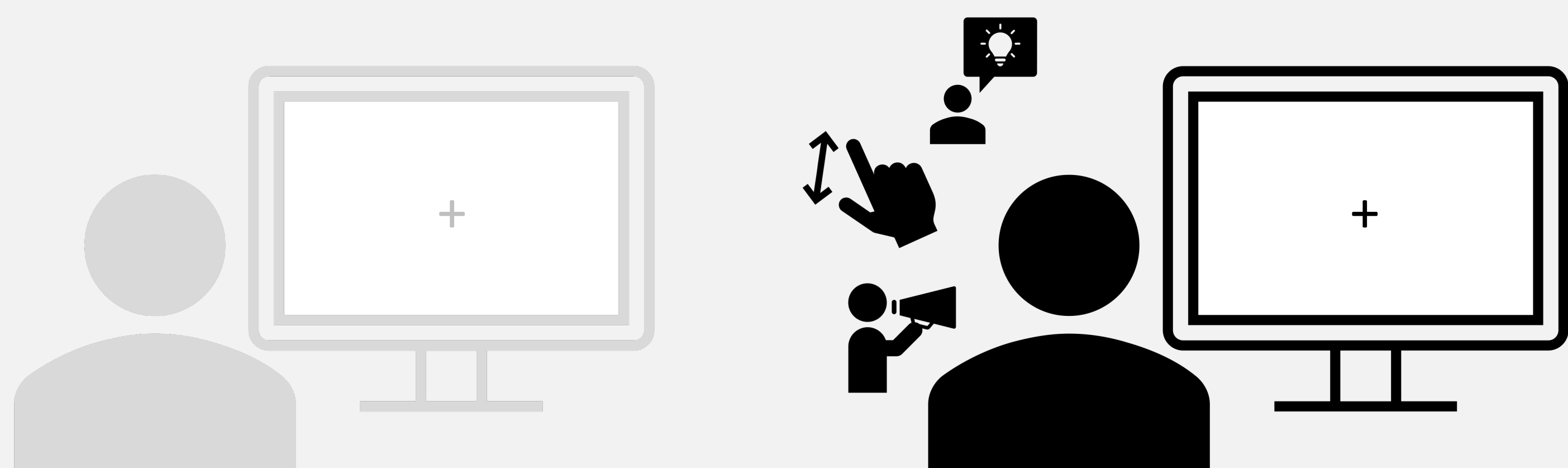


MARCIN
KOCULAK

MICHAŁ
WIERZCHOŃ

CONSCIOUSNESS SCIENCE NEEDS SOME REST

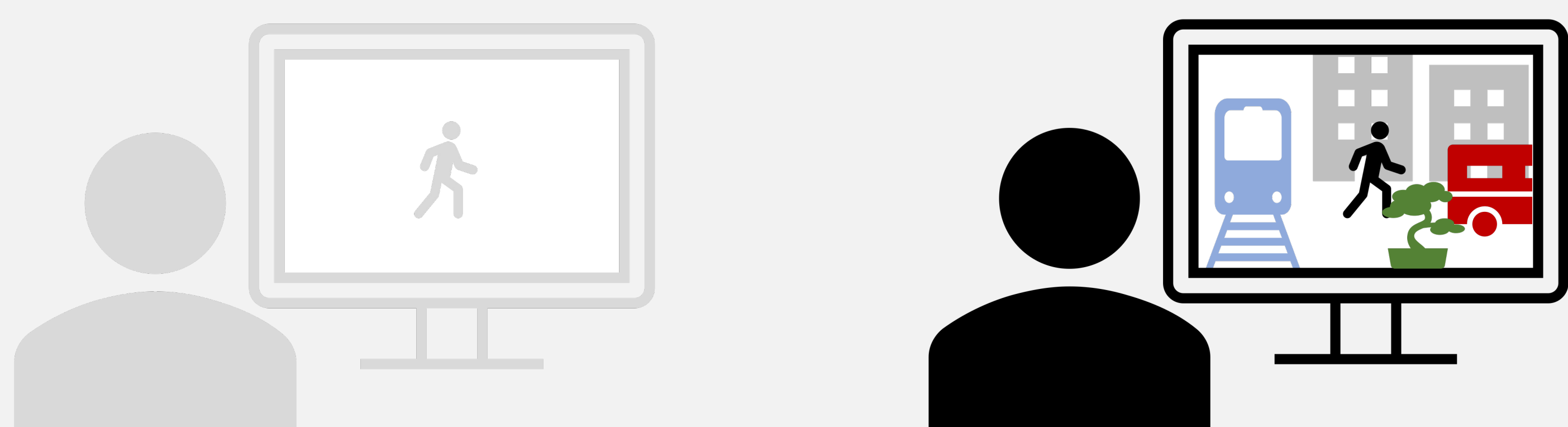
RESTING ≠ NO REPORT



GOING FROM NO INFORMATION

TO EXPERIENCE SAMPLING

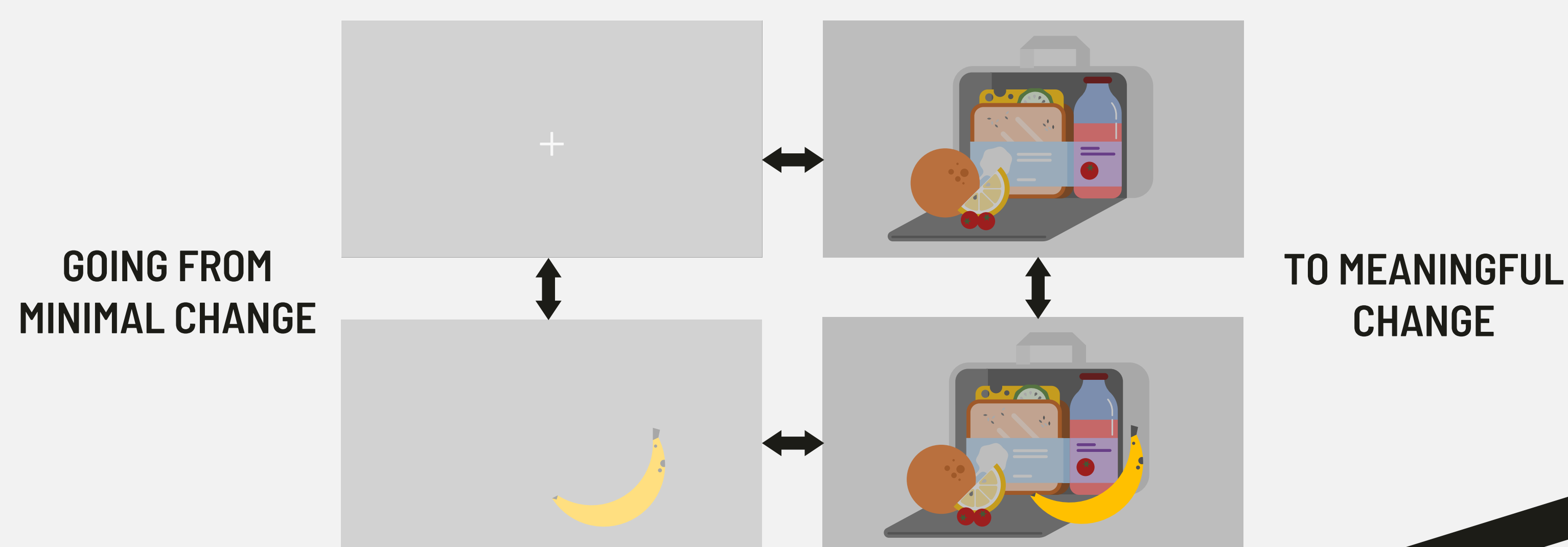
RESTING ≠ DEPRIVATION



GOING FROM NO STIMULATION

TO NATURALISTIC SETTING

RESTING = CONSCIOUS BACKGROUND



GOING FROM
MINIMAL CHANGE

TO MEANINGFUL
CHANGE

This part is based on our recent paper under the same name as this poster.

