

# Beyond Univariate and Static Understandings of the Person in Psychology

Ludwig Maximilian University of Munich

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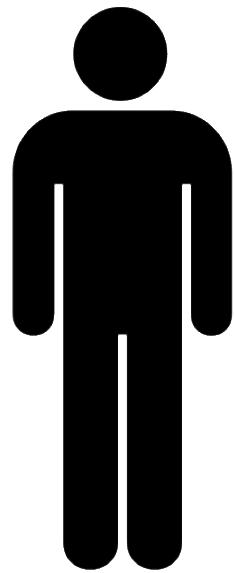
@EmorieBeck



**Description**

**Prediction**

**Explanation**



**Thoughts**

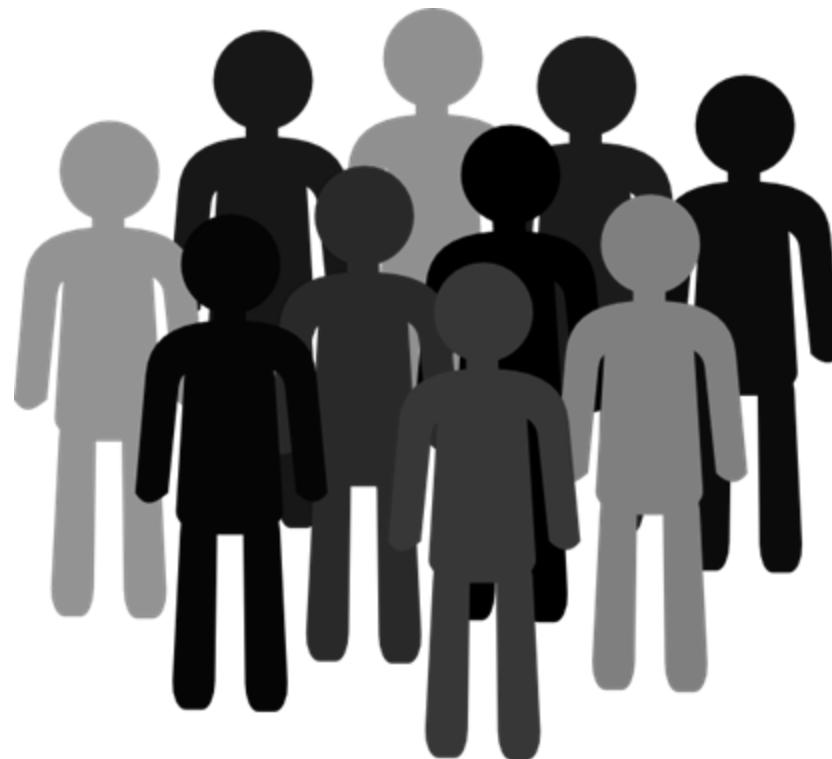
**Feelings**

**Behaviors**

**Description**

**Prediction**

**Explanation**



**Thoughts**

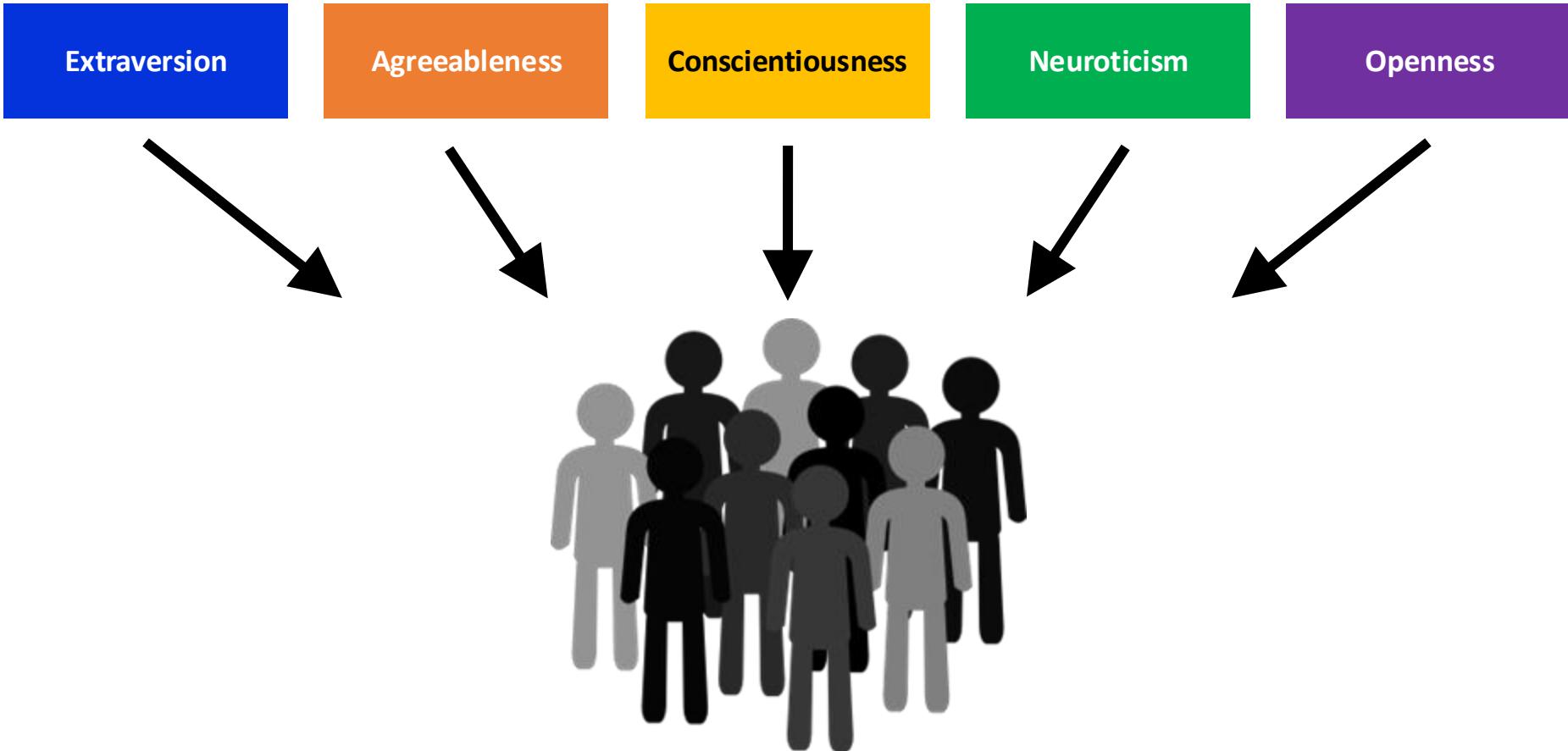
**Feelings**

**Behaviors**

# What is personality?

“Personality refers to those **characteristics** of the person that account for **consistent patterns of feelings, thinking, and behaving.**”

(Pervin, Cervone & John, 2005, p. 6)



**Nomothetic  
Between-Person  
Variable Centered**

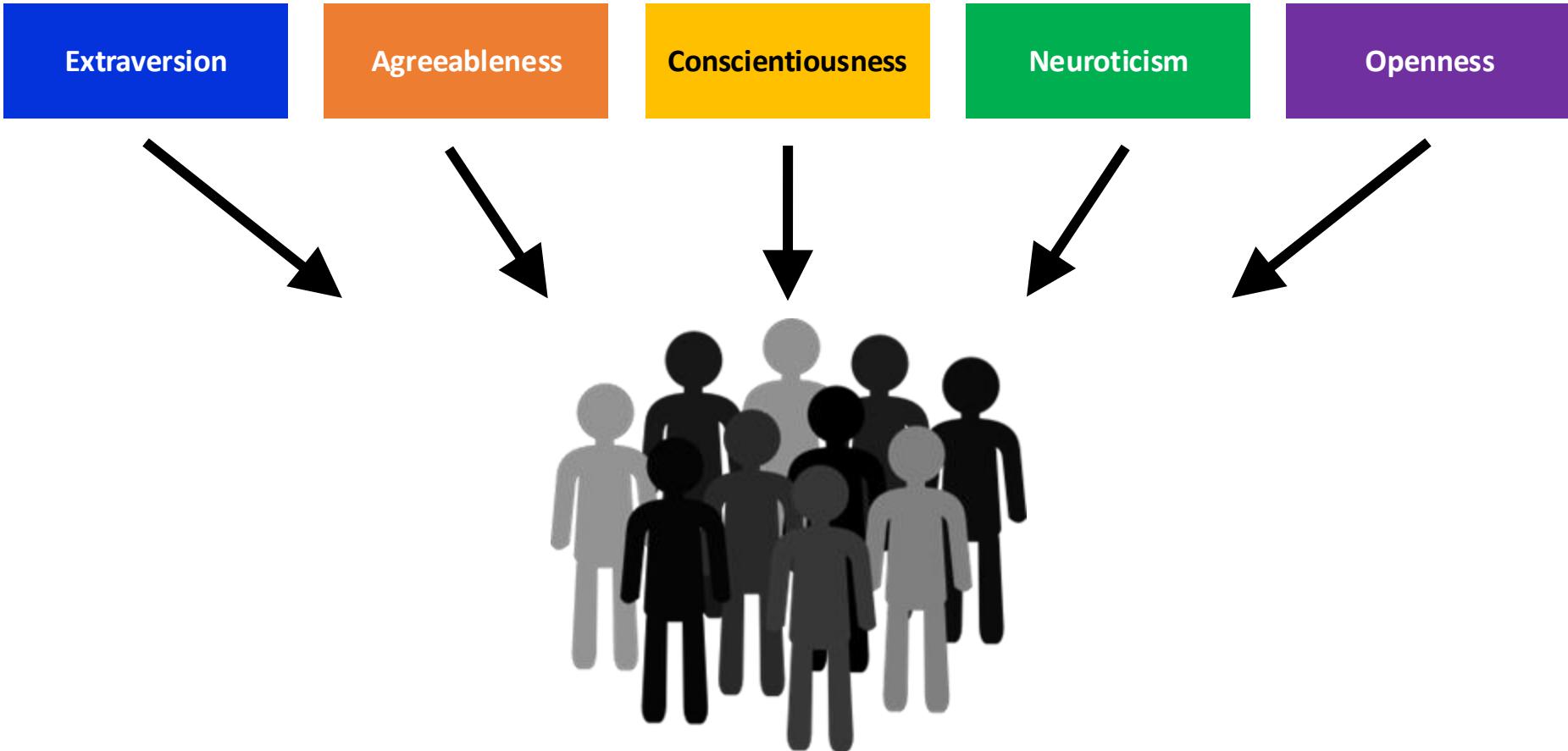


EJP  
@EJPBlog

"We assessed personality with the Big Five - As seductive as it is to make such statements, they are only a bit true... personality is not just the Big Five." Read [@rauthmann](#) blog post and memes here. [ejp-blog.com/blog/2024/9/17...](http://ejp-blog.com/blog/2024/9/17...)



12:07 PM · Sep 17, 2024 · 275 Views

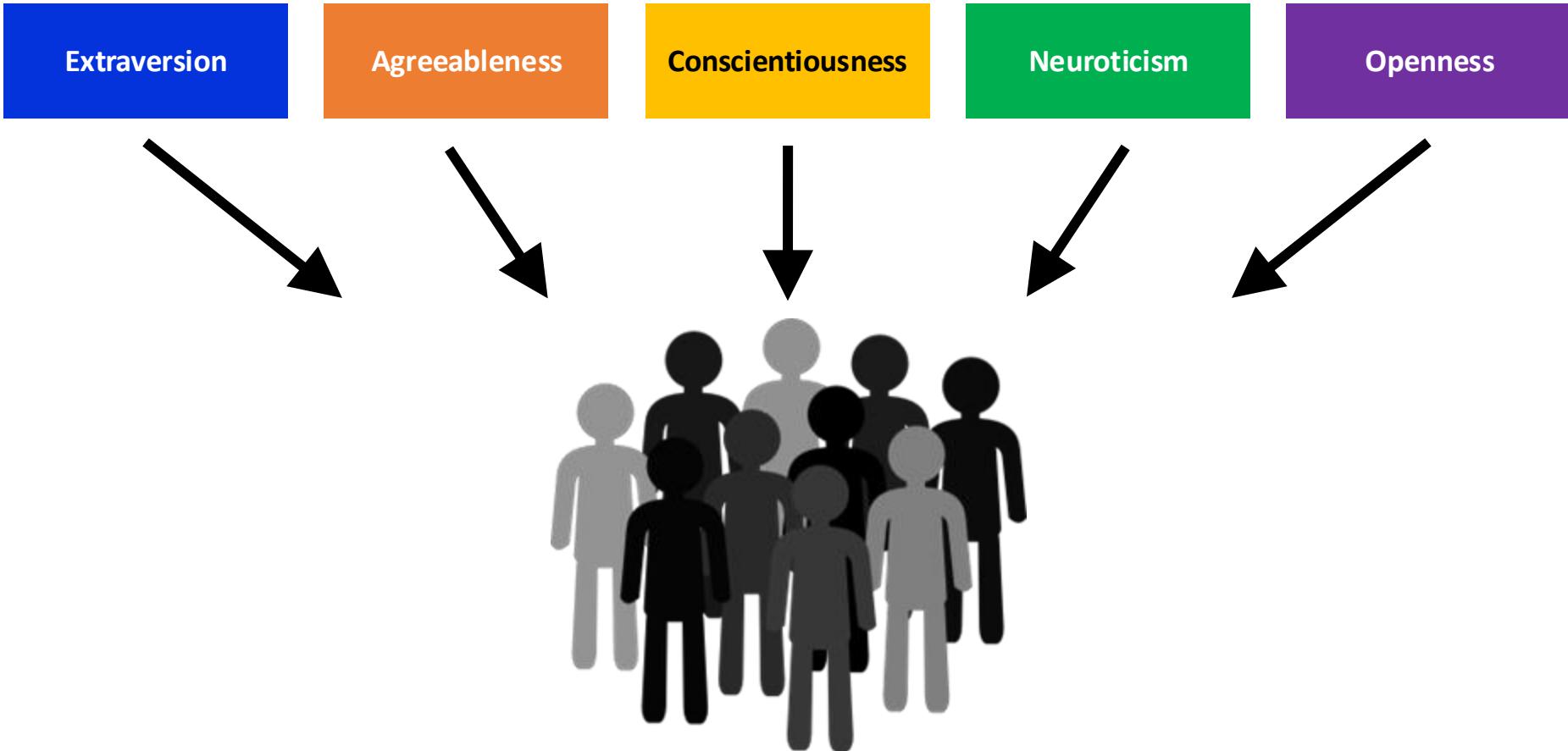


**Nomothetic  
Between-Person  
Variable Centered**

# What is personality?

**Personality is what personality tests test.**

(Jack Wright, personal communication, 2013)



**Nomothetic  
Between-Person  
Variable Centered**

# What is personality?

“Personality is the **dynamic organization** within the individual of those **psychophysical systems** that determine his **unique adjustments to the environment**.”



(Allport, 1937, p. 32)

e.g., Allport, 1937, 1961, 1968

# What is personality?

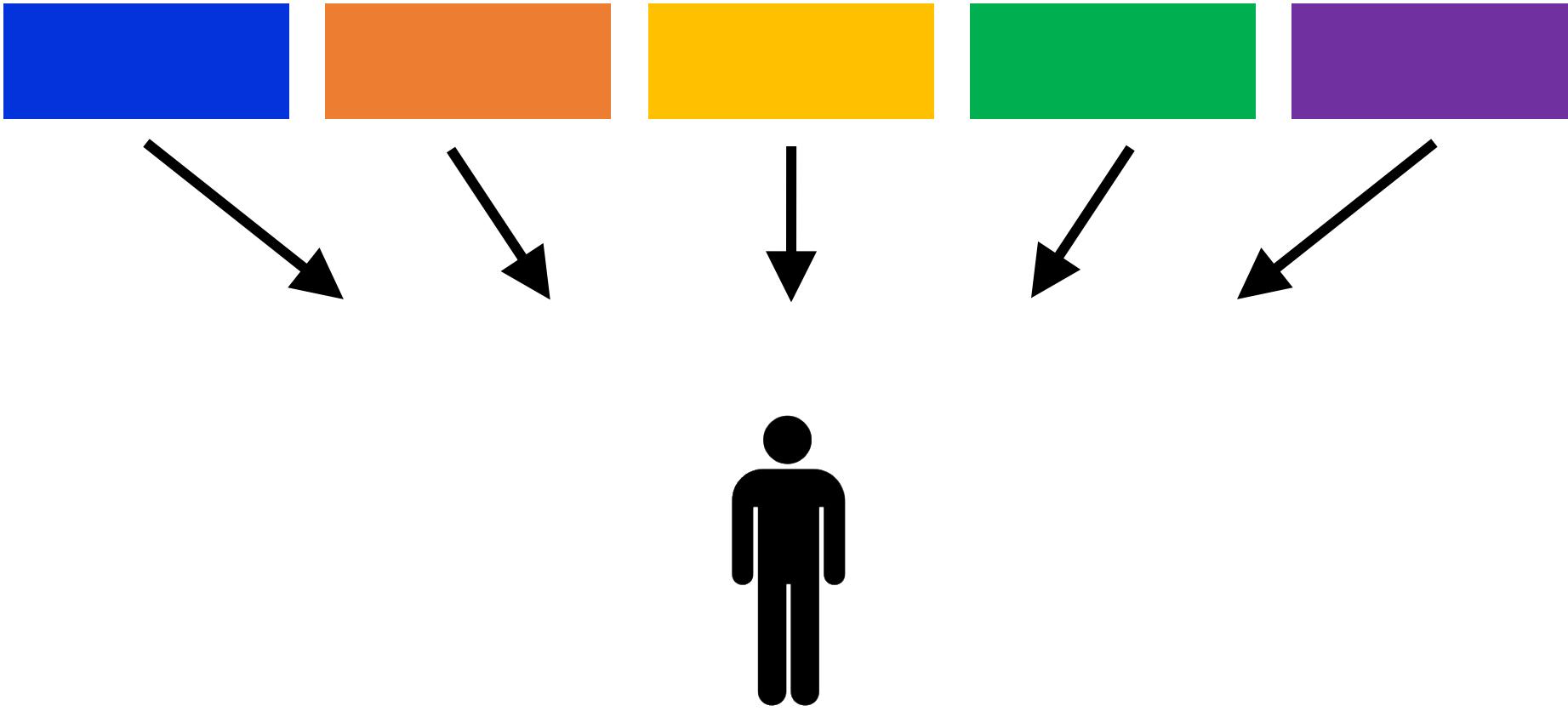
**Personality is what personality tests test.**

(Jack Wright, personal communication, 2013)

Individuals  
(idiographic)

Contexts & Time

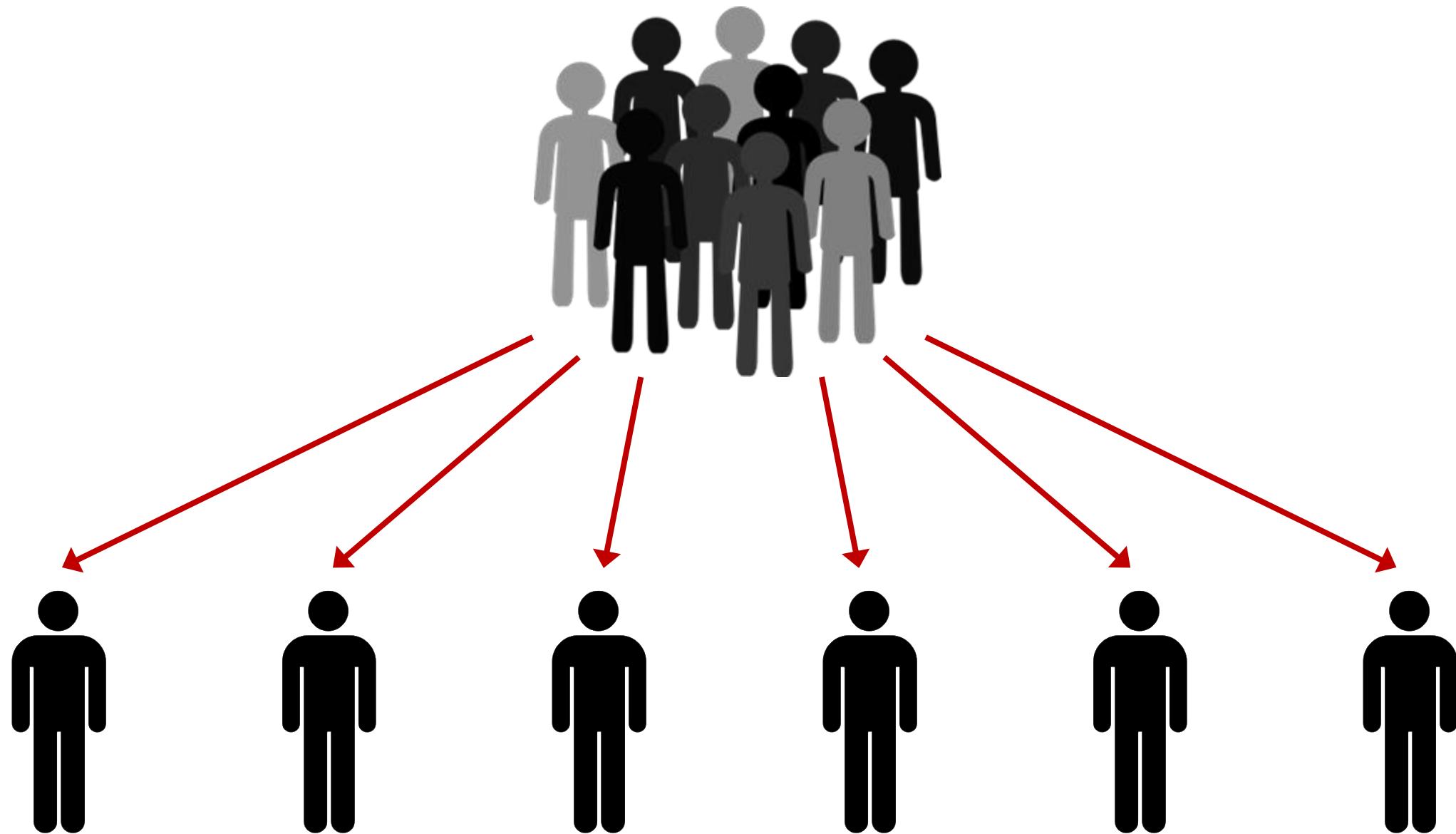
Dynamics &  
Systems



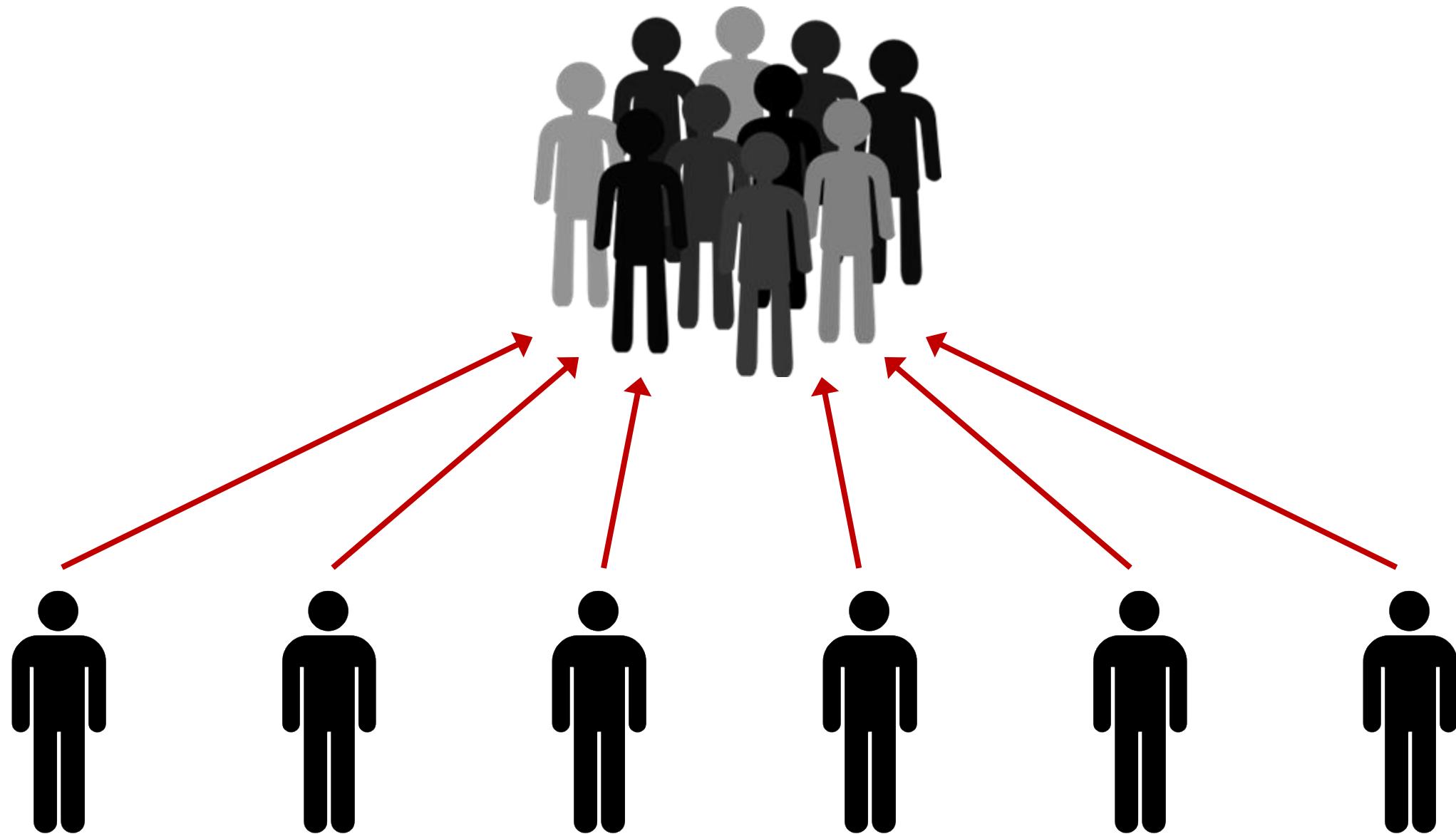
**Idiographic  
Person-Specific  
 $N = 1$**

e.g., Beck & Jackson, 2020a, *JPSP*; 2020b, *CDPS*

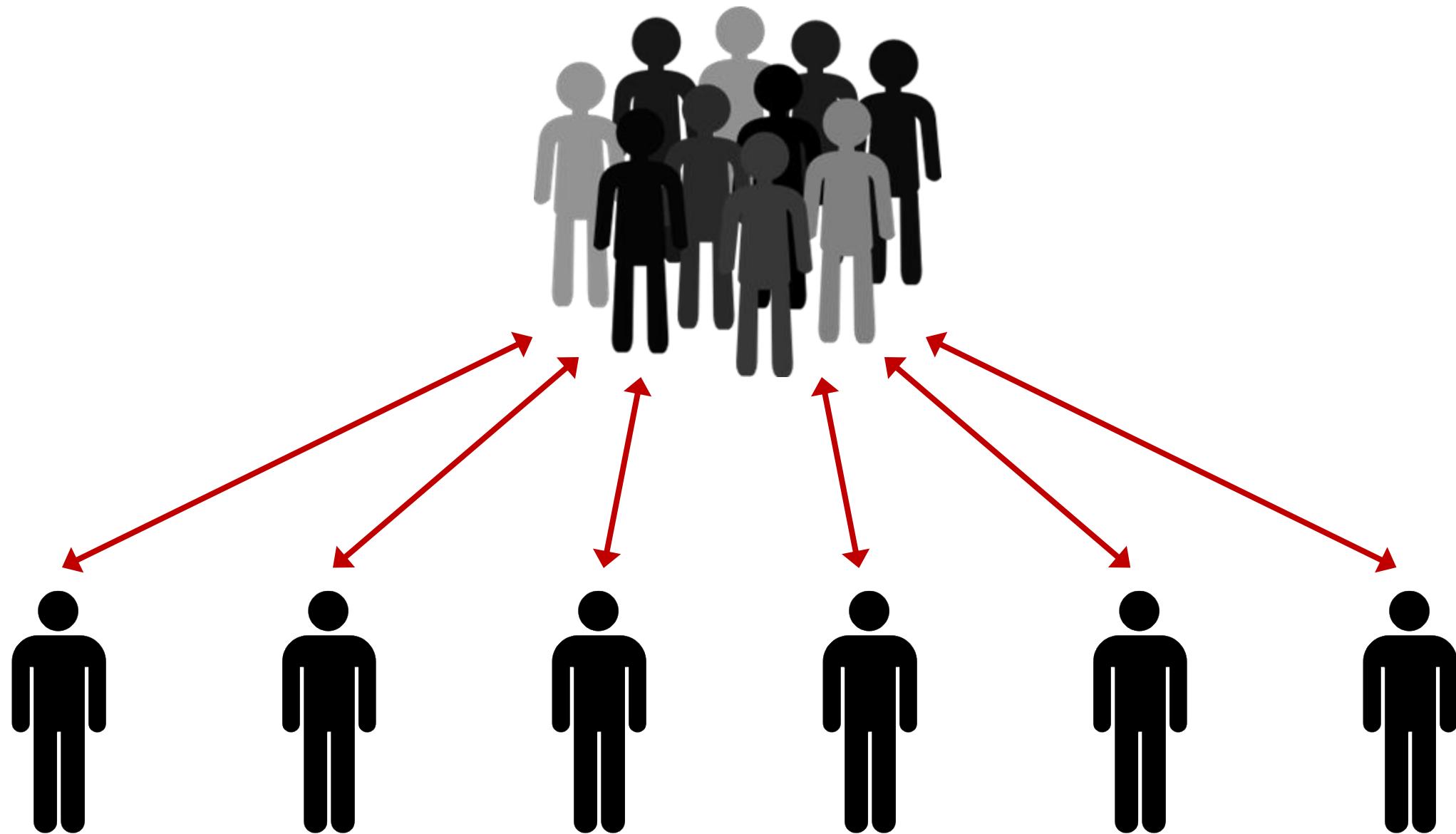
# Bottom-Up Psychological Science



# Bottom-Up Psychological Science



# Bottom-Up Psychological Science





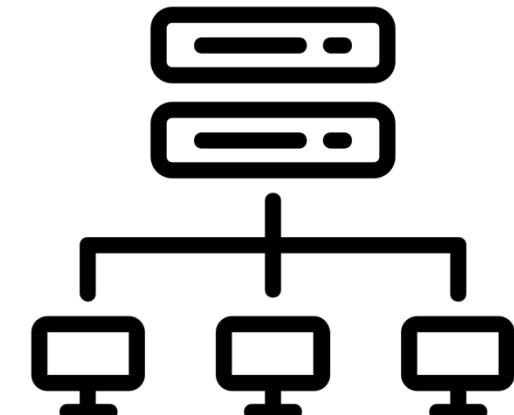
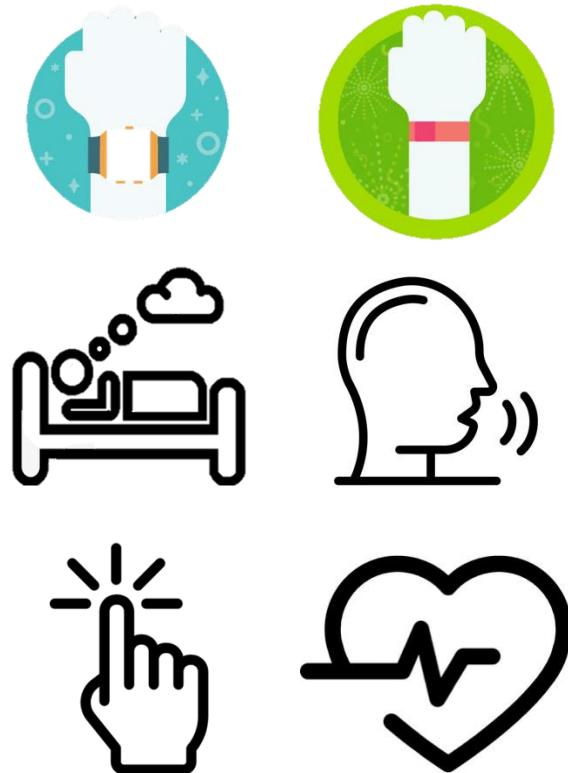
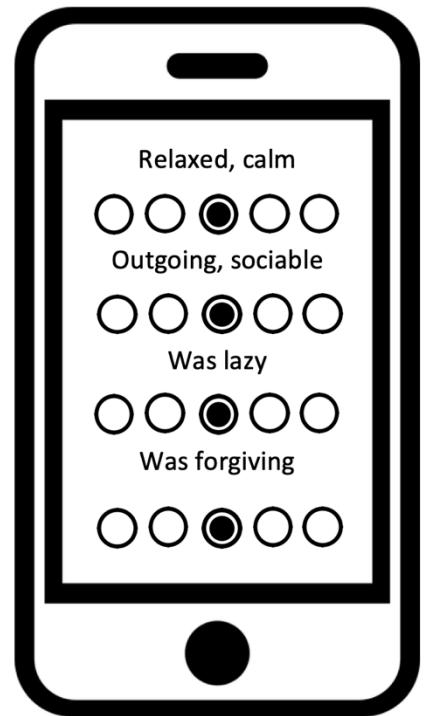
# Modern Opportunities for $N = 1$ Research

