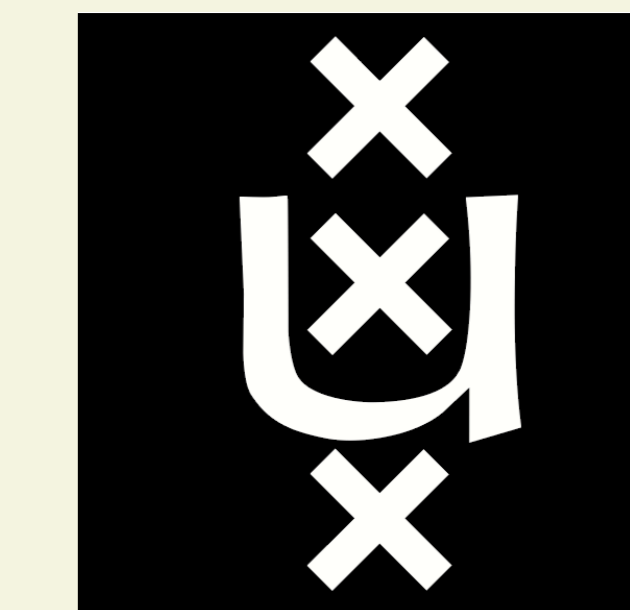


# To Be Or Not To Be (Depressed)?

## Assessing the Risk for the Development of Depression



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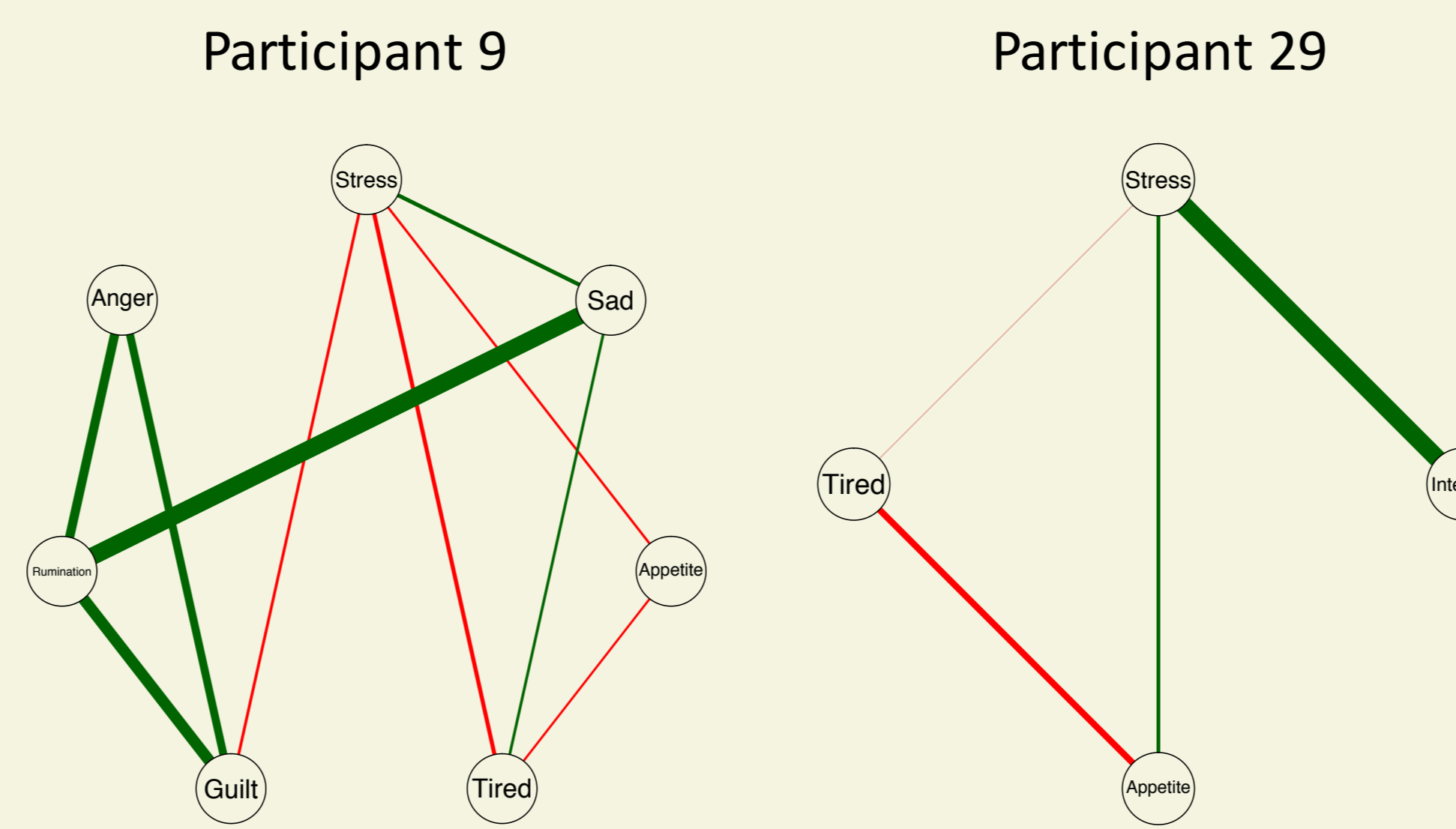
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### Introduction

Symptom interactions are key to any psychological disorder. These interactions can be represented by networks, which in turn can describe the interactions between symptoms. One of the many challenges of using networks is that such a complex and multivariate system is not easy to use for risk assessment; if a network has many variables and interactions, it becomes far from trivial to determine which configurations lead to healthy or pathological behaviour. Here, we show for two individuals how their risk to develop a depression is assessed.

