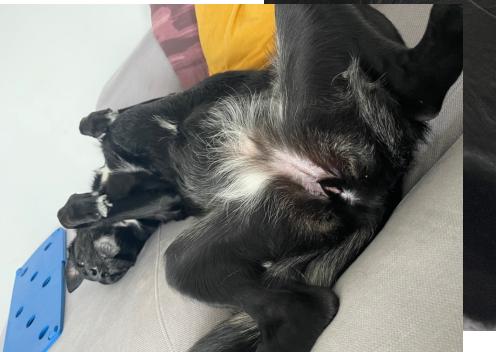
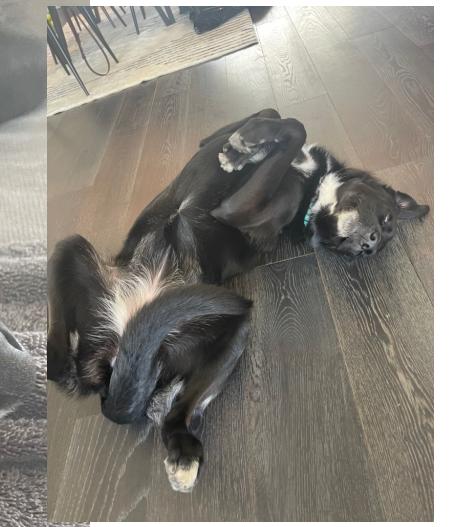
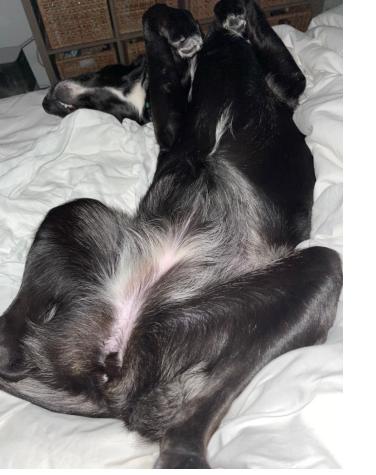
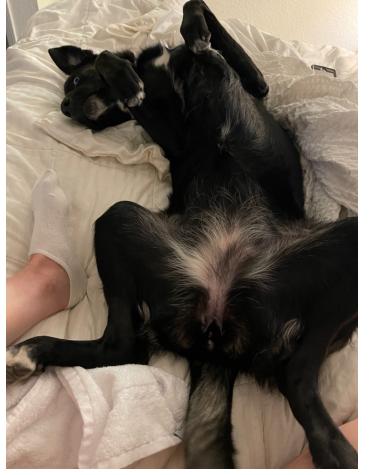
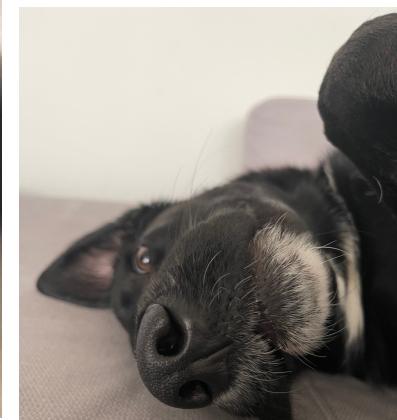
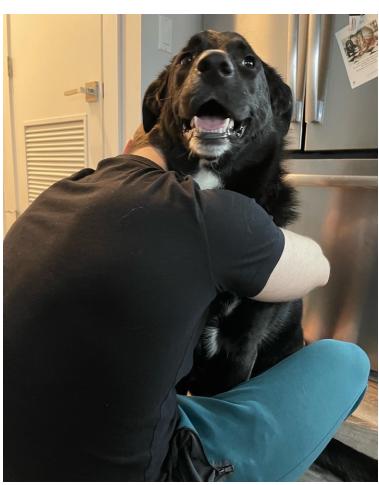
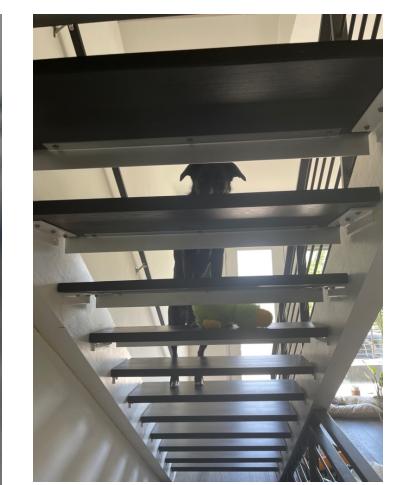
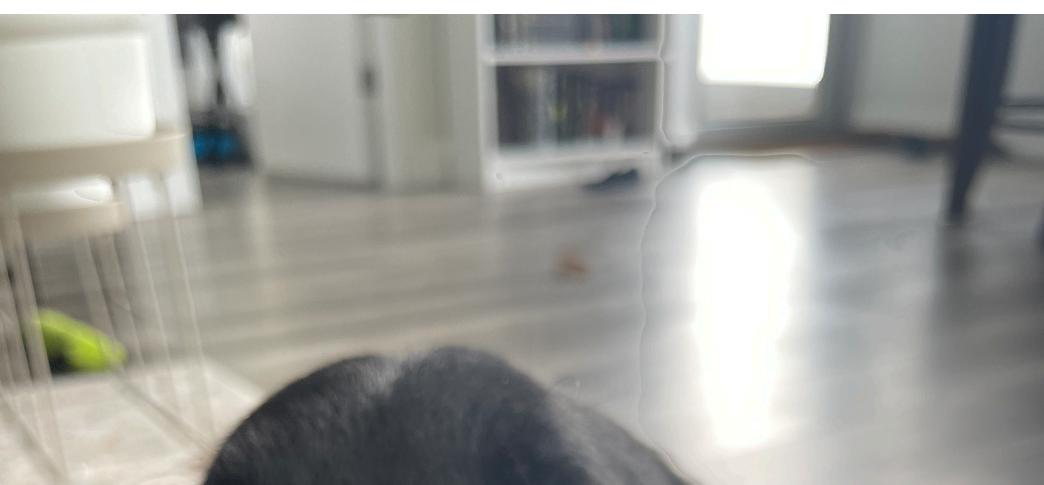


Person and Situation as Coupled Systems

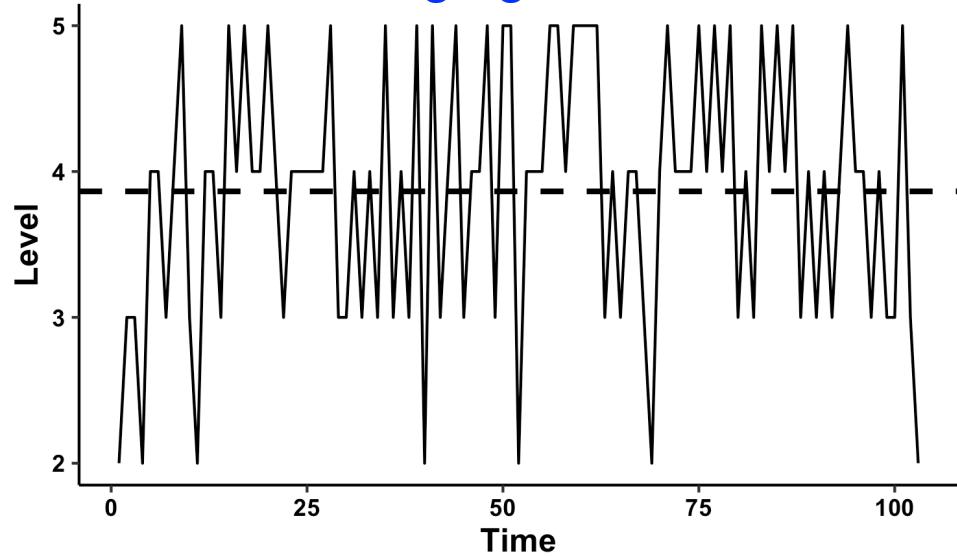
Emorie D. Beck, PhD
UCDAVIS
UNIVERSITY OF CALIFORNIA