ESM / EMA

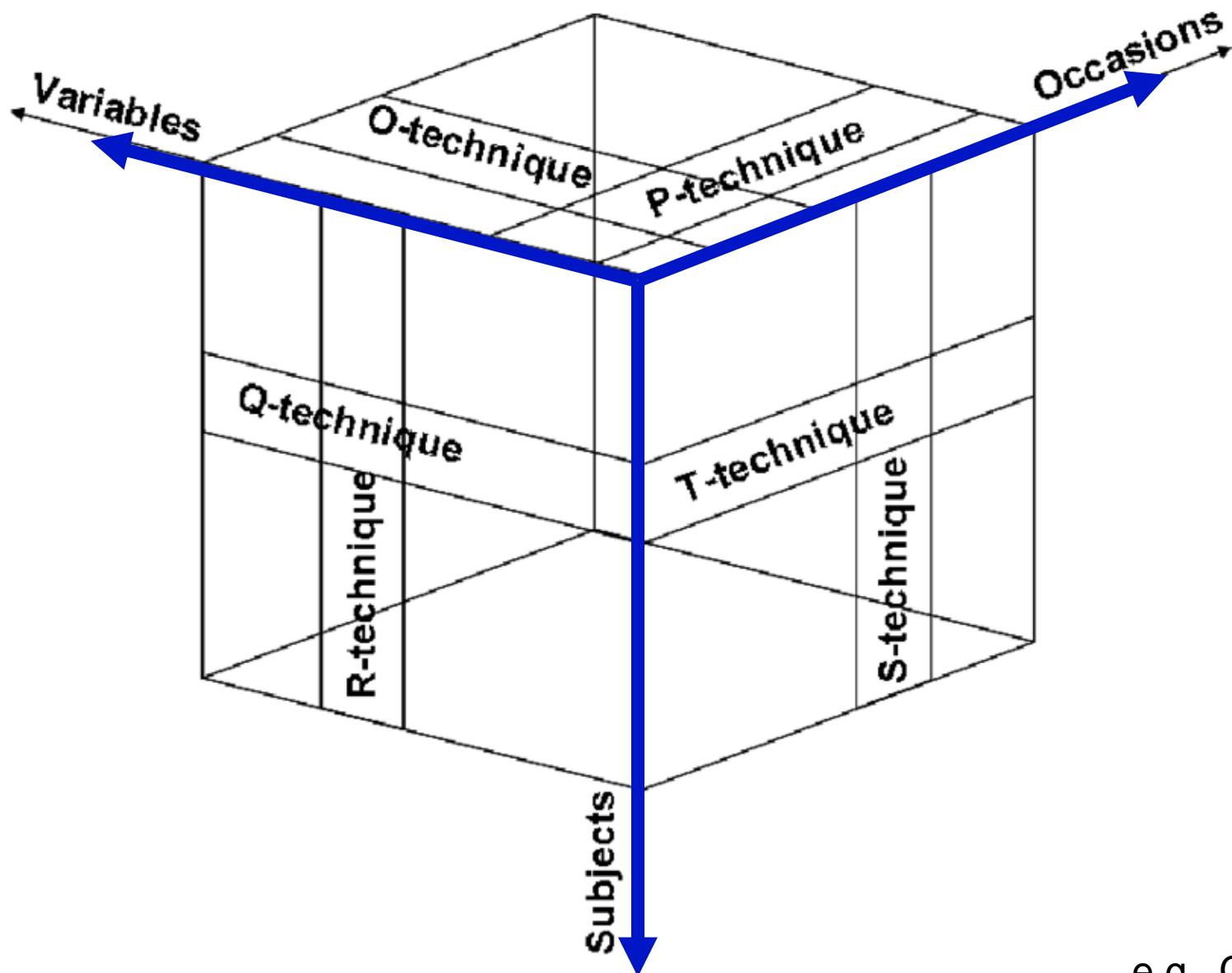
Mobile Sensing

Open-Ended  
Responses

Computing  
Power

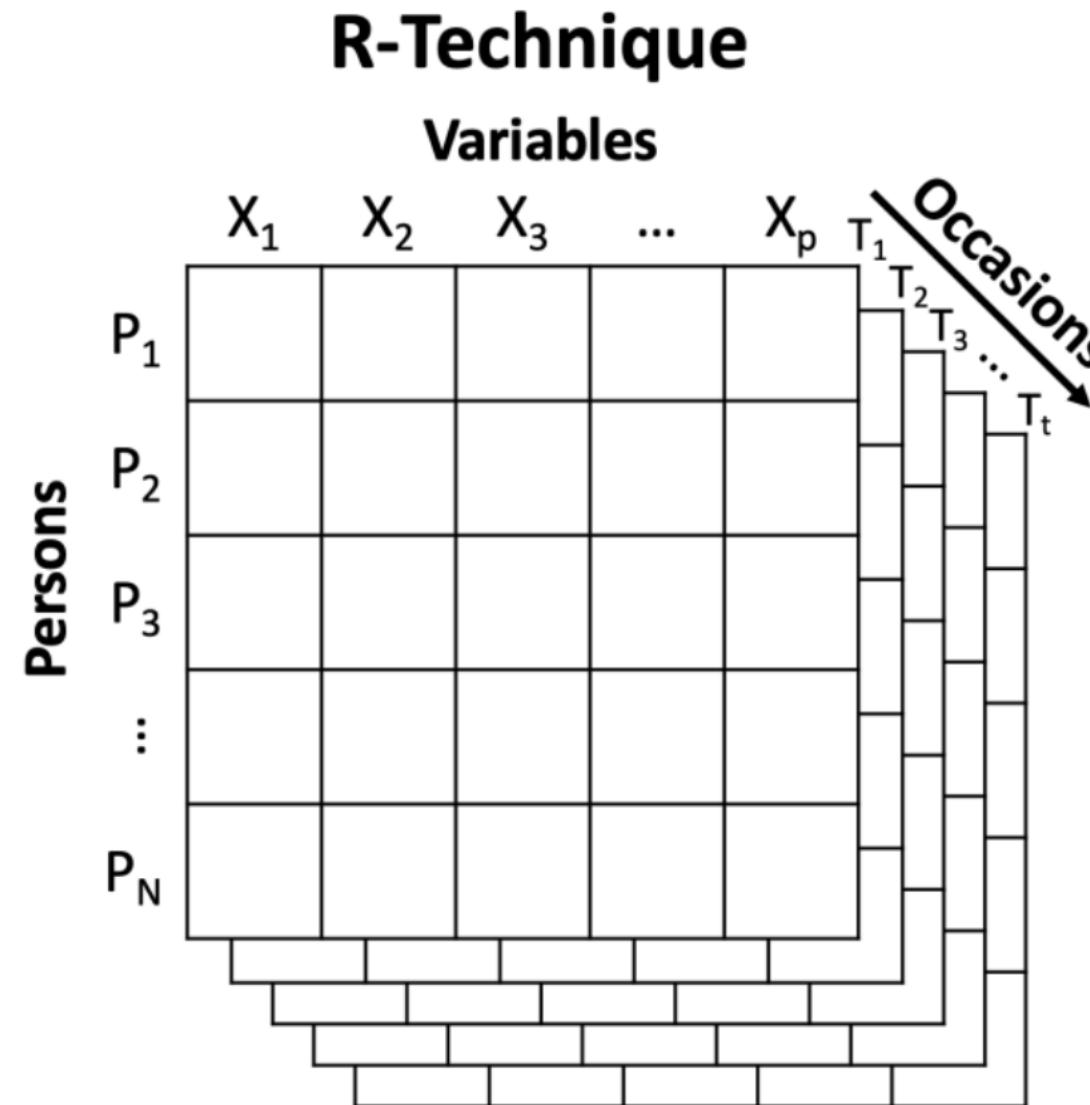


# What is personality?



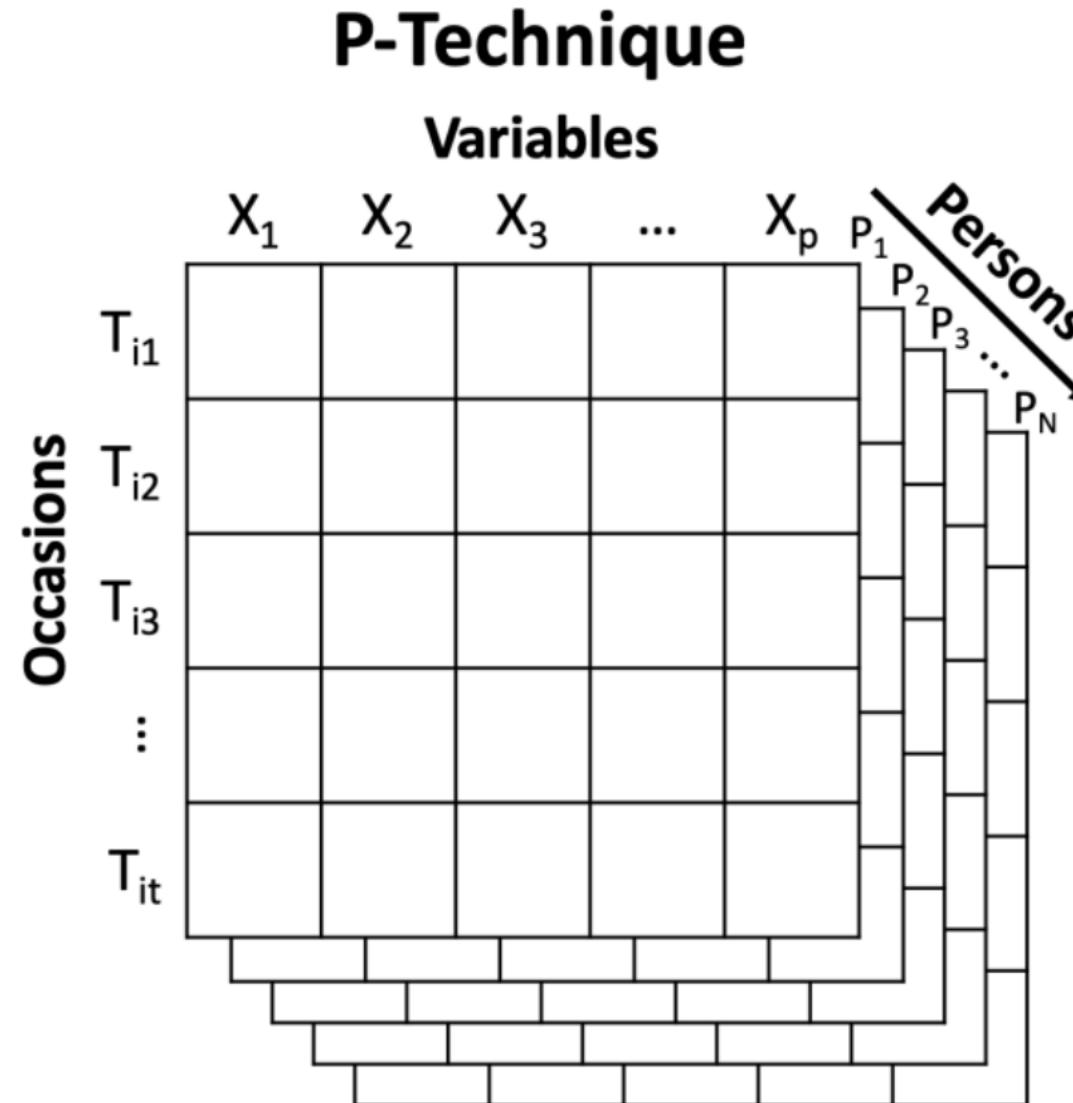
e.g., Cattell, 1943, 1946, 1957

# What is personality?



e.g., Cattell, 1943, 1946, 1957

# What is personality?



e.g., Cattell, 1943, 1946, 1957



# What is personality?

***if***

***...***

***then***

***Context***

***Situation perception***

***Experience***

***Etc.***

***Behavior***

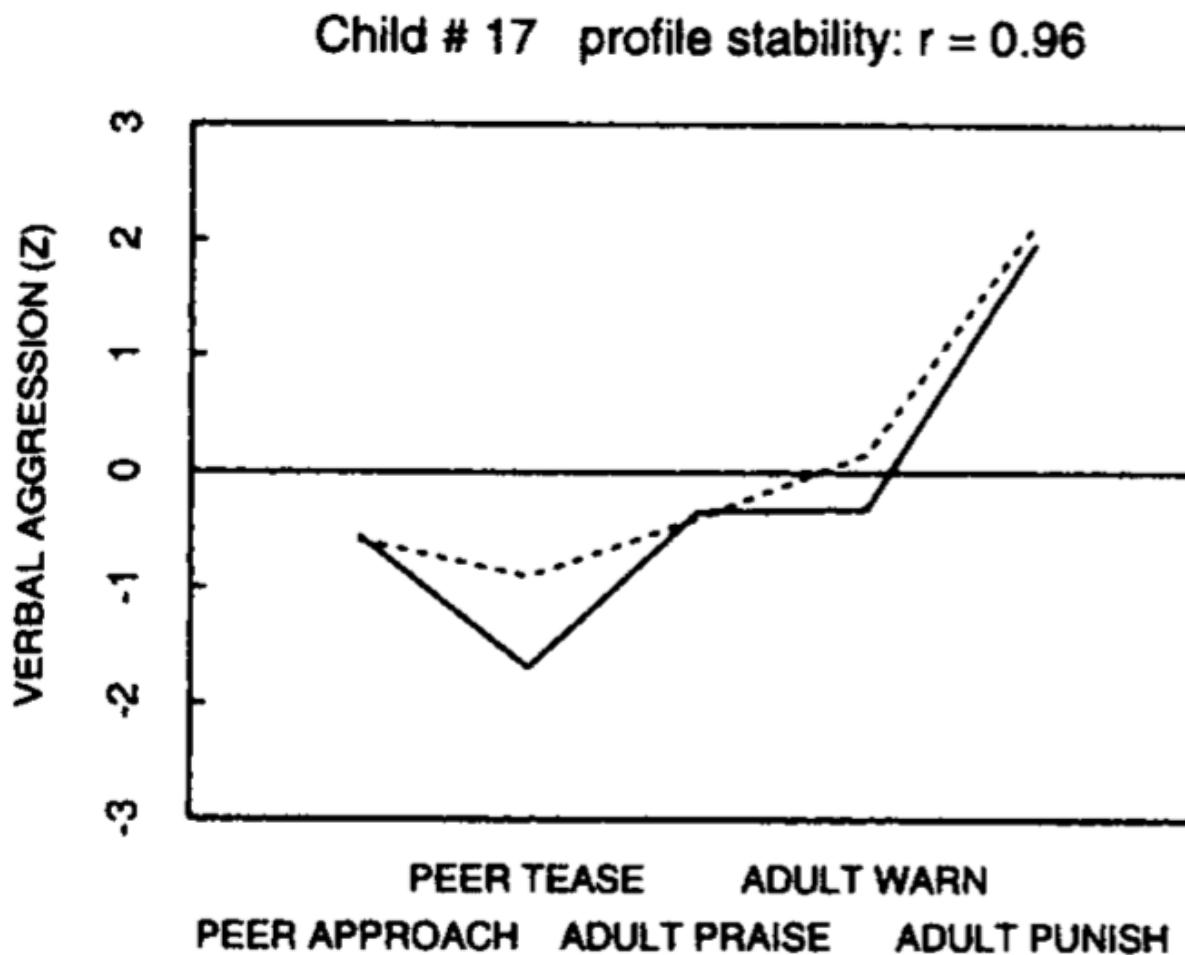
***Experience***

***Etc.***

e.g., Mischel & Shoda, 2005; Wright & Mischel, 1987;  
Shoda, Mischel, & Wright, 1993; Mischel, 1973



# What is personality?



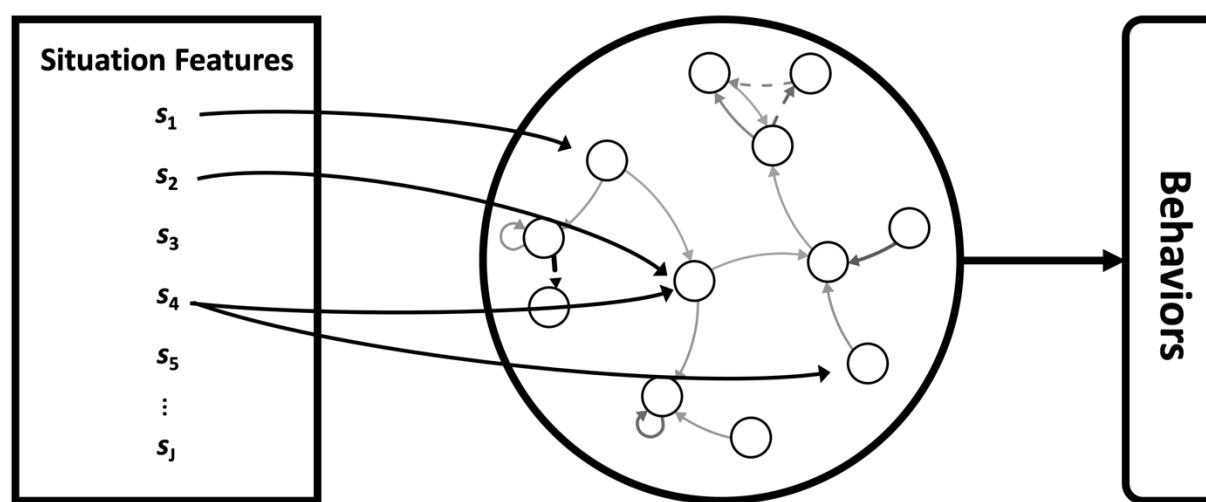
e.g., Mischel & Shoda, 2005; Wright & Mischel, 1987;  
Shoda, Mischel, & Wright, 1993; Mischel, 1973

# Persons in Context: Systems Theories

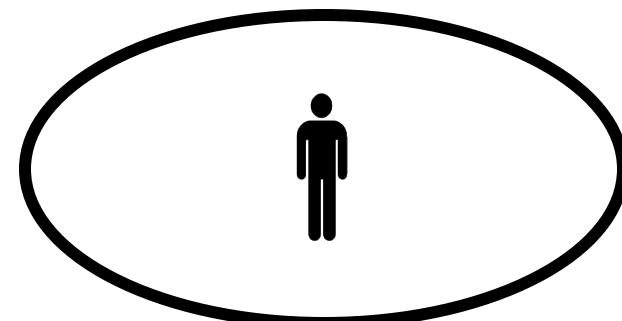
**Ecological Systems Theory**  
(e.g., Bronfenbrenner, 1979)



**Cognitive Affective Personality System**  
(e.g., Mischel & Shoda, 1995)



**Field Theory**  
(e.g., Lewin, 1936)

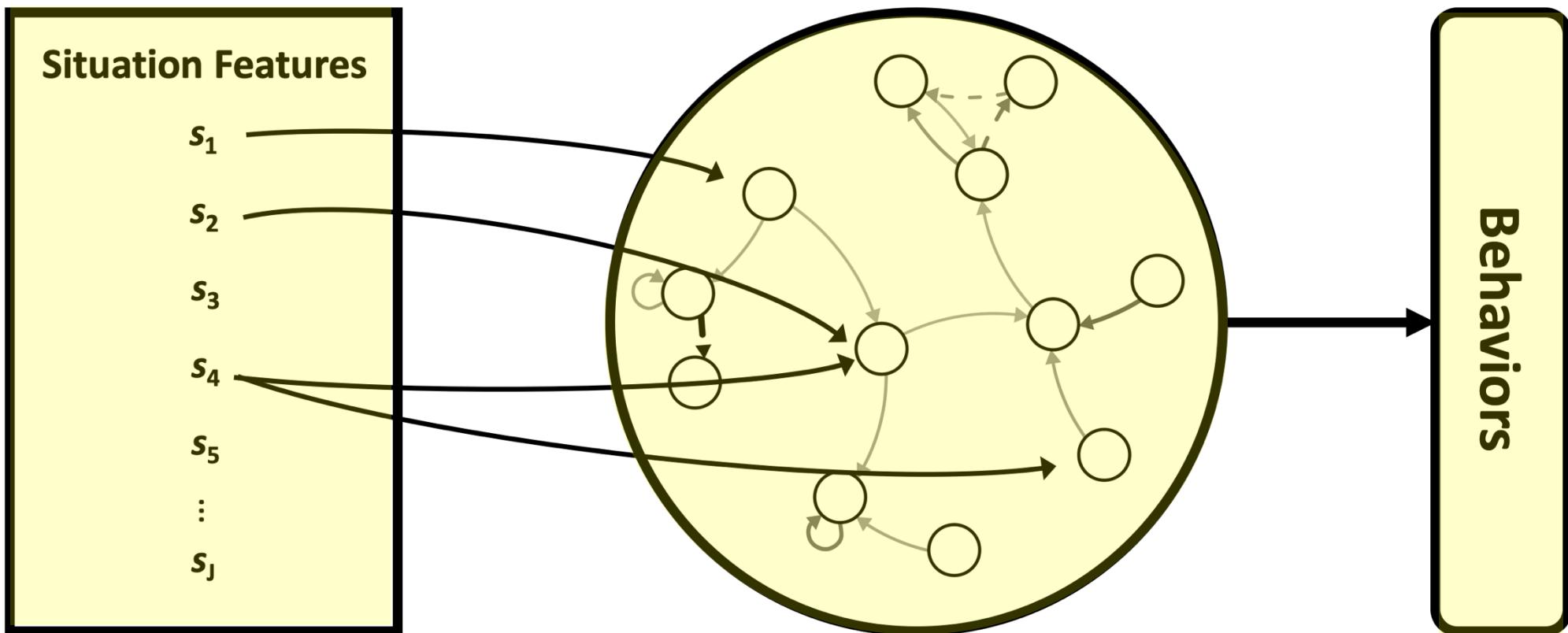


e.g., Lewin, 1936

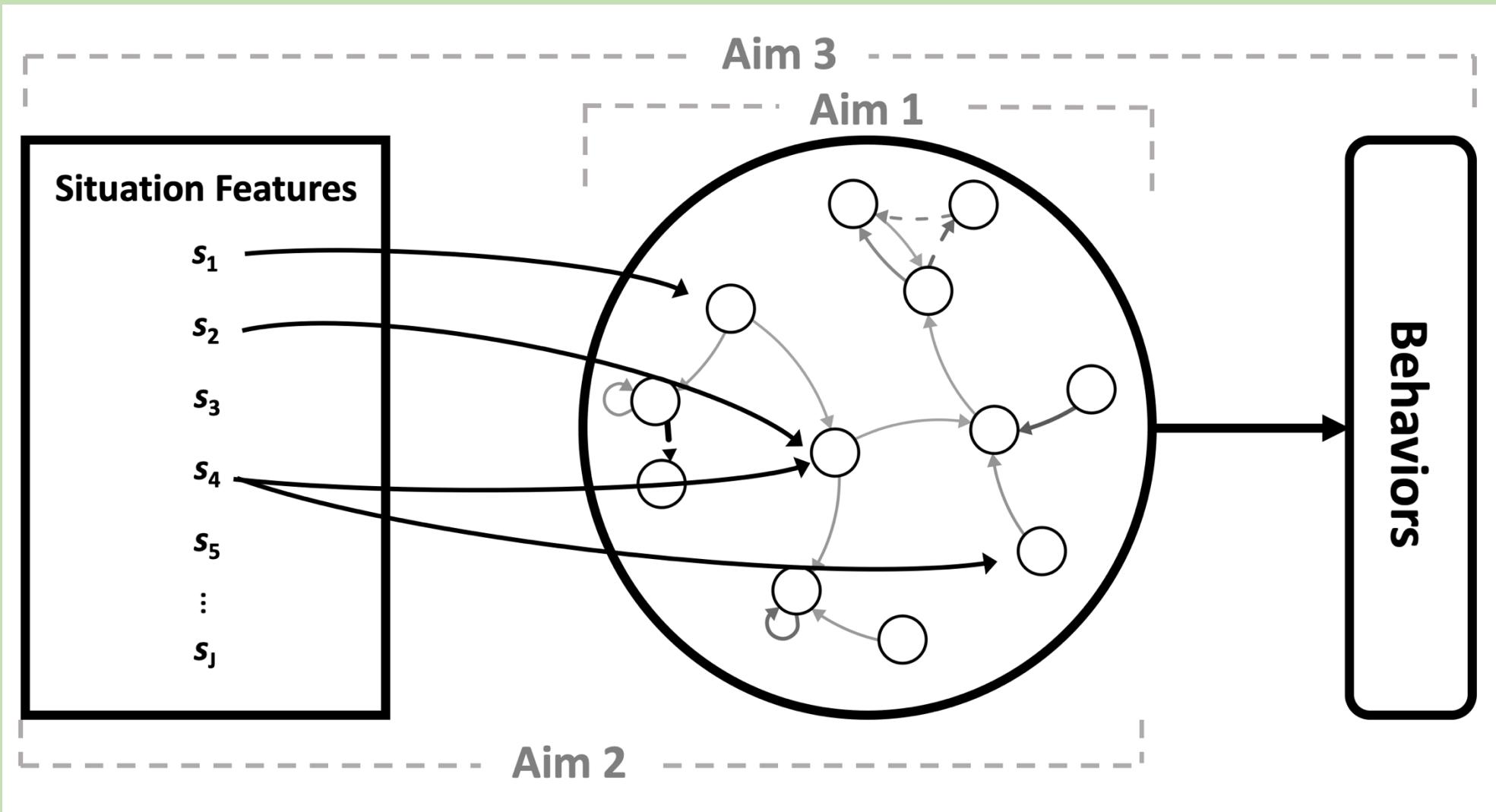


# What is personality?

A Cognitive Affective Processing System (CAPS)



e.g., Mischel & Shoda, 2005; Wright & Mischel, 1987;  
Shoda, Mischel, & Wright, 1993; Mischel, 1973



**Aim 1:** Bringing the individual back in the study of personality structure and change.

Beck & Jackson  
(2020, *JPSP*; 2021b; *EJP*)

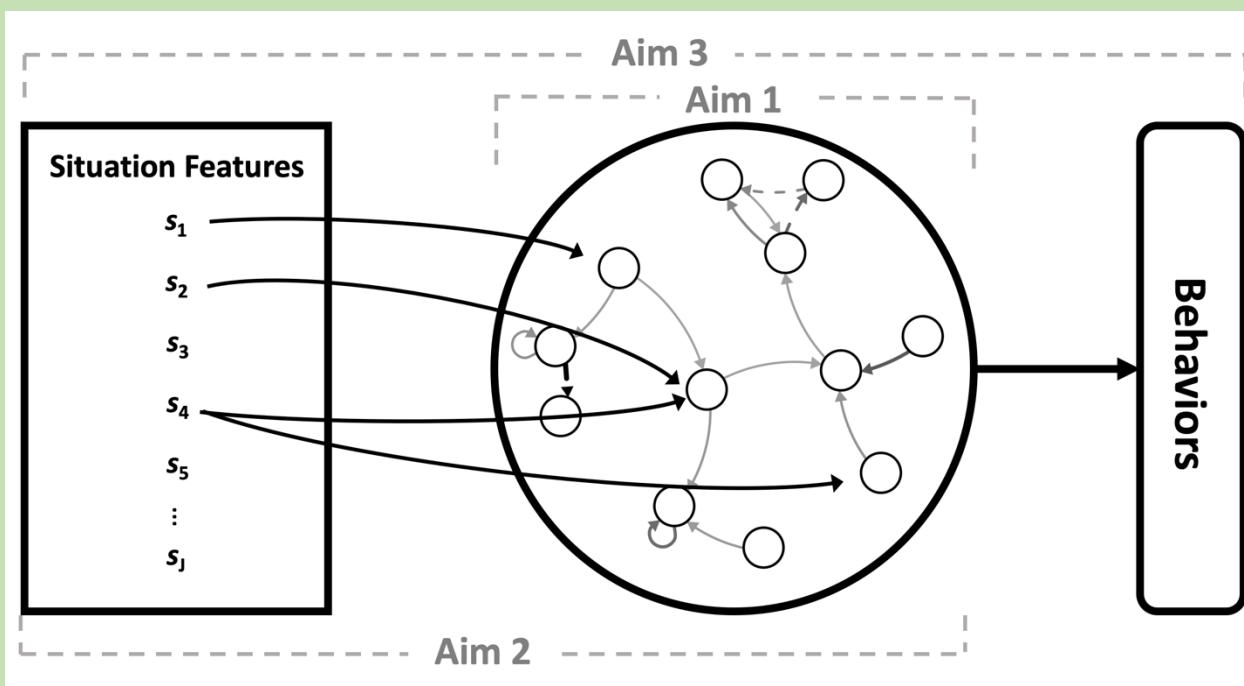
**Aim 2:** Using longitudinal data to understand how well-being unfolds across contexts.

Beck, et al.  
(in press, *NHB*)

**Aim 3:** Predicting behavior using machine learning.

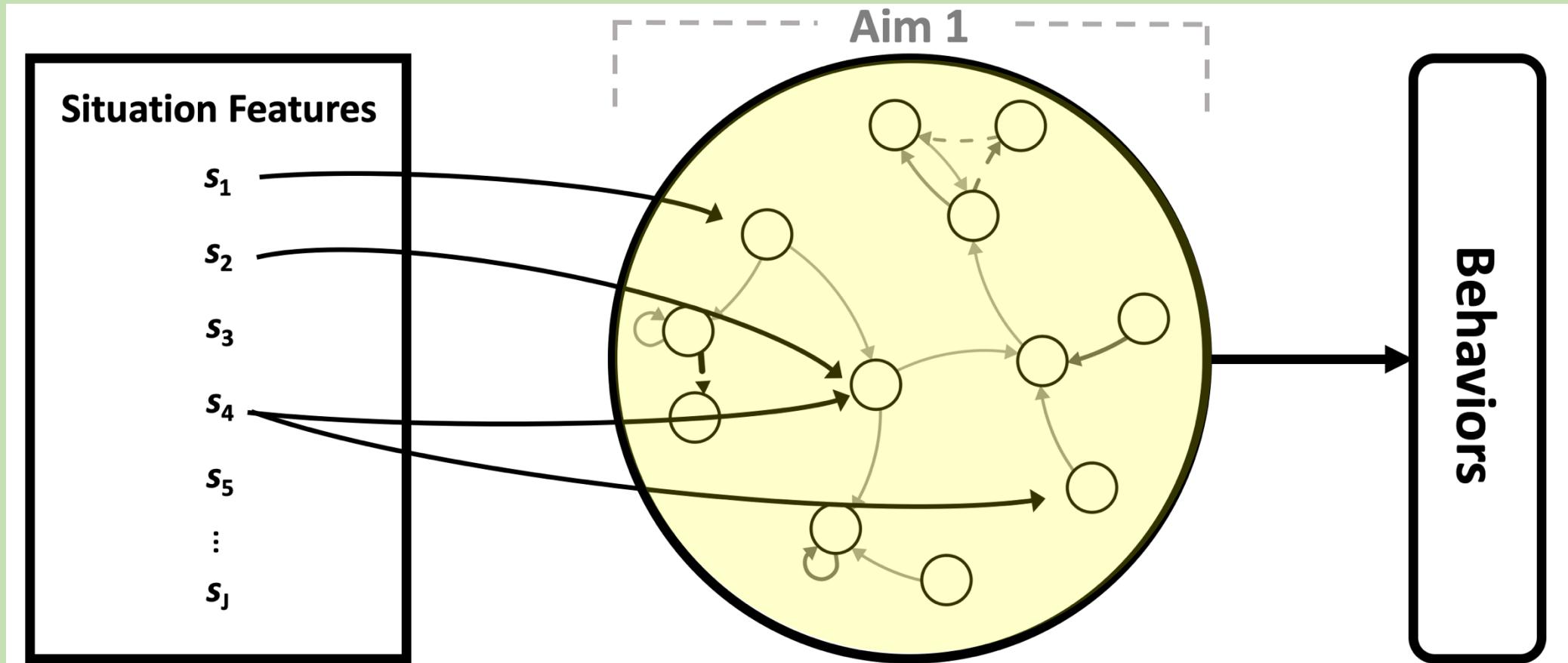
Beck & Jackson  
(2023, *Psych Science*)

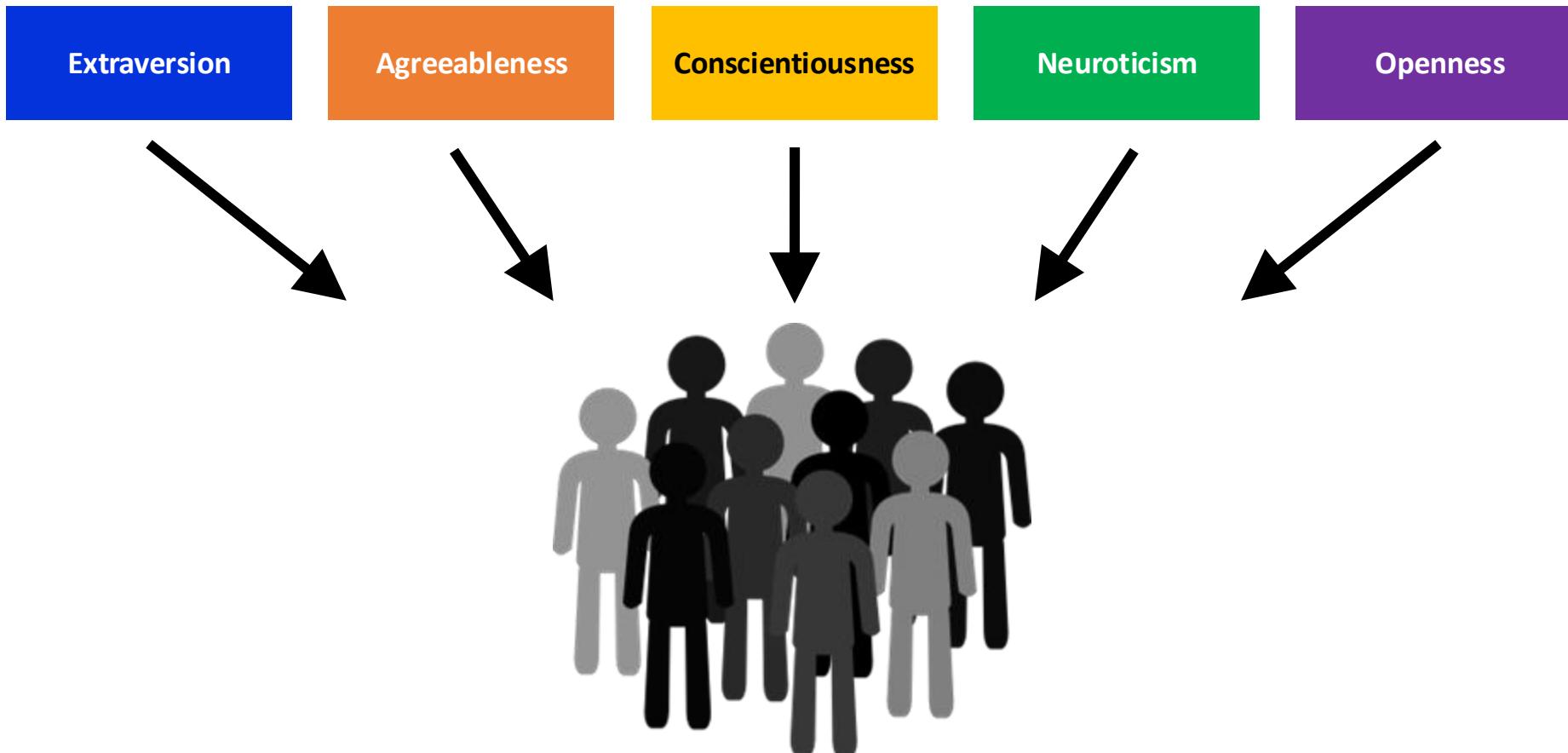
## Ongoing Directions



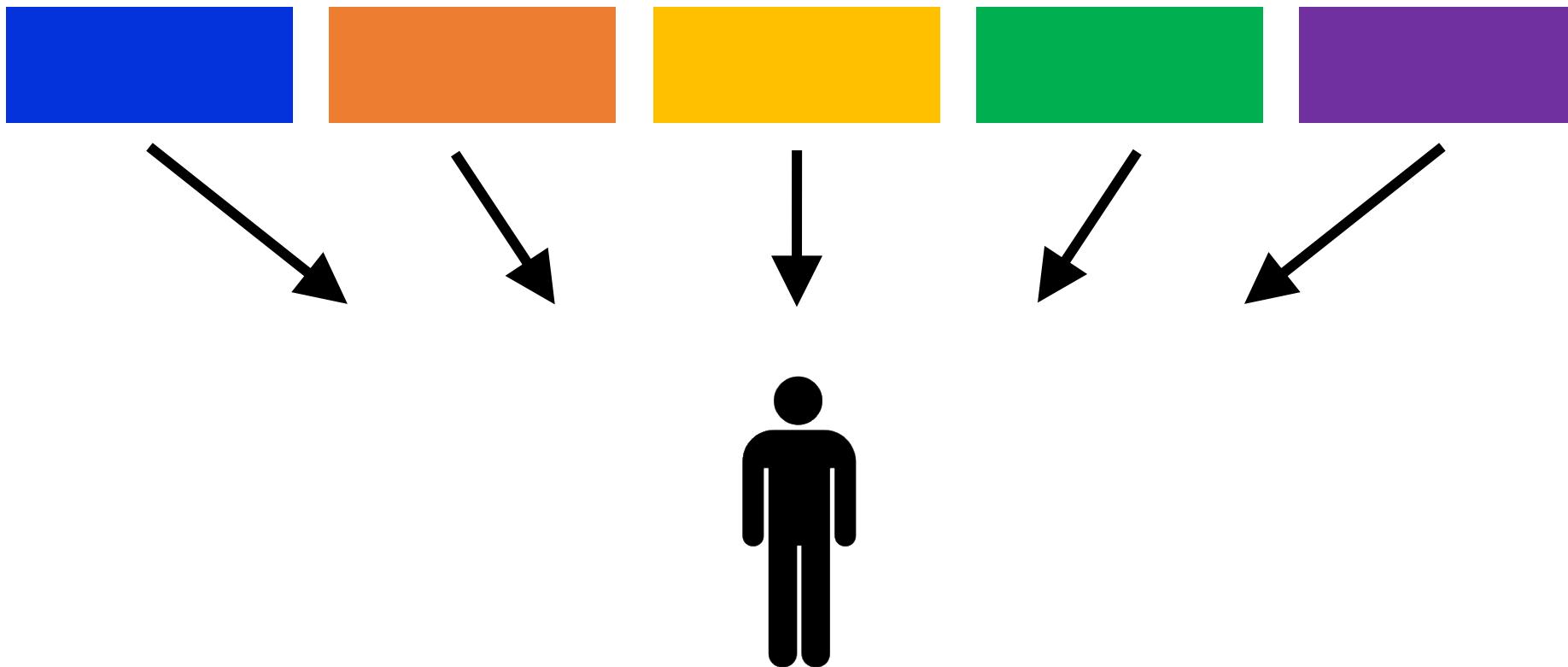
**Aim 1:** Bringing the individual back in the study of personality structure and change.

