Functional Specification

Filename: MindWandering_Spec.doc
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1. Overview

The purpose of this program is to take subjects through an experiment to measure mind wandering with reading tasks and questionnaires. This program will take the subject through two reading tasks which will measure key-logging events while the subject is reading text.

Each subject will read two texts, one which is displayed page by page on the screen with a "next" button to progress through the text. The other will display mp4 videos (already made) of scrolling text where the subject can use the **spacebar** to pause the video and the key "**C**" to continue. To accommodate different reading speeds there are 7 different speed versions of the videos. Before the task begins, the subject will use trial videos to find the best suited video speed for them to read comfortably.

Each task will measure "mind wandering" occurrences where the subject has lost focus from the text. In the "still task", where the text is still, they will be instructed to press a mind wandering button when they notice this occurring. In the scrolling task we hope to capture this naturally when they pause the scrolling text with the spacebar. Each task will be followed with comprehension questions in short answer and multiple choice format as well as 'likert' type questionnaires and short form questions to assess their experience of the task and other individual differences.

1.1 *Assumptions and Dependencies*

1.1.1. Assumptions

	Assumptions
1	Participant will arrive at the research lab. The participant will sit at a Mac computer and complete the program in an application that can record keystrokes, timestamps and responses in a csv file.
2	This application needs to be run on a Mac 27-inch display (could be smaller window than the display)

1.1.2 Dependencies

Dependency	Details
Text 1	"Rise of Life" chapter from Bill Bryson's *A short history of Nearly Everything*
Text 2	"Life goes on" chapter from Bill Bryson's *A short history of Nearly Everything*
MP4 Videos available to use for scrolling text condition	The videos display text scrolling from the bottom to the top of the page. The length of the video depends on the text and speed of the scrolling movement. 7 videos of each text (14 approx.15-25min mp4) and 2 speed Trial sets (14 2min mp4). Videos are currently on google drive, they can be stored on the Mac computer for the experiment due to their large data size.
CSV file for data collection	CSV file will need to include: ● userID ● protocol option inc. text A or B ● timestamps of "next" for pages of text in still condition ● timestamps of "mind wandered" button click ● scrolling text speed option selected ● time stamps of keystrokes "**spacebar"** - pause and "**C**"- continue in scrolling condition ● Responses to all comprehension questions, questionnaires (multiple choice, scaled and short answer)

2. System Features

Experiment sequence of events

2.1.Psychology Experiment Design

Because in psychology we want to avoid "order effects", task order and texts will need to be randomized for each subject. This means the subject will take 1 of 4 different protocol orders:

Protocol 1. StillTextA
   a. Standard task **Text A**
   b. **Text A** comprehension test
   c. 5 minute break
   d. Scrolling task **Text B**
   e. **Text B** comprehension test
   f. Questionnaires

Protocol 2. StillTextB
   a. Standard task **Text B**
   b. **Text B** comprehension test
   c. 5 minute break
   d. Scrolling task **Text A**
   e. **Text B** comprehension test
   f. Questionnaires

Protocol 3. ScrollTextA
   a. Scrolling task **Text A**
   b. **Text A** comprehension test
   c. 5 minute break
   d. Standard task **Text B**
   e. **Text B** comprehension test
   f. Questionnaires

Protocol 4. ScrollTextB
   a. Scrolling task **Text B**
   b. **Text B** comprehension test
   c. 5 minute break
   d. Standard task **Text A**
   e. **Text A** comprehension test
   f. Questionnaires

The two different texts will need to be incorporated into both tasks. The Still text task will need to be designed with each text. The Scrolling text task will need to be designed with each text. Each of these tasks will be followed with comprehension questions that are specific to the text that was just read. The randomization can occur manually where a researcher selects one of the four protocols before the subject sits down at the computer.

The still and scrolling tasks will differ in format but also instructions. Please see the protocol instruction document for all instructions and how they need to be displayed.

The Still Task

Subjects are instructed to read the text and click a "mind wandered" button if their mind wanders from the text. This button will be displayed on the side of the screen where the subject can click it with the mouse. To progress through the screens of text, a NEXT button at the bottom right can be clicked with the mouse. Once the screens of text have been progressed through the subject will complete comprehension questions about the text they read.

The Scrolling Task

Speed selection: Subjects are instructed to select a speed they are most comfortable with. Scrolling text will appear (at the mid speed) and there will be a left arrow and a right arrow to opt for a slower or faster speed. (words slower and faster must not be used, only arrows). There will also be a select button (middle bottom) and once clicked the selection will be recorded on the csv file and set. Following, a video will appear in that selected speed option. Participants will need to read this short video as a way to confirm this speed is appropriate. At the end of the video, a prompt will appear: RESET or NEXT. See protocol instructions for further guidance. Reset will send the subject back to the speed select page. Next will continue to pages with more task instructions.

