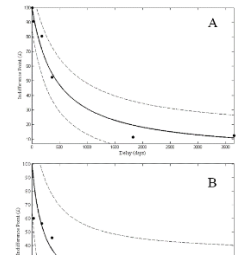May 01, 2018   Version 1

🌐 Impulsivity V.1

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Abstract

The ability to respond quickly in a flexible and changing environment is advantageous in many settings (Dalley & Robbins, 2017). However, if such impulsive behaviours are chronically expressed they become maladaptive and salient to a number of brain disorders and damaging behaviours such as smoking and binge eating.

Emerging evidence suggests that chronotype, which is an individual's preference for waking and sleeping with morning types preferring to rise and go to bed early and evening-types preferring to go to bed late and rise late, is related to impulsivity. For example, Kang and colleagues (2015) observed a significant association between subjective trait impulsivity (as measured by the Barratt Impulsivity Scale (BIS 11, Patton, Stanford, & Barratt, 1995) and chronotype in healthy young adults (Kang et al., 2015). Similarly, Hwang *et al.,* (2016) reported that morningness-eveningness was related to both impulsivity and anger (Hwang, Kang, Gwak, Park, & Lee, 2016). Limited data, therefore, point to a link between eveningness and impulsivity (Hwang et al., 2016; Kang et al., 2015). However, although self-report questionnaires are often structured according to different subtypes of impulsivity (e.g. the BIS includes measures of attentional, motor and non-planning impulsivity) impulsivity if often condensed to a single metric (Hwang et al., 2016; Kang et al., 2015). In addition, few studies have supplemented subjective outcomes with objective laboratory-based measures and related these to chronotype. One study, Berdynaj *et al.,* (2016) found no difference between early/intermediate chronotypes and late chronotypes using a computer-based delay discounting task (Berdynaj et al., 2016). However, the modest sample size (*n* = 86) and the collapsing of early and intermediate chronotypes into a single group limits the interpretation these data (Berdynaj et al., 2016).

The aim of the current study, therefore, is to extend previous findings (Berdynaj et al., 2016; Hwang et al., 2016; Kang et al., 2015) to include both subjective and objective metrics of impulsivity. Decisional impulsivity can be objectively measured using: 1) Delay discounting, which is the preference for small, immediate rewards versus larger but delayed rewards. An impulsive choice in a temporal discounting task is reflected as a preference for smaller, more-immediate outcomes and follows a delay-dependent hyperbolic function. And 2) The jumping to conclusions task (as measure of reflection impulsivity) which assays the tendency to make rapid decisions without adequate accumulation and consideration of the available evidence. Motor impulsivity can be assessed using the stop-signal reaction time (SSRT) which measures the ability to inhibit a response after it has been initiated (please see below for experimental details). Based on the extant literature, it is expected that later chronotype will be associated with increased self-report impulsivity. The proposed work also provides a unique opportunity to assess (in an exploratory manner) the relationship between chronotype and objective-measures of impulsivity.

1   Invite your participant to complete the consent form and be ready to respond to any questions.

2   You should at the same time add the unique identifier (e.g. RN001 – YOUR initials then the participant number. Each participant should have a different identifier – RN001, RN002 …)

3   Login to the testing computer and navigate to the experimental files on your N-drive.

4   Find the first experimental folder (e.g Impulsivity) and within that the first task folder e.g. 1_DD. Run the experiment as you have been shown. When prompted enter the subject number (1,2,3,4), the session number will always be 1. Repeat for the remaining experiments. To avoid potential order effects you should counterbalance the order of experiments. IT IS IMPORTANT THAT YOU ENTER THE CORRECT SUBJECT NUMBER – IF NOT YOUR FILES MAY GET OVERWRITTEN!

5   Please remember to name your files correctly, if you think you may be at risk of overwriting a file STOP and CHECK.

6   At this point you should read the following instructions to your participant (the order of these will depend on the participant number) :DD"We are now going to show you two amounts of money on the screen and we would like you to choose either to take the lesser amount now or the larger amount later. For example, would you rather have £50 now or £100 in ten years? If you would like to take the money now press the "z" key, if you would rather wait press the "m" key. As you make your choices the money available may change. In each case simply continue with your choices as I described. You will not be given the money presented – the amounts are purely hypothetical – but you should respond as if you were getting the money. We will start with a few examples so you can get the hang of it. If you have any questions at end of the practice block please let me know."

7   Once the experiment has finished you should open the next experiment (remember you do not need to close EPrime to do this you can navigate to the other experimental folder). Enter the participant details just as above At this point you should read the following instructions to your participant:JCT"We are going to show you 2 jars, A and B. In jar A the ratio of blue to red discs is 85:15, in Jar B the ratio is reversed, i.e. there are 15 blue discs and 85 red discs. Next we will ask you a question about the proportions. Specifically we will ask you estimate the probability of drawing a blue disc from jar A? We will then proceed to the main part of the task. For each trial you will be shown a disc (either red or blue) and you will be offered the choice to see another disc or guess which jar the disc is drawn from. If you want to see another disc press the key "d" the disc will be replaced in

the jar and a second disc drawn at random. If you are pretty certain you know which jar the bead come from then you should select jar (the letter "j"). You will then be asked to indicate which jar you think the disc came from and how positive (as a percentage) you are about your choice. There are 5 sets trials, in each set draws will be taken from the same jar and the disc replaced in the jar after each draw."SST"For this task please place the first and index fingers of your dominant hand on the "< >" symbols on the keyboard. I will then start the task. Your see watch the screen carefully and respond as quickly as possible to the arrow symbol by pressing the corresponding key, so if the "<" symbol appears press the "<" key as quickly as possible. If the ">" symbol appears press the ">" key as quickly as possible. Occasionally the "<>" symbol will turn red, if it does you should inhibit your response (i.e. try not to press the key). The game starts with a few practice trials to get you going. Remember you should always try to respond as quickly as possible.

8   When you have finished the experiments you should have a number of additional files in each experimental folder. The most important ones end with the extension .edat2 (e.g. 1_DD-1-1.edat2) and the .txt extension (e.g. 1_DD-1-1.txt)

9   Once you have finished the session thank your participant and give them a copy of the debrief form (make sure you have included the participant identifier on the debrief form).

10   At the end of your session please email to me all the *.edat2 and *.txt files.

11   At this point you do not need to do anything else with your data. Please do not rename any files, move any files into different folders or run any macros.

12   If you are any doubt about these instructions come and speak to me. It is important we avoid losing data.Thank you.