Beck & Jackson  
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Nomothetic  
Variable-Centered

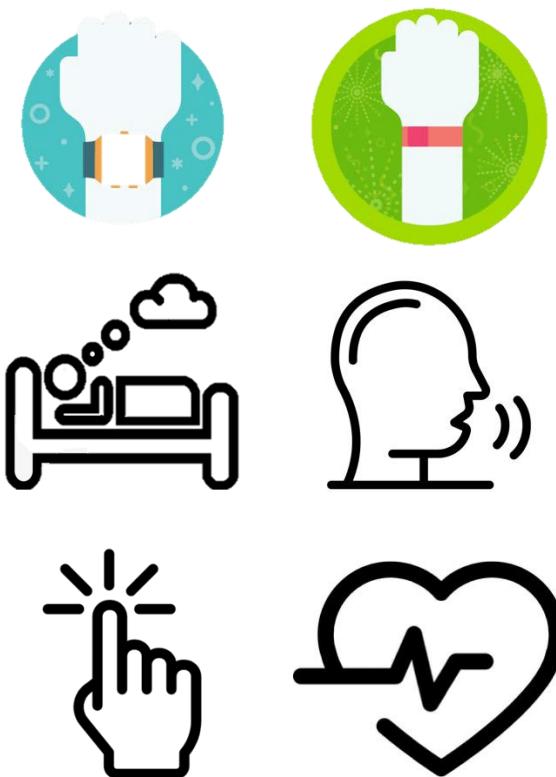
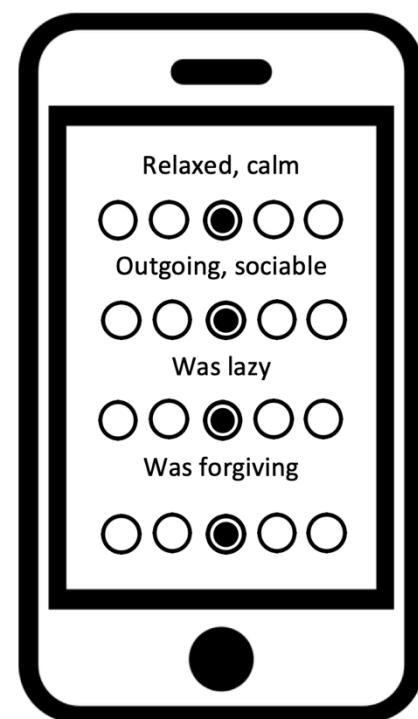


# Idiographic Person-Specific

e.g., Beck & Jackson, 2020a, *JPSP*; 2020b, *CDPS*

## ESM / EMA

## Mobile Sensing



# Methods

2 years of ESM responses from the Personality and Interpersonal Roles Study (PAIRS)

N = 372 Wash U undergrads, total assessments N = 17,715

## Measures

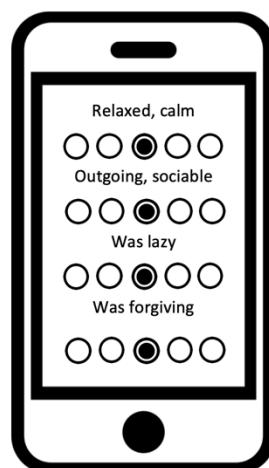
9 items from the Big Five Inventory (BFI)

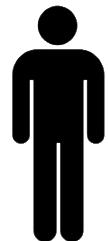
## Procedure

4 assessments / day for 15 days

## Modeling

Graphical vector autoregression

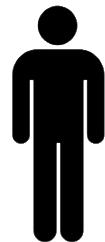




time	E	A	C	N	O
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

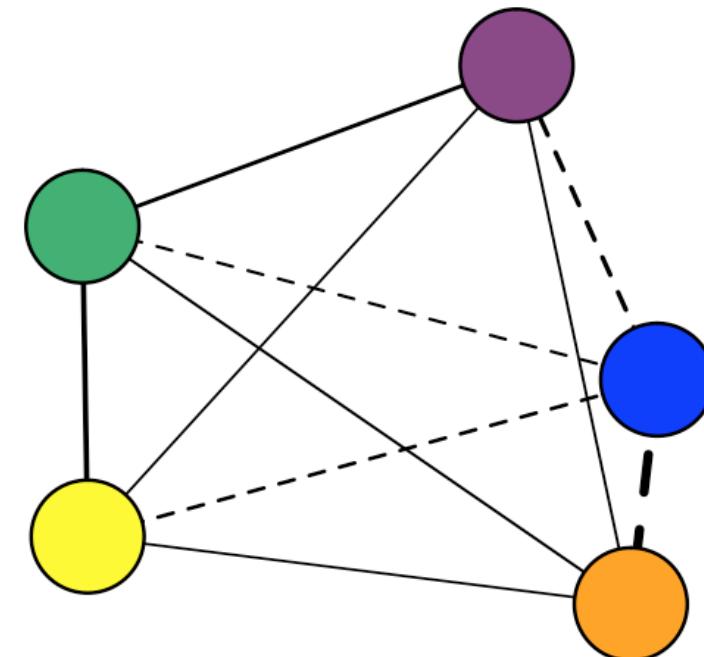
E				
A	0.02			
C	-0.05	0.08		
N	0.64	-0.12	-0.10	
O	0.26	-0.27	0.43	0.07

Contemporaneous: Within Time-Points  
 $x_{it} \leftrightarrow x_{jt}$

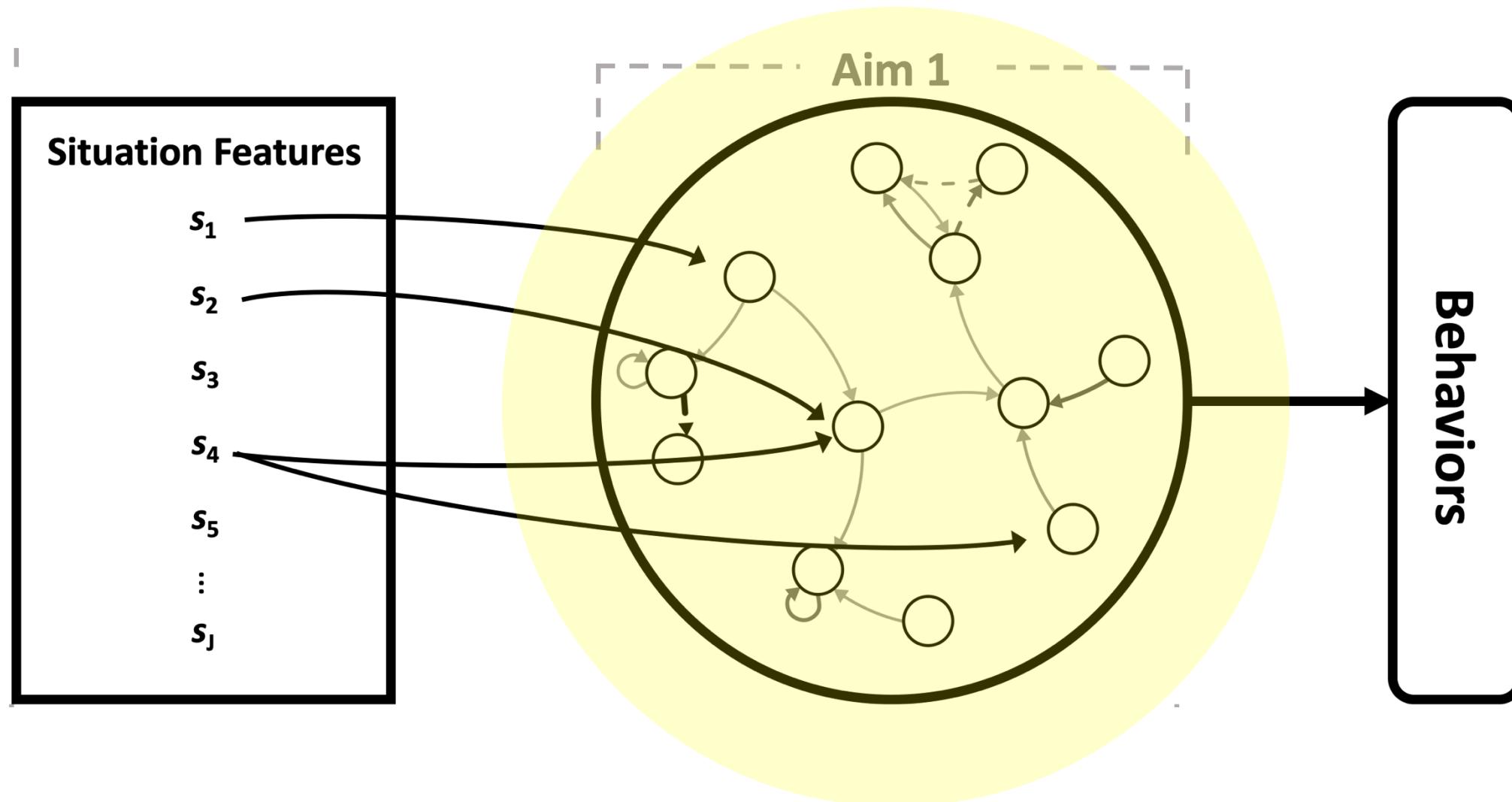


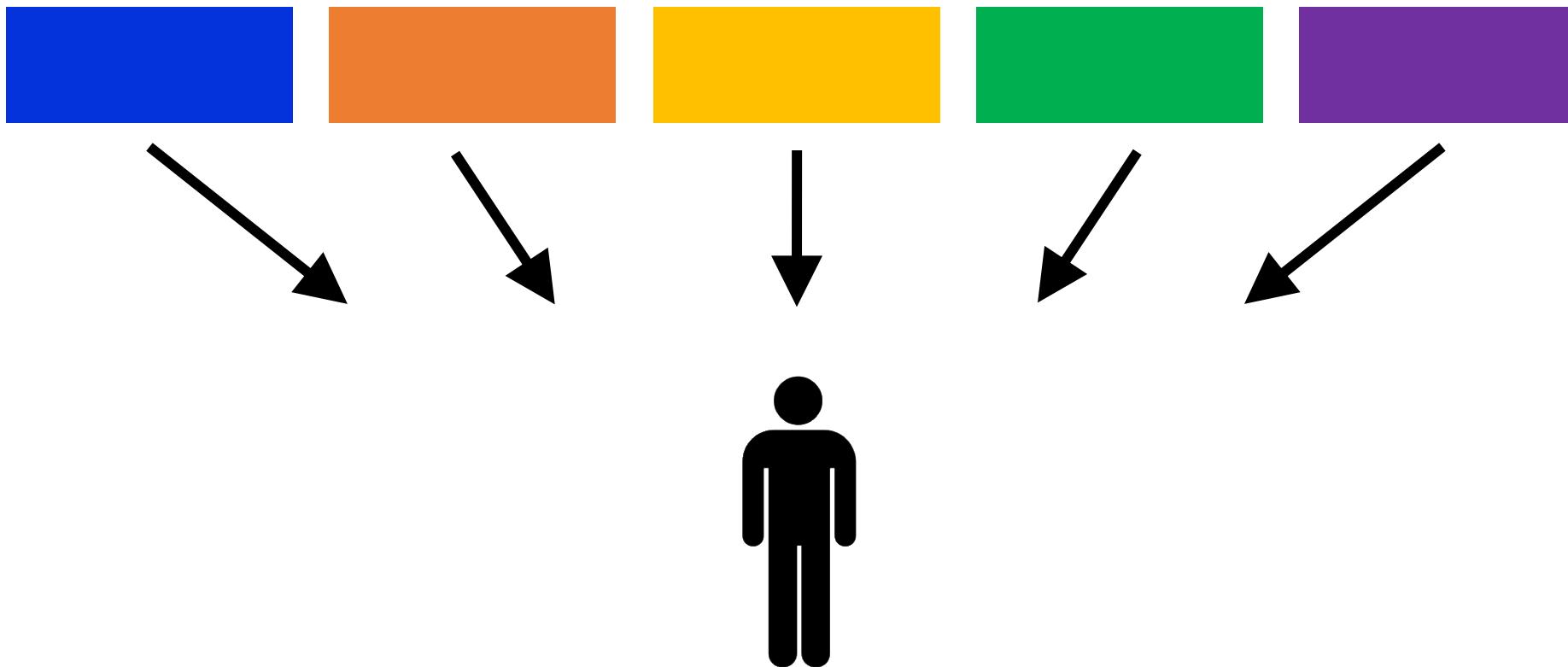
time **E A C N O**

1	4	2	3	2	4
2	2	3	4	1	4
3	3	3	2	2	4
4	3	1	3	2	3
5	4	4	3	2	2
6	4	1	2	3	4
7	2	2	2	2	1
8	4	2	3	3	4
9	3	2	2	1	2
10	4	2	3	3	3
11	3	1	3	2	5

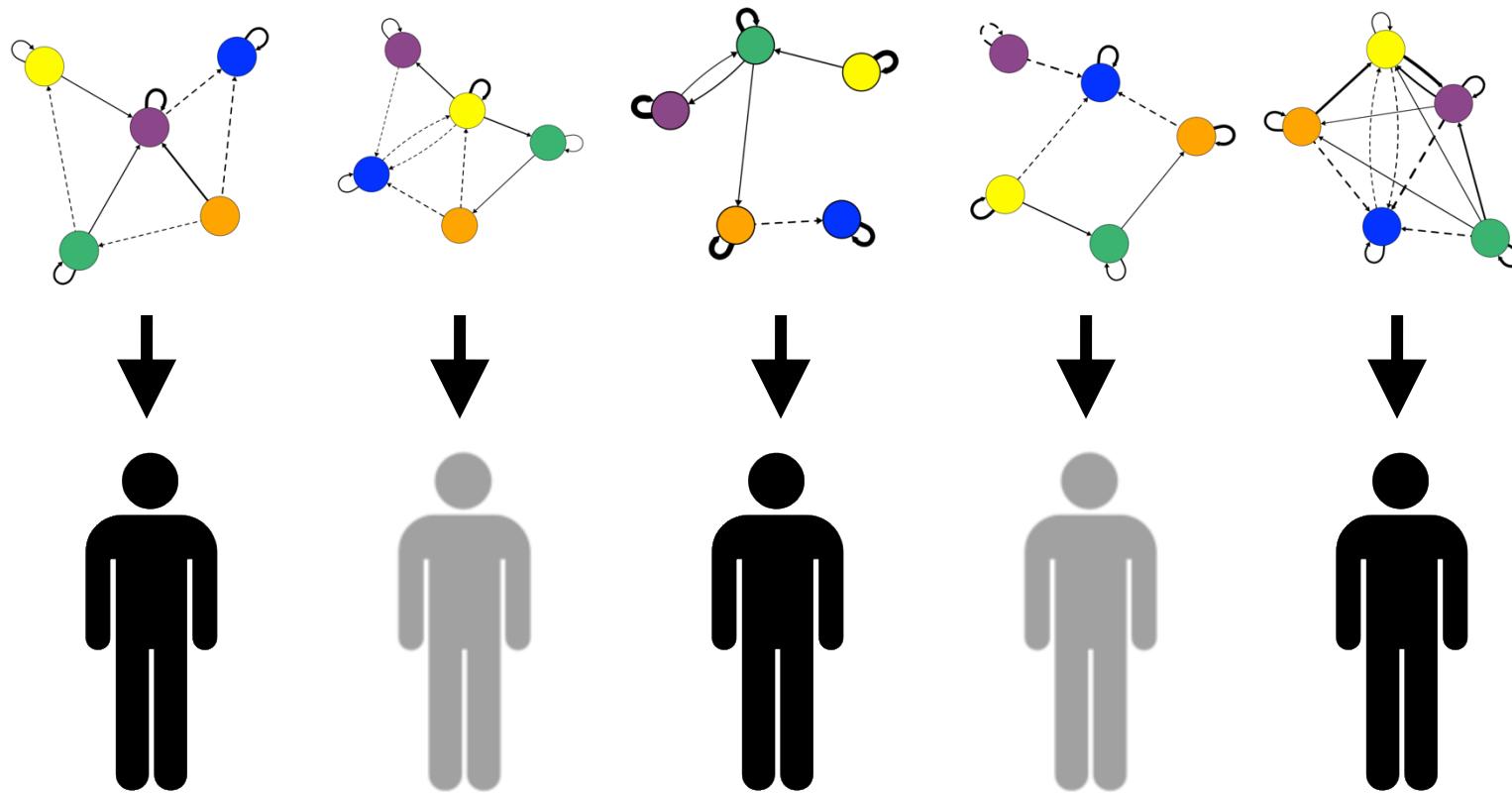


**Contemporaneous: Within Time-Points**  
 $x_{it} \leftrightarrow x_{jt}$





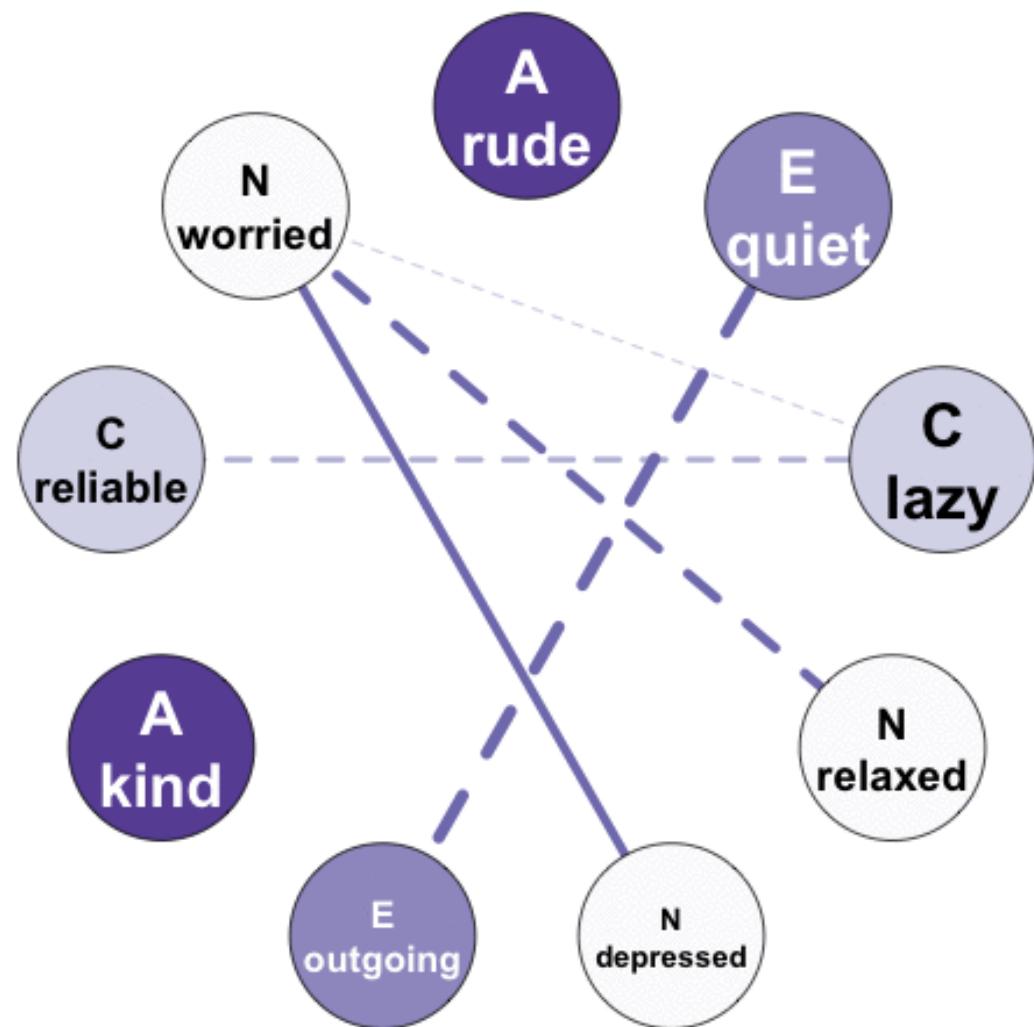
# Idiographic Person-Specific

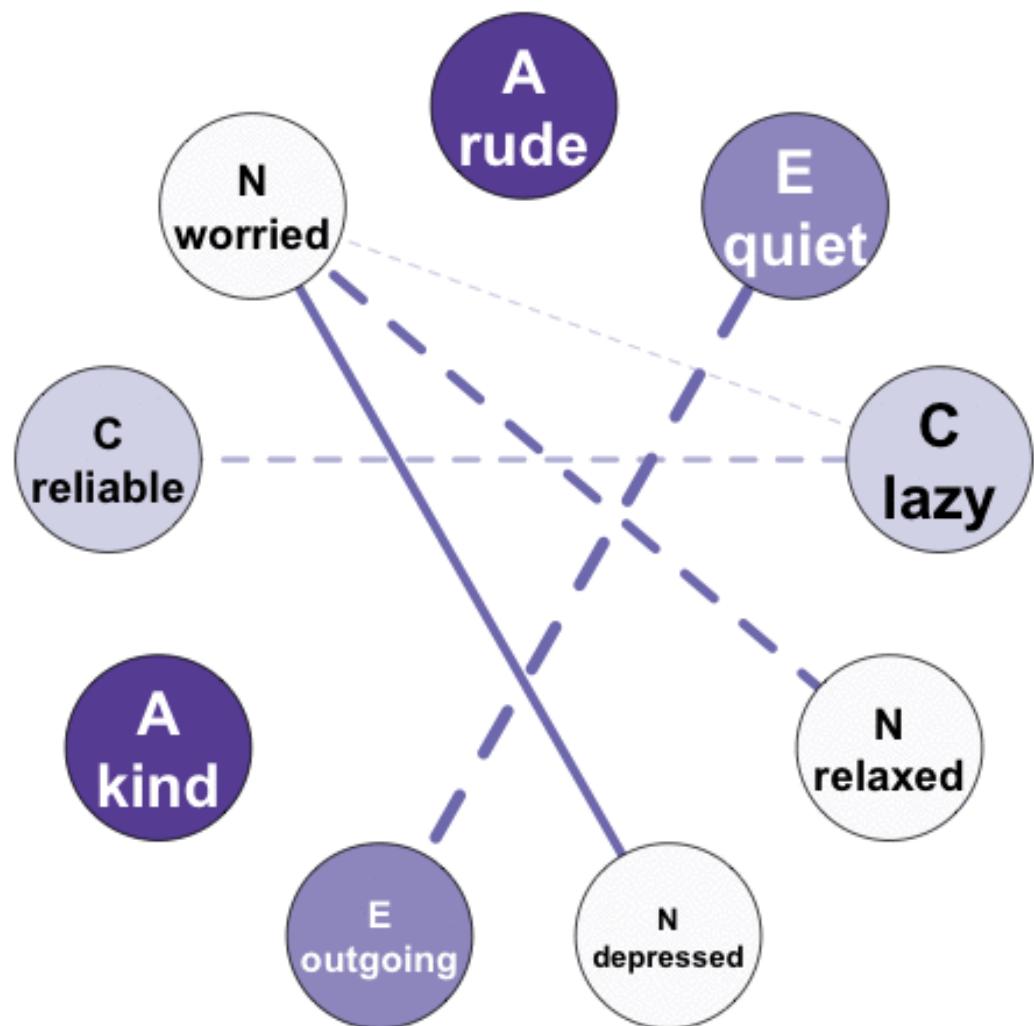


**Idiographic  
Person-Specific**

# RESULTS

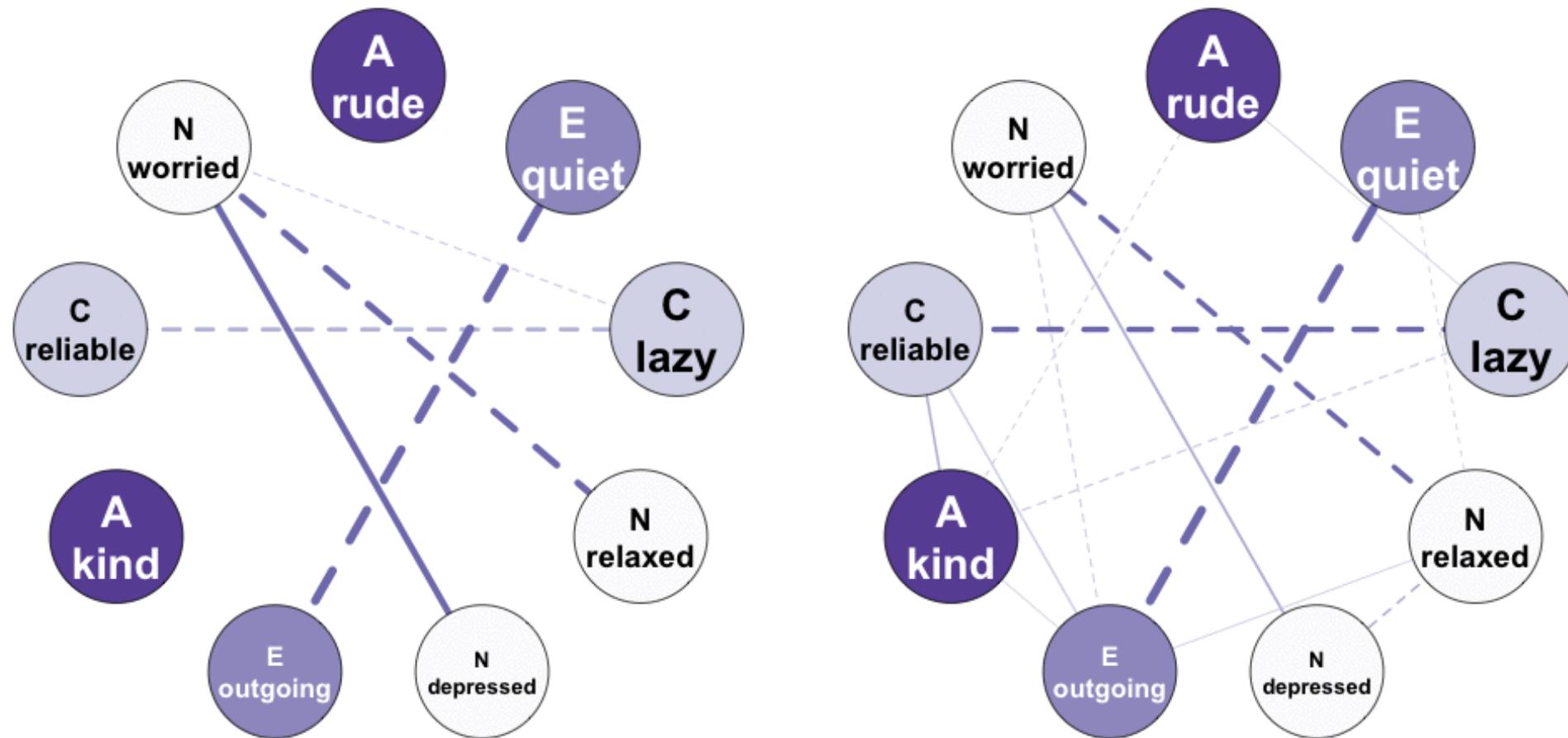
Aim 1

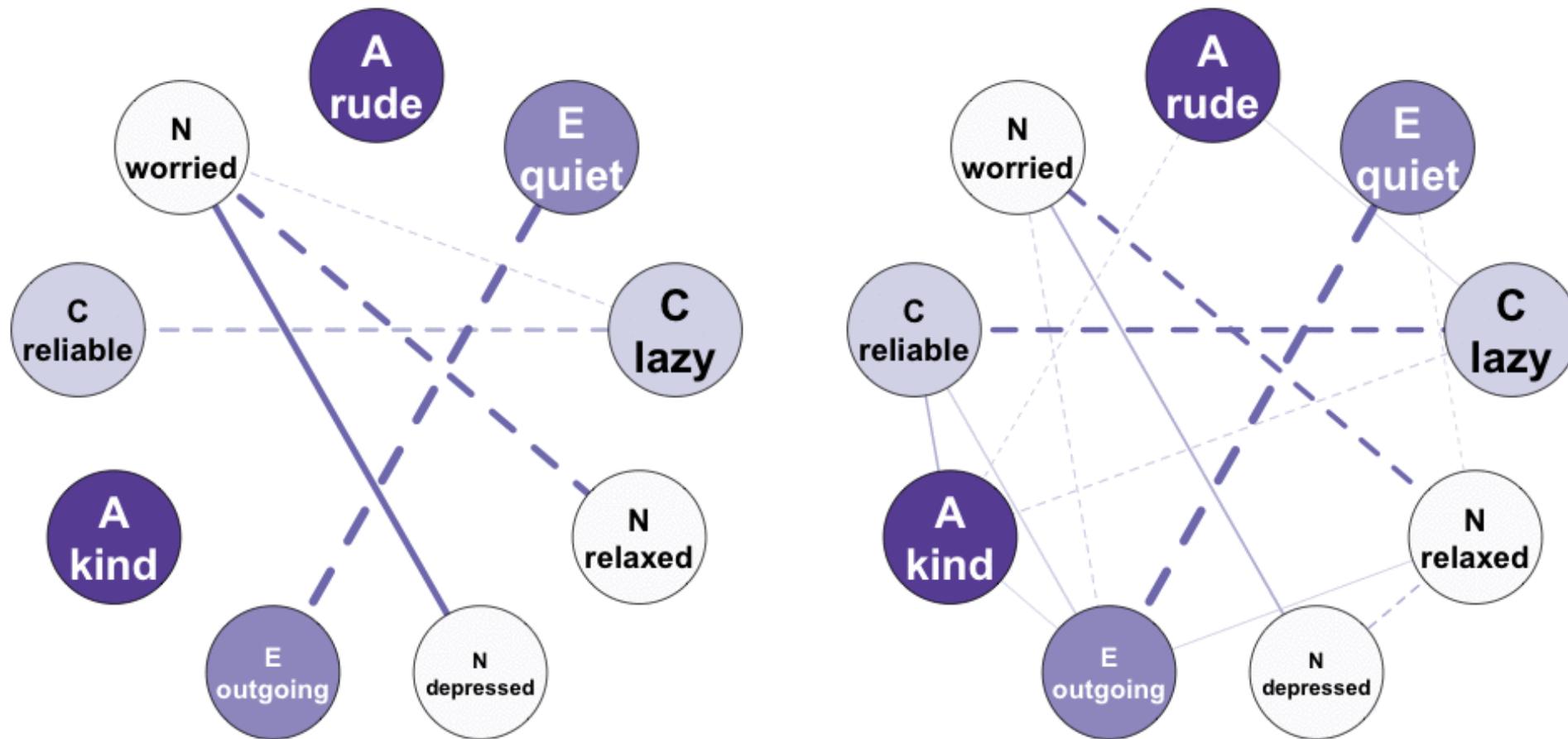


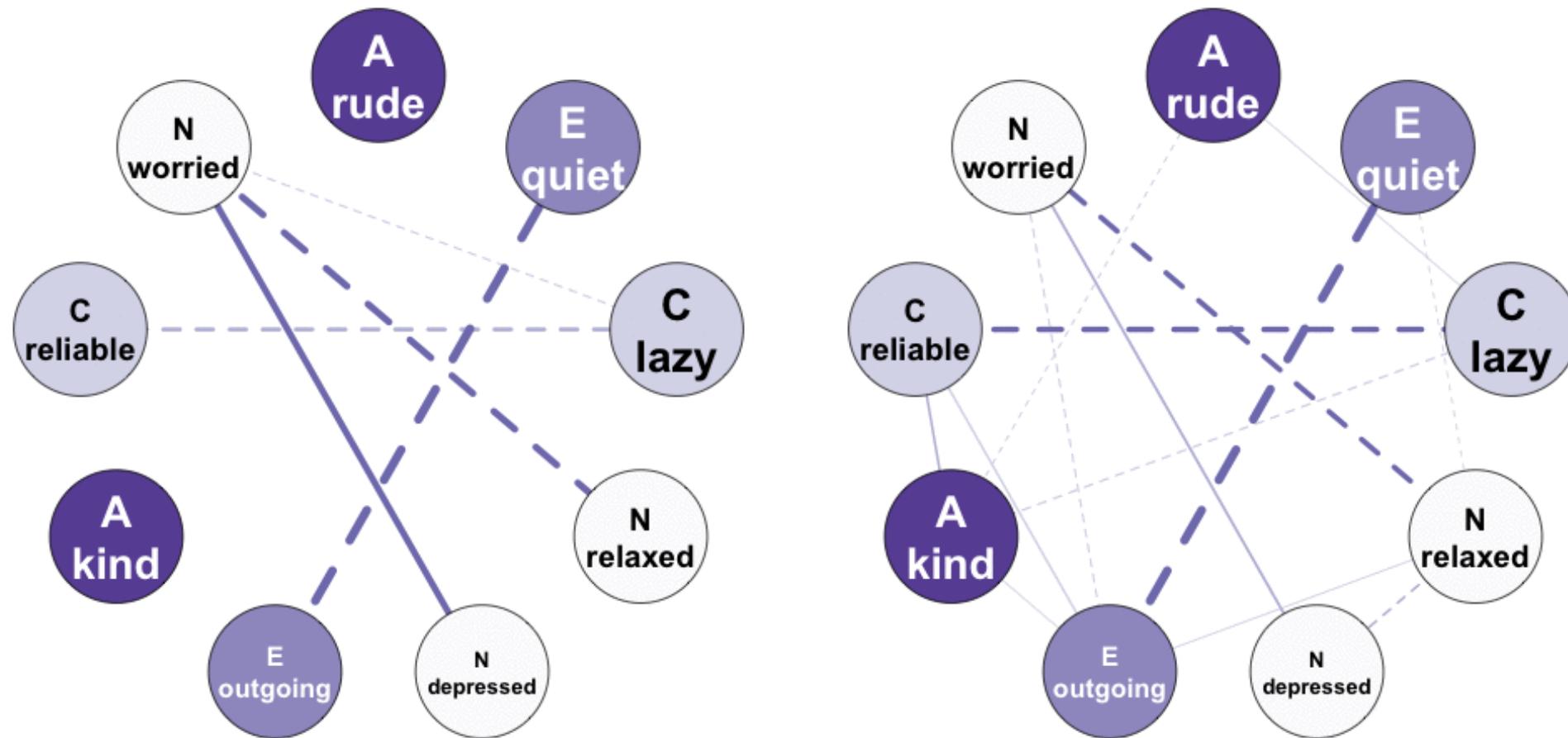


The structures differ across people.

But do they show expected longitudinal consistency?