Video speeds: There will be 7 speeds available for each text offering a range of options that align with the average high school reading speed 200-300wpm.

Scrolling task: Subjects are instructed to read the chapter as it scrolls from the bottom to top of the page and if needed they can press the "spacebar" to pause the video and press the "C" button for the scrolling text to continue. This will be pausing and resuming the video of text at the speed selected by the subject at the previous speed selection trials. Once the video has finished the subject will complete comprehension questions about the text they read.

Questionnaires
Once the subject has read two chapters, one in each format (still and scrolling), they will complete a variety of questionnaires that include multiple choice format (drop down options or bubble), short answer (textbox) and scales (bubble). The text for these questionnaires are included in the Experiment procedure document.
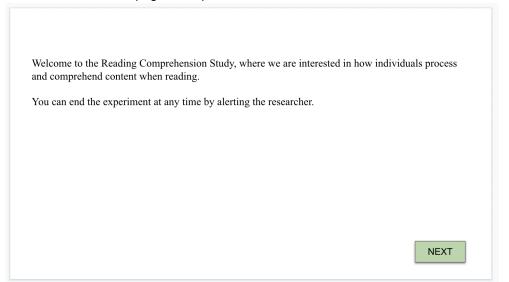
Debriefing
This includes a couple of demographic questions, short explanation of the study and a final thank you to the subject.

2.2. Screen layout examples

There is some flexibility with design but simple is best.

a. An instruction page example

Welcome to the Reading Comprehension Study, where we are interested in how individuals process and comprehend content when reading.

You can end the experiment at any time by alerting the researcher.

NEXT

b. A page of the **still** text reading task

You can progress through the text by clicking NEXT. If your mind wanders, click the purple button and continue reading.

Indeed, he almost knocked her easel over, coming down upon her with his hands waving shouting out, "Boldly we rode and well," but, mercifully, he turned sharp, and rode off, to die gloriously she supposed upon the heights of Balaclava. Never was anybody at once so ridiculous and so alarming. Even while she looked at the mass, at the line, at the colour, at Mrs Ramsay sitting in the window with. James, she kept a feeler on her surroundings lest someone should creep. up, and suddenly she should find her picture looked at. But now, with all her senses quickened as they were, looking, straining, till the colour of the wall and the jacmanna beyond burnt into her eyes, she was aware of someone coming out of the house, coming towards her; but somehow divined, from the footfall, William Bankes, so that though her brush quivered, she did not, as she would have done had it been Mr Tansley, Paul Rayley, Minta Doyle, or practically anybody else, turn her canvas upon the grass, but let it stand. William Bankes stood beside her. But now, with all her senses quickened as they were, looking, straining, till the colour of the wall and the jacmanna beyond burnt into her eyes, she was aware of someone coming out of the house, coming towards her; but somehow divined, from the footfall, William Bankes, so that though her brush quivered, she did not, as she would have done had it been Mr Tansley, Paul Rayley, Minta Doyle, or practically anybody else, turn her canvas upon the grass, but let it stand. William Bankes stood beside her.

Mind Wandered   NEXT

c. Scrolling text **Speed Selection**

Find your preferred speed by pressing the left or right arrow. When you have arrived at your preferred speed press SELECT.

Indeed, he almost knocked her easel over, coming down upon her with his hands waving shouting out, "Boldly we rode and well," but, mercifully, he turned sharp, and rode off, to die gloriously she supposed upon the heights of Balaclava. Never was anybody at once so ridiculous and so alarming. But so long as he kept like that, waving, shouting, she was safe; he would not stand still and look at her picture. And that was what Lily Briscoe could not have endured. Even while she looked at the mass, at the line, at the colour, at Mrs Ramsay sitting in the window with. James, she kept a feeler on her surroundings lest someone should creep. up, and suddenly she should find her picture looked at. But now, with all her senses quickened as they were, looking, straining, till the colour of the wall and the jacmanna beyond burnt into her eyes, she was aware of someone coming out of the house, coming towards her; but somehow divined, from the footfall, William Bankes, so that though her brush quivered, she did not, as she would have done had it been Mr Tansley, Paul Rayley, Minta Doyle, or practically anybody else, turn her canvas upon the grass, but let it stand. William Bankes stood beside her.

⬅️ **SELECT** ➡️

d. **Speed Confirmation** Screen

If it is not comfortable to continuously read at this speed, select RESET. Otherwise choose NEXT.

