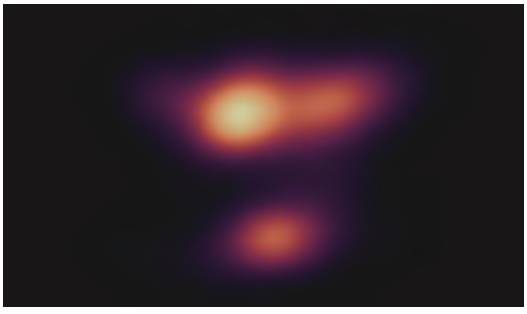
- Sixth Gameplay Sequence
- Gameplay Stops
- Tutorial Text
- Seventh Gameplay Sequence
- Moving

1.5. Data Analysis

The average heatmaps of the RR shows that the average fixation of the subject was unambiguously concentrated on the centre of the AoI, or at the level of the reticule (Figure 2).

Therefore, the gaze of the subject seems to be mainly focused on the centre of the screen, as was theorised by Kurzhal et al (2017: 6559). When analysing the various 'Game Sequence' events, those that have been tagged as 'Active' at least, a similar pattern (Figure 3) can be observed. This could mean that when the player is cognitively involved in the game, ergo when they must interact with the stimuli sent their way, their attention is fully concentrated on the aiming reticule, and it would seem that they ignore the subtitles.

However, during a 'Passive' sequence, whether it is a 'Cutscene' type or 'Gameplay Sequence' type, the fixation pattern changes. During cutscenes, the fixation spectrum is much more spread on the AoI than it is in game sequences, and a clear line is visible at the bottom, where we established the subtitle line sits (Figure 4). This could mean that during a passive event, the viewer has the time they need to both listen to the audio dialogue, but also to follow the subtitles. According to Kurzhal et al (2017), it could also be possible that subtitles act as a magnet for the gaze of a viewer, as "with the tendency to read text even when the audio language is known, the viewer has to foveate the respective region at the bottom of the screen to read." (KURZHAL ET AL, 2017: 6559). A similar behaviour can be observed to a lesser extent during Gameplay Sequences with low cognitive investment, that we would in this study consider as 'Passive'.



The observation of these heatmaps allows us to outline certain behavioural patterns. During active gameplay sequences, the player seems to favour attention and reactivity to the various stimuli sent their way, and since their brain might be in Cognitive Overload, they prioritise the treatment of information immediately relevant to their goal and needs, completely outclassing subtitles, in accordance with Sweller's Cognitive Overload theory (SWELLER, 1988: 276). This effect might even be enhanced by the ability of the player to hear the dialogue in their mother tongue, rather than having to rely on the subtitles to understand their content and follow the story. However, the evaluation forms

filled by the participants tend to confirm the overload hypothesis, since most have reported being mostly able to follow the scenario without help from the subtitles, but still felt as if they would be unable, by the end of the sequence, to relay all the details of the story given to them that far.

During Gameplay sequences, the gaze of the player is almost exclusively fixated on the centre of the AoI. However, on a few occasions, a slight variation towards the mini map at the top right-hand corner of the AoI can be observed. Which of the 'Gameplay Sequences' it concerns varies from subject to subject, but it seems to be a regularity amongst players. As a side note, it seems to show that, when playing, the perception of space is different from outside of the game. Players seem to visualise the world within the game as if they were taking the avatar's place within the environment. Therefore, to turn and see around them, they will rather turn the avatar itself within the game environment, rather than move their gaze on the surface of the screen, outside of the virtual environment. However, when it comes to elements outside of the field of view of the avatar, such as the health bar, the ammunition or, in our case, the mini map, players perceive it as outside of the game, outside of the immersion, and therefore can move their eyes on the AoI to get the in-game information they need.

