

Handbook

for facilitators of Double Bubble

a BMI¹ participatory arrangement
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Introduction

Reading the following pages you will get a picture of what this participatory arrangement is about and how you, a prospective facilitator, can aid participants to find their way with it.

Double Bubble is an environment where one mind and two bodies become one. The mind is that of the participant as is the first body, the second body is of a robot that Double Bubble provides. During the interactive experiment in Double Bubble, that we call a “session”, the robot becomes an extension of the participant’s body. (We call those members of the public who enter the bubble and experiment ‘participants’ and who aid the experiment ‘facilitators’.)

The robot



Fernbot

This is one of our robots and we call it Fernbot because it has six legs with a fern planted on top. (Presenting the bare-bone version of Double Bubble, we always present Fernbot because while it is funny it does move very gracefully and it is our most versatile and developed one. For the other robots see: <http://db.c3.hu>)

Facilitators, we hope you will become one, introduce the environment to participants, by which, help to lower the relatively high threshold that such a technical environment with its machine interface has for the public.

Why we prefer facilitators to be female and in the midterm of pregnancy? Because: 1. It is widely accepted and customary for women to work as hostesses or stewardesses, etc. so it is easily understood. 2. Hormonally and mentally you are strongly tuned to your condition that means for example that you move carefully protecting your body. 3. Visually your bellies are not yet as pronounced so the undertone of humor remains that, an undertone. 4. Being in the midterm of pregnancy you are still able to work for shorter periods without over exhaustion. There will be breaks between sessions! And 5. Last but not least in you "the other's" presence is an undeniable bodily fact. In other words the 2 in 1 is a counter point to the 1 in 2, the later being one mind in two bodies.

Welcome on board!

The tent

Double Bubble has the protective environment of a tent, which is approximately 6,5 meters long, 5 meters wide 3,5 meters high and it is made out of transparent plastic. A ventilator constantly blows air into the tent creating roughly 1,15 bar atmospheric pressure, which is the tent's sole structural support. A combination of water filled valve and about 25 bags containing roughly 1 metric ton of sand placed around the base perimeters keep the air pressure at the required level and the tent from rising off the ground. The tent shelters participants from passer-bys and enables them to focus easier. Remember with us it is harmless to become 1 with the robot! In the bare-bone version we do not offer the protective tent we make do with local rooms and spaces.

The interface

Double Bubble supports a brain-machine interface that relies on Electroencephalography (from here on **EEG**²) measurements of the participant's

² The EEG measurements of the brain represent a summation of post-synaptic potentials from a large number of neurons (the electrically active brain cells). These are sometimes called *brainwaves*, though this use is discouraged,

brain activity. So participants need to be introduced to the **EEG** interface carefully, make them understand how this unfamiliar interface works and how they can be able to handle it. Its workings can be approached in a simple manner: All brain activity is electrical to the extent that it can be measured as such so in order to be able to manipulate something via an **EEG** interface one has to manipulate one's mental processes, their associative fields and objects. Not to mention that one has to keep it up for a length of time. It is crucial for us since the EEG measurements create the ground of the experiment. But more about this "task" later.

Sessions

Info phase, Tune-in phase, Interaction phase.

Info phase:

This phase starts with advertisements, invitations and/ or visiting the website <http://db.c3.hu>. On location the public can view several videos in the "foyer" area, which surrounds the tent or "playground" of Double Bubble.



The first video is called "Introduction" (<http://db.c3.hu/files/training.html>) it gives information on the full version Double Bubble. The second and third videos are "Neverland: Fernbot dancing" and "Neverland: Poisebot dancing"

because the brain does not broadcast electrical waves. EEG is a brain function test, but in clinical use it is a "gross correlate of brain activity".

(<http://db.c3.hu/files/neverland.html>) their function is to call attention to Double Bubble. The last short video is called Touchstone it presents one with the basics in attention architecture. (<http://db.c3.hu/files/training.html>)

Participation is possible by appointment only. Either it is arranged on location and ahead of time by contacting a colleague in the foyer or via sending an email. There will always be two facilitators 1 to take care of preliminary info and timetables and 1 to help the experiment.

