

## Data Request form YOUth (version 6.0, February 2020)

### Introduction

The information you provide here will be used by the YOUth Executive Board, the Data Manager, and the Data Management Committee to evaluate your data request. Details regarding this evaluation procedure can be found in the Data Access Protocol.

All data requests will be published on the YOUth researcher's website in order to provide a searchable overview of past, current, and pending data requests. By default, the publication of submitted and pending data requests includes the names and institutions of the contact person and participating researchers as well as a broad description of the research context.

After approval of a data request, the complete request (including hypotheses and proposed analyses) will be published. If an applicant has reasons to object to the publication of their complete data request, they should notify the Project Manager, who will evaluate the objection with the other members of the Executive Board and the Data Management Committee. If the objection is rejected, the researcher may decide to withdraw their data request.

### Section 1: Researchers

In this section, please provide information about the researchers involved with this data request.

- Name, affiliation and contact information of the contact person
- Name and details of participating researchers (e.g. intended co-authors)
- Name and details of the contact person within YOUth (if any)

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## **Section 2: Research context**

In this section, please briefly describe the context for your research plans. This section should logically introduce the next section (hypotheses). As mentioned, please note that this section will be made publicly available on our researcher's website after submission of your request.

Please provide:

- The title of your research plan
- A very brief background for the topic of your research plan
- The rationale for and relevance of your specific research plan
- The specific research question(s) or aim(s) of your research (Please also provide a brief specification)
- A short description of the data you request

References can be added at the end of this section (optional).

## Title of the study

Using dual eye tracking to study gaze behavior during parent-child interactions

## Background of the topic of your research plan, rationale, relevance (max. 500 words)

### Background & rationale:

Gaze behavior is important for human interaction. In daily social encounters with other people, gaze behavior may support and regulate social interaction, for example, during conversations (Ho, Foulsham & Kingstone, 2015; Hessels et al. 2019). In this study, we used a novel dual eye-tracking setup (introduced by Hessels et al. 2017), which allowed us to record gaze of parents and children simultaneously. Using this novel eye-tracking setup, we aim to uncover new insights about 1) the role of gaze behavior during interactions between parents and children, and 2) how gaze behavior during social interaction to faces unfolds over time. Previous research has often been limited to the study of social attention and gaze in non-interactive research settings (i.e. looking at pictures of faces and social scenes), or observational video-studies without more advanced eye-tracking techniques to measure gaze behavior in high-resolution (Risko, Richardson & Kingstone, 2016; Hessels, 2020). In this study, we introduce a new methodology: dual-eye tracking; which allows us to overcome some of the methodological limitations of previous studies.

### Dual eye-tracking

Our dual eye-tracking setup enables us to study gaze behavior during face-to-face interaction at high spatial and temporal resolution. We want to use this setup to describe how gaze behavior is related to e.g. turn taking (speaking, listening), the topic of conversation, and other verbal and non-verbal patterns (e.g. prosody, intonation, facial expressions, gestures). The task is based on the PCI paradigm used in the *YOUth Child & Adolescent* study and is comprised of two semi-structured conversations in which parents and children discuss family topics.

### Data quality

The data we have collected for this project allows us to study different types of behaviors during parent-child interactions, e.g. eye-tracking data to analyze gaze behavior, audio-recordings to analyze speech/listening behavior, and webcam-recordings to analyze facial expressions and head-movements. Based on preliminary data quality analyses, we expect that for specific research questions, we will have to use specific subsets of the data. Depending on the quality of the data source (e.g. eye-tracking data, audio-recordings, etc.), the data may or may not be adequate for specific analyses. As an example, the overall quality of eye tracking data of the parents is probably better than that of the children. Also, this may differ between the two conversations. Consequently, the specific subsets used for further analyses depend on whether we have good data of a) the parents, b) the children, c) the parent-child dyads.

### Goals of project

1) We will investigate the relation between gaze behavior to facial features and speech/listening behavior during parent-child conversations. While gaze behavior to faces and speech/listening behavior during conversations has previously been investigated in adult populations (see e.g. Hessels et al., 2017, 2019; Ho, Foulsham & Kingstone, 2015), yet little is known about how these behaviors are manifested within the context of parent-child interactions.

2) We will further investigate whether the relation between gaze and speech/listening behavior is dependent on the conversation topic (i.e. cooperation vs. conflict-scenario). Furthermore, if there is enough variation among dyad-composition (e.g. number of mother-daughter, mother-son, father-daughter, father-son dyads), we also want to look at differences in gaze and speech as a function of dyad-composition.

### **Publication**

The final goal is to publish the findings of this project in a scientific journal dedicated to experimental and/or developmental psychology. Furthermore, this work shall be used to complete a PhD thesis by Gijs Holleman.