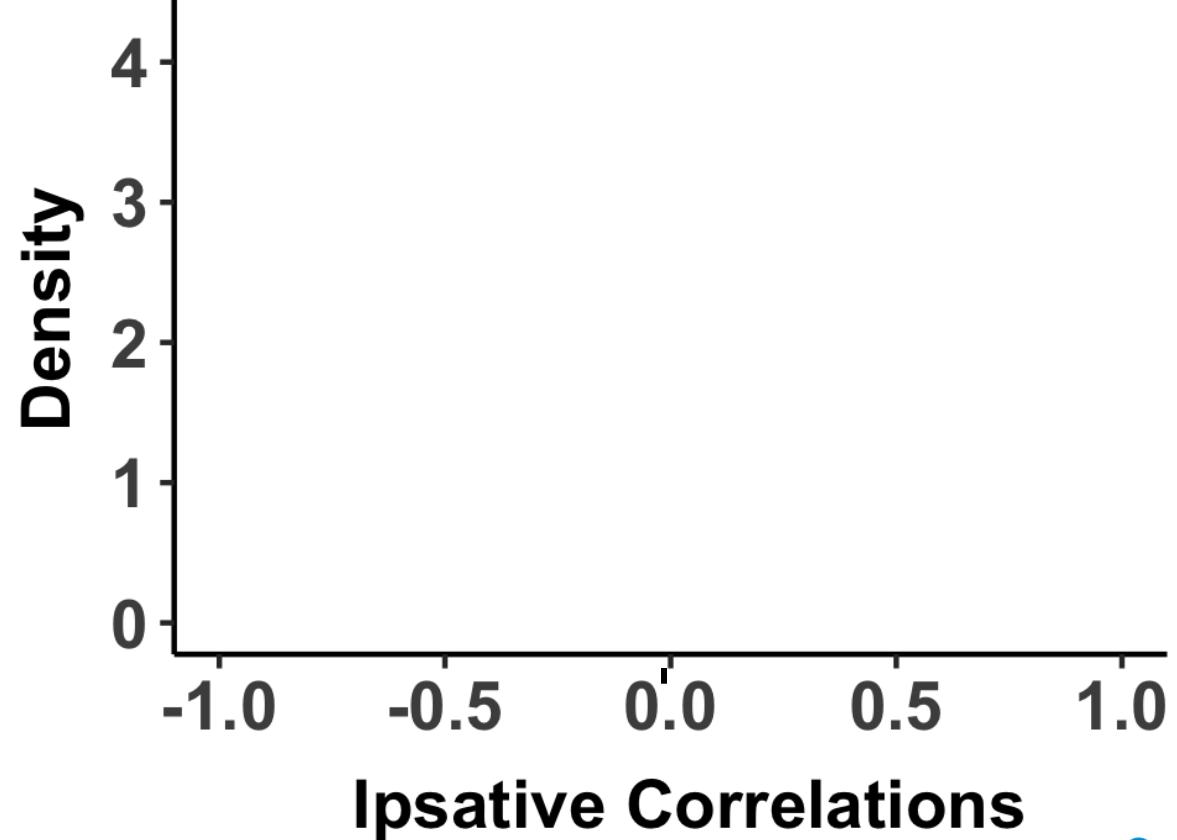




How consistent is  
idiographic personality  
across two  
years?

## Ipsative Network Consistency

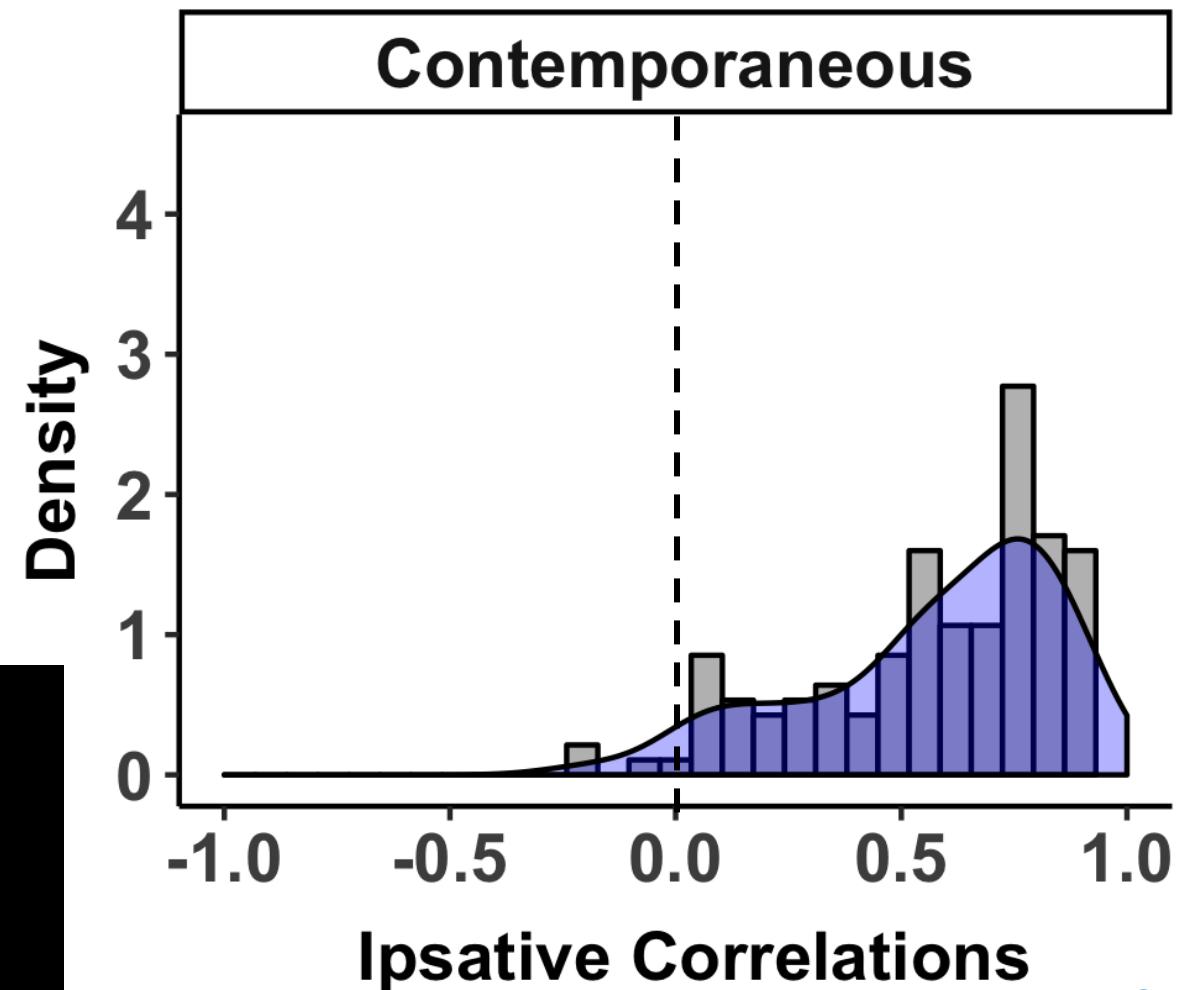
Contemporaneous



How consistent is  
idiographic personality  
across two  
years?

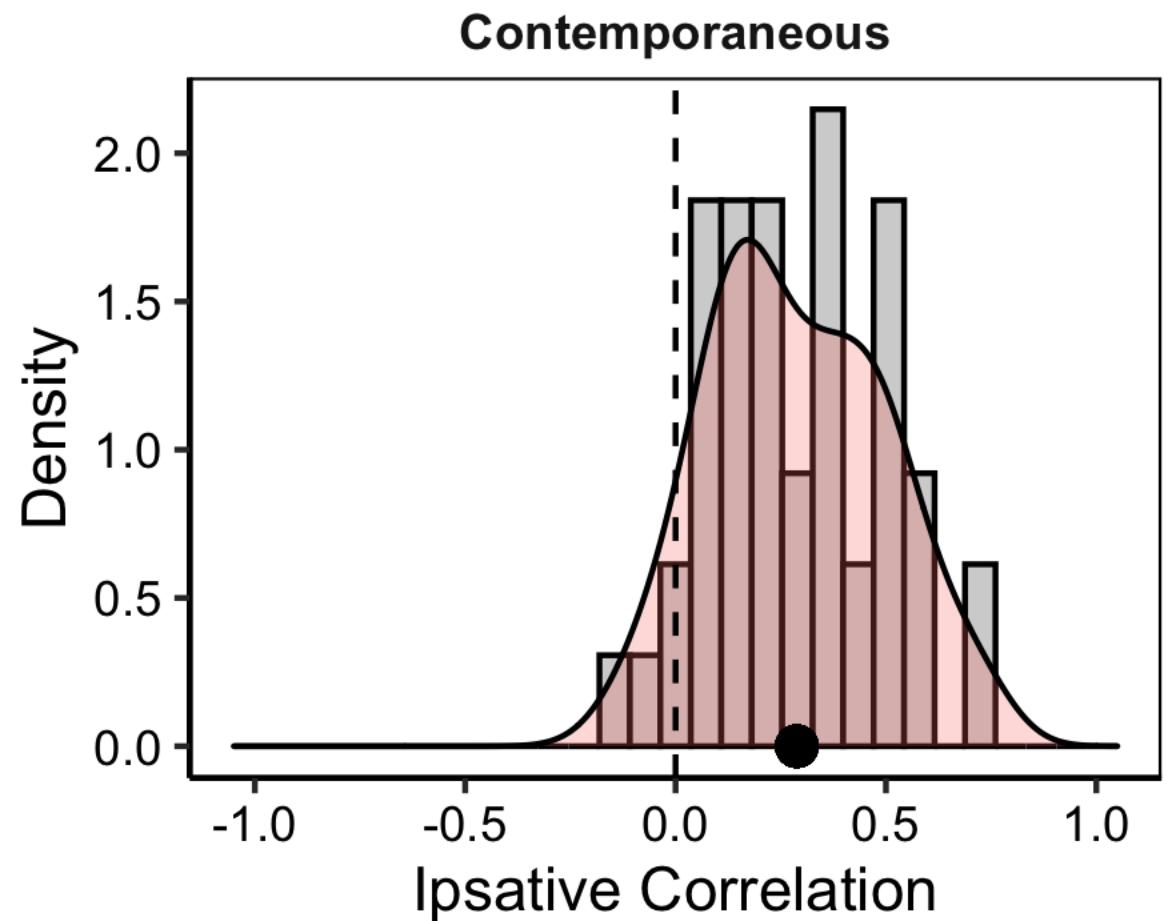
Idiographic Personality is  
consistent over two years.

## Ipsative Network Consistency



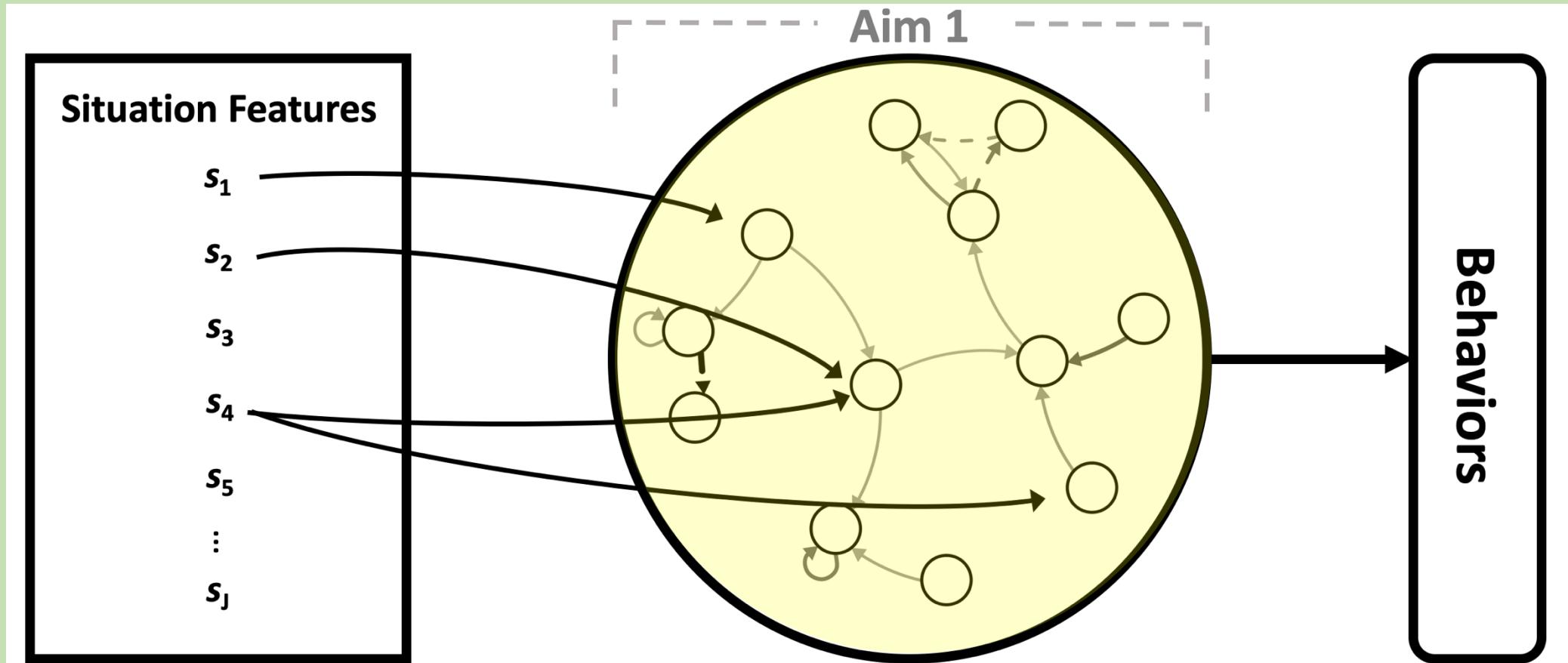
How consistent is  
idiographic personality  
across two  
years?

Idiographic Personality is  
consistent over two years AND  
global events.



**Aim 1:** Bringing the individual back in the study of personality structure and change.

Beck & Jackson  
(2020, *JPSP*; 2021b; *EJP*)



**Aim 1:** Bringing the individual back in the study of personality structure and change.

**Beck & Jackson**  
(2020, *JPSP*; 2021b; *EJP*)

**Idiographic personality structures are:**

**Unique (i.e. differ across people).**

**Relatively consistent over time.**

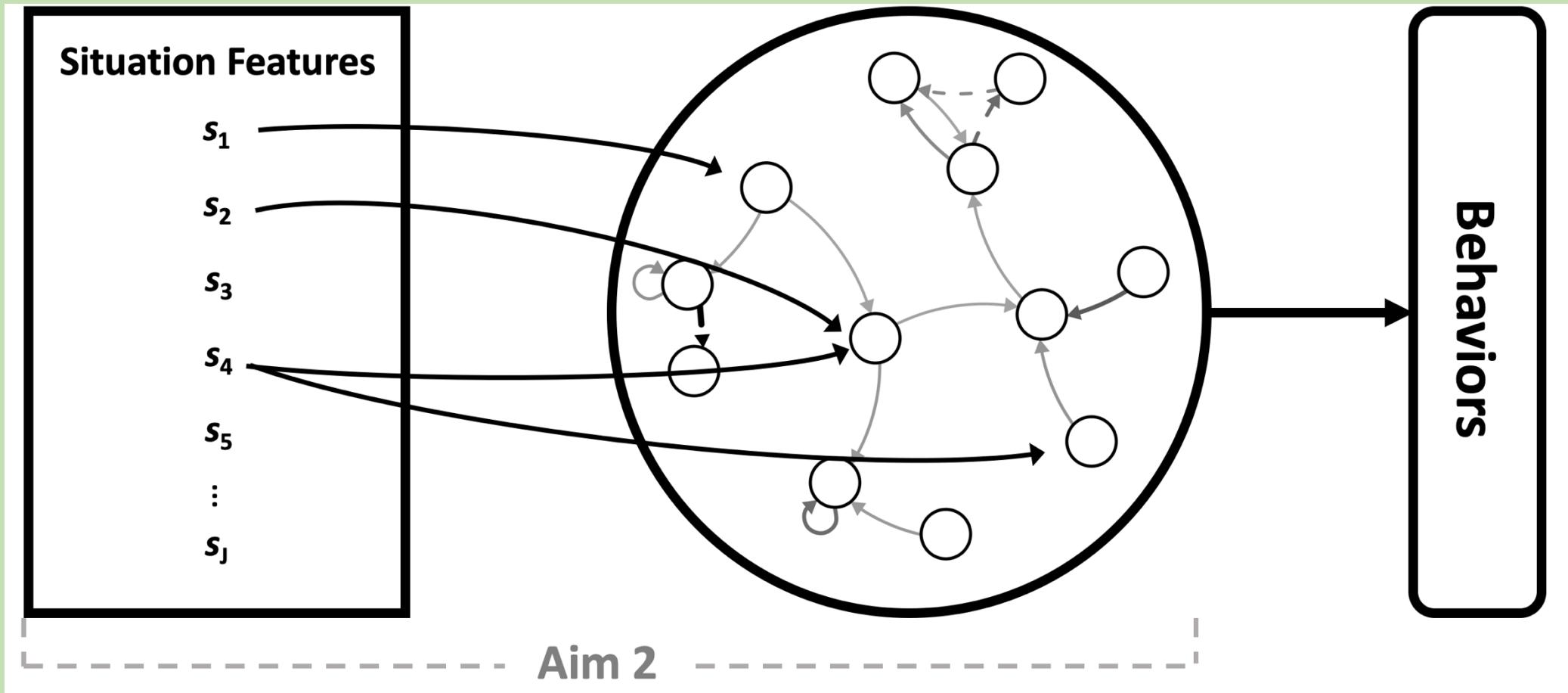
**Relatively consistent across global events.**

**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

Beck & Jackson  
(2020, *JPSP*; 2021b; *EJP*)

**Aim 2:** Using longitudinal data to understand how well-being unfolds across contexts.

Beck, et al.  
(in press, *NHB*)

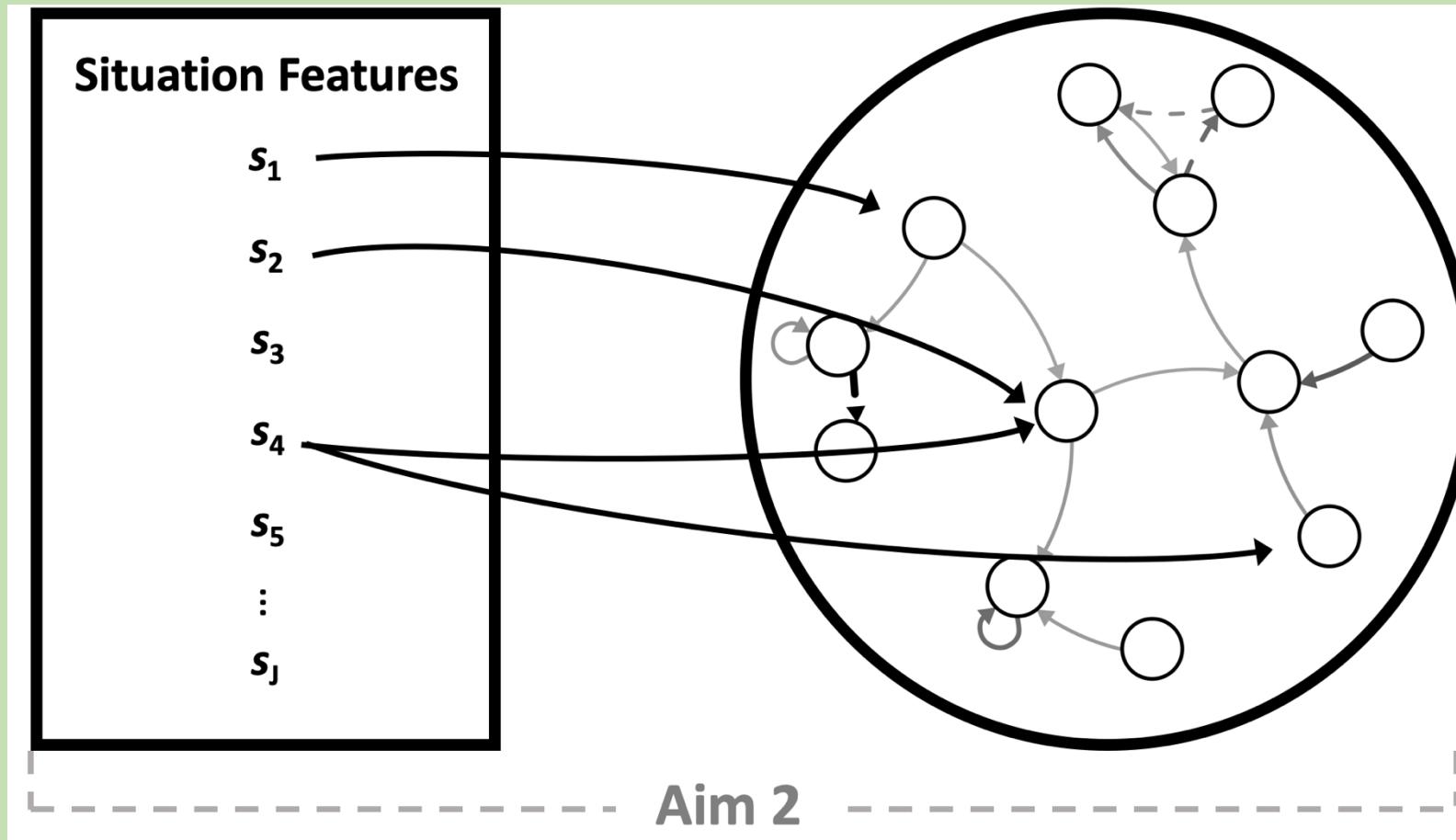


**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

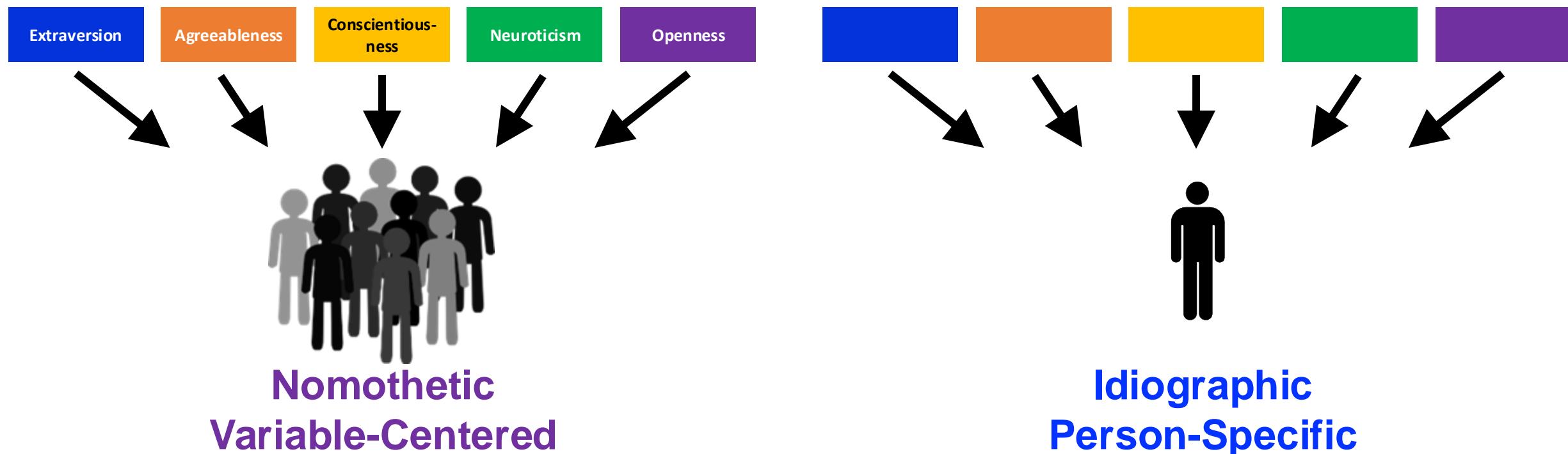
Beck & Jackson  
(2020, *JPSP*; 2021b; *EJP*)

**Aim 2:** Using longitudinal data to understand how well-being unfolds across contexts.

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(in press, *NHB*)



\* = shared first authorship.



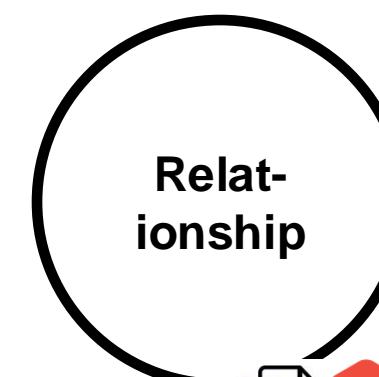
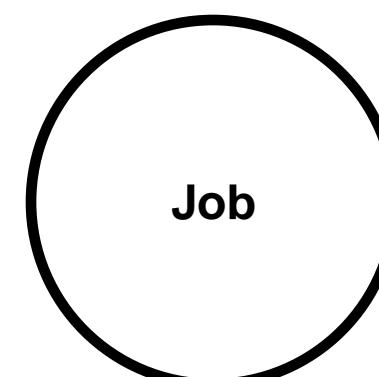
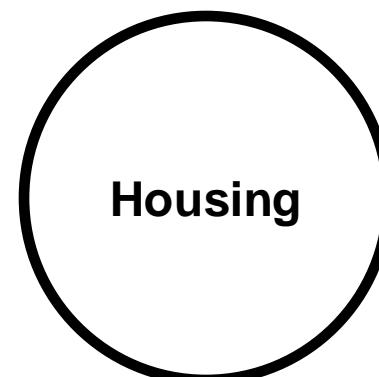
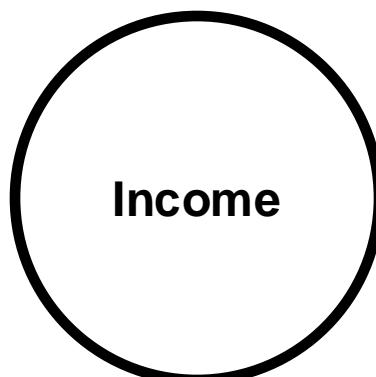
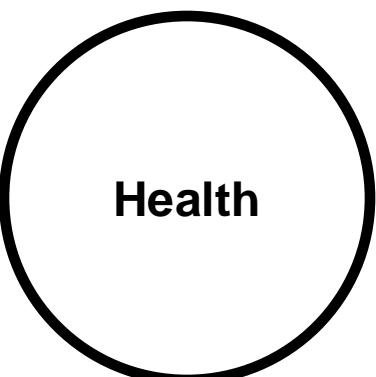


