university of groningen / faculty of behavioural and social sciences

PhD Fund
Application form

BASIC DATA

1 Details of the applicant(s) and candidate

1a Main applicant			
Name, first name, title(s)	Sebastiaan Mathôt, Dr.		
End contract	31/10/2021		
Affiliation	University of Groningen		
Department	Psychology	Section	Experimental
Tel		E-mail	s.mathot@rug.nl
Do you hold the ius promovendi?[1]	~~YES~~ / **NO**		
1b Co-applicant			
Name, first name, title(s)	Monicque Lorist, Prof. dr.		
End contract	-		
Affiliation	University of Groningen		
Department	Psychology	Section	Experimental
Do you hold the ius promovendi?[1]	**YES** / ~~NO~~		
1c Proposed PhD candidate			
Name, first name, title(s)	Yavor Ivanov		

[1] At least one of the (co-)applicants should have the ius promovendi.

2. Title of the proposal

Pupil size and the mechanisms behind attentional focus and distraction

3. Summary of the proposed research
(*please provide in 100 words a summary of the proposed research in English*)

Pupil size is widely used as a measure of attention. In the proposed research, we will link pupil size with natural behavior, as well as with known neurophysiological markers of attention. Crucially, our project is rooted in a strong theoretical framework, the adaptive-gain theory, which posits two different modes of behavior: exploration, characterized by frequent task switching and a lack of focused attention; and exploitation, characterized by a narrow attentional focus on a single task. This theory will allow us to test novel and specific predictions about the relationship between pupil size and behavior.

DESCRIPTION OF THE PROPOSED RESEARCH

Maximum 2,000 words for sections 4a an 4b together, including footnotes and illustrations but excluding literature references.

4a. Research topic

The adaptive-gain theory (AGT) is an influential framework that describes how pupil size is related to attention and behavior (Aston-Jones & Cohen, 2005). The AGT posits that there are two modes of behavior: exploitation and exploration. During *exploitation*, you are calmly focused on a single task (e.g. eating). When the reward offered by this task declines (e.g. you become less hungry and eating therefore becomes less rewarding), you start to explore; during *exploration*, you are distractible and rapidly switch from one task to another, until you find a new task that is rewarding (e.g. watching NetFlix).

The AGT further posits that activity in the brain-stem area Locus Coeruleus (LC) drives these modes of behavior: During exploitation, LC is relatively silent with occasional bursts of activity (i.e. ”phasic” mode); during exploration, LC is highly active (i.e. “tonic” mode). Furthermore, several studies have reported a tight correlation between LC activity and pupil size (Aston-Jones & Cohen, 2005; Costa & Rudebeck, 2016). This means that pupil size can be used as a marker of whether people are exploring (large pupils) or exploiting (small pupils with occasional rapid dilations).

To date, the AGT has been tested in a limited range of artificial tasks (e.g. Jepma & Nieuwenhuis, 2011; Gilzenrat et al., 2010). However, we propose that this theory is a valuable framework that can explain many forms of real-life behavior, from how we visually inspect our environment **(Projects A1, A2, B1, and B2)**, to how on-task behavior varies with pupil size as well as with neurophysiological markers of attention **(Project C)**.

In **Projects A1 and B1**, we will look at the effect of the mere presence of smartphones on exploration/ exploitation behavior, as well as on pupil size. It is widely assumed that smartphones affect (and perhaps disrupt) attention and behavior (Caird, Willness, Steel, & Scialfa, 2008; Rosen, Carrier, & Cheever, 2013). However, there is currently no clear theoretical framework to explain these effects. We propose that the mere presence of a smartphone biases people to go into an exploratory mode of behavior. This follows from the AGT, because smartphones are always rewarding (new notifications, new posts on social media, etc.), but this reward declines very quickly (in many cases immediately after you’ve checked your phone); in this way, smartphones naturally induce a state of exploration, and interfere with a clear focus on a single task. Therefore, we aim to test whether the mere presence of a smartphone indeed increases exploration behavior at the expense of exploitation behavior.