Strictly speaking sessions consist of the following two phases “Tune-in” and “Interaction”. Usually a session lasts about 15 minutes. Between each session there is a 5–10 minutes break for you to relax.

When conducting sessions it is important to create a situation where participant can focus and where by-standers do not interfere. When working in the tent it is a matter of simply zipping up the entrance door. When working without the tent by-standers have to be dealt with in a way which allows them to get a sneak preview of what is going on yet it also makes them observe the participant’s need for focus on experimentation. The moment to ask by-standers to withdraw is at your discretion and up to the situation considering the space and the public present. Nevertheless do ask them politely and firmly to withdraw!

During Tune-in phase, one eases the participant into the interaction by describing the workings of the EEG environment and encourages trial runs. For technical details on the rest of the equipment such as IR camera, computers and robots see end footnote.¹

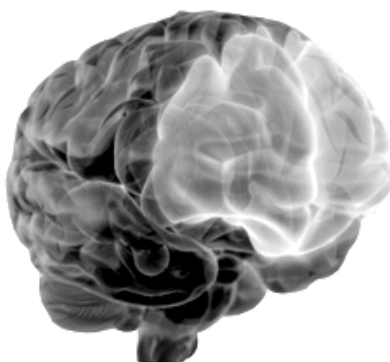
Here are a few things about the EEG measuring equipment, which is the tool by which Double Bubble interfaces the participant and the robot and what to do with it. To take EEG measurements, you place 4 electrodes on the participant’s forehead. 1 blue electrode goes on each side of the temple and 2 yellow ones go in the middle, above each other. The 5th red sensor, the ground, gets placed behind the participant’s right ear.

It is important to know that these electrodes or gel sensors are passive devices they are “read-only”. They do not “write”, meaning they are absolutely non-invasive. The sensors are connected to a small unit that does emit Bluetooth signals to forward the EEG measurements to the rest of DB just as a laptop does when it communicates for example with another laptop. You can rest assured about the harmlessness and safety of Bluetooth signals and answer all questions from nervous participants accordingly.



Sensor placement on forehead

As the placement of the sensors, on the picture above, already shows we concentrate on the prefrontal cortex (PC), which is located behind the forehead. PC has a high number of interconnections both between the brainstem's Reticular Activating System (RAS) and the limbic system. As a result, the centers in the PC depend significantly on high levels of alertness, and emotional linkages with deeper brain structures related to control, pleasure, pain, anger, rage, panic, aggression (fight-flight-freeze responses), and basic sexual responses. PC is also involved in conscious functions such as empathy, self-perception, and the ability to interact appropriately with others.



Prefrontal Cortex is the lighter area

Once the sensors are in place open a new file in Bioexplorer software running on the laptop. Bioexplorer has 3D visualizations divided into a left and right window to show sensor measurements of the left and right hemisphere these can be useful but keep the participants attention on how to manipulate their mental processes.

Already in the Tune-in phase the rule applies that no speculative or art questions need to be answered or rather your reply has to directly pull the focus away from interpretation and put it on the interaction at hand, on how it functions and on how to enter into it.

The task

The “task” - if it is a task - for participants is to manipulate their mental processes so as to vary their EEG readings connected to the robot. Since the interaction is based on a real time connection between the participant and the robot via EEG.

One of the easiest characteristics to learn to influence is the coherence between the brain activity of the right and left hemispheres. That is the grade of similarity of brain activity of the two hemispheres. The interface links robotic behavior to this in such a way that if there is a high degree of coherence and remains so for a while: the robot comes close and moves according to the participant’s slow alpha waves. If coherence is low: the robot distances itself from the participant and moves nervously to and fro. If coherence value is indecisive the robot moves midfield and its gait becomes very slow.

Your first step is to observe if the participant realises that those form the basis and second to see if they are “ready” to take the challenge and experiment. Observe their questions and watch out for what they pay most attention to.

The different approaches participants have to the task:

For some - who are familiar with meditation, be that esoteric or just their comfort with “daydreaming” - it will be perfectly self-evident how to get a grip on and alter their mental states. When you realize that you are “dealing” with such a person you can cut the Tune-in short and start the Interaction phase.