The observation of the movement of the pupil on the AoI also offers some insight on the cognitive logic of the gaze. During the cutscene sequences, notably the introduction cutscene, the eye of the subjects tends to be locked on the centre of the screen, with slight variations and movements to décor elements that might have been put there by the creators to draw attention. In the introduction cutscene, the first reaction of the gaze is to travel from building to building, exploring the AoI and the environment. As soon as characters appear on screen, the behaviour changes in every recording: players make a sudden movement towards the figures when they appear, and towards the faces when they become visible. From the face, eyes then explore the environment, until a line of subtitles appears on screen, which immediately catches the attention of the subjects, who then read the line, to finally return to exploring the AoI (Figure 5). Thanks to this observation, we now have a referential to compare the different cognitive behaviours between the game sequences we have already defined and isolated. The basic movement of the eyes during a cutscene can be summarised as follows:

- The gaze follows the faces of characters or notable background elements when no character appears on screen.
- The gaze travels down-screen to the subtitle line shortly after it appears.
- The gaze returns to faces and background elements when the subject is done reading.

The moment the player switches to an 'Active' cognitive involvement, their behaviour changes completely, as observed on the various heatmaps. During 'Gameplay Sequences,' the dotted lines remain almost exclusively on the centre of the AoI, though this feature allows to witness some very subtle and punctual movements towards other elements around the reticule. Therefore, the subject is not entirely and exclusively fixated on the reticule, but they also investigate some other possible sources of stimuli and remain alert to possible changes in their peripheral vision. Players seem to favour indirect eye-contact and peripheral vision to receive outside stimuli. However during the first and second gameplay sequences, the player will unequivocally ignore the subtitles as soon as they directly interact with the game. This can be observed in both instances of gameplay. Unlike in the cutscenes, there is no movement done towards the bottom of the screen, even when subtitles appear on the AoI. When the player is out of a combat situation, their cognitive investment appears to be focused on the observation and surveillance of décor elements, looking for points of

interest or possible perturbators (enemies or interactions). The moment the game ceases to be interactive, the behaviour previously observed during the introduction cutscene returns, and the player is more keen to reading the subtitles.

During 'Passive Gameplay Sequences,' the cognitive investment of the player is somewhere in between. The perceived absence of immediate stimuli makes it so the subject takes more time to care for other elements, including subtitles, the same way they did during the 'Passive Cutscene.' However, when still in a Gameplay Sequence, the points of interest of the player will be slightly different from the ones of the Cutscene: the movement of the gaze is less ample than in Cutscenes, and the occasional divergence from the central-area focused pattern will usually be located on the mini-map, in the top right-hand side of the AoI, rather than on any décor elements. If it does not always appear on heatmaps, the fact that this phenomenon happens repeatedly (though not long enough for the fixation to be registered by the software) shows how prevalent this behaviour is. These 'breaks' in the action of the game appear to be used by the player's brain as a way to register the environment and understand the goals of the scenario.

2. Discussion

Referring to Sweller's Cognitive Overload Theory, when a video game player is active in the interaction of the game, then their brain is indeed in a state of Cognitive Overload. Due to their engagement in the game, and in order to respond instantly to the various stimuli on screen (including audio-clues and dialogue), players will usually forego the reading of subtitles. Therefore, intra-lingual subtitles are completely ignored by the cognitive functions, as it is superfluous for a hearing French-speaking audience. This allows us to answer the hypotheses:

- Hypothesis 1: 'The player's gaze will be unequivocally drawn to the subtitle line and may distract the player.' During Gameplay Sequences, the attention of the player is fully focused on reacting to visual and auditory stimuli and remains fixed on the very centre of the AoI, within the reticule. The player also appears to favour moving the avatar within the game environment rather than moving their eyes and attention on the screen (with small exceptions for out-of-game information, such as map and interface) to visually explore the game environment. Since the map and interface cannot move, they are considered by the brain as 'in front' of the game.

