According to the goal-oriented approach to cognition, all organisms essentially aim at maintaining homeostasis (appropriate level of the most important physiological parameters – e.g. blood sugar level), since homeostasis is directly related to survival. In this view, higher-order cognitive processes and perception evolved to render homeostasis regulation processes (allostasis) more efficient. The essential function of perception is to guide behavior rather than to reflect the image of the world. It is not important whether the conscious percept corresponds with "how the world really looks like" – perception works when guided behavior is effective. The image of the world may be distorted, if it helps in acquisition of food or avoidance of threat.

But how does the cognitive system know its ways to influence perception, so it can be most effective in guiding behavior recovering or securing homeostasis? The goal of our project is to examine the hypothesis that associations between external events and their interoceptive consequences are responsible for this effect. Objects and their features may be linked to their physiological repercussions, both on shorter timescales – what is the immediate physiological reaction to the stimulus – and longer timescales – what are the long-term homeostatic consequences of interaction with a given object. For example, the view of the burger on a plate may be associated with blood sugar level increases in the future. Development of models of associations between external and internal events is an efficient way to secure long-term homeostasis, since homeostatic effects of allostatic actions are delayed (e.g. blood sugar level will increase 30 minutes after having a burger). These models allow anticipation of homeostatic needs and selection of a proper sequence of actions to be performed to either secure or recover homeostatic parameter levels.

To test our hypothesis, we will use classic conditioning paradigm to associate neutral visual stimuli with fear and disgust. Then, we will present these stimuli in dichoptic stimulation condition – one eye will be viewing a stimulus associated with fear or disgust, and the other eye will be viewing a "mask"; flashing image hindering conscious perception of the target stimulus. We expect that stimuli associated with threat will be detected faster than neutral stimuli and those associated with disgust – slower. Early detection of object threatening homeostatic equilibrium (e.g. object that may cause serious damage to the body) allows immediate regulatory behavior – avoidance of contact. Disgust motivates avoidance behavior as well, but in a different fashion – it motivates to maintain distance, since only the direct contact pose a serious threat to homeostasis (e.g. infection, poisoning). Suppression is therefore a regulatory mechanism, as it prevents unpleasant physiological reactions association with indirect contact with a disgusting object. In our project, we will also examine whether strength of a physiological response (skin conductance response) can be a predictor of detection times.

In the second study, we will test our hypothesis directly – using conditioning, we will associate neutral stimuli with physiological reactions underying fearful response. Such reactions may be elicited by short exposure to CO_2-enriched air. If our hypothesis is true, development of such associations should result in shorter detection times of conditioned stimuli in comparison with neutral stimuli.

The main goal of our project is to understand how perception works and whether the image of the world may be different for different people – depending on what internal meaning is ascribed to particular objects and events. However, the project may also form a basis for development of techniques or trainings, e.g. for people suffering from phobias.