Niclas Kuper
Kai T. Horstmann
Joshua J. Jackson

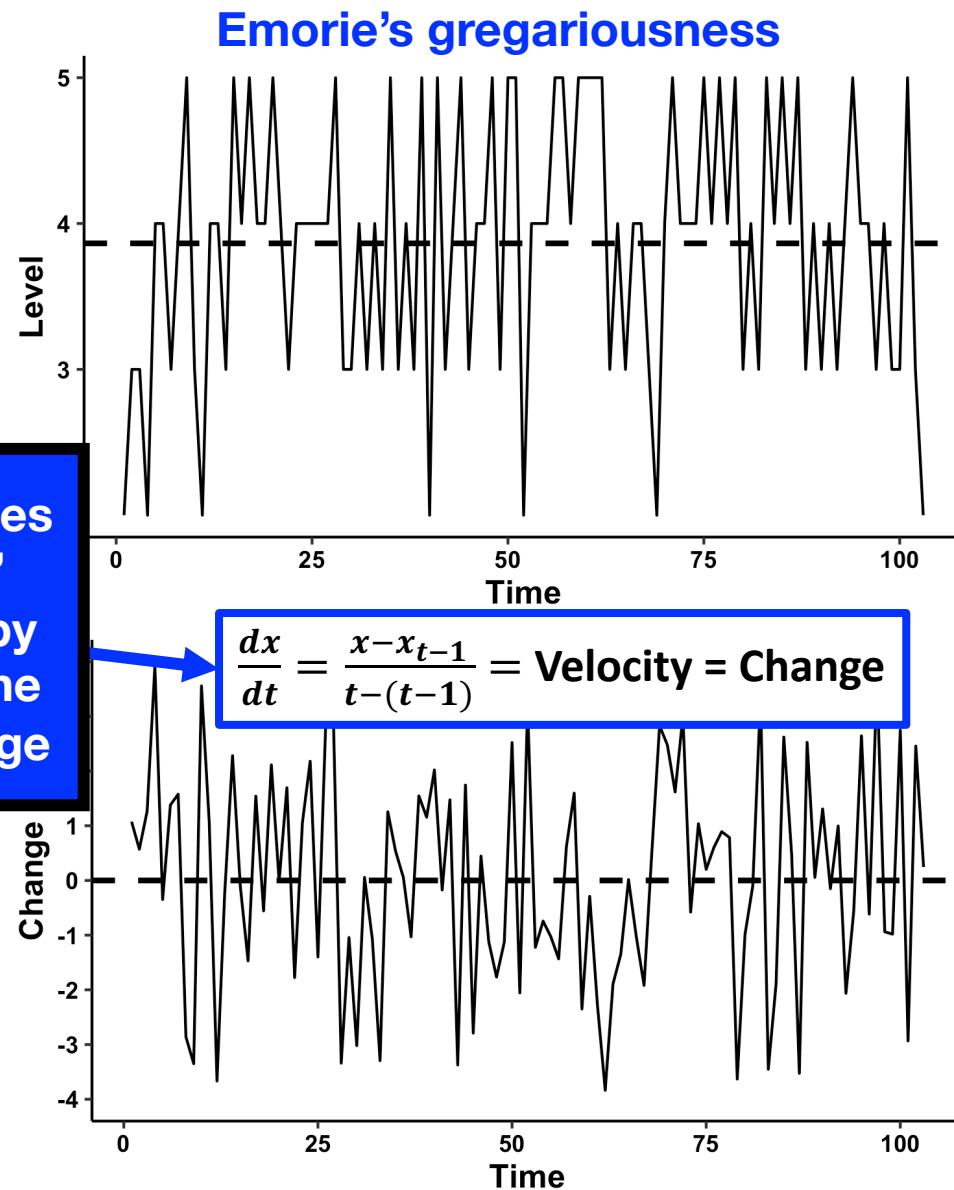




Emorie's gregariousness

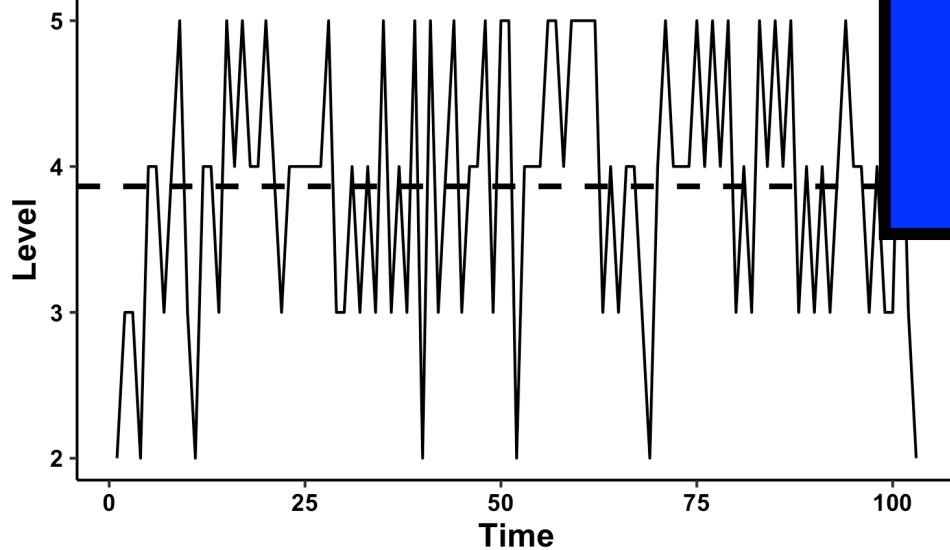


Time becomes
a “hidden”
dimension by
looking at the
rate of change

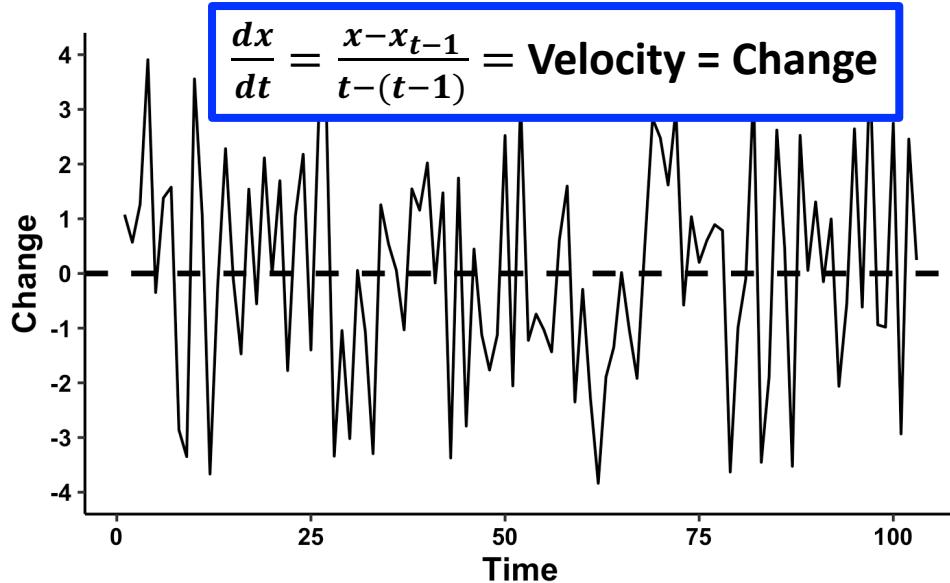


$$\frac{dp}{dt} = b_0 + b_1 p$$

Emorie's gregariousness

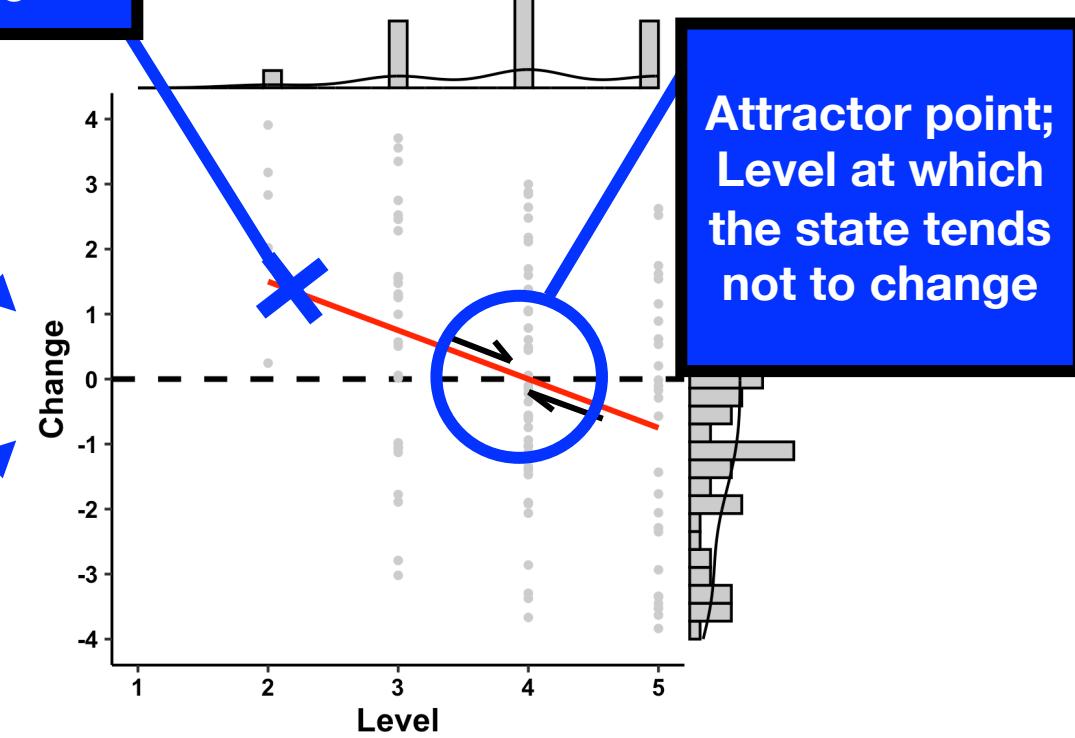


When $x = 2$,
expected
change is
positive



$$\frac{dx}{dt} = \frac{x - x_{t-1}}{t - (t-1)} = \text{Velocity} = \text{Change}$$

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



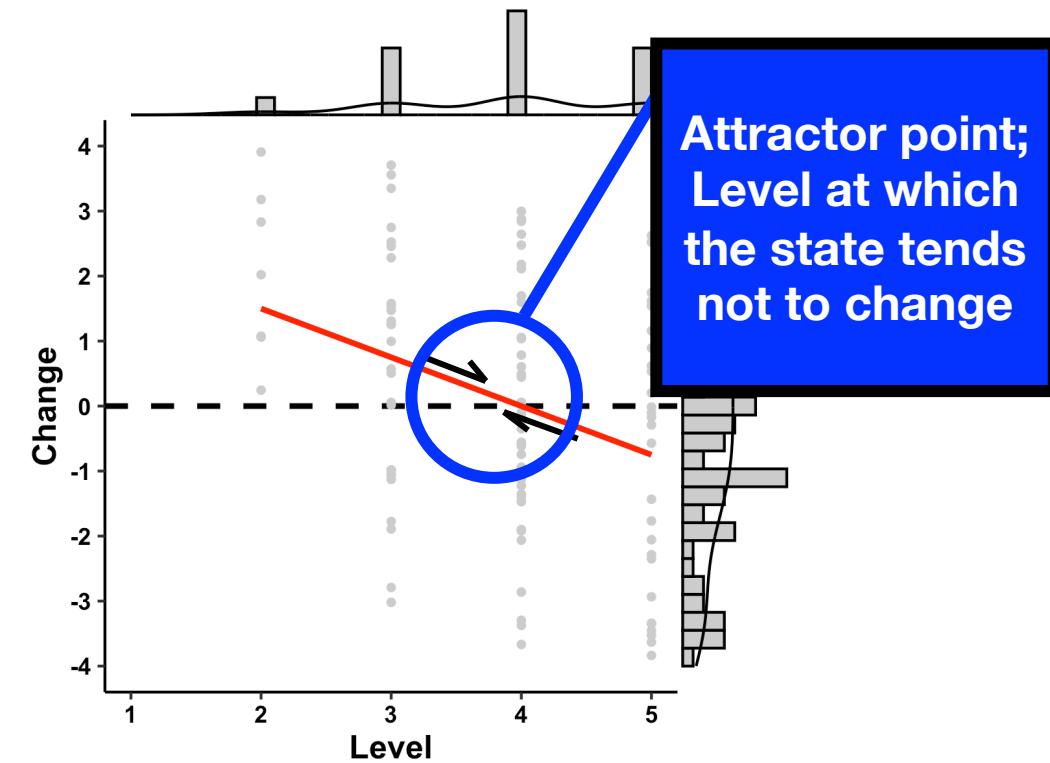
Attractor point;
Level at which
the state tends
not to change

Looking across individuals,
individual differences appear in:

Attractor location
(x at which change is 0)

Attractor strength
(slope; b_1)

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

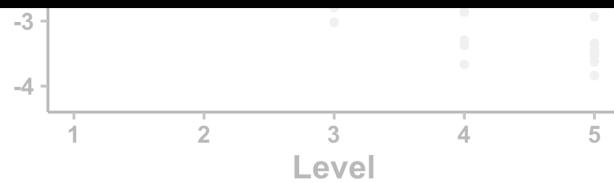


Looking across individuals,
individual differences appear in:

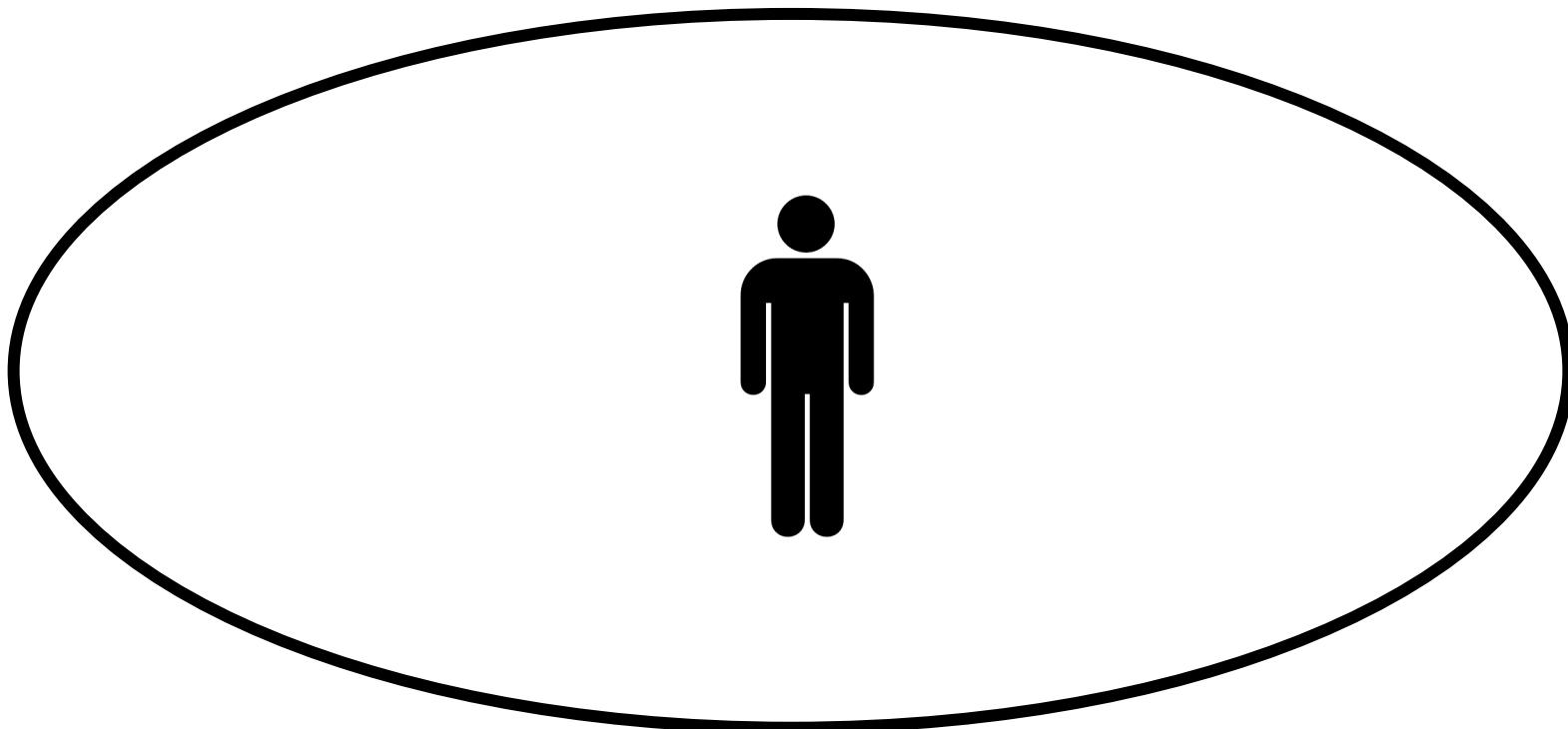
$$\frac{dp}{dt} = b_0 + b_1 p$$

But *why* are states pulled back toward an equilibria?

