An investigation into the influence of non-representational gestures on response times: An online VR-study

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Abstract

Human beings gesture a lot with their hands when communicating one to another. There are multiple types of manual gestures, one category of them being the group of non-representational gestures. In this study, we are interested in whether response times (RTs) can be influenced by non-representational gestures which are not iconic and rather have a pragmatic or interactive function in conversation. As of now, their effect on the addressee's comprehension has not been studied. Therefore, in this study participants were presented a VR-avatar which used different forms of non-representational gestures (palm up open hand, addressee pointing, and palm lateral). Participants were asked polar questions (general knowledge vs. personal preference) and had to press keys for a *yes* or *no* response. The questions were constructed so that they had either an early or a late answer point. Data was collected via the software Gorilla where the RTs were measured. The results show a significant main effect for the answer point, suggesting that questions with an early answer point are answered faster than questions with a late answer point. However, no significant main effect for gesture presence, gesture form, or the interaction between answer point and gesture presence was found. Thus, non-representational gestures seem to be of no influence on addressee's RTs. There are multiple reasons for why the effect could not be found (e.g., participants might have focused only on the verbal cues and not on the visual cues when planning their response, the online VR-avatar might have involved participants less in a social interaction than planned, or the button-press response mode might have been not as accurate as a verbal response would have been). A lot has still to be investigated in relation to the social aspect non-representational gestures hold, for example, by looking into other variables in human interactions (e.g., physiological measures) which might be influenced by non-representational gestures and creating better social environments when testing the effect of those gestures on the addressee.

1. Introduction

Human face-to-face interaction is highly effective and efficient, despite involving a variety of processes. Informal face-to-face communication is fundamental in social interaction and the main mode of human communication (Bavelas et al., 1992; Holler & Levinson, 2019; Nota et al., 2022). This means that language is multimodal and based on a turn-taking principle. However, so far language has mostly been studied as a unimodal activity by a single speaker rather than in dialogue (Bavelas et al., 1992). The present study aims to address this shortcoming by looking at language in social interactions (between two interlocutors) and focusing on manual gestures involved in face-to-face conversations.

1.1 Language in social interaction

Bavelas et al. (1992) "propose that conversation must be seen not as alternating monologues but as a social system" (p.476), where "the speaker constantly includes the addressee and attends to dialogic requirements in a variety of ways" (Bavelas et al., 1995, p. 395). In conversation, people take turns rapidly, without interruptions and with no or minimal delay. This can be achieved because different elements which are part of communication are coordinated simultaneously in an incredible construct (Templeton et al., 2021).

Turn-taking is the behavioural mechanism needed for coordinating interaction (i.e., coordinating who speaks and when) (Stivers et al., 2009). This process reveals itself in the very smooth and fast transitions between speakers (Bögels, 2020) and thus minimises the length of gaps in conversations (Templeton et al., 2021). Turn-taking develops very early in humans: infants engage in communicative dialogues months before they produce their first words (Templeton et al., 2021). Several studies find that gaps are usually around 200 ms long (e.g., Holler et al., 2018; Stivers et al., 2009; Templeton et al., 2021), an interval which can be compared to the duration of an eyeblink (Castellucci et al., 2022). This is three times faster than the mean speed of object naming, and therefore turn-taking is believed to be too fast to depend on conscious control (Templeton et al., 2021). Researchers could show that there are universals in the underlying pattern of response latencies (i.e., general avoidance of overlapping talk and minimisation of silence in turn gaps) (Stivers et al., 2009; Templeton et al., 2021). However, there is still some variability across languages in RTs ranging from 7 ms in Japanese to 460 ms in Danish (Stivers et al., 2009).

A very important role in social interaction is fulfilled by asking questions. According to the corpus study of Holler et al. (2018), questions are the ideal case to look at turn-taking as they make responses mandatory. In their study they look at question-response sequences, as did Stivers et al. (2009) who found that question-response sequences identified in a corpus are representative for the turn-taking principle in general. According to Stivers et al. (2009), 67% of all identified questions in their video data of 10 different languages were polar questions and thus the most common type of questions. Polar questions are the simplest type of question because their answer possibilities limit themselves to a simple yes or no, unlike responses to WH-questions, and they are extensively investigated in research (e.g., Bögels, 2020; Stivers et al., 2009). Interestingly, confirmatory responses (yes-responses) are delivered faster than responses giving disconfirmation (no-responses). On average, this difference lies between 100 and 500 ms. (Stivers et al., 2009).

Still, the question of how people manage to respond so fast, remains. One aspect influencing this might be the human prediction capacity. Different kinds of signals paired with different modalities seem to facilitate prediction in face-to-face communication (Holler & Levison, 2019). Experimental evidence shows that processing spoken turns relies considerably on predictive processes (e.g., Holler et al., 2018; Magyari & de Ruiter, 2012; Templeton et al., 2021), for example when predicting the end of a word based on the first couple of sounds a speaker utters. Being able to make predictions about an ongoing utterance can allow the listener to anticipate what the speaker's aim is, and therefore allows them to already start planning early on, often before the speaker has finished their turn (Bögels, 2020; Jongman et al., 2019). Another factor influencing response speed might be social connection. Templeton et al. (2021) argue that the more socially connected and engaged the interlocutors are, the faster the response.

Important contributors for fast responding may be response mobilisation cues. Stivers and Rossano (2010) suggest that responses are mobilised by the speaker through the union of different features which are simultaneously used. Those features are: interrogative morphosyntax, interrogative intonation, addressee epistemic expertise on the topic relative to the speaker (i.e., if the speaker/recipient has access to a certain epistemic domain and if there is asymmetry between the interlocutors), and addressee directed eye gaze (Stivers & Rossano, 2010). Looking at the example of gaze, Stivers et al. (2009) found that addressees are more prompt to respond when they are looked at than when they are not. Thus, a speaker can show with their gaze if a response is wished in certain circumstances.

1.2 Multimodality of language

Language interactions are facilitated by being multimodal in nature (Holler & Levinson, 2019; Holler et al., 2018), as bodily signals add a great amount of meaning to what is being said (Holler et al., 2018). The multimodality in face-to-face communication consists of multiple articulators and modalities, like auditory cues (speech and non-speech) and visual cues (gestures and signs made for example by hands, arms, torso, and head) (Holler & Levinson, 2019).

It might be argued that, taking all the visual cues into account while communicating, the addressee is presented with a challenging situation which could be a delaying factor for the processing system. This is because the listener must process all the input at once, and not all the movements an addressee receives do in fact convey meaning (e.g., scratching one's head or adjusting one's clothes) (Holler & Levinson, 2019). These irrelevant movements which are not part of the signal must be set aside (segregation problem) but those which are part of the

message must be paired with their speech counterparts, which are not always simultaneous (integration problem) (Holler & Levinson, 2019).

Nevertheless, it looks like this multimodality facilitates comprehension. Experimental studies show that multimodal messages do not lead to a delay but rather to rapid processing and a faster response (e.g., Holler & Levinson, 2019). Holler et al. (2018) present an analysis of multimodal conversations revealing that bodily signals influence language processing in interactions. Questions paired with those cues lead to faster responses from the addressee. Further evidence comes from experimental studies showing that stimuli presenting gestural information alongside speech facilitate information processing and lead to faster RTs compared to speech-only stimuli (Holle et al., 2008; Kelly et al., 2009). Levinson and Torreira (2015) argue that gestures might contribute to signaling turn ends.

1.3 Manual gestures

Manual gestures are one of the biggest components in multimodal interactions. In certain contexts, manual gesturing information carries up to 50-70% of the information directed to the addressee (Gerwing & Allison, 2009; Holler et al., 2018). Manual gestures can be communicative or non-communicative. Non-communicative gestures do not add any semantic, pragmatic, or interactive meaning to what is being said (e.g., scratching one's head, adjusting one's clothing) (Kendon, 2004). In this study, when talking about manual gestures, only communicative gestures are considered.

Kendon (1987) divides manual gestures into two large categories: one related to the content of speech and the second in a more abstract and distant relation to the content. Bavelas et al. (1992) name the former *topic gesture* and the latter *interactive gesture*. However, in this study, the terms representational gestures (topic gestures) and non-representational gestures (interactive gestures) will instead be used.

1.3.1 Representational gestures

Representational gestures interact with speech to convey semantic information (Bavelas et al., 1992; McNeill, 1985). They depict a certain meaningful concept or object and are therefore described as iconic. An example is the word "house" expressed by gesturing the shape of a house with two hands, beginning with a pointed roof and ending with two lateral hands for the walls of the house. However, also more abstract concepts belong to this group, like rising house prices where the hand moves upwards or pointing gestures referring to visible and non-visible objects (or entities) the speaker is creating in the gesture space while talking (McNeill, 1985). Cohen (1997) proved experimentally that representational gestures decreased in

frequency when the addressee was not visible to the speaker. McNeill (1985) showed that those gestures are part of the language production system: gestures of this type occurred at the exact same time as the specific speech part. Lastly, ter Bekke et al. (2020) showed that responses are significantly faster when a representational gesture occurs just before the lexical affiliate than with no gesture.

Far less attention is given to non-representational gestures (Holler, 2010).

1.3.2 Non-representational gestures

In some older and more recent studies, non-representational gestures were also referred to as *batons* (Ekman & Friesen, 1969), *speech primacy movements* (Freedman, 1972), *beats* (McNeill & Levy, 1982), or *interactive gestures* (e.g., Bavelas et al., 1992; Holler, 2010). A study by Alibali et al. (2001) first introduced the term *representational gesture* for topic gestures, while the term *beats* was used for the simple, rhythmic gestures not conveying semantic meaning. However, in our study the counterpart of *representational gestures* used is *non-representational gestures* as they include not only beats (e.g., palm lateral), but also pragmatic and interactive gestures (e.g., addressee pointing or palm up open hand).

Bavelas et al. (1995) claim that the exact form of the hand does not determine the meaning (i.e., there is no fixed form-meaning mapping). Non-representational gestures do not have stereotypic forms, such as the group of representational gestures and they are less redundant than representational gestures (Bavelas et al., 1992; Bavelas et al., 1995). However, non-representational gestures tend to share some features (i.e., palm/fingers oriented towards the addressee). Most of them directly relate or reference to the addressee: at a given time, the hand or fingers are oriented towards the addressee (Bavelas et al., 1995). The two most studied non-representational gestures are the palm up open hand gesture (PUOH) and the addressee pointing. The PUOH gesture is characterised by a flat hand where the palm is pointing upwards. The fingers are not stretched but rather curled in a more relaxed way (Holler, 2010). PUOH gestures seem to have evolved from actions in the physical world (e.g., offering or giving an object to someone) (Cooperrider et al., 2018; Holler, 2010). There are a lot of cases in which these kinds of gesture are used. However, the hand is not always perfectly flat and up, but sometimes lateral or diagonal. The addressee pointing consists of a pointing gesture done with the index finger pointing towards the addressee (Holler, 2010). Researchers believe that the pointing gesture is made to single out a certain referent in the surroundings (i.e., the addressee) and it is possible that it evolved from touching or reaching in the physical world (Holler, 2010). Therefore, it could be that this gesture seems more demanding than the classical PUOH. The

palm of the hand can face different direction in this case (upwards, downwards, or lateral) (Holler, 2010).