- Hypothesis 2: 'The player's gaze will not always be drawn to the subtitles, and those will only cause minor distraction.' According to the eye-tracking results obtained here, the player's gaze is not necessarily drawn to the subtitle line at the bottom of the screen, particularly in gameplay. The 'distraction' effect of the subtitles is also mitigated, as none of the subjects have reported any perceived sensation of looking at the subtitles when they were playing. Therefore, the subtitles do not seem to constitute any distraction whatsoever during gameplay phases, and go as far as to be ignored, unlike in cutscene of 'passive' sequences, where they act as a magnet to the gaze, as the cognitive load lowers.

- Hypothesis 3: 'The player's gaze will not be drawn to the subtitles at all.' This hypothesis seems to be the best matching with the experiment's results. Though it must be nuanced that if the player's gaze is indeed not drawn to the subtitles during gameplay, it is still the case for cutscenes and 'passive' gameplay. Since the subject's brain is mainly focused on reacting to stimuli, the positioning of subtitles at the bottom centre of the screen does not seem to suit the actual needs of the player. Since the player's gaze is almost exclusively focused on the centre of the AoI, it might be relevant for the industry to rethink their linguistic and accessibility features to match the cognitive needs of the public more efficiently.

The cognitive behaviours of video game players can be summarised by sorting them on two axes: Gameplay Sequence Type and Cognitive Investment (Table 1). If the behaviour is comparatively similar between the three categories Cutscene-Active, Cutscene-Passive (allegedly) and Gameplay-Passive, a stark shift in the behaviour of the player in the category Gameplay-Active can be observed. Since the goal of any given video game, and what makes them so different from films or series, is to offer an interactive experience, then it would seem logical to consider this last aspect as a priority over the others, particularly if the video game intends to cater to a deaf audience (who need the subtitles to follow the dialogue). Besides, even when considering a broader spectrum of players, the current position of subtitles at the bottom centre of the screen does not suit the actual behaviour of players, who mostly remain focused on the centre of the screen. A solution similar to that investigated by Kurzhal et al (2017), which consists in placing the subtitles close to the face of the speaker, may offer interesting perspectives to be formally investigated.

Cognitive Investment / Gameplay Sequence Type	Active	Passive
Cutscene	Subtitles are followed and player's attention goes from exploration of the background to other notable elements (character faces and/or background elements)	Subtitles are followed and player's attention goes from exploration of the background to other notable elements (character faces and/or background elements)
Gameplay	Gaze is fixated on the centre of the AoI and ignores the subtitles.	Subtitles are followed and player's attention goes from exploration of the background to other notable elements (character faces and/or background elements), and on interface information.

Table 1: Summary Table of the Observations made during tests, depending on the required Cognitive Investment and Gameplay Sequence.

When it comes to research limits, the size of the sample is far from ideal to yield any generalising results due to time and material constraint. With only five participants, among which two had to be cast aside from the data, it is impossible to apply results to the majority of the population. From follow up discussions between the subjects and the researcher, another limitation has emerged: the knowledge of the topic might have influenced their actual behaviour, and that they might have paid more attention to the subtitles than they normally would in a casual setting.

Since the entirety of the participants have declared being familiar with video games, a control group composed of people with little to no experience with the medium could be envisaged, as a way to see whether familiarity is a relevant variable in the ability to follow subtitles in an interactive environment. A paradigm using an EEG device can also be envisaged, as a way to visualise cerebral activity in the situation investigated in this research, alongside the already used eye-tracking and possibly pupillometry as recommended by Kruger (2013). This equipment can provide valuable

data on potential Cognitive Overload in video-game players as it would allow for comparison of various data sets with specific focuses.

