

Supervisor: Ulrike Nederstigt

Second assessor: Béryl Hilberink

CAN WE BUILD IT?

The influence of Dutch subtitle use in Spanish instruction videos on the performance of mimicking the procedural-manipulative task.

Anne Bergmans

S4599098

Radboud University, Nijmegen

07-06-2019

ABSTRACT

Companies are slowly replacing paper instructions for instruction videos. A more cost efficient alternative than producing instruction videos in many different languages, is adding subtitles. Many studies on the effects of subtitles on comprehension have suggested that adding subtitles in combination with verbal audio could cause cognitive overload. In this research the influence of subtitles on the performance of following instructions to build a LEGO house was studied. Participants completed the construction of a LEGO house while watching either the subtitled or non-subtitled Spanish instruction video. The results showed that adding subtitles to an instruction video significantly enhanced the performance of mimicking the task displayed in the video. Furthermore, a gender difference of performance was found; men outperform women in the non-subtitled condition. A reflection of the results based on theories on cognitive overload, split-attention effect, multitasking and spatial ability was performed.

1. Introduction

Over the years, many (international) companies have replaced their paper product instructions for instruction videos. While paper instructions can easily be provided in many different languages, it is substantially more expensive and time consuming to produce instruction videos in as many languages as paper instructions contain. A more cost efficient and less time consuming alternative, is adding subtitles to the instruction video. This ensures that the video can be understood regardless of the proficiency of the viewer in the spoken language. There has been plenty of research on the effects of the addition of subtitles to videos regarding the comprehensibility. However, research specifically focused on the influence of subtitles on the performance of reproducing the task displayed in the video is scarce. Hence, the following research has been conducted.

1.1 Instruction videos

With the rise of the internet and modern technology, the use of videos to acquire more information about a subject or procedure has become more common. These educational videos are often provided in different contexts or produced for different purposes. For example, numerous videos are produced in an academic context, as online learning tools, for educational purposes. According to Hartsell and Yuen (2006), the use of these online learning tools increased rapidly over the past few years. Moreover, within open online courses, the learning tools used most frequently by students are videos (Coetzee, Fox, Hearst, & Hartmann, 2014). These educational videos provide an alternative to the static learning tools, such as textbooks and academic papers. Research on the effectiveness of these educational videos has produced slightly contradicting outcomes. According to Klass (2003), streaming online learning tools such as video and audio, could help increase the comprehensiveness of complex problems and procedures. On the other hand, researchers have suggested that the effectiveness of a dynamic tool over a static equivalent depends on what the person is supposed to learn (Castro-Alonso, Ayres & Paas, 2014). Castro-Alonso et al. (2014) argued that specifically when a person has to mimic a procedural-manipulative task, instructional dynamic visualizations might be more effective than statically displayed instructions. However, they did not think this applied to non-procedural-manipulative tasks, such as learning about a specific topic or concept. Hence, a distinction can be made between two types of educational videos; content videos and instruction videos. Content videos can be defined as videos in which a certain concept or event is explained,

so the student can understand this concept better. This can be for example a video about which parts a motor engine consists of, or a video to help the student learn a foreign language. This type of video is often used in online courses. While instruction videos can be defined as videos in which a certain manipulative task is explained or performed, in such a manner that the person watching the video is able to mimic the task. The use of the latter is increasing amongst companies, as they progressively utilize these instruction videos to elaborate on product use or as a substitute for written instruction manuals. These instruction manuals generally are considered boring and often not read, which could lead to less understanding of the product and complications due to poor construction. A high quality instruction video can be of great value to a company as a replacement for these boring paper manuals. Video sharing websites such as YouTube have provided a platform on which companies can easily reach their customers and help them with the correct use of their products. These instruction videos utilise one of the most effective learning strategies for humans; learning by observing and imitating (Van Gog, Paas, Marcus, Ayres & Sweller, 2009). A study by Van Duijn et al. (2014) even showed that there is no difference in effectiveness of learning cervical psychomotor skills through an instruction video or through face-to-face observation and imitation.

1.2 Dual processing

An important difference between instruction videos and paper manuals is that videos make use of visual aspects as well as audio, in contrast to paper manuals, which only use visual aspects. These differences are connected with how people process information in the working memory. Baddeley (2003), defined the working memory as a system within the brain, with limited capacity, that temporarily stores and processes information needed for complex cognitive tasks. The working memory is needed to store the information one receives from an instruction video or paper manual, when performing the task explained in these instruction carriers. According to the dual processing theory, this working memory has a different processing channel for audio as for visual input (Baddeley, 2003). Moreover, the theory states that receiving input with similar content via multiple channels could improve the comprehensibility of the input (Mayer, 2003). Hence, providing information through the audio as well as the visual processing channel, such as with an instruction video, could be more effective. In the light of this research, it is important to keep in mind the different processing channels for audio and visual information.

1.3 Proficiency

Another important aspect which determines the comprehensibility of instruction videos, is the use of language. The rapid globalization and internationalisation has created a broader target group for many companies, which extends beyond borders. The instruction videos of these companies are therefore widely accessed by people of numerous different countries, who speak different languages. To facilitate all the different costumers within the target group, the instruction videos should be comprehensible for all different nationalities. The languages most often used in instruction videos are either English or the native language of the company itself. If a customer does not understand or is not proficient in these languages, a language barrier might occur, which can restrain the customer's comprehension of the video. According to Van der Zee, Admiraal, Paas, Saab and Giesbers (2017), non-native English students with a higher proficiency of English scored substantially higher on content comprehension when shown an English video, than students with a lower proficiency. Furthermore, a study by Lavaur and Bairstow (2011) on the comprehension of English films related to the language proficiency showed that French participants with a higher English proficiency achieved a higher comprehension of the film than participants with a lower English proficiency. Less comprehension of the instruction video may lead to more errors in reproducing the task explained in the video and incorrect use of products. Hence it is important to make the instruction video comprehensible for people who have a low proficiency in the spoken language. Ideally, to increase the comprehensibility, instruction videos could be produced in different languages. However, this is very time consuming and could be very expensive. Furthermore, companies often do not have enough linguistical knowledge or are not proficient in the different languages their target group speaks, which could lead to bad pronunciation or incorrect translations, of which the latter already can be seen in the paper manuals they use now. This again reduces the comprehensibility of the instructions.

Since many Dutch inhabitants speak or at least understand English, some sort of comprehension of English spoken instruction videos might not be a problem for a substantial amount of the population in the Netherlands. However, the levels of English proficiency differ greatly amongst Dutch citizens, causing differences between the level of comprehension. Furthermore, if a video would be presented in a different language than English or Dutch, for many the comprehension would be far less. An example of the latter would be using Spanish in an instruction video. Although this language is, after English, the most spoken language in the

world, many Dutch citizens do not understand this language. Since this research is focused on discovering if the addition of subtitles is a good option to facilitate people who are not proficient in the spoken language, it is important that differences in proficiency levels will not influence the results. Hence Spanish was chosen as the spoken language of the videos.