For others these processes might seem to be mystifying. You as a facilitator can help them by suggesting methods like not to “will” and try to stare the robot down and get fixated on that but rather to pick themes like counting sheep or arithmetic.

If you want refer to the “counting sheep” visualization, which is a “known aid” to fall asleep, you can use the frequently encountered hint:

Don't think of sheep as they jump over the fence! That is too full of commotion! Instead why not think of sheep, lots and lots of them, already asleep, quietly and breathing in a slow rhythm as you are evenly gliding past! 1,2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13...

Or when you see that more help is needed, tell a more gradual story to lead them

in:

On the green slope, do you see them sheep, in a distance? There they are! Can you see them? Grazing slowly? Approaching slowly! (Don't ask: How many? If participant's response is slow. If he/ she is not going along. Just continue!) See them reaching the foot of the slope? (Nibble, nibble.) The grass is juicy and green there! And there is just so much of grass on that slope! All the little blades of green, green grass.(Nibble, nibble.) Now the sheep stop there they settle! Now approach them just softly! Don't stop, don't be shy, (stop counting)! Is it springtime? Is there a little one? Yes there, it also is settling down... Easy does it! ...Next to a fern. Let it float off! No hurry, let it fall a sleep, but reach out gently, you can feel its soft white fur. See it snoozing it is by now. Feel the fur as it curls sweetly under your fingers!

Please note that the “sheep counting” story serves only as an example you can change it as long as you don't scare them sheep off! You are also welcome to make a new one up. But remember that help in this sense of you leading the way can only be given at the beginning of the Tune-in phase to encourage the participant to find out, remember, his/her own method of working their own mental processes. Latter especially during the Interaction phase you got to step back and let them go own their own.

FAQ (Frequently Asked Questions)

FAQ gives examples of question and answers we have encountered when presenting DB.

What is this tent for?

The tent is here to ensure a sheltering environment for your experiment.

Where is the tent?

We now concentrate on the barebones version to show the technical side of Double Bubble due to challenged financing. The tent stayed in storage.

Where are the other robots?

Due to challenged financing we only show the barebones version with Fernbot concentrating on presenting the technical side of Double Bubble. Blackboxbot and Poisebot send their greetings to all and hope to catch up with you later.

What is that camera hanging there for?

That camera is an infrared camera (IR) that surveilles the playground and serves as a sensor for location and collision control of the robot. (For more on this see end footnote.)

Why are you dressed as nurses?

Because it is a “you know it” kind of and non-demanding outfit.

Would you prefer bodybuilders instead? (Meaning another {maybe more “fun” tuned uniform} extension of body capabilities?)

Is this a medical experiment?

No the similarity is limited only, it goes as far as the outfits and the EEG part of the experiment is not about health rather about well being.

Don't you like playing telekinesis?

Don't you like your other-self running around?

Is this a scientific experiment?

What am I experimenting with?

Yourself! A robot!

Are you promising a new me then? Is Fernbot a new me that is nature sitting on top of technology?

We are sorry that challenges to financing limit your experiments from the outset would you like to at least look at the other 2 robots? Here you have pictures of them.

If I achieve coherence or control over the different hemispheres of my brain and remote control Fernbot do I get a cookie?

No, no cookies! Would you like a glass of water?

What does a successful experiment bring to me?

Let me quote/ show an email response of a previous participant, Tatjana Ganser:

Date: Fri, 28 Sep 2007 18:29:05 +0200

From: tatjana

To: rolland@c3.hu

Subject: IAP exhibition Double Bubble

Hallo Herr Pereszlenyi,

As promised my experiences. Thank you, to begin with. It was quite entertaining.

Following your suggestion, I have tried to think of themes with different moods. First, I thought I had mastered left and right movement (left- something funny, right – more romantic), however I was only able to achieve that twice. The third time I didn't get the reaction I was hoping for.

Then I recalled you talking about the harmony between left and right

hemispheres. After that, it was not a big deal to send the robot away or get it back close to me. When I was doing multiplications, he walked away. Poetry he liked more and walked back to me. :)

I have sent him app. 3 times to and fro after which I have tried to find something new. Unfortunately, I was not able to evoke strong characteristic responses. I wasn't able to become really sad, neither was I able to empty my mind.