According to Bavelas et al. (1995), non-representational gestures belong to a small group of conversational gestures which have been highly unnoticed in the past. They can be inserted quickly instead of interactive words and phrases (e.g., Bavelas et al. (1992): "what do you think?", "you know?"), so that the conversational flow is not (or only minimally) disrupted (McNeill, 1985; Bavelas et al., 1992; Bavelas et al., 1995). For example, if a speaker states an opinion and says: "Dark chocolate is the best kind of chocolate." and produces a PUOH or pointing gesture to the addressee, they seek confirmation from the addressee without asking for it verbally. In this case, the question is formulated entirely by the non-representational gesture. Different functions have been associated with non-rep gestures, including citing the other's contribution, seeking agreement, help, or a response, delivery of information, markers of common ground, and coordinating turns (Bavelas et al., 1992; Bavelas et al., 1995; Holler 2010). Non-representational gestures, specifically the PUOH gestures, are described as "interactive" (Bavelas et al., 1992) or "pragmatic" (Kendon, 2004) as they do not depict concrete or abstract concepts represented in the speech information, but serve instead to regulate a conversation.

Bavelas et al. (1992) conducted an experiment in which they found that people use far more non-representational gestures when they communicate to another person than when they must speak in an alone condition (monologue). With a second experiment, they proved that the use of non-representational gestures declines when the addressee could not be seen while communicating. This supports the claim that those gestures serve to regulate face-to-face interactions and are made for the addressee to see (Bavelas et al., 1992). Holler (2010) looks at non-representational gestures used as markers of common ground. In her study, she found that there is a tendency for a faster response when a pointing gesture is made by the speaker compared to a PUOH gesture.

1.4 Current study

The aim of the current study is to investigate what effect non-representational gestures have on an addressee's RT. The difference in non-representational gesture form has not been described extensively up until now. A few studies have focussed on the effect of representational gestures on comprehension (e.g., ter Bekke et al., 2020; Wu & Coulson, 2007) and ter Bekke et al. (2020) found that responses were given faster if the question was accompanied by a representational gesture. Nevertheless, as of yet there are no studies carried out on the effect of non-representational gestures on comprehension, yet they account for the

largest portion of manual gestures. A few studies have looked at non-representational gestures from a theoretical point of view (Bavelas et al., 1992; Bavelas et al., 1995), but not many significant steps in experimental research have been taken since the publication of these studies.

In addition, studies show that there are different response mobilising cues in multimodal communication (e.g., eye gaze) which lead to faster responses (e.g., Stivers et al., 2009). However, it is still unknow how non-representational gestures influence the addressee and if they might belong to the cues mobilising response. Also, most studies have been done with English-speaking participants and have not looked at other languages.

Prior to this study, a corpus analysis was conducted within the Communication in Action (CoAct) corpus set up by the Communication in Social Interaction (CoSI) group at the Max Planck Institute in Nijmegen. The identified non-representational gestures in all questions and responses of the corpus were analysed, and it was found that non-representational gestures appeared more often in combination with a question than with an answer. 8.3% of 1692 questions present in the corpus contained a non-representational gesture, and the majority of those gestures (47.1%) belonged to the group of PUOH gestures. We could find a small difference in RT, meaning that questions with non-representational gestures were answered somewhat faster than questions with no gesture. However, this effect was not significant. This may be due to differences between different gesture forms, insufficient number of observations, or because non-representational gestures may mobilise cognitive response preparation not evident in behaviour. This presented a motivational factor to further investigate non-representational gestures from a behavioural point of view.

Therefore, the research question of this study is: What is the influence of non-representational gestures on the response time of an addressee?

To investigate this question, participants' RT was measured in an online VR-experiment. People were asked polar questions in two different conditions, gesture versus no gesture. Within the gesture condition, one of three gesture forms was presented (PUOH gesture, addressee pointing, and palm lateral). The questions were testing either personal preference or general knowledge and were constructed to either have an early or a late answer point.

The main hypotheses of this study are the following:

1. Questions with an early answer point are answered faster than questions with a late answer point (Bögels et al., 2015).
2. Questions asked with non-representational gestures lead to shorter RTs compared to speech-only questions. This would be in line with Holler and Levinson (2019), who propose that multimodal messages lead to a faster response than speech-only

messages. It would also reflect our tendency found in the corpus analysis towards faster responses with non-representational gestures.

3. In addition, we might expect a difference in RT according to the different forms of non-representational gestures. However, there are no clear expectations about which gesture should lead to the fastest response. It might be that the addressee pointing is more demanding for an immediate response than the lateral palm or the classical PUOH, because of its pointing component directed exclusively to the listener (Holler, 2010). On the other hand, it might also be the case that the pointing finger appears as a surprisal effect and thus leads to the highest response latency. It could be that the lateral palm has a higher RT than the other two gestures analysed, because it belongs more to the category of beats and strokes, and probably serves less as an interactive or pragmatic gesture.
4. Our last hypothesis is that there might be an interaction effect between the answer point and the presence of a gesture, meaning that in the presence of a gesture, a question with early answer point would be answered even faster than without gesture.

2. Method

2.1 Participants

In total, 43 subjects (31 females, 12 males) participated in the experiment. All the participants were native or native-like Dutch speakers, and they were between the ages of 18-45 (M = 19.63; SD = 2.44). All had no sensorimotor or cognitive problems, were right-handed, had normal to corrected-to-normal vision, had normal hearing, and have not been diagnosed with speech or language disorders in the past.

Inclusion criteria were that they have access to a computer/laptop, used wired ear-phones, and closed all tabs before starting with the experiment.

Participants were excluded from the data if their accuracy on general knowledge questions was lower than 75%, because this would mean that they are not paying sufficient attention to the experiment. However, this was not the case for any participant in our dataset.
The subjects for the study were recruited via the Sona participant database from the Radboud University in Nijmegen, and they were compensated with one ppu (*proefpersoonuren*) credit.

Based on prior power calculations, we aimed at having 60 participants, but due to a slow-down in participant recruitment, this number could not be reached. Recruitment is still

ongoing, but this thesis focusses on the data of the participants obtained until the 16th of January 2023.

2.2 Materials

2.2.1 Stimuli

The stimuli consisted of 252 polar questions, where half were general knowledge questions and half were questions about personal preferences. Twelve questions were used as practice items, so the final number of stimuli was 240. The minimum length of the questions was set to five words. The duration of the stimuli varied (M = 2548.30 ms; SD = 864.31 ms), and we aimed to balance the right answer options (yes/no) for the general knowledge questions. Additionally, half of the questions were constructed to have an early answer point, and half a late answer point. Two annotators proficient in Dutch identified the answer point in all questions following instructions from Bögels (2020). This resulted in four question categories: early general questions (EG), late general questions (LG), early personal questions (EP), and late personal questions (LP) (see Table 1 for examples and the Appendix for the full question list). The question set was revised by four native speakers of Dutch. The audio stimuli were recorded in 44.1kHz and 32-bit in Audacity 2.0.6 (https://www.audacityteam.org/), and spoken by a female native Dutch speaker who was instructed to speak as naturally as possible.

Table 1

Examples of questions per condition (EG, LG, EP, and LP) with English translation

	Dutch question	English translation
EG	"Hebben planten koolstofdioxide nodig om fotosynthese uit te voeren?"	*"Do plants need carbon dioxide to perform photosynthesis?"*
LG	"Heeft de Engelse vlag de kleuren wit, rood en blauw?"	*"Does the English flag have the colours white, red, and blue?"*
EP	"Breng je veel tijd door achter het computerscherm vanwege je werk of school?"	"*Do you spend a lot of time in front of the computer screen because of your work or school?"*
LP	"Heb je een broer of zus die ouder is dan 20 jaar?"	*"Do you have a sibling who is above the age of 20?"*

2.2.2 Avatar

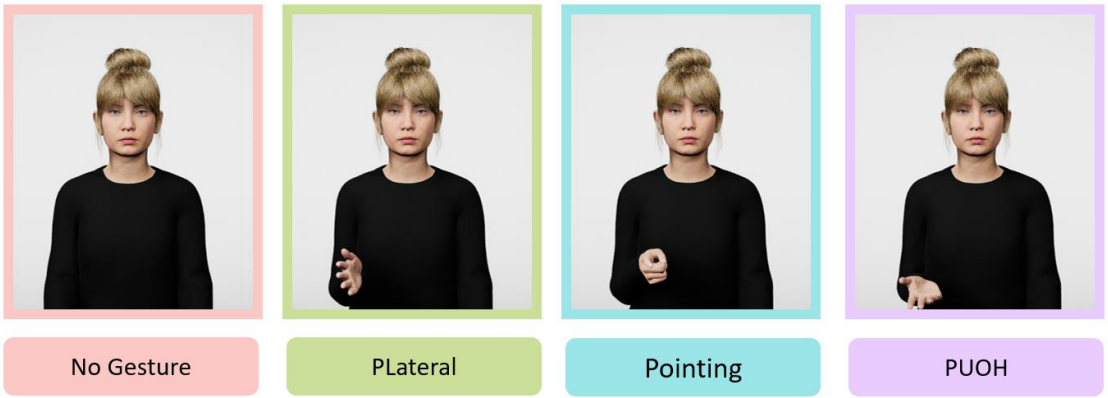
For the visual presentation of the stimuli, VR-videos were made showing a female avatar. The choice for an avatar was made in order to have full control over the bodily signals.

Furthermore, recent studies looking at related aspects have shown great results by using avatars for their studies (e.g., Heyselaar et al., 2015; Nota et al., 2022). The avatar was presented in 2D in front of a light-coloured background, in the field of view from the head to the umbilicus, it had blond hair, and it was wearing a black sweater. The avatar was lip-synchronised for all the stimuli and gestured only with the right hand. The avatar was either using no gesture when asking a question or using a non-representational gesture variation: PUOH, palm lateral, or addressee pointing. The variations for the non-representational gestures used in the experiment were selected after conducting a pre-study in the CoAct-corpus of the Max Planck Institute (see 1.4 Current study for further information). We found that the classical PUOH, the palm lateral, and the addressee pointing are commonly used non-representational gesture forms in the corpus. We could also see that non-representational gestures are more often used in combination with a question than with a response, which also validates our choice of using questions as verbal stimuli for our study.

The avatars were created with MetaHuman (June 2022), the gesture animation was done with Maya 2020, and the lip synchronization was done with Jali 1.30. The rendering of the avatars was done in Unreal Engine 4.27 and exported as mp4 videos. The avatar can be seen in Figure 1.

Figure 1

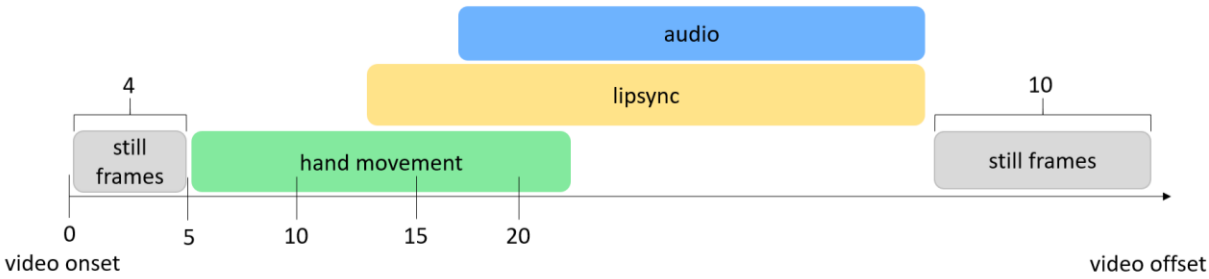
Avatar in four gesture conditions (no gesture, palm lateral, addressee pointing, and PUOH)



The exact structure of the complete stimuli is presented in Figure 2. The stimuli start with 4 still frames and in the 5th frame the hand movement starts (before the audio onset), reaching the final position at approximately 100 ms (4 frames) into the question. The gesture remains in this position until the end of the video. The lip synchronisation was set to start 13 frames (ca. 360 ms) after the video onset and the audio would start at 17 frames to make the avatar look more natural.