1.3 Subtitles

A more cost and time efficient alternative to enhance the comprehensibility of instruction videos could be adding subtitles. However, research into the effectiveness of adding subtitles on increasing the comprehensibility of the video has produced contradicting results. The study by Van der Zee et al. (2017) on learning about biological systems in the human body from English spoken content videos used in Massive Open Online Courses, found no influence of the presence or absence of English subtitles on learning performance of non-native English speakers. Nonetheless, a study by Perego, Del Missier and Bottiroli (2015) on the effect of dubbing versus first language subtitling on comprehension and memory of Italian students showed that first language subtitling can enhance certain aspects of cognitive performance.

Van der Zee et al. (2017) provided several explanations for these conflicting findings based on theories on information processing. Firstly, the findings could be explained with the dual processing theory described earlier, which states that the working memory has separate processing channels for visual and for auditory input. If subtitles are added to an instruction video which already contains other visual features, both the subtitles and the other visual features of the video are processed via the same channel. According to Kalyuga et al. (1999), if more than one source is processed via the same channel, cognitive overload is more likely to occur. Mayer and Moreno describe cognitive overload as a situation in which “the processing demands evoked by the learning task may exceed the processing capacity of the cognitive system” (2003, p. 45). In other words, the processing capacity of the working memory is not sufficient to properly process the information presented which results in a loss of information. According to a study by Fox, Park and Lang (2007), when cognitive overload occurred, people had substantially more difficulty in separating useful new information from un-useful noise. This, could decrease the performance of properly following the instructions in a video.

Secondly, the presence of subtitles in videos requires that a certain part of the visual attention is spent on reading or watching the subtitles, so less attention can be spent on other visual features. This phenomena is called the split-attention effect. A study showed that when videos containing subtitles were displayed, viewers spend a significant amount of time concentrating on these subtitles (Schmidt-Weigand, Kohnert, & Glowalla, 2010). In a study by

Mayer, Heiser and Lonn (2001) on multimedia learning, participants who viewed subtitled or captioned videos with audio, performed less on the retention tests, in which they had to explain the content of the video, than participants who viewed videos without written text, but with audio. Even more negative are the findings of a study by Kalyuga, Chandler and Sweller (1999) on split-attention in multimedia instructions. According to their study, participants who were exposed to a video with subtitles in their first language, replicating exactly what was said in the audio in the same language, did not remember the content as well as participants exposed to a video with only audio.

Thirdly, adding subtitles could lead to verbal redundancy. Verbal redundancy occurs when viewers need to extend mental resources to coordinate the double presented verbal information, when an illustration is explained by the written word as well as the spoken word (Mayer, 2002). The presentation of the same information spoken as well as written could result in cognitive overload, which inhibits learning (Kalyuga, 2012).

Fourthly, not only the quantity of sources processed via the same channel could cause cognitive overload, the complexity of the source as well contributes to creating cognitive load. If the visual features of the video are rather complex or vital for the understanding of the video, paying attention to subtitles could result in missing out on vital visual information. According to Van der Zee et al. (2017), complex videos demanded a significantly higher mental effort of the viewers, compared to videos with a lower complexity level. However, a study by Moreno and Mayer (2002) showed that when the visual features are less complex, audio verbal explanation in combination with subtitles benefits learning.

For this research, it is very important to be aware of the information processing theories mentioned above. Since the instruction videos used in this study will contain a rather complex procedural-manipulative task, adding subtitles could easily result in the occurrence of cognitive overload. Furthermore, when viewing the subtitled instruction video, it could take more effort to perform the task, due to the division of attention evoked by the multiple visual inputs. Moreover, the information presented textually will correspond with the information presented verbally, which could result in a redundancy of information.

1.4 Gender

Another factor which could influence the performance of tasks involving working memory is gender. Several scholars have investigated gender differences in performance of different tasks involving working memory. Firstly, research has shown that there are differences in working memory capacity between man and women (Cochran & Davis, 1987; Speck, Ernst, Braun,

Koch, Miller & Chang, 2000). A study by Speck et al. (2000) showed that women performed significantly more accurately on tasks which activated the working memory than man. In this study the participants were shown sequences of letters and numbers and were asked to identify if the current letter was the same as the letter displayed before, or the letter displayed two before and if the current number displayed was one or two higher than the previous number. Although the reaction time of the female participants was slightly higher than that of the male participants, the female participants outperformed the male participants on all different tasks. Moreover, the results of a study by Cochran and Davis (1987) showed that women performed better than man on working memory tasks about verbal recall. The researchers stated that that the amount of errors made might be related to the working memory capacity. This could indicate that women have a higher working memory capacity as man.

Secondly, research has indicated that there is a difference in performance of spatial related tasks between man and women (De Lisi & Cammarano, 1996; Linn & Petersen, 1985; Terlecki & Newcombe, 2005; Voyer, Voyer & Bryden, 1995). Since the procedural-manipulating task of building the LEGO house requires some sort of spatial ability, this too can be seen as a spatial related task. According to several researchers, men have generally been better in performing spatial related tasks than women, due to their natural spatial ability (Terlecki & Newcombe, 2005; Voyer, Voyer & Bryden, 1995). Terlecki and Newcombe describe spatial ability as a “skill in representing and transforming symbolic or nonlinguistic information through space” and give as an example tasks such as installing electrical equipment (2005, p. 433). Furthermore, research has shown that man are especially better in spatial tasks that require mental rotation (De Lisi & Cammarano, 1996; Linn & Petersen, 1985). Mental rotation can be described as “the ability to imagine how an object or array would appear after being revolved for a specified number of degrees around an imaginary axis in a specified direction” (De Lisi & Cammarano, 1996,p. 352). Mimicking a procedural-manipulative task from an instruction video often involves some form of mental rotation. Since the task in the instruction video of this research is demonstrated by another person and since the person mimicking the task is not able to observe it from the point of view of the person demonstrating the task, the observer should imagine what the task looks like from that point of few while mimicking. Since men generally outperform women on mental rotation task, it could be reasoned men would have an advantage over women in performing the procedural-manipulative task according to the instructions displayed in the instruction video.

For this research, it is very important to be aware of the possible different advantages man and women could have in the performance of mimicking the procedural-manipulative task

presented in the instruction video. On the one hand, men might perform better due to their natural spatial ability and higher performance on mental rotation tasks. On the other hand, when the video contains subtitles, women might perform better because they generally perform better than men when cognitive demand is increased. Whether these advantages specifically influence the performance of mimicking the procedural-manipulative tasks displayed in instruction videos, has not been researched yet. Hence this subject is added to this research.

1.5 Research questions and hypothesis

This study will focus on gaining more insight on the influence of first language (L1) subtitling in instruction videos on the performance of mimicking the task displayed in these videos. The choice for the focus on language influence on instruction videos was based on the possible value for multinational companies. Many companies, such as IKEA or Miele, already frequently make use of instruction videos on YouTube or other video sharing websites to replace the printed instruction manuals for their products. To overcome the language barrier the instruction videos propose for certain customers, they now use different methods: from dubbing or subtitling to no language use at all. The choice to investigate the influence of the presence or absence of subtitling derived from the fact that this is a relatively cheap and easy method for overcoming language barriers. Furthermore, research on whether adding subtitles to instruction videos enhances the performance is scarce.

