Data Article

Cognitive inhibition behavioral tasks in online and laboratory settings: Data from Stroop, SART and Eriksen Flanker tasks

Krystian Barzykowski [a,*], Michał Wereszczyński [a], Sabina Hajdas [a], Rémi Radel [b]

[a] Applied Memory Research Laboratory, Institute of Psychology, Faculty of Philosophy, Jagiellonian University, Kraków, Poland
[b] Université Côte d'Azur, Nice, France

A B S T R A C T

The provided dataset represents the performance of adult individuals in three experimental tasks measuring cognitive inhibition: the Stroop task; the SART task and the Eriksen Flanker task. All tasks were initially completed in a web setting (online) by 485 individuals. Additionally, randomly selected participants completed all these tasks one more time (220 participants) or two more times (100 participants) during separate laboratory session(s) offline. The provided dataset contains data both from the offline and online experimental sessions. For the Stroop and Flanker tasks, we have provided data on mean reaction times for correct answers and the percent of correct answers for both congruent and incongruent trials. For the SART task, we have provided data on the number and the percent of commission and omission errors; the mean correct reaction times in "go" trials; the standard deviations of correct reaction times in "go" trials; the coefficients of variability for correct reaction times in "go" trials; the mean reaction times for successful "go" trials proceeding successful "no-go" trials; and the mean reaction times for correct "go" trials proceeding failed "no-go" trials. Data from both laboratory sessions contains information on the age and gender of participants. Additionally, we have provided the dates and hours of all experimental sessions. This

---

* Corresponding author:
  E-mail address: krystian.barzykowski@uj.edu.pl (K. Barzykowski).

dataset can potentially be reused for exploratory research on cognitive inhibition, i.e., the stability of individual cognitive inhibition capacity over time; intercorrelations of various inhibition task performance measures; individual differences in cognitive inhibition; or the influence of task setting (web vs laboratory) on inhibition performance measured in different settings (web vs laboratory).

Specifications Table

Subject	Psychology
Specific subject area	Cognitive Psychology; Cognitive Inhibition; Stroop Task; SART Task; Flanker Task; Reaction Time; Online Behavioral Experiment
Type of data	Excel.xls
How the data were acquired	The dataset contains performance measures of adult individuals in three experimental tasks measuring cognitive inhibition: the Stroop Task, the Eriksen Flanker Task, and the SART task. All tasks were completed by participants on separate days in both a web setting (online) and a laboratory setting (offline). The online and offline tasks were implemented with Inquisit-web software and Inquisit 5, respectively.
Data format	Raw and analyzed
Description of data collection	Data was collected from 16.05.2017 to 04.04.2019. Initially we asked a big pool of participants to complete cognitive tasks in an online setting (in total:485 participants; data of 19 participants was excluded from the base due to the incomplete recording of the results so the final sample was 466). Participants were recruited to the online session via social media (Facebook), university advertisements and flyers. The links to the website with the experimental tasks were sent to participants' email addresses. Subsequently, based on participants' performance (see [1] for the procedure of calculating the individual inhibition capacity indices), from the initial pool we randomly selected 220 individuals (after excluding from the base 2 participants with lacking data: 218 in total) who displayed different levels of individual inhibition capacity and invited them to participate in the 1st laboratory session. Finally, from the participants of the 1st session, we selected 100 individuals (after excluding from the base 8 participants with lacking data: 92 in total) to participate in the 2nd laboratory session. All performance measures were recorded by Inquisit 5 software [2] (for laboratory sessions) and Inquisit web software [3] (for online sessions).
Data source location	Jagiellonian University Cracow Poland
Data accessibility	**All data referred to in your data article must be made publicly available prior to publication.** All data is attached to the article. The data is stored in the OSF repository. The title of the dataset is "Cognitive inhibition behavioral tasks in online and laboratory settings: data from Stroop, SART and Eriksen Flankers tasks". The GUID identifier number of the dataset is: *2gxhy*. The dataset can be accessed by the following link: https://osf.io/2gxhy/?view_only=31aa5d5964a943df8d3e7d911d2d7141
Related research article	K. Barzykowski, S. Hajdas, R. Radel, A. Niedźwieńska, L. Kvavilashvili, The role of inhibitory control and ADHD symptoms in the occurrence of involuntary thoughts about the past and future: An individual differences study, Cons. And Cogn. 95 (2021) 1-19. https://doi.org/10.1016/j.concog.2021.103208 K. Barzykowski, S. Hajdas, R. Radel, L. Kvavilashvili, Effects of inhibitory control capacity and cognitive load on involuntary past and future thoughts: A laboratory study, Conscious. Cogn. 102 (2022). https://dx.doi.org/10.1016/j.concog.2022.103353.

