**Intro**

Current clinical diagnoses of social anxiety are largely based on self-reports either in the form of questionnaires or patients’ describing their symptoms to clinicians (Osório, 2012). However, this assessment method has down sides, such as the self-report bias, that impair its' validity and reliability (Gustavson, 1997; Mortel, 2008; Stone, Greenberg, Kennedy-Moore, & Newman, 1991).

Therefor the field of psycho-diagnosis could substantially gain from more objective and reliable indices for different pathologies.

Clinical psychopathology has struggled to come up with biological and behavioral markers that are reliable and valid, to diagnose social anxiety (Glass & Furlong, 1990).

Here, we applied machine learning principles to this objective, creating a model on reliable eye-tracking data in relation to social anxiety. Specifically, we extracted a classifier and tested its generalizability.

Social anxiety disorder (SAD) is characterized by an enhanced fear of social situations, that at time might lead to avoidance of such situations. This disorder may also cause distress and impaired functioning (Hidalgo, Barnett, & Davidson, 2001; Moutier & Stein, 1999)

Missing REF from DSM V

In the literature there are various assessment tools for diagnosing SAD, most of them are either self-report inventories (), such as the popular LSAS scale which tests the fear and avoidance of various social situations (G. HEIMBERG et al., 1999) and is the most commonly used in clinical assays ().

These is also a clinician interview assessment tool, named, Structured Clinical Interview for DSM-IV (SCID) is one of the most widely used diagnostic interviews.

Is this paper good enough?

First MB, Spitzer RL, Williams JBW, Gibbon M. Structured Clinical Interview for DSM-IV (SCID)Washington, D.C: American Psychiatric Association; 1997

Threat-related attention bias is present in social anxiety disorder (Pergamin-Hight, Naim, Bakermans-Kranenburg, Van Ijzendoorn, & Bar-Haim, 2014) and has been a target for interventions (Lazarov & Pine, n.d.; Pergamin-Hight et al., 2014). attention bias reflects a tendency to shift attention more easily towards threats, and difficulties in disengaging attention once captured by threats. for example, attention bias project itself in reaction time tasks, where it found that the reaction time on threatening stimuli is shorter than on neutral stimuli.

This attention bias has been captured using multiple paradigms, including eye-tracking (Fernandes et al., 2018; Mogg, Philippot, & Bradley, 2004).

These studies have shown that highly socially anxious participants had a stronger attention bias towards threat, expressed as longer dwell time on threatening faces, compared to participants with low SAD symptoms (Lazarov, Abend, & Bar-Haim, 2016).

These studies used a theory-driven approach to predict social anxiety from eye-tracking data. However, data collected by eye-tracker are rather complex, and using theory-driven approach could cause ignoring useful patterns that are irrelevant to the assumed theory. Using data-driven approach could exploit these data that were ignored before and thus might theoretically increase the predictive power.

In addition, the attempts made so far to predict SAD were at the group level, and few studies examined objective predictors at the individual level. (Buckner, Maner, & Schmidt, 2010; Chen, Clarke, Macleod, & Guastella, 2012)

It is reasonable to assume that one of the reasons for this situation is that it is a hard task to distinguish signal from noise because there are many factors that affect eye movements such as physiological factors

(arousal…citations) not finding

and characteristics of the stimuli such as their salience . Thus, a data-driven model could be a better candidate to predict SAD at the individual level.

The computerized learning models, giving a rise to more complex representation of the data, that are best fitting the observed samples.

The use of machine learning approach to predict symptoms in other disorders is scarce but seems to hold promise

## **Cross-trial prediction of treatment outcome in depression: a machine learning approach**

In machine learning processes, the algorithm builds models of the data using tunable inner parameters of the function to fit the data in an optimal way. After fitting, these models can be used to predict new data. In this paper we are using supervised learning, that is, the algorithm is presented with the label, or desired solution of the data (in our case, the label is the social anxiety group).

The aim of the current study was to develop a classifier for social anxiety disorder that relies on eye tracking data. This classifier was designed to label participants as high or low on social anxiety symptom severity based on their eye-tracking data in a free viewing task. The classifier was built by supervised learning on a training set and was further tested on an additional distinct test set of participants. We postulated that using these data we could create a classifier that could predict social anxiety above chance level.