tractor point;
level at which
the state tends
not to change

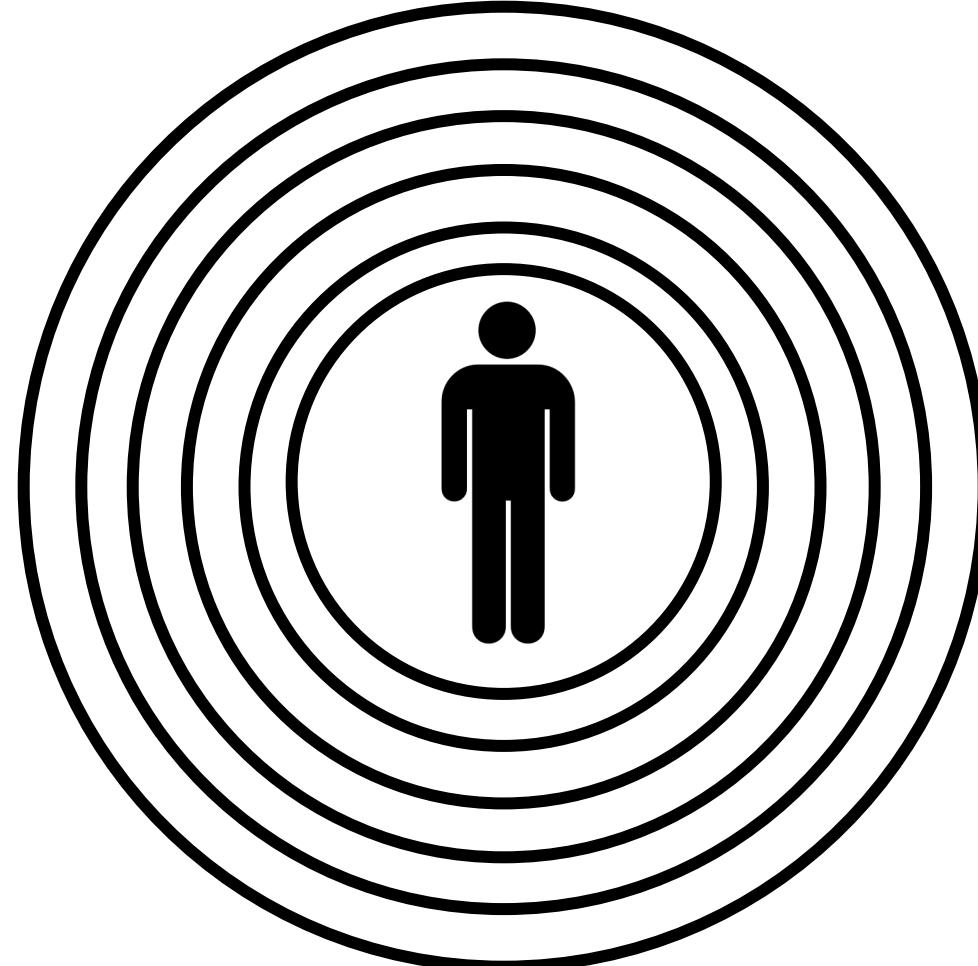


Persons in Context



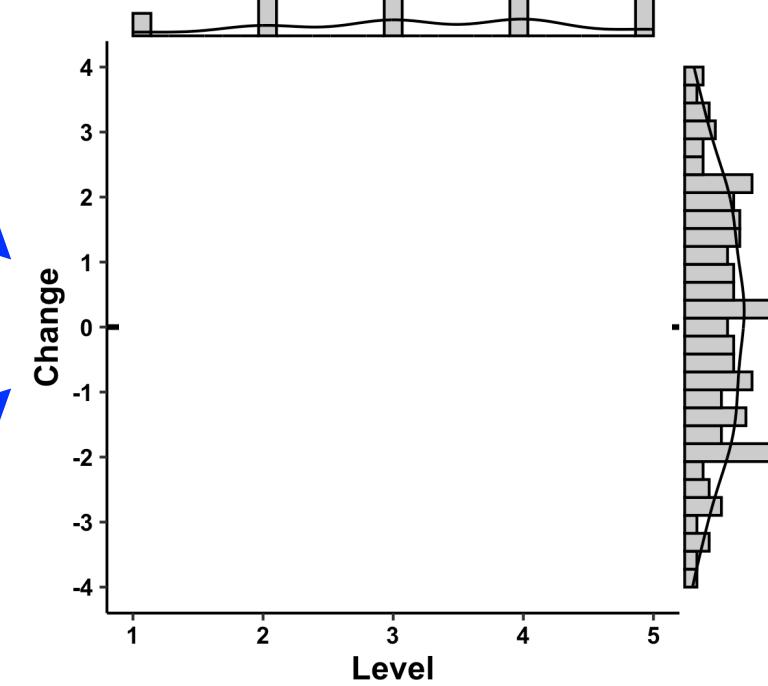
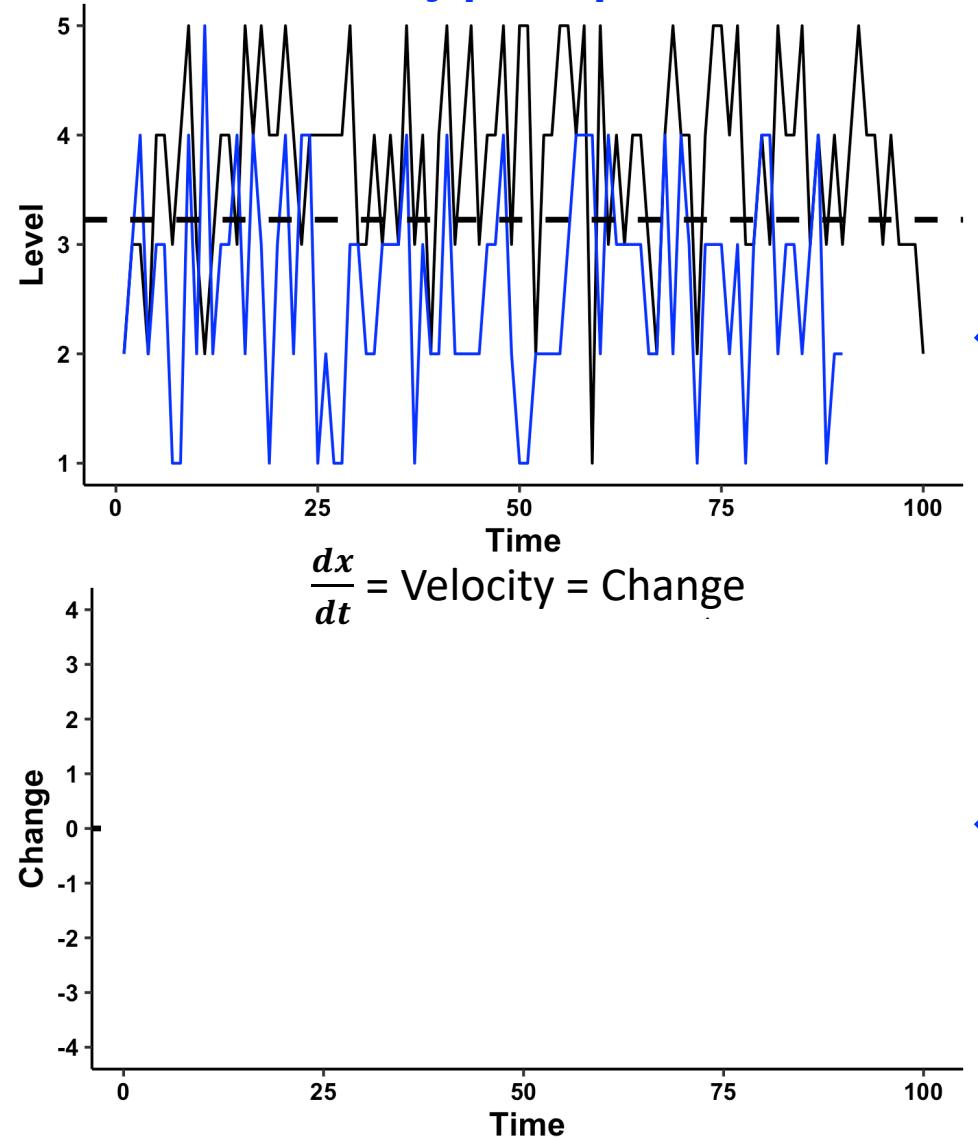
e.g., Lewin, 1936