Table 1

Data file variables relating to general information about the experimental sessions.

Variable	Description
FILTER for completed sessions	AutoFilter column, which allows the selection of participants to display in the xls document based on the criterion of completed experimental sessions. Possible filters include: "*online*" – displays participants who completed only the online session (without lab sessions) "*online+1 lab session*" – displays participants who only completed the online session and only the 1st laboratory session "*online+2 lab sessions*" – displays participants who only completed the online session, the 1st laboratory session, and the 2nd laboratory session
Subjectid	Participants' individual ID numbers
Date of online session	The day the online session was completed
Online session time	Online session start time
Date of first lab session	The day the 1st laboratory session was completed
Hour of first lab session	Starting time of the 1st laboratory session
Date of second lab session	The day the 2nd laboratory session was completed
Hour of second lab session	Starting time of the 2nd laboratory session
Gender	Gender of participants
Age	Age of participants

Value of the Data

- This data is useful because it includes performance of participants from the same pool on cognitive inhibition tasks in both web and laboratory settings. Thanks to this, in this dataset the influence of individual differences on eventual between-session differences in task performance was significantly reduced.
- These data could be beneficial for future executive function or cognitive inhibition researchers.
- This dataset provides a wide range of performance measures, i.e., between-settings comparisons (e.g., lab vs web) and between-session comparisons (e.g., 1st lab session vs 2nd lab session), which can be used for future analysis of multiple performance measures in classic experimental tasks. This data can also be used to develop future web-based behavioral experiments and exploratory research on the influence of task setting on performance.

1. Data Description

The STROOP_FLANKERS_SART_web_and_lab.xls data file contains the performance of adult individuals in three tasks measuring cognitive inhibition. The data in this xls. file were taken from the files generated by Inquisit 5 for the laboratory sessions [2] and Inquisit web [3] for the online session. In Table 1, we provide descriptions of the variables in the datafile that relate to information about the participants and the technical details of the experimental sessions. In Table 2, we provide descriptions of the datafile variables that relate to the participants' performance in the three experimental tasks. The raw data from each task is included in the following files: Raw_Flanker.xlsx, Raw_Sart.xlsx and Raw_Stroop.xlsx. Each raw data file consists additional sheet named "Variables Description" where specifications of the included variables are provided.

2. Experimental Design, Materials and Methods

2.1. Participants

485 participants were recruited for the initial online experimental session (age and gender were not recorded at this stage) [4]. Data of 19 participants was excluded from the base due to

Table 2
Datafile variables related to performance in cognitive tasks[1].