Based on the theory and reasons displayed above, the researchers have chosen the following research question (RQ1);

RQ1: What is the influence of the presence of L1 subtitling in Spanish instruction videos on the performance of Dutch participants on mimicking the procedural-manipulative task displayed in the video?

The instruction videos make use of subtitles as well as other visual features, which are both processed via the same channel in the working memory. Due to the use of subtitles as well as other visual information, cognitive overload might occur. The first hypothesis (H1) will therefore be in agreement with the theory on working memory, cognitive overload, verbal redundancy effect and the split-attention effect presented before. Hence the first hypothesis states;

H1: L1 subtitling in Spanish instruction videos reduces the performance of Dutch participants on mimicking the procedural-manipulative task displayed in said videos.

For the second research question (RQ2) this study will focus on the differences of working memory capacity and performance on mental rotation task based on gender. The choice for this focus was mostly based on the absence of previous research on this specific topic. In addition, this choice was made based on the possible relation gender differences in working memory capacity could have on how well instruction videos are processed, which may influence choices a company makes for certain products. For companies producing instruction videos for which the target group mainly consist of one gender, it could be important to be aware of possible differences in information processing and if this influences the capability of reproducing the task displayed in the video.

Based on the theory and reasons displayed above, the researchers have chosen the following research question (RQ2);

RQ2: What is the effect of gender on the performance of Dutch participants on mimicking the procedural-manipulative task displayed in (L1 subtitled) Spanish instruction videos?

Female as well as male participants both have advantages which might increase their performance of correctly performing the instructions displayed in the videos. However, when subtitles are used in the video, the advantage regarding working memory capacity of the female participants is expected to exceed the advantage of spatial ability of the male participants. Based on this assumption and in agreement with the theory about working memory capacity displayed above, the second hypothesis (H2a) states;

H2a: Female Dutch participants will score higher on the performance of mimicking the procedural-manipulative task displayed in L1 subtitled Spanish instruction videos than male Dutch participants.

Solely focussing on the non-subtitled instruction videos, the researchers expect the contrary for the second hypothesis (H2a). Since participants watching the non-subtitled videos do not have to process multiple input via one channel, cognitive overload is less likely to occur. Furthermore, this would make the working memory capacity advantage of female participants redundant. Based on the research on gender differences in performance of spatial related tasks and mental rotation tasks, the third hypothesis (H2b) states;

H2b: Male Dutch participants will score higher in the performance of mimicking the procedural-manipulative task displayed in the non-subtitled Spanish instruction video than female Dutch participants.

2. Method

2.1 Materials

The instruction videos display a woman building the house of LEGO bricks. The camera only filmed the upper body and arms of the women, so her head was not visible. Firstly, the women in the video points out the different colours and then the shapes of the bricks she is using. Secondly, she states that the house will consist of ten different layers and that she will explain the construction of the house layer by layer. Hereafter, she starts constructing the house, while explaining which bricks to use. The women does not use all the bricks displayed on the table for constructing the LEGO house. The duration of the videos is four minutes and 22 seconds.

The instruction video was filmed in a slightly high angle perspective; viewing the object of filming from a higher position than the object itself. The camera is faced towards the woman, so the participants view the construction of the house as if they are sitting across her. Figure 1 displayed below, shows the perspective in which the instruction video was filmed.



Figure 1. Image of a screenshot of the beginning of the instruction video with subtitles.

The language of instruction used in the videos is Castilian, the official Spanish language. It is important that the participants are not proficient in the spoken language in the instruction video because this could influence the comprehension of the video. The Castilian language was chosen due to the large quantity of Dutch citizens who do not speak or understand this language, to eliminate the possible influence of language proficiency of the spoken language on the performance of the participants. Furthermore, this assured that the collection of adequate participants did not oppose many difficulties, because finding participants not proficient in Spanish was not difficult.

The two instruction videos are exactly the same except for the presence of subtitles in one version of the videos. To eliminate the influence of language proficiency, the subtitles were provided in the first language of the participants (Dutch), assuming that all participants had a sufficient level of their mother tongue. The subtitles corresponded identically with the spoken language in the instruction video, however were in Dutch. Furthermore, the subtitles were displayed in white, with a black contour.

The participants received a set of LEGO bricks similar to the one used in the video, except it contained a few extra bricks. The set consisted of a green building plate, six pieces of white bricks, nine green bricks, 19 yellow bricks, 20 blue bricks and 21 red bricks. These bricks could have two different shapes; rectangular with eight nods or square shaped with four nods. Four of the white bricks, two of the green bricks, eight of the yellow bricks, nine of the blue bricks and twelve of the red bricks had a rectangular shape (eight nods). The other bricks were square shaped (four nods).

2.2 Subjects

The researchers aimed to collect a sample of participants of different ages, occupations and with a rather equal division of male and female participants to be able to represent the Dutch population as well as possible. The study was conducted amongst native Dutch participants between the age of 17 and 79 years old ($M = 29.90$, $SD = 15.48$). A sample of 103 participants was collected within a period of 3 weeks' time, of which 55 were male (54%) and 48 female (46%). Overall, the female participants ($M = 29.57$, $SD = 15.53$) were slightly younger than the male participants ($M = 30.18$, $SD = 15.58$). Furthermore, the participants had a wide range of educational levels. 44 participants had an university degree (42%), 34 an HBO degree (32%), 20 a MBO degree (19%) and 5 participants were still attending high school (5%). Most of the participants were collected in the region of Nijmegen, since this was be the main location of the execution of the experiment. The participants were approached via email, on the street or personal connections to the researchers. Only participants who had no prior knowledge of the Spanish language were selected for this experiment.

Of the 103 participants 53 participants were shown the subtitled instruction video, of which 28 (53%) were male and 25 (47%) were female. The participants were between the age of 17 and 79 years old ($M = 28.27$, $SD = 14.80$). The other 50 participants, of which 27 (54%) were male and 23 (46%) were female, were shown the instruction video without subtitles. The participants were between the age of 17 and 73 years old ($M = 31.60$, $SD = 16.14$).

The participants in the subtitled and non-subtitled group did not differ by gender [$X^2(1) = .014, p = .905$]. Furthermore, the subtitled and non-subtitled group did not differ by age [$t(100) = 1.09, p = .280$]. On the other hand, the participants in the subtitled and non-subtitled group differed significantly by educational level [$X^2(3) = 7.892, p = .048$]. In the subtitled condition there were significantly more participants with an university degree (56%) and significantly fewer participants with an MBO degree (11%) than in the condition without subtitles (30%, 28%).

2.3 Design

The experiment consisted of a 2 (video type: with subtitles or without subtitles) by 2 (gender; male or female) between subject design, which resulted in four conditions; male participants watching a subtitled or non-subtitled video, female participants watching a subtitled or non-subtitled video. Gender and video type therefore were the independent variables of this study. The dependent variable measured in this study was accuracy score. Furthermore, this research is part of a larger study. Therefore, the dependent variables attitude, mental effort and task difficulty were measured, however not analysed in this research.

2.4 Instruments

The measurement of the variable accuracy was based on the three sub-dimensions, colour, shape and placement of the LEGO bricks, which was coded on a coning sheet. Furthermore, the variables attitude, task difficulty and mental effort were measured using an online questionnaire.