As a sideline, I have noticed a few humorous little things. If I was reflecting on what poem I would like to read then the robot was making hectic little movements. For instance, he was circling around in one spot. And to get clear reactions it was helpful to speak my thoughts out loud. For instance to murmur the poem or math operation.

So that's about it. I cannot remember anything else in particular.

I wish you success and kind regards to the Little One. :)

Tatjana Ganser

What does an unsuccessful experiment bring to me?

Disappointment.

Is EEG a form of reading my thoughts?

Yes, in the sense that you use them and they use you, your brain. Where by the way are many a things happening.

Do the sensors influence my brain?

No the sensors are completely passive. There is absolutely no emission from the sensors.

Does this experiment/ measurement have any dangerous effects/ consequences?

In a medical or physical sense there is no danger, none. In the sense you make of it, it has all the dangers you can associate with thinking.

Do you sense art here?

No interpretations before and during participation. Stop "wagging your pinky" let the idyll take hold!

What is the art?

No interpretations before or during participation. Stop "wagging your pinky" let the idyll take hold!

Why do you work when being pregnant?

Does being pregnant mean disabled?

What happens with the results of measurements?

We store them for the purpose of enhancing Double Bubble. But we take care that no one else will have access to them.

How can I acquire results for myself?

We can give them to you on a CD but you would only be able to access the files if you purchased a program called Bioexplorer.

Why is that fern riding on a 6-legged robot?

The fern has been put there because it moves graciously. But don't worry no ferns were harmed in making Double Bubble. The six-legged robot was chosen because of its agility...

How am I connected to the robot?

Technically speaking: via Bluetooth.

Can I make Fernbot to come to me?

Can I make Fernbot to go away from me?

As some participants said:

...the harmony between left and right hemispheres. After that, it was not a big deal to send the robot away or get it back close to me. When I was doing multiplications, he walked away. Poetry he liked more and walked back to me. :)

...

Interaction phase

You can start this phase when you see that the participant is getting familiar enough with the environment has already gotten an idea of how it works. Remember some people need a gentle push to start on their own but never rush the process.

Select the robot the participant has chosen to experiment with on the screen and start it. In this phase you should figuratively speaking withdraw as much as possible from the playground, you can also literally change place and maybe posture. For example you may move a bit to the side with very nervous people you might want to stay a bit closer but don't hold their hand! In any case do not turn away!

Let them submerge in their brainwaves. Unless, the participant falls a sleep in which case you better wake them up, after about 10 minutes the robot will sit down to signal the end of session.

At this point you save the EEG session file, remove the sensors and offer wet tissues to participants to wipe off any residue from sensors on their forehead.

Thank them for their participation and say See you again! As you let them out.

i

Double Bubble's system machinery consists of 2 computers: a laptop and a desktop one, an infrared camera (IR), a set of sensor connected to a Bluetooth unit and the robot.

The software that you have to operate during sessions runs on a laptop. It is fairly simple and requires only a minute to get to know and operate it.

Behind it are other software packages that you won't have to touch. We have developed a vvvv software background to analyse the EEG measurements and feed the results to the robot driver software package (also developed by us). The robot driver software package functions both as position and servo control. Position control relies on an IR camera that observes the whereabouts of the 3 IR LEDs on each robot. With the exception of the coax cable connecting the IR camera to the desktop computer and the IR signals from the robot to camera, communication within the Bubble is wireless along Bluetooth channels.

About robotic movement in Double Bubble

For each robot predefined posture and gait sets get activated as the ongoing measurements match certain EEG criteria. The initial set of a session becomes modified in real time by any or all of the following: changing set, adjusting direction, altering pace and adapting height in the case of legged ones while adapting swivel frequency in case of the wheeled one. The surveillance part of the robotics software watches the playground with an IR camera and corrects the robot's path. 1. To avoid collision with the playground's borders when coming close to the boundary the robot's path is corrected gradually to parallel the borderline or to bounce back straight if the predicted angle of collision were close to 90 degrees. 2. The software corrects divergence from the expected path caused by either the mechanical and motoric limitation of the robot or by the influences of the playground surface.