**Strong Theoretical Models**

**Rich longitudinal data**

**Unique patterns ignored**

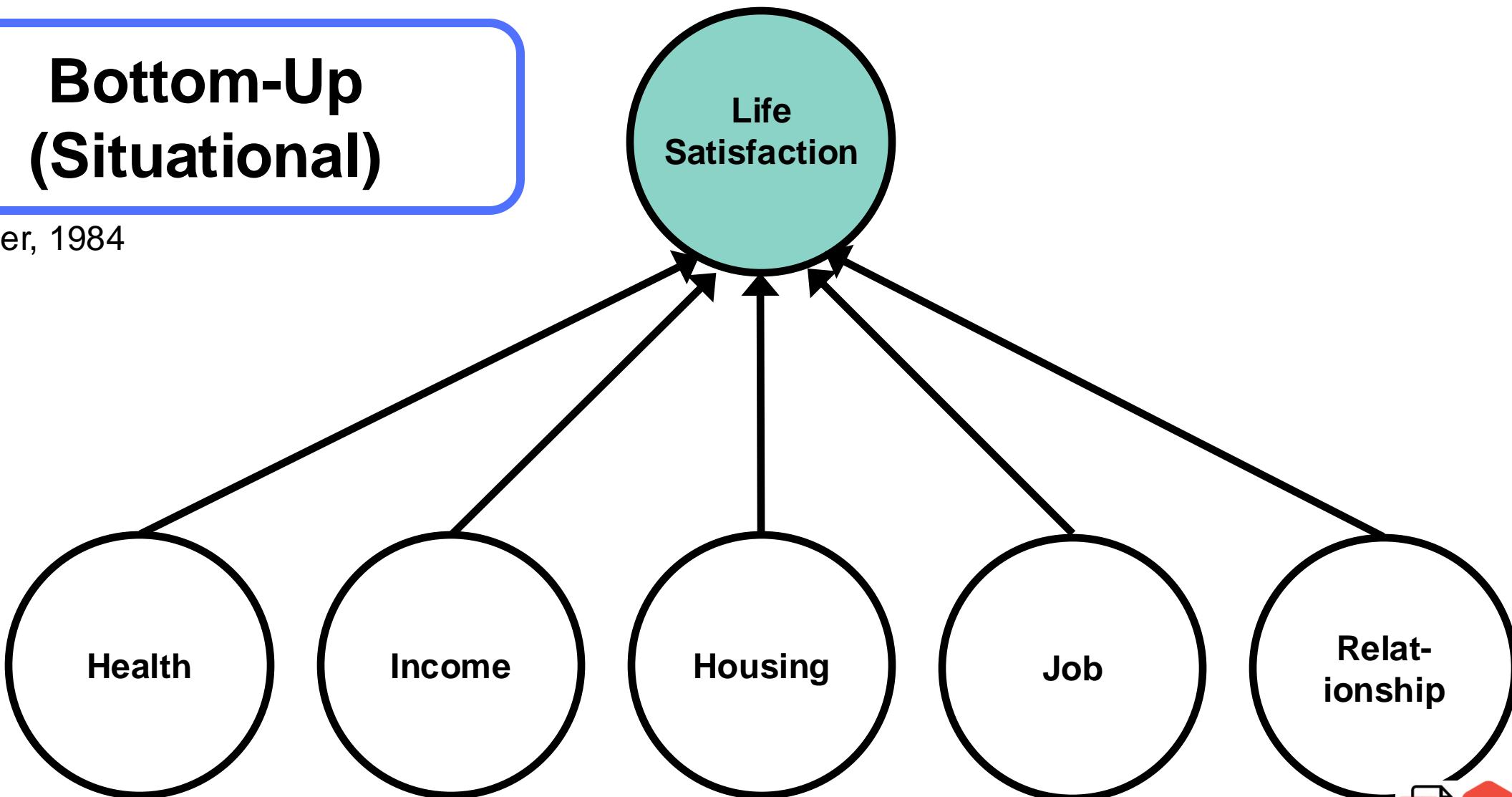
**Domain Satisfaction**



## Bottom-Up (Situational)

Diener, 1984

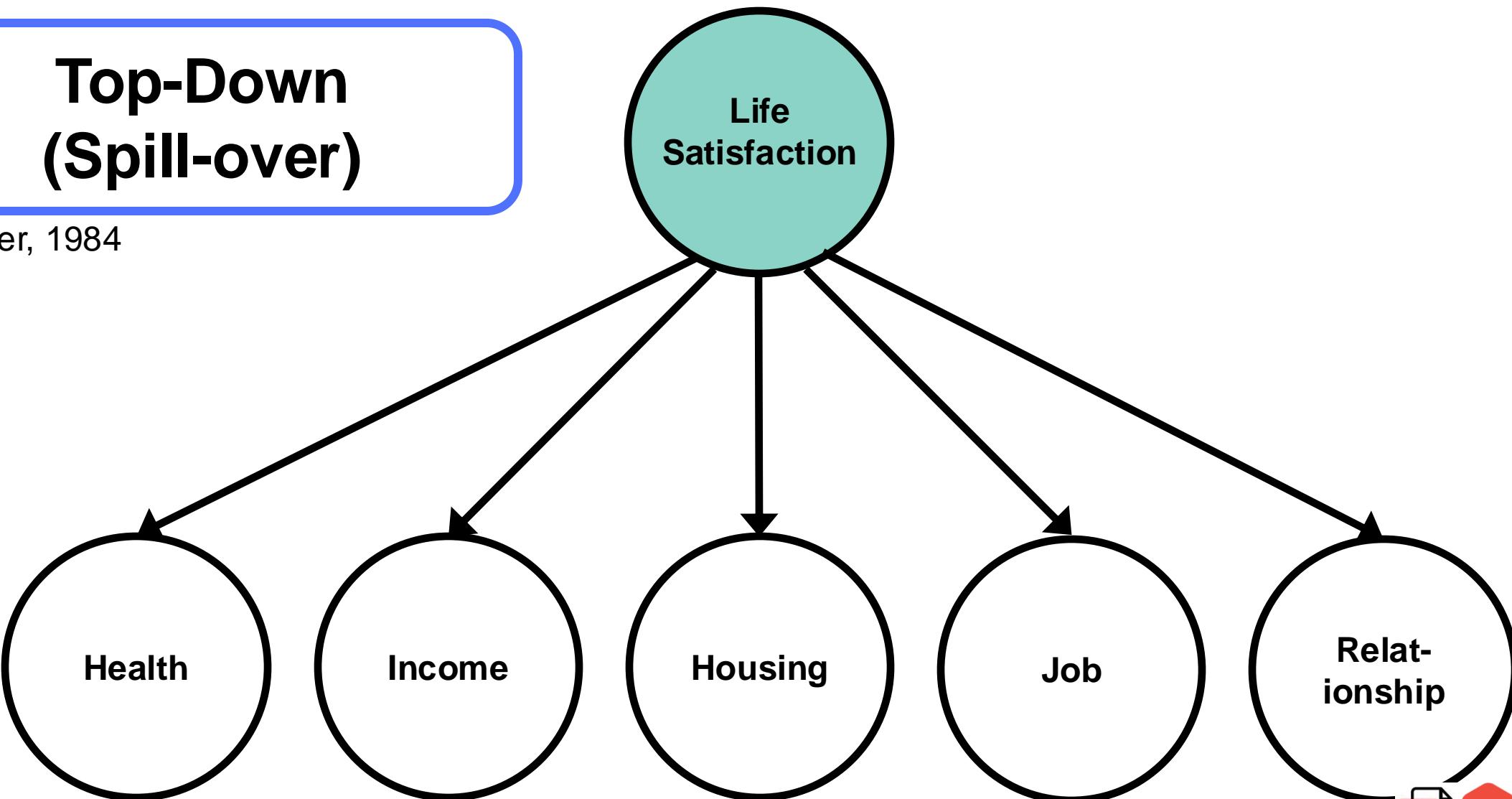
Domain Satisfaction



## Top-Down (Spill-over)

Diener, 1984

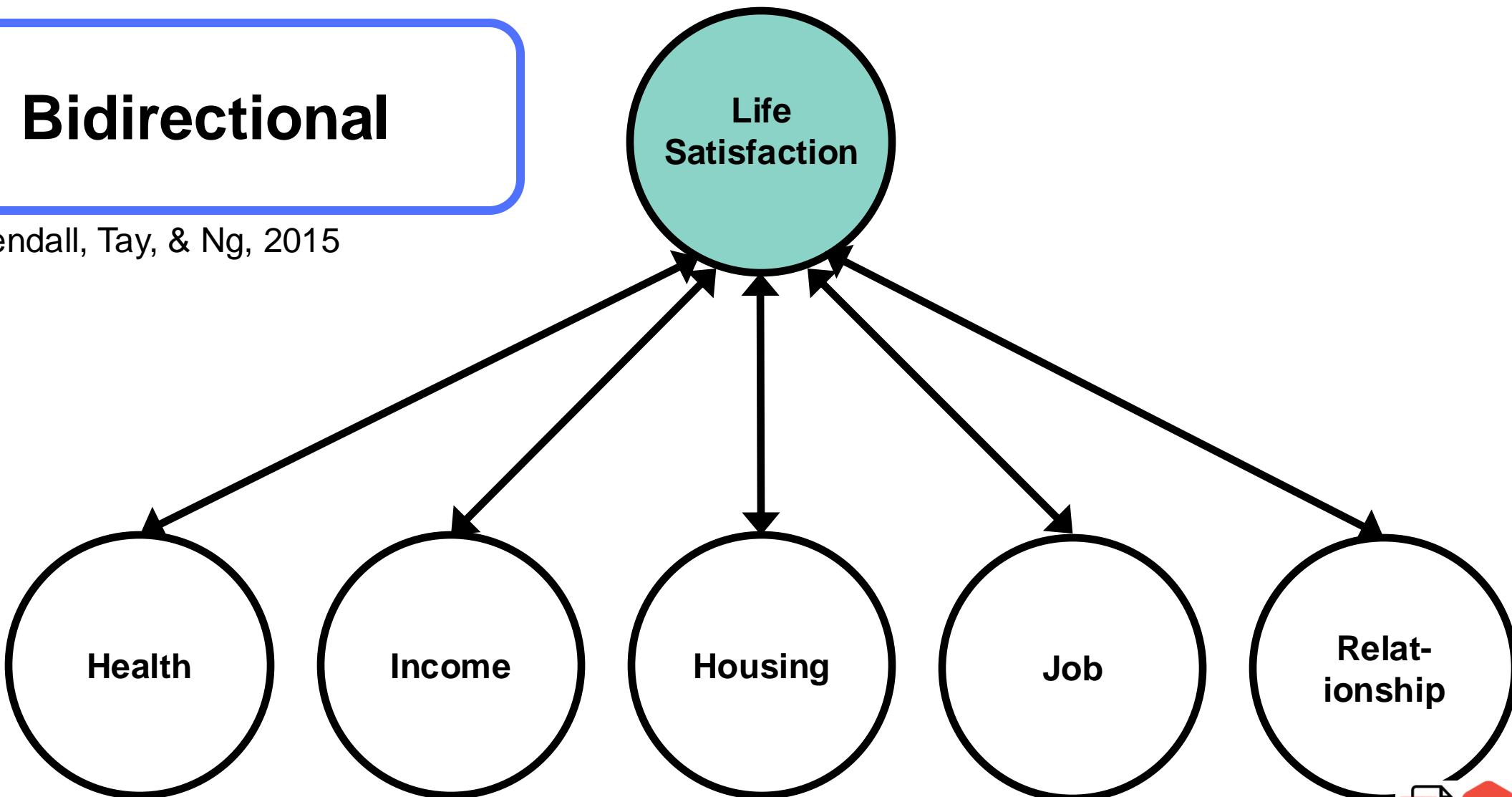
Domain Satisfaction



## Bidirectional

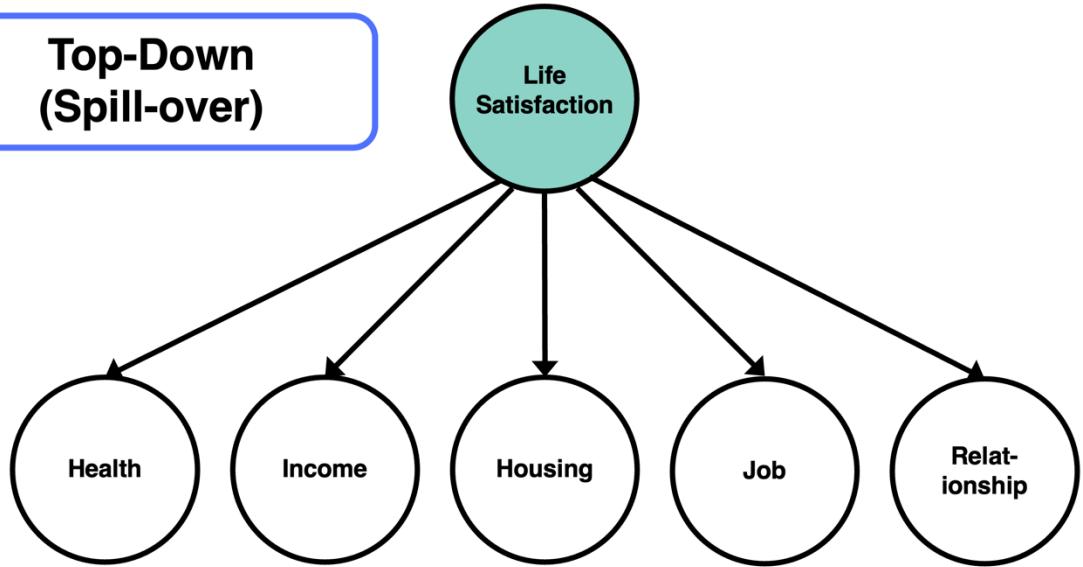
Kuykendall, Tay, & Ng, 2015

Domain Satisfaction



### Top-Down (Spill-over)

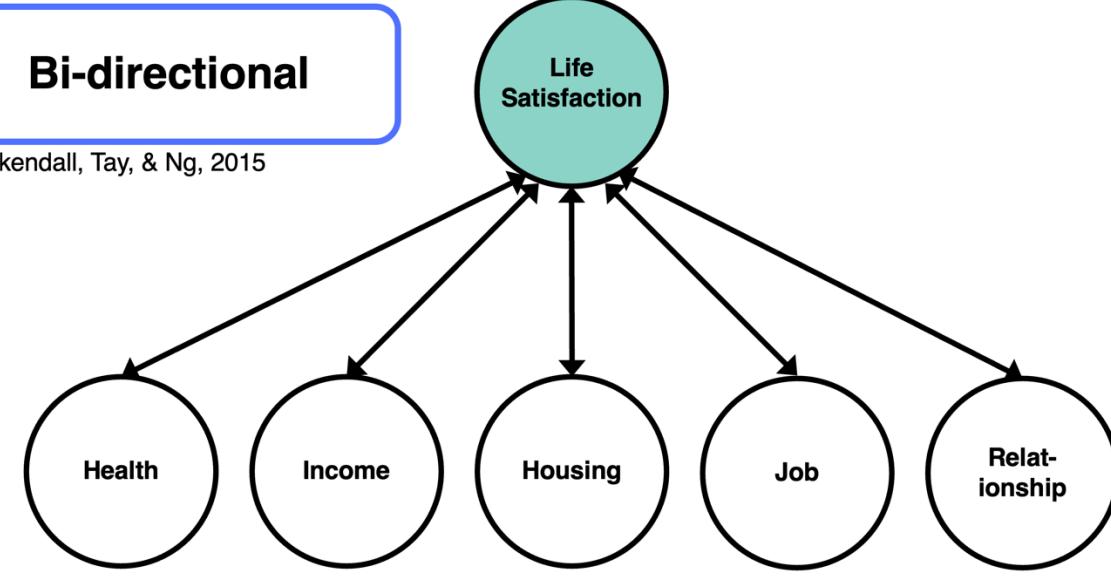
Domain Satisfaction



### Bi-directional

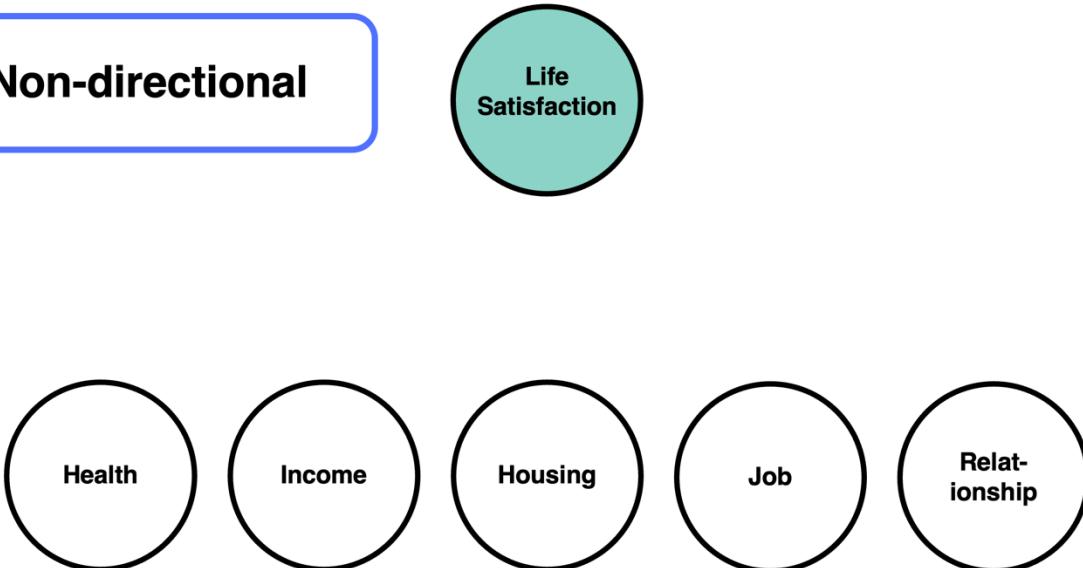
Kuykendall, Tay, & Ng, 2015

Domain Satisfaction



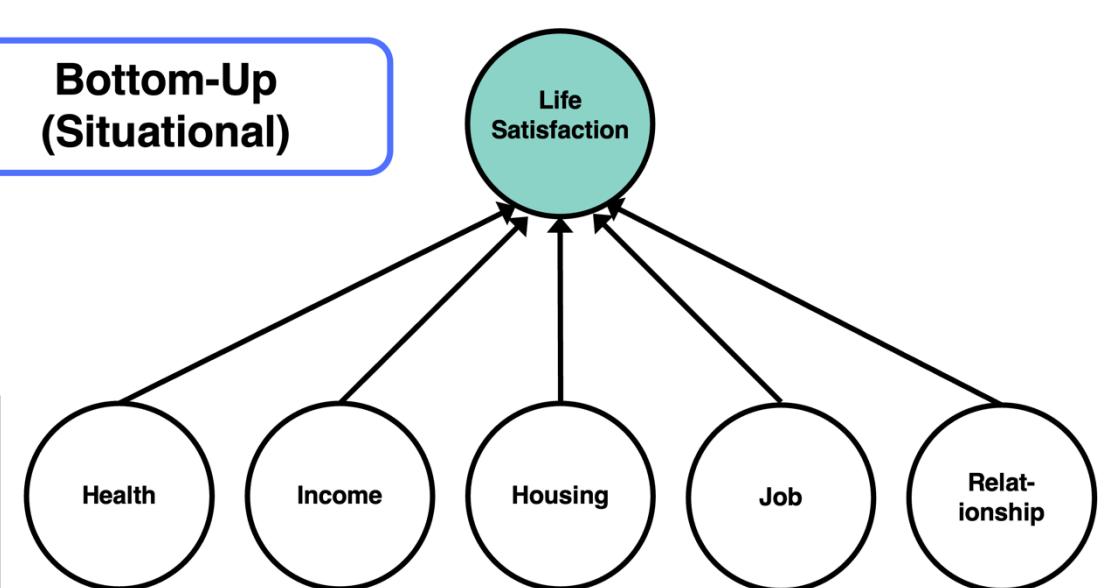
### Non-directional

Domain Satisfaction

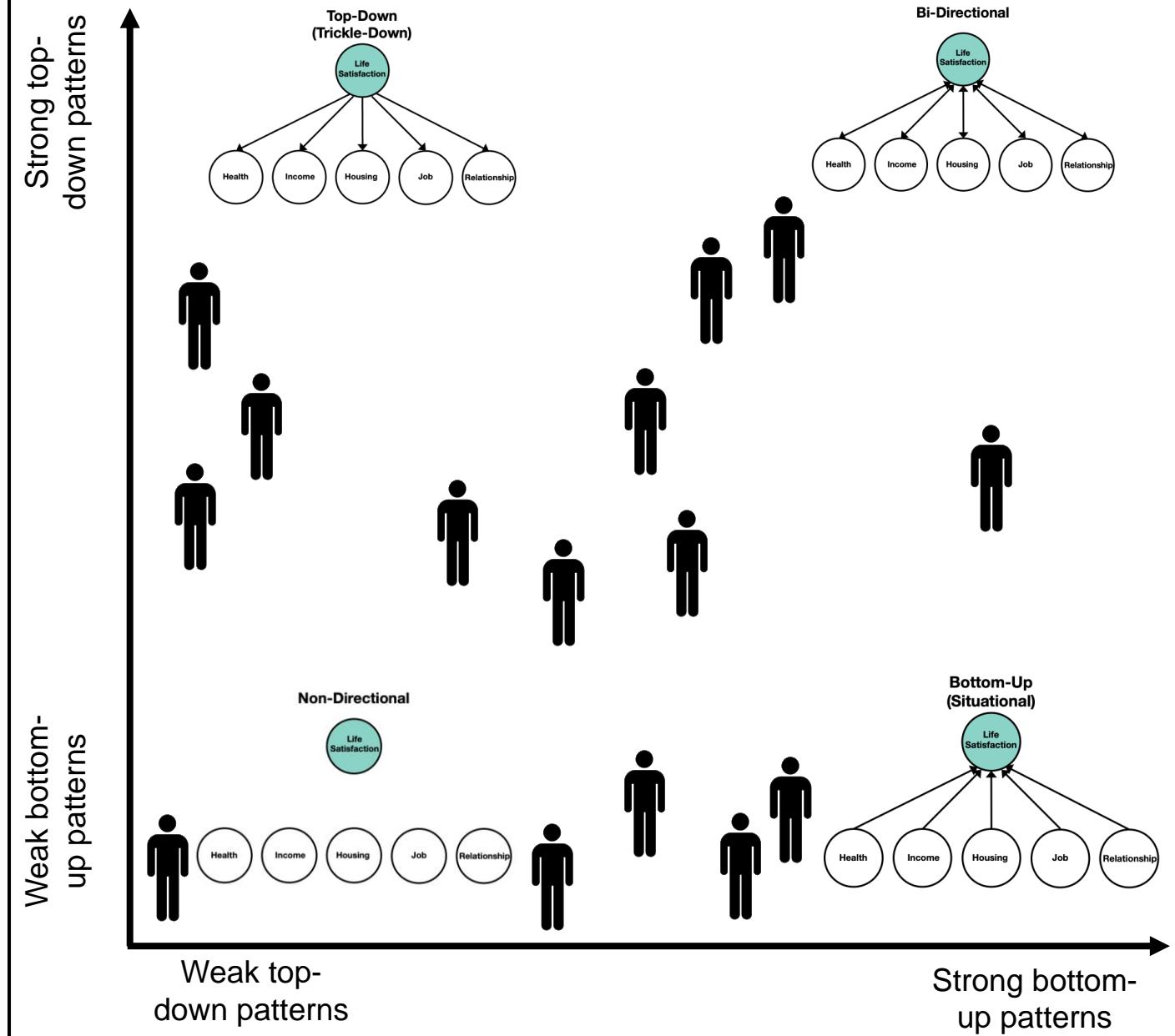


### Bottom-Up (Situational)

Domain Satisfaction



# Personalised Perspectives on Happiness: For whom is each theory correct?



GSOEP

HILDA

SHP

BHPS

LISS

**Multilevel VAR(1) Models**

Epskamp et al., 2018

**Level 1:**

$$Y_{ptj} = \beta_{0pj} + \beta_{1pj} * V_{1,p,t-1} + \dots + \beta_{kpj} * V_{k,p,t-1} + \varepsilon_{ptj}$$

**Level 2:**

$$\beta_{0pj} = \gamma_{00j} + \gamma_{01j} * \bar{V}_{1,p} + \dots + \gamma_{01j} * \bar{V}_{kp} + r_{0pj}$$

$$\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots$$

$$\beta_{kpj} = \gamma_{k0j} + \gamma_{k1j} * \bar{V}_{p,1} + \dots + \gamma_{kkj} * \bar{V}_{pj} + r_{kpj}$$

**Between-Person Effects  
(Level 2)**

$$\gamma_{01j} - \gamma_{0kj}$$

**Within-Person Effects  
(Level 1)**

$$\gamma_{10j} - \gamma_{kkj}$$

**Person-Specific Effects  
(Level 2 random effects)**

$$r_{0pj} - r_{kpj}$$

**GSOEP****HILDA****SHP****BHPS****LISS****Multilevel VAR(1) Models**

Epskamp et al., 2018

**Level 1:**

$$Y_{ptj} = \beta_{0pj} + \beta_{1pj} * V_{1,p,t-1} + \dots + \beta_{kpj} * V_{k,p,t-1} + \varepsilon_{ptj}$$

**Level 2:**

$$\beta_{0pj} = \gamma_{00j} + \gamma_{01j} * \bar{V}_{1,p} + \dots + \gamma_{01j} * \bar{V}_{kp} + r_{0pj}$$

$$\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots$$

$$\beta_{kpj} = \gamma_{k0j} + \gamma_{k1j} * \bar{V}_{p,1} + \dots + \gamma_{kkj} * \bar{V}_{pj} + r_{kpj}$$

