Ecological psychology and enactivism in research practice:
theoretical and empirical analysis of bionic systems for laryngectomees

What can we learn about the basic principles of such a complex phenomenon as human communication by examining laryngectomees who, as a result of salvage cancer treatment, have been deprived of the larynx, the key organ responsible for the production of voiced speech? The study of human cognition, including language-mediated cognition, is often based on an in-depth analysis of specific cases of function impairment. For example, much of our scientific knowledge of the human brain comes from studying damage to this vital organ, and we would not even know that phantom pain exists, were it not for first-person reports of people who lost their limbs.

Within this project, we plan a detailed analysis of the interactions of people without a larynx in order to learn more about the nature of human communication. We are particularly interested in the concept of agency in interactions, namely: how the loss of the larynx and the use of alternative communication methods, including those based on artificial intelligence, affect the perceived possibility to actively influence the environment. We plan to involve several people after laryngeal amputation, who, together with us, will analyse their everyday communication situations that are important to them, as well as test the latest systems that restore the ability to speak and engagement in social interactions.

The approach to the problem and the methods of its research are based on two theories from the cognitive sciences: enactivism and ecological psychology. The latest achievements of the former indicate that socially engaged science should draw directly from the experience of individuals, integrate the perspective of the researcher and the research object (or in the case of social sciences: research participant), in an engaged way, and not just detached observation. In this way, real values realized within interactions can be uncovered, which is, in turn, emphasized by ecological psychology. Both theories are guided by a motto of how to approach the study of human cognition, "don't ask what's inside your head, but what's your head inside of". Our goal is to integrate these theories into research practice.

The research scheme is based on engaged field methods. The researchers will be respecting participants as research team members and together with them will choose such communication situations that 1) are important to them, 2) still pose a communication problem after the surgery, 3) which the participants, would like to investigate. We assume that the selected situations may result in numerous disturbances in the realized values, i.e. perturbations of the entire communication system. We will analyse those interactions together with the laryngectomees in participatory workshops. In addition, we will offer them a device based on artificial intelligence, which, after a period of testing, will also be jointly assessed. Thanks to this, we will find out how the sense of agency in interaction is shaped by a given communication system, including the person and the device.

On the other hand, we need to look at the interactions as closely as possible, so we plan to use cameras, eye-tracking glasses and binaural recording microphones (located at the ears). These devices will be used by all participants in interactions, providing a recording of the first, second and third-person perspectives. This method of data collection, apart from the undoubted quality of such recordings for the process of drawing conclusions about the interaction, allows for a more objective description and assessment of interactions in a systemic approach. Moreover, it allows people watching the interaction to “step into the shoes” of the laryngectomee and their interlocutors. It turns out that by putting together recordings of movement and utterances, we can draw some conclusions about the entire communicating system, instead of limiting ourselves to analyzing individuals only.

The possibility of examining specific communication situations allows the introduction of ecological psychology and enactivism into research practice, which may be beneficial for those theories themselves, but also for the study of bionic systems from a novel perspective. Recording the situation so precisely will allow us to integrate our interactive approach with more traditional research theories which focused solely on the analysis of the voice of the laryngectomee. Moreover, it may result in the development of guidelines for the examination of laryngectomy and speech restoration systems from a systemic perspective, taking into account the values, multi-aspect and individuality of each communication situation and each laryngectomee.