Indeed, he almost knocked her easel over, coming down upon her with his hands waving shouting out, "Boldly we rode and well," but, mercifully, he turned sharp, and rode off, to die gloriously she supposed upon the heights of Balaclava. Never was anybody at once so ridiculous and so alarming. But so long as he kept like that, waving, shouting, she was safe; he would not stand still and look at her picture. And that was what Lily Briscoe could not have endured. Even while she looked at the mass, at the line, at the colour, at Mrs Ramsay sitting in the window with. James, she kept a feeler on her surroundings lest someone should creep. up, and suddenly she should find her picture looked at. But now, with all her senses quickened as they were, looking, straining, till the colour of the wall and the jacmanna beyond burnt into her eyes, she was aware of someone coming out of the house, coming towards her; but somehow divined, from the footfall, William Bankes, so that though her brush quivered, she did not, as she would have done had it been Mr Tansley, Paul Rayley, Minta Doyle, or practically anybody else, turn her canvas upon the grass, but let it stand. William Bankes stood beside her.

RESET   **NEXT**

These buttons will only appear once the text video is finished

e.   Instruction Screen for Scrolling Reading Task

Thank you for selecting your speed, you will now begin the reading tasks.

Please read each text in full to be included in the study. A break will be available to you after completing the first text.
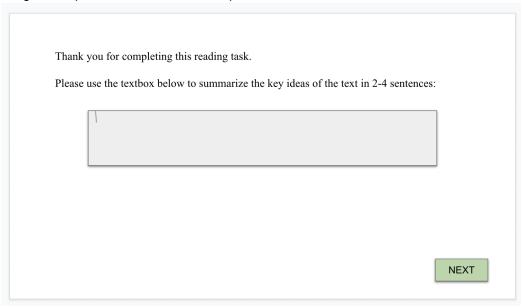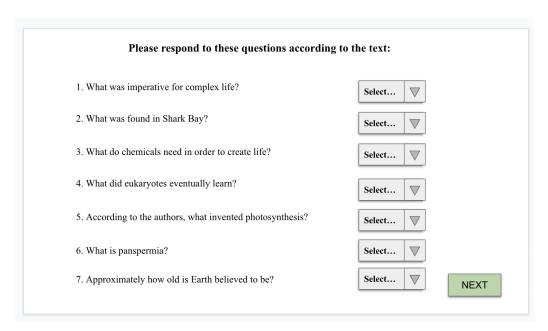
NEXT

f.   Scrolling Reading task

If you need to briefly pause the scrolling text while reading, you can press the SPACEBAR. To continue, press the "C" button.

Indeed, he almost knocked her easel over, coming down upon her with his hands waving shouting out, "Boldly we rode and well," but, mercifully, he turned sharp, and rode off, to die gloriously she supposed upon the heights of Balaclava. Never was anybody at once so ridiculous and so alarming. But so long as he kept like that, waving, shouting, she was safe; he would not stand still and look at her picture. And that was what Lily Briscoe could not have endured. Even while she looked at the mass, at the line, at the colour, at Mrs Ramsay sitting in the window with. James, she kept a feeler on her surroundings lest someone should creep. up, and suddenly she should find her picture looked at. But now, with all her senses quickened as they were, looking, straining, till the colour of the wall and the jacmanna beyond burnt into her eyes, she was aware of someone coming out of the house, coming towards her; but somehow divined, from the footfall, William Bankes, so that though her brush quivered, she did not, as she would have done had it been Mr Tansley, Paul Rayley, Minta Doyle, or practically anybody else, turn her canvas upon the grass, but let it stand. William Bankes stood beside her.

g. Comprehension short answer question

Thank you for completing this reading task.

Please use the textbox below to summarize the key ideas of the text in 2-4 sentences:

NEXT

h. Comprehension multiple choice

Please respond to these questions according to the text:

1. What was imperative for complex life?   Select... ▽

2. What was found in Shark Bay?   Select... ▽

3. What do chemicals need in order to create life?   Select... ▽

4. What did eukaryotes eventually learn?   Select... ▽

5. According to the authors, what invented photosynthesis? Select... ▽

6. What is panspermia?   Select... ▽

7. Approximately how old is Earth believed to be?   Select... ▽   NEXT

i. Questionnaire Page

How often do you find that you:

	Never	Rarely	Sometimes	Often	Always
Q1.Do not remember what you were just told because you were not attentive	○	○	○	○	○
Q2. Do not remember part of a conversation you were following, realizing that you were not paying attention (during a television program, or when with friends or relatives)	○	○	○	○	○
Q3. Start to talk to someone and realize you do not know/remember your starting point and what you wanted to say exactly	○	○	○	○	○
Q4. Lose the thread of the discourse because, while you were talking, you were thinking of something else	○	○	○	○	○
Q5. Go past place you wanted to go to, while you were running errands, because you were thinking about something else (going past a certain shop, or passing a road you should have taken)	○	○	○	○	○