2.4.1 Coding LEGO construction

The performance of the participants was measured by means of how accurate the participant had mimicked the procedural-manipulative task displayed in the instruction video. The accuracy score was measured based on how many bricks the participant placed correctly, meaning if the participant chose the brick with the correct shape and colour and if he or she put it in the correct place. The bricks a participant could choose from had two different shapes; squared with four knots, or rectangular with eight knots. These shapes could have five different colours; blue, red green white and yellow. The accuracy was evaluated by the researchers directly after the participant finished building, using the accuracy sheet displayed in figure 2 below. The corrected version can be found in appendix I.

PPN: _____
Exp: _____

Laag 4

Laag 3

Laag 2

Laag 1

Laag 10

Laag 9

Laag 8

Laag 7

Laag 6

Laag 5

Figure 2. Accuracy form to indicate the correctness of the LEGO house built.

On this sheet the correctors indicated per layer of the construction which colours, shapes and positions of the bricks were used. Per brick the participant could receive 3 points; 1 for correct place, 1 for correct shape and 1 for correct colour. The LEGO house consisted in total of 48 bricks. If every brick was chosen and placed correctly the participant could obtain a maximum of 144 points for correctness of construction. Per layer the amounts of correctly chosen and placed bricks were indicated and scored, using the correction model which can be found in the appendix. The reliability of the variable performance composed of correctness of colour, correctness of shape and correctness of place was good: $\alpha = .84$. The variable was therefore computed into one variable named correctness of building.

2.4.2 Questionnaire

There were two questionnaires; one for the with and one for the without subtitles condition. In the questionnaire the variables attitude towards the video, attitude towards the audio and attitude towards the subtitles were measured each using six items with a 5-point Likert scale. Furthermore, self-perceived task difficulty was measured with two items and mental effort with one item, both using a 5-point Likert scale. Additionally, the last part of the questionnaire included several questions on demographic information about the participant, such as; age, gender and level of educational degree. The questionnaires can be found in appendix II and III.

2.5 Procedure

The experiment was conducted with one participant at the same time. The participants were placed at a table on which the construction board and LEGO bricks were placed in front of a laptop. The LEGO bricks were placed around the construction board similar to how they are placed in the instruction video, to eliminate possible confusion. The precise set up of the experiment is displayed in figure 3 below.



Figure 3. Set up of the LEGO equipment and laptop used in the experiment.

Before the participants could start the experiment, the researcher gave a verbal instruction in either Dutch or English, depending on the origin of the researcher herself, what was expected from the participant and what the data obtained would be used for. In the verbal instruction was explained that participants were not allowed to pause or rewind the video and that they could start building as soon as the video started. Furthermore, the participants was asked to construct the LEGO house, consisting of ten different layers, in the same manner as instructed in the video, while watching the video. After the verbal instruction, the participant was asked to sign the consent form, which can be found in the appendix. Subsequently, the participant was shown one of the two instruction videos, with or without subtitles, which displays the instruction on how to build a specific type of house using LEGO bricks. After completing the task, the participants were asked to fill out the online questionnaire on the laptop provided. While filling out this questionnaire, the LEGO house constructed by the participant was deconstructed and evaluated on accuracy by the researcher.

The video was displayed on a laptop or tablet in a private environment, such as an empty class room, to minimise environmental distractions. Moreover, participants were, in some cases, provided with headphones to further neutralise environmental noise. All participants

were allowed to spend as much time on the construction of the LEGO house as they wanted. They were allowed to start constructing the LEGO house as soon as the video started and could continue when the video was finished. Furthermore, at all times one researcher was present while the participant conducted the experiment, so possible questions could be answered.

2.6 Statistical treatment

To answer the first research question an one-way between subject ANOVA was conducted. This analysis provided sufficient information to answer the research questions, hence no further analysis was conducted.

Information to answer the second research question was gathered by conducting multiple one-way between subject ANOVA's. Furthermore, a multivariate and univariate two-way ANOVA was conducted to analyse data of the questionnaire regarding mental effort and task difficulty.

3. Results

The main purpose of this study was to investigate the influence of L1 subtitles on the performance of mimicking the procedural-manipulative task displayed in the video. Performance was measured by how many LEGO bricks were placed correctly. The correctness was based on the chosen colour, shape and placement of the brick.

3.1 Subtitles

To provide an answer to the first research question an one-way ANOVA was conducted to compare the effects of the variable subtitles (with and without) on the variable overall correctness of building, which is constructed of correctness of shape, colour and place. The analysis showed a significant overall effect of subtitles on the correctness of building [$F(1, 101) = 4.46, p = .037$]. The correctness of the construction of the LEGO house was higher for the group which received the instruction video with subtitles ($M = 86.47, SD = 12.75$) than for the group which received the instruction video without subtitles ($M = 80.71, DS = 14.88$). Furthermore, the one-way ANOVA showed a significant effect of subtitles on correctness of shape [$F(1, 101) = 13.69, p < .001$]. The participants who were shown the subtitled instruction video more often chose the correct shape of the LEGO brick ($M = 81.96, SD = 15.45$) than the participants who were shown the instruction video without subtitles ($M = 69.50, SD = 18.65$). There was no significant effect of subtitles on correctness of place [$F(1, 101) < 1, p = .904$] and

correctness of colour [$F(1, 101) = 3.88, p = .052$]. Table 1 shows the means and standard deviations generated with the one-way ANOVA for performance and subtitling.

Table 1. Means and standard deviations (between brackets) in percentages for the accuracy of building performance in function of the presence or absence of subtitling in the instruction video (0 = all wrong, 100 = all correct).

	With subtitles n = 53 <i>M (SD)</i>	Without subtitles n = 50 <i>M (SD)</i>	Total n = 103 <i>M (SD)</i>
Correctness of shape	81.96 (15.45)	69.50 (18.65)	75.91 (18.11)
Correctness of place	84.00 (17.07)	84.42 (17.71)	84.20 (17.30)
Correctness of colour	93.44 (9.01)	89.21 (12.58)	91.38 (11.04)
Correctness of building	86.47 (12.75)	80.71 (14.88)	83.67 (14.06)

3.2 Gender

To provide an answer to the second and research question, a statistical analysis was done to determine if there is an overall difference between the accuracy of performance of men and women. An one-way ANOVA was conducted to compare the effects of gender (male and female) on the correctness of building, which is constructed of correctness of shape, colour and place. The analysis showed a significant overall effect on the correctness of building [$F(1, 101) = 9.49, p = .003$]. The correctness of the construction of the LEGO house was higher for male participants ($M = 87.50, SD = 11.17$) than for female participants ($M = 79.28, SD = 15.77$). Furthermore, the one-way ANOVA showed a significant effect of gender on correctness of shape [$F(1, 101) = 8.82, p = .004$] and correctness of place [$F(1, 101) = 8.01, p = .006$]. The male participants more often chose the correct shape of the LEGO brick ($M = 80.68, SD = 16.42$) and more often placed the brick on the correct place ($M = 88.56, SD = 13.89$) than the female participants ($M = 70.44, SD = 18.56; M = 79.21, SD = 19.49$). There was no significant effect of gender on the correctness of colour [$F(1, 101) = 9.49, p = .083$]. Table 2 shows the means and standard deviations generated with the one-way ANOVA for performance and gender.

