Brainclinics®
FOUNDATION

NCG TMS 2.0 measurement manual
version 1.32/1.0

HeartBrainConnect

NCG TMS 2.0 measurement Quick Start Guide

Note: This test and exercise suite is meant to be conducted by a trained and certified rTMS professional or rTMS technician, using professional rTMS equipment.

INSTRUCTIONS FOR rTMS CLINICIAN

Short overview
- The measurement is executed at four locations: the Beam and 5CM rule (5CM) on the left *and* right hemisphere;
- Per location, fifteen increasing steps of 2% of machine output (MO) are applied;

Preparations

IMPORTANT: To process the collected data from the Heart Brain Connect App your iPhone needs to be connected to the internet and be sufficiently charged to complete the assessment.

1. Make sure you have downloaded and installed the HeartBrainConnect (HBC) app on your iPhone

2. **Set up the ECG measurement** with the H10 polar band
    a. Make sure that:
    1. The Polar Heart Rate Sensor is attached to the participants chest;
    2. The polar band is paired with the iPhone and with the HBC app;
    3. The ECG measurement functions properly.
    b. Note: Your iPhone needs to be connected to the internet to complete the assessment successfully!

3. **Set the protocol** in the rTMS device:
    1. 10 Hz
    2. Pulses in trains: 50
       (train duration 5 sec. @ 10 Hz)
    3. Number of trains: 15
    4. Inter-train interval: 11 seconds
    5. Start delay: 0 seconds (for exact timing)

4. **Determine the MT** on both the *right* and *left* hemisphere (take the average);
   - Based on the (average left/right) individual MT, the specific steps of %MO are defined:
   o Per individual, you determine the 120% of the MT, and start stimulation 28% points of machine output under this 120% MT
   o Example for an MT of 50%: 120% MT = **60%**, so stimulation starts at 32%
     * 32%-34%-36%-38%-40%-42%-44%-46%-48%-50%-52%-54%-56%-58%-**60%**

5. **Determine the Beam and 5CM location** on both hemispheres;
   a. Use a different color pencil for both locations for visual distinction;
   b. Determine the distance between two locations in cm.
      - In case this distance is smaller than 1 cm, choose the Beam on that hemisphere (optimal within-site determination is not possible);

6. **Localization order:** Start stimulation on the left Beam location and then alternate between hemispheres for the following measurements
   1. So: *Beam left,* then -> Beam right -> 5CM left -> 5CM right

7. **Instructions** to participant:
   a. Make sure that the participant is comfortable, as the total assessment of four measurements will take up to sixty minutes, including pauses (to readjust the coil).
   b. Make sure the participant does not move the head during a measurement.
   c. Make sure the participant does not talk during the measurement.

HBC measurement (per site)
The stimulation needs to be streamlined *exactly* with the HBC measurement.
   1. Place the rTMS coil on the starting location.
   2. Start the measurement in the HBC-app:
      o Press the ASSESS button on the START screen;
      a. Give the assessment a name (for example: "Institution"_"*ID*"_ HBC_"*date*"
      o Choose a series of 4 measurements and press the play button

o Each measurement has a duration of around 3.5 minutes.

3. After one stimulation train, increase the %MO with 2% (during the ITI of 11 s), and again after the next stimulation train etc.
   NB: unless this is preprogrammed in the rTMS protocol (e.g. on Deymed DuoMag hardware).

4. The HBC measurement ends automatically after 3.5 minutes. Please only press Play if you are set for the next measurement.