NEXT

3. Screen Controls

Control	Control Type	Task	Action	Response
Next	Mouse Click Button	Instructions	On Click	● Takes user to next page
Next	Mouse Click Button	Still Task	On Click	● Takes user to next page ● Time Stamp recorded to csv
Mind Wandered	Mouse Click Button	Still Task	On Click	● Time Stamp recorded to csv
Slower Speed Arrow	Mouse Click Button	Speed Selection	On Click	● Takes user to slower speed video until no videos left then no function
Faster Speed Arrow	Mouse Click Button	Speed Selection	On Click	● Takes user to faster speed video until no videos left then no function
Select	Mouse Click Button	Speed Selection	On Click	● Set selected speed for next video ● Record speed in csv
Reset	Mouse Click Button	Speed Confirmation	On Click	● Takes user back to speed selection page

Next	Mouse Click Button	Speed Confirmation	On Click	● Takes user to next page ● Sets speed for next video
PAUSE	spacebar	Scrolling reading task	On Click	● Pauses video of scrolling text ● Records timestamp to csv
RESUME	"C" button on keyboard	Scrolling reading task	On Click	● Resumes video of scrolling text ● Records timestamp to cvs
Questionnaire bubble select	Mouse button click	Responses	On click	● responding to all questionnaire scaled question types ● answers recorded on csv ● answer selected shown to subject bubble filled in
Questionnaire drop down	Mouse button click	Comprehension Multiple choice Responses	On click	● responding to all multiple choice ● answers recorded on csv ● answer selected shown in select box
Short answer boxes	Keyboard typing	Responses	Keyboard	● responding to all short answer types ● answers recorded on csv ● text shown to subject when typing

CSV file template: (see MWcsv_template.csv file for full document

	A	B	C	D	E	F	G	H	I	J	K	L
1	user_ID	protocol	timestamp	text_format	text	action	page	question	correct	speed		
2	0001	1	000000001			started						
3	0001	1	000000220	still	A	next	still_text_pg1					
4	0001	1	000003300	still	A	next	still_text_pg2					
5	0001	1	000000406	still	A	mind wandered	still_text_pg2					
6	0001	1	000005526	still	A	next	still_text_pg3					
7	0001	1	000007305	still	A	next	still_text_pg4					
8	0001	1	000000855	still	A	next	still_text_pg5					
9	0001	1	000010024	still	A	next	still_text_pg6					
10	0001	1	000011354	still	A	mind wandered	still_text_pg6					
11	0001	1	000001303	still	A	next	still_text_pg7					
12	0001	1	000014523	still	A	next	still_text_pg8					
13	0001	1	000016302	still	A	mind wandered	still_text_pg8					
14	0001	1	000001752	still	A	next	still_text_pg9					
15	0001	1	000019021	still	A	next	still_text_pg10					
16	0001	1	000020351	still	A	next	still_text_pg11					
17	0001	1	000002200	still	A	next	still_text_pg12					
18	0001	1	000023520	still	A	next	still_text_pg13					
19	0001	1	000024399	still	A	next	still_text_pg14					
20	0001	1	000002649	still	A	next	still_text_pg15					
21	0001	1	000027928		A	"I thought the mai	comprehension_test_SA	a_question_SA				
22	0001	1	000029348		A	answer_2	comprehension_test	a_question_1	0			
23	0001	1	000003097		A	answer_1	comprehension_test	a_question_2	0			
24	0001	1	000032427		A	answer_4	comprehension_test	a_question_3	1			
25	0001	1	000033396		A	answer_3	comprehension_test	a_question_4	1			
26	0001	1	000003546		A	answer_1	comprehension_test	a_question_5	1			
27	0001	1	000036925		A	answer_2	comprehension_test	a_question_6	0			
28	0001	1	000038345		A	answer_3	comprehension_test	a_question_7	1			
29	0001	1	000003994		A	answer_1	comprehension_test	a_question_8	1			
30	0001	1	000041424		A	answer_2	comprehension_test	a_question_9	1			
31	0001	1	000042393		A	answer_3	comprehension_test	a_question_10	1			
32	0001	1	000004443	scroll		select	speed_select			speed_5		
33	0001	1	000045922	scroll		confirm	speed_select			speed_5		
34	0001	1	000047342	scroll		select	speed_select			speed_4		
35	0001	1	000004891	scroll		confirm	speed_select			speed_4		