Table 2. Means and standard deviations (between brackets) in percentages for the accuracy of building performance in function of gender (0 = all wrong, 100 = all correct).

	Man	Women	Total
	n = 55	n = 48	n = 103
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Correctness of shape	80.68 (16.42)	70.44 (18.56)	75.91 (18.11)
Correctness of place	88.56 (13.89)	79.21 (19.49)	84.20 (17.30)
Correctness of colour	93.14 (7.92)	89.37 (13.59)	91.38 (11.04)
Correctness of building	87.50 (11.17)	79.28 (15.77)	83.67 (14.06)

To provide an answer to the third hypothesis, an one-way ANOVA for the group without subtitles for gender and correctness of building, shape, place, and colour was conducted. The test showed a significant effect of gender on the overall correctness of building [$F(1, 48) = 10.07, p = .003$]. The correctness of the construction of the LEGO house was higher for the male participants ($M = 86.37, SD = 9.24$) than for the female participants ($M = 74.06, SD = 17.51$) in the without subtitles group. Moreover, the one-way ANOVA showed a significant effect of gender on the correctness of shape [$F(1, 48) = 9.89, p = .003$] and correctness of place [$F(1, 48) = 7.25, p = .010$]. Men scored higher on the correctness of shape ($M = 76.54, SD = 16.81$) and correctness of place ($M = 90.78, SD = 9.12$) than women ($M = 61.23, SD = 17.55$; $M = 77.54, SD = 22.55$). Furthermore, the test showed no significant effect of gender on correctness of colour [$F(1, 48) = 3.13, p = .083$]. Table 3 shows the means and standard deviations generated with the one-way ANOVA for gender and performance for the without subtitling condition.

Table 3. Means and standard deviations (between brackets) in percentages for the accuracy of building performance for the without subtitling condition in function of gender (0 = all wrong, 100 = all correct).

	Man	Women	Total
	n = 27	n = 23	n = 50
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Correctness of shape	76.54 (16.81)	61.23 (17.55)	69.50 (18.65)
Correctness of place	90.78 (9.12)	77.54 (22.55)	84.42 (17.71)
Correctness of colour	92.05 (8.01)	85.87 (15.98)	89.21 (12.58)
Correctness of building	86.37 (9.24)	74.06 (17.51)	80.71 (14.88)

To provide an answer to the second hypothesis, the same analysis was conducted for the group with subtitles. The one-way ANOVA for the group with subtitles showed no significant effect of gender on the overall correctness of building [$F(1, 51) = 1.67, p = .202$], the correctness of shape [$F(1, 51) = 1.86, p = .178$], the correctness of place [$F(1, 51) = 1.74, p = .193$] and the correctness of colour [$F(1, 51) < 1, p = .521$]. Table 4 shows the means and standard deviations generated with the one-way ANOVA for gender and performance for the with subtitling condition.

Table 4. Means and standard deviations (between brackets) in percentages for the accuracy of building performance for the with subtitling condition in function of gender (0 = all wrong, 100 = all correct).

	Man	Women	Total
	n = 28	n = 25	n = 53
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Correctness of shape	84.67 (15.28)	78.92 (15.37)	81.96 (15.45)
Correctness of place	86.90 (17.33)	80.75 (16.51)	84.00 (17.07)
Correctness of colour	94.20 (7.84)	92.58 (10.26)	93.44 (9.01)
Correctness of building	88.59 (12.83)	84,08 (12.49)	86.47 (12.89)

4. Conclusion and discussion

The aim of this study was to investigate the influence of L1 subtitling in Spanish instruction videos on the performance of Dutch participants of mimicking the procedural-manipulative task displayed in the video. Furthermore, the researchers wanted to investigate whether and how gender influences the performance of said task. This generated the following two research questions and corresponding three hypothesis;

RQ1: What is the influence of the presence of L1 subtitling in Spanish instruction videos on the performance of Dutch participants on mimicking the procedural-manipulative task displayed in the video?

The results of this experiment showed that the participants who mimicked the task in the instruction video with subtitles, performed significantly better on choosing the correct shape of the LEGO bricks than the participants who mimicked the task in the instruction video without subtitles. Furthermore, the overall performance (correctness of building) was significantly

better for the subtitled condition than for the non-subtitled condition. It can therefore be concluded that the L1 subtitling in Spanish instruction videos partially enhances the performance of Dutch participants on mimicking procedural-manipulative tasks displayed in the video. This, however, is in contradiction with the literature on working memory, cognitive overload and split attention effect, which state that processing information presented in subtitled videos can be more cognitive demanding and therefore will likely decrease the performance (Baddeley, 2003; Kalyuga, 1999; Kalyuga, 2012; Mayer, 2002; Mayer, 2003). Based on the contradicting results of this study it can be concluded that either cognitive overload did not occur or the occurred cognitive overload did not affect the performance of the participants. Furthermore, the results indicate that the addition of subtitles provided extra helpful information which was not, or less clearly, provided in the other visual features. Firstly, the procedural-manipulated task displayed in the instruction video could have been less cognitively challenging, or complex, than expected, resulting in an absence of cognitive overload. If the task is of lower cognitive complexity the need for paying close attention to the visual demonstration of the task diminishes. In this case, more attention could be spent on the subtitles without missing necessary visual information to perform the task correctly. Secondly, it stands out that the participants in the subtitled condition exclusively performed better on choosing the correct shape of the LEGO brick than the participants in the non-subtitled condition. This could indicate that the subtitles provided more accurate and clear information on when to use which brick size than the other visual information. The subtitles clearly mention when which shape of LEGO brick is used, which explains the superior performance on this component of the construction for the subtitled condition. In this case, the better performance of the subtitled condition could not fully be contributed to the presence of subtitles, but also to the poor quality of the visual distinction between brick sizes in the instruction video. If the visual distinction would have been more clear, the subtitled condition might not have performed better than the non-subtitled condition.

H1: L1 subtitling in Spanish instruction videos diminishes the performance of Dutch participants on mimicking the procedural-manipulative task displayed in said videos.

Since the results showed that the performance of the participants in the subtitled condition were better than the performance of the participants in the non-subtitled condition, the first hypothesis needed to be rejected. Not only was the hypothesis incorrect, the results showed the exact opposite of what the first hypothesis predicted.

RQ2: What is the influence of gender on the performance of Dutch participants on mimicking the procedural-manipulative task displayed in (L1 subtitled) Spanish instruction videos?

The results of this experiment showed that the male participants generally outperformed the female participants. The male participants performed better than female participants at choosing the correct shape of the LEGO brick and putting it in the correct place. Furthermore, the overall performance (correctness of building) was significantly better for the male participants, despite of no significant difference between gender in choosing the correct colour of the LEGO brick. It can therefore be concluded that gender indeed influences the performance of mimicking procedural manipulative tasks displayed in Spanish instruction videos and that male participants are better at this task than female participants. These results are in line with previous research on gender differences in performance of tasks involving mental rotation and spatial ability (De Lisi & Cammarano, 1996; Linn & Petersen, 1985; Terlecki & Newcombe, 2005; Voyer, Voyer & Bryden, 1995), and suggest that mental rotation could be a key feature in completing the task displayed in the instruction video.

