

Analogue clock as tool to investigate perception of complex visual information

Principal Investigator: dr Marek A. Pędziwiatr

What time is it? For many people, answering this question involves looking at a clock (or a watch) – often an analogue clock with a dial and hands. Reading the time shown by such a clock seems easy, but at the level of the brain, it requires a complicated operation: translating complex visual information into the abstract mental representation of the current time. The ability to perform this operation is often considered ubiquitous. Public spaces (e.g. train stations) are designed with the assumption that their users are fluent ‘clock readers’ and feature clocks in clearly visible places. What is more, tasks that test the ability to use an analogue clock are among the psychological tools used to diagnose neurodegenerative diseases (e.g. Alzheimer’s disease) that currently pose a significant civilisational challenge. Despite the multitude of contexts in which it appears, ‘clock reading’ has not yet become an object of interest for scientists studying the human visual system. My project will fill this gap – I will conduct a series of experiments with human participants that will allow me to characterise this activity from the perspective of contemporary (neuro)science.

The first aim of the project is to develop methods for studying clock reading and to compare eye movements during this task between people who are proficient in it and those who are not. This comparison will allow me to determine how similar ‘clock reading’ is to other tasks commonly used in vision research.

The project's second goal is to thoroughly characterise the processes that occur in the brain during clock reading. In particular, I will focus on their similarity to the processes underlying other activities that require extracting abstract content from complex visual information: face recognition and text reading. I will test which of these activities is more similar to reading the time from an analogue clock at the brain level. For this purpose, I will use two brain imaging techniques: electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). Their combination will allow me to examine the aforementioned similarity between the processes in terms of their course over time and the brain structures involved. My research will, therefore, deepen the understanding of brain mechanisms responsible for processing complex visual information that are at play in many different visual tasks.

The third goal of my project is to use experimental methods developed for laboratory studies to examine the level of competence in reading the time from an analogue clock in a large group representative of the Polish population. I hypothesise that this skill is gradually disappearing, especially among young people, who often rely on displays indicating the time using only digits (e.g. smartphones). In this way, I intend to capture possible societal changes that may lead to revising the assumption that clock reading is a commonly possessed skill.

Achieving these three goals will allow for a better understanding of the functioning of the human visual system, will result in the development of new methods for studying it (psychological tasks related to reading time from an analogue clock) and – potentially – will provide evidence that the methods of designing public spaces and diagnosing neurodegenerative diseases need to be improved to adapt to the changes caused by technological progress.