**Between-Person Effects  
(Level 2)**

$$\gamma_{01j} - \gamma_{0kj}$$

**Within-Person Effects  
(Level 1)**

$$\gamma_{10j} - \gamma_{kkj}$$

**Person-Specific Effects  
(Level 2 random effects)**

$$r_{0pj} - r_{kpj}$$

# RESULTS

Aim 2

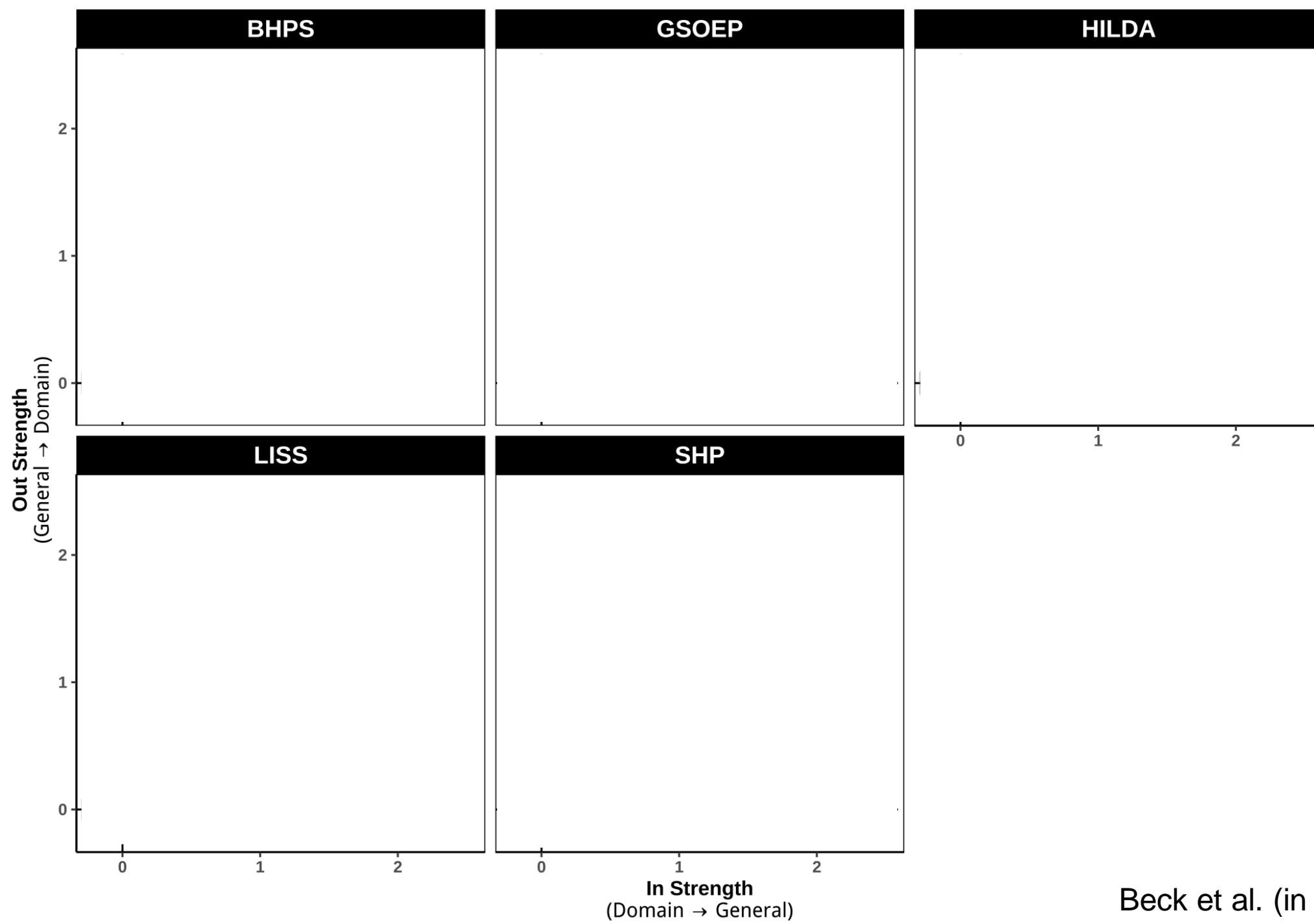
Top Down

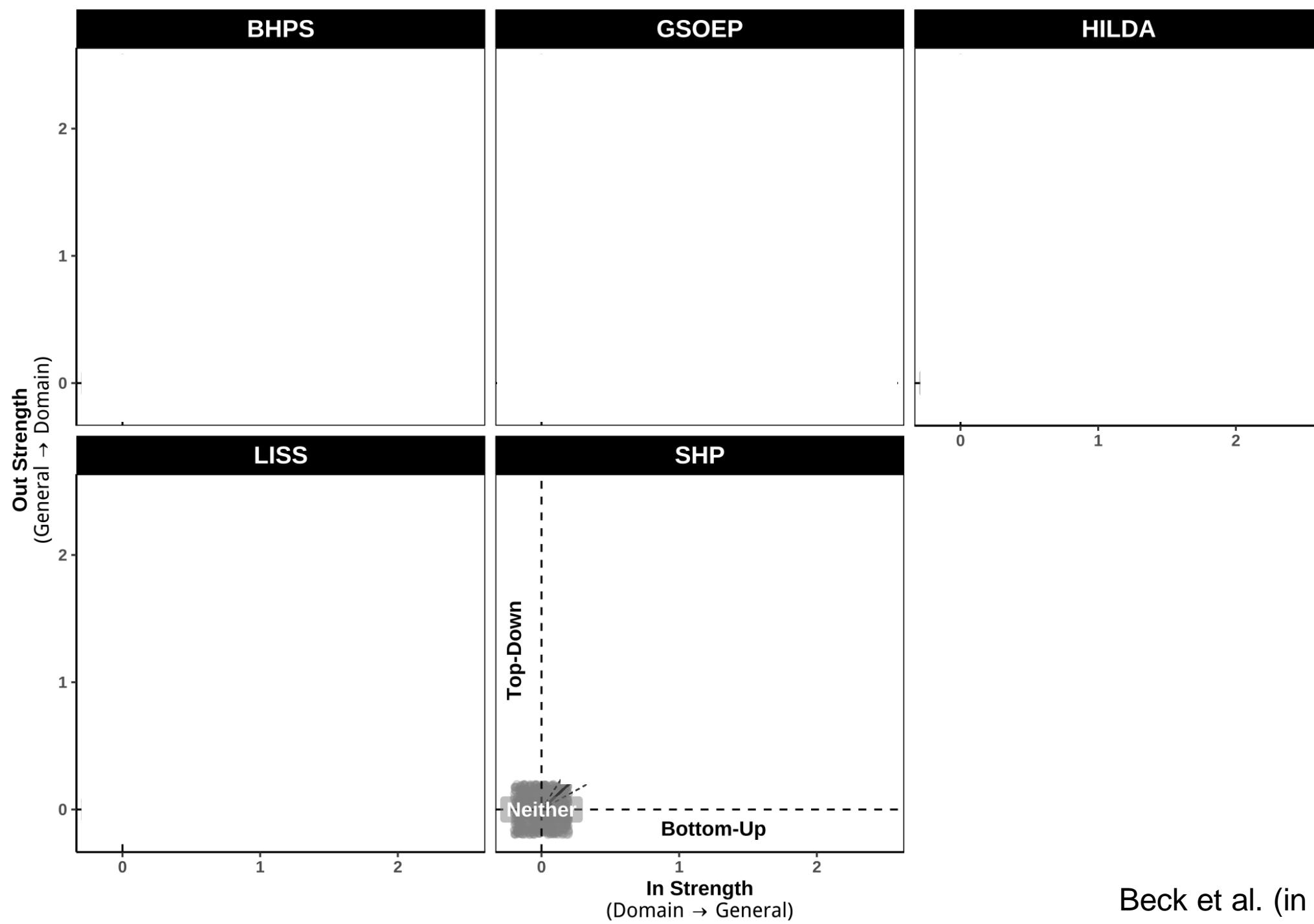
Bi-directional

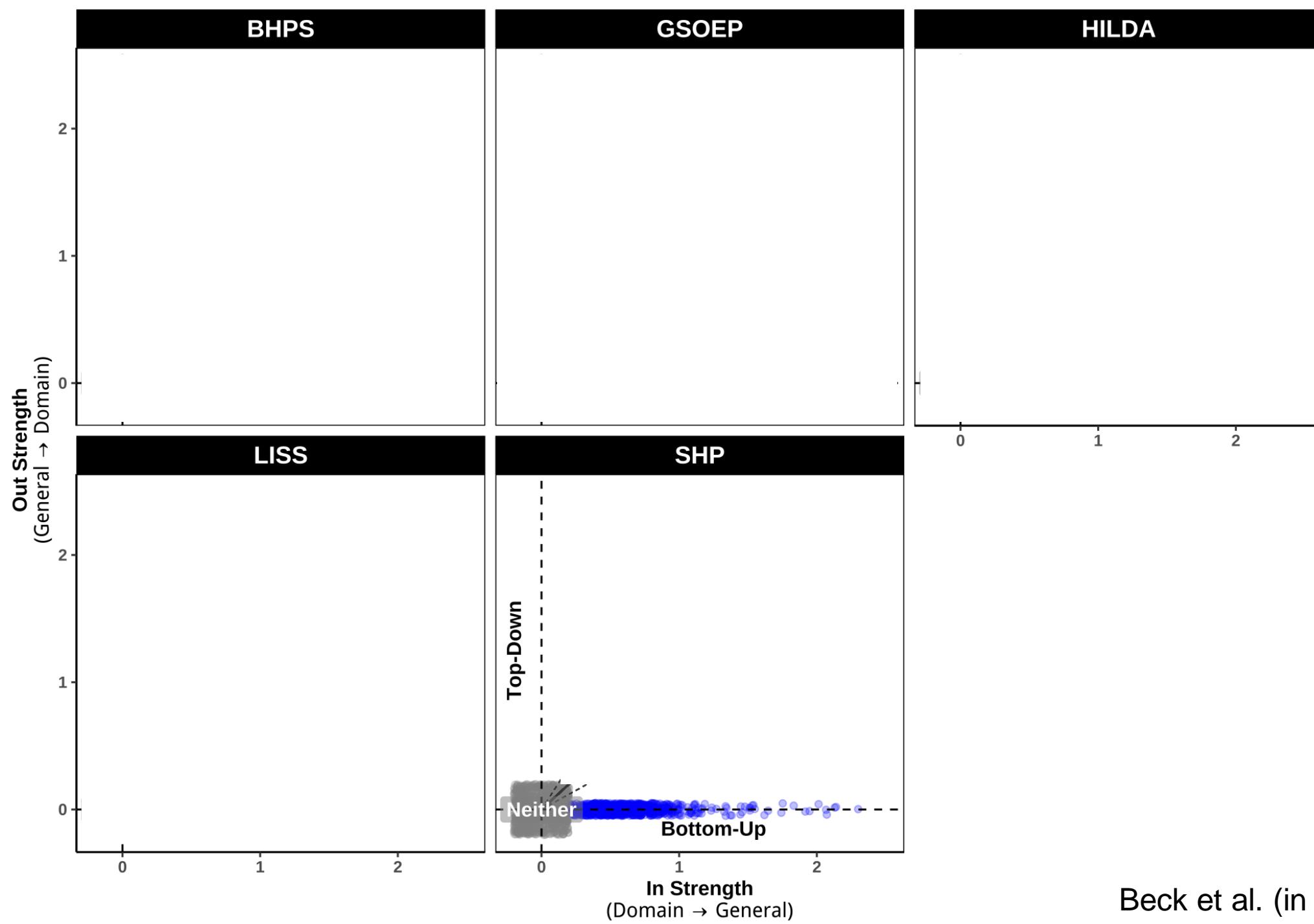
Non-Directional

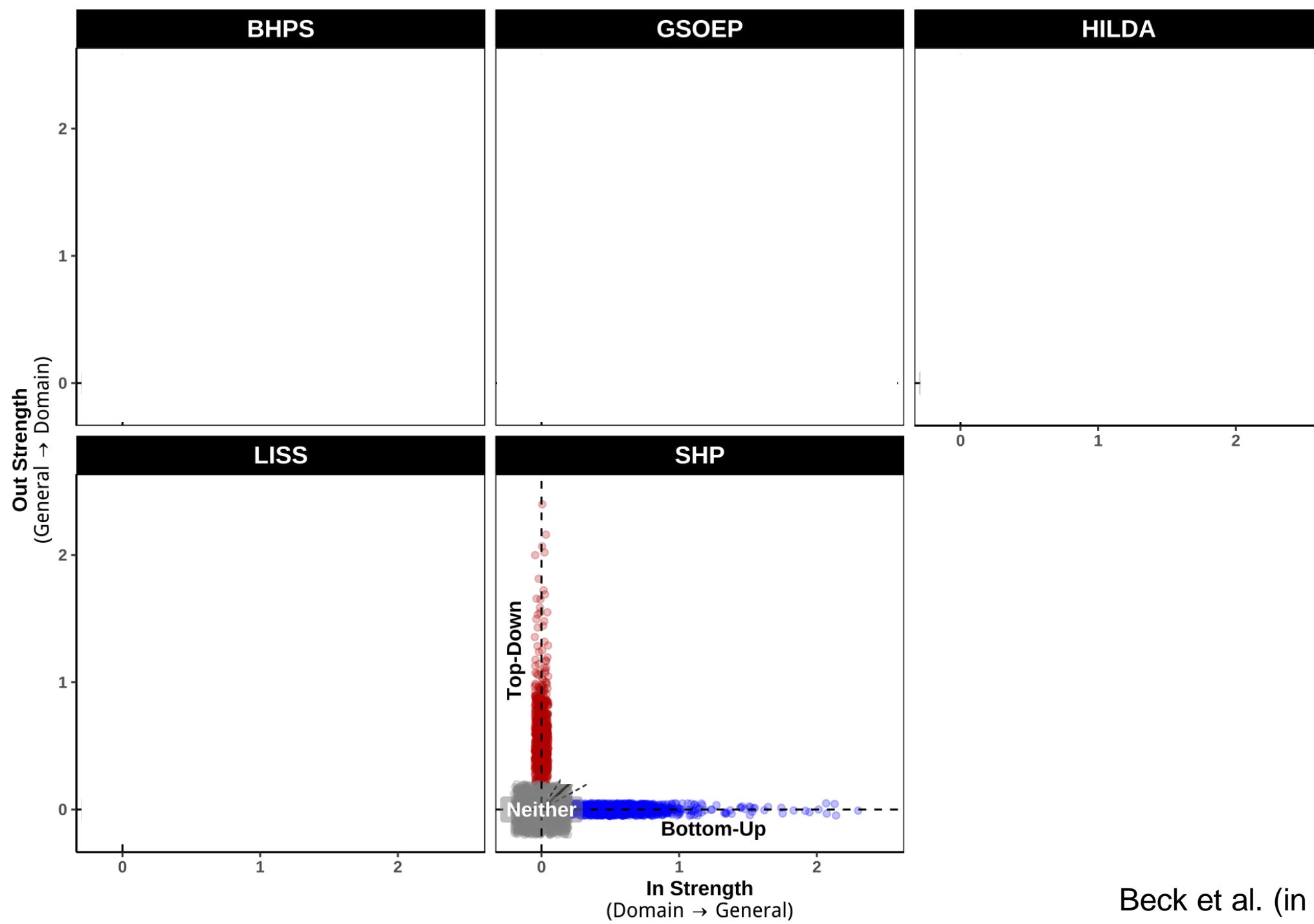
Bottom Up

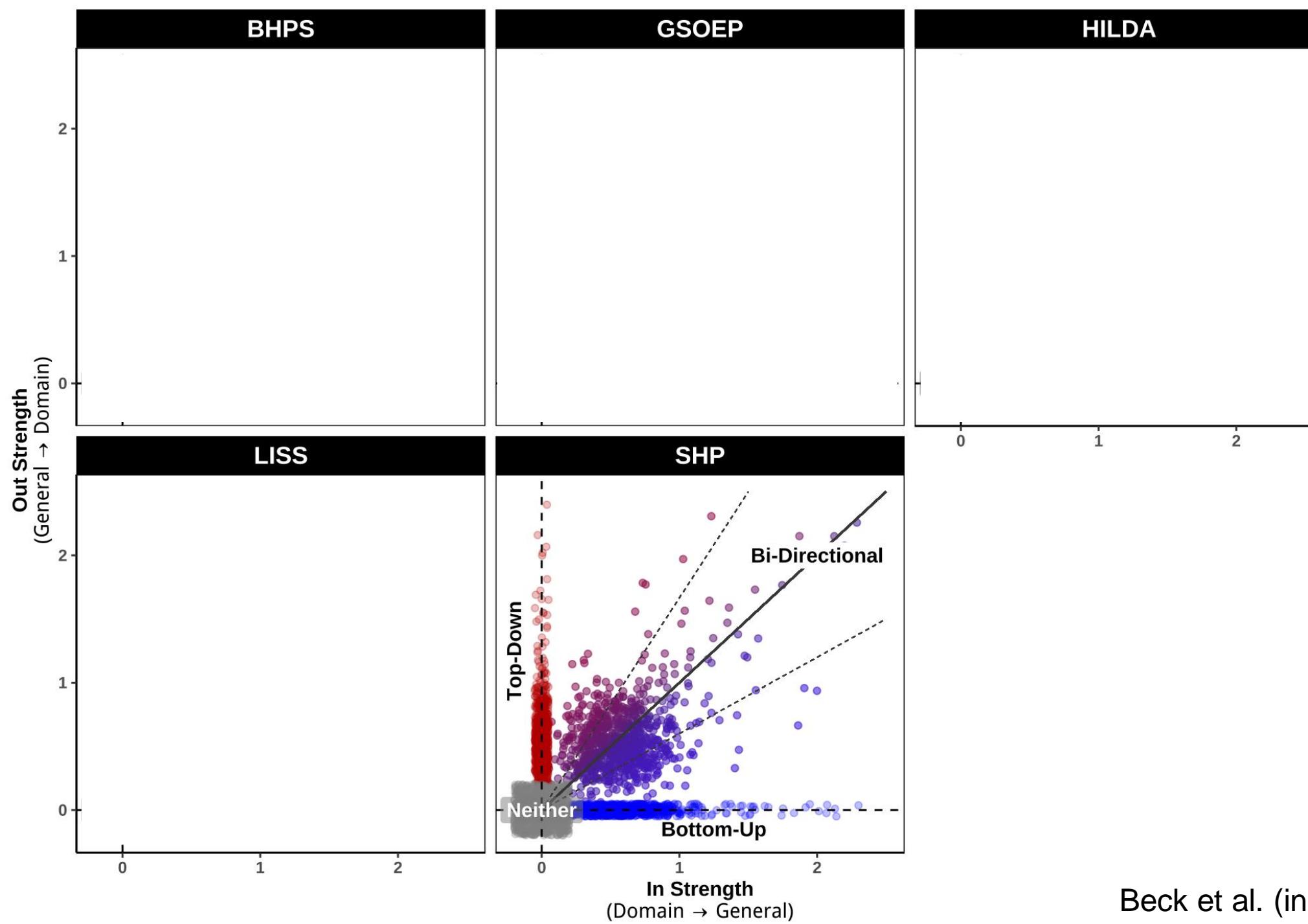


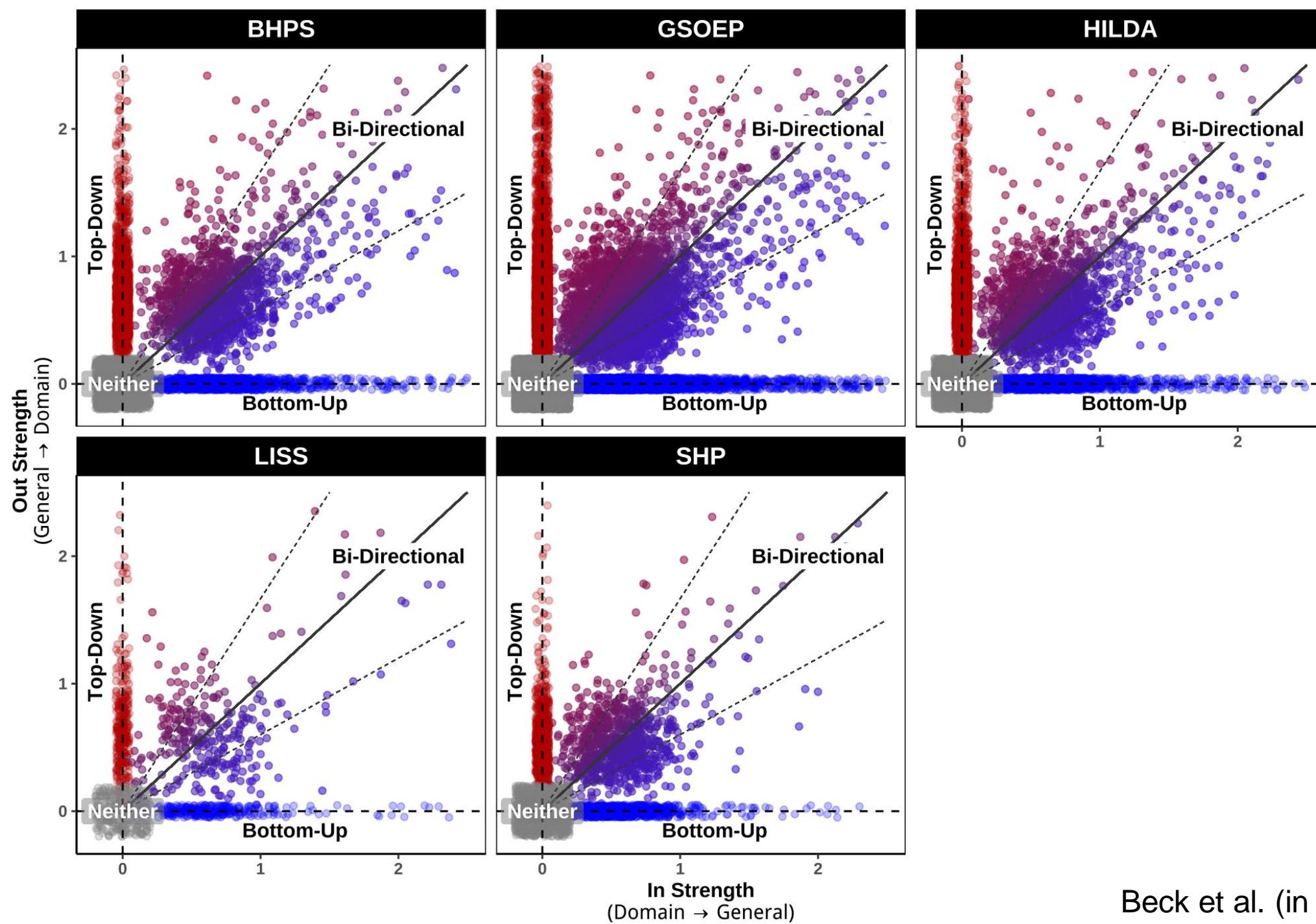


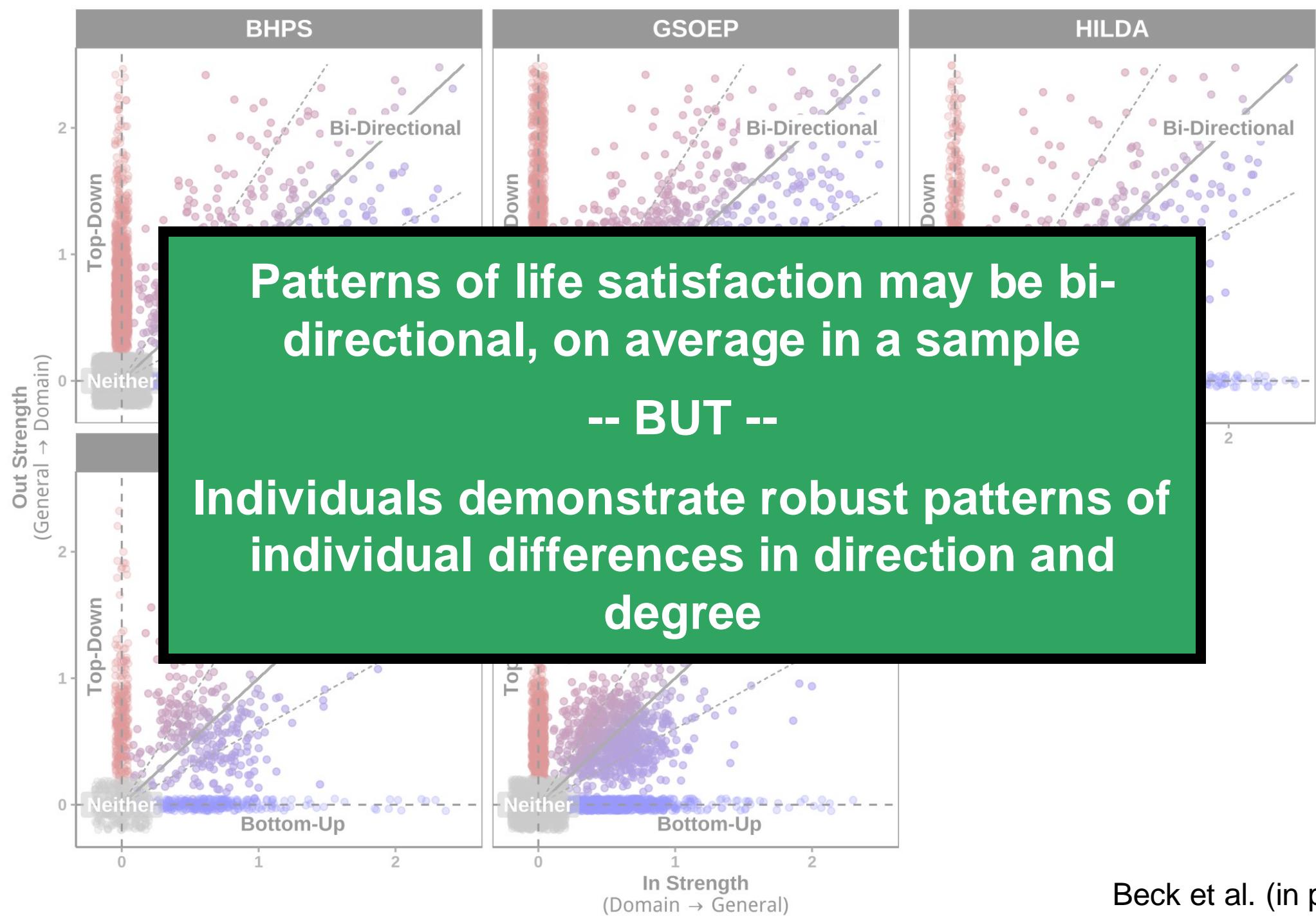










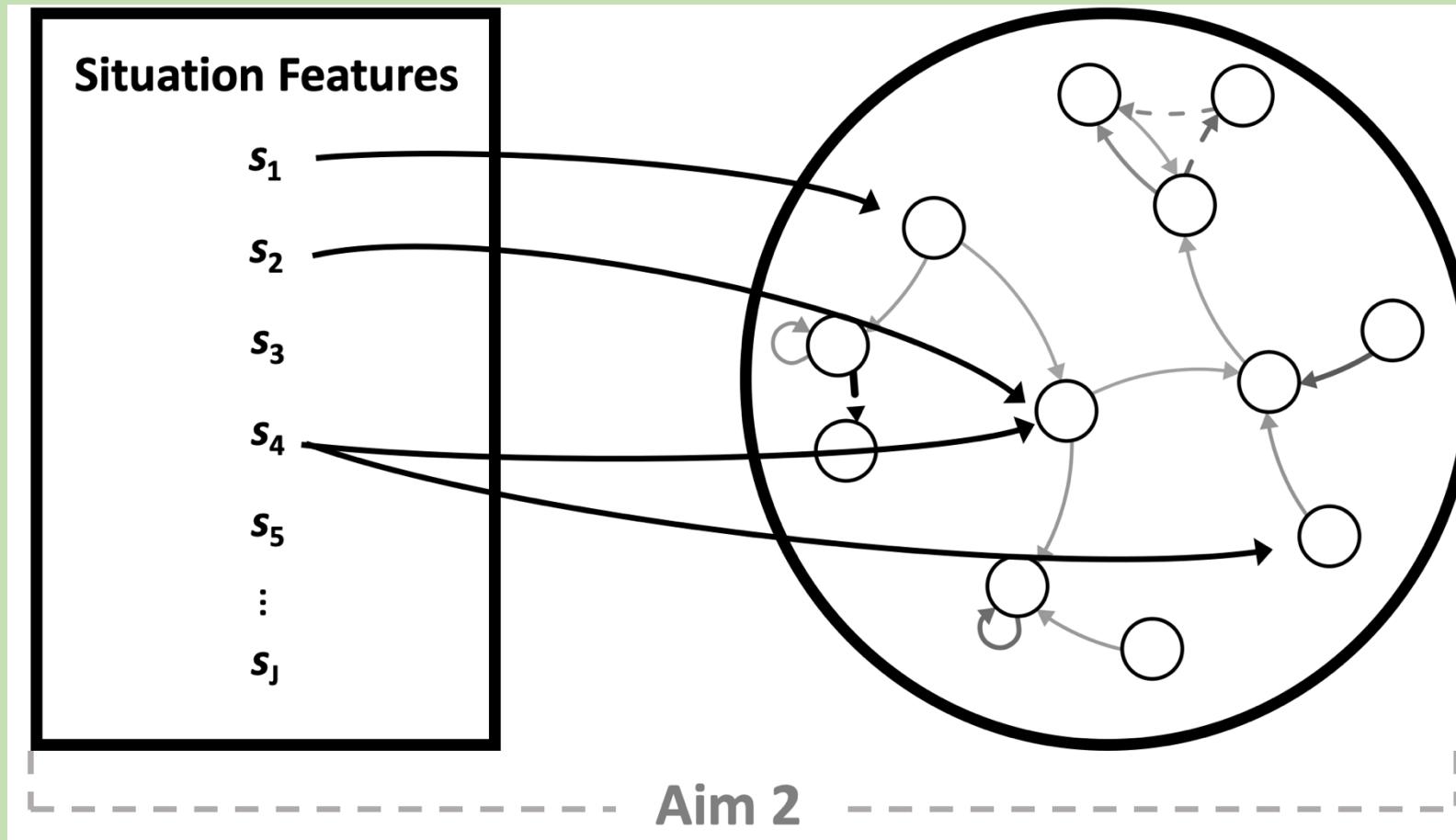


**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

Beck & Jackson  
(2020, *JPSP*; 2021b, *EJP*)

**Aim 2:** Using longitudinal data to understand how well-being unfolds across contexts.

Beck et al.  
(in press, *NHB*)



\* = shared first authorship.

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Beck et al.  
(in press, *NHB*)

The dynamics of life and domain satisfaction:

Unfold differently across people

Do not appear well-captured by sample averages of idiographic dynamics

Have similar patterns of individual differences across samples

**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

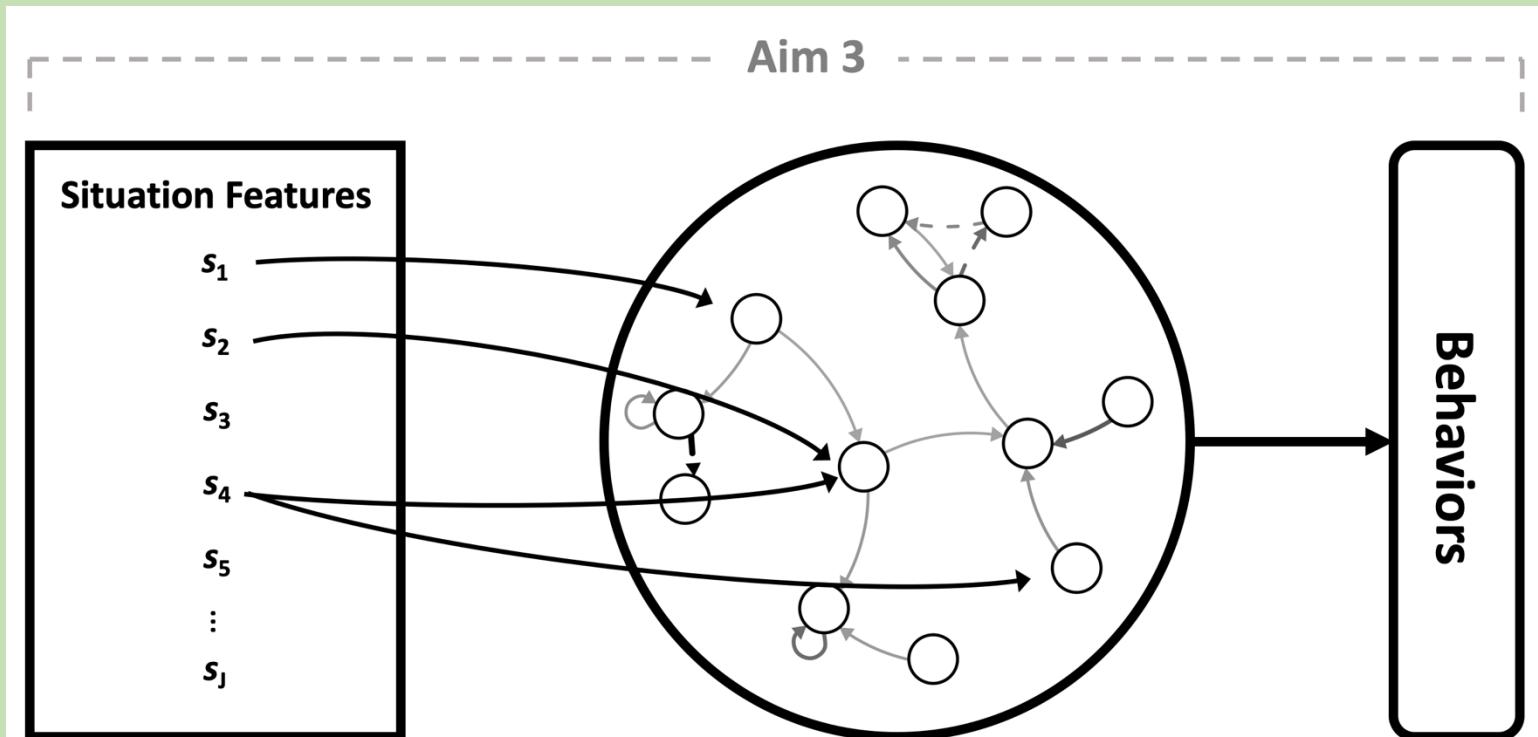
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(in press, *NHB*)

**Aim 3:** Predicting behavior using machine learning.

Beck & Jackson  
(2023, *Psych Science*)



Psychological

Situations

Behavior /  
Experiences

# Critical Assumption

**Situations and experiences  
should have similar  
consequences across people.**

**People with similar levels of a  
personality characteristic  
should behave in similar ways.**

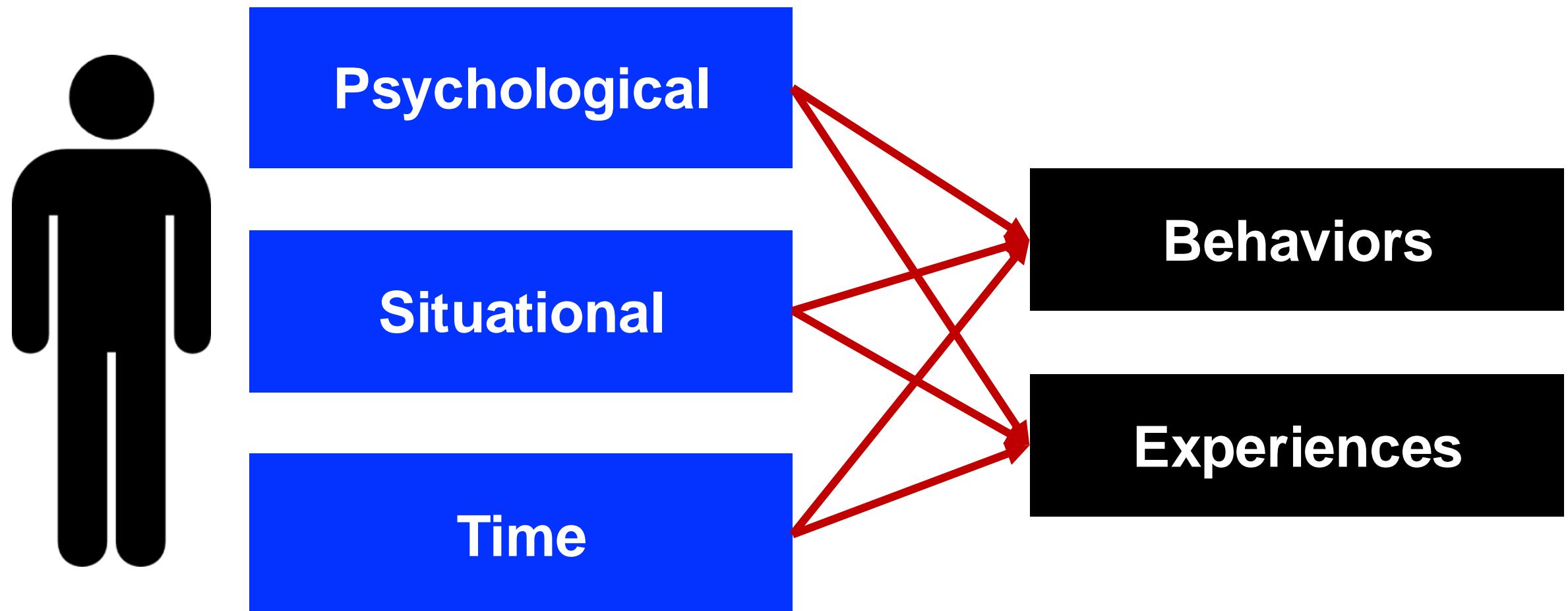


# Alternative Assumption

Situations and experiences  
should have *different*  
consequences across people.

People with similar levels of a  
personality characteristic *may*  
*not* behave in similar ways.

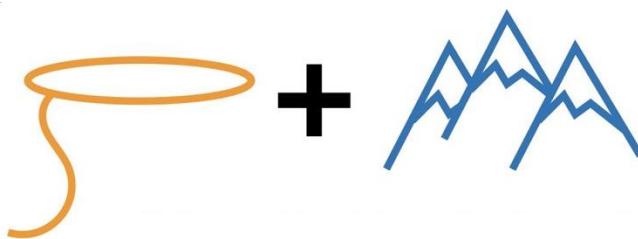




# Analytic Plan

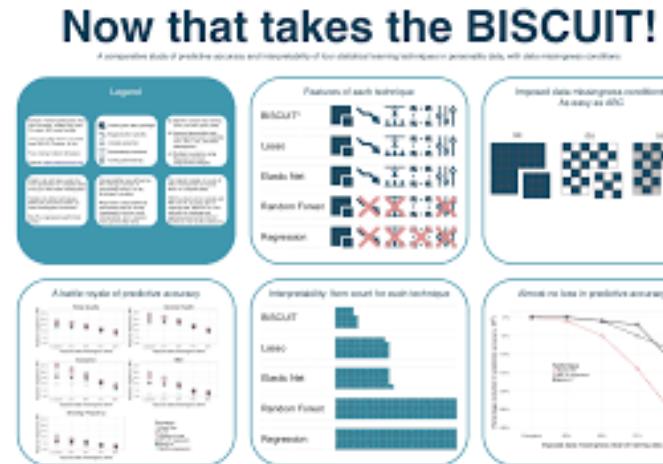
## 3 machine learning classification methods:

### Elastic Net

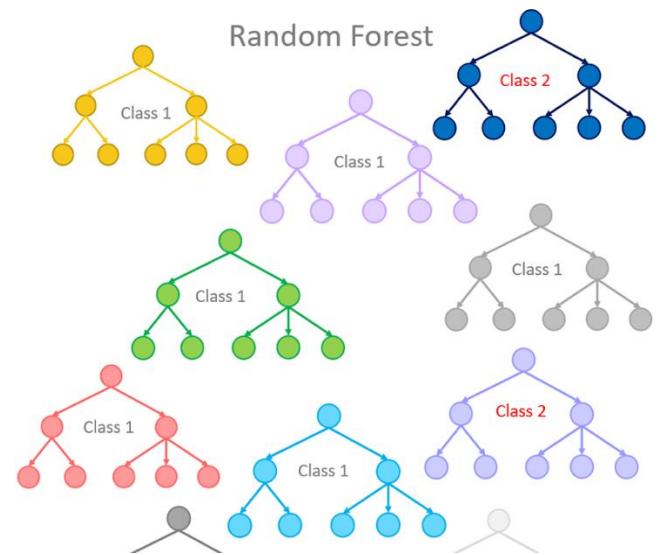


- Classification Accuracy
- Area under the receiver operating curve (AUC)

### BISCWIT



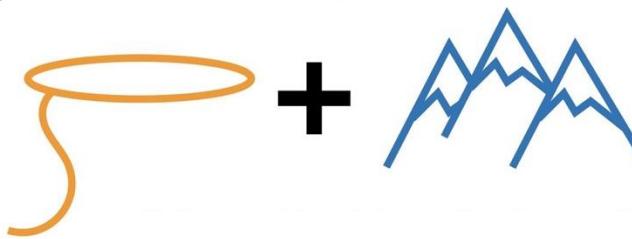
### Random Forest



# Analytic Plan

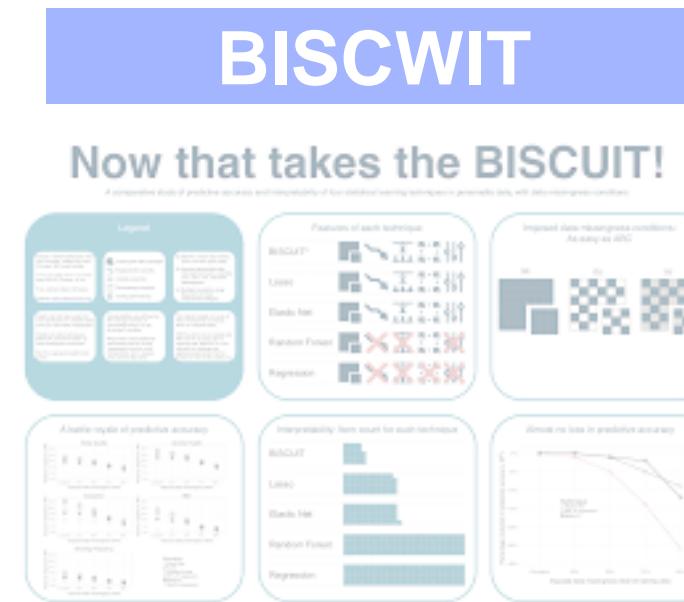
## 3 machine learning classification methods:

### Elastic Net

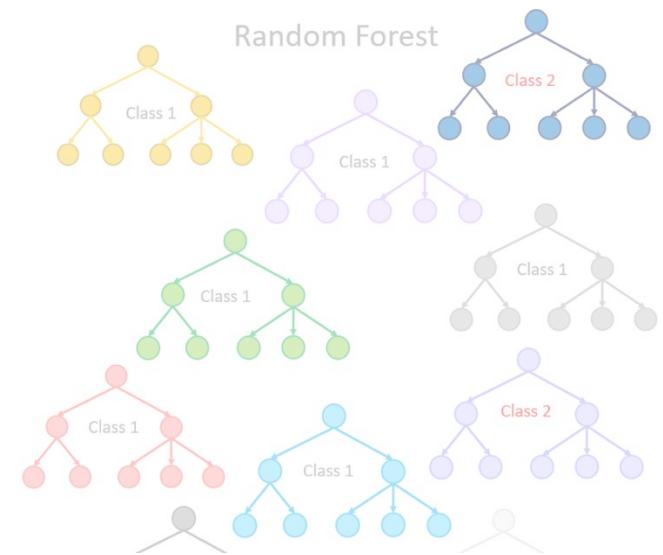


- Classification Accuracy
- Area under the receiver operating curve (AUC)

### BISCWIT



### Random Forest



# RESULTS

Aim 3

# Classification Accuracy

## Elastic Net

Median (SD)	N
-------------	---

---

**Procrastination**

**Loneliness**

**Argument**

**Interacted**

**Studying**

**Sick**

**Tired**



## Classification Accuracy

Elastic Net

**Classification accuracy was high, on average, with some variability across outcomes.**

Sick

Tired

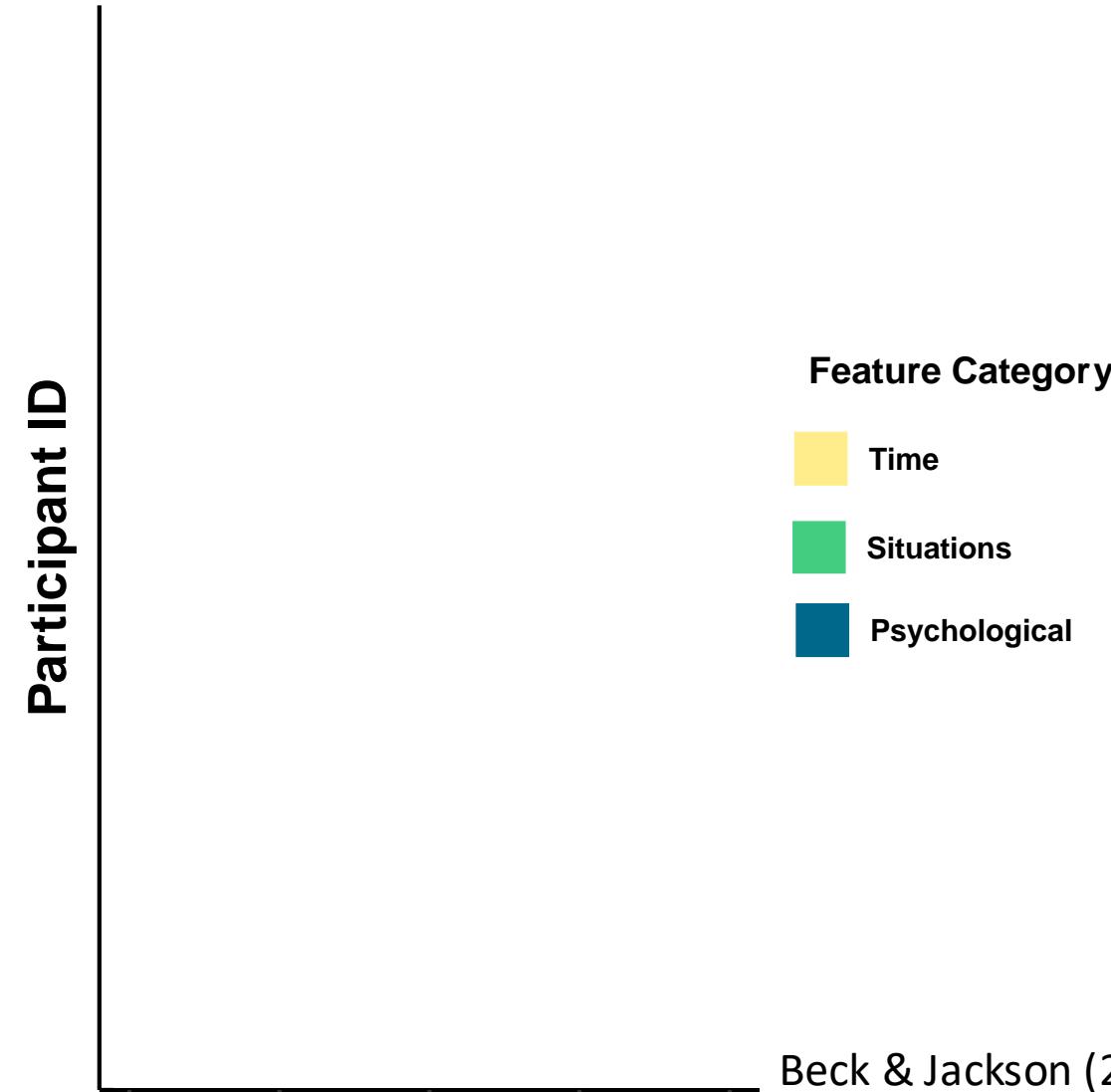


Do certain categories of features out-predict others?

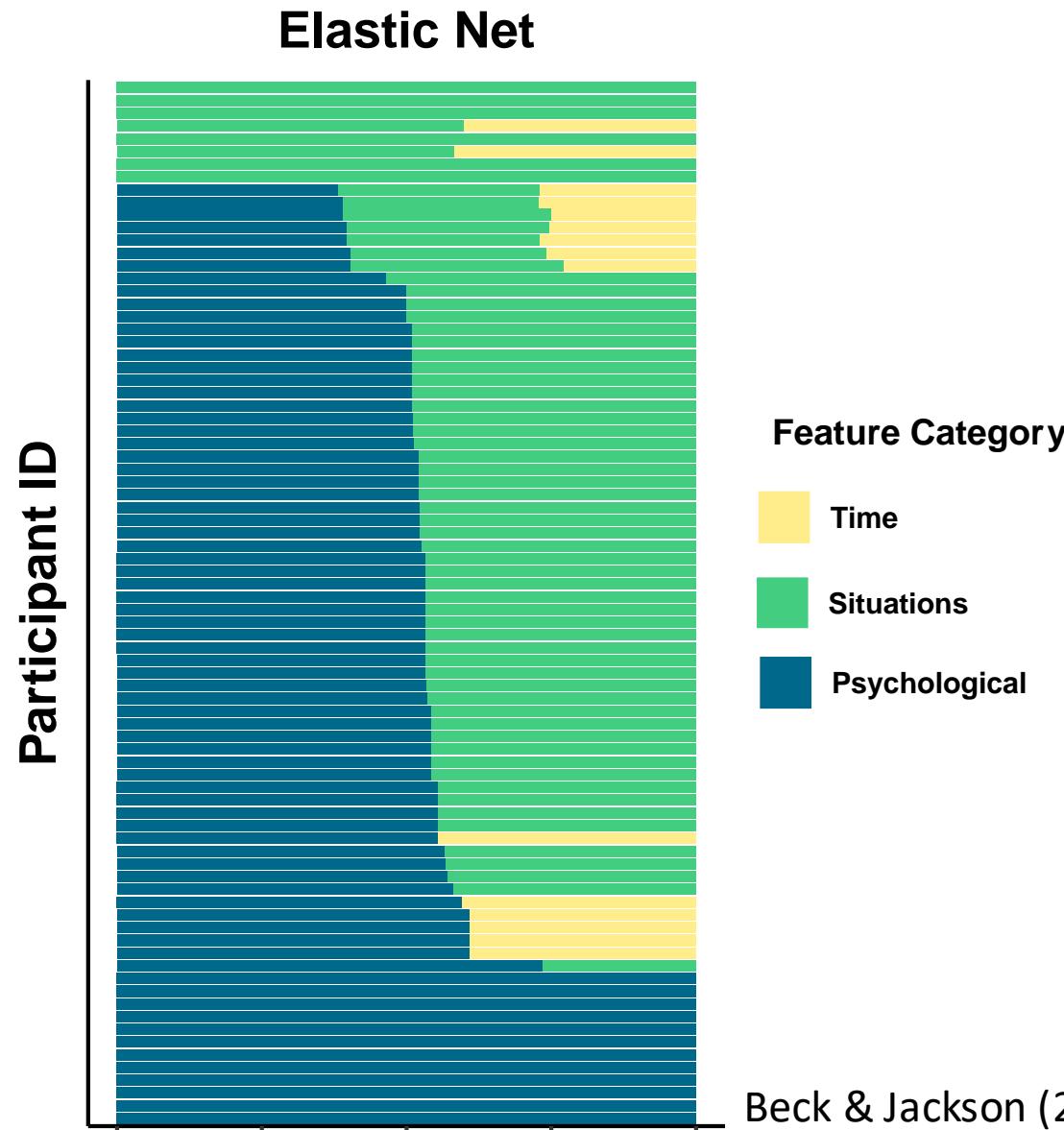


Do certain categories of features out-predict others?

### Elastic Net



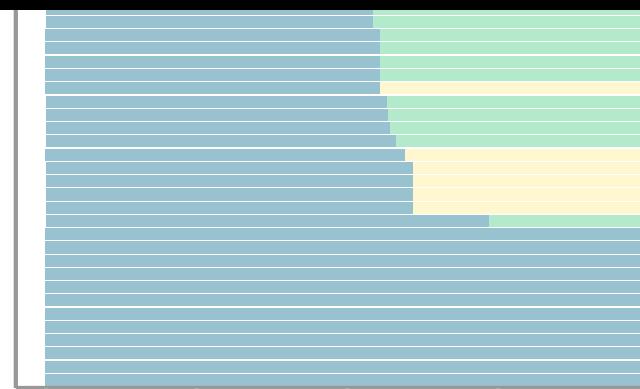
Do certain categories of features out-predict others?



## Do certain categories of features out-predict others?

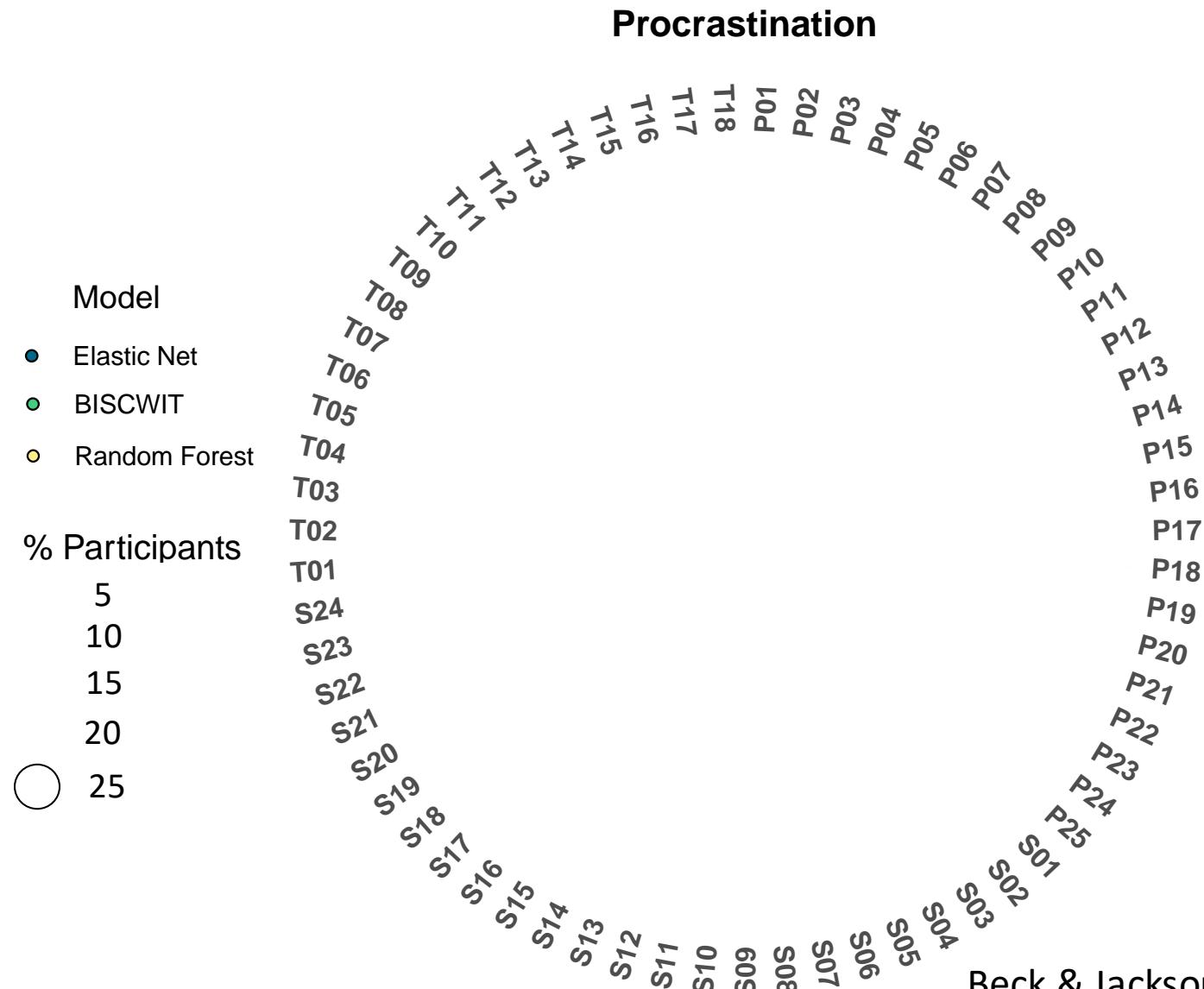
### Elastic Net

The relative contribution of person, situation, and timing features varies across people.