In **Projects A2 and B2**, we will use open-source fMRI data (Hanke et al., 2016) in order to establish a link between gaze behavior, pupil size, and neural activity. This dataset contains simultaneously recorded eye movements, pupil size, and fMRI of participants watching the movie *Forrest Gump*. We can perform similar analyses on these data as we will do for Projects A1 and A2 (but without the smartphone presence), while adding two crucial components: We can look at activity of the Locus Coeruleus (LC), a brain-stem area that according to the AGT controls the trade-off between exploration and exploitation behavior; and we can test whether the main results of Projects A1 and A2 hold up in a relatively unconstrained setting (movie viewing).

In **Project C**, we will test whether there is a link between alpha-band power (an electrophysiological measure), pupil size, and behavior. This is a crucial question, because alpha-band power, like pupil size, has been linked to attentional engagement. It is therefore important to understand how alpha-band power and pupil size relate: Do they reflect similar processes? Or do they, as we hypothesize, tap into different aspects of attentional engagement?

In summary, we propose to bridge the influential adaptive-gain theory with real-life behavior, and with known neurophysiological markers of attention. We will combine state-of-the-art methods, including electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and pupillometry. The combined expertise of the three applicants provides a unique opportunity to take on this challenging—but potentially ground-breaking—project.

4b. Approach

Project A1 – Switching between regions (exploration), and the effect of smartphone presence, in visual search

We will use a visual-search paradigm that we have recently developed, in which participants try to find a unique symbol (e.g. “F”) in a display that is divided into several colored regions (Figure 1). Crucially, periods in which participants’ gaze stays within one region are indicative of exploitation, whereas moments in which gaze switches from one region to another are indicative of exploration. In a pilot study (Regnath & Mathôt, in prep.), it was found that periods preceding a region switch were accompanied by pupil dilation, consistent with the AGT. This shows that this paradigm can be effectively used to study exploration and exploitation behavior.

In our version of the study, we will manipulate the presence or absence of a smartphone as a within-subject factor. As discussed in the previous section, and following the AGT, we predict that the mere presence of a smartphone increases exploration behavior at the expense of exploitation behavior.

Based on this, we can make three concrete **predictions**:

- Pre-trial baseline pupil size should be negatively correlated with the number of fixations within a colored region (less exploitation), and positively correlated with the number of switches between regions (more exploration).
- In the phone-present condition, baseline pupil size should be larger than in the phone-absent condition, indicative of a generally more explorative state.
- In the phone-present condition, periods of exploitation (i.e. staying within a colored region) should be associated with fewer fixations, whereas exploration (i.e. switching between regions) should be more common.

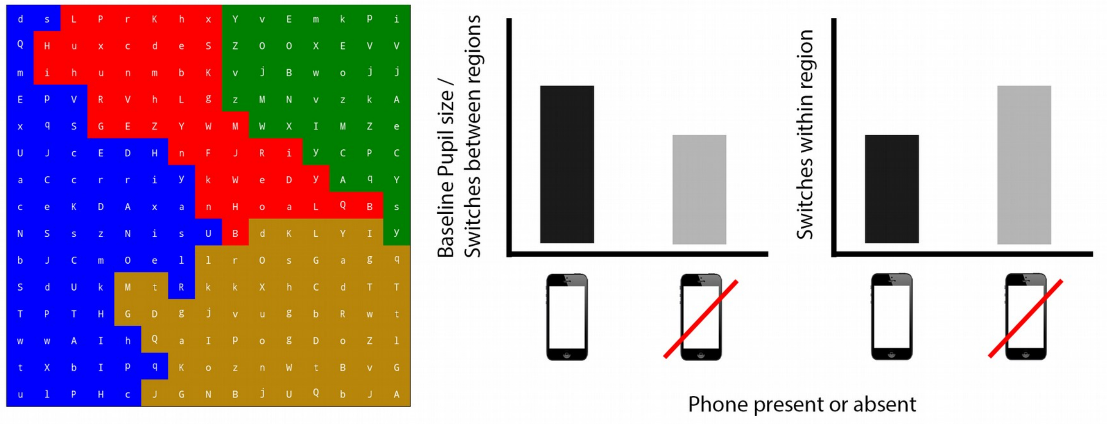

Figure 1: Example trial from the visual-search task (left) and predicted results (right)