### **The specific research question(s) or aim(s) of your research**

#### **1) Can we use dual eye tracking data to study gaze behavior and turn-taking during parent-child interactions?**

- a) Is the data of sufficient quality to allow for a detailed description of gaze behavior and speaking/listening during face-to-face interaction?
- b) How is gaze behavior during face-to-face interaction related to episodes of speech/listening?

#### **2) Is the relation between gaze behavior and speaking/listening dependent on conversation topic and dyad-configuration?**

- a) Does conversation topic influence gaze coordination and speaking/listening behavior during parent-child interactions? (e.g. conflict-scenario vs. cooperation-scenario).
- b) What is the influence of dyad-configuration on gaze behavior and speaking/listening during parent-child interactions? (e.g. mother-daughter, father-daughter, etc.)

**Summary of the data requested for your project:** Please indicate which data you request to answer your research question.

#### **1) All the data from the add-on study: CHDUALET. Note that this data is not part of the general YOUTH dataset, but was collected separately in an add-on study by Gijs Holleman.**

- a) Webcam recordings
- b) Audio recordings
- c) Gaze ET recordings

### **References (optional)**

Hessels, R. S., Cornelissen, T. H., Hooge, I. T., & Kemner, C. (2017). Gaze behavior to faces during dyadic interaction. *Canadian Journal of Experimental Psychology/Revue canadienne de psychologie expérimentale*, 71(3), 226.

Hessels, R. S., Holleman, G. A., Cornelissen, T. H., Hooge, I. T., & Kemner, C. (2018). Eye contact takes two—autistic and social anxiety traits predict gaze behavior in dyadic interaction. *Journal of Experimental Psychopathology*, 9(2), jep-062917.

Hessels, R. S., Benjamins, J. S., Cornelissen, T. H., & Hooge, I. T. (2018). A validation of automatically-generated Areas-of-Interest in videos of a face for eye-tracking research. *Frontiers in psychology*, 9, 1367.

Hessels, R. S., Holleman, G. A., Kingstone, A., Hooge, I. T., & Kemner, C. (2019). Gaze allocation in face-to-face communication is affected primarily by task structure and social context, not stimulus-driven factors. *Cognition*, 184, 28-43.

Hessels, R. S., & Hooge, I. T. (2019). Eye tracking in developmental cognitive neuroscience—The good, the bad and the ugly. *Developmental cognitive neuroscience*, 40, 100710.

Ho, S., Foulsham, T., & Kingstone, A. (2015). Speaking and listening with the eyes: gaze signaling during dyadic interactions. *PloS one*, 10(8), e0136905..

### **Section 3: Hypotheses**

In this section, please provide your research hypotheses. For each hypothesis:

- Be as specific as possible
- Provide the anticipated outcomes for accepting and/or rejecting the hypothesis

#### **Hypotheses**

We will follow a more exploratory-based approach, primarily because very little is yet known about the range and distribution of gaze patterns and speech/listening behavior during parent-child interactions. As such, our study is not hypothesis-driven, although we do have some expectations with regards to certain outcomes. However, before proceeding to more hypothesis-driven analyses, a detailed description of the variables will be necessary.

For the first part of this study (see *Research Question 1*), we provide a detailed description of gaze and speech/listening behavior during parent-child interactions. We may expect that gaze is directed at specific parts of the other person's face during conversations. For example, when a person is listening, that person may be directing his/her gaze at the mouth area of the speaking person (Võ, Smith, Mital & Henderson, 2012). In a similar vein, when a person's is speaking, we may expect that gaze is not continuously directed at the other person's face, but is specifically directed at the other person's face at the end of one's speaking turn (Ho, Foulsham & Kingstone, 2015).

For the second part of this study (see *Research Question 2*), we will investigate whether the relation between gaze behavior and speaking/listening episodes is also dependent on the topic of conversation (e.g. cooperation vs. conflict-scenarios) and the dyad-configuration (e.g. mother-daughter, mother-son). We hypothesize that, in the conflict-scenario, parents will talk more than the children, and also look more at the eyes of the children, whereas children will be more likely to look away from the eyes/face of the parent, and also talk less than the parent. Likewise, we expect that in the cooperation-scenario, parents and children will look at each other more equally, and the children may even talk more than the parents compared with the conflict-scenario.

### **Section 4: Methods**

In this section, you should make clear how the hypotheses are tested. Be as specific as possible.