Persons in Context



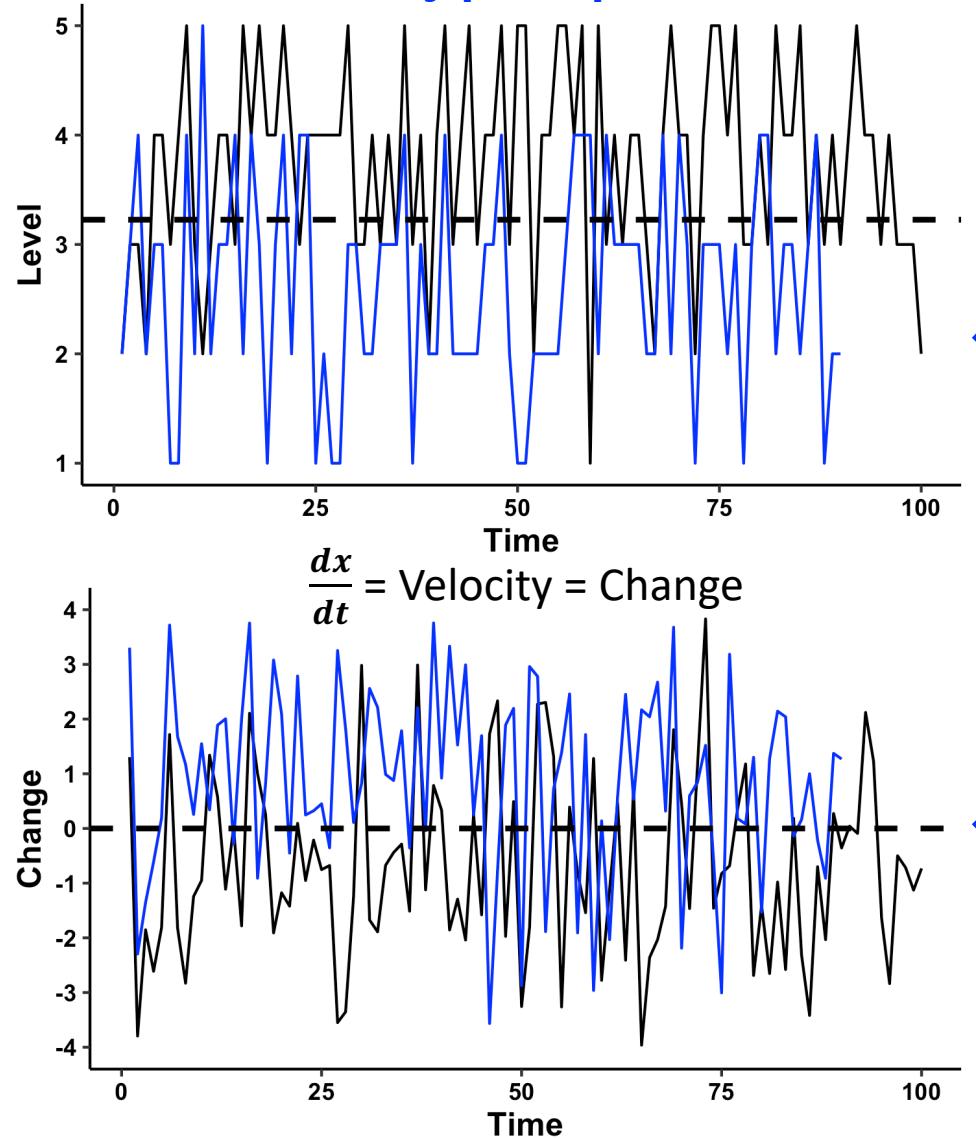
e.g., Bronfenbrenner, 1979

Emorie's gregariousness & sociality perceptions

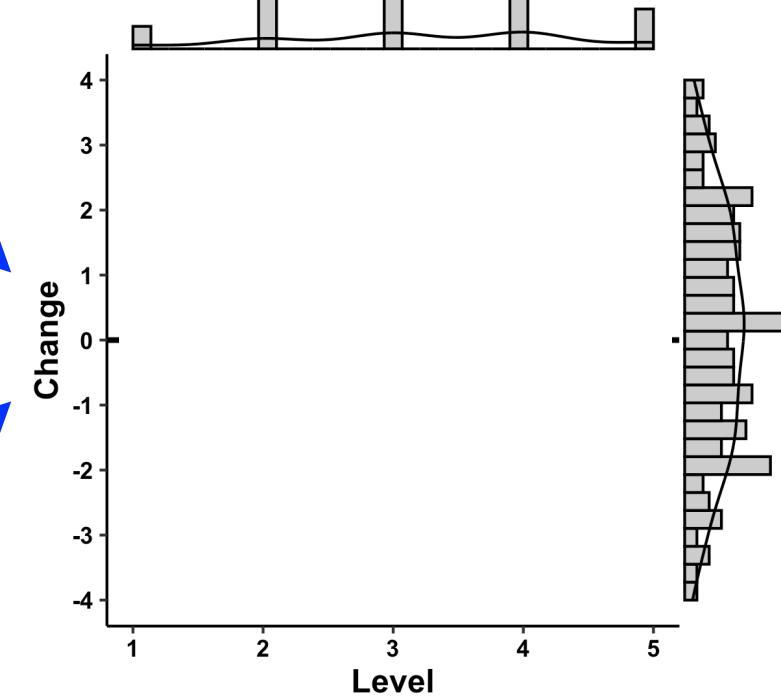


Butner et al., 2014; Danvers et al., 2019

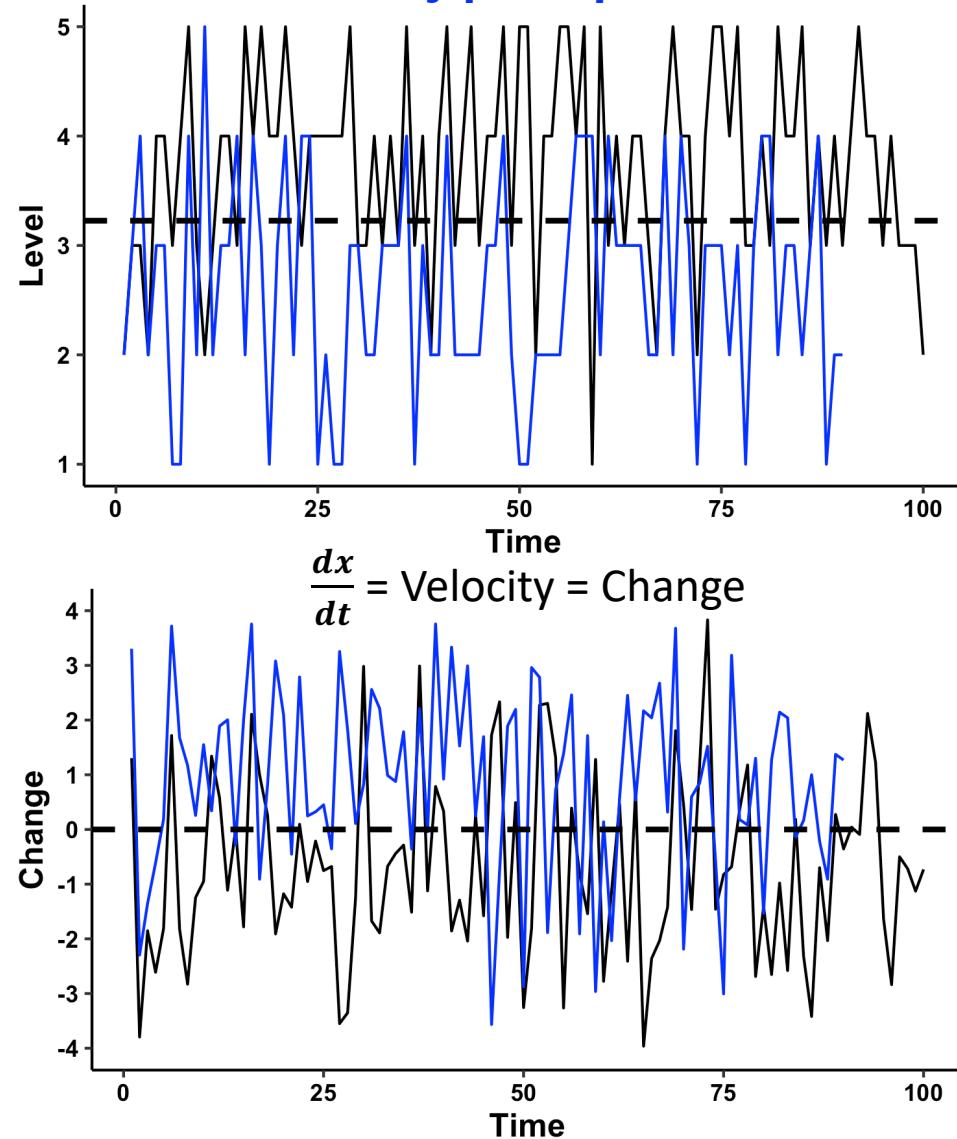
Emorie's gregariousness & sociality perceptions



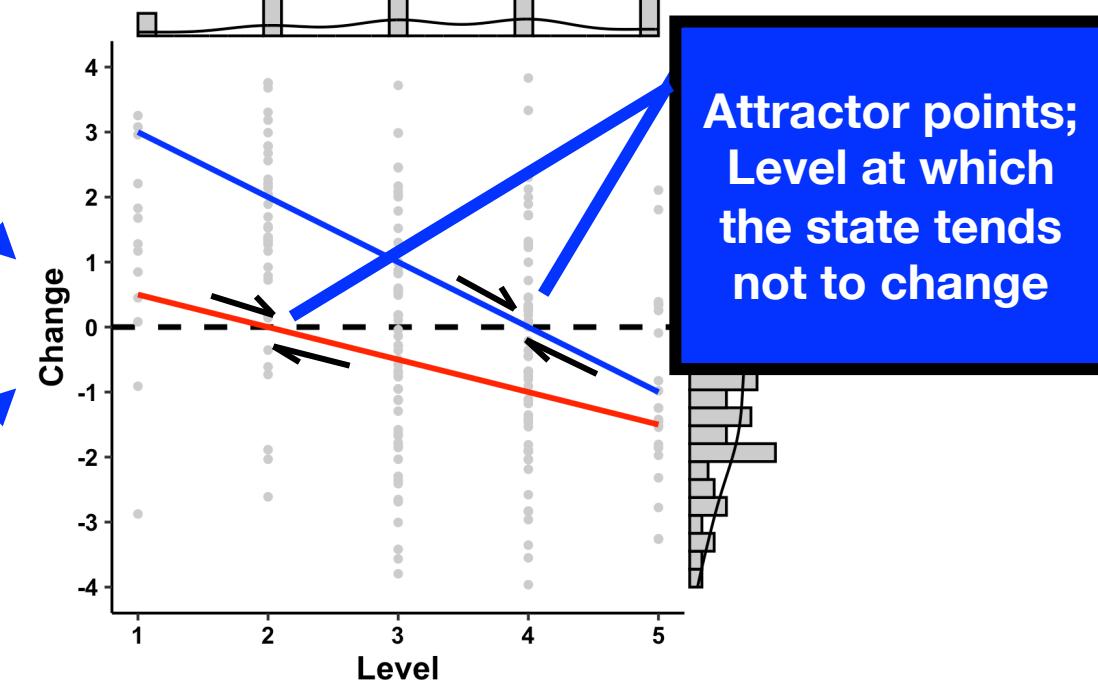
$$\frac{dp}{dt} = b_0 + b_1 p_i + b_2 s_i + b_3 p_i s_i$$



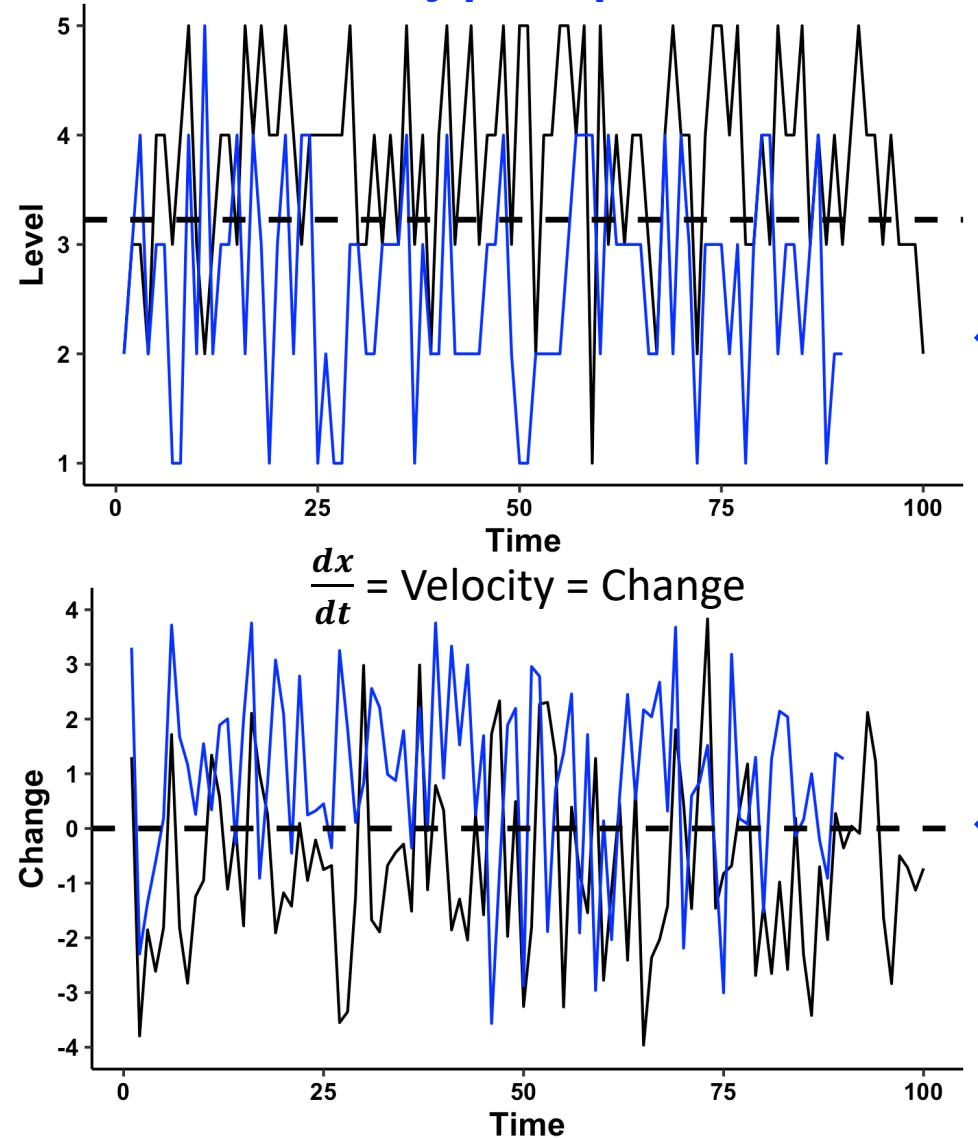
Emorie's gregariousness & sociality perceptions