Project A2 – Switching between objects (exploration) and Locus Coeruleus activity in movie viewing

In this project, we will use high-quality open source data from the "studyforrest" initiative (Hanke et al., 2016), which combines fMRI, eye gaze, and pupil size data from 20 participants who are watching the movie *Forrest Gump*. The "studyforrest" project also offers a multitude of movie annotation datasets that provide detailed information about each frame. One such dataset that will soon be released provides the identity, location, and timecourse of objects in the movie. By combining these annotations with the fMRI and eyetracking data, we will be able to test links between exploitatory vs. exploratory gaze behavior, pupil size, and Locus Coeruleus activity.

We will extract the BOLD signal from the Locus Coeruleus, and perform a band-pass filter in two frequency bands: (1) 0.115 – 0.161 Hz (indicative of faster, phasic activity); and (2) 0.001 - 0.115 Hz (indicative of slower, tonic activity).

We make the following **predictions** (Figure 2): Periods during which participants make more switches between objects (indicative of exploration), should be associated with:

- Increased pupil size
- Increased low-frequency (tonic) LC activity
- Decreased high-frequency (phasic) LC activity

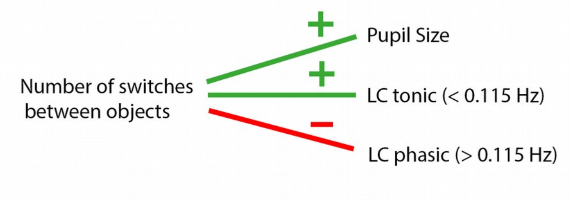

Figure 2: Expected relationship between gaze behavior, pupil size, and LC activity

Project B1 – Gaze indices of exploration in the visual-world paradigm, and the effect of smartphone presence

The visual-world paradigm is widely used to investigate how gaze relates to cognitive processes (e.g. Cooper, 1974; Huettig, Rommers & Meyer, 2011). In this paradigm, participants hear a spoken sentence while they see a set of objects on a display. Participants are free to look around the display, without any specific task, which elicits relatively natural eye movements. (Which are qualitatively different from the scanning-like eye movements that participants make in a visual-search task, such as used in Project A1.)

We will establish a link between pre-trial baseline pupil size and gaze-indices of exploration, such as the number of unique objects looked at on a single trial (more objects → more exploration) and average saccade length (longer saccades → more exploration). All objects will be matched in terms of their visual intensity, in order to minimize differences in object saliency which may drive saccadic behavior and modulate pupil size.

We will again include smartphone presence as a factor in this experiment. This will allow us to conceptually replicate the results of Project A1, and to test whether smartphone presence affects different measures of exploration behavior.

We make several **predictions**:

- Pre-trial Baseline pupil size should be positively correlated with:
  - The number of objects looked at on a single trial (indicative of exploration)
  - The average saccade length on a single trial (indicative of exploration)
- The mere presence of a smartphone should be positively correlated with:
  - The number of objects looked at on a single trial (indicative of exploration)
  - The average saccade length on a single trial (indicative of exploration)

This project will not only allow us to test hypotheses related to the AGT, but also to develop a state-of-the-art plugin for OpenSesame (Mathôt, Schreij & Theeuwes, 2012), an open-source program for experiment building. This plug-in will allow for easier set-up and automated variable output for the visual-world paradigm, and will be made freely available to the research community.