Please describe:

- The study design and study population (Which data do you require from which subjects?)
- The general processing steps (to prepare the data for analysis)
- The analysis steps (How are the data analysed to address the hypotheses? If possible, link each description to a specific hypothesis)
- Any additional aspects that need to be described to clarify the methodological approach (optional)

#### **Study design, study population and sample size (e.g. cross-sectional or longitudinal; entire population or a subset; substantiate your choices)**

**Population:** We will use a subset of the YOUTH *Child & Adolescent cohort* (Around 9). This subset was collected separately in an add-on pilot study within this cohort under the name: CHDUALET (Child DUAL Eye Tracking).

**Sample size:** Initially, we aimed to gather additional data of 100 sets of parent-child dyads (i.e. 200 participants). However, further data collection is currently cancelled due to the COVID-2019 pandemic for months February – June). Therefore, we decided to request all data sets which we have already collected thus far, N=79 parent-child dyads → 158 participants).

**Study design:**

The study design consists of two semi-structured conversations between parents and their children, which last approximately 4-5 minutes per conversation. There are two scenario's: the 'cooperation'-scenario and the 'conflict'-scenario. This created a mixed design with parent – child as a between-subject factor and conversation-scenario as a within-subject factor. This allows us to compare behavior of parent-child dyads under two different conditions.

**General processing steps to prepare the data for analysis**

In order to prepare the data for our analyses, we will use the following four steps. First, we will compute several measures to check data quality. This will determine how many sets are useful for specific research questions and analyses. Next, we will align the eye tracking data with audio-and-webcam recordings to compute measures of gaze behavior during conversations (e.g. speaking/listening).

**1) Data quality measures:**

We will compute data quality measures, such as data loss, precision and 2d-accuracy (e.g. see Hooze, Holleman, Haukes & Hessels, 2019), as well as the *Root Mean Square* (RMS) of gaze position (Holmqvist et al., 2011; Hessels & Hooze, 2019).

These data-quality measures will allow us to determine which measurements are suitable for subsequent analyses. For example, it may be the case that certain interactive measures of gaze behaviour are only possible if there is eye-tracking data of sufficient quality for both the parent and the child. However, some analyses may require only good data of the parent or the child (e.g. analysis of speaking-listening status and gaze to specific facial features).

**2) Eye tracking-based parameters:**

We will compute measures of gaze behavior to faces: *total dwell time, dwell durations, number of dwells*, both for parent and child individually, as for the dyad combined (i.e. do parent and child look at each other's eyes at the same time?), see also Holmqvist et al., 2011; Hessels et al., 2018a; 2019), and transform these measures into a time-based scale to study how gaze develops over time.

**3) Audio recording-based parameters:**

We will use the audio-recordings to compute measures of speaking/listening behavior, i.e. total speech duration, average speech and listening periods, speech rate (Duncan & Fiske, 1977; Ho, Foulsham & Kingstone, 2015).

Finally, after we have processed and prepared the data into these measures and variables, we can proceed to specific analyses of patterns of gaze behaviour and turn-taking during parent-child interactions.

### Specific processing and analysis steps to address the hypotheses

We will use several processing-methods to analyze eye-tracking data, webcam data, and audio data. To identify specific gaze and turn-taking patterns and to describe how these develop over the course of the conversation, we first need to classify gaze behavior to facial features (e.g. using automatic AOI construction and mapping of eye-movements), and identify speech-listening episodes). For these steps, we will use several methods designed by Hessels et al. (2015; 2016; 2017; 2018; 2019), among others, as well as custom-software designed by the participating researchers.

These methods will give us specific measures that allow us to relate patterns of gaze to facial features with episodes of speech/listening behavior. These measures (e.g. dwell times, speech episodes) will form the basic set of variables to address our research questions.

### Additional methodological aspects (optional)

To describe the development of gaze and speech/listening behavior during parent-child interactions, we may want to use measures such as transition-matrices and cross-recurrence plots to describe patterns of behavior during interaction. These techniques have previously been used to describe interaction dynamics, global synchronicity and interpersonal attunement between parents and children (Cox & van Dijk, 2013; Main, Paxton & Dale, 2016).

### Section 5: Data request

In this section, please specify as detailed as possible which data (and from which subjects) you request.

#### Data requested

**1) All the data from the CHDUALET study**

- a) Webcam recordings
- b) Audio recordings
- c) Gaze recordings

#### Data request for the purpose of:

- Analyses in order to publish
- Analyses for data assessment only (results will not be published)

Publication type (in case of analyses in order to publish):

- Article or report
- PhD thesis
- Article that will also be part of a PhD thesis

#### Would you like to be notified when a new data lock is available?

- Yes
- No

Upon approval of a data request, the complete request will be made publicly available on our researcher's website by default.

**Do you agree with publishing the complete request on our researcher's website after it is approved?**

Yes

No. Please provide a rationale

