User Intent Modeling in Online Dating:

Recommendation Alignment & Causal Drivers of Family Planning

Prepared by C. Joseph Francemone, Ph.D.

Executive Summary
Optimizing Match Relevance by Decoupling Interest from Intent

Demographics fail to capture the nuance of user intent.

Demographics provide **79% baseline** accuracy for family planning but miss the **child-free** vs. **not ready** distinction.

Romance signals are not a proxy for family planning.

Users seeking "love" and "connection" showed **no meaningful increase** in family planning, highlighting an inverse of algorithmic assumptions.
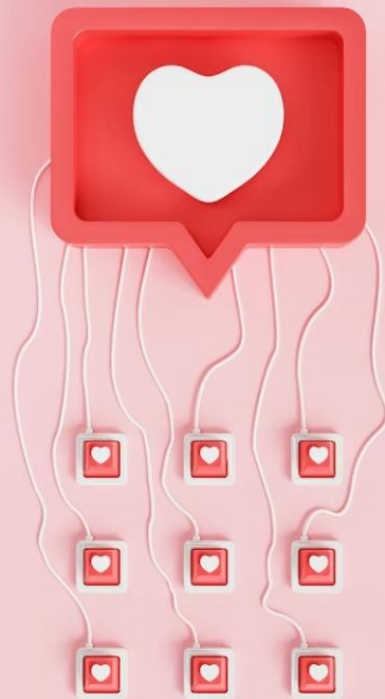
Psychographic personas provide improved matching.

Socialite behaviors **increase** family planning by +**18.5%**, while **Techie** interests **decrease** family planning by **-19.8%**.
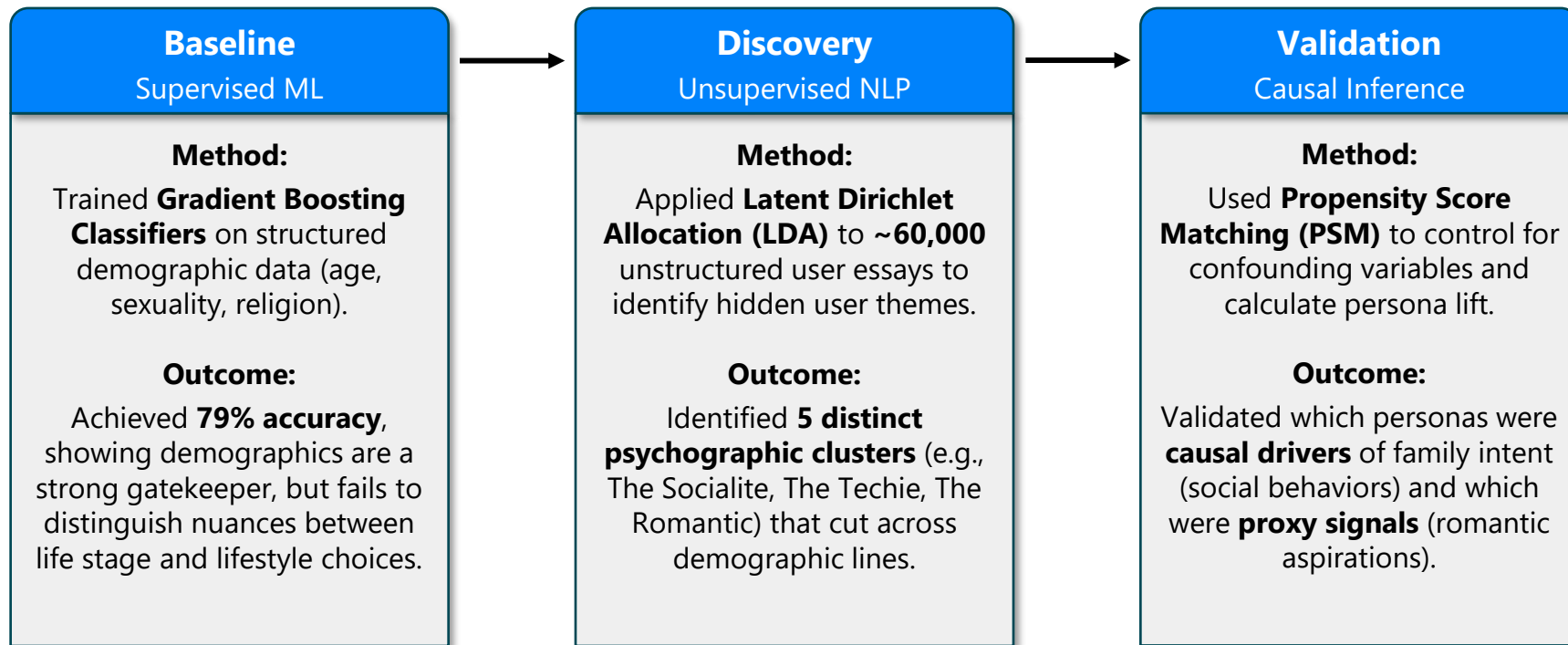
Algorithmic alignment requires distinct tracks.