Figure 2

Complete structural flow of stimuli (for the gesture condition)



2.2.3 Design and conditions

The experiment has a flat design, where the condition with no gesture is compared to the condition with gesture containing three variations (palm lateral, addressee pointing, and PUOH). 120 questions were presented with no gesture, and each of the variation conditions was combined with 40 questions, ending up with a total of 120 stimuli for the gesture condition. In total, participants had to respond to 240 stimuli.

The questions in the conditions were displayed in six different lists of 40 questions each (matched for mean question duration, question type, and answer point). Each participant was presented with each question once in one gesture condition. The questions were counterbalanced across participants so that each question appeared in each condition.

Gorilla (Anwyl-Irvine et al., 2020) was used to set up and display the experiment as well as for data collection because RTs can be measured quite accurately online with this platform.

2.3 Procedure

Prior to getting access to the experiment, participants had to sign an informed consent form. The experiment was set up online, so participants did not need to come to the lab, but could easily do the experiment from a computer or laptop at home using Google Chrome. Subjects were instructed to sit in a quiet place where they would not be disturbed throughout the experiment. They had to use wired earphones and had to close all tabs and programmes on their device to prevent issues with internet connection or audio quality. Furthermore, they had to fill in a questionnaire asking about demographic information (age, gender, languages, language proficiency, and country of origin). Additionally, prior to starting the main experiment, participants had to perform a screening task to ensure they were using headphones (Milne et al., 2020).

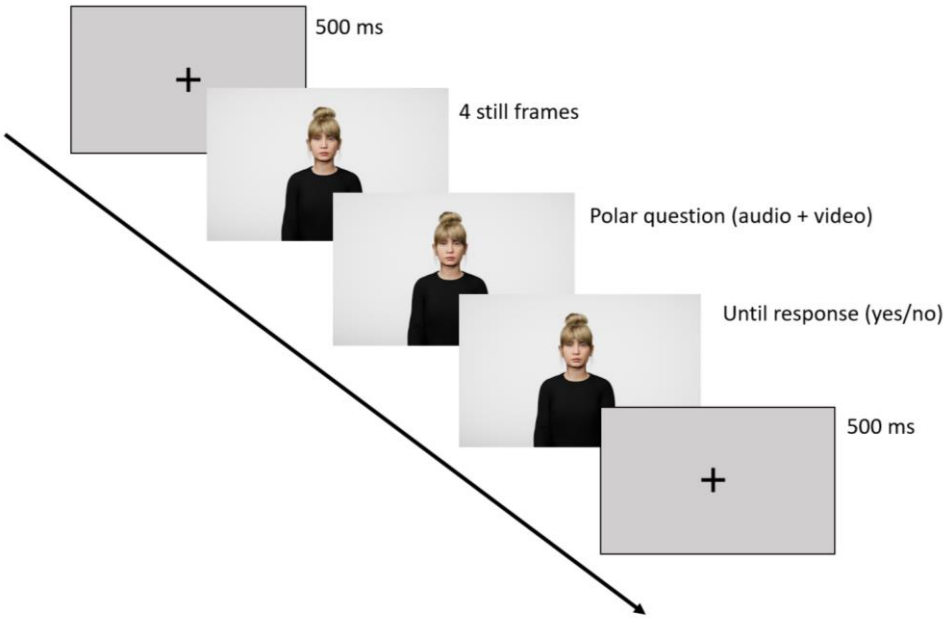
Before starting with the actual experiment, the participants were given the instructions to watch and listen carefully to the woman on the screen. They were informed about the kind of question they could expect, and they were asked to answer questions as fast and accurately

as possible. They were instructed to press the key "M" for *no* and the key "X" for *yes*. Participants were familiarised with the task by doing a practice trial: first a fixation cross appeared, followed by a practice item, and terminating with a fixation cross. Then they continued to the main task after having read the instructions for a second time.

For the main experiment, each subject needed to respond to 240 questions. The questions were presented in 12 blocks of each 20 questions. In between the blocks, participants could take small breaks during which they could look away from the screen. Before each question, participants were presented with a fixation cross. In Figure 3 the specific flow of the experimental trials can be seen.

Figure 3

Flow of experimental trial (here based on an example from the no gesture condition)



During the experiment, the RT of the participants was measured and additionally, the participants' accuracy on the general knowledge items was measured.

Upon completion of the experiment, subjects were asked to fill out different questionnaires. The first two questionnaires were the Empathy Quotient (EQ) (Groen et al., 2016) and the Actions and Feelings Questionnaire (AFQ) (van der Meer et al., 2021), which appeared in random order. In the EQ questionnaire, participants had to report whether they did (or did not) agree with statements regarding empathy. In the AFQ questionnaire, participants needed to respond to questions related to self-awareness of actions connected to feelings. In both questionnaires, answers had to be given on a four-point scale ranging from (1) *strongly disagree* to (4) *strongly agree*. Furthermore, participants were asked about their experience with

the avatar and lastly, they were asked to write down what they thought the experiment's scope was.

The entire experiment lasted approximately 60 minutes.

2.4 Data analysis

For the analysis of this study, the participants' RTs on the four conditions (no gesture vs. three variations) were analysed and compared. Two kinds of RT were obtained: one relative to the question end and one relative to the identified answer point. First, the data was checked for outliers which we considered to be RT scores 3*SD* from the participants' mean RT. Due to this, 199 trials (1.93% of total trials) were removed from the dataset. Additionally, all incorrect responses to the general knowledge questions were removed (702 trials which correspond to 6.80% of total trials).

The data-extraction was done in R (R Core Team, 2022) with the help of the package *dplyr* (Wickham et al., 2022). The data visualisation was done in R (R Core Team, 2022) by using the package *ggplot2* (Wickham, 2016).

Generalised linear mixed-effect models (GLMMs) were used in R (R Core Team, 2022) for the statistical analysis. The packages used for running the models were *lme4* (Bates et al., 2015) and *lmerTest* (Kuznetsova et al., 2017).

The dependent variable was RT (relative to the answer point or relative to the question end) and the independent variables were Question Type (general knowledge questions vs. personal preference questions), Answer Point (late vs. early), Gesture Presence (gesture vs. no gesture), and Gesture Form (PUOH, addressee pointing, palm lateral). Random intercepts for participant and item were included but no random slopes (for item and participant) because applying both would lead to convergence errors.

Likelihood-ratio tests (ANOVA function) were run for RT to test for the presence of main effects of gesture presence, gesture form, answer point, and the interaction effect between gesture presence and answer point.

The models tested were the following:

1. RT ~ AnswerPoint + (1|Participant) + (1|Item)
2. RT ~ GesturePresence + (1|Participant) + (1|Item)
3. RT ~ GestureForm + (1|Participant) + (1|Item)
4. RT ~ AnswerPoint * GesturePresence + (1|Participant) + (1|Item)

Additionally, two exploratory model analyses were performed on the effect of response type and question type on the RT:

5. RT ~ Response + (1|Participant) + (1|Item)
6. RT ~ QuestionType + (1|Participant) + (1|Item)

3. Results

3.1 Planned analysis

Hypothesis 1: Answer point

Figure 4

Density plot showing mean RT (relative to the question end) across participants per answer point condition (early/late)

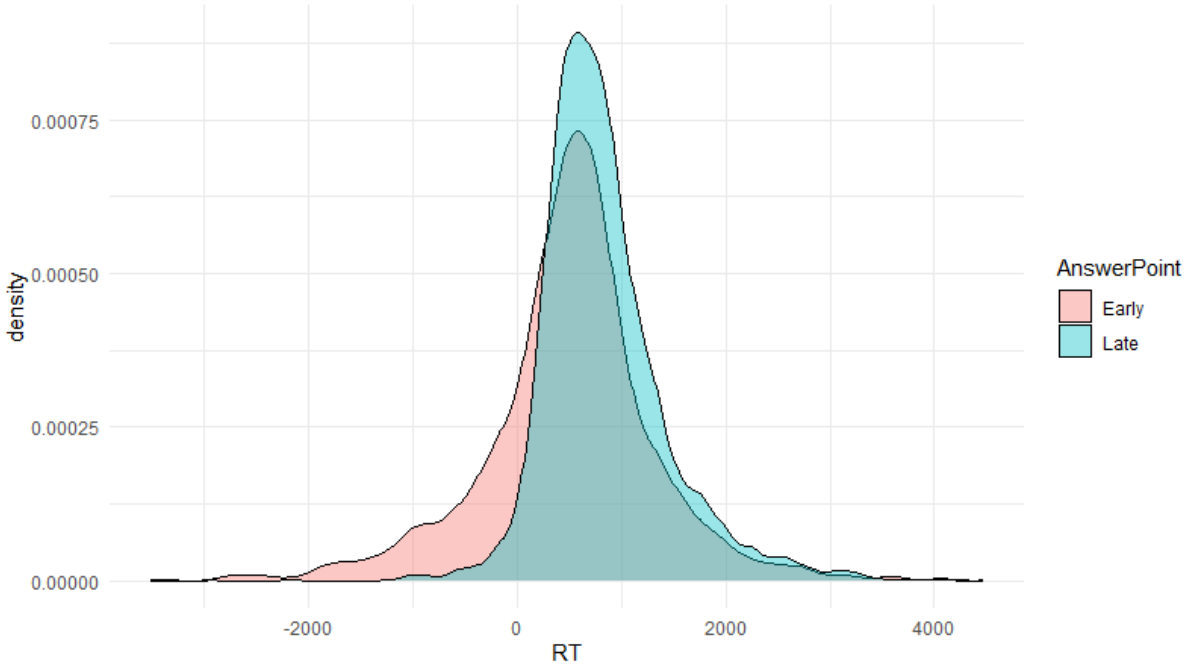


Table 2

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	489.52	59.58	82.89	8.216	.0001
AnswerPointLate	366.23	46.23	232.94	7.921	.0001

In Figure 4, the RT is visualised for questions with a late (M = 838 ms; SD = 604 ms) and questions with an early (M = 503 ms; SD = 843 ms) answer point. In Table 2, the output of the mixed model analysis is presented. For the RT (relative to the question end), there is a significant main effect of the answer point ($p < 0.05$), suggesting that questions with a late answer point are answered significantly slower than questions with an early answer point.

Hypothesis 2: Gesture presence

Figure 5

Density plot showing mean RT (relative to the answer point) across participants for gesture presence (yes/no)

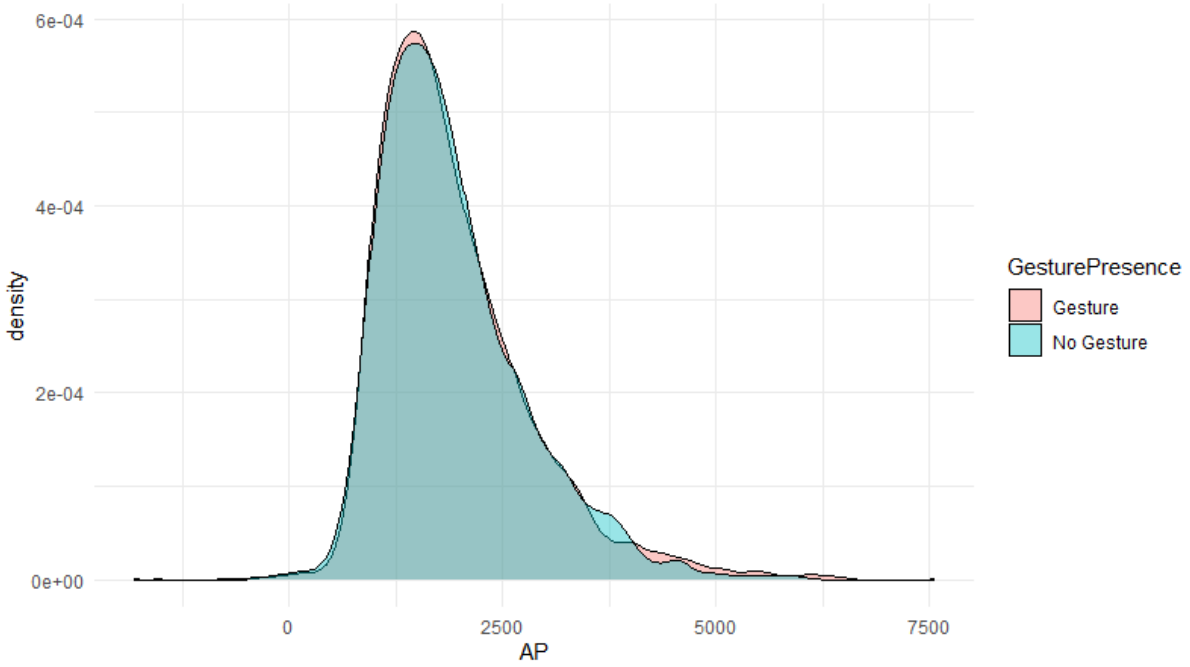


Table 3

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	1964.99	64.10	105.48	30.657	.0001
GesturePresenceNoGesture	-11.91	11.87	9143.76	-1.003	.316

In Figure 5, the RT is visualised for stimuli with gesture (M = 1941 ms; SD = 904 ms) and stimuli without gesture (M = 1916 ms; SD = 855 ms). In Table 3, the outcome of the mixed model analysis is presented. For the RT (relative to the answer point), there is no significant main effect of gesture presence ($p > 0.05$), suggesting that there is no difference in RT when seeing a gesture or not.