H2a: Female Dutch participants will score higher on the performance of mimicking the procedural-manipulative task displayed in L1 subtitled Spanish instruction videos than male Dutch participants.

The results showed that within the subtitled condition, there was no difference in overall performance (correctness of building) between the male and the female participants. Furthermore, there was no difference in this condition of the performance between male and female participants in choosing the correct colour or shape of the LEGO bricks and putting them in the correct place. Hence the second hypothesis needs to be rejected. Moreover, since there is no influence of gender in this condition, it can be concluded that both female and male participants performed better in the subtitled condition than in the non-subtitled condition. An explanation for why these findings contradict the expectations could be that the addition of subtitles did not cause cognitive overload and that the subtitles provided more helpful information than the other visual features, as explained above.

H2b: Male Dutch participants will score higher in the performance of mimicking the procedural-manipulative task displayed in the non-subtitled Spanish instruction video than female Dutch participants.

The results show that within the non-subtitled condition, male participants outperformed female participants on correctly mimicking the procedural-manipulative task displayed in the video. Male participants in the non-subtitled condition were significantly better than female participants in this condition, in choosing the correct shape of the LEGO brick and putting it in the correct place. Despite no difference in performance of choosing the correct colour of the LEGO brick, the overall performance of men was better than that of female participants. Hence the third hypothesis can be accepted. These results indicate that men in fact have an advantage over women in performing procedural-manipulative tasks displayed in instruction videos without subtitles, due to their more advanced spatial ability and mental rotation (De Lisi & Cammarano, 1996; Linn & Petersen, 1985; Terlecki & Newcombe, 2005; Voyer, Voyer & Bryden, 1995). Furthermore, looking at the results of the subtitled condition, it may be concluded that the addition of subtitles neutralizes this advantage of the male participants. This indicates that the theory on gender differences in working memory capacity would be correct, which states that women have a higher working memory capacity and therefore outperform men in tasks which demand more of the working memory (Cochran & Davis, 1987; Speck, Ernst, Braun, Koch, Miller & Chang, 2000). However, the advantage of the female participants was not as high as expected and resulted in solely neutralising the advantage of the male participants, instead of exceeding the male participants on performance. Hence, it can be concluded that adding subtitles to an instruction video is beneficial for the performance of mimicking the task for female as well as male viewers.

Furthermore, several external factors could have influenced the results of this study. Firstly, the researchers have decided to ignore the inequality of distribution of educational levels between the two conditions. In the subtitled condition there were more participants with an university degree and less with a MBO degree than in the non-subtitled condition. The overall higher level of education in the condition with subtitles might have caused the higher performance of this group. Secondly, the size of the participant sample was insufficient. Due to the amount of independent variables investigated (gender and subtitles), four different conditions needed to be analysed. An accurate sample size would contain roughly thirty participants per condition, resulting in a sample size of 120 participants. Therefore, this research should have been conducted amongst 17 more participants. Thirdly, the participant sample mostly consisted of young and middle aged people, instead of an accurate representation of the population in Nijmegen. Therefore, homogenisation is only possible to a certain extent. Fourthly, in some cases, it was not explicitly asked to the participants if they had any prior knowledge of the Spanish language. This might have resulted in different levels of proficiency

amongst the participants, which could have influenced the results. If several participants would have a higher proficiency level, they might have performed better, as suggested by the literature on proficiency (Lavour & Bairstow, 2011; Van der Zee, Admiraal, Paas, Saab & Giesbers, 2017). Fifthly, the rules for coding the correctness of building were not fully clarified. This resulted in uncertainty regarding how to code several constructions of participants, which could have resulted in an inconsistency of coding between the researchers. Lastly, this research only studied the situation in which it was not possible to pause, rewind or fast forward the instruction video. In real life situations, this would be possible and if needed the video would be rewind or stopped.

For further research it might be interesting to investigate the influence of educational level on the performance of mimicking instruction videos. Furthermore, it might be interesting to research the relation between educational and the presence or absence of subtitles on performance. The latter could be combined with research on the relation between educational level and working memory capacity. Moreover, to increase the generalizability of the results it would be wise to increase the sample and sampling area. Lastly, research using existing instruction videos from companies, would make the results more applicable and specific for the companies involved.

Overall the results of this research are favourable for interested parties, such as international companies who make use of subtitled instruction videos. The results indicate a positive effect of subtitles on how well people follow the instructions in the video. Although this research exclusively studied the effect on the construction of a LEGO house, the results could be applicable to other similar construction tasks. Furthermore, the fact that the poor visual distinction between the size of the LEGO bricks might have influenced the results, does not diminish the additional value subtitles could have for instruction videos of companies. In actual instruction videos the visuals might not be completely clear as well. Moreover, there was no indication of cognitive overload caused by the presence of subtitles, which could have been influenced by the low proficiency of the participants in the spoken language. This could be favourable for companies in non-English speaking countries, who already have existing instruction videos in their native language and want to internationalise.

5. References

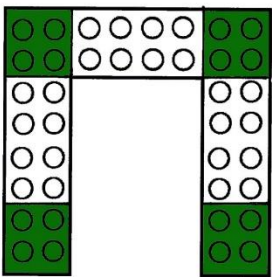
- Baddeley, A. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience*, *4*(10), 829-839. doi: 10.1038/nrn1201
- De Lisi, R., & Cammarano, D. M. (1996). Computer experience and gender differences in undergraduate mental rotation performance. *Computers in Human Behavior*, *12*(3), 351-361. doi: 10.1016/0747-5632(96)00013-1
- Castro-Alonso, J. C., Ayres, P., & Paas, F. (2015). Animations showing Lego manipulative tasks: Three potential moderators of effectiveness. *Computers & Education*, *85*, 1-13. doi: 10.1016/j.compedu.2014.12.022
- Cochran, K. F., & Davis, J. K. (1987). Individual differences in inference processes. *Journal of Research in Personality*, *21*(2), 197-210. doi: 10.1016/0092-6566(87)90007-9
- Coetzee, D., Fox, A., Hearst, M. A., & Hartmann, B. (2014, February). Should your MOOC forum use a reputation system?. *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*, 1176-1187. ACM. doi: 10.1145/2531602.2531657
- Fox, J. R., Park, B., & Lang, A. (2007). When available resources become negative resources: The effects of cognitive overload on memory sensitivity and criterion bias. *Communication Research*, *34*(3), 277-296. doi: 10.1177/0093650207300429
- Hartsell, T., & Yuen, S. C. Y. (2006). Video streaming in online learning. *AACE Journal*, *14*(1), 31-43. Retrieved from <https://www.learntechlib.org/primary/p/6152/>
- Kalyuga, S. (2012). Instructional benefits of spoken words: A review of cognitive load factors. *Educational Research Review*, *7*(2), 145-159. doi: 10.1016/j.edurev.2011.12.002
- Kalyuga, S., Chandler, P., & Sweller, J. (1999). Managing split-attention and redundancy in multimedia instruction. *Applied Cognitive Psychology*, *13*(4), 351-371. doi: 10.1002/(SICI)1099-0720(199908)13:4<351::AID-ACP589>3.0.CO;2-6
- Klass, B. (2003). Streaming media in higher education: Possibilities and pitfalls. *Syllabus*, *16*(11), 1-5. Retrieved from <https://campustechnology.com/articles/2003/05/streaming-media-in-higher-education-possibilities-and-pitfalls.aspx>
- Lavaur, J. M., & Bairstow, D. (2011). Languages on the screen: Is film comprehension related to the viewers' fluency level and to the language in the subtitles?. *International Journal of Psychology*, *46*(6), 455-462. doi: 10.1080/00207594.2011.565343