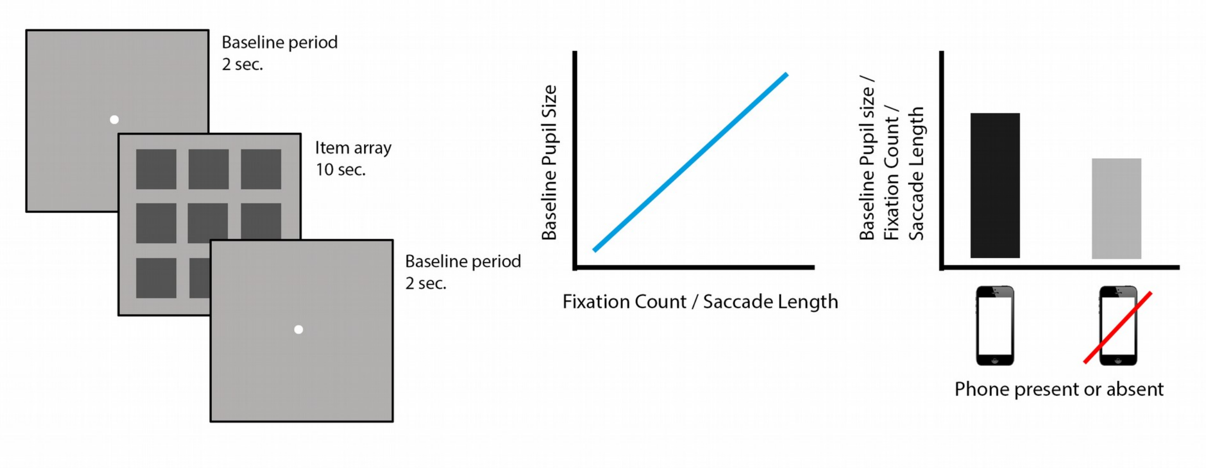

Figure 3: Example trial sequence in the visual world paradigm (left). Grey squares are placeholders for images of objects. Expected results (right)

Project B2 – Gaze indices of exploration in movie viewing, and Locus Coeruleus activity

We will again use data from the "studyforrest" initiative (Hanke et al., 2016). Using the available eye-tracking data, we will derive similar variables that are indicative of visual exploration as in Project B1: fixation count and average saccade length. The first aim of this project is to verify the results of Project B1 with a more naturalistic stimulus (movie viewing). The second aim is to relate gaze indices of exploration with LC activity.

We make the following **predictions**:

- There should be a positive correlation between:
  - Fixation count and pupil size (averaged over a short period)
  - Fixation count and tonic (low-frequency) LC activity
  - Saccade length (averaged over a short period) and pupil size (averaged over a short period)
  - Saccade length (averaged over a short period) and tonic (low-frequency) LC activity
- There should be a negative correlation between:
  - Fixation count and phasic (high-frequency) LC activity
  - Saccade length (averaged over a short period) and phasic (high-frequency) LC activity

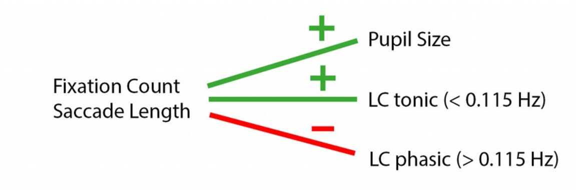

Figure 4: Expected relationship between gaze behaviors indicative of exploration, pupil size, and LC activity

Project C – The relationship between pupil size and EEG alpha-band power

Several studies have reported a positive correlation between baseline pupil size and reaction times (RTs) (e.g. Jepma & Nieuwenhuis, 2011; Konishi, Brown, Battaglini, & Smallwood, 2017). This research suggests that larger pupil size is linked with attentional *dis*engagement, evidenced by slower RTs. However, we hypothesize that similar RT results may be obtained in situations where the pupils are very small, which reflects drowsiness. That is, we hypothesize that performance is optimal when pupil size is intermediate. We will replicate results from previous research, while simultaneously recording global EEG alpha-band power (a widely used marker of neural gain and task engagement). According to the AGT, baseline pupil size should be indicative of global neural gain, which is regulated by the LC. Establishing a relation between pupil size and alpha-band power will provide a crucial link between the AGT, which has focused on pupil size, and the extensive literature on alpha-band power as a measure of attentional engagement.

