**Primed Go/Nogo with Feedback Task**

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The Primed Go/Nogo task was designed as a replication from the paper by **Liebrand, Pein, Tzvi and Kramer (2017**). It was designed using the PsychoPy3 Experiment Builder v3.1.0. The main adaptation compared to the original paper includes the added feedback – a green “correct” when the correct response is made, and a red “incorrect” when an incorrect response is made.

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1. **EXPERIMENT OUTCOMES**

The timing of the components and stimuli in the task allows for the analysis of a range of variables including behavioural and electrophysiological data. In its current form, the task allows to measure:

**Behavioural outcomes:** reaction time, task accuracy, motor planning errors (omissions, wrong presses), impulsive errors (failure to inhibit, pressing too early), post-error slowing (on the MS condition).

**Electrophysiological**: ERPs: ERN, FRN, but is also possible to record CNV, P300 and Frontal theta

1. **EXPERIMENT DETAILS**

**Trials:** Each trial consists of a cue shape presented in the middle of the screen, either a circle or a square. The cue shape prompts participants to prepare a response. Responses are made on a computer keyboard. When the circle is presented participants prepare to respond with the button “C” and when the square was presented with the button “M”.

Following the cue, the target shape is presented. This is always a triangle. The triangle appears either in the middle of the screen, on the left or on the right. Participants are instructed to always execute the prepared response when the triangle is presented in the middle. Participants may have to inhibit responses when the triangle appears on either side depending on the condition of each block.

There is a fixation plus presented in the middle of the screen at the start of the trial. The duration of the fixation plus is jittered between 700 and 1000ms. The cue shape and the triangle target are presented for 200ms. The time between the cue shape (circle or square) and the triangle target stimulus is 900ms. During this time participants are presented with a fixation plus. Premature responses are recorded during this period. Required responses are collected over a period of 600ms from the presentation of the triangle target. As soon as the participant responds, the feedback is presented 600ms before the next trial begins.

**Blocks:** In some blocks participants are instructed to inhibit their responses when the triangle appears on the left (thus following the circle cue). In some blocks only when the triangle appears on the right (thus following the square cue).

Before the task begins participants engage in a short training procedure which includes 2 mini blocks with 8 trials in each. The main testing part of the task includes 6 blocks of 80 trials each. Block conditions are randomly assigned.

There are 480 trials in the main testing phase. The task together with the training phase takes about 30 minutes.

**Conditions:** There are two main conditions with four sub-conditions.

Maybe stop (MS) – when participant prepares a response but knows that they may have to inhibit that response. Eg. The instructions at the start of the block ask the participants to prepare to respond with letter “C” when the circle cue appears. But only execute the prepared response if the triangle target subsequently appears in the middle. The participant prepares a response when they see the circle cue but they know that if the triangle appears on the left they will have to inhibit that response.

Sub-conditions:

* Stop e.g. when the triangle target appears on the left and the participant has to inhibit the prepared response (25% of trials)
* No Stop e.g. when the triangle target appears in the middle and the participant executes the prepared response (75% of trials)

Certain go (CG) – when the participant prepares a response and knows that they will always execute that response. Eg. The instructions at the start of the block ask the participants to prepare to respond with the letter “M” every time the square cue appears and to execute the response when the triangle target appears regardless of its position.

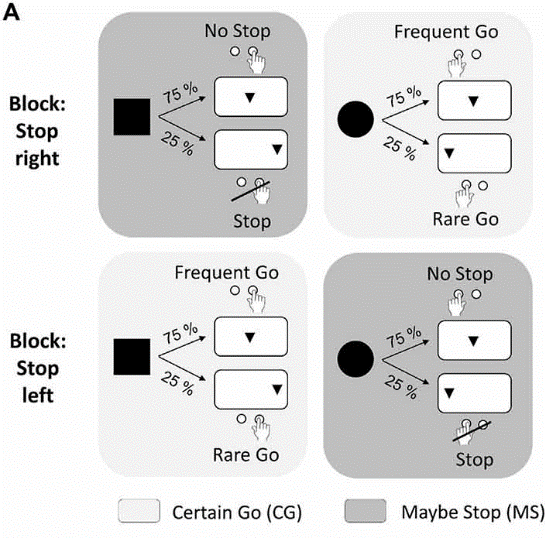
Sub-conditions:

* Rare Go – e.g. when the triangle target appears on the right and the participants should execute the prepared response (25% of trials)
* Frequent Go – e.g. when the triangle target appears in the middle and the participant should execute the prepared response (25% of trials)

1. **DATA ANALYSIS**

**Analysis scripts**: written in R for the behavioural outcomes outlined above can be accessed through my OSF page (I am currently working on it). These variables can be extracted separately for the MS and CG conditions.

**Expected task effect**: The original study by Liebrand et al. (2017) showed significantly more early errors in the Certain Go condition and significantly slower reaction time in the Maybe Stop condition. This is expected in the control group to reflect that the task produced the required effect of motor planning and proactive inhibition.

**Exclusion criteria** – check for outliers in the number of errors

1. **ADDITIONAL MATERIALS**

Please check out the **task instructions document** available on the repository. The document can be provided to the participants so that they can read through and better understand the task before they complete it.

Here is the diagram produced by Liebrand et al. (2017) to illustrate the task stimuli and conditions.

1. **HOW DO I USE THE TASK IN MY OWN RESEARCH?**

You will need to have PsychoPy installed on your computer. Please note that the experiment was created in PsychoPy3 Experiment Builder v3.1.0 and some features may run differently in a more recent version (however, it is not recommended that you install the old version just to be able to work on the task).

Make sure to download all files from my GitLab repository apart from the folder “data”.

The file “Primed GoNogo.psyexp” should let you open the experiment in PsychoPy. From this point you can make your own changes to the task and adapt it so that it becomes suitable for the needs of your experiment.

**Added Code:** The code components that are added in this task include specification for jitter used to randomise the inter trial intervals (ITI). There is also a component which specifies the given feedback.

**Condition files:** You might notice that there are many condition files and loops in the task. When I first created it, I was not that good at using PsychoPy and I could not think of other solutions. Here is a list of the condition files and what they are used for:

* Conditions 1/Conditions 2.csv: these two files basically set up the block type. They specify the position of the triangle relative to the cue shapes (circles and squares) and the correct buttons. Conditions 1.csv includes settings specific for blocks where inhibition happens on the left (following the circle cue), Conditions 2.csv includes settings specific for when inhibition happens on the right (following the square cue). The MS/CG condition split is 50/50. Within each of the conditions there is a 25/75 split for Stop/No Stop and Rare Go/ Frequent Go sub-conditions.
* ConditionsFile1/ ConditionsFile2.csv: these two files pair the Conditions 1/Conditions2.csv block files with the relevant instructions.
* ConditionsMaster1/ConcitionsMaster2.csv: specify the order of the blocks so that the same block is not repeated twice in a row. There are two files here, and each file starts with a different block.
* Groups.csv: uses the ConditionsMaster1/ConditionsMaster2.csv files to randomly pick which bock will be presented to the participant first.
* All files beginning with the letter “p” are similar to the ones described above, only that they are used for the short practice blocks.

**Additional files:** please don’t forget to download the image files. These are your stimuli!

**Referencing the task:**

DOI not yet established. Please contact me for further info.

**Contact:**

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1. **REFERENCES**

Liebrand, M., Pein, I., Tzvi, E., & Krämer, U. M. (2017). Temporal dynamics of proactive and reactive motor inhibition. *Frontiers in human neuroscience*, *11*, 204.