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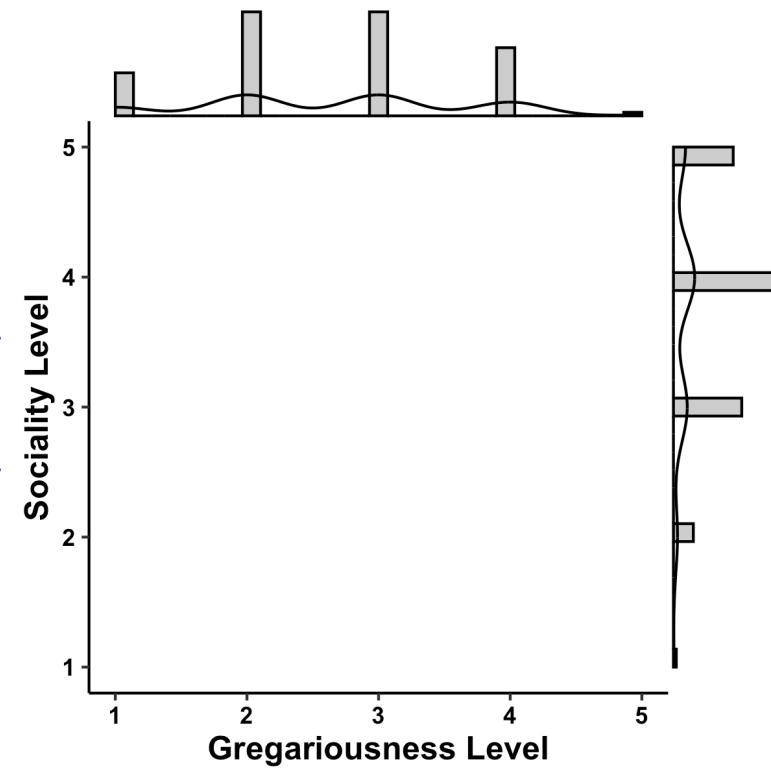


Emorie's gregariousness & sociality perceptions



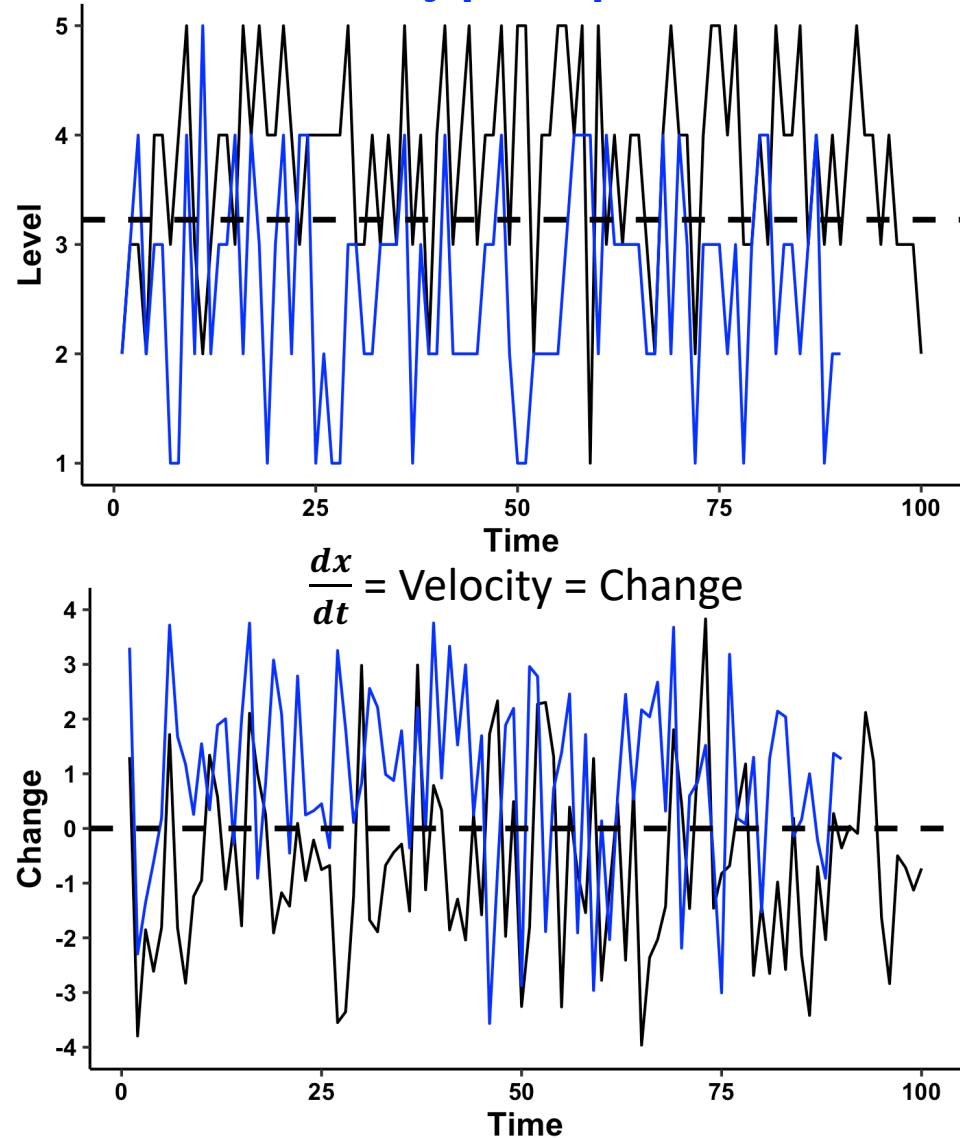
$$\frac{dp}{dt} = b_{0,p} + b_{1,p}p_i + b_{2,p}s_i + b_{3,p}p_is_i$$

$$\frac{ds}{dt} = b_{0,s} + b_{1,s}s_i + b_{2,s}p_i + b_{3,s}p_is_i$$



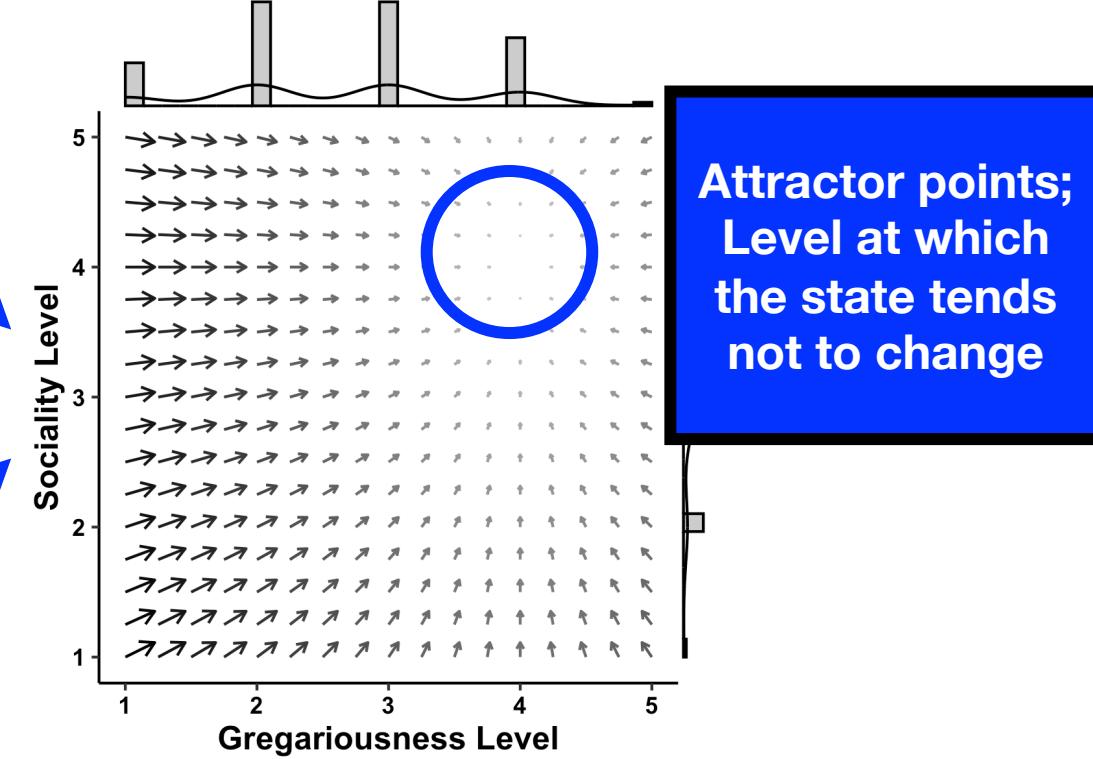
Butner et al., 2014; Danvers et al., 2019

Emorie's gregariousness & sociality perceptions



$$\frac{dp}{dt} = b_{0,p} + b_{1,p}p_i + b_{2,p}s_i + b_{3,p}p_is_i$$

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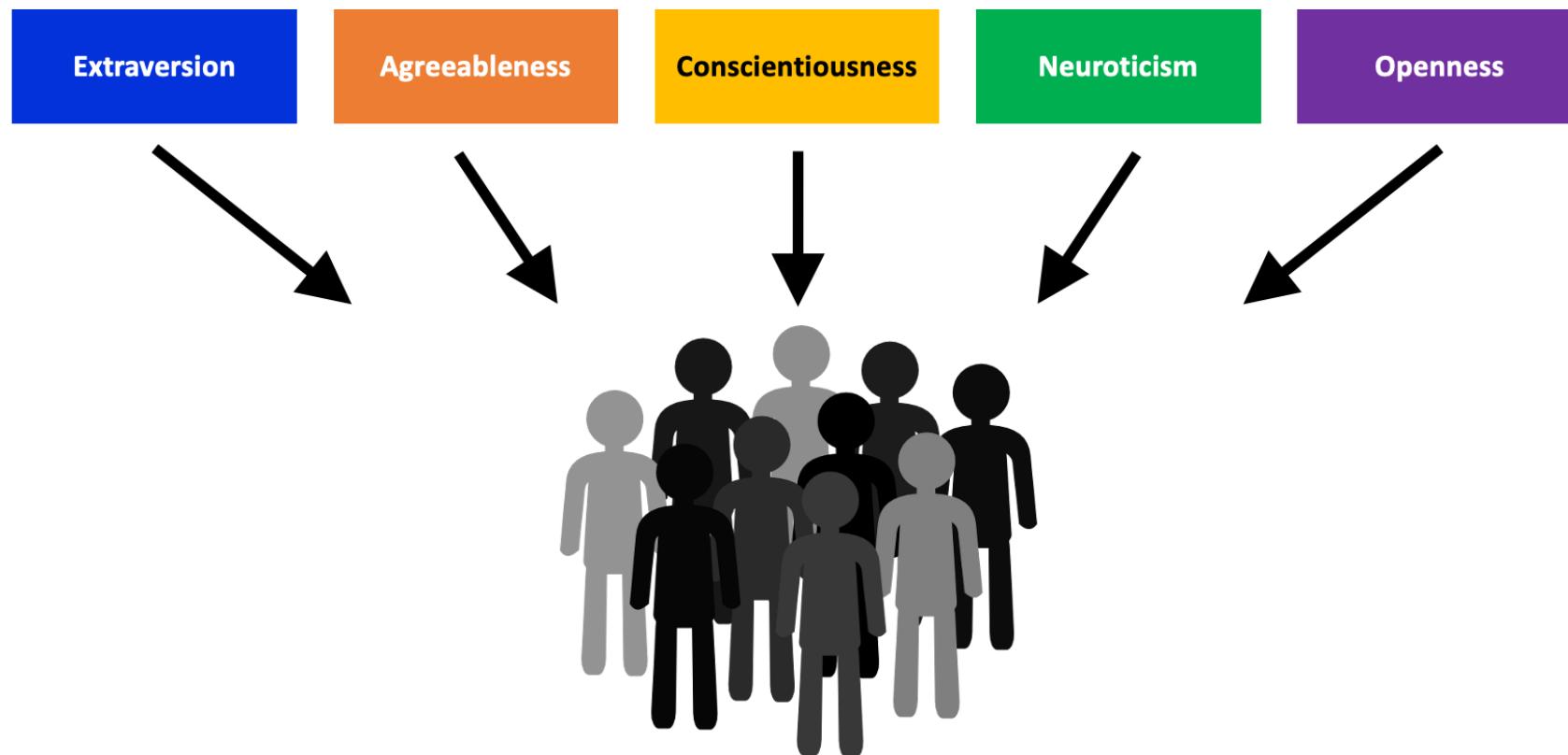
Using topological features to understand personality structure and process

Butner et al., 2014

Type	First Lyapunov (+/-)	Second Lyapunov (+/-)	Equation Components	Illustration
Attractor	-	-	two negative first order equations	
Repellor	+	+	two positive first order equations	
Saddle	-	+	one negative and one positive first order equations	
Spiral Attractor	-	i	one negative first order equation and one second order equation	
Spiral Repellor	+	i	one positive first order equation and one second order equation	
Limit Cycle	i	0	one second order equation	
Torus	i	i	two second order equations	