You can find it [HERE](#)

RESTING STATE ACTIVITY IS CRUCIAL BUT OVERLOOKED

- Treating no-task activity as **baseline for cognition**, while rich inner conscious activity is present at all time – we still know very little about the non-evoked conscious content; experience sampling can shed some light on it and allow for more informed analyses. Additionally, it can give us insight into more structural aspects of consciousness like the neural underpinnings of integration and apparent unity of experience.
- Running it in **artificial conditions of minimal stimulation**, while **not controlling** for internal variability – no-task activity is happening to everyone multiple times every day, yet very rarely we find ourselves in an isolated environment with no stimulation. Since we know that external and internal activity influences each other, recording internal with deprivation of the external can potentially introduce unnecessary confounds on top of the problem of studying neural correlates of taking part in an experiment (see the experimenter effect mentioned in the paper).
- Background conscious** activity is treated as **unconscious baseline** for task although makes up for most of awareness – it is common to label a condition unconscious, but only in respect to manipulated stimulus. Yet, the recorded signal contains correlates of conscious perception of all the other things present (the mask, glow of the screen, room the person is in). Without accounting for it, we do not know to what extent and how the background conscious content interacts and influences neural correlates of the stimulation in question.

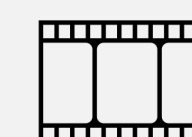
RECORDING IMPROVED RESTING DATA CAN HELP

- Employing some form of **experience sampling** can allow for **control** over **conscious content**, but also reveals moments of **mind wandering** or **blanking** – the most popular solution is either experience probing during the recording (typical for fMRI studies) or have the person report their thought after (e.g., Amsterdam Resting State Questionnaire – ARSQ2), but hopefully some new methods will emerge. This can allow for more fine-grained analyses, since you can couple the recorded activity with reported mental content.
- Introducing more **naturalistic, complex stimulation** can bring us closer to recording brain processes it evolved to perform – the way it was conceptualized in the second part of this poster, naturalistic stimulation is more of a continuum, where on one end you have stimuli deprivation, but then you can have real-life stimulation (video condition that simulates looking out of the window to the outside), stimulation mimicking natural perception (walk condition, where the video material is recorded while moving from a human-like perspective; a step further would include VR goggles, where the participant could look around while moving their head) to recording of neural activity outside of the lab completely (with mobile sets).
- Resting activity reflects **background conscious awareness**, so treating it as one of the experimental conditions could **improve inference** about **neural correlates** of conscious perception of **focal content** – typical contrastive analysis could be extended through addition of no-task condition that would allow for separation of neural correlates of non-task conscious content. It would also allow for more complex designs, where not only the visibility of one stimulus is manipulated, but also the background content and its interaction with the stimulus.

EEG + ECG + ARSQ



SHORT MOVIES



C-REST DATABASE

Collected simultaneously with task experiments for several years.

This data is now being organized, cleaned, and will hopefully be published and made publicly available this year.

Database includes more than **1500 individual recordings** from around **500 participants**.

Most were tested multiple times with different variants of resting procedure.

64-channel EEG, single channel **ECG** (2048Hz sampling, BioSemi system)