Decouple **interest-based** matching from **intent-based** matching to reduce false positives and avoid nudging users toward incompatible partners.
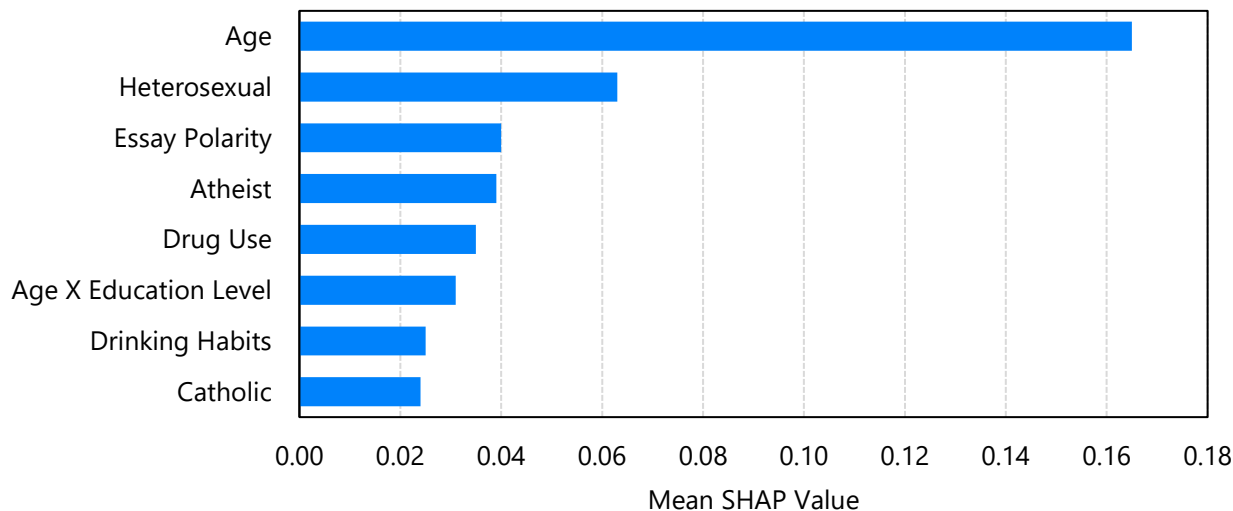
From Data to Insight: The Research Pipeline

Triangulating User Intent via Machine Learning, Natural Language Processing, and Causal Inference

Baseline
Supervised ML

Method:

Trained **Gradient Boosting Classifiers** on structured demographic data (age, sexuality, religion).

Outcome:

Achieved **79% accuracy**, showing demographics are a strong gatekeeper, but fails to distinguish nuances between life stage and lifestyle choices.

Discovery
Unsupervised NLP

Method:

Applied **Latent Dirichlet Allocation (LDA)** to **~60,000** unstructured user essays to identify hidden user themes.

Outcome:

Identified **5 distinct psychographic clusters** (e.g., The Socialite, The Techie, The Romantic) that cut across demographic lines.

Validation
Causal Inference

Method:

Used **Propensity Score Matching (PSM)** to control for confounding variables and calculate persona lift.

Outcome:

Validated which personas were **causal drivers** of family intent (social behaviors) and which were **proxy signals** (romantic aspirations).

Python   Pandas   NumPy   Matplotlib

Unlocking Psychographics: Language is a Behavior

Latent Dirichlet Allocation (LDA) Topic Modeling of User Essays

The Artist

Keywords:
Art, Film, Band

Signal: Non-traditional lifestyle; values expression, creativity, and aesthetics

The Techie

Keywords:
Game, Video, Computer

Signal: Niche interests; highly specific media and tech culture compatibility

The Socialite

Keywords:
TV, Sports, Dinner

Signal: High social activity; values community and shared experiences

The Professional

Keywords:
Work, Home, Business

Signal: High ambition; prioritizes stability and career trajectory

The Romantic

Keywords:
Relationship, Soul, Heart

Signal: Intimacy-focused; explicitly seeking deep emotional connection

Python   SpaCy   Gensim   pyLDAvis

Lifestyle Choices Drive Family Planning

Validating Causal Drivers via Propensity Score Matching (PSM)