SAVING HBC RESULTS

Important note: Assessments are not saved on the iPhone and you will not be able to access their results once you have exited the assess screen.
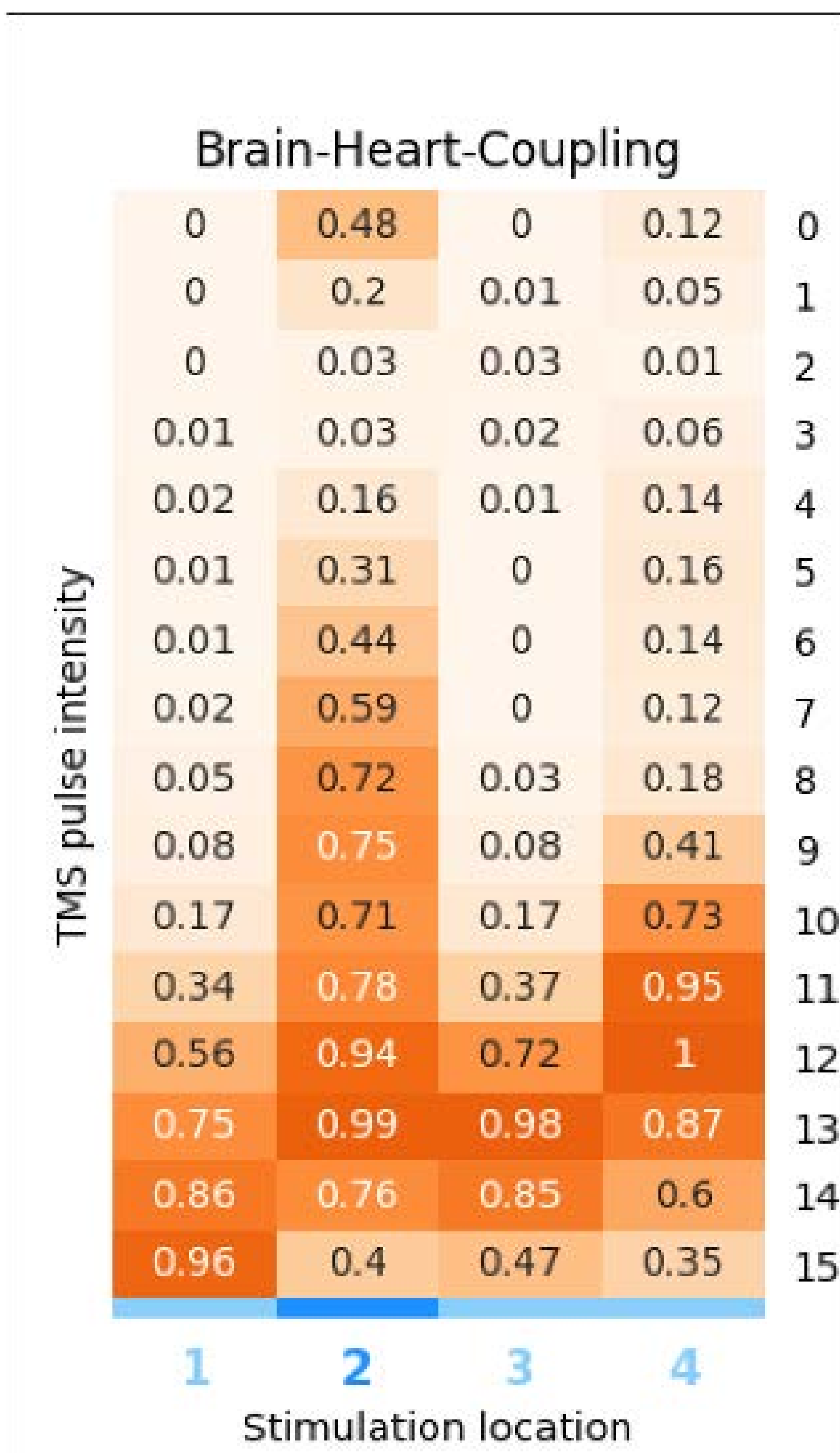

After completing all four measurements:

a. Press the "RESULTS" button.
   You'll see an overview of the results. Clicking "Export the results" will bring you to different options for sending the data.

b. Send the data by email to yourself (naming it, for example: "Institution"_"ID"_ HBC_"date")

The results page shows the amount of Heart-Brain-Coupling per location.

Location is identified as 1-4, where the first stimulation

location is number 1 (Beam left) etc.

The picture below shows the overview of heart-brain coupling for all intensities for the four sites.

Brain-Heart-Coupling

	1	2	3	4	
TMS pulse intensity	0	0.48	0	0.12	0
	0	0.2	0.01	0.05	1
	0	0.03	0.03	0.01	2
	0.01	0.03	0.02	0.06	3
	0.02	0.16	0.01	0.14	4
	0.01	0.31	0	0.16	5
	0.01	0.44	0	0.14	6
	0.02	0.59	0	0.12	7
	0.05	0.72	0.03	0.18	8
	0.08	0.75	0.08	0.41	9
	0.17	0.71	0.17	0.73	10
	0.34	0.78	0.37	0.95	11
	0.56	0.94	0.72	1	12
	0.75	0.99	0.98	0.87	13
	0.86	0.76	0.85	0.6	14
	0.96	0.4	0.47	0.35	15

Stimulation location

Download the app (latest version):
https://apps.apple.com/nl/app/heart-brain-connect/id1571191475?l=en

For more information, please visit:
https://brainclinics.com/heart-brain-connect/

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