3. Conclusion

Unlike what has been investigated in audio-visual research until now, it seems that video-game subtitles do cause cognitive overload in users. The results of this experiment show that players seem to ignore subtitles once they become active in the game to focus more on the stimuli sent their way. A major behavioural difference could be observed thanks to the contrast in gaze fixation between four investment categories, depending on the 'Sequence Type' and the 'Cognitive Investment', as seen in Table 1: Active Cutscene Sequence, Passive Cutscene Sequence, Active Gameplay Sequence and Passive Gameplay Sequence. Cinematic sequences, which can be compared to films, have confirmed the observations of the available literature on subtitles and cognitive load. However, the observation of gameplay sequences where the player needs to be active yielded results showing a completely different behaviour, as the player's gaze stops moving around the screen and focuses solely on the centre of the AoI, with only very small variations towards interface elements. Across all investigated recordings, the subtitles were ignored during gameplay sequences.

If the observation of a wider range of players and a larger sample could yield more precise results and a better average behaviour of players, this research shows that there is indeed a specificity to the way video-game players react to subtitles. The way the industry currently offers subtitling is not relevant to the actual needs of the audience, at least when it comes to subtitles used to translate or offer a non-audio version of the in-game dialogues. Thanks to questionnaires filled by the participants, none of the subjects have felt a need to use the subtitles to understand the story, despite some difficulties to render the full picture by the end of the experiment. Still, observations did confirm that, to the average video-game player, subtitles do not constitute an obstacle to the player's involvement in the game, as they are simply ignored. However, it does bring up the question of the relevance for hearing audience of the bottom-centre display currently in use by the industry. The industry may then rethink the way they provide accessibility content to better match the specificities of the medium to better the accessibility of video games for a wider range of players and include the deaf and hard-of-hearings.

Bibliography

BARANOWSKA, K. (2020). "Learning most with least effort: subtitles and cognitive load", in *ELT Journal*, *74*(2), pp. 105115. https://doi.org/10.1093/elt/ccz060

CHANDLER, P., & Sweller, J. (1991). "Cognitive Load Theory and the Format of Instruction", in *Cognition and Instruction*, *8*(4), pp. 293332. https://doi.org/10.1207/s1532690xci0804_2

KARAMITROGLOU, F. (1997). "A Proposed Set of Subtitling Standards in Europe", in *Translation Journal*.

