Bub Matching Engine — Scientific Architecture (Dual-Model)

SECTION A — NARRATIVE STORY SIMILARITY ENGINE

1. Overview
The Narrative Similarity Engine models the semantic, emotional, and psychological structure of a user's expressed story.

2. Mathematical Model
Let x(t) be the narrative token sequence:
E_sem = f_sem(x)
E_aff = f_aff(x)
E_latent = f_latent(x)

Combined embedding:
E = W1*E_sem + W2*E_aff + W3*E_latent

Similarity:
S_narr(i,j) = 1 / (1 + ||E_i - E_j||_2)

Emotional distribution distance:
D_KL(P_aff_i || P_aff_j)

Final score:
S_total = α *S_narr + (1- α)*exp(-D_KL)

3. Pipeline
- Semantic Transformer
- Affect Mapping
- Latent VAE Embedding
- Fusion
- Similarity Scoring

SECTION B — BEHAVIORAL STORY SIMILARITY ENGINE

1. Overview
Behavioral story similarity models multi-session emotional trajectories.

2. Latent Trait Modeling
$p(\theta \mid S) \propto p(S \mid \theta)p(\theta)$

3. Time-Series Alignment
Soft-DTW:
S_beh(i,j) = exp(-DTW_soft(H_i, H_j))

4. Final Matching Score
S_combined = β *S_beh + (1- β)*S_narr