After splitting the data into four bins based on pre-trial baseline pupil size, we make the following **predictions**:

- Very small pupils should be associated with largest alpha-band power and slow RTs (task disengagement)
- Small pupils should be associated with moderate alpha-band power and moderate RTs (task engagement)
- Large pupils should be associated with moderate alpha-band power and moderate RTs (task engagement)
- Very large pupils should be associated with smallest alpha-band power and slow RTs (task disengagement)

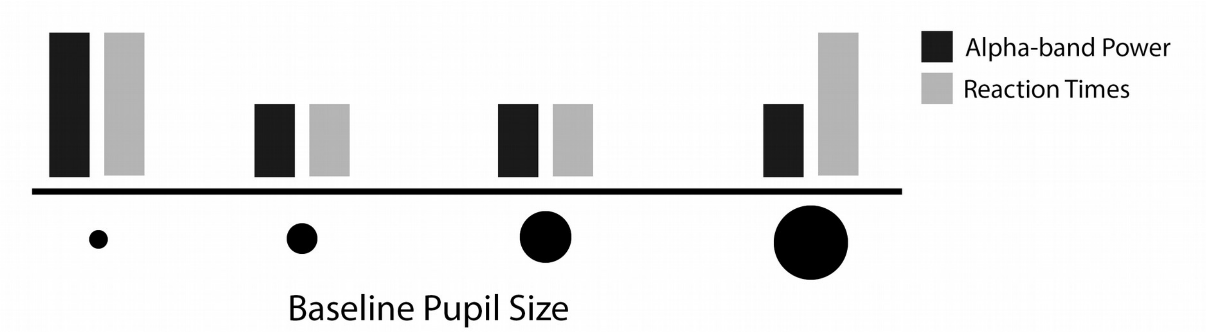

Figure 5: Expected relationship between pupil size, alpha-band power and RTs.

Participant recruitment:

For projects **A1**, **B1**, and **C**, participants will be recruited using the 1st year Psychology student pool, and rewarded with course credit.
We will test 30 participants per experiment. Power analyses are not feasible in our case, but a sample size of 30 should provide considerable power based on previous studies in this field. Each experiment will take approximately 1.5 hours to complete.

4c. Word count (sections 4a-4b)

1	9	4	4

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4d. Time plan and feasibility

Give a practical timetable over the grant period, max. half a page.
Motivate the feasibility of the plan within the 4 years project time. This includes issues related to lab availability, participant recruitment, development of experimental tasks, required programming, ethics approval, etc. Indicate possible risks of delay, and describe how you will deal with them.

The following timetable provides an idea of the project's timeline:

There are three labs with available eye trackers in our laboratory. Given that we will run only a single eye-tracking project at a given time, lab availability should not be an issue. If issues arise with lab availability, or unforeseen delays come up, our efforts can be temporarily focused on projects A2 and B2, for which data is already available.

Experiment programming can be done during data collection, if necessary. We have already written code for experiments similar to projects A1 and B1, so their programming will likely not take much time. This will allow us to focus our efforts on programming project C well in advance.

Participant recruitment for projects A1, B1, and C will happen through the 1st year Psychology student pool. Data collection for these projects will occur roughly in the period of January-May every year, which is a time during which participant engagement is usually high.

4e. Dissertation, scientific output including data and output related to knowledge utilisation

	Output	Number	Expected year of publication
☐	Articles in refereed journals	5	2020, 2021, 2022, 2022, 2023 (Each project will be one manuscript.)
☐	Articles in non-refereed journals		
☐	Books		NA
☐	Book chapters		NA
☐	Dissertation	1	2023
☐	Conference papers	4	2020, 2021, 2022, 2023
☐	Data (see also question 7)	5	2021, 2021, 2022, 2022, 2023 (Data for each manuscript will be made publicly available, to the extent possible given privacy regulations.)
Output related to knowledge exchange and impact (please specify)			
☐	Professional publications		
☐	Other scientific output		
☐	Publications aimed at general public	4	2020, 2021, 2022, 2023 (We will regularly report on the progress of the project by writing articles for the general public. The main outlet for this will be Mindwise, the blog of the Psychology department.)