FLANKER CONGRUENT: % correct	Percent of correct reactions (out of all valid responses) in the congruent condition of the Flanker task
FLANKER INCONGRUENT: % correct	Percent of correct reactions (out of all valid responses) in the incongruent condition of the Flanker task
FLANKER CONGRUENT: mean RT for correct	Mean reaction time of correct reactions in the congruent condition of the Flanker task
FLANKER INCONGRUENT: mean RT for correct	Mean reaction time of correct reactions in the incongruent condition of the Flanker task
STROOP CONGRUENT: % correct	Percent of correct reactions (out of all valid responses) in the congruent condition of the Stroop task
STROOP INCONGRUENT: % correct	Percent of correct reactions (out of all valid responses) in the incongruent condition of the Stroop task
STROOP CONGRUENT: mean RT for correct	Mean reaction time of correct reactions in the congruent condition of the Stroop task
STROOP INCONGRUENT: mean RT for correct	Mean reaction time of correct reactions in the incongruent condition of the Stroop task
SART: NUMBER OF COMMISSIONS	Number of commission errors[2]
SART: % COMMISSIONS	Percent of commission errors (out of all valid answers)
SART: NUMBER OF OMISSIONS	Number of omission errors[3]
SART:% OMISSIONS	Percent of omission errors (out of all valid answers)
SART: anticipatory count	Number of GO reactions initiated before the digit onset
SART "GO" TRIAL: mean RT	Mean reaction time for correct reactions in GO trials of the SART task
SART SD RT GO	Standard Deviation of mean reaction times for correct reactions in GO trials of the SART task
ONLINE SART CV GO	Coefficient of mean reaction time variability[4] in GO trials
ONLINE SART GObeforesuccessNOGO mean RT	Mean correct reaction time in GO trials proceeding successful NO-GO trials
ONLINE SART_GObeforefailedNOGO mean RT	Mean correct reaction time in GO trials proceeding failed NO-GO trials

[1] Each of variables below is named with an additional prefix in the datafile: "ONLINE", indicating that this variable refers to a task completed in the online experimental session; "L1", indicating that this variable refers to a task completed during the 1st lab session; "L2", indicating that this variable refers to a task completed during the 2nd lab session.
[2] a key was pressed in a no-go trial.
[3] a key wasn't pressed in a go trial.
[4] coefficient of variability=SD/MEAN.

the incomplete recording of the results so the final sample was 466. In the 1st laboratory session, 220 participants were selected from the initial pool based on their performance in the online experimental tasks (see [1] for the procedure of calculating the individual inhibition indices that were applied in order to assess the participants' performance). After excluding from the base 2 individuals with lacking data there were 218 participants in total (69 males, MA=25; SD=4.97; eleven participants did not indicate their age) . For the 2nd laboratory session, 100 individuals with high and low individual inhibition capacity (per 50) were selected from the 1st laboratory session participants. ([5]). After excluding from the base 8 individuals with lacking data there were 92 participants in total (25 males, MA = 24.75, SD = 4.57).

2.2. Materials

- *Inquisit software***:** All experimental tasks were created and displayed with the Inquisit software. Inquisit Web software [2] was used in an online setting and Inquisit 5 software [3] was used in the laboratory setting.
- *The Stroop task***:** During the Stroop task participants were presented the names of four colors in Polish (i.e., red, green, blue, and yellow). Words were displayed in one of these four colors (e.g., the word green could be displayed in red, green, blue or yellow font). Participants were asked to determine the color of the font as quickly as possible by pressing the key assigned

to the corresponding color while paying attention to the meaning of the word. Each color name was displayed until the response. Reaction times were measured from the onset of stimuli. There was a 400 ms interval between trials . After each failed trial a 400 ms error feedback screen was displayed. In congruent trials the meaning of the word and the color of the font were corresponding (e.g., the word "green" was displayed with green font) – in contrast, the meaning did not match the color of the font in incongruent trials. There were 140 trials (70 congruent and 70 incongruent). Additionally, before completing the main task, participants were asked to compete the practice block consisting of short 14-trial version of the Stroop task including 7 congruent and 7 incongruent trials. The main task lasted up to 10 min.

- *Eriksen Flanker task* [6]**:** In the Eriksen Flanker task participants were asked to press the arrow keys corresponding to the target arrow in the center of the screen. Participants had to press the right arrow key with right index finger and the left arrow key - with the left index finger. The target arrow was displayed surrounded by the additional arrows (flankers). Participants were asked to ignore the flankers and focus on the target arrow. In congruent trials the target arow pointed the same direction as surrounding flankers. In contrast, in incongruent trials, the target arrow indicated the opposite direction to the flankers what resulted in activating the wrong automatic response, which had to be ignored and inhibited in order to react correctly. There were 140 trials (70 congruent and 70 incongruent). Each trial was presented for a maximum of 2700 ms (the target arrow and flankers were presented for a maximum of 1750 ms). Before starting the main task, participants were asked to complete the additional practice block consisting of 10 trials (5 congruent and 5 incongruent). The main task lasted up to 10 min
- *SART task* [7]: In this task, participants were presented with a single digit (1–9) in the middle of the screen. The digit disappeared after a short while and was followed by a mask (circle with an X). Participants were asked to press the SPACEBAR if any digit other than 3 was presented and to refrain from reacting if the digit 3 was presented. In total, there were 225 trials (digits 1–9 presented 25 times each). The digit order was semi-random (predetermined). Each digit was presented for 250 ms, followed by a mask (900 ms), so the SOA was 1250 ms. Before completing the main task, participants were provided with 18 practice trials.

