

1 **Supplemental Materials**

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5 **Cognitive Dynamics of Spontaneous Thought: A Novel Modeling Approach**

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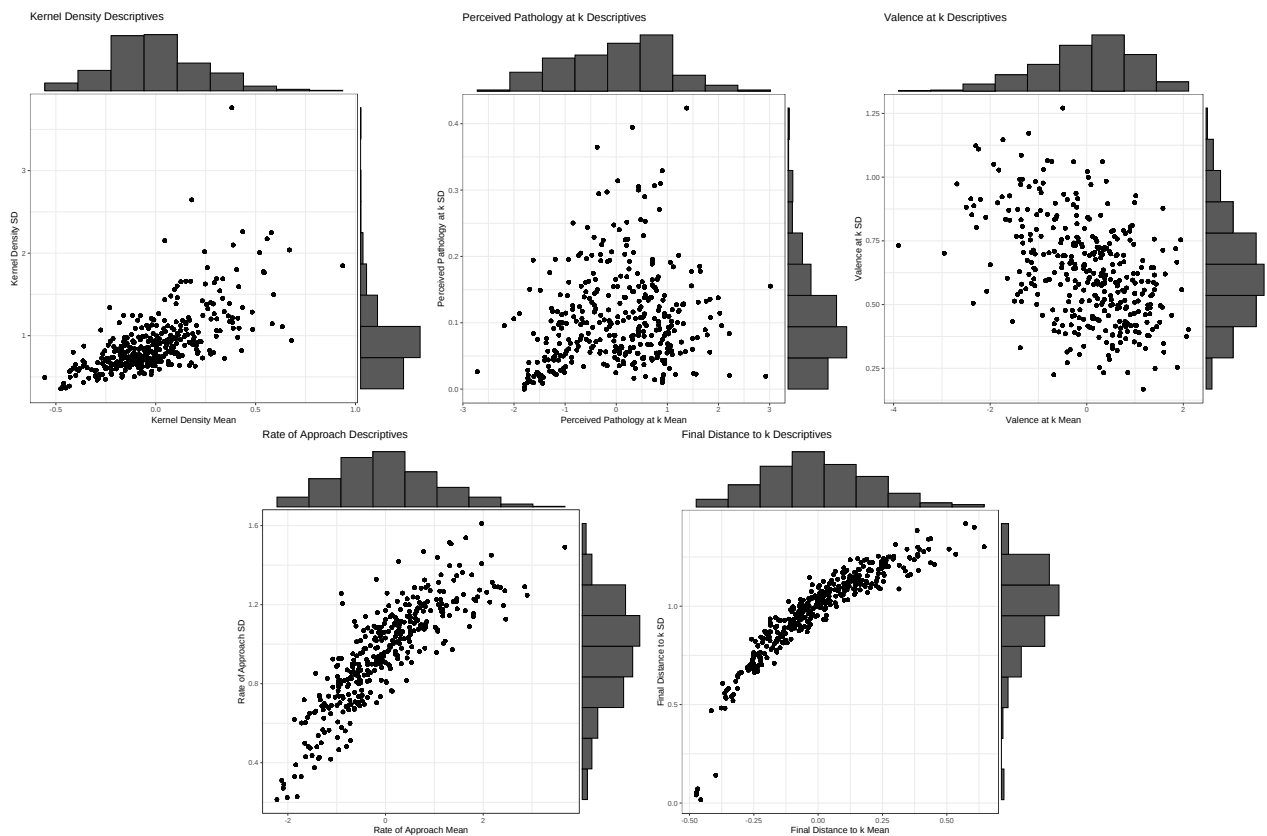
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Parameter Descriptives

Because participants completed 21 word-chains, 21 distinct $\hat{k}$ s and rates of approach (μ) were estimated for each participant. Each $\hat{k}$ also yielded a distinct associated valence, “perceived pathology” rating, and kernel density. Trial-based parameter estimations varied within participants, meaning that individual thinking behaviors often varied throughout the completion of the task. While primary analyses utilized all trial-based data, supplemental analyses below explored individual-level parameters averages and their relationship to clinical self-report measures of stress, rumination, worry, and mood. See *Supplemental Figure 1* for a visual representation of all five primary variables of interest: 1. Rate of approach, 2. Valence at $\hat{k}$, 3. Perceived pathology ratings at $\hat{k}$, 4. Kernel density estimates at $\hat{k}$, and 5. Final distances to $\hat{k}$.



Supplemental Figure 1: Individual-level Parameter Descriptives. Visual representation of means (x-axes) and standard deviations (SD; y-axes) of relevant variables. Both frequency histograms and scatter plots are displayed.

Individual-Level Analyses

Multiple Linear Regression

Collapsing across all 3 samples, a multiple linear regression model including our cluster variables (final distance to $\hat{k}$, valence at $\hat{k}$, and rate of approach) revealed a trend-level significant prediction of rumination (as measured by RRS; $F(362) = 2.14, p = 0.09$), and significant prediction of stress, (as measured by PSS; $F(362) = 4.39, p < 0.01$), and negative mood (as measured by PANAS; $F(362) = 7.98, p < 0.001$). This finding reveals that, at the individual level (averaging across trials), increased negative valence at $\hat{k}$, larger rate of approach, and larger final distance to $\hat{k}$ predict elevated self-report measures of rumination, stress, and negative mood.

Mixed-Linear Model

Collapsing across all 3 samples, a mixed-linear model aimed to investigate whether individual clustering patterns predicted self-reported RNT, stress, and negative mood. No model significantly predicted these self-reported measures (RRS: $F(5837) = 0.16, p = 0.92$, PSWQ: $F(5837) = 0.40, p = 0.75$, PSS: $F(5837) = 2.42, p = 0.06$, PANAS: $F(5837) = 1.57, p = 0.19$).

Canonical Correlation Analysis

In a final attempt to understand how patterns of clustering within individuals may have predicted self-report measures of RNT, stress, and negative mood, we conducted a canonical correlation in Sample 3 ($N = 222$). In canonical correlation analyses, there is no set r -coefficient cut-off that constitutes a “good” or “viable” coefficient. However, values closer to 1 are considered stronger and have greater predictive power. The largest r -coefficient that we obtained was 0.25 ($p < 0.001$), only explaining 6.25% of the variance in our data, indicating a weak predictive power. Accordingly, we concluded that no clustering

79 patterns were uniquely predictive of self-reported psychopathology severity, as those may be better
80 explained by data likely not captured in our model/task.