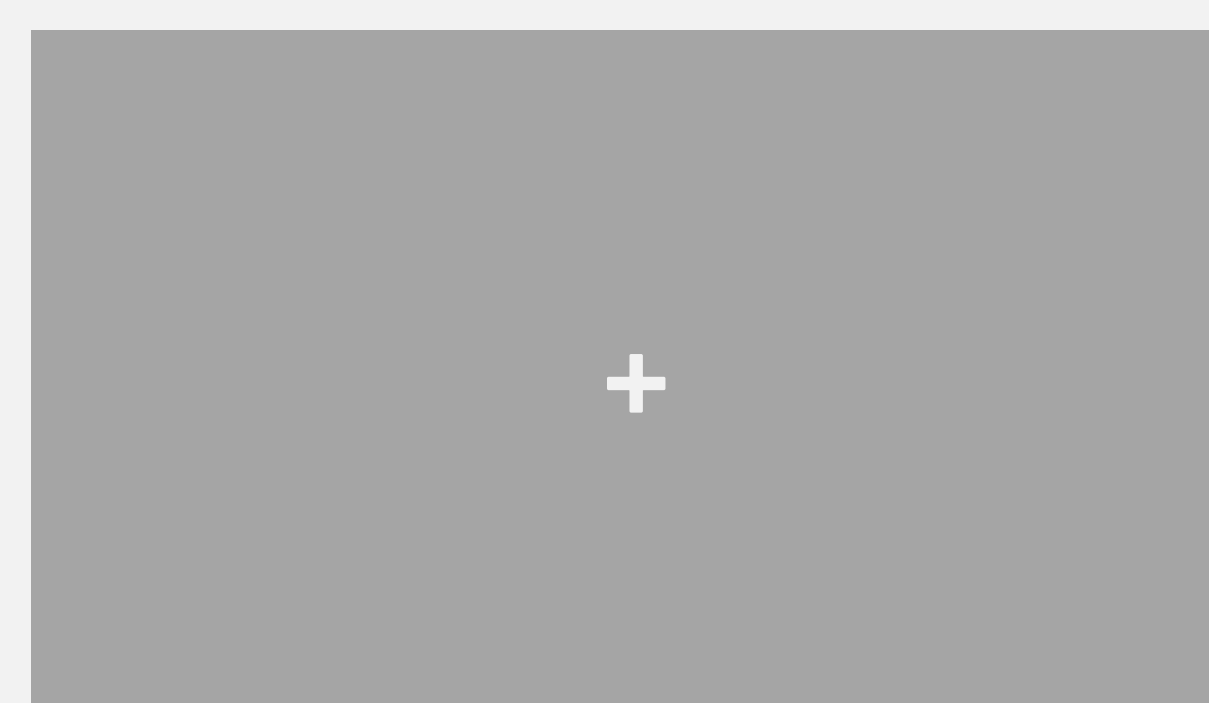
Electrode digitalization with a 3D scanner (we used Structure sensor with an iPad)

MRI T1 scans available (for the COST participants – info below)

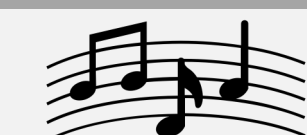
ARSQ2 questionnaire after each recording

The main design principle was to collect more naturalistic resting data with variable level of stimulation “complexity” – so from left to right you can see deprivation, followed by stimulation in one modality and multimodal material.