2.3. Procedure

The online pre-selection sessions were part of a bigger project aimed at pre-selecting a pool of participants based on their individual inhibitory control capacity; this is already described in detail elsewhere [4,5]. Briefly, the final pool consisted of 485 participants who engaged in online versions of commonly used tasks measuring response inhibition, such as the Stroop task [8], the SART task [7] and the Eriksen Flanker task [6] (data of 19 participants was excluded from the base due to the incomplete recording of the results so the final sample was 466). Subsequently, based on participants' performance (see [1,4] for the procedure of assessing performance), from the initial pool we randomly selected 220 individuals (after excluding from the base 2 individuals with lacking data: 218 in total) with different levels of individual inhibition capacity and invited them to complete the 1st laboratory session, in which they performed the same tasks as in the online session. In case of not accepting the invitation or being unable to take part in the study by the selected person, a new participant was randomly selected. For the 2nd laboratory session, 100 participants (after excluding from the base 8 individuals with lacking data: 92 in total) with high and low levels of individual inhibition capacity were randomly selected to the study from the 1st laboratory session participants.

Ethics Statements

The University Research Ethics Committee has approved the study (KE/02/122016). Written consent for participation was obtained prior to data collection. Participants were informed that

they were free to withdraw from the study at any point. Facebook's data redistribution policies were complied with.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Data_set (Original data) (osf)

CRediT Author Statement

Krystian Barzykowski: Conceptualization, Methodology, Resources, Writing – review & editing; **Michał Wereszczyński:** Writing – original draft, Data curation, Writing – review & editing; **Sabina Hajdas:** Investigation, Project administration, Writing – review & editing; **Rémi Radel:** Conceptualization, Methodology, Software, Data curation.

Acknowledgments

References

[1] K. Barzykowski, M. Wereszczyński, S. Hajdas, R. Radel, An Inquisit-web protocol for calculating composite inhibitory control capacity score: An individual differences approach, MethodsX 8 (2021), doi:10.1016/j.mex.2021.101530.
[2] Inquisit 5, (2016). https://www.millisecond.com.
[3] Inquisit Web, (2016). https://www.millisecond.com.
[4] K. Barzykowski, S. Hajdas, R. Radel, A. Niedźwieńska, L. Kvavilashvili, The role of inhibitory control and ADHD symptoms in the occurrence of involuntary thoughts about the past and future: an individual differences study, Cons. Cogn. 95 (2021) 1–19, doi:10.1016/j.concog.2021.103208.
[5] K. Barzykowski, S. Hajdas, R. Radel, L. Kvavilashvili, Effects of inhibitory control capacity and cognitive load on involuntary past and future thoughts: a laboratory study, [Manuscript under revision] (2022).
[6] B.A. Eriksen, C.W. Eriksen, Effects of noise letters upon the indetification of a target letter in a nonsearch task, Encycl. Clin. Neuropsychol. 16 (1974) 143–149, doi:10.1007/978-3-319-57111-9_9085.
[7] I.H. Robertson, T. Manly, J. Andrade, B.T. Baddeley, J. Yiend, "Oops!": performance correlates of everyday attentional failures in traumatic brain injured and normal subjects, Neuropsychologia 35 (1997) 747–758, doi:10.1080/01619565609536671.
[8] C.M. MacLeod, Half a century of reseach on the stroop effect: an integrative review, Psychol. Bull. 109 (1991) 163–203, doi:10.1037/0033-2909.109.2.163.