4f. Knowledge exchange and impact

Our findings will be relevant to a broad spectrum of scientific fields, from fundamental cognitive neuroscience to human factors and ergonomics. Importantly, our findings are also directly applicable to the real-world.

If, as we hypothesize, we find that smartphones are disruptive because they increase exploratory behavior, and if we understand the mechanisms behind exploratory behavior, then we can design several interventions to mitigate this. The main idea is that smartphones promote exploratory behavior by providing immediate reward (usually higher than the reward offered by, for example, studying or writing) that quickly declines, thus leading to a repetitive (in some cases compulsive) cycle of smartphone checking.

One possible intervention is to develop an app that adds a brief delay (about a second) between the moment that you pick up your phone and the moment that you see whether there are notifications or not. This brief delay reduces the reward associated with the phone in two ways: it is slightly annoying (but not very much, or people wouldn't use the intervention) and it provides a temporal delay between the action (picking up your phone) and the rewarding outcome (seeing notifications). The user should be able to manually set times during which this delay occurs. The phone will work normally outside of these user-defined time periods. Alternatively, the app could detect periods during which the user likely does not want to be disrupted, for example by using the accelerometer to detect when the phone is lying still.

A second, complementary intervention would be a computer app that gives the user points for typing a pre-defined number of words, or having a work-related program open without interruption (i.e. without minimizing it) for a certain period of time. This will increase rewards related to work, thus increasing the desire to engage in these activities instead of using one's phone.

In summary, the results of the proposed research will provide clear directions for the development of interventions aimed at reducing the disruptive effects of smartphones. As part of the publications aimed at the general public (see 4e), we will share these implications in blog articles.

4g. Literature references

Maximum 35 references

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PHD CANDIDATE, SUPERVISION AND SETTING

5. Candidate

5a. Candidate's CV and motivation
Please add the candidate's CV and motivation to this form (please use the format provided at the end of this form).
Candidate's CV

Bachelor study (studies)			
University	Rijksuniversiteit Groningen	Department	Faculty of Behavioural and Social Sciences
Name BA study	BSc Psychology		
Specialisation	*Mention your chosen specialisation and list the subjects and courses followed. Include subsidiary subjects, if any, and identify them as such. If any courses have been followed at a different university, please mention at which one. If courses resulted in papers or similar output, please mention this as well as the grade awarded.* *Specialization: Cognitive Psychology and Research Methodology* *3rd year (minor) courses:* *Experimental Skills* *Statistical Solutions to Research Problems in Psychology* *Cognition and Attention* *Cognitive Neuroscience* *Thinking and Decision Making* *Human Error*		
Thesis title	Integrating functional and structural models of cognition to explain change detection		
Thesis grade	8.0		
Date diploma	15 March 2017	Distinction	NA
Start date	01 September 2013	End date	15 March 2017
Average weighted grade based on ECs	*Provide the average overall weighted grade or GPA of your entire bachelor study. In case of a GPA: please indicate explicitly, and include university remarks, if available, with regard to your GPA.* Average weighted grade: 8.3		
Honour or talent programme	*Mention the title of the honour/talent programme and the subject(s) followed. If courses resulted in papers or similar output, please mention this as well as the grade awarded.* *NA*		
Start date	*NA*	End date	*NA*
Average weighted grade based on ECs	Grade: *NA*	Distinction	*NA*
Research master			
Start date	*01 September 2017*	*End date*	*July 2019*
Subjects	*List the subjects and courses followed. Include subsidiary subjects, if any, and identify them as such. If any courses have been followed at a different university, please mention at which one. If courses resulted in papers or similar output, please mention this as well as the grade awarded.* *Introduction to the Behavioural and Cognitive Neurosciences* *Career Related Topics* *Functional Neuroscience – C Track*		

