



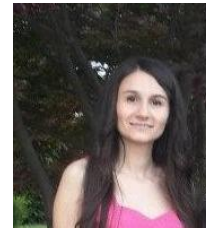
ANALYSIS OF ULTRASONIC COMMUNICATION IN A MOUSE MODEL OF NEURODEVELOPMENTAL DISORDERS

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Background

Mice emit ultrasonic vocalizations (USVs) under different social conditions: pups separated from the mother, juveniles in social play and adults during courtship and social investigation. Mice ultrasonic communication analysis has become an important tool for behavioral readout and monitoring. Altered calling patterns are detected in different mouse models of neurodevelopmental disorders.

Objectives

In the first part of my PhD project, the goal is to perform a quantitative and qualitative analysis of ultrasonic vocalizations in a mouse model of neurodevelopmental disorders with a manual method. In the second part, the aim is an automated detection and classification of ultrasonic vocalizations.

Methodologies

USVs of control and p50 KO pups (a mouse model of neurodevelopmental disorders) were recorded using an ultrasound sensitive microphone and quantitatively analyzed by Avisoft software. Each call was categorized manually based on spectral features.

In addition, for automated detection of USVs, the segmentation of the recorded audio track was performed. A graphical interface was created in order to allow the user to segment an audio track automatically and to classify each segment by manually selecting a label. This interface had been used to generate the ground truth dataset useful as a starting point for the classification of the vocalizations.

Expected Results and Impact

Concerning manual analysis, the results showed quantitative and qualitative alterations in ultrasonic communication of p50 KO pups. Indeed, a significant increase in both number and duration of USVs in p50 KO pups was found. Also a significant increase in frequency and duration of some type of calls in p50 KO pups was detected. These results were common to other mouse model of developmental disorders but little is known about their meaning. It could be very interesting to better understand the meaning and/or function of altered pattern of calling of mouse model of neurodevelopmental disorders.

Concerning automated analysis, the evaluation of the goodness of the segmentation was performed by computing values, such as precision and recall, on the comparison between the time windows obtained from the proposed segmentation and the ones in the ground truth. The goal was to get the highest precision and recall values. The values of recall and precision obtained were good.

The next step will be to automatically classify the segmented vocalizations using dataset to train the software (machine learning).