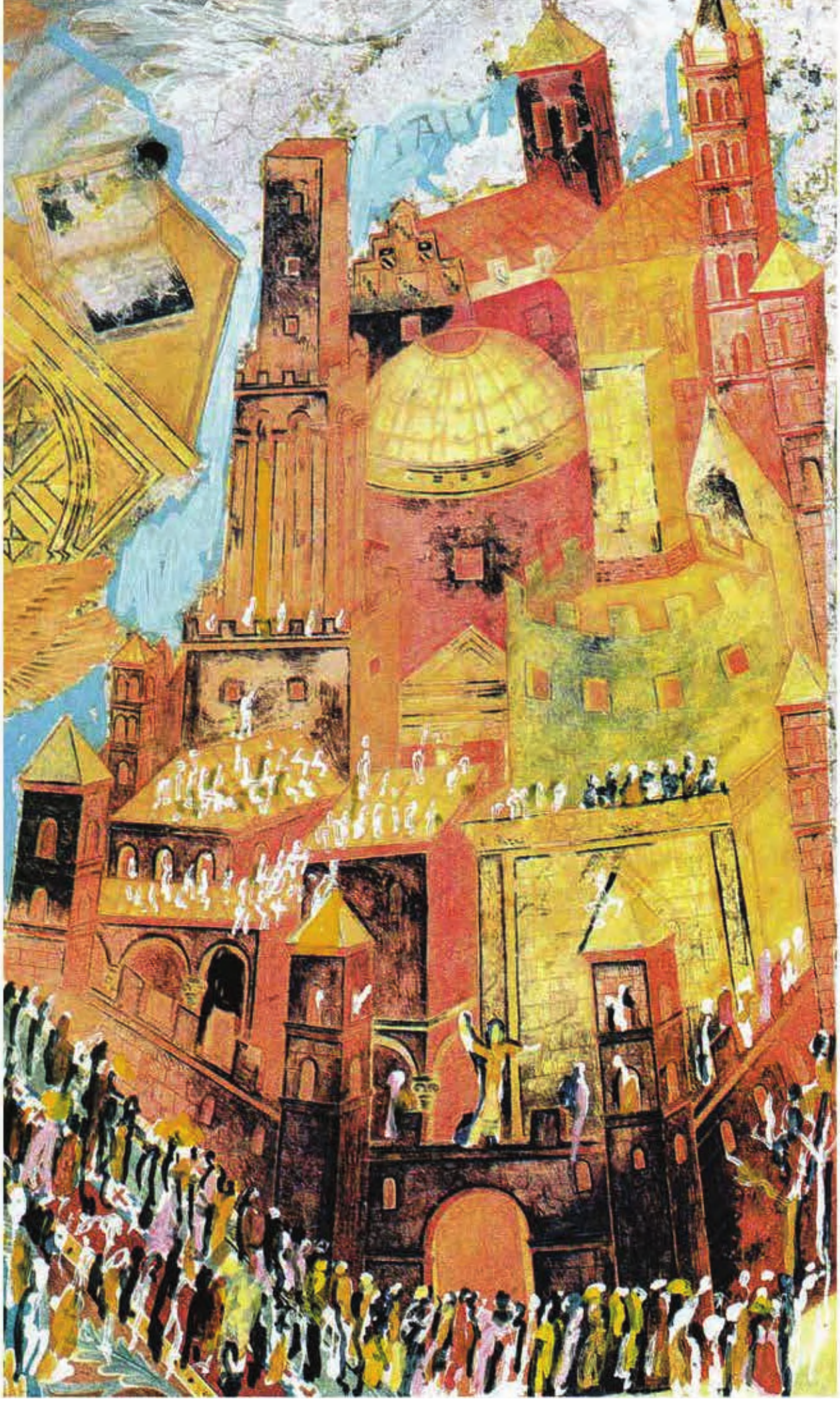
KRUGER, JL., HEFER, E., MATTHEW, G., (2013), "Measuring the Impact of Subtitles on Cognitive Load: Eye Tracking and Dynamic Audiovisual Texts", in *Proceedings of Eye Tracking South Africa*, pp. 62-66, https://www.researchgate.net/publication/262296072_Measuring_the_impact_of_subtitles_on_cognitive_load_Eye_tracking_and_dynamic_audiovisual_texts

MANGIRON, C. (2013). "Subtitling in game localisation: a descriptive study", in *Perspectives*, *21*(1), pp. 4256. https://doi.org/10.1080/0907676x.2012.722653

MANGIRON, C. (2016). "Reception of game subtitles: an empirical study", in *The Translator*, 22:1, pp. 72-93, DOI: 10.1080/13556509.2015.1110000

SWELLER, J. (1988). "Cognitive Load During Problem Solving: Effects on Learning" in *Cognitive Science*, *12*(2), pp. 257285. https://doi.org/10.1207/s15516709cog1202_4

SZARKOWSKA, A., & GERBER-MORÓN, O. (2018). "Viewers can keep up with fast subtitles: Evidence from eye movements" in *PLOS ONE*, *13*(6), e0199331. https://doi.org/10.1371/journal.pone.0199331



"La concione a Bologna" (Dario Fo, 1999) per gentile concessione dell'archivio Rame - Fo ***www.archivio.francarame.it***