	Models of Cognition *Repeated Measures* *Cognitive Modelling: Basic Principles and Methods* *BCN Summer Symposium 1* *Colloquium* *Research project (Minor Thesis)* *Essay /PhD proposal* *BCN Summer symposium 2* *Research Project (Major Thesis)*
Specialisation	*Mention your chosen domain and, if applicable, specialisation and list the subjects and courses followed. Include subsidiary subjects, if any, and identify them as such. If any courses have been followed at a different university, please mention at which one. If courses resulted in papers or similar output, please mention this as well as the grade awarded.* *Specialization - Cognitive Neuroscience (BCN C-track)* Specialization courses in BCN 2nd year: Auditory and Visual Perception User Models Machine Learning
Graduation date	*Date can be in the future when you are in the second year of your master's, but not later than September 2019.The first year of your master's is concluded when submitting this form.* *July 2019*
Title thesis	*Proposed or completed thesis (please indicate status).* *Completed (1st year): Effects of attentional breadth and task difficulty on tonic pupil size* *Proposed (2nd year – exchange): Effects of semantic brightness on pupil size and ERP components – co-registration of EEG and pupillometry*
Average weighted grade based on ECs	*Provide the average weighted grade of the first year of your research master study* Grade: 7.9
Prizes, awards	
Extracurricular activities (max. 200 words)	
Academic activities	I worked as a paid research assistant for dr. Sebastiaan Mathot for two years. As part of this work, I was involved in critically evaluating research, designing novel research methodologies, collecting data (for four different research projects), writing manuscripts, and presenting results at conferences (at the 2018 meeting of De Nederlandse Vereniging voor Psychonomie (talk), and the Dag van de Perceptie - 2018, Nijmegen (poster)). I am also voluntarily collaborating with the Department of Clinical Psychology on two projects investigating attentional biases towards alcohol and high-caloric foods. Both projects are headed by prof. dr. Peter J. de Jong. My tasks were to design and set up the experiments, and write code to analyse eye gaze data. In addition to that, I provided the research teams with advice on the projects, and in rare occasions helped with data collection. I am also voluntarily involved in exploratory research on pupil oscillations related to musical beat entrainment. This project is headed by Atser Damsma at the Experimental Psychology Department. This work is extremely interesting, novel, and I enjoy it greatly. Lastly, I have been involved in developing plugins for OpenSesame, an open-source program for building experiments, developed by dr. Sebastiaan Mathôt.
Non-academic activities	For four years I was an active member of the student editorial board of mindwise-groningen.nl – the online blog of the Faculty of Behavioural and Social Sciences. I was primarily responsible for organizing, recording, participating in, and editing the

	Mindwise Podcast – a talk show focused on the work and opinions of researchers working at the faculty BSS. The podcast is published on Soundcloud.com and iTunes, and has received hundreds of listens over the years. Furthermore, I helped create an art installation that utilizes fluctuations in pupil size in order to decode a user's focus of attention. I am an avid music lover, and have taught myself to play the guitar, bass guitar, drums, and piano.
Candidate's motivation (max. 250 words)	
Motivation	Very quickly after starting my studies in Psychology, I knew I wanted to get involved in research in the field of Cognitive Neuroscience—and I did. I currently have the technical, organizational, and inter-personal skills needed to be a successful PhD candidate. Crucially, I also love dong research. This can be seen from my willingness to engage in research projects not only for a salary, but also as a volunteer. My research experience helped me gain many crucial skills that are not necessarily part of the university curriculum, among which: a competence in programming in two widely used languages (Python and R); a confident and relaxed presentation style at scientific conferences; and the ability to work on many projects at the same time. Given the chance to pursue this PhD project, I think my contribution to the scientific literature will be only a part of the greater picture. I will also promote openness and transparency in science, and create software that aids and improves current scientific methods.

6. Research environment
Please describe (max 200 words) why the research environment is the proper setting for the proposed research.