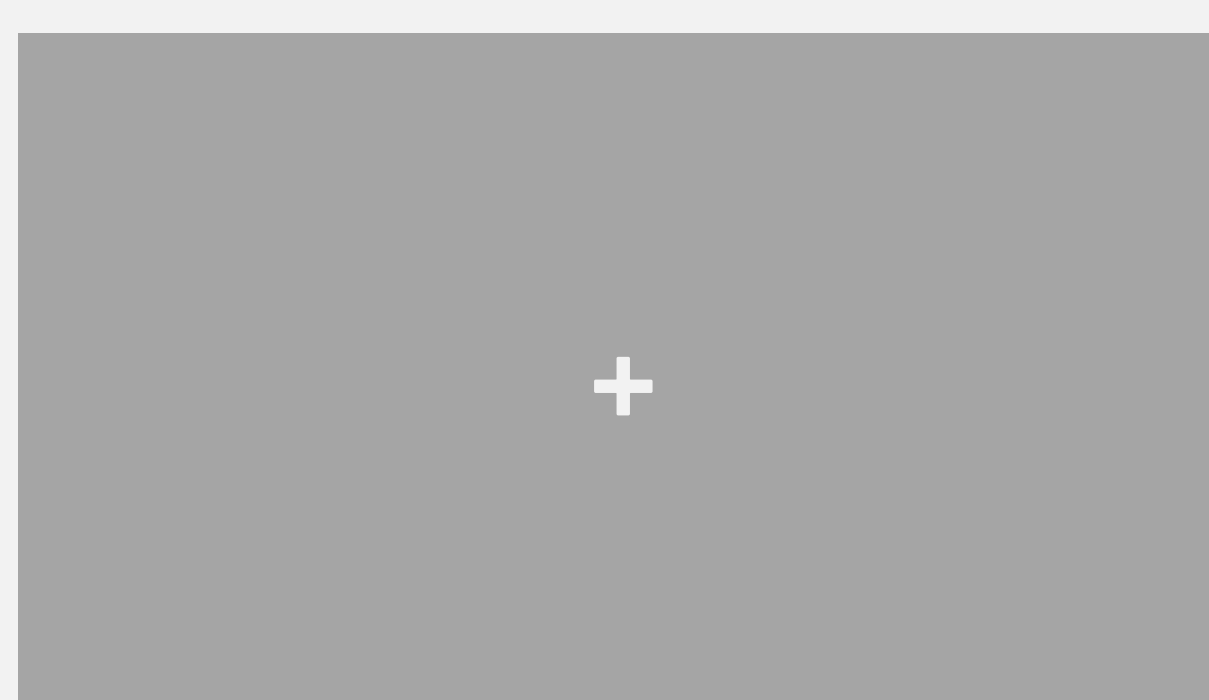
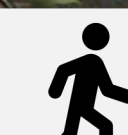
From bottom to top there is an increase in “meaningfulness”, where music has more structure than static visual stimulation; stationary video is just like looking out a window, walk has also motion information combined with pedestrian-like perspective, while short stories includes some form of plot, making the temporal order of events more meaningful than just looking outside.