Propensity Score Matching

Challenge:
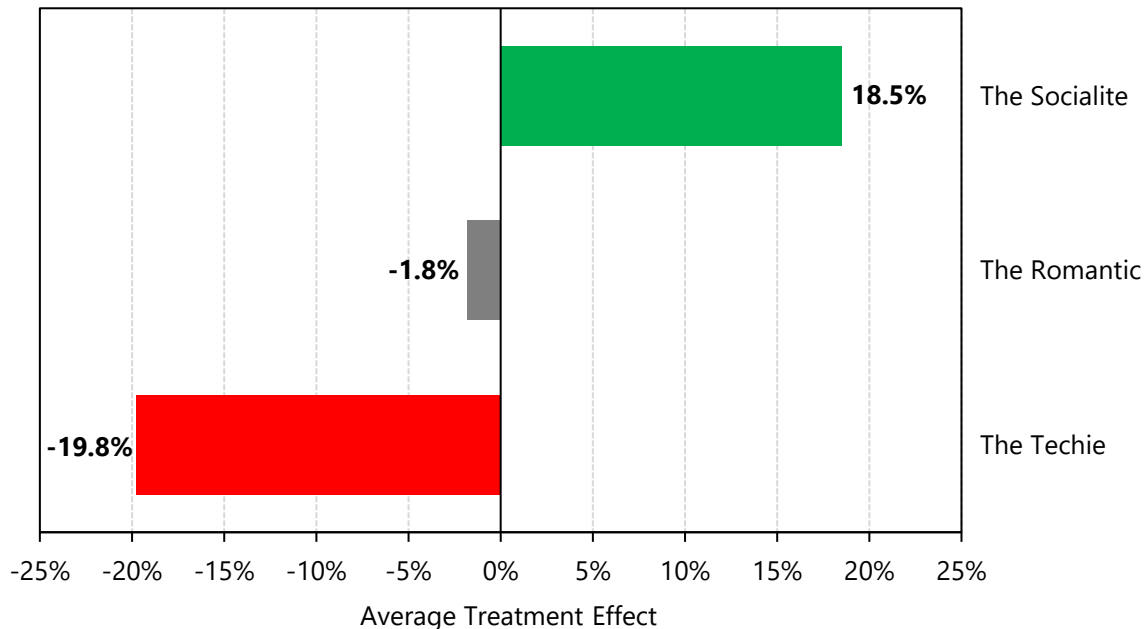Are certain personas (e.g., Socialites) more family-oriented, or just older?

Method:
Create statistical "twins" for every user (a demographically identical "non-persona") to isolate causal effects.

Insight:
Lifestyle choice is a significant causal driver.

- **Socialites**: Community focus aligns with family goals.
- **Techies**: Niche interests compete with family planning.
- **Romantics:** "Love" signals are noise, proving intent is distinct from connection.

Causal Lift on Family Planning

The Socialite: 18.5%
The Romantic: -1.8%
The Techie: -19.8%

Average Treatment Effect

Python   Scikit-Learn   SciPy   Statsmodels

From Insight to Impact: Strategic Recommendations

Optimizing Product Features Based on Psychographic Drivers

⚙ The Algorithm
Decouple Interest from Intent

Insight:

Niche interests **actively suppress** family intent signals.

Recommendation:

Downweight **interest-based** matching. Prioritize **latent psychographics** as a primary feature.

📋 The Onboarding
"Lifestyle" Signal Onboarding

Insight:

Demographics achieve **79% accuracy** but miss nuance.

Recommendation:

Replace static demographic filters with a **visual lifestyle quiz**. Let users self-select into specific psychographic tracks (e.g., Socialite, Romantic).

◎ The Growth
Segmented Value Proposition

Insight:

"Romantics" seek **connection**, not commitment.

Recommendation:

Stop retargeting "Romantic" users with ads about family. Shift focus to **"deep connection" messaging** to align with actual intent.

Product Strategy   A/B Testing   Algorithmic Auditing

Execution Strategy: Validation & Rollout

Translating Insights into Measurable Product Impact

A/B Test Design

Hypothesis:

Users who complete a **lifestyle quiz** during onboarding will show higher day-30 retention than standard onboarding users.

Test Setup:

Treatment: Lifestyle Quiz
Control: Demographic filters
Traffic: 5% of new user traffic

Success Metrics

Primary:

Day-30 Retention.
(Do better matches keep users?)

Secondary:

Conversation Initiation Rate
(Do matched users engage?)

Guardrail:

Onboarding Completion Rate
Match Volume

Phased Rollout

Phase 1:

Backtest on historical data ✓

Phase 2:

Live A/B Test (5% traffic)

Phase 3:

Ship if day-30 retention shows
≥ 2% lift

Product Strategy   A/B Testing   Experimentation