### Figure 1: Networks



### Assessment Procedure

The assessment procedure starts with estimating the networks for each participant using IsingFit (Figure 1). Then, the number of active symptoms is determined for each time point (Figure 2), after which we use Maximum Likelihood Estimation to optimize the person-specific probability  $p$  in the model. We then use these parameters to create a bifurcation diagram (Figure 3), which we compare to the person-specific parameter (red line). In the area where two prongs emerge, an increased risk for sudden mood shifts exists.

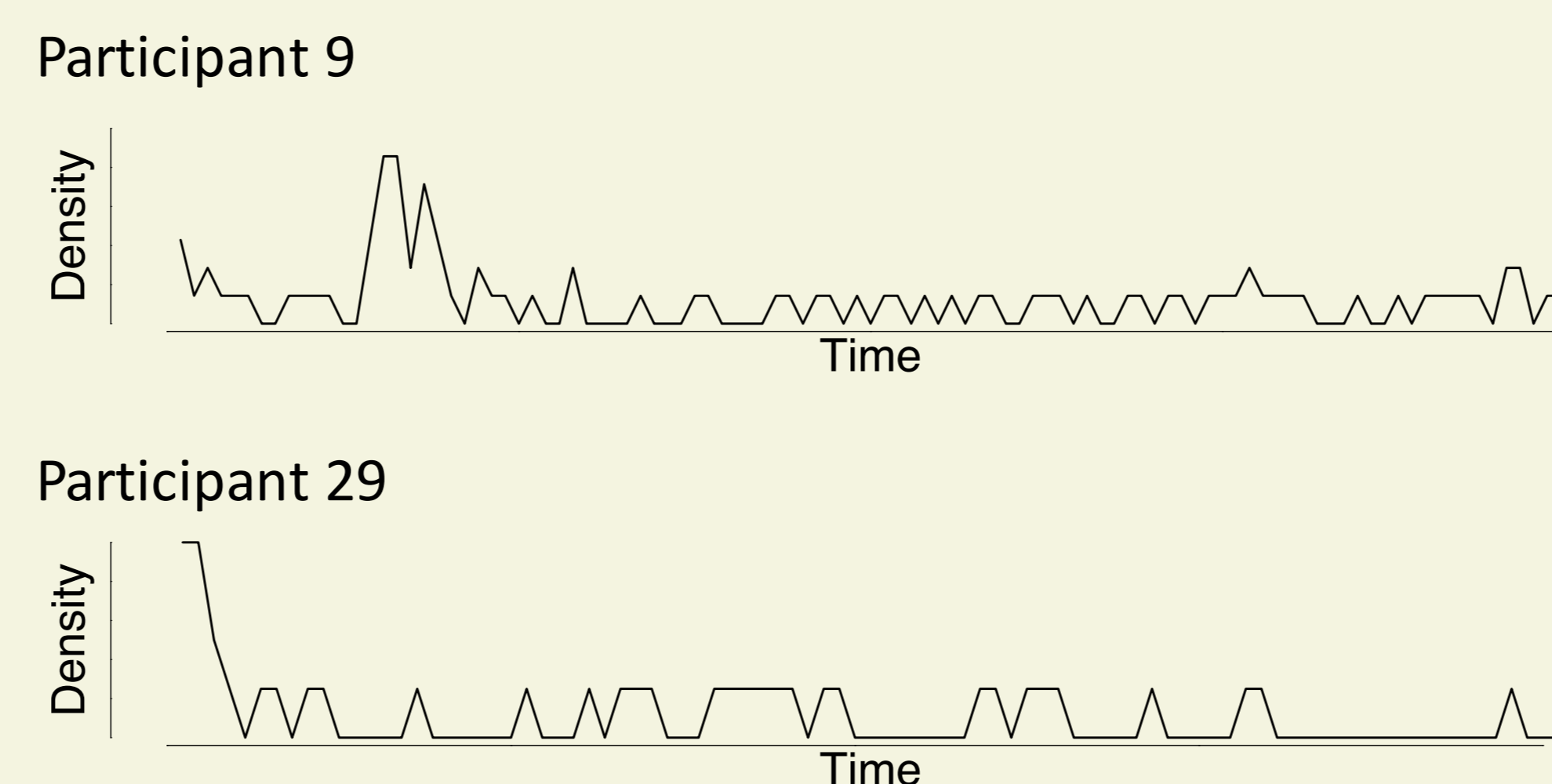
### Participants

17 individuals participated in a bachelor research project either voluntarily or for research credit.