- Linn, M. C., & Petersen, A. C. (1985). Emergence and characterization of sex differences in spatial ability: A meta-analysis. *Child Development, 56*(6), 1479-1498. doi: 10.2307/1130467
- Mayer, R. E. (2002). Multimedia learning. *Psychology of Learning and Motivation, 41*, 85-139. Academic Press. doi: 10.1016/S0079-7421(02)80005-6
- Mayer, R. E., Heiser, J., & Lonn, S. (2001). Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology, 93*(1), 187-198. doi: 10.1037//0022-0663.93.1.187
- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist, 38*(1), 43-52. doi: 10.1207/ S15326985EP3801_6
- Moreno, R., & Mayer, R. E. (2002). Verbal redundancy in multimedia learning: When reading helps listening. *Journal of Educational Psychology, 94*(1), 156-163. doi: 10.1037//0022-0663.94.1.156
- Perego, E., Del Missier, F., & Bottiroli, S. (2015). Dubbing versus subtitling in young and older adults: Cognitive and evaluative aspects. *Perspectives, 23*(1), 1-21. doi: 10.1080/0907676X.2014.912343
- Schmidt-Weigand, F., Kohnert, A., & Glowalla, U. (2010). A closer look at split visual attention in system-and self-paced instruction in multimedia learning. *Learning and Instruction, 20*(2), 100-110. doi: 10.1016/j.learninstruc.2009.02.011
- Speck, O., Ernst, T., Braun, J., Koch, C., Miller, E., & Chang, L. (2000). Gender differences in the functional organization of the brain for working memory. *Neuro Report, 11*(11), 2581-2585. doi: 10.1097/00001756-200008030-00046
- Terlecki, M. S., & Newcombe, N. S. (2005). How important is the digital divide? The relation of computer and videogame usage to gender differences in mental rotation ability. *Sex Roles, 53*(5-6), 433-441. doi: 10.1007/s11199-005-6765-0
- Van der Zee, T., Admiraal, W., Paas, F., Saab, N., & Giesbers, B. (2017). Effects of subtitles, complexity, and language proficiency on learning from online education videos. *Journal of Media Psychology, 29*, 18-30. doi: 10.1027/1864-1105/a000208
- Van Duijn, A. J., Swanick, K., & Donald, E. K. (2014). Student learning of cervical psychomotor skills via online video instruction versus traditional face-to-face instruction. *Journal of Physical Therapy Education, 28*(1), 94-102. doi: 10.1097/00001416-201410000-00015_

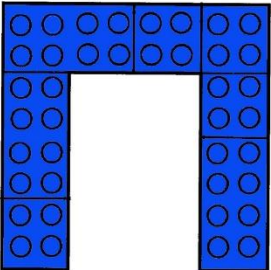
- Van Gog, T., Paas, F., Marcus, N., Ayres, P., & Sweller, J. (2009). The mirror neuron system and observational learning: Implications for the effectiveness of dynamic visualizations. *Educational Psychology Review*, *21*(1), 21-30. doi 10.1007/s10648-008-9094-3
- Voyer, D., Voyer, S., & Bryden, M. P. (1995). Magnitude of sex differences in spatial abilities: A meta-analysis and consideration of critical variables. *Psychological Bulletin*, *117*(2), 250-270. doi: 10.1037/0033-2909.117.2.250

6. Appendix

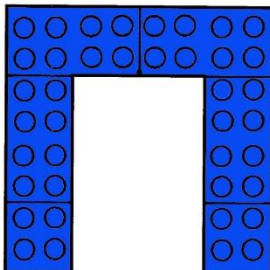
I. Correction model



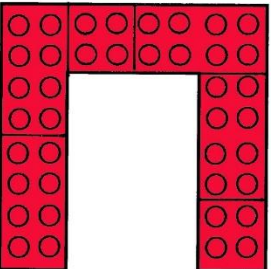
Laag 5:



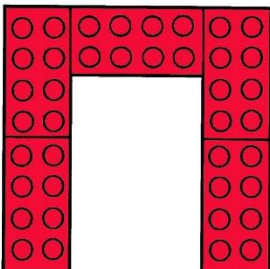
Laag 3:



Laag 1:

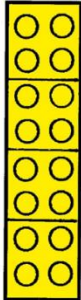


Laag 4:

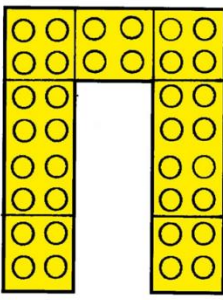


Laag 2:

1



Laag 8:



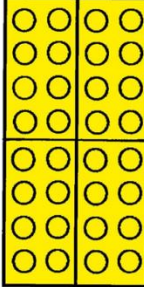
Laag 6:



Laag 9:

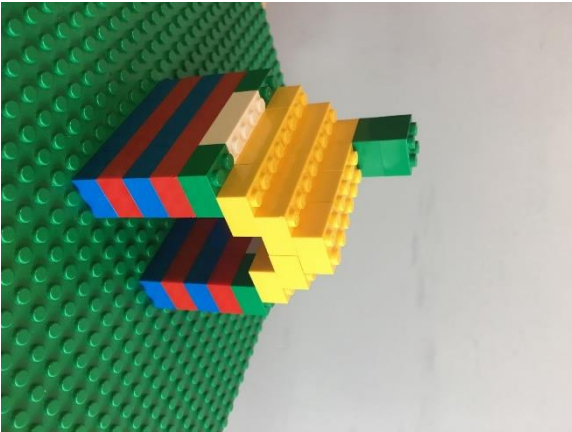


Laag 10:



Laag 7:

2



II. Questionnaire non-subtitled condition

Start of Block: Block 1

Q21 Vul hier je deelnemernummer in.

End of Block: Block 1

Start of Block: adult Dutch

Q6.2 Wat vond je van de taak? Ik heb de taak...

	1	2	3	4	5	
helemaal begrepen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	helemaal niet begrepen
helemaal goed uitgevoerd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	helemaal niet goed uitgevoerd

Q6.3 Geef voor de volgende vragen aan wat je mening het beste weergeeft.

Q6.4 Ik vond de instructievideo

	helemaal eens				helemaal oneens
goed gestructureerd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
duidelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
niet interessant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makkelijk te onthouden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
van goede kwaliteit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
goed in beeld gebracht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.5 Ik vond de taak in deze instructievideo

	helemaal eens				helemaal oneens
leuk om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makkelijk om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
saai om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
moeilijker dan ik had verwacht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q96

Hoeveel mentale inspanning heb je geïnvesteerd in deze taak om het te voltooien?