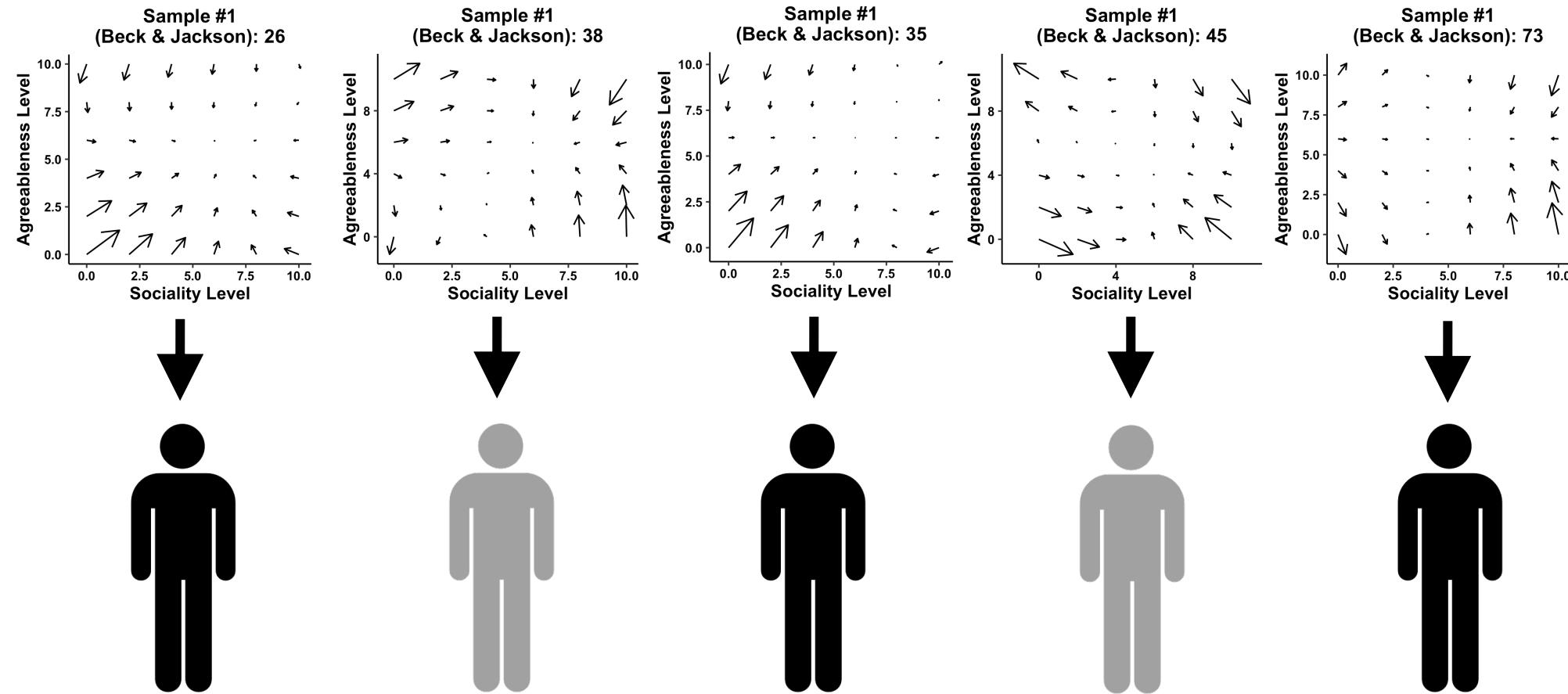
Figure 19. Combinations of Lyapunov exponents and two-dimensional typologies.

Using topological features to understand personality structure and process



Nomothetic
Between-Person
Variable Centered

Using topological features to understand personality structure and process



Idiographic
Person-Specific

Personality States

	E	A	C	N	O
Situation Characteristics	Duty				
	Intellect				
	Adversity				
	Mating				
	Positivity				
	Negativity				
	Deception				
	Sociality				

Personality States

	E	A	C	N	O
Situation Characteristics					
Duty			+		
Intellect					+
Adversity		-		+	
Mating	+				
Positivity	+			-	
Negativity	-			+	
Deception		-		+	
Sociality	+	+			

Research Questions

GOAL: Describe common topologies and individual differences in topologies.

- 1. Are there individual differences in attractor location and strength of personality states and situation characteristics (univariate)?**

- 2. Are there conceptually expected coupled associations between personality states and situation characteristics (bivariate)?**

- 3. Are there individual differences in the degree of coupled associations?**

Sample #1

(IPCS e.g., Beck & Jackson,
2021a)

Sample #2

(e.g., Sherman et al., 2015)

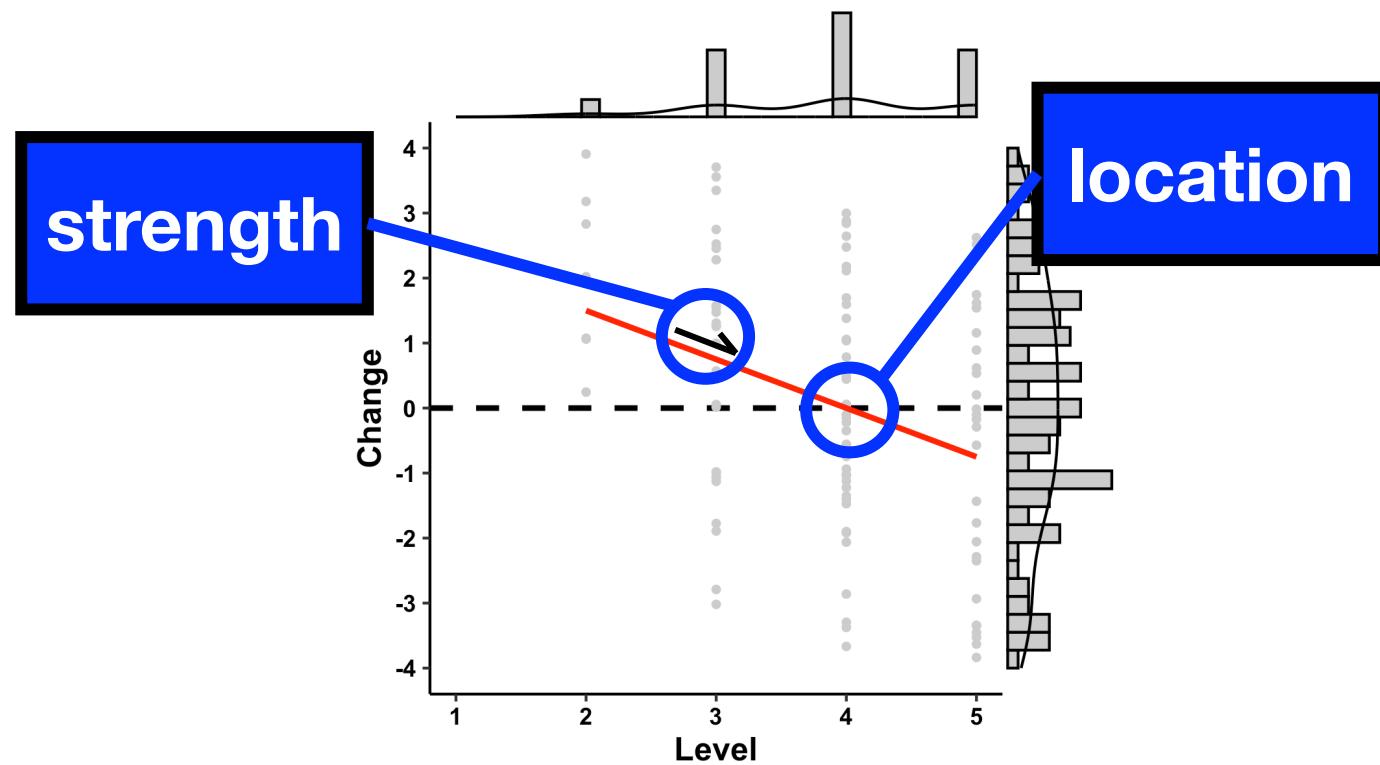
Sample #3

(e.g., Horstmann et al., 2021)

N	157	197	152
M _{age} (SD _{age})	19.5 (1.26)	18.61 (1.78)	24.11 (6.41)
% female	74.2%	65.1%	85.5%
M _{obs} (SD _{obs})	49.1 (20.3)	36 (5.69)	40.4 (10.1)
min _{obs} - max _{obs}	20-157	20-48	20-50

1. Are there individual differences in attractor location and strength of personality states and situation characteristics (univariate)?

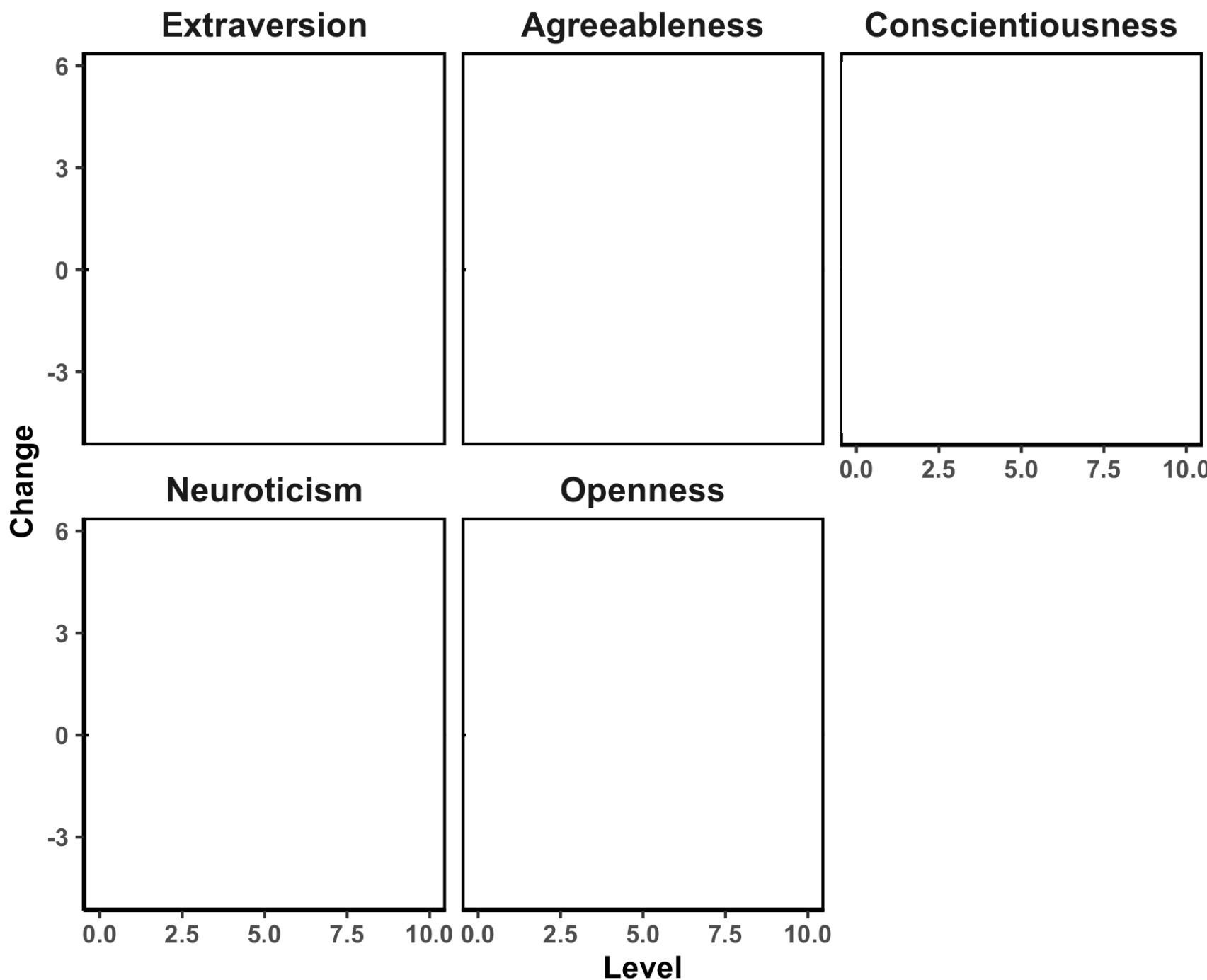
$$\frac{dp/s_{it}}{dt} = b_0 + b_1 p/s_{it} + \varepsilon_{it}$$