Hypothesis 3: Gesture forms

Figure 6

Density plot showing mean RT (relative to the answer point) across participants per gesture condition (no gesture/ palm lateral/ addressee pointing/ PUOH)

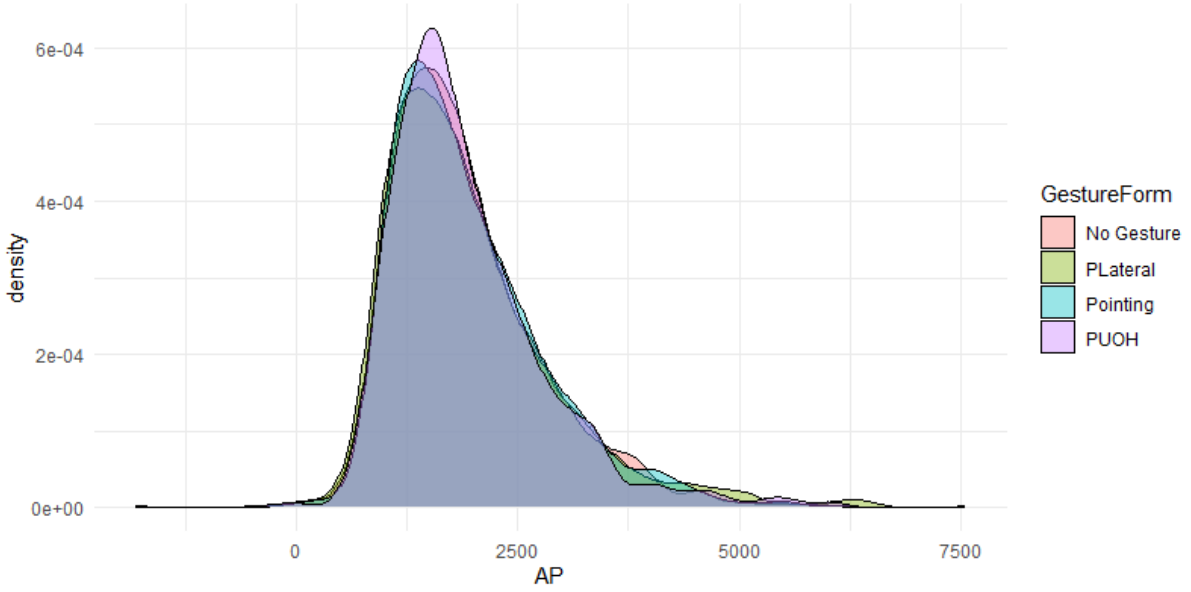


Table 4

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	1953.0707	64.1006	105.5093	30.469	.0001
GestureFormLateral	19.4133	16.7393	9142.9709	1.160	.246
GestureFormPointing	16.6334	16.7644	9141.2188	0.992	.321
GestureFormPUOH	-0.2294	16.7206	9141.6801	-0.014	.989

In Figure 6, the RT is visualised for stimuli with no gesture (*M* = 1916 ms; *SD* = 855 ms), PUOH (*M* = 1924 ms; *SD* = 878 ms), addressee pointing (*M* = 1947 ms; *SD* = 876 ms), and palm lateral (*M* = 1952 ms; *SD* = 957 ms). In Table 4, the outcome of the mixed model analysis is presented. For the RT (relative to the answer point), there is no significant main effect of gesture form ($p > 0.05$), suggesting that there is no difference in RT due to different gesture forms.

Hypothesis 4: Interaction answer point and gesture presence

Table 5

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	496.80	60.17	86.22	8.257	.0001
AnswerPointLate	361.70	47.74	264.23	7.576	.0001
GesturePresenceNoGesture	-14.67	16.80	9155.86	-0.874	.382
AnswerPointLate:GesturePresence NoGesture	9.18	23.73	9153.07	0.387	.699

In Table 5, the outcome of the mixed model analysis is presented. For the RT (relative to the question end), there is no significant main effect of interaction between answer point and gesture presence ($p > 0.05$), suggesting that the effect of the answer point is not enhanced by the presence of a gesture.

3.2 Exploratory analyses

Response type

Figure 7

Density plot showing mean RT (relative to the answer point) across participants for response type (yes/no)

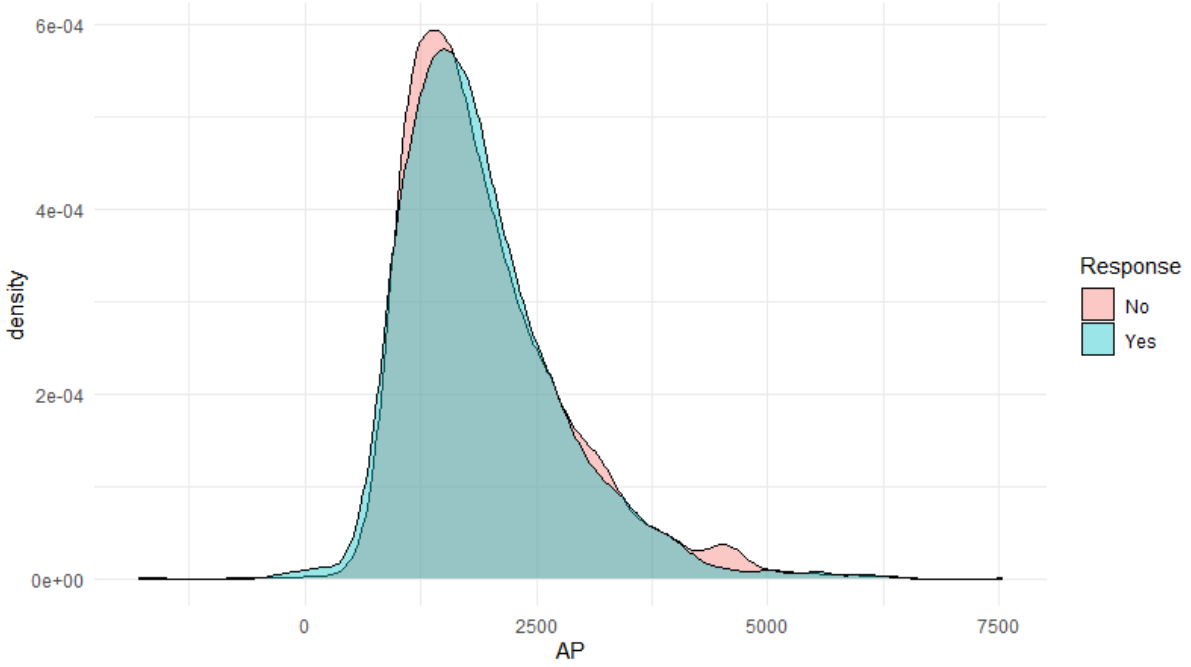


Table 6

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	1994.13	64.57	109.38	30.882	.0001
ResponseYes	-63.50	18.60	9351.18	-3.413	.001

As the effect of response type on RT is reported in multiple studies (e.g., Stivers et al., 2009), we wanted to look into this to investigate whether the experimental set-up is justified and natural, and to ensure that the overall approach has worked. In Figure 7, the RT is visualised for yes-responses (M = 1905 ms; SD = 863 ms) and no-responses (M = 1959 ms; SD = 901 ms). In Table 6, the outcome of the mixed model analysis is presented. For the RT (relative to the answer point), there is a significant effect of response type ($p < 0.05$), suggesting that the RT is influenced by the given response (yes-responses being faster than no-responses).

Question type

Figure 8

Density plot showing mean RT (relative to the answer point) across participants for question type (general knowledge/personal preference)

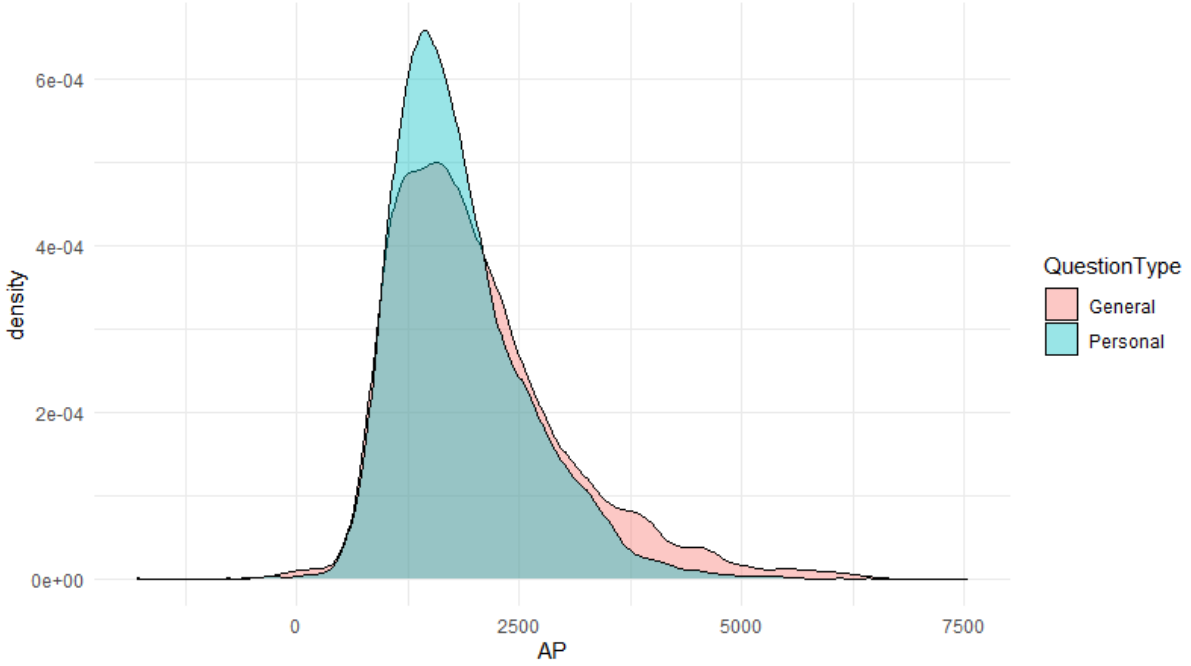


Table 7

Fixed effects of mixed model analysis with estimate, standard error, degrees of freedom (df), t- and p-value

	Estimate	Std. Error	*df*	*t*	*p*-value
Intercept	2082.27	74.50	163.26	27.951	.0001
QuestionTypePersonal	-244.70	77.88	237.28	-3.142	.002

The influence of the question type has not been stated in our main hypotheses, but is known to influence RT (e.g., Nadeau and Niemi (1995) find that responses to personal questions are given faster than responses to general knowledge questions). This exploratory analysis seeks to investigate if the same effect can be found, because to replicate these results would mean our study set-up is natural and that the overall approach worked. In Figure 8, the RT is visualised for general knowledge questions (M = 2038 ms; SD = 996 ms) and personal preference questions (M = 1837 ms; SD = 758 ms). In Table 7, the outcome of the mixed model analysis can be seen. For the RT (relative to the answer point), there is a significant effect of question type ($p < 0.05$), suggesting that questions asking about personal preferences are answered faster than questions testing general knowledge.