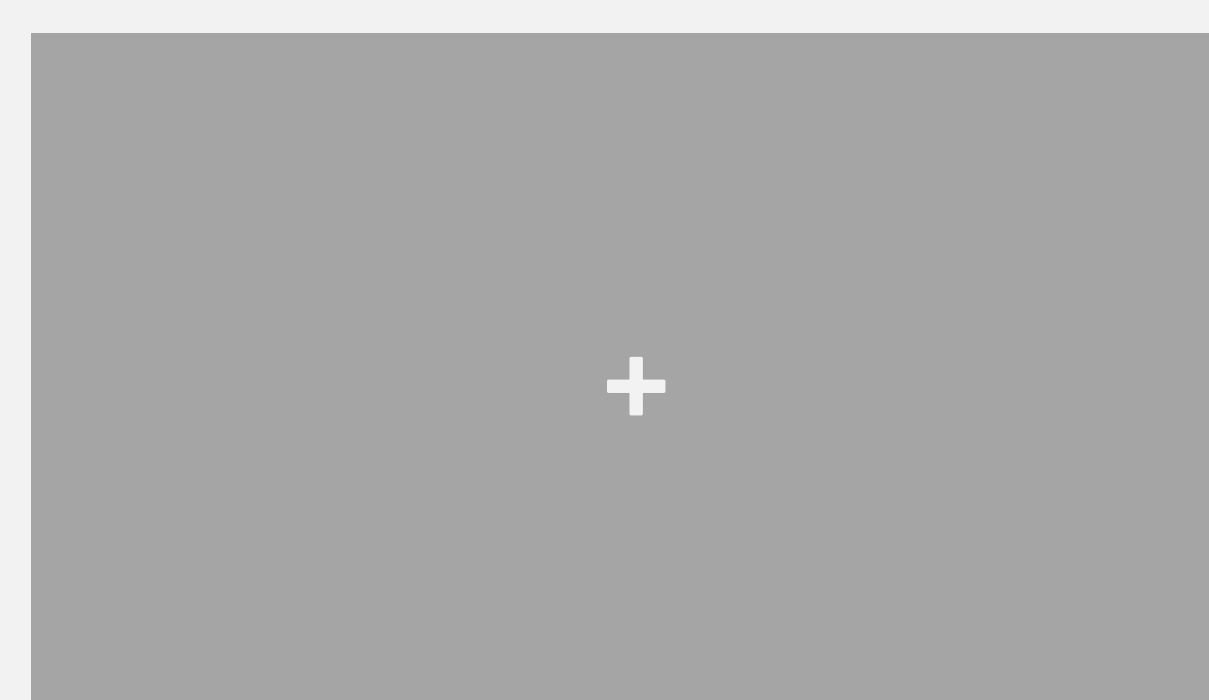
MUSIC



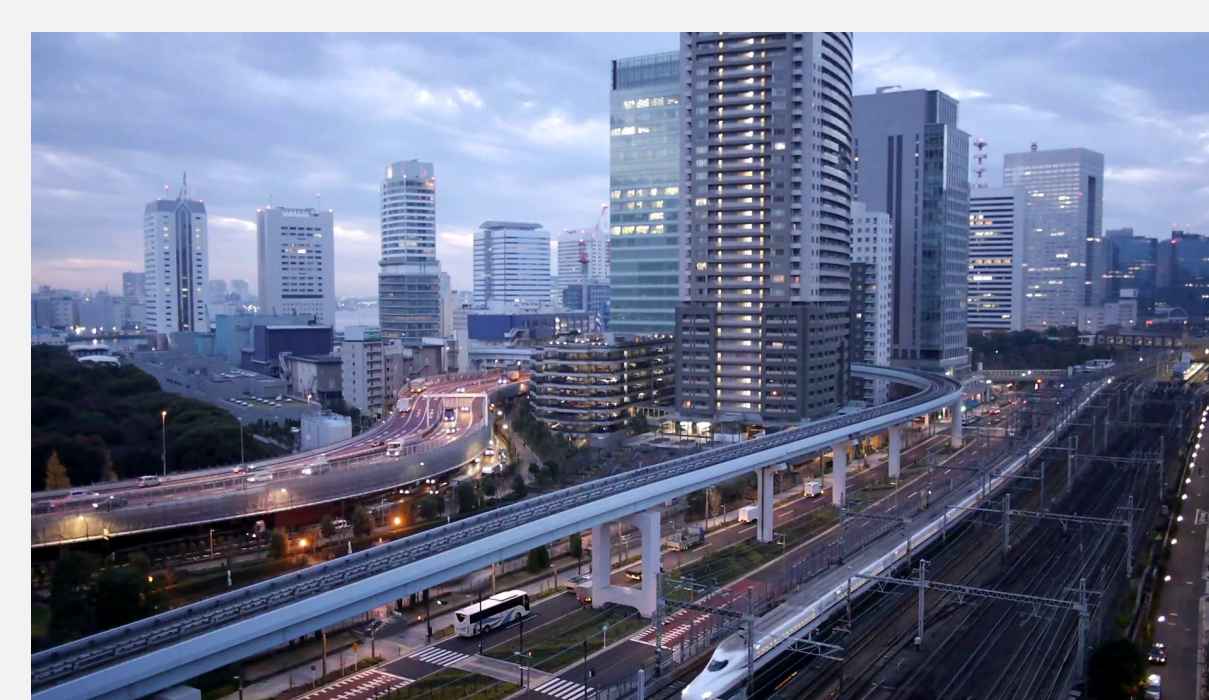
WALK



EYES CLOSED



EYES OPENED



STATIONARY VIDEO



We feel there is much more that can be done with resting state paradigm!

The dataset will be open to everyone soon, but **if You do not like waiting, feel free to contact us.** ☺

We are also open to collaboration with regards to our data but also your data/projects.

It would be great to share our insights from this massive project.

Maybe **You are planning to collect resting state data** in your project and would like it to comparable with our data or you have an idea how to expand the available conditions?

We can share with You **our procedures and relevant Python code** or assist You in writing Your own to work similarly.

CONTACT

You can reach us through e-mail:

Marcin – marcin.koculak@doctoral.uj.edu.pl

Michał – michal.wierzchon@uj.edu.pl

You can also visit the website of our lab – **c-lab.pl**

Parts of this project were done in collaboration with COST project **The neural architecture of consciousness** led by dr Kristian Sandberg see the website for more info – neuralarchcon.org