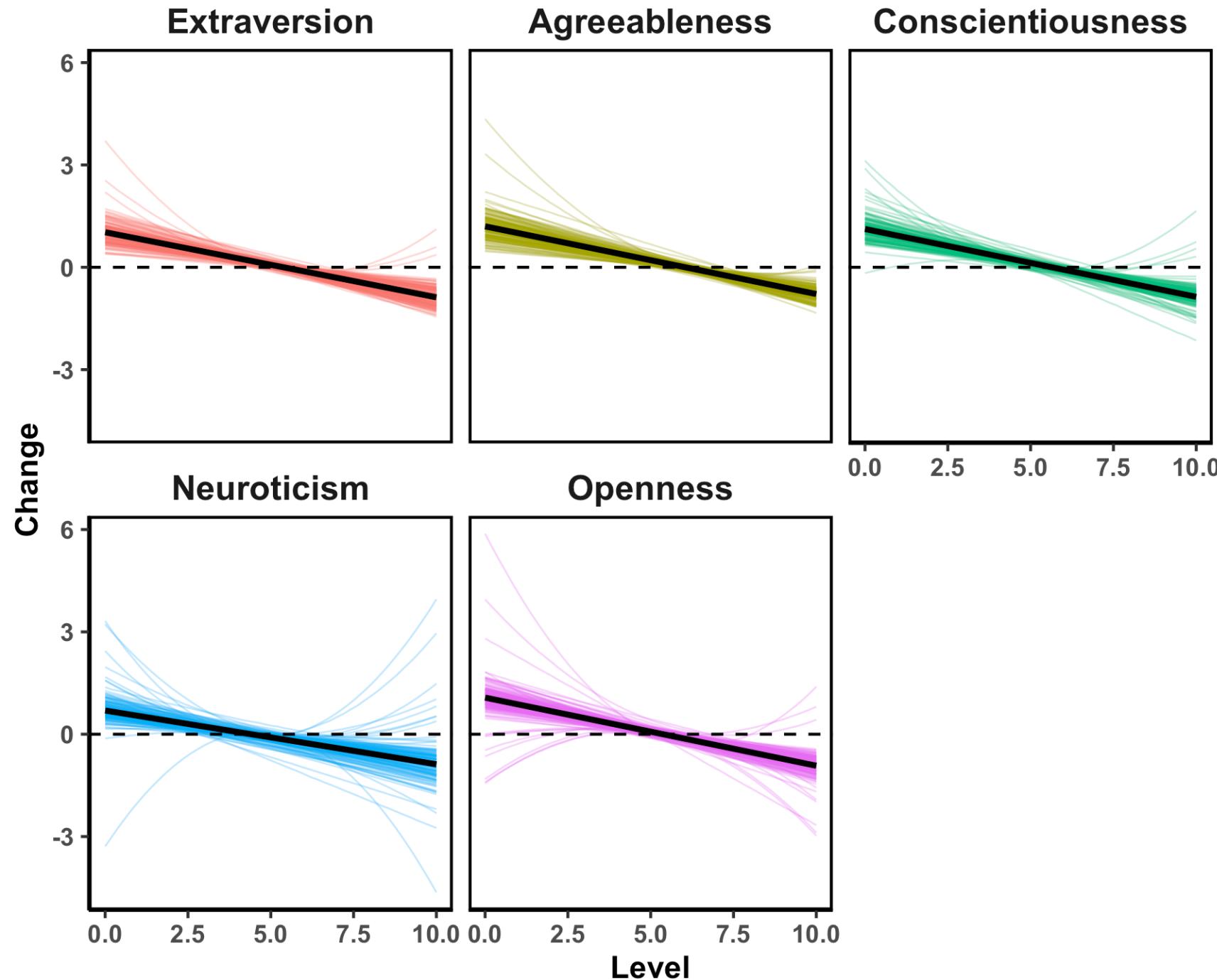
1. Are there individual differences in attractor location and strength of personality states and situation characteristics (univariate)?

Short answer:
Yes – but more variability in location than strength.

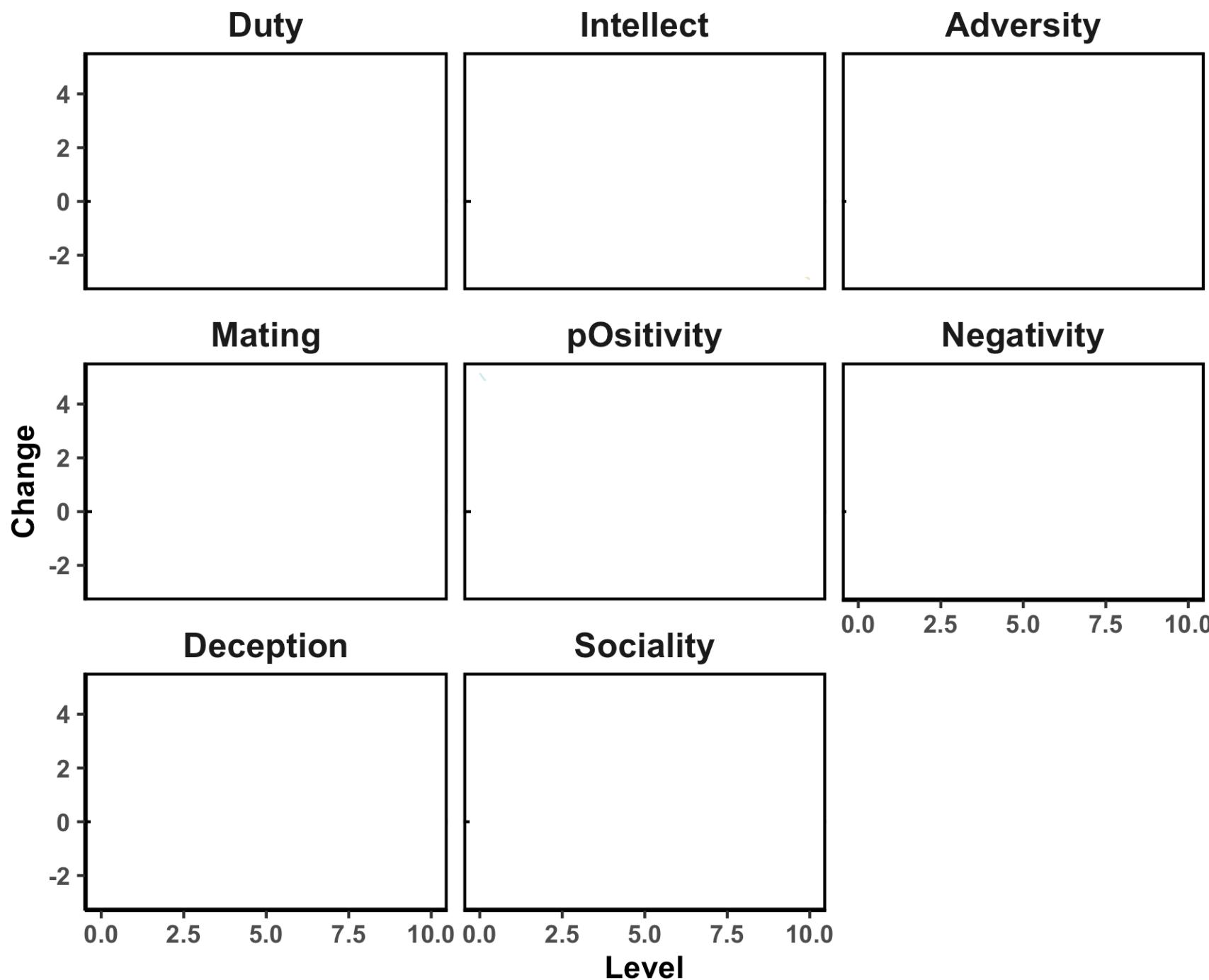
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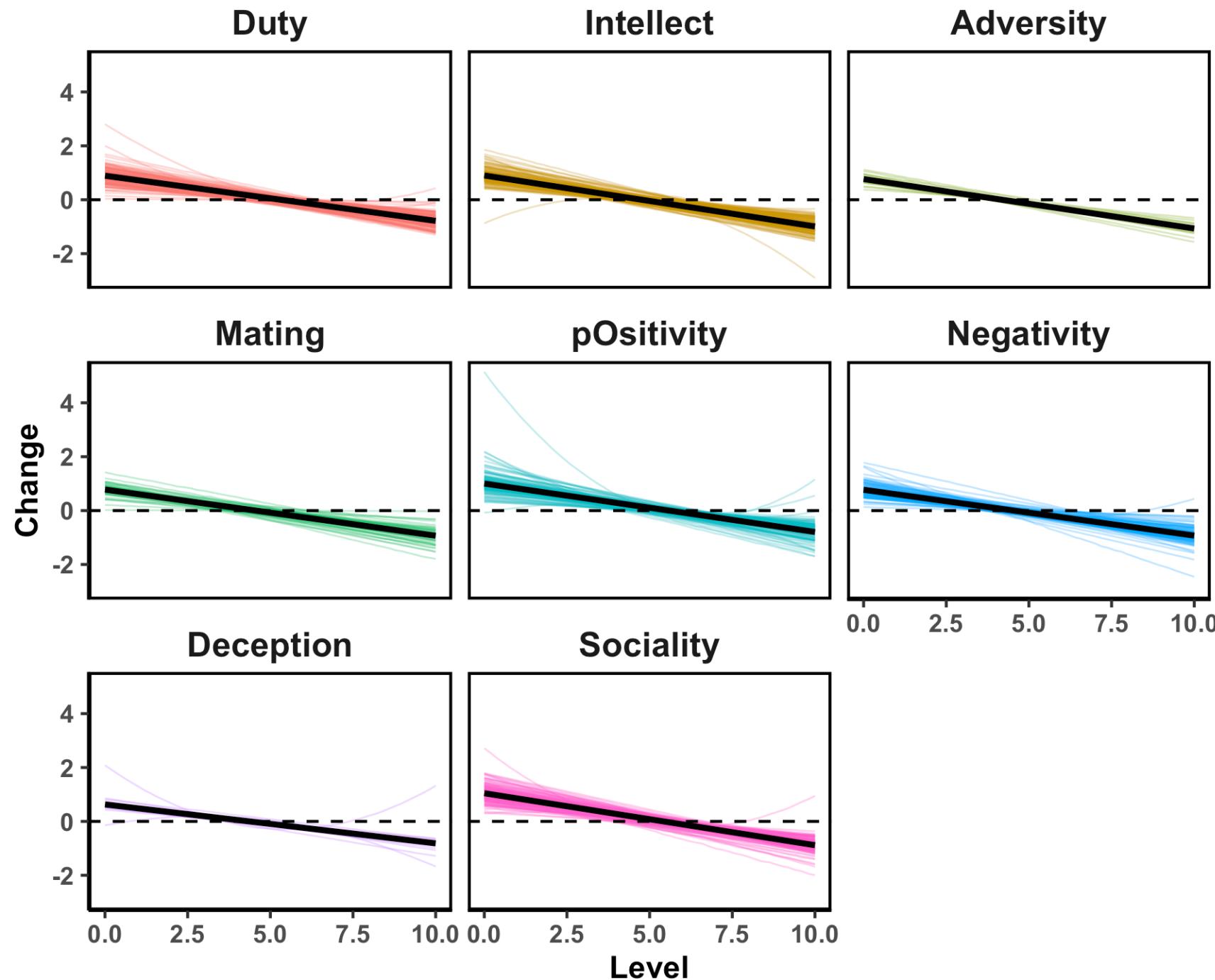
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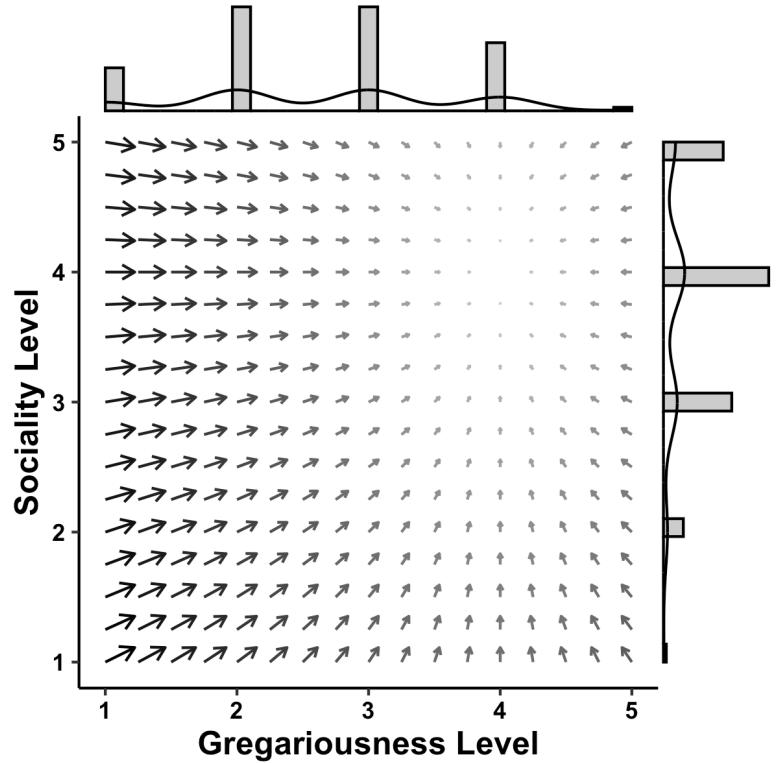