unicación y Mediación lingüística y cultural 言語文化コミュニケーション学 Études en Communicatio
化中介 **Studies on Communication and Linguistic and Cultural Mediation** Исследования в области
uistique et culturelle 语言学与语言文化中介 Studies on Communication and Linguistic and Cultura
оммуникации, языковое и межкультурное посредничество **Estudos de Comunicação e Mediação**
e Comunicação e Mediação Linguística e Cultural Zeitschrift für Kommunikations- und Translationsw
linguistique et culturelle **语言学与语言文化中介** Studies on Communication and Linguistic and Cul
ommunication et Médiation linguistique et culturelle Studi di Comunicazione e Mediazione linguisti
e Mediazione linguistica e culturale دراسات في الإتصال و الوساطة اللغوية الثقافية Estudios de comunicación
Исследования в области коммуникации, языковое и межкультурное посредничество
ios de comunicación y Mediación lingüística y cultural 言語文化コミュニケーション学 Études en Com
Mediazione linguistica e culturale دراسات في الإتصال و الوساطة اللغوية الثقافية Estudios de comunicación
os de comunicación y Mediación lingüística y cultural **言語文化コミュニケーション学** Études en Com
语言学与语言文化中介 Studies on Communication and Linguistic and Cultural Mediation Исследо
ミュニケーション学 **Études en Communication et Médiation linguistique et culturelle** 语言学与语
Исследования в области коммуникации, языковое и межкультурное посредничество Estudos d
ество **Estudos de Comunicação e Mediação Linguística e Cultural** Zeitschrift für Kommunikations- u
urelle 语言学与语言文化中介 Studies on Communication and Linguistic and Cultural Mediation Ис
Mediação Linguística e Cultural **Zeitschrift für Kommunikations- und Translationswissenschaft**
Cultural Zeitschrift für Kommunikations- und Translationswissenschaft 言語文化コミュニケーション
e et culturelle **Studi di Comunicazione e Mediazione linguistica e culturale** و الوساطة اللغوية الثقافية
nicación y Mediación lingüística y cultural 言語文化コミュニケーション学 Études en Communicatio
e et culturelle **语言学与语言文化中介** Studies on Communication and Linguistic and Cultural Medi
化中介 Studies on Communication and Linguistic and Cultural Mediation Исследования в области
оммуникации, языковое и межкультурное посредничество **Estudos de Comunicação e Mediação**
ación lingüística y cultural 言語文化コミュニケーション学 Études en Communication et Médiation li
ultural **Zeitschrift für Kommunikations- und Translationswissenschaft** 言語文化コミュニケーション
mmunication et Médiation linguistique et culturelle Studi di Comunicazione e Mediazione linguisti
Mediazione linguistica e culturale **دراسات في الإتصال و الوساطة اللغوية الثقافية** Estudios de comunicación
os de comunicación y Mediación lingüística y cultural 言語文化コミュニケーション学 Études en Com
言文化中介 **Studies on Communication and Linguistic and Cultural Mediation** Исследования в обла
ミュニケーション学 Études en Communication et Médiation linguistique et culturelle 语言学与语言
mmunication and Linguistic and Cultural Mediation **Исследования в области коммуникации, я**
ação e Mediação Linguística e Cultural Zeitschrift für Kommunikations- und Translationswissenscha
s en Communication et Médiation linguistique et culturelle 语言学与语言文化中介 Studies on Com
دراسات في الإتصال و الوساط **Estudios de comunicación y Mediación lingüística y cultural** 言語文化コミ
Cultural Zeitschrift für Kommunikations- und Translationswissenschaft 言語文化コミュニケーション
Comunicazione e Mediazione linguistica e culturale **دراسات في الإتصال و الوساطة اللغوية الثقافية** Estudios
nicación y Mediación lingüística y cultural 言語文化コミュニケーション学 Études en Communicatio
化中介 **Studies on Communication and Linguistic and Cultural Mediation** Исследования в области
uistique et culturelle 语言学与语言文化中介 Studies on Communication and Linguistic and Cultura
оммуникации, языковое и межкультурное посредничество **Estudos de Comunicação e Mediação**
e Comunicação e Mediação Linguística e Cultural Zeitschrift für Kommunikations- und Translationsw
linguistique et culturelle **语言学与语言文化中介** Studies on Communication and Linguistic and Cul
ommunication et Médiation linguistique et culturelle Studi di Comunicazione e Mediazione linguisti
Mediazione linguistica e culturale دراسات في الإتصال و الوساطة اللغوية الثقافية Estudios de comunicación