Participant 9 is a 55-year old female who completed 99 measurements in 15 days (mean = 6.60).

Participant 29 is a 26-year old male who completed 90 measurements in 14 days (mean = 6.43)

### Figure 2: Progression



### Results

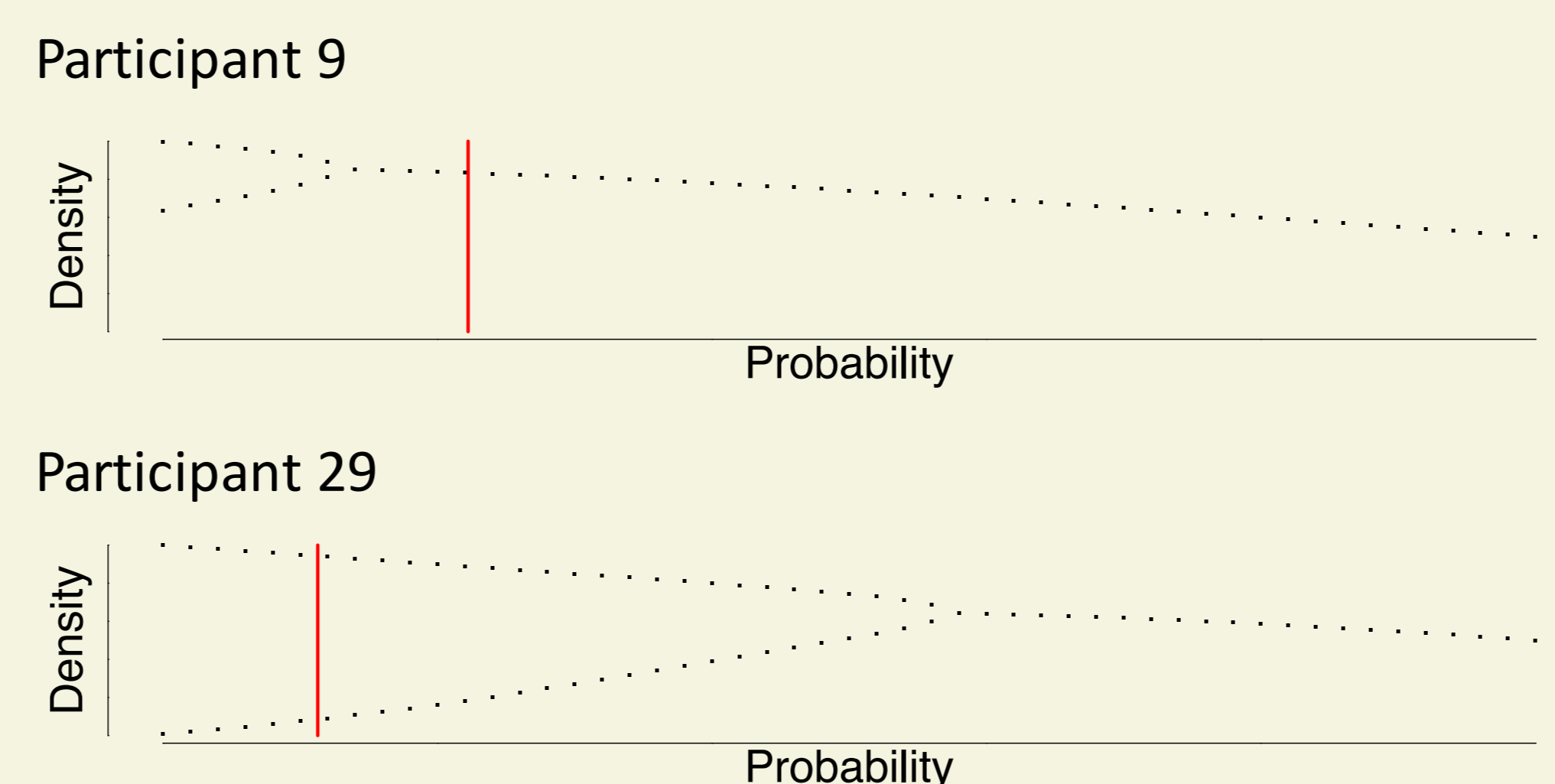
For participant 9, the person-specific parameter falls outside the risk area. This means that this participant does not have an increased risk for developing a depression. We see a different story for participant 29, where the person-specific parameter falls inside the risk area. This participant has an increased risk for developing a depression.

### Methods

Participants had to complete a 13-item questionnaire seven times a day for at least 14 days. Questions were based on DSM-V criteria for major depressive episode, combined with self-esteem, rumination and anger items; all were measured with a 5-point Likert scale.

Any missing values were replaced with the item median; the median was also used to dichotomize all items. Items with zero variance were removed, as well as items with categories observed less than three times.

### Figure 3: Risk Assessment



### Discussion

In this study we proposed a new method for assessing the risk for developing a depression. This method is illustrated with examples of two participants, for whom we assessed their individual risk for developing a depression. Results showed that one participant has an increased risk, whereas the other does not have an increased risk. We are currently elaborating on this study by validating our method for different samples. Also, we are working on solutions for coping with missing data, items with either zero variance or categories with few observations.