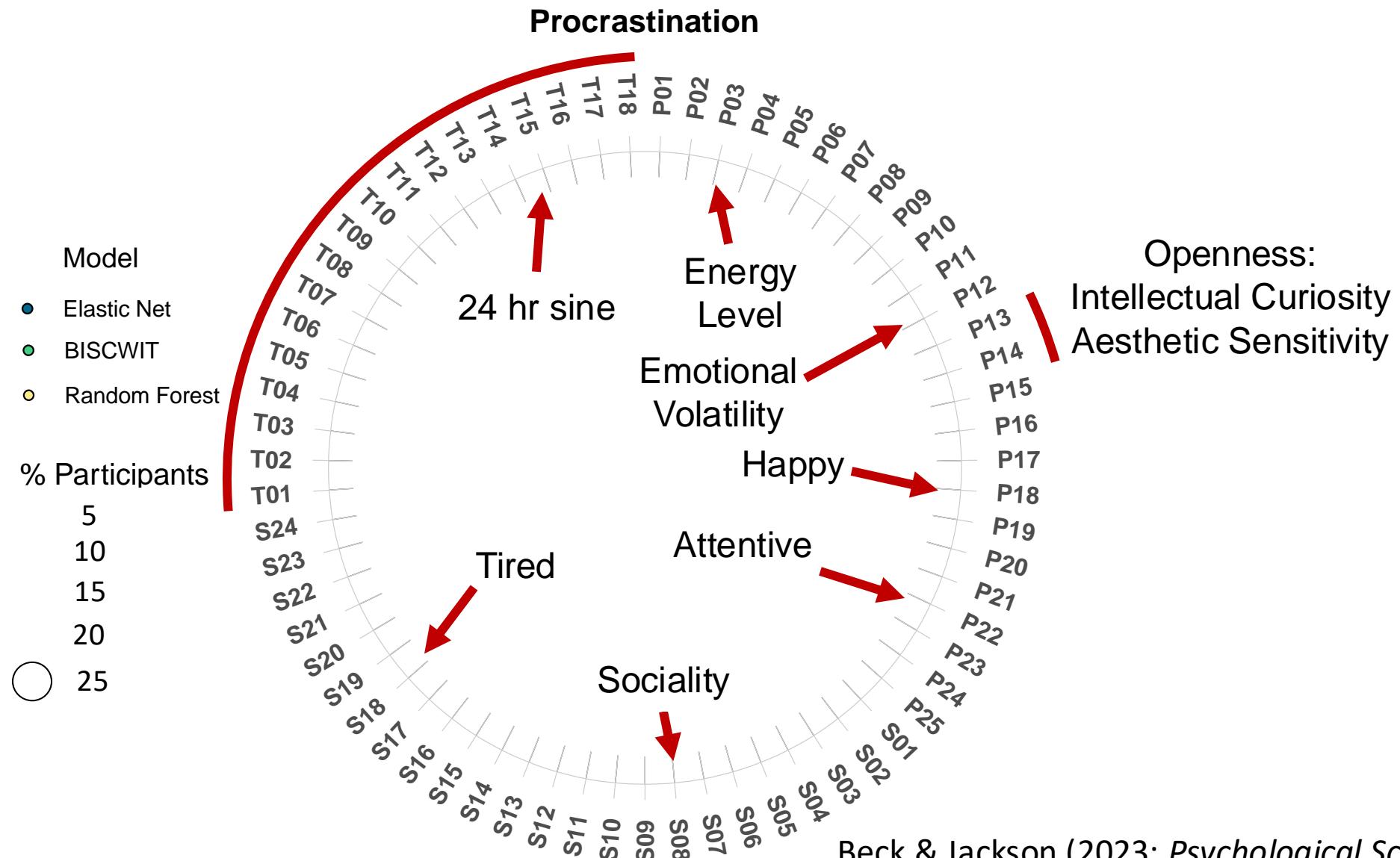


Which features play the strongest roles?

# Which features play the strongest roles?



## Which features play the strongest roles?



## Which features play the strongest roles?

Procrastination

No one feature dominated the prediction of any outcome (max ~35%).

Behaviors & experiences have unique antecedents.

○ 25

S<sub>20</sub>  
S<sub>19</sub>  
S<sub>18</sub>  
S<sub>17</sub>  
S<sub>16</sub>  
S<sub>15</sub>  
S<sub>14</sub>  
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P<sub>25</sub>

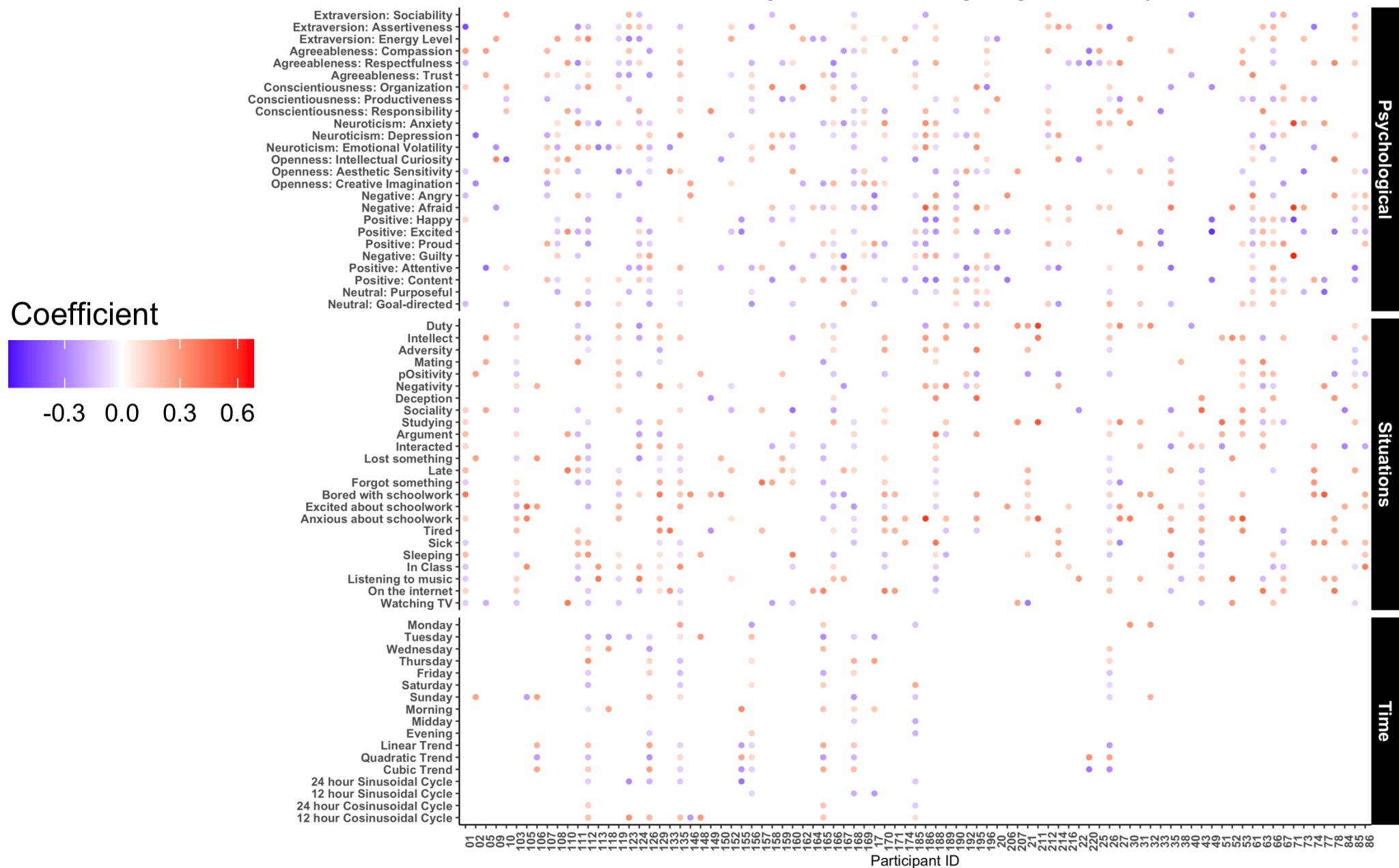
## Aim 1: Individuals

## Aim 2: Dynamics

## Aim 3: Integration

## Future Directions

BISCWIT Predicting Future Procrastinating Using Best Accuracy Models



## Aim 1: Individuals

## Aim 2: Dynamics

## Aim 3: Integration

## Future Directions

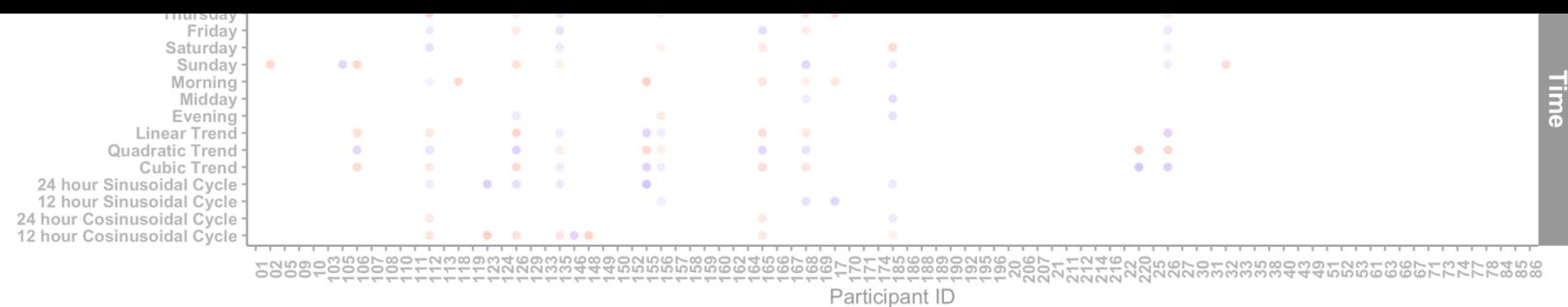
BISCWIT Predicting Future Procrastinating Using Best Accuracy Models



Coefficient



**Individuals' profiles of antecedents differed in presence and direction.**



**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

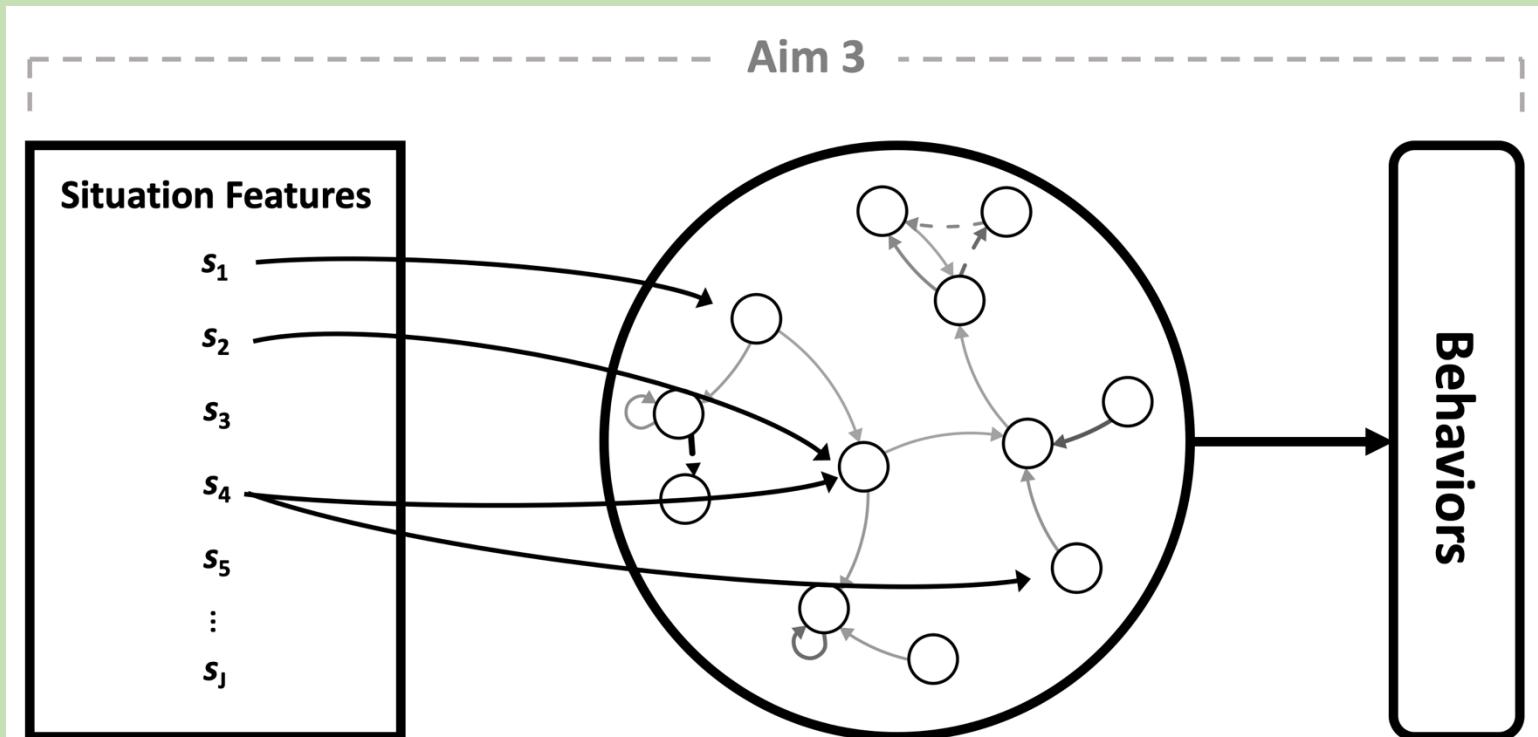
Beck & Jackson  
(2020, *JPSP*; 2021b; *EJP*)

**Aim 2:** The dynamics of well-being unfold differently across people.

Beck et al.  
(in press, *NHB*)

**Aim 3:** Predicting behavior using machine learning.

Beck & Jackson  
(2023, *Psych Science*)



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(in press, *NHB*)

**Aim 3:** Predicting behavior using machine learning.

Beck & Jackson  
(2023, *Psych Science*)

The antecedents of behaviors and experiences:

Can be used to accurately predict those behaviors and experiences

Differ across people

Vary in the degree of psychological, situational, and timing antecedents

**Aim 1:** Individuals show unique personality structures that are relatively consistent across time and events.

Beck & Jackson  
(2020, *JPSP*; 2021b, *EJP*)

**Aim 2:** The dynamics of well-being unfold differently across people.

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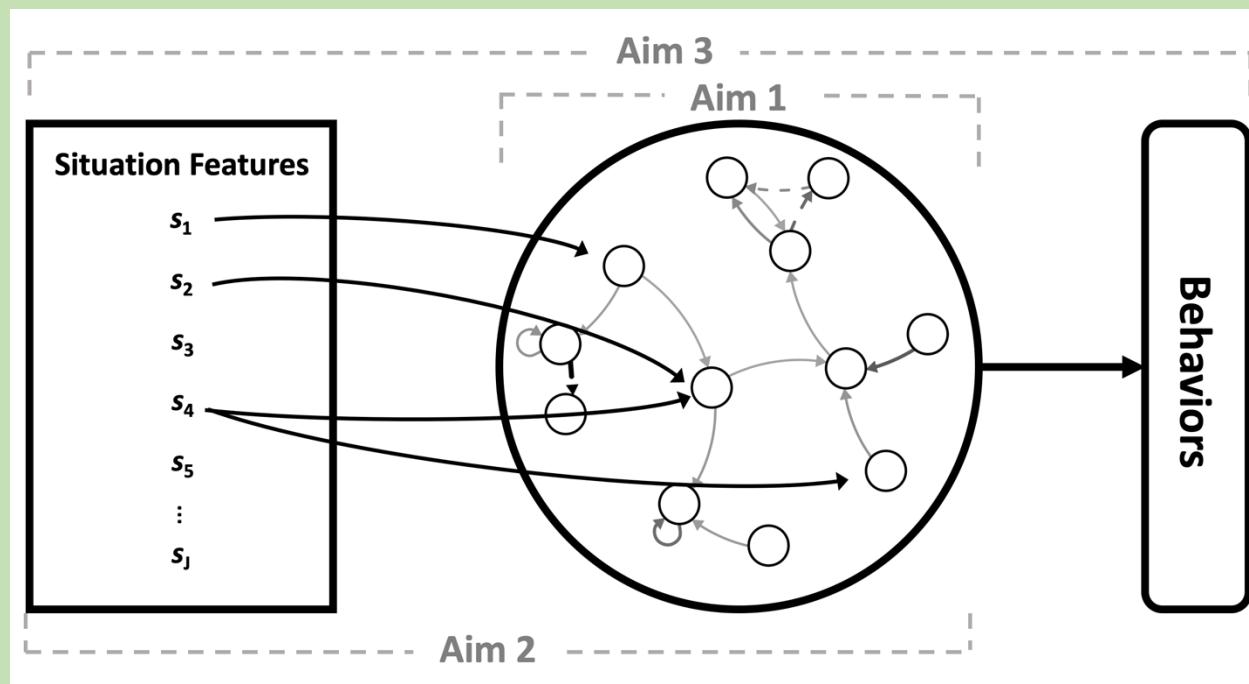
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Beck & Jackson  
(2023, *Psych Science*)

## Ongoing Directions



# Other Ongoing Directions

**Multilevel Structure**

**Differential Equations & Formal Modeling**

**Personalized Assessment**

**Revisiting Cattell's Data Box**

**Integrating Across Time Scales**

# Multilevel Structure

# Nomothetic

# Extraversion

# Agreeableness

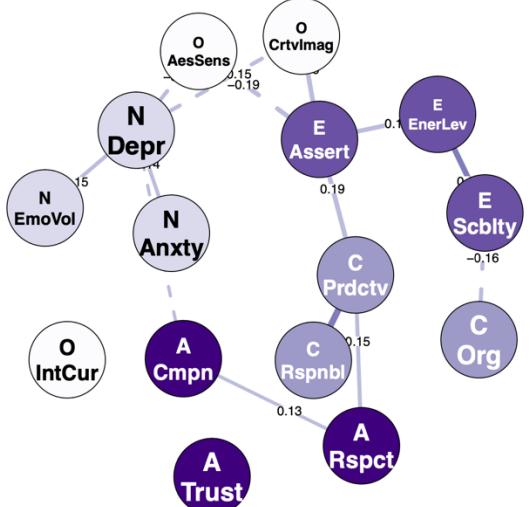
# Conscientiousness

# Neuroticism

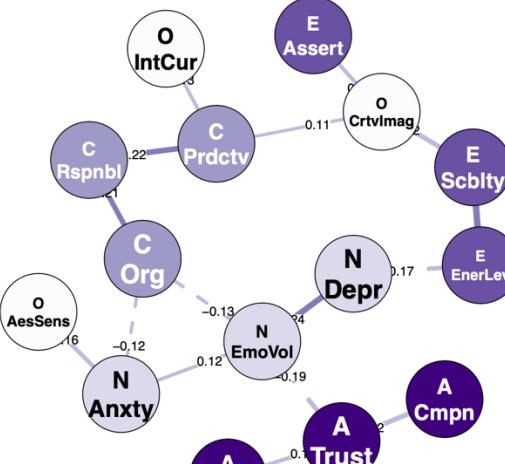
## Openness



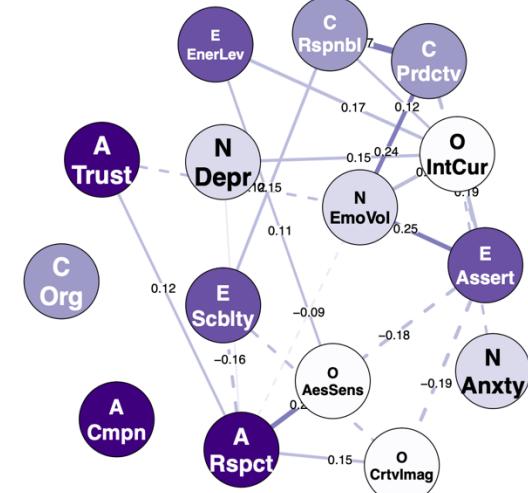
### Wave 1: Contemporaneous for S16



Wave 1: Contemporaneous for S22



## Wave 1: Contemporaneous for S29



# Idiographic

# Personalized Assessment

**What are we missing when we use  
the same measures for everyone?**

We have no idea. That's an empirical question!

# What are we missing when we use the same measures for everyone?

## Content

**Hypothesis:** People will generate content that doesn't overlap with the Big Five or other typical shared indicators we measure.

## Variability

**Hypothesis:** People will show more variability and use the full scale more for unique items than shared items, on average.

## Predictive Utility

**Hypothesis:** Unique items will improve predictive utility and play important roles in personalized prediction models.

# The Personalizing Personality Pilot Study

Study Design

**UCDAVIS**

● N = 200

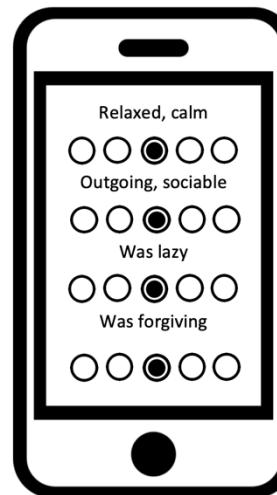


## Baseline Surveys

- Big Five Personality
- Cardinal Traits
- Demographics
- **Unique Item Generation**
- ...
- etc.



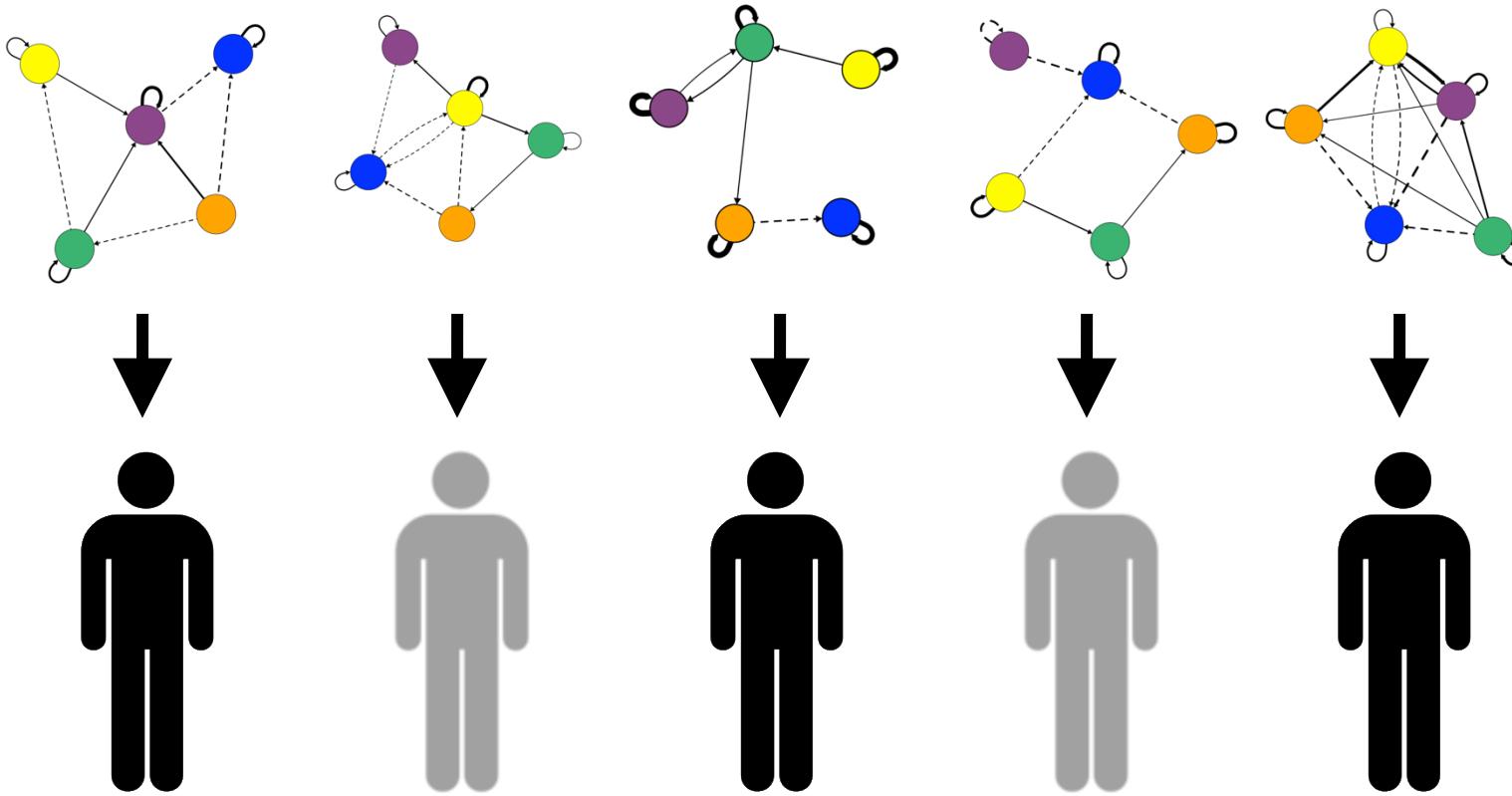
BCS-2336406



## Experience Sampling Method (ESM)

- 5 x / day for 3 weeks ( $\max n = 105$ )
- Big Five Personality States
  - Unique, participant generated “Cardinal States”
  - DIAMONDS Situation Characteristics
  - Binary Behavior Indicators
  - Passive Sensing

# Integrating Across Time Scales: Using personality dynamics to link idiographic systems to personality trait change



**Idiographic  
Person-Specific**

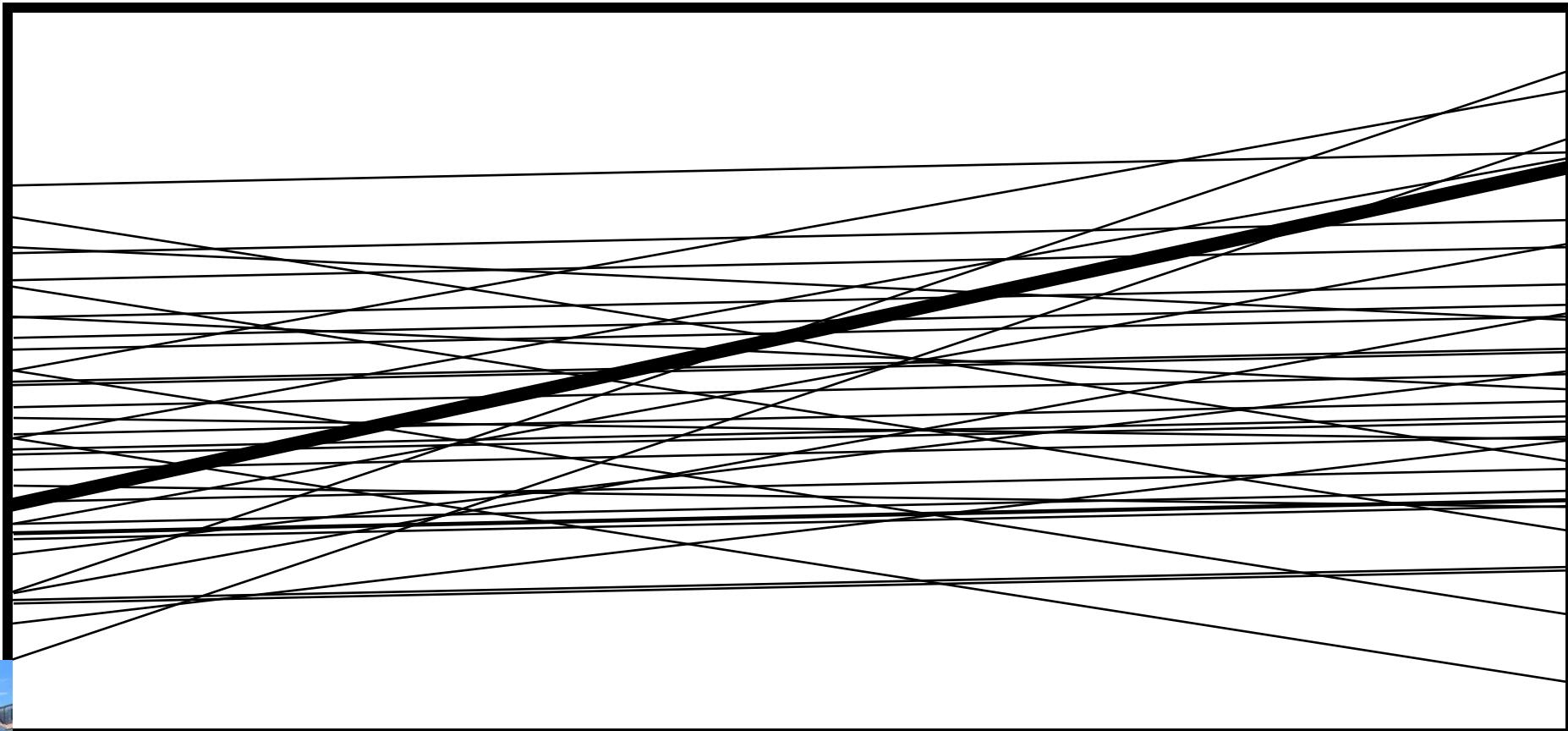
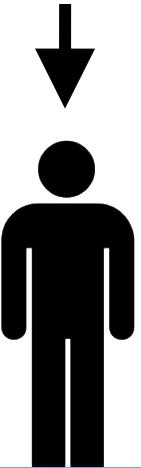
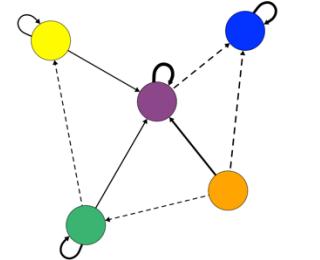
Extraversion

Agreeableness

Conscientiousness

Neuroticism

Openness



Adam Nissen

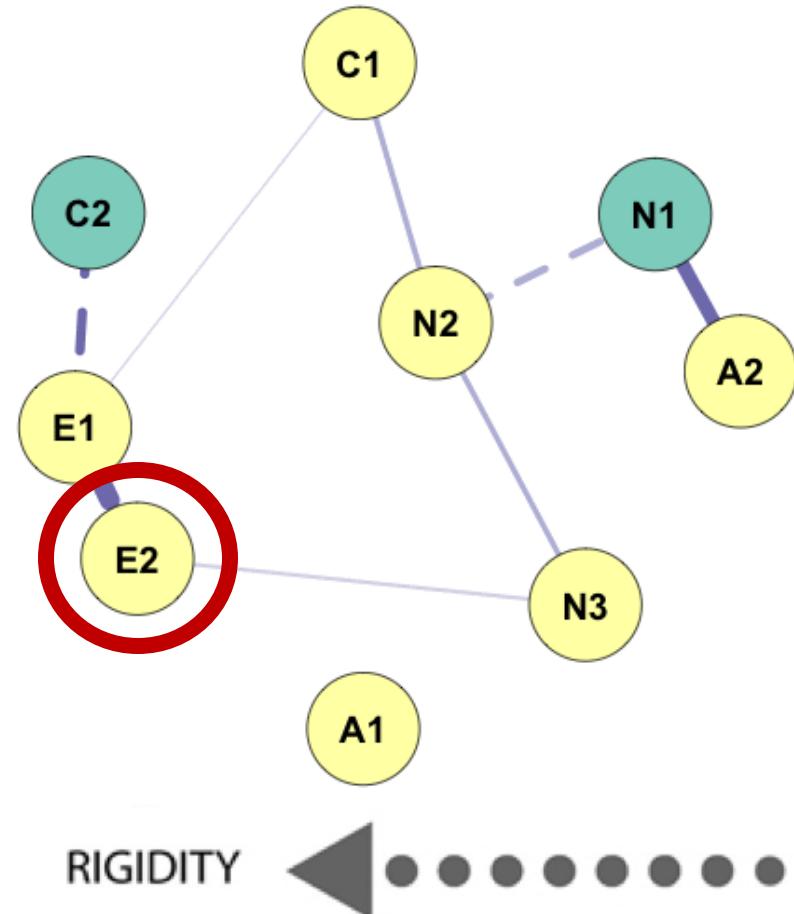
Nissen & Beck (in press, *JPSP*)

# Integrating Across Time Scales:

Using personality dynamics to link idiographic systems to personality trait change

