Analyzing Youth Program Effectiveness in Gang Reduction Using Dynamic Mode Decomposition

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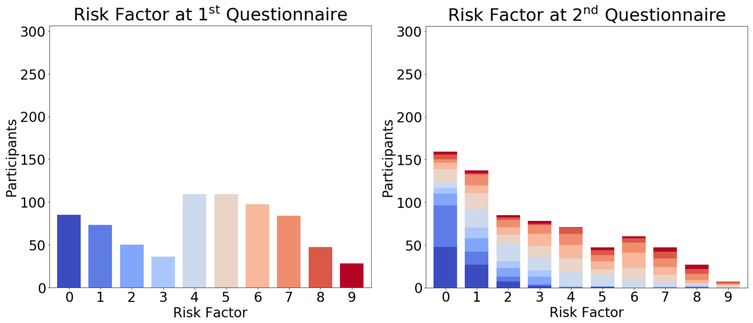
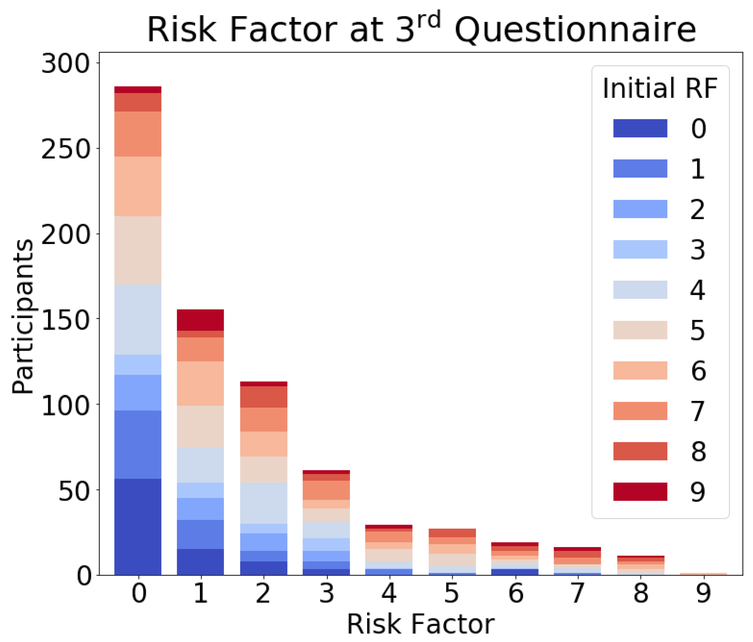
Introduction