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$$\frac{dp}{dt} = b_{0,p} + b_{1,p}p_i + b_{2,p}s_i + \boxed{b_{3,p}p_i s_i}$$

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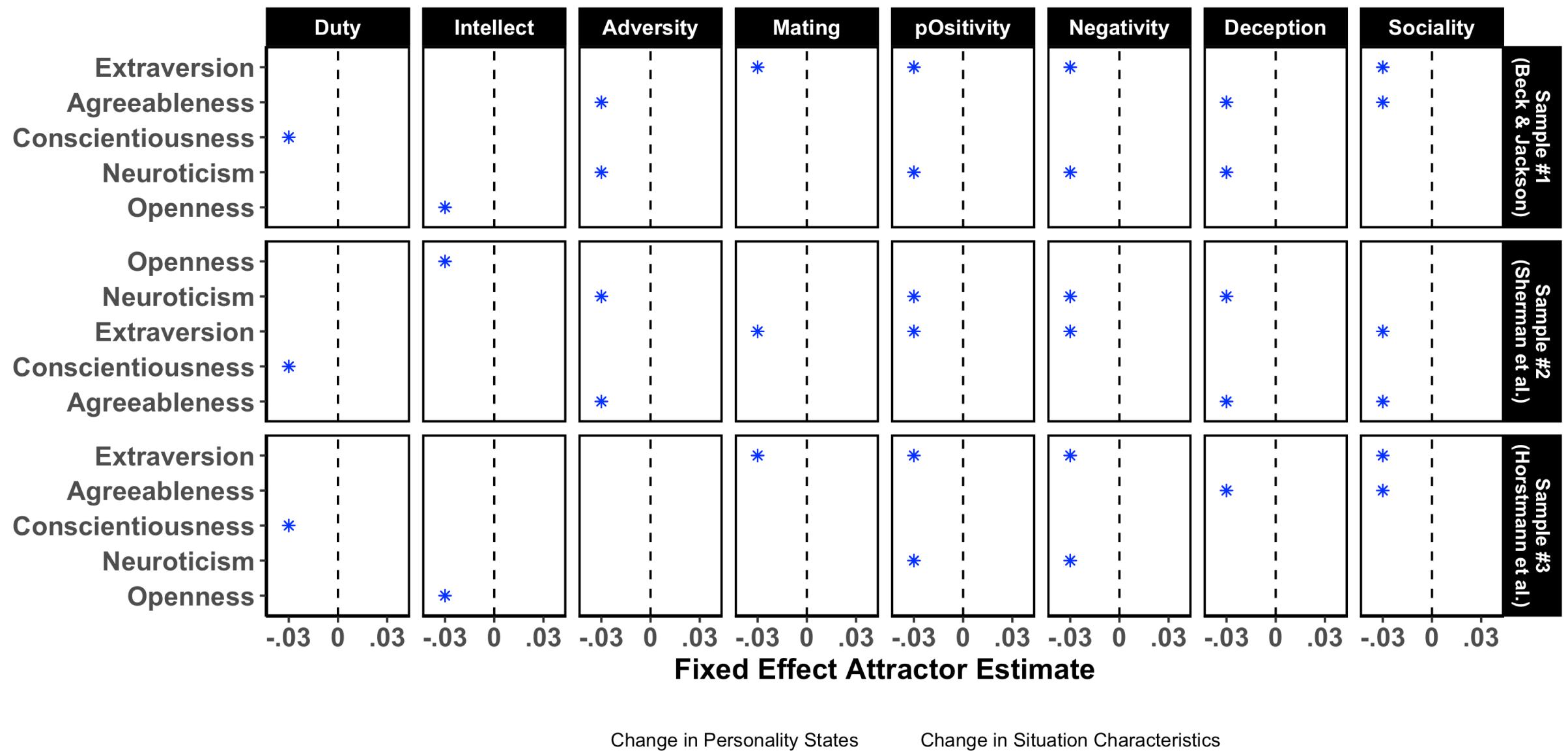


2. Are there conceptually expected coupled associations between personality states and situation characteristics (bivariate)?

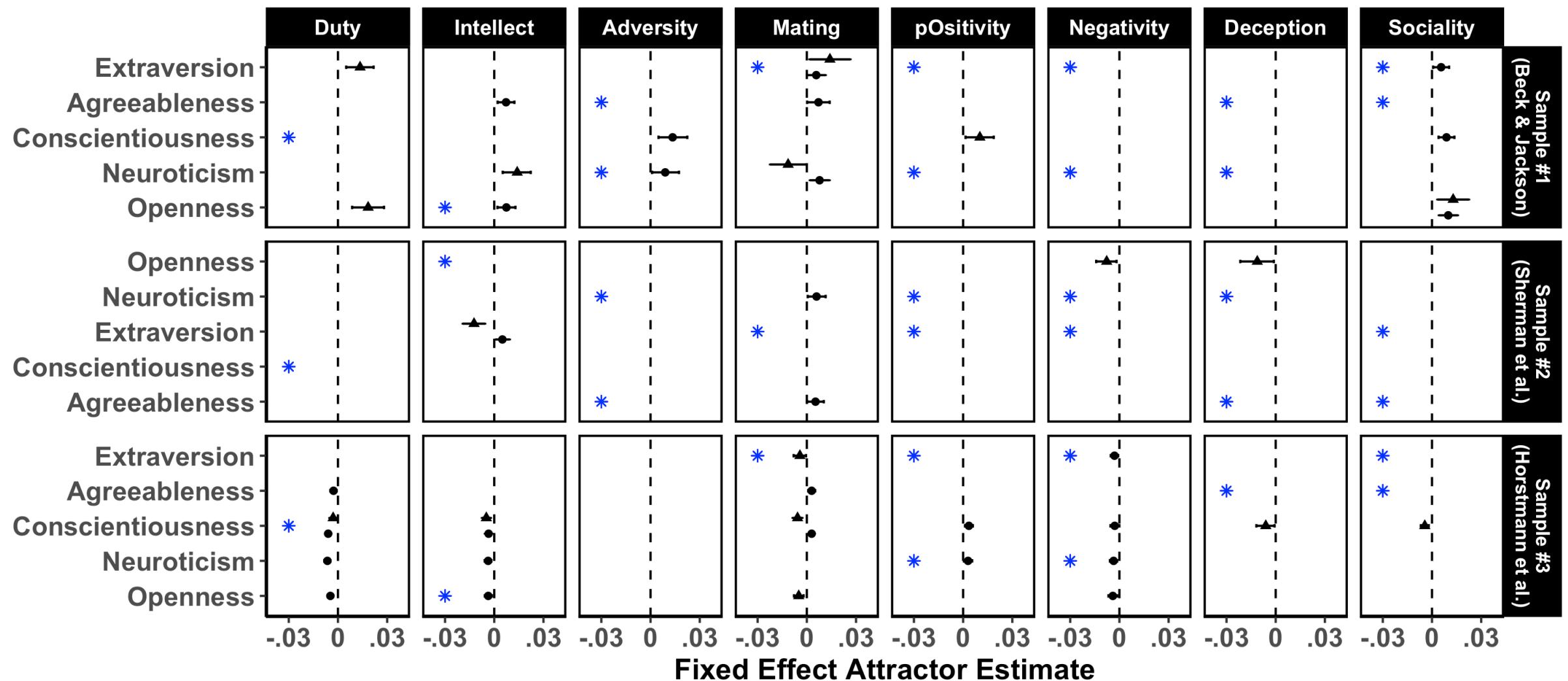
Short answer:
Sort-of.

2. Are there conceptually expected coupled associations between personality states and situation characteristics (bivariate)?

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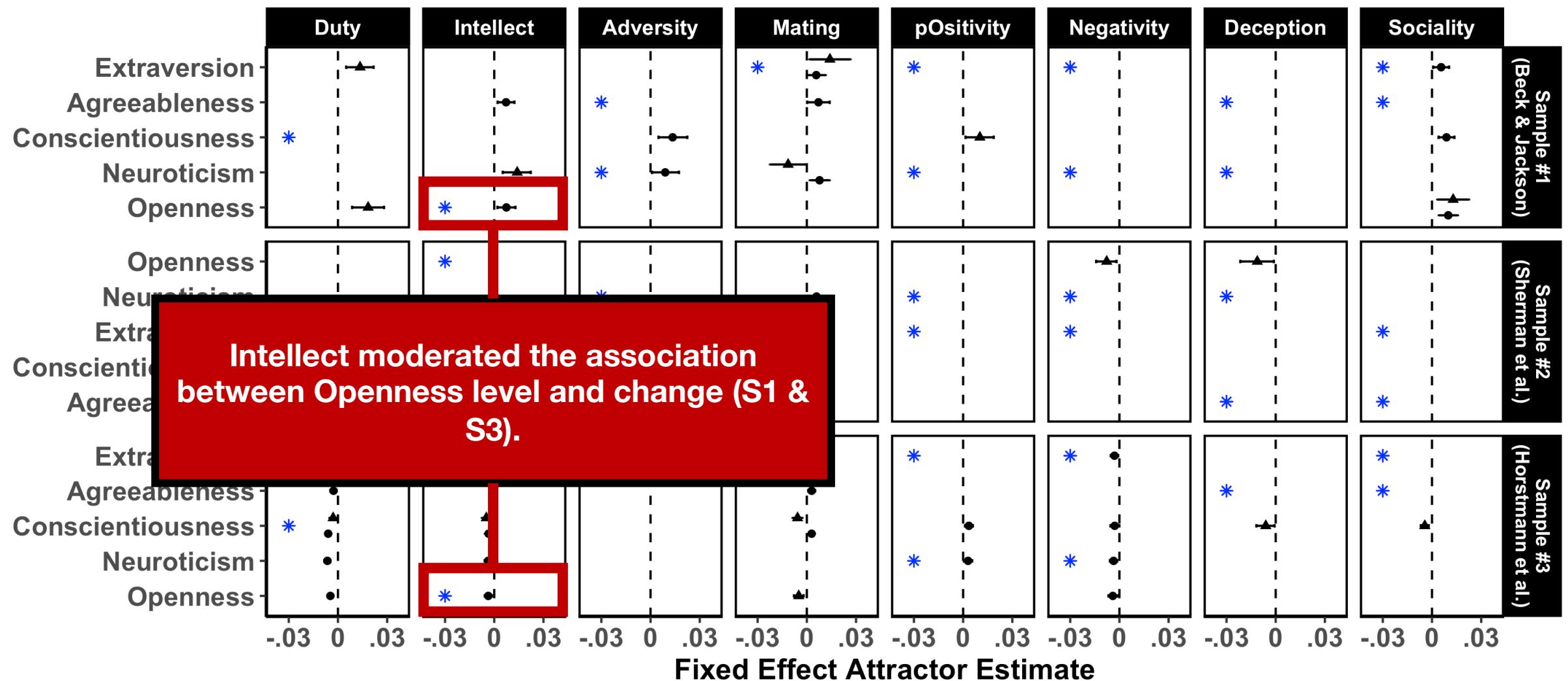


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