How to correct someone’s life from a viewpoint of psychological God

• You have all of the subject’s data from birth to death.
• You can go back and forth time.
• You can see and tweak hidden psychological parameters.
Step 1. Model a typical day from typical days

1. Collect all standard days (■) and exclude special days (□).
2. Identify personality traits, such as diligent, precise, humble, careless, impulsive out of his standard-day behavior.
3. Quantify these traits, and fit Gaussian distribution to these personality traits across days.
Step 2. Start evaluation

Personal trait distribution

- Diligence
- Preciseness
- Humbleness
- Carelessness
- Impulsivity

Big-5 Converter

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

Original Behavior of a day
Step 2. Evaluate one day, *one* event

**Personal trait distribution**

- Diligence
- Preciseness
- Humbleness
- Carelessness
- Impulsivity

**Big-5 Converter**

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

**Original Behavior of a day**

Getting up (5:30 am)
Step 2. Evaluate one day, *one* event

Personal trait distribution

- Diligence
- Preciseness
- Humbleness
- Carelessness
- Impulsivity

Big-5 Converter

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

Original Behavior of a day

Getting up (5:30 am)
Step 2. Evaluate one day, *one* event

![Diagram of personal traits and Big-5 converter]

- **Personal trait distribution**
  - Diligence
  - Preciseness
  - Humbleness
  - Carelessness
  - Impulsivity

- **Big-5 Converter**
  - Openness
  - Conscientiousness
  - Extraversion
  - Agreeableness
  - Neuroticism

- **Original Behavior of a day**
  - Getting up (5:30 am)
Step 2. Evaluate one day, \textit{all} events

- Personal trait distribution
  - Diligence
  - Preciseness
  - Humbleness
  - Carelessness
  - Impulsivity

- Big-5 Converter
  - Openness
  - Conscientiousness
  - Extraversion
  - Agreeableness
  - Neuroticism

- Original Behavior of a day
  - Getting up (5:30 am)
  - Breakfast ($6)
  - Going to office (by train)
  - Teaching (hard)
  - Lunch ($10)
  - 
  - 
  -
Step 2. A mistake was made in one day

Personal trait distribution

Diligence
Preciseness
Humbleness
Carelessness
Impulsivity

Big-5 Converter

Openness
Conscientiousness
Extraversion
Agreeableness
Neuroticism

Outside $\mu + 3\sigma$

Original Behavior of a day

Getting up (5:30 am)
Breakfast ($10$)
Going to office (by train)
Teaching (hard)
Lunch ($200$ steak)

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-
Step 3. Correct the mistake by removing Big 5-personality trait combinations

Personal trait distribution

- Diligence
- Preciseness
- Humbleness
- Carelessness
- Impulsivity

Big-5 Converter

- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

Original Behavior of a day

Getting up (5:30 am)
Breakfast ($10)
Going to office (by train)
Teaching (hard)
Lunch ($200 steak)

Truncate ‘Openness’ to terminate its input.
Step 3. ‘Impulsivity’ is now corrected

Truncate ‘Openness’ to terminate its input.

Corrected to the normal range.
Step 4. Reconstruct the behaviors of the day

Reconstructed Behavior of the day

Big-5 Converter

Personal trait distribution

Big-5 Converter

Original Behavior of a day

- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

- Diligence
- Preciseness
- Humbleness
- Carelessness
- Impulsivity

- Openness

- Getting up (5:30 am)
- Breakfast (S10)
- Going to office (by train)
- Teaching (hard)
- Lunch ($200 steak)
  -
  -
  -
Step 4. Reconstruct the behaviors of the day

Reconstructed Behavior of the day

Big-5 Converter

Personal trait distribution

Big-5 Converter

Original Behavior of a day

- Getting up (5:30 am)
- Breakfast (S10)
- Going to office (by train)
- Teaching (hard)
- Lunch ($200 steak)
  -
  -
  -
Step 4. Reconstruct the behaviors of the day

Reconstructed Behavior of the day

- Getting up (5:30 am)
- Breakfast (S6)
- Going to office (by train)
- Teaching (hard)
- Lunch ($10)

Big-5 Converter

Personal trait distribution

Original Behavior of a day

- Getting up (5:30 am)
- Breakfast (S10)
- Going to office (by train)
- Teaching (hard)
- Lunch ($200 steak)
Hence the name

Reconstructed Behavior of the day

Big-5 Converter

Personal trait distribution

Big-5 Converter

Original Behavior of a day

Getting up (5:30 am)

Breakfast ($6)

Going to office (by train)

Teaching (hard)

Lunch ($10)

Artifact subspace reconstruction

Getting up (5:30 am)

Breakfast ($10)

Going to office (by train)

Teaching (hard)

Lunch ($200 steak)
Application for observed EEG channel signals

Reconstructed 1-s chunk of channel signals ($S_{\text{clean}}$)

1-s chunk of channel signals ($S$)

PCA ($V$)

Square-root of the geometric median of covariance matrices ($M$)

PCA ($V$)

Artifact subspace reconstructed

PC1 (blink)

PC2 (saccade)

PC3 (occ. alpha)

PC4 (parie. P300)

PC5 (muscle)

P300

P1

N1

Muscle

Eye blink

P300

P1

N1

Muscle

Eye blink

Fz

Pz

Cz

F3

F4

PC1 (blink)

PC2 (saccade)

PC3 (occ. alpha)

PC4 (parie. P300)

PC5 (muscle)

PC1 (blink)

PC2 (saccade)

PC3 (occ. alpha)

PC4 (parie. P300)

PC5 (muscle)
\[ S_{clean} = V \times V^T M \times ((V^T M)^{truncated})^\dagger \times V^T \times S \]
Derivation

\[ S = S \]
\[ S = MM^{-1}S \]
\[ S_{\text{clean}} = MM_{\text{truncated}}^{\dagger}S \]
\[ S_{\text{clean}} = MM_{\text{truncated}}^{\dagger}(V^T)^{-1}V^TS \]
\[ S_{\text{clean}} = M((V^TM)_{\text{truncated}})^{\dagger}V^TS \]
\[ S_{\text{clean}} = VV^TM((V^TM)_{\text{truncated}})^{\dagger}V^TS \]

† Moore-Penrose inverse
Derivation explained for dummies

\[ S_{\text{clean}} = V \times V^T M \times ((V^T M)_{\text{truncated}})^\dagger \times V^T \times S \]

- $10$ lunch behavior
- Back-interpret the Big 5 scores to behavior
- Interpret the behavior to Big 5 scores
- Big 5 scores interpreted in his personality traits; then outrageous personality-trait interpretation rejected
Thank you for your attention

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