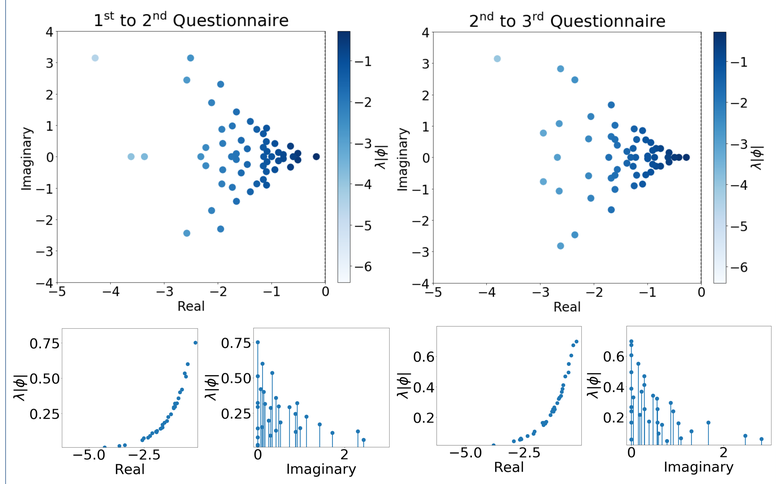
Method

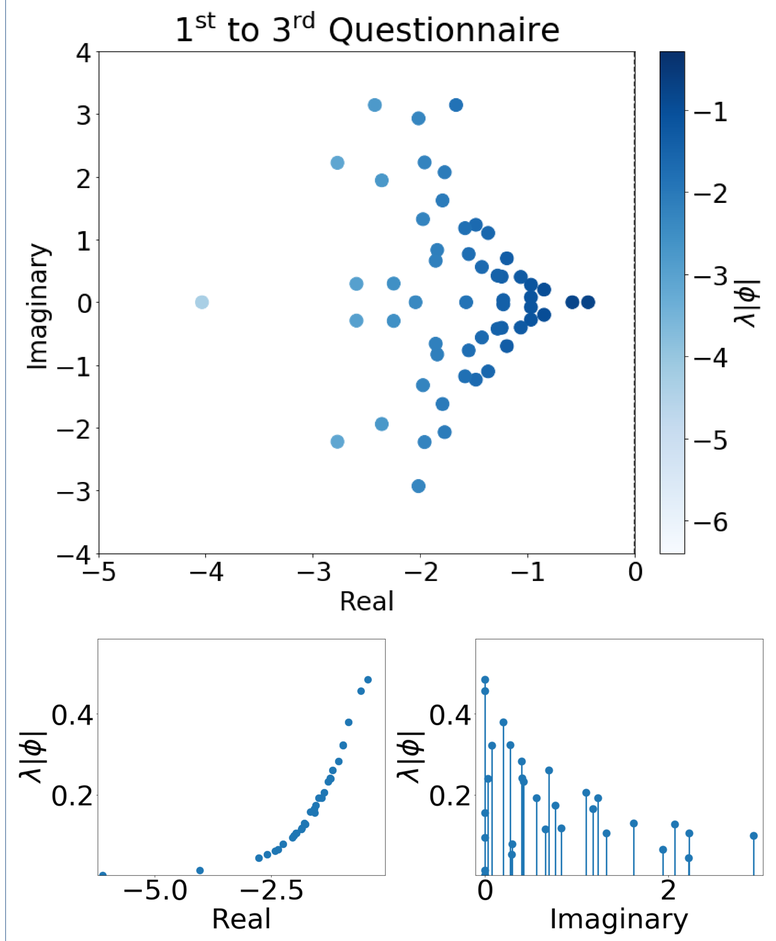
$$\begin{matrix} & \text{participants} \\ \text{questions} & \end{matrix} \quad \underbrace{\begin{bmatrix} Q_0 \\ \text{intake} \end{bmatrix}}_{m \times n} \xrightarrow{A} \underbrace{\begin{bmatrix} Q_1 \\ \text{retake} \end{bmatrix}}_{m \times n}$$

$$\underbrace{\begin{bmatrix} \tilde{Q}_0 \end{bmatrix}}_{r \times n} \xrightarrow{\tilde{A}} \underbrace{\begin{bmatrix} \tilde{Q}_1 \end{bmatrix}}_{r \times n}$$

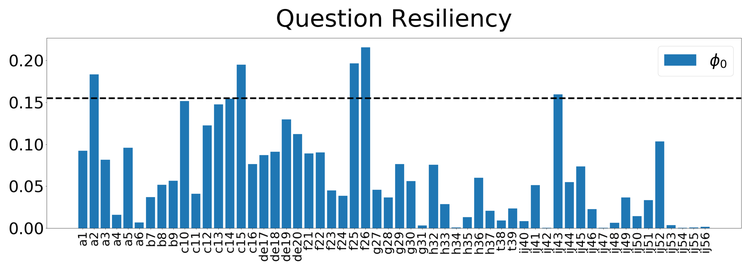
1. Singular-value Decomposition $Q_0 = U\Sigma V^T$
2. Define $\tilde{A} = U^T \tilde{Q}_1 V \Sigma^{-1}$
3. Calculate for A: $\{\lambda_i\}_1^r, \{\phi_i = \tilde{Q}_1 V \Sigma^{-1} w_i\}_1^r$

Results

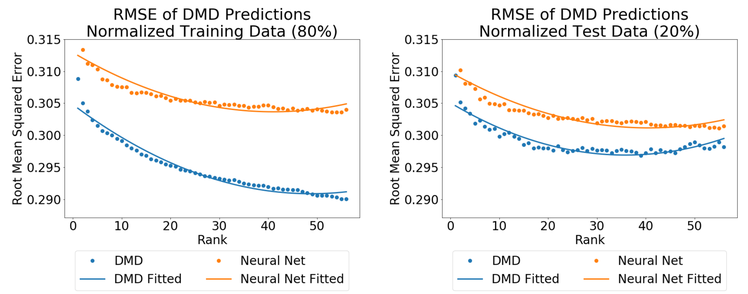


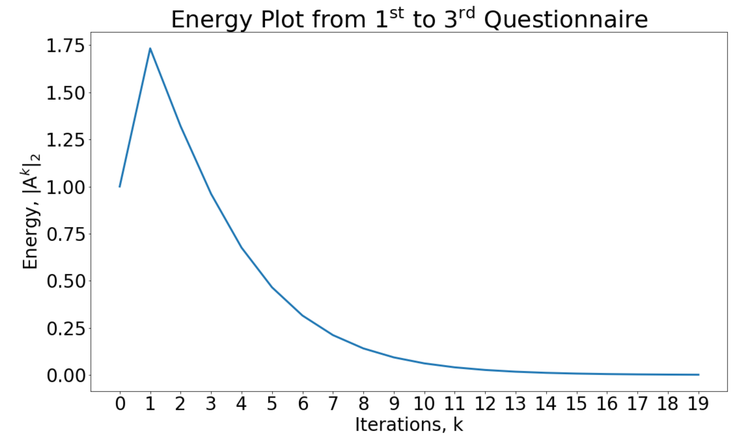


Results



a2: "I try to be nice to other people because I care about their feelings"
c15: "In the last year, did you start hanging our with a new or different group of friends?"
f25: "It is okay to beat people up if they hit me first"
ij43: "Have you skipped class without an excuse?"





Acknowledgements

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