The Heymans Institute at the University of Groningen is an ideal location for this PhD project, as it offers all the facilities required to carry out the proposed research. There are three labs equipped with an EyeLink 1000 eye-tracker, as well as five portable EyeTribe eye-trackers. Furthermore, the Heymans labs have four EEG laboratories equipped with 32 or 64 channel TMSi Refa amplifiers. For computationally heavy projects, such as the fMRI analyses in projects A2 and B2, a high-capacity server is available for remote use. Among the staff of the Heymans Insitute are specialists whose expertise closely matches the proposed projects, for example Sebastiaan Mathôt (pupillometry and eye-tracking), Monicque Lorist and Elkan Akyürek (EEG), among many others.

DATA MANAGEMENT

7. Data management
Responsible data management is part of good research. For the collection/generation of data and the analysis of these data timely measures need to be taken to ensure its storage and later reuse. This means that prior to the start of the research project researchers must ascertain a) if the project can make use of available data from third parties, b) which project data could be relevant for reuse and c) how these data can be stored so that they are suitable for reuse.
After a proposal has been awarded funding the researcher will draw up a detailed data management plan.

7a. Will data be collected or generated that are suitable for reuse?

☐	**Yes**	*Please answer question 8*

☐	~~No~~	*Please explain below why the research will not result in reusable data or in data that cannot be stored or data that for other reasons are not relevant for reuse.*

7b. Where will the data be stored *during the research*?
Every project will have its repository on the Open Science Framework website (osf.io). All (anonymized) data will be stored there on the day it is collected.

7c. After the project has been completed, how will the data be stored for the long-term and how will the data be made available for the use by third parties? For whom will the data be accessible?
After completion of each sub-project, its repository on the Open Science Framework website will be made publicly available, given that the results get published. We will ensure that the publicly available data does not contain personally identifiable information. At all times (also before completion of projects), the administrators of each repository will be able to give temporary access for third-party users (i.e. other researchers) manually.

7d. Which facilities (ICT, (secure) archive, refrigerators or legal expertise) do you expect will be needed for the storage of data during and after the research? Are these facilities available?

Apart from the aforementioned repositories on the website osf.io, all data will be stored on the University's Y:/ drive, following the Heymans Data Storage Protocol. A recent development allows OSF and the Heymans Storage to be linked, and this functionality will be used for all projects.

FINANCIAL DETAILS

8. Budget

Personnel	
PhD student	4 years full time

In total, 10k€ is available for PhD related costs, as conferences, education, research costs (including knowledge exchange, impact, data management, data collection etc.).
If your PhD related costs exceed the 10k€, please indicate how this surplus will be covered.

PhD related costs (please specify)	**In k€**
Conference: Vision Sciences Society (VSS) 2020	1
Conference: European Conference on Eye Movements (ECEM) 2021	1
Conference: European Conference on Visual Perception (ECVP) 2022	1
Conference: Conference of the European Society for Cognitive Psychology (ESCOP) 2023	1
Equipment: Powerful computer for data analysis *(There are currently two such computers available in the unit, which are shared. Due to an increasing number of researchers running computationally intensive analysis, we need an additional computer, which we will in turn share with our colleagues.)*	2
Education: European Summer School on Eye Movements (ESSEM) 2020	1
Total research costs requested (k€)	7

PhD Fund
Application form

STATEMENTS

9. Statements by the Applicant

TRUE/~~FALSE~~ The director of research of your department has been informed and agrees to accept the conditions if the proposal is awarded a grant.
TRUE/~~FALSE~~ I have completed this form truthfully.

Name: Yavor Ivanov, Sebastiaan Mathôt, Monicque Lorist

Place: Marseille, France and Groningen, The Netherlands

Date: 21/03/2019

Deadline for submitting this form: March 21st, 2019.
Please submit the application to the Graduate School of Behavioural and Social Sciences in pdf format (gradschool.bss@rug.nl). The application must be submitted from the account of one of the applicants mentioned under question 1.