4. Discussion

In the current study, we investigated whether non-representational gestures influence the RT of the addressee when responding to questions. An avatar was created asking polar questions (general vs. personal) with early or late answer points accompanied by three different variations of non-representational gestures (PUOH, palm lateral, or addressee pointing) or no gesture. The hypotheses were (1) that early/late answer points influence the addressees' RT, (2) that the presence of a non-representational gesture would lead to a faster RT, (3) that there might be an influence of specific gesture forms on the addressees' RT, and (4) that there might be an effect of interaction between gesture presence and answer point. Therefore, multiple mixed model analyses were conducted to test the significance of the different predictors.

The results show no effect of gesture presence and gesture form on the participants' RT. In addition, there is no effect of interaction between the answer point and the presence of a gesture. Thus, non-representational gestures seem to have no influence on the RT of addressees. However, we found an effect of answer point on RT showing that questions with an early answer point are answered significantly faster than questions with a late answer point. This is in line with earlier studies investigating early response planning in turn-taking (e.g., Bögels, 2015).

Additionally, in the exploratory analyses significant effects were found showing that the response type influences the RT (yes-responses are given significantly faster than no-responses). This is in line with prior research (e.g., Stivers et al., 2009) showing that confirmatory responses are given faster than non-confirmatory responses. Another significant effect comes from the question type (personal preference questions are answered faster than general knowledge questions). This finding is in line with Nadeau and Niemi (1995), who show that personal questions are answered faster than general questions, because responses to personal questions represent a simple retrieval from memory while responses to knowledge questions rely on more complex and different factors. These findings show that the interactional setting of the experiment is natural and that the overall approach worked. The assumption people might have that humans act differently with computers or avatars than with other people can therefore be eliminated. In addition, the lack of effect in our main analyses does not likely come down to a lack of power or other major design problems, because otherwise the exploratory effects (see 3.2 Exploratory analyses) would probably also not have appeared.

Finding no effect of gestures could be linked to the experimental set-up: the VR-avatar might have not reflected the social aspect which non-representational gestures hold. Therefore, it might be important to create a better social interaction, so that the participant feels more socially involved. In contrast, the effects of response type and question type have still been found because they relate more to the human memory capacity and are far less socially related than the impact of gestures should be. Additionally, semantic effects (e.g., answer point) seem to be easier to manipulate. Another reason might be that participants only focussed on verbal cues (and not visual cues) when preparing their response in order to have as fast and accurate responses as possible. However, it might also still be an effect of the online component of the study, and it might be that results related to gestures would be found in another setting. In addition, other effects might have been found when using a verbal response instead of the button-press task or presenting gestures with retraction (as this is also the case in multimodal real-life conversations).

Another reason might be the language or culture tested: according to Colletta et al. (2015), Italians use far more hand gestures than other cultures in face-to-face conversations. It would be interesting to see whether an effect could be found when testing a language which uses hand gestures extensively.

It could also be that the effect of non-representational gestures on RT clusters together with another aspect or social cue and does not reveal itself on its own, but only in interaction with something else, as there are a lot of cues in conversation (e.g., eye gaze, body posture, tone

of voice). In this study, we have isolated only one cue (i.e., answer point) to investigate this, which had no effect, but there might still be another interaction effect.

However, it might also be that non-representational gestures do not at all show an influence on RT but rather on another more physiological measure showing an increased response readiness (e.g., hart rate, pupil dilation) (Kaartinen et al., 2012). Unfortunately, this is not something we can investigate with the data collected within this study.

A post-study starting shortly will determine whether an effect of gestures is to be found when looking at brain signals from EEG-data. For this experiment, the exact same set-up is used, and we hope to find an effect on RT by looking at the readiness potential, which should be a more sensitive RT measure (e.g., Jansen et al., 2014). The readiness potential should tell us if there is an earlier response planning even if the response is still launched at the same time.

Future research could investigate the effect of non-representational gestures deeper by using more complex and real-life resembling VR-environments or holograms, because it might be that seeing an avatar on a screen does not lead to the same social connection human being have when communicating face-to-face with another human being. Also, researchers could look more into the social aspect non-representational gestures hold and whether other social cues are directly linked to non-representational gestures.

5. Conclusion

In summary, we could not find that either gesture presence or gesture form facilitate response-giving in addressees. The only main effect found comes from the answer point influencing addressees' RT. Thus, we were unable to provide evidence for non-rep gestures acting as response mobilising cues. Still, a lot needs to be investigated around the social effect of non-representational gestures in face-to face interactions.

References

Alibali, M. W., Heath, D. C., & Myers, H. J. (2001). Effects of visibility between speaker and listener on gesture production: Some gestures are meant to be seen. *Journal of Memory and Language, 44*(2), 169–188. https://doi.org/10.1006/jmla.2000.2752

Anwyl-Irvine, A. L., Massonnié, J., Flitton, A., Kirkham, N., & Evershed, J. K. (2020). Gorilla in our midst: An online behavioral experiment builder. *Behavior Research Methods*, *52*(1), 388–407. https://doi.org/10.3758/s13428-019-01237-x

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1-48. https://doi.org/10.18637/jss.v067.i01

Bavelas, J. B., Chovil, N., Coates, L., & Roe, L. (1995). Gestures specialized for dialogue. *Personality and Social Psychology Bulletin*, *21*(4), 394–405. https://doi.org/10.1177/0146167295214010

Bavelas, J. B., Chovil, N., Lawrie, D. A., & Wade, A. (1992). Interactive gestures. *Discourse Processes*, *15*(4), 469–489. https://doi.org/10.1080/01638539209544823

Bekke, M. ter., Drijvers, L., Holler, J. (2020). The predictive potential of hand gestures during conversation: An investigation of the timing of gestures in relation to speech. *PsyArXiv*. https://doi.org/10.31234/osf.io/b5zq7

Bögels, S. (2020). Neural correlates of turn-taking in the wild: Response planning starts early in free interviews. *Cognition*, *203*, 104307. https://doi.org/10.1016/j.cognition.2020.104347

Bögels, S., Magyari, L., & Levinson, S. C. (2015). Neural signatures of response planning occur midway through an incoming question in conversation. *Scientific Reports*, *5*(1), 1-11. https://doi.org/10.1038/srep12881

Castellucci, G. A., Kovach, C. K., Howard, M. A., Greenlee, J. D. W., & Long, M. A. (2022). A speech planning network for interactive language use. *Nature, 602*(7895), 117–122. https://doi.org/10.1038/s41586-021-04270-z

Cohen, A. (1997). The communicative function of hand gestures. *Journal of Communication, 27*(4), 54-69.

Colletta, J. M., Guidetti M., Caprici, O., Cristilli, C., Demir, O. E., Kunene-Nicolas, R. N., & Levine, S. (2015). Effects of age and language on co-speech gesture production: An investigation of French, American, and Italian children's narratives. *Journal of Child Language, 42*(1), 122–145. https://doi.org/10.1017/s0305000913000585

Cooperrider, K., Abner, N., & Goldin-Meadow, S. (2018). The palm-up puzzle: Meanings and origins of a widespread form in gesture and sign. *Frontiers in Communication*, *3*, 23. https://doi.org/10.3389/fcomm.2018.00023

Ekman, P., & Friesen, W. (1969). The repertoire of nonverbal behaviour: Categories, origins, usage and coding. *Semiotica, 1*(1), 49-98.

Freedman, N. (1972). The analysis of movement behaviour during clinical interviews. *Studies in Dyadic Communication, 7*, 153-175.

Gerwing, J., & Allison, M. (2009). The relationship between verbal and gestural contributions in conversation. *Gesture*, *9*(3), 312–336. https://doi.org/10.1075/gest.9.3.03ger

Groen, Y., Fuermaier, A. B., den Heijer, A. E., Tucha, O., & Althaus, M. (2016). De Nederlandse empathie quotiënt (EQ) en systematiseren quotiënt (SQ). *Wetenschappelijk Tijdschrift Autisme*, *15*(2), 73.

Heyselaar, E., Hagoort, P., & Segaert, K. (2015). In dialogue with an avatar, language behavior is identical to dialogue with a human partner. *Behavior Research Methods*, *49*(1), 46–60. https://doi.org/10.3758/s13428-015-0688-7

Holle, H., Gunter, T. C., Rüschemeyer, S. A., Hennenlotter, A., & Iacoboni, M. (2008). Neural correlates of the processing of co-speech gestures. *NeuroImage*, *39*(4), 2010–2024. https://doi.org/10.1016/j.neuroimage.2007.10.055

Holler, J. (2010). Speakers' use of interactive gestures as markers of common ground. *Gesture in Embodied Communication and Human-Computer Interaction*, 11–22. https://doi.org/10.1007/978-3-642-12553-9_2

Holler, J., Kendrick, K. H., & Levinson, S. C. (2018). Processing language in face-to-face conversation: Questions with gestures get faster responses. *Psychonomic Bulletin & Review*, *25*(5), 1900–1908. https://doi.org/10.3758/s13423-017-1363-z

Holler, J., & Levinson, S. C. (2019). Multimodal language processing in human communication. *Trends in Cognitive Sciences*, *23*(8), 639–652. https://doi.org/10.1016/j.tics.2019.05.006

Jansen, S., Wesselmeier, H., de Ruiter, J. P., & Mueller, H. M. (2014). Using the readiness potential of button-press and verbal response within spoken language processing. *Journal of Neuroscience Methods, 232*, 24–29. https://doi.org/10.1016/j.jneumeth.2014.04.030

Jongman, S. R., Piai, V., & Meyer, A. S. (2019). Planning for language production: The electrophysiological signature of attention to the cue to speak. *Language, Cognition and Neuroscience*, *35*(7), 915–932. https://doi.org/10.1080/23273798.2019.1690153

Kaartinen, M., Puura, K., Mäkelä, T., Rannisto, M., Lemponen, R., Helminen, M., Salmelin, R., Himanen, S. L., & Hietanen, J. K. (2012). Autonomic arousal to direct gaze correlates with social impairments among children with ASD. *Journal of Autism and Developmental Disorders*, *42*(9), 1917–1927. https://doi.org/10.1007/s10803-011-1435-2

Kelly, S. D., Özyürek, A., & Maris, E. (2009). Two sides of the same coin. *Psychological Science*, *21*(2), 260–267. https://doi.org/10.1177/0956797609357327

Kendon, A. (2004). *Gesture: Visible Action as Utterance*. Cambridge University Press.

Kendon, A. (1987). On gesture: Its complementary relationship with speech. *Nonverbal Behaviour and Nonverbal Communication*, 65-97.