- extreem kleine hoeveelheid
- kleine hoeveelheid
- gemiddelde hoeveelheid
- grote hoeveelheid
- extreem grote hoeveelheid
-

Q6.6 De gesproken taal in de instructievideo was ...

	helemaal eens				helemaal oneens
makkelijk te begrijpen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
moeilijk te volgen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
afleidend van de taak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ondersteunend aan de taak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
te snel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
te informatief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.7 Wat vond je van de instructievideo in het algemeen?

Q6.8 In vergelijking met een papieren handleiding is de instructievideo

	helemaal eens				helemaal oneens
makkelijker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
leuker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
informatiever	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.9 Stel dit was de handleiding voor het in elkaar zetten van een kast, wat had je liever?

- instructievideo
- papieren handleiding
- beide

Q6.10 Wanneer heb je voor het laatst met LEGO gebouwd?

- Afgelopen week nog
- Afgelopen maand nog
- Langer dan een jaar geleden
- Langer dan 5 jaar geleden
- Langer dan 10 jaar geleden

Q6.11 Welke van de volgende talen spreek je en hoe goed?

	heel goed	goed	matig	niet goed	helemaal niet
Engels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spaans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nederlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q94 Als ik een taal hoor die ik niet ken, voel ik mij:

Comfo rt	<input type="radio"/> comforta bel	<input type="radio"/> redeli jk comforta bel	<input type="radio"/> neutr aal	<input type="radio"/> redelijk oncomforta bel	<input type="radio"/> oncomforta bel
Gevoel	<input type="radio"/> goed	<input type="radio"/> redeli jk goed	<input type="radio"/> neutr aal	<input type="radio"/> redelijk slecht	<input type="radio"/> slecht

Q95 Het herkennen van een taal buiten mijn moedertaal is:

Belang	<input type="radio"/> belangrijk	<input type="radio"/> redelijk belangrijk	<input type="radio"/> neutraal	<input type="radio"/> redelijk onbelangrijk	<input type="radio"/> onbelangrijk
Bruikbaarheid	<input type="radio"/> bruikbaar	<input type="radio"/> redelijk bruikbaar	<input type="radio"/> neutraal	<input type="radio"/> redelijk onbruikbaar	<input type="radio"/> onbruikbaar

Q97 Identiteit

	Eens	redelijk eens	neutraal	redelijk oneens	oneens
Ik ben trots dat ik Nederlands ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik voel me verbonden met de Nederlandse cultuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan me vinden in andere Nederlanders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.12 Je bent

- man
 - vrouw
 - zeg ik liever niet
-

Q6.13 Hoe oud ben je?

Q6.14 Wat is je moedertaal?

- Nederlands
 - Engels
 - Duits
 - anders, namelijk _____
-

Q6.15 Wat is je opleidingsniveau?

- MBO
 - HBO
 - WO
 - Ik zit nog op de middelbare school, namelijk (vul hier je schooltype in bv. VMBO)
- _____

End of Block: adult Dutch

III. Questionnaire subtitled condition

Start of Block: Block 1

Q22 Vul hier je deelnemernummer in.

End of Block: Block 1

Start of Block: adult Dutch

Q3.2 Wat vond je van de taak? Ik heb de taak...

	1	2	3	4	5	
helemaal begrepen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	helemaal niet begrepen
helemaal goed uitgevoerd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	helemaal niet goed uitgevoerd

Q3.3 Geef voor de volgende vragen aan wat je mening het beste weergeeft.

Q3.4 Ik vond de instructievideo

	helemaal eens				helemaal oneens
goed gestructureerd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
duidelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
niet interessant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makkelijk te onthouden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
van goede kwaliteit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
goed in beeld gebracht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.5 Ik vond de taak in deze instructievideo

	helemaal eens				helemaal oneens
leuk om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makkelijk om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
saai om te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
moeilijker dan ik had verwacht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q41 Hoeveel mentale inspanning heb je geïnvesteerd in deze taak om het te voltooien?

- extreem kleine hoeveelheid
- kleine hoeveelheid
- gemiddelde hoeveelheid
- grote hoeveelheid
- extreem grote hoeveelheid
-

Q3.6 De gesproken taal in de instructievideo was ...

	helemaal eens				helemaal oneens
makkelijk te begrijpen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
moeilijk te volgen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
afleidend van de taak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ondersteunend aan de taak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
te snel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
te informatief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.7 De ondertiteling van de instructievideo was

	helemaal eens				helemaal oneens
moelijk te begrijpen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makkelijk te volgen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
te langzaam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ondersteunend aan de taak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
afleidend van de gesproken taal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
afleidend van het beeld	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.8 Wat vond je van de instructievideo in het algemeen?

Q3.9 In vergelijking met een papieren handleiding is de instructievideo

	helemaal eens				helemaal oneens	
makkelijker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
leuker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
informatiever	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.10 Stel dit was de handleiding voor het in elkaar zetten van een kast, wat had je liever?

- instructievideo
 - papieren handleiding
 - beide
-

Q3.11 Wanneer heb je voor het laatst met LEGO gebouwd?

- Afgelopen week nog
 - Afgelopen maand nog
 - Langer dan een jaar geleden
 - Langer dan 5 jaar geleden
 - Langer dan 10 jaar geleden
-

Q3.12 Welke van de volgende talen spreek je en hoe goed?

	heel goed	goed	matig	niet goed	helemaal niet
Engels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spaans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nederlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q38 Als ik een taal hoor die ik niet ken, voel ik mij:

Comfo rt	<input type="radio"/> comforta bel	<input type="radio"/> redeli jk comforta bel	<input type="radio"/> neutr aal	<input type="radio"/> redelijk oncomforta bel	<input type="radio"/> oncomforta bel
Gevoel	<input type="radio"/> goed	<input type="radio"/> redeli jk goed	<input type="radio"/> neutr aal	<input type="radio"/> redelijk slecht	<input type="radio"/> slecht

Q39 Het herkennen van een taal buiten mijn moedertaal is:

Belang	<input type="radio"/> belangrijk	<input type="radio"/> redelijk belangrijk	<input type="radio"/> neutraal	<input type="radio"/> redelijk onbelangrijk	<input type="radio"/> onbelangrijk
Bruikbaarheid	<input type="radio"/> bruikbaar	<input type="radio"/> redelijk bruikbaar	<input type="radio"/> neutraal	<input type="radio"/> redelijk onbruikbaar	<input type="radio"/> onbruikbaar

Q40 Identiteit

	Eens	Redelijk eens	neutraal	redelijk oneens	oneens
Ik ben trots dat ik Nederlands ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik voel me verbonden met de Nederlandse cultuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan me vinden in andere Nederlanders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.13 Je bent

- man
- vrouw
- zeg ik liever niet

Q3.14 Hoe oud ben je?

Q3.15 Wat is je moedertaal?

Nederlands

Engels

Duits

anders, namelijk _____

Q3.16 Wat is je opleidingsniveau?

MBO

HBO

WO

Ik zit nog op de middelbare school, namelijk (vul hier je schooltype in bv. VMBO)

End of Block: adult Dutch