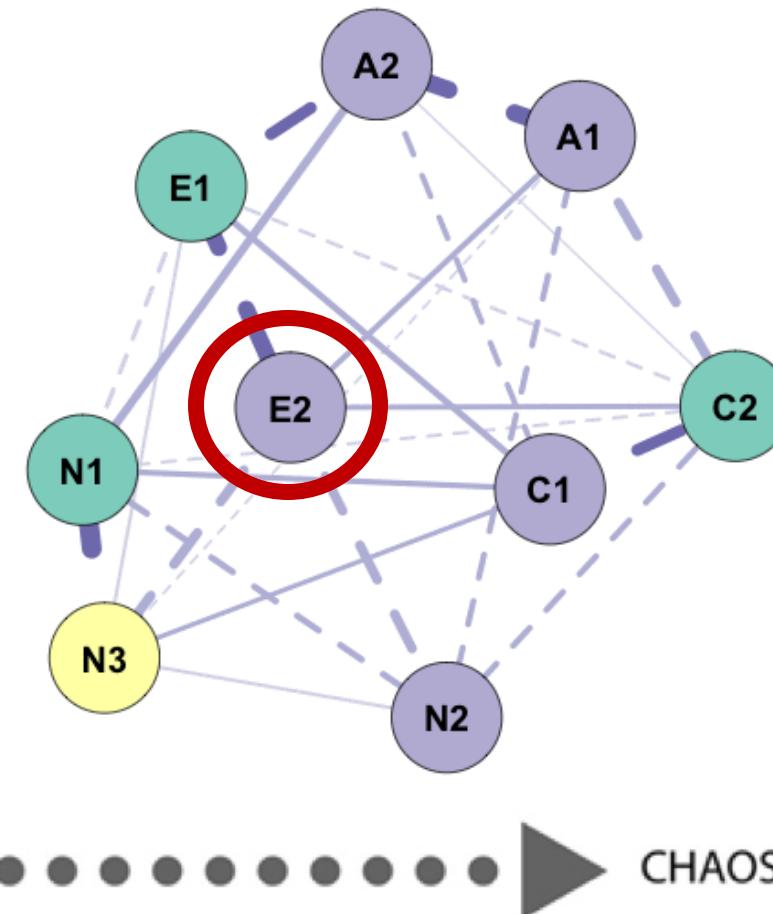
## Low Density, Degree

Contemporaneous Wave 1 for S62



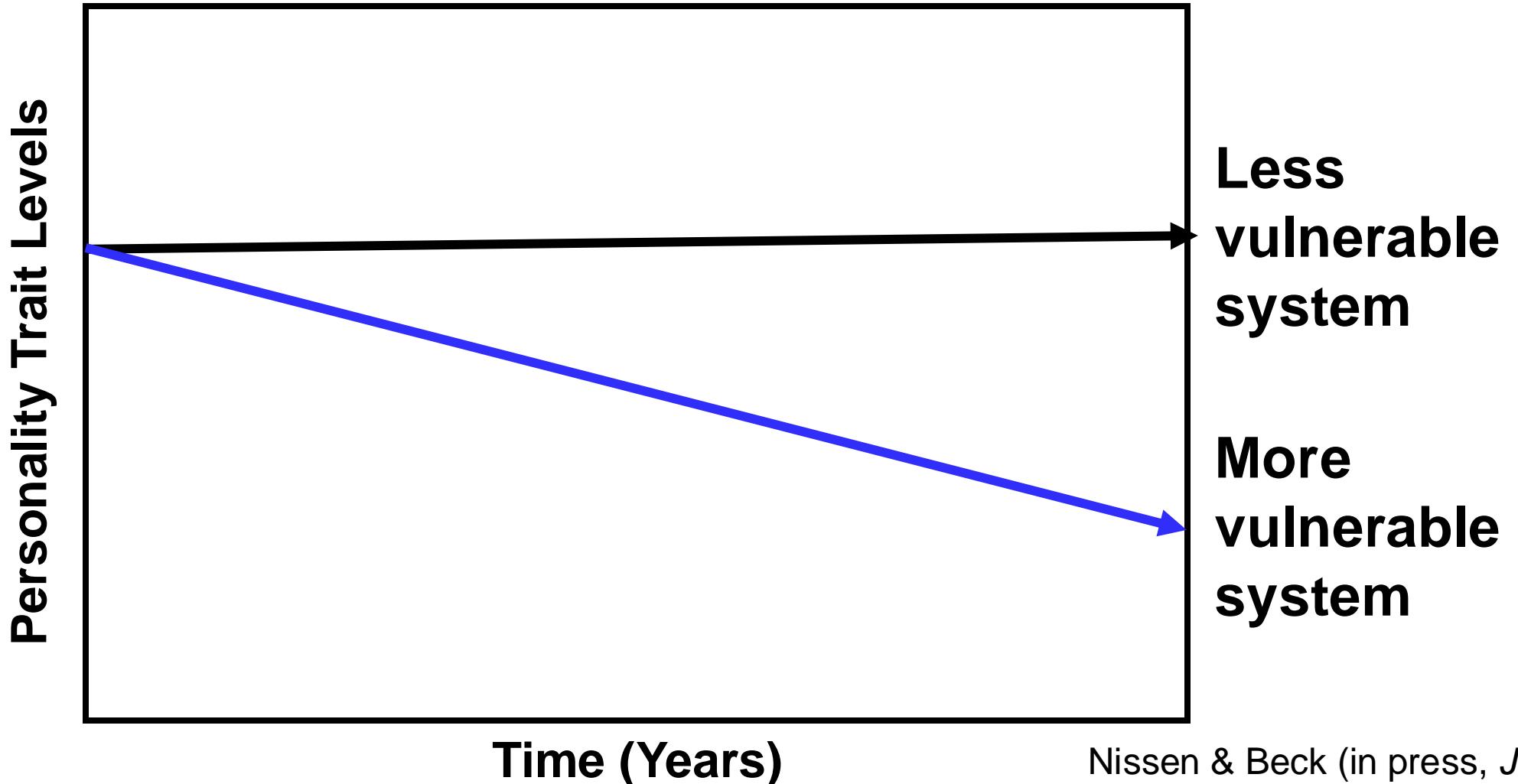
## High Density, Degree

Contemporaneous Wave 1 for S95



# Integrating Across Time Scales:

Using personality dynamics to link idiographic systems to personality trait change

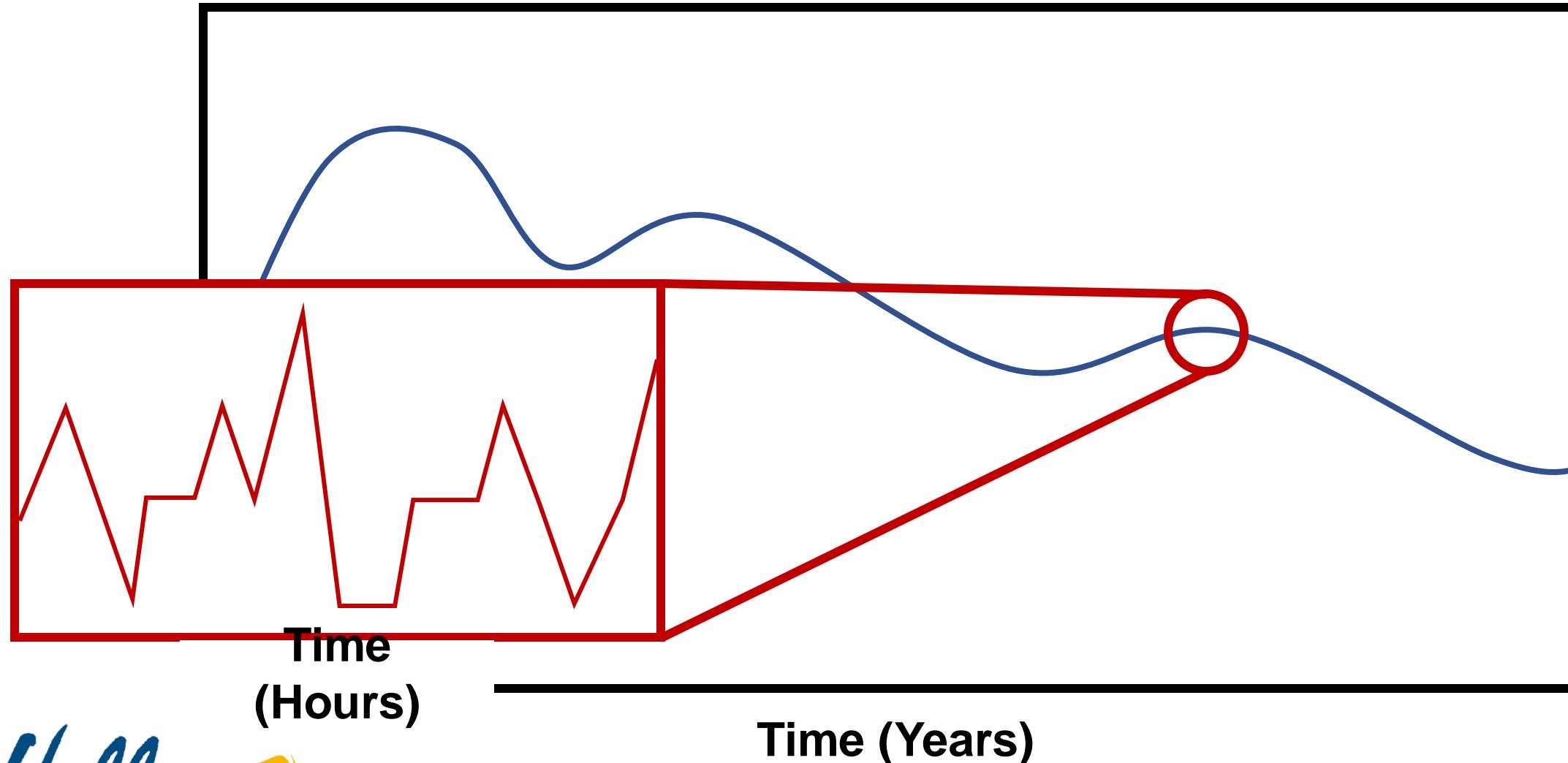


Adam Nissen

Nissen & Beck (in press, *JPSP*)

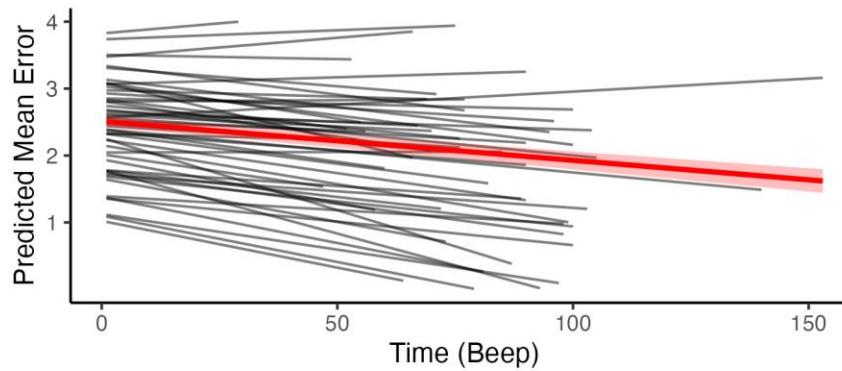
# Integrating Across Time Scales

## Lifespan Cognitive Function



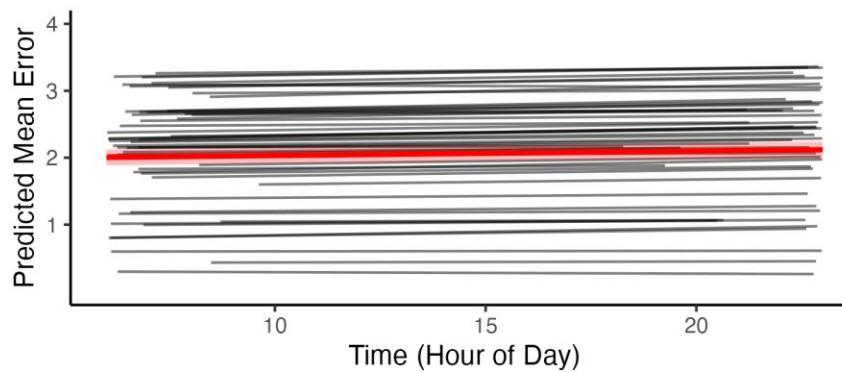
### Practice Effects

*Linear Trend Across All Measurements*



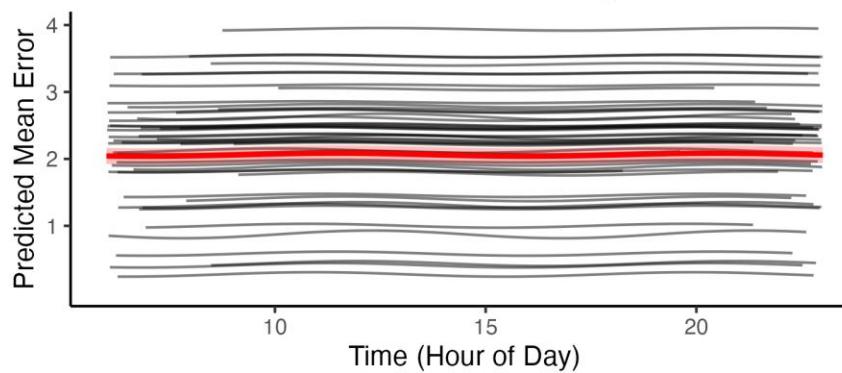
### Within Day Slope

*Linear Trend Within Days*



### Daily Rhythms

*Cosinor Trends Within Days*



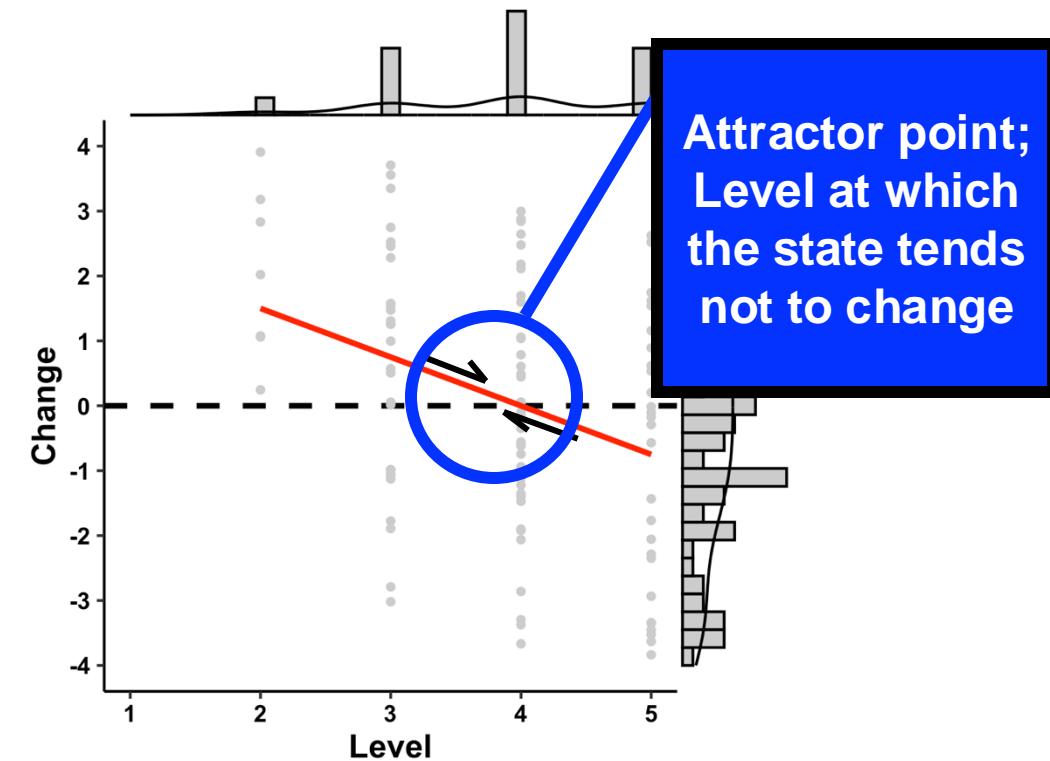
# Differential Equations and Formal Models

Looking across individuals,  
individual differences appear in:

**Attractor location**  
(x at which change is 0)

**Attractor strength**  
(slope;  $b_1$ )

$$\frac{dp}{dt} = b_0 + b_1 p$$





## Define Your Target System

Number of Variables

Univariate

Bivariate

Type of Model

Linear ODE

Define Parameters

$\mu$   
0

$\beta$   
-0.8

$y_0$



Reset Parameters

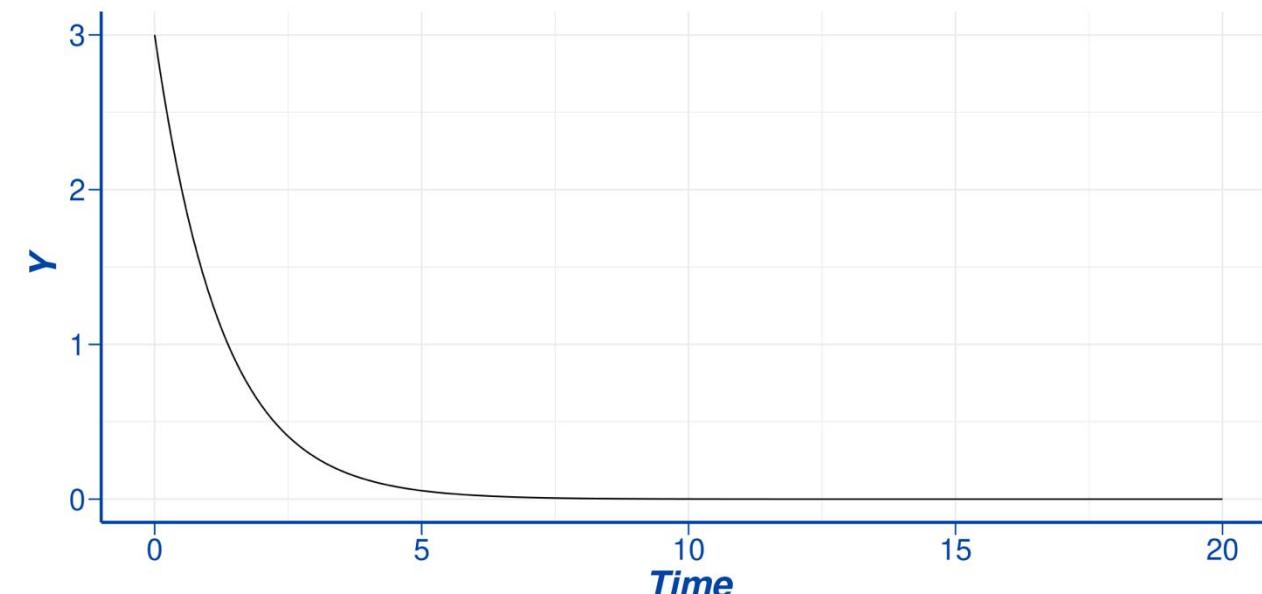
Rohit Batra

Define Time

Equation of the System

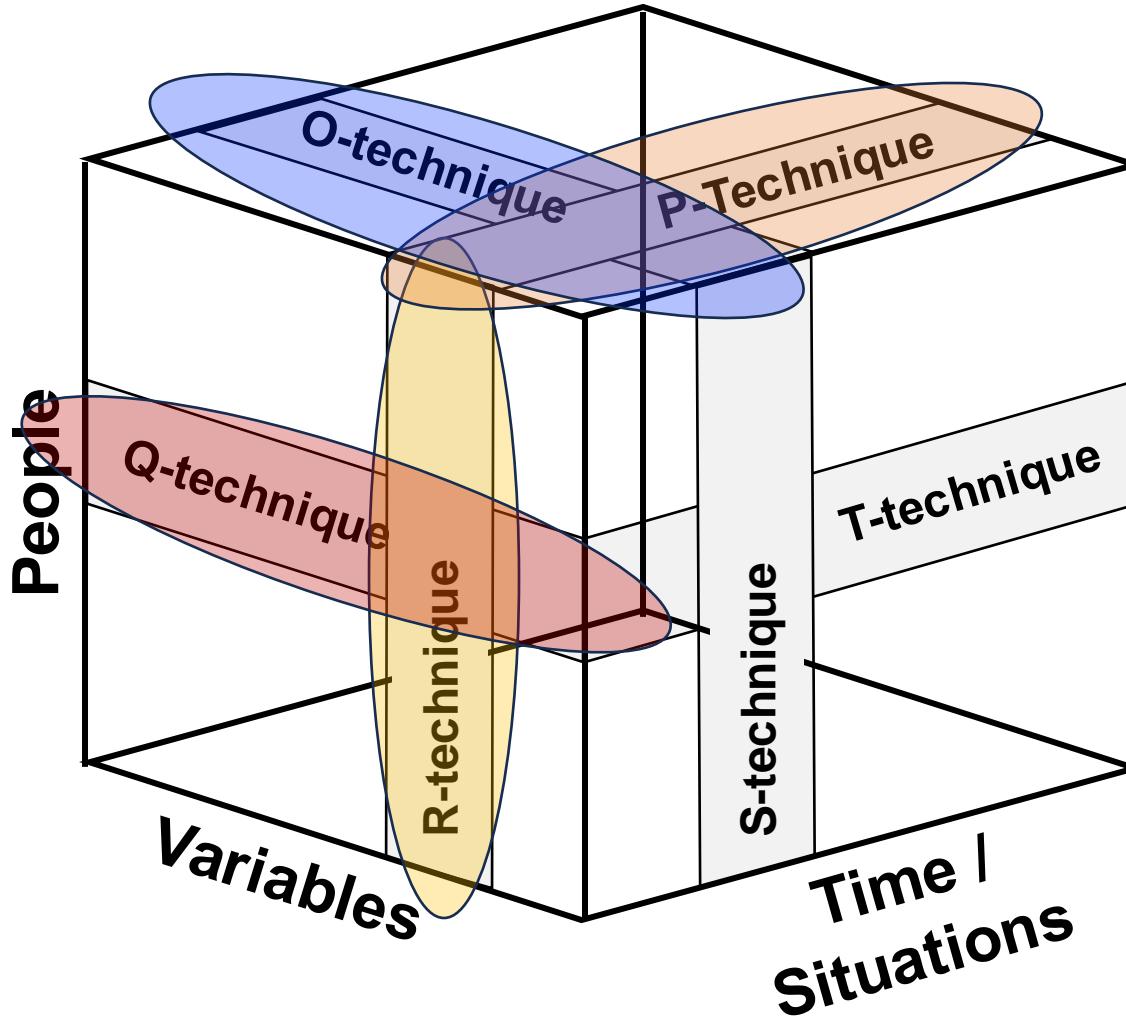
$$\frac{dy_t}{dt} = \beta \cdot (y_t - \mu)$$

Plot of Y Over Time



Generate Plot

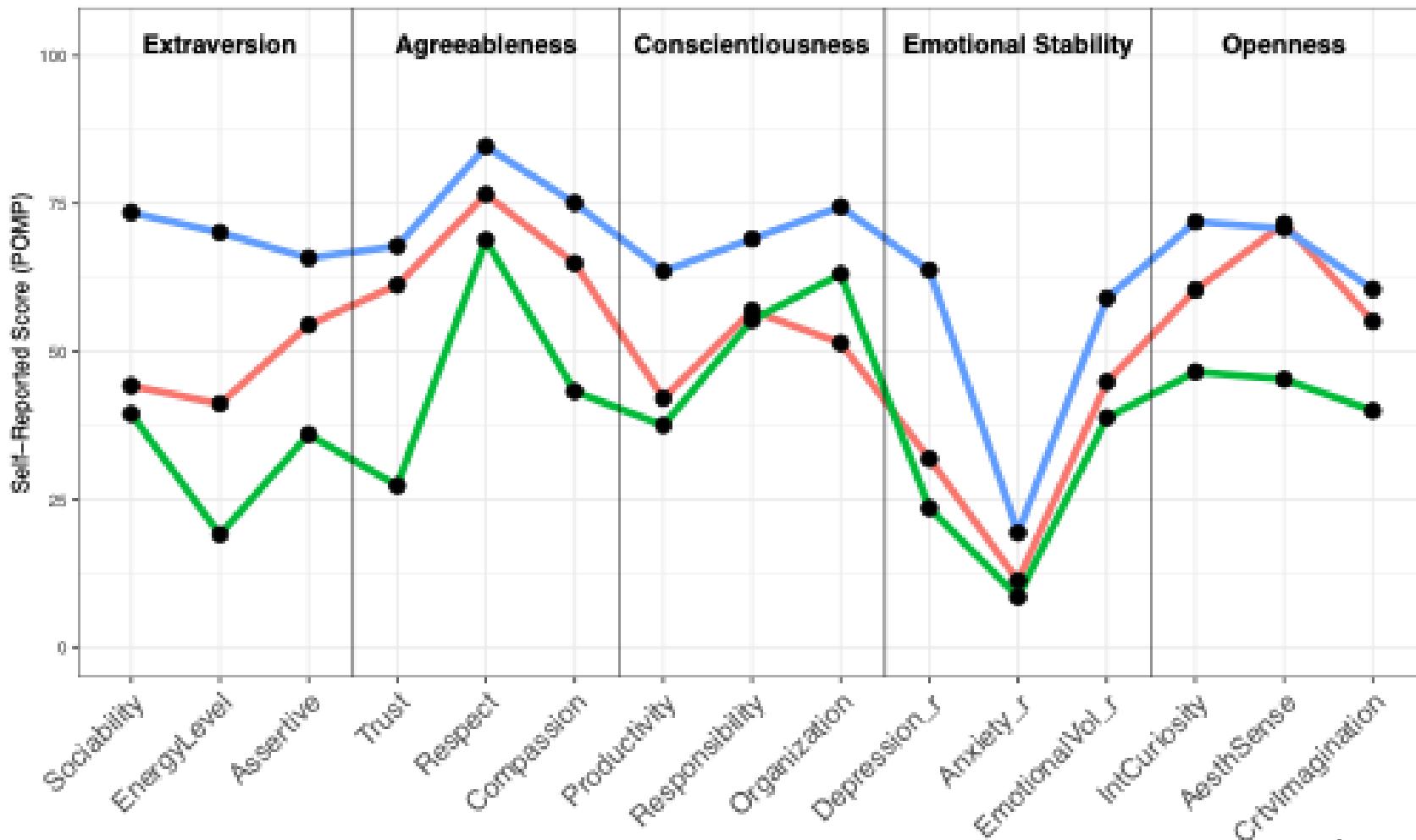
# Revisiting Cattell's Data Box



# Revisiting Cattell's Data Box

Participant 108  
n = 79

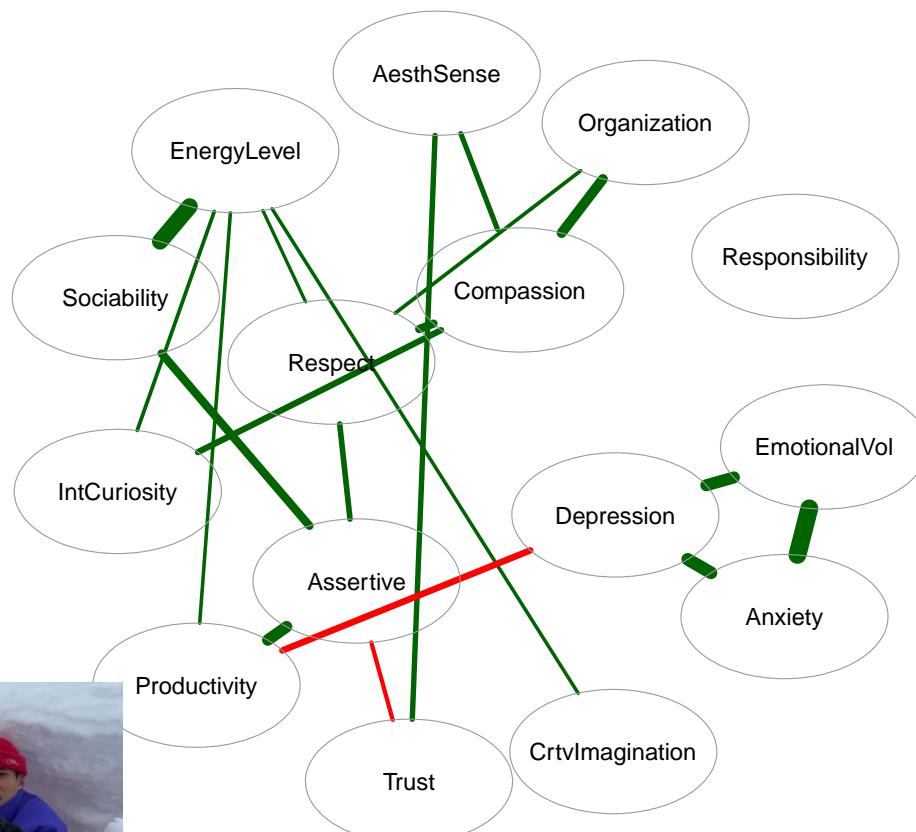
Profiles: 1 (44.30%) 2 (27.86%) 3 (27.86%)



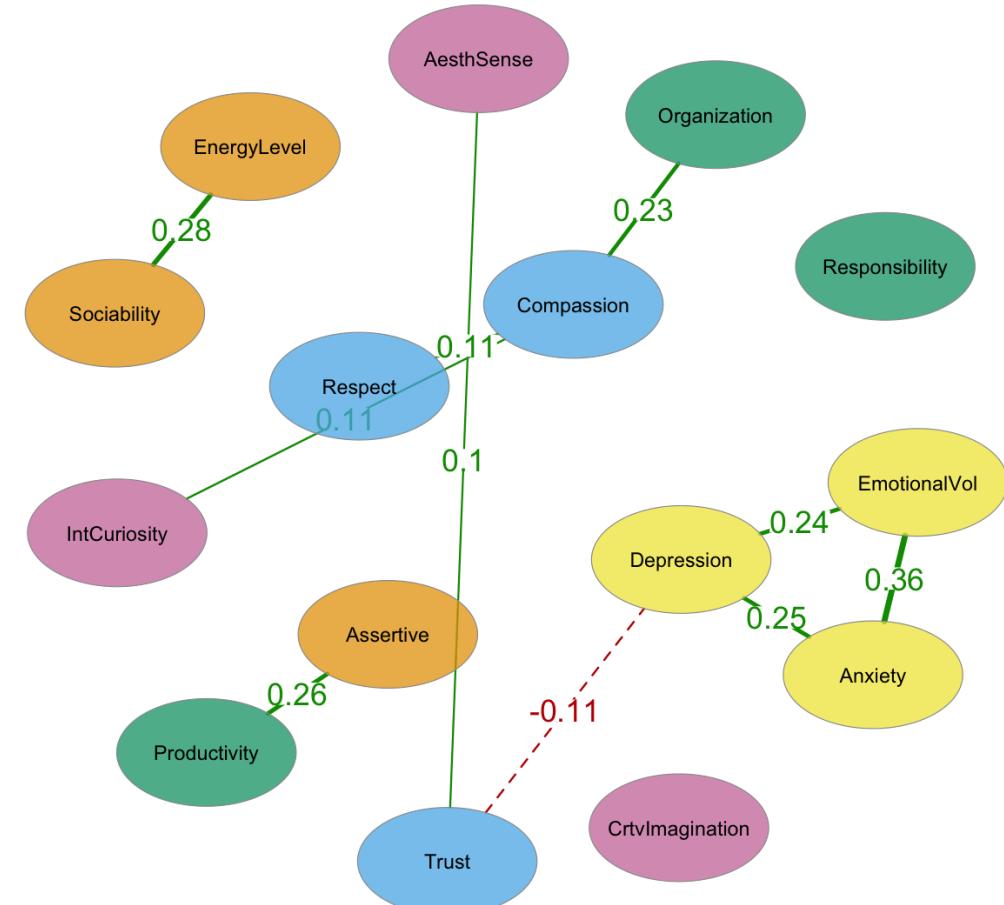
Colin J Lee

# Revisiting Cattell's Data Box

# Stationary Network



## Estimation Point 1

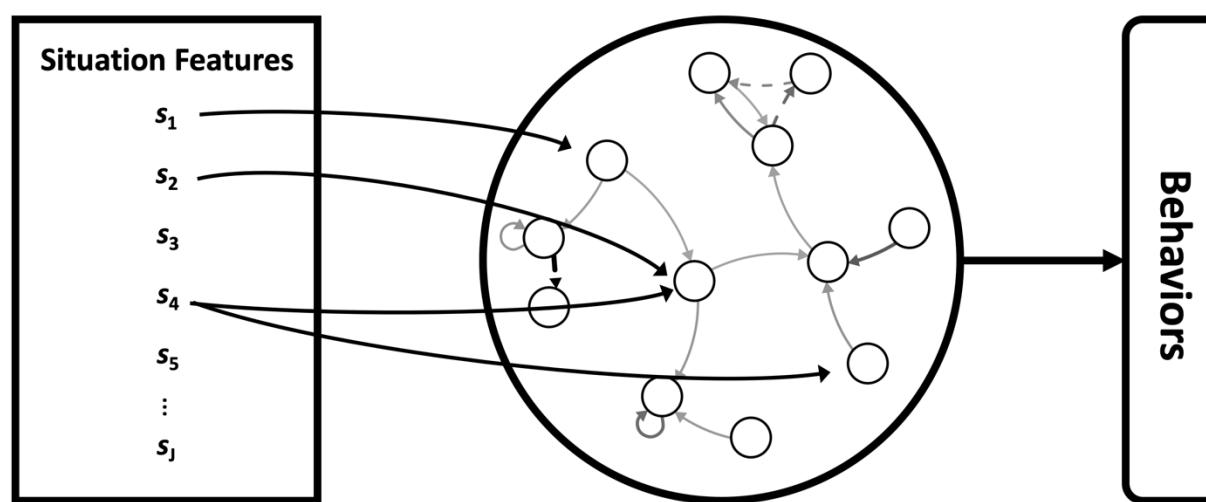


# Persons in Context: Systems Theories

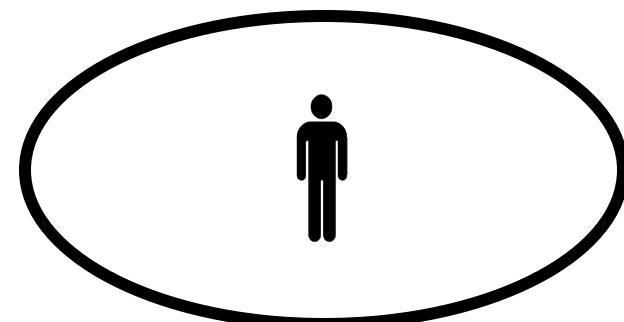
**Ecological Systems Theory**  
(e.g., Bronfenbrenner, 1979)



**Cognitive Affective Personality System**  
(e.g., Mischel & Shoda, 1995)



**Field Theory**  
(e.g., Lewin, 1936)



e.g., Lewin, 1936

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Beck & Jackson  
(2020, *JPSP*; 2021b, *EJP*)

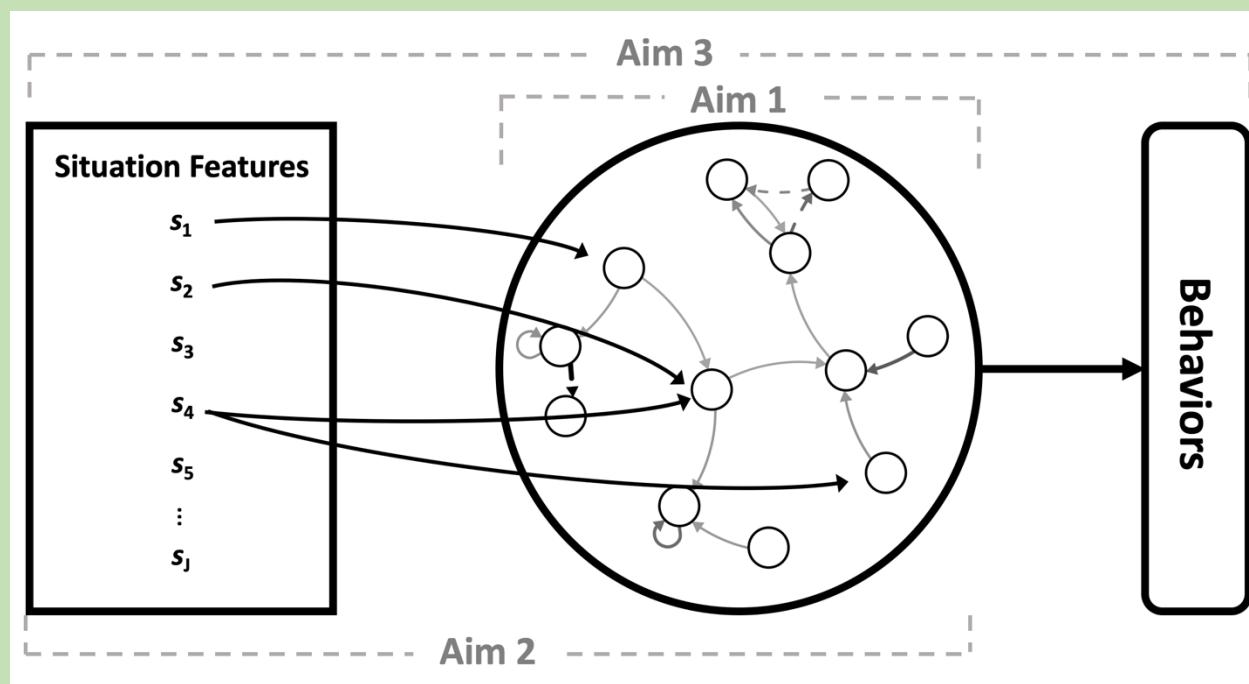
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Beck et al.  
(in press, *NHB*)

**Aim 3:** Psychological and situational antecedents of behaviors and experiences vary across people.

Beck & Jackson  
(2023, *Psych Science*)

## Ongoing Directions



# Acknowledgements

## Collaborators

Dr. Josh Jackson  
Adam Nissen  
Colin Lee  
Dr. Felix Cheung  
Dr. Stuti Thapa  
Dr. Zoe Hawks  
Dr. Dan Mroczek  
Dr. Eileen Graham

## The Beck Lab



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 @EmorieBeck



SCAN ME



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National Science Foundation Grants BCS-2336406 and BCS-1125553; SPSP Inside the Grant Panel