Kuznetsova A., Brockhoff P. B., & Christensen R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, *82*(13), 1-26. https://doi.org/10.18637/jss.v082.i13

Levinson, S. C., & Torreira, F. (2015). Timing in turn-taking and its implications for processing models of language. *Frontiers in Psychology*, *6*, 731. https://doi.org/10.3389/fpsyg.2015.00731

Magyari, L., & de Ruiter, J. P. (2012). Prediction of turn-ends based on anticipation of upcoming words. *Frontiers in Psychology*, *3*, 376. https://doi.org/10.3389/fpsyg.2012.00376

McNeill, D. (1985). So you think gestures are nonverbal? *Psychological Review*, *92*(3), 350–371. https://doi.org/10.1037/0033-295x.92.3.350

McNeill, D. & Levy, E. (1982). Conceptual representations in language activity and gesture. *Speech, place and action*, 271-295.

Meer, H., van der., A., Sheftel-Simanova, I., Kan, C. C., & Trujillo, J. P. (2021). Translation, cross-cultural adaptation, and validation of a Dutch version of the actions and feelings questionnaire in autistic and neurotypical adults. *Journal of Autism and Developmental Disorders*, *52*(4), 1771-1777. https://doi.org/10.1007/s10803-021-05082-w

Milne, A. E., Bianco, R., Poole, K. C., Zhao, S., Billig, A. J., Oxenham, A. J. & Chait, M. (2020). An online headphone screening test based on dichotic pitch. *Behavior Research Methods*, *53*(4), 1551-1562. https://doi.org/10.3758/s13428-020-01514-0

Nadeau, R., & Niemi, R. G. (1995). Educated guesses: The process of answering factual knowledge questions in surveys. *Public Opinion Quarterly*, *59*(3), 323. https://doi.org/10.1086/269480

Nota, N., Trujillo, J. P., & Holler, J. (2022). Conversational eyebrow frowns facilitate question identification: An online VR study.

Pine, K. J., Lufkin, N., Kirk, E., & Messer, D. (2007). A microgenetic analysis of the relationship between speech and gesture in children: Evidence for semantic and temporal asynchrony. *Language and Cognitive Processes*, *22*(2), 234–246. https://doi.org/10.1080/01690960600630881

R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org

Stivers, T., Enfield, N. J., Brown, P., Englert, C., Hayashi, M., Heinemann, T., Hoymann, G., Rossano, F., de Ruiter, J. P., Yoon, K. E., & Levinson, S. C. (2009). Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences*, *106*(26), 10587–10592. https://doi.org/10.1073/pnas.0903616106

Stivers, T., & Rossano, F. (2010). Mobilizing response. *Research on Language & Social Interaction*, *43*(1), 3–31. https://doi.org/10.1080/08351810903471258

Templeton, E. M., Chang, L. J., Reynolds, E. A., Cone LeBeaumont, M. D., & Wheatley, T. (2021). Fast response times signal social connection in conversation. *Proceedings of the National Academy of Sciences*, *119*(4), e2116915119. https://doi.org/10.1073/pnas.2116915119

Wickham, H. (2016). ggplot2: Elegant graphics for data analysis. https://ggplot2.tidyverse.org

Wickham, H., François, R., Henry, L., & Müller, K. (2022). dplyr: A grammar of data manipulation. https://dplyr.tidyverse.org

Wu, Y. C., & Coulson, S. (2007). How iconic gestures enhance communication: An ERP study. *Brain and Language*, *101*(3), 234–245. https://doi.org/10.1016/j.bandl.2006.12.003

Appendix

Full question list

EP = EARLY PERSONAL

EP1	Did you have a favourite toy when you were a child?	Had je een favoriet speelgoed toen je jong was?
EP2	Have you laughed a lot in the past few days?	Heb je veel gelachen in de afgelopen paar dagen?
EP3	Do you have a favourite song at the moment?	Heb je een lievelingsnummer op dit moment?
EP4	Do you have a Netflix account?	Heb je een Netflix-abonnement?
EP5	Do you have a Spotify account?	Heb je een Spotify-abonnement?
EP6	Are you polite in general?	Ben je beleefd in het algemeen?
EP7	Are you planning any trips in the near future?	Ben je van plan om in de nabije toekomst uitstapjes te maken?
EP8	Would you change history if you could?	Zou je de geschiedenis veranderen als je dat zou kunnen?
EP9	Do you play any sports in your free time?	Doe je aan sport in je vrije tijd?
EP10	Do you ever cook for your family or friends?	Kook je wel eens voor je familie of vrienden?
EP11	Do you follow a lot of celebrities on social media platforms?	Volg je veel beroemdheden op social media platforms?
EP12	Would you like to go to space once if you had the chance?	Zou je een keer naar de ruimte willen, als je daar de kans voor kreeg?
EP13	Does somebody you know work as a cook in a restaurant?	Ken je iemand die als kok in een restaurant werkt?
EP14	Do you have a lot of hobbies that you like to practice in your free time?	Heb je veel hobby's die je graag in je vrije tijd uitoefent?
EP15	Do you spend a lot of time in front of the computer screen because of your work or school?	Breng je veel tijd door achter het computerscherm vanwege je werk of school?
EP16	Do you spend a lot of time watching videos on the internet?	Besteed je veel tijd aan het bekijken van video's op het internet?
EP17	Do you like doing house chores?	Vind je het leuk om huishoudelijke klusjes te doen?
EP18	Do you like being physically active a couple of times per week?	Vind je het leuk om een paar keer per week fysiek actief te zijn?
EP19	Is summer your favourite time of the year?	Is de zomer jouw favoriete tijd van het jaar?
EP20	Would you like to read other people's minds if you could	Zou je de gedachten van andere mensen willen lezen als je dat zou kunnen?
EP21	Did you like to play outside as a child?	Speelde je graag buiten als kind?
EP22	Do you think that there is alien life in other parts of the universe?	Denk je dat er buitenaards leven is in andere delen van het universum?
EP23	Do you share your apartment with any roommates?	Deel je jouw woning met huisgenoten?
EP24	Are you in your first bachelor year at the university?	Zit je in jouw eerste bachelorjaar aan de universiteit?
EP25	Do you like spending time with your family?	Vind je het leuk om tijd met jouw familie door te brengen?
EP26	Do you often use a bike to get around the city?	Gebruik je vaak de fiets als transportmiddel in de stad?
EP27	Are you afraid of going to the dentist?	Ben je bang om naar de tandarts te gaan?
EP28	Do you study psychology at the Radboud university in Nijmegen?	Studeer je psychologie aan de Radboud Universiteit in Nijmegen?
EP29	Do you like going to the zoos?	Vind je het leuk om naar de dierentuin te gaan?
EP30	Would you consider eating insects?	Zou je overwegen om insecten te eten?
EP31	Do you like trying out new cooking recipes?	Vind je het leuk om nieuwe kookrecepten uit te proberen?
EP32	Are there any snacks that you like so much that you could eat them every day?	Zijn er snacks die je zo lekker vindt dat je ze elke dag zou kunnen eten?
EP33	Would you consider yourself a messy person?	Vind je dat je een rommelig persoon bent?
EP34	Do you enjoy working on group projects?	Vind je het leuk om aan groepsopdrachten te werken?
EP35	Did you own a smartphone before you entered high school?	Had je een smartphone voordat je naar de middelbare school ging?
EP36	Did you own a laptop before you entered high school?	Had je een laptop voordat je naar de middelbare school ging?
EP37	Do you like celebrating carnaval?	Vind je het leuk om carnaval te vieren?
EP38	Are you a jealous type of person?	Ben je een jaloers persoon?
EP39	Are you more of a cat person than a dog person?	Ben je eerder een kattenmens dan een hondenmens?
EP40	Would you consider yourself a friendly person?	Zou je jezelf als een vriendelijk persoon beschouwen?
EP41	Would you consider yourself a spontaneous person?	Zou je jezelf als een spontaan persoon beschouwen?
EP42	Was maths one of your favorite subjects at school?	Was wiskunde een van jouw favoriete vakken op school?
EP43	Are there any books that you liked so much that you read them more than once?	Zijn er boeken die je zo leuk vond dat je ze meer dan één keer hebt gelezen?
EP44	Do you remember when you last read a book?	Weet je nog wanneer je voor het laatst een boek hebt gelezen?
EP45	Did your family have pets while you were in elementary school?	Had jouw familie huisdieren toen je op de basisschool zat?
EP46	Is breakfast your favorite meal of the day?	Is ontbijt jouw lievelingsmaaltijd van de dag?

EP47	Are there any board games that you like so much that you cannot stop playing?	Zijn er bordspellen die je zo leuk vindt dat je niet kunt stoppen met spelen?
EP48	Do you have a morning routine that you follow regularly?	Heb je een ochtendroutine die je regelmatig volgt?
EP49	Would you read someone's diary if you had the chance?	Zou je iemands dagboek lezen, mocht je daar de kans voor hebben?
EP50	Would you start your own business if you had the opportunity?	Zou je een eigen bedrijf beginnen als je daar de mogelijkheid toe had?
EP51	Would you like to time travel, if you could?	Zou je willen tijdreizen, als je dat zou kunnen?
EP52	Do you think that you have a good sense of humour according to your friends?	Denk je dat je een goed gevoel voor humor hebt volgens je vrienden?
EP53	Would you like to have sushi for breakfast if you were offered one?	Zou je sushi als ontbijt willen, als dat werd aangeboden?
EP54	Do you ever do something knowing you will regret it later?	Doe je wel eens iets terwijl je weet dat je er later spijt van zal krijgen?
EP55	Did you believe in Santa Claus when you were small?	Geloofde je in Sinterklaas toen je klein was?
EP56	Have you ever seen the original Mona Lisa painting during a trip to Paris?	Heb je ooit het origineel van de Mona Lisa gezien tijdens een reis naar Parijs?
EP57	Do you think that French is a difficult language to learn?	Denk je dat Frans een moeilijke taal is om te leren?

EP58	Do you have any early memories from before you were 10 years old?	Heb je herinneringen van voor je 10e levensjaar?
EP59	Is there anything on your list that you would like to do in the coming months?	Is er iets wat op je lijstje staat dat je de komende maanden zou willen doen?
EP60	Do you sometimes struggle with finishing tasks before the deadline?	Heb je soms moeite om taken voor de deadline af te ronden?
EP61	Do you spend a lot of time playing video games on the internet?	Besteed je veel tijd aan het spelen van videogames op internet?
EP62	Do you have a favorite movie at the moment?	Heb je op dit moment een favoriete film?
EP63	Did you like broccoli when you were a kid?	Hield je van broccoli toen je klein was?
EP64	Do you post a lot of pictures on social media?	Plaats je veel foto's op sociale media?
EP65	Do you like participating in social activities at your university or workplace?	Vind je het leuk om deel te nemen aan sociale activiteiten op jouw universiteit of op jouw werk?
EP66	Have you ever made a cake for somebody else's birthday?	Heb je ooit een taart gemaakt voor de verjaardag van iemand anders?
EP67	Would you ever consider using Tinder to find a romantic partner?	Zou je ooit overwegen om Tinder te gebruiken om een romantische partner te vinden?

EP68	Is there any food that you dislike?	Is er eten dat je niet lekker vindt?
EP69	Would you be happy if you won a lottery?	Zou je blij zijn als je een loterij zou winnen?
EP70	Are you an organised person?	Ben je een georganiseerd persoon?
EP71	Do you like to eat soup in the Winter?	Eet je graag soep in de winter?
EP72	Have you ever swam in the North-Sea?	Heb je ooit in de Noordzee gezwommen?
EP73	Do you forgive people easily?	Vergeef je mensen meestal snel?
EP74	Do you fall asleep easily on most of the evenings?	Val je de meeste avonden gemakkelijk in slaap?

EG = EARLY GENERAL

EG1	Does Sushi originate from Japan?	Komt Sushi uit Japan van origine?	JA
EG2	Is Jupiter the biggest planet in our solar system?	Is Jupiter de grootste planeet in ons zonnestelsel?	JA
EG3	Is saffron the most expensive spice in the world?	Is saffraan de duurste specerij in de wereld?	JA
EG4	Was Claude Monet an Impressionist painter?	Was Claude Monet een impressionistische schilder?	JA
EG5	Is Harry Potter a wizard in the famous book series?	Is Harry Potter een tovenaar in de beroemde boekenreeks?	JA

EG6	Are ossicles located in the ear of a human body?	Bevinden gehoorbeentjes zich in het oor van een menselijk lichaam?	JA
EG7	Is Mount Everest the highest mountain in the world?	Is de Mount Everest de hoogste berg ter wereld?	JA
EG8	Does ASAP constitute an abbreviation, meaning as soon as possible, which is often used in online communication?	Is ZSM een afkorting die zo snel mogelijk betekent, en die vaak wordt gebruikt in online communicatie?	JA
EG9	Is the Pacific the largest ocean in the world	Is de Stille Oceaan de grootste oceaan ter wereld?	JA
EG10	Is cell energy mostly generated in mitochondria, according to what you learned in high school?	Wordt celenergie meestal gegenereerd in mitochondriën, zoals je op de middelbare school hebt geleerd?	JA
EG11	Does pizza originate from Italy?	Komt pizza uit Italië van origine?	JA
EG12	Are domestic cats carnivores, meaning they eat meat?	Zijn katten carnivoren, wat betekent dat ze vlees eten?	JA
EG13	Do plants need carbon dioxide to perform photosynthesis?	Hebben planten koolstofdioxide nodig om fotosynthese uit te voeren?	JA
EG14	Is William Shakespeare the author of the tragedy Romeo and Juliet?	Is William Shakespeare de auteur van de tragedie van Romeo en Julia?	JA
EG15	Does China have one of the largest populations worldwide?	Heeft China een van de grootste bevolkingsgroepen ter wereld?	JA

EG16	Are the cone cells located in the retina of a human eye?	Bevinden de kegelcellen zich in het netvlies van een menselijk oog?	JA
EG17	Is Pikachu the main mascot of the Pokémon cartoon series, which a lot of people loved when they were children?	Is Pikachu de belangrijkste mascotte van de Pokémon-tekenfilmserie, waar veel mensen van hielden toen ze nog kinderen waren?	JA
EG18	Is serotonin a hormone involved in happiness in humans and other mammals?	Is serotonine een hormoon dat betrokken is bij geluk in mensen en andere zoogdieren?	JA
EG19	Does a pescetarian diet include seafood while it excludes all other meat products?	Bevat een pescotarisch dieet zeevruchten terwijl het alle andere vleesproducten uitsluit?	JA
EG20	Did Marie Curie win a Nobel prize for her research work?	Heeft Marie Curie een Nobelprijs gewonnen voor haar onderzoekswerk?	JA
EG21	Did Leonardo Dicaprio win an Oscar for his acting?	Heeft Leonardo Dicaprio een Oscar gewonnen voor zijn acteerwerk?	JA
EG22	Is a DNA molecule a double helix by its form?	Is de vorm van een DNA-molecuul een dubbele helix?	JA
EG23	Is Sicily located south of Italy in the Mediterranean Sea?	Ligt Sicilië ten zuiden van Italië in de Middellandse Zee?	JA
EG24	Are cheetahs the fastest land animals in the world?	Zijn cheeta's de snelste landdieren ter wereld?	JA
EG25	Did Astrid Lindgren write the Pippi Longstocking books?	Heeft Astrid Lindgren de Pippi Langkous boeken geschreven?	JA

EG26	Do arteries push the blood away from the heart and towards the rest of the body?	Pompen slagaders het bloed weg van het hart en naar de rest van het lichaam?	JA
EG27	Is the Vatican the smallest country in the world?	Is de Vaticaanstad het kleinste land ter wereld?	JA
EG28	Do snakes shed their skin as they grow bigger?	Vervellen slangen wanneer ze groter worden?	JA
EG29	Is Ikea a Swedish store that sells furniture?	Is Ikea een Zweedse winkel die meubels verkoopt?	JA
EG30	Was Napoleon Bonaparte a French historical figure?	Was Napoleon Bonaparte een Frans historische figuur?	JA
EG31	Is Monaco the largest country in the world?	Is Monaco het grootste land ter wereld?	NEE
EG32	Is the Earth the largest planet in our solar system?	Is de aarde de grootste planeet in ons zonnestelsel?	NEE
EG33	Is Elizabeth the second an ancient Egyptian ruler, who lived in the first century BC?	Is Elizabeth II een Oud-Egyptische heerser die in de eerste eeuw voor Christus leefde?	NEE
EG34	Is London a country located in Europe?	Is Londen een land in Europa?	NEE
EG35	Is lasagna a sweet dessert, originating from the U.S.?	Is lasagne een zoet toetje, afkomstig uit de Verenigde Staten??	NEE
EG36	Is Zara a Dutch store that sells food?	Is Zara een Nederlandse winkel die eten verkoopt?	NEE

EG37	Is Tolkien the author of the book Harry Potter and the philosopher's stone?	Is Tolkien de auteur van het boek Harry Potter en de steen der wijzen?	NEE
EG38	Are there 4 continents in the world?	Zijn er vier continenten op de aarde?	NEE
EG39	Can you find the Colosseum in the French city of Nice?	Kun je het Colosseum in de Franse stad Nice vinden?	NEE
EG40	Is Japan located in the Atlantic Ocean, south of Iceland?	Ligt Japan in de Atlantische Oceaan, ten zuiden van IJsland?	NEE
EG41	Is Egypt located in Asia, west of Turkey?	Ligt Egypte in Azië, ten westen van Turkije?	NEE
EG42	Do piano and flute belong in the same group of musical instruments, called woodwind instruments?	Behoren piano en fluit tot dezelfde groep muziekinstrumenten, de zogenaamde houtblazers?	NEE
EG43	Did Titanic sink by crashing into another boat in the middle of the ocean?	Is de Titanic gezonken door tegen een andere boot in het midden van de oceaan te botsen?	NEE
EG44	Is the orca the biggest aquatic animal in the world?	Is de orka het grootste zeedier ter wereld?	NEE
EG45	Is it spinach which gives pesto it's green colour?	Is spinazie hetgeen dat pesto zijn groene kleur geeft?	NEE
EG46	Were Asterix and Obelix Romans according to the famous comic book?	Waren Asterix en Obelix Romeinen volgens het beroemde stripboek?	NEE
EG47	Is Cl the atomic sign for Helium on the periodic table?	Is Cl het chemische symbool voor Helium in het periodiek systeem?	NEE

EG48	Did Hansel and Gretel use stones when they were trying to find their way home?	Gebruikten Hans en Grietje stenen toen ze hun weg naar huis probeerden te vinden?	NEE
EG49	Is Nijmegen a major Dutch port city and of vital importance to the Dutch marine economy?	Is Nijmegen een grote Nederlandse havenstad en van vitaal belang voor de Nederlandse maritieme economie?	NEE
EG50	Can you find Taj Mahal in the German City of Munich?	Kun je de Taj Mahal vinden in de Duitse stad München?	NEE
EG51	Was Cleopatra a Russian historical figure?	Was de koningin Cleopatra een Russisch historisch figuur?	NEE
EG52	Did Dostoevsky write the Lord of the rings books?	Heeft Dostojevski de Lord of the rings boeken geschreven?	NEE
EG53	Is a burger an Italian dish, traditionally consisting of ham next to other ingredients?	Is een burger een Italiaans gerecht, traditioneel bestaande uit ham naast andere ingrediënten?	NEE
EG54	Is the heart located on the right side of the human body?	Bevindt het hart zich aan de rechterkant van het menselijk lichaam?	NEE
EG55	Does Apple mainly sell food products and clothes?	Verkoopt Apple vooral voedingsproducten en kleding?	NEE
EG56	Did Nelson Mandela win an Oscar to award his political career?	Heeft Nelson Mandela een Oscar gewonnen vanwege zijn politieke carrière?	NEE
EG57	Is Neptune the single star in our solar system?	Is Neptunus de enige ster in ons zonnestelsel?	NEE

EG58	Was Andy Warhol the creator of the famous statue David, depicting the Biblical figure?	Was Andy Warhol de maker van het beroemde standbeeld David, wat een verbeelding is van de bijbelse figuur?	NEE
EG59	Is Salvador Dali the creator of a painting the Starry Night, depicting an expressionist interpretation of a night sky?	Is Salvador Dali de maker van het schilderij de Sterrennacht, dat een expressionistische interpretatie van een nachtelijke hemel weergeeft?	NEE
EG60	Can humans regrow their arms in the right conditions?	Kunnen mensen hun armen opnieuw laten groeien in de juiste omstandigheden?	NEE
EG61	Is Primark a high-end food store?	Is Primark een hoogwaardige voedingswinkel?	NEE
EG62	Is a croissant traditionally a spicy food, originating from Mexico?	Is een croissant origineel een pittig gerecht, afkomstig uit Mexico?	NEE
EG63	Was Sherlock Holmes a painter according to the famous book series?	Was Sherlock Holmes een schilder volgens de gelijknamige beroemde boekenreeks?	NEE
EG64	Was Joan of Arc a Dutch-born historical figure?	Was Jeanne d'Arc een in Nederland geboren historisch figuur?	NEE
EG65	Is Na the atomic sign for Lithium on the periodic table?	Is Na het chemische symbool voor Lithium in het periodiek systeem?	NEE
EG66	Is the Sistine Chapel a creation of a famous French painter Claude Monet?	Is de Sixtijnse Kapel een creatie van een beroemde Franse schilder Claude Monet?	NEE
EG67	Is an Ode to joy a South African national anthem?	Is de Ode aan de Vreugde een Zuid-Afrikaans volkslied?	NEE

LP = LATE PERSONAL

LP1	Are you afraid of spiders?	Ben je bang voor spinnen?
LP2	Are you planning a vacation for the coming summer?	Ben je de vakantie voor aankomende zomer al aan het plannen?
LP3	Have you ever broken your leg?	Heb je ooit je been gebroken?
LP4	Have you ever been to Greece?	Ben je ooit in Griekenland geweest?
LP5	Do you have a favorite snack?	Heb je een favoriete snack?
LP6	Have you ever had a favorite teacher?	Heb je ooit een favoriete leraar gehad?
LP7	Do you have a favorite museum?	Heb je een favoriet museum?
LP8	Have you ever cheated at a board game?	Heb je ooit vals gespeeld tijdens een bordspel?
LP9	Have you ever written a song for someone?	Heb je ooit voor iemand een liedje geschreven?
LP10	Do you have a job besides your studies?	Heb je naast je studie een bijbaan?
LP11	Do you like to spend time in nature?	Breng je graag tijd door in de natuur?
LP12	Do you like Indian food?	Houd je van Indiaas eten?
LP13	Do you enjoy listening to audiobooks?	Luister je graag naar audioboeken?
LP14	Are you interested in history?	Ben je geïnteresseerd in geschiedenis?
LP15	Do you prefer magazines over books?	Geef je de voorkeur aan tijdschriften in plaats van boeken?
LP16	Are you interested in modern art?	Ben je geïnteresseerd in moderne kunst?
LP17	Do you often go to the movie theatre?	Ga je vaak naar een bioscoop?
LP18	Is it easy for you to trust people?	Is het makkelijk voor je om mensen te vertrouwen?
LP19	Do you get easily annoyed if people are late?	Ben je snel geïrriteerd als mensen te laat zijn?
LP20	Do you own any items with sentimental value?	Heb je spullen met emotionele waarde?
LP21	Do you like the colour red?	Houd je van de kleur rood?
LP22	Do you live in an apartment in Nijmegen?	Woon je op kamers in Nijmegen?
LP23	Do you like reading books?	Vind je boeken lezen leuk?
LP24	Is the eye colour of one of your family members blue?	Heeft een van jouw familieleden blauwe ogen?
LP25	Are you taller than 160 cm?	Ben je langer dan 160 cm?
LP26	Is one of your favorite foods pizza?	Is een van je favoriete gerechten pizza?
LP27	Do you consider yourself good at speaking English?	Vind je jezelf goed Engels spreken?
LP28	Do you have a sibling who is above the age of 20?	Heb je een broer of zus die ouder is dan 20 jaar?
LP29	Do you prefer drinking tea over coffee?	Drink je liever thee dan koffie?
LP30	Do you like being outdoors during the weekends?	Ben je in de weekenden graag in de buitenlucht?
LP31	Have you ever travelled abroad with friends?	Ben je ooit met vrienden naar het buitenland geweest?
LP32	Do you have any friends living nearby you?	Heb je vrienden die bij jou in de buurt wonen?
LP33	Did you start with your master this year?	Ben je dit jaar begonnen aan je master?
LP34	Do you like communicating with people through phone texts?	Vind je het leuk om met mensen te communiceren via sms-berichtjes?
LP35	Do you own a personal car?	Bezit je een eigen auto?
LP36	Do you like watching horror movies?	Kijk je graag naar horrorfilms?
LP37	Do you prefer vanilla over strawberry ice cream?	Heb je liever vanille-ijs in plaats van aardbeienijs?

LP38	Do you prefer chocolate over cookies?	Heb je liever chocolade in plaats van koekjes?
LP39	Do you like singing in the shower?	Vind je het leuk om onder de douche te zingen?
LP40	Do you have a favorite pizza topping?	Heb je een favoriete pizzabeleg?
LP41	Do you already have a driver's licence?	Heb je al een rijbewijs?
LP42	Do you ever talk to yourself out loud?	Praat jij wel eens hardop tegen jezelf?
LP43	Do you already know what you will be doing tomorrow?	Weet je al wat je morgen gaat doen?
LP44	Do you like the taste of pesto?	Vind je de smaak van pesto lekker?
LP45	Do you find it important that your partner is funny?	Vind je het belangrijk dat je partner grappig is?
LP46	Would you like to move to another country in the future	Wil je in de toekomst naar een ander land verhuizen?
LP47	Do you like the color blue?	Houd je van de kleur blauw?
LP48	Have you always lived in the Netherlands?	Heb je altijd al in Nederland gewoond?
LP49	Would you consider yourself an early bird?	Vind je jezelf een ochtendpersoon?
LP50	Do you have a favorite book?	Heb je een favoriet boek?
LP51	Do you have a favorite TV-show?	Heb je een favoriet TV-programma?
LP52	Do you have a favorite type of music?	Heb je een favoriete muziekstijl?
LP53	Do you sometimes listen to podcasts?	Luister je soms naar podcasts?
LP54	Do you have a favorite sleeping position?	Heb je een favoriete slaappositie?
LP55	Do you have a favorite board game?	Heb je een favoriet bordspel?
LP56	Would you consider yourself a workaholic?	Vind je dat je zelf een workaholic bent?
LP57	Does your family have more than 4 members?	Heeft je familie meer dan 4 familieleden?
LP58	Have you ever held a snake?	Heb je ooit een slang vastgehouden?
LP59	Have you ever had your dream job?	Heb je een droombaan?
LP60	Do you wish that you had a different natural hair color?	Zou je willen dat je een andere natuurlijke haarkleur had?
LP61	Do you wish that you had been born in a different country?	Zou je willen dat je in een ander land was geboren?
LP62	Do you spend a lot of time working out?	Besteed je veel tijd aan sporten?
LP63	Have you ever contributed to a charity?	Heb je ooit bijgedragen aan een goed doel?
LP64	Have you ever sewn your own piece of clothing?	Heb je ooit je eigen kledingstuk genaaid?

LG = LATE GENERAL

LG1	Is Berlin the capital of Germany?	Is Berlijn de hoofdstad van Duitsland?	JA
LG2	Are there 3 colors in the Dutch flag?	Zitten er drie kleuren in de vlag van Nederland?	JA
LG3	Was John Lennon a member of the Beatles?	Was John Lennon een lid van de Beatles?	JA
LG4	Is it possible for a clover to have more than 3 leaves?	Kan een klaver meer dan 3 bladeren hebben?	JA
LG5	Is H2O the chemical symbol for water?	Is H2O het chemische symbool voor water?	JA
LG6	Did Leonardo da Vinci paint the famous portrait of Mona Lisa?	Heeft Leonardo da Vinci het beroemde portret van Mona Lisa geschilderd?	JA
LG7	Is Rome the capital of Italy?	Is Rome de hoofdstad van Italië?	JA
LG8	Is marzipan made of almonds?	Wordt marsepein gemaakt van amandelen?	JA
LG9	Is a ph-score of 7 neutral?	Is de ph-waarde 7 neutraal?	JA
LG10	Does the English flag have the colours white, red and blue?	Heeft de Engelse vlag de kleuren wit, rood en blauw?	JA
LG11	Is Mark Rutte the premier minister of the Netherlands?	Is Mark Rutte de minister-president van Nederland?	JA
LG12	Does Bart Simpson have 2 sisters?	Heeft Bart Simpson 2 zussen?	JA
LG13	Are violin, viola and cello string instruments?	Zijn viool, altviool en cello snaarinstrumenten?	JA
LG14	Can most snakes survive for at least a couple of days without food	Kunnen de meeste slangen minstens een paar dagen zonder voedsel?	JA
LG15	Is Pluto the dog of Mickey Mouse?	Is Pluto de hond van Mickey Mouse?	JA
LG16	Is Valentine's day the day of love?	Is Valentijnsdag de dag van de liefde?	JA
LG17	Is the heart a muscle that pumps blood?	Is het hart een spier die bloed rond pompt?	JA
LG18	Is Li the chemical symbol for lithium?	Is Li het chemische symbool voor lithium in het periodiek systeem?	JA
LG19	Was Michael Jackson also known as "the king of pop"?	Stond Michael Jackson ook wel bekend als "de koning van de pop"?	JA
LG20	Is the Taj Mahal in India?	Staat de Taj Mahal in India?	JA
LG21	Is the American currency the dollar?	Is de Amerikaanse munteenheid de dollar?	JA

LG22	Are there 7 dwarves in the story of Snow White	Zijn er 7 dwergen in het verhaal van Sneeuwwitje?	JA
LG23	Are there more than 1 Pirates of the Caribbean films?	Zijn er meer dan 1 Pirates of the Caribbean-films?	JA
LG24	Was Frida Kahlo born in Mexico?	Is Frida Kahlo in Mexico geboren?	JA
LG25	Is Edvard Munch the painter of the Scream?	Is Edvard Munch de schilder van de Schreeuw?	JA
LG26	Are Germany and Belgium the only countries sharing borders with the Netherlands?	Zijn Duitsland en België de enige landen die grenzen aan Nederland?	JA
LG27	Is the Virgo one of the zodiac signs?	Is de Maagd een van de sterrenbeelden?	JA
LG28	Does the river Nile flow through Egypt?	Stroomt de rivier Nijl door Egypte?	JA
LG29	Does the ocean cover more than 50 % of the globe?	Bedekt de oceaan meer dan 50% van de aarde?	JA
LG30	Does the atmosphere mostly contain nitrogen?	Bestaat de atmosfeer grotendeels uit stikstof?	JA
LG31	Does a human normally have around 5-6 litres of blood?	Heeft een mens normaal gesproken tussen de 5 en 6 liter bloed?	JA
LG32	Are bears the closest living relatives of human species?	Zijn beren de meest verwante diersoort aan de mens?	NEE
LG33	Are bacteria members of the animal kingdom?	Maken bacteriën onderdeel uit van het dierenrijk?	NEE

LG34	Are kangaroos indigenous to South America?	Zijn kangoeroes inheems in Zuid-Amerika?	NEE
LG35	Was Marylin Monroe a famous scientist?	Was Marilyn Monroe een beroemde wetenschapper?	NEE
LG36	Is the country Luxembourg bigger than Belgium?	Is het land Luxemburg groter dan België?	NEE
LG37	Are 2, 4 and 6 odd numbers?	Zijn twee, vier en zes oneven getallen?	NEE
LG38	Is London the capital of Bulgaria?	Is London de hoofdstad van Bulgarije?	NEE
LG39	Is the country of China part of North-America?	Is het land China deel van Noord-Amerika?	NEE
LG40	Is Luxembourg bigger than Belgium?	Is Luxemburg groter dan België?	NEE
LG41	Does an average adult have 33 teeth?	Heeft een gemiddelde volwassene 33 tanden?	NEE
LG42	Does the Gouda cheese originally come from Switzerland?	Komt de Goudse kaas oorspronkelijk uit Zwitserland?	NEE
LG43	Is there an almond in the middle of a Ferrero Rocher?	Heeft een Ferrero Rocher in het midden een amandel?	NEE
LG44	Is Timon in "The Lion King" a kangaroo?	Is Timon van de film "The Lion King" een kangoeroe?	NEE
LG45	Is the euro an official currency in China?	Is de euro een officiële munteenheid in China?	NEE

LG46	Is Spanish the main language spoken in Brazil?	Is Spaans de meest gesproken taal in Brazilië?	NEE
LG47	Is Washington the capital city of Australia?	Is Washington de hoofdstad van Australië?	NEE
LG48	Are people with aviophobia afraid of spiders?	Zijn mensen met aviofobie bang voor spinnen?	NEE
LG49	Is the apple blossom the national symbol of Japan?	Is de appelbloesem het nationale symbool van Japan?	NEE
LG50	Are Tenerife and Gran Canaria part of the Caribbean Islands?	Maken Tenerife en Gran Canaria deel uit van de Caribische eilanden?	NEE
LG51	Did Christopher Columbus discover America in the seventeenth century?	Heeft Christoffel Columbus Amerika ontdekt in de zeventiende eeuw?	NEE
LG52	Was Freddie Mercury the singer of the band the Beatles?	Was Freddie Mercury de zanger van de band the Beatles?	NEE
LG53	Does the term "orient" stand for the West?	Staat de term "orient" voor het Westen?	NEE
LG54	Are people with arachnophobia afraid of heights?	Hebben mensen met arachnofobie hoogtevrees?	NEE
LG55	Was Google founded by Elon Musk?	Is Google opgericht door Elon Musk?	NEE
LG56	Is a story containing animals as main characters officially called a fable?	Wordt een verhaal met dieren als hoofdpersonages officieel een fabel genoemd?	JA

LG57	Is Nigeria a country located in Indonesia?	Is Nigeria een land in Indonesië?	NEE
LG58	Is Lisbon the capital of Peru?	Is Lissabon de hoofdstad van Peru?	NEE
LG59	Is the name of the Roman goddess of love Cleopatra?	Is de naam van de Romeinse godin van de liefde Cleopatra?	NEE
LG60	Was Abraham Lincoln the first president of the United States?	Was Abraham Lincoln de eerste president van de Verenigde Staten?	NEE
LG61	Is London the capital of the United States?	Is Londen de hoofdstad van de Verenigde Staten?	NEE
LG62	Is Pisa the town where the leaning tower is situated in Italy?	Is Pisa de stad in Italië waar de scheve toren staat?	JA
LG63	Is peperkoek something typically Dutch?	Is peperkoek iets typisch Nederlands?	JA
LG64	Are the Alps located in Europe?	Bevinden de Alpen zich in Europa?	JA
LG65	Are Dutch and German part of the Germanic languages?	Behoren Duits en Nederlands tot de Germaanse talen?	JA
LG66	Is Disney known internationally because of its cartoons for children and teenagers?	Is Disney internationaal bekend om zijn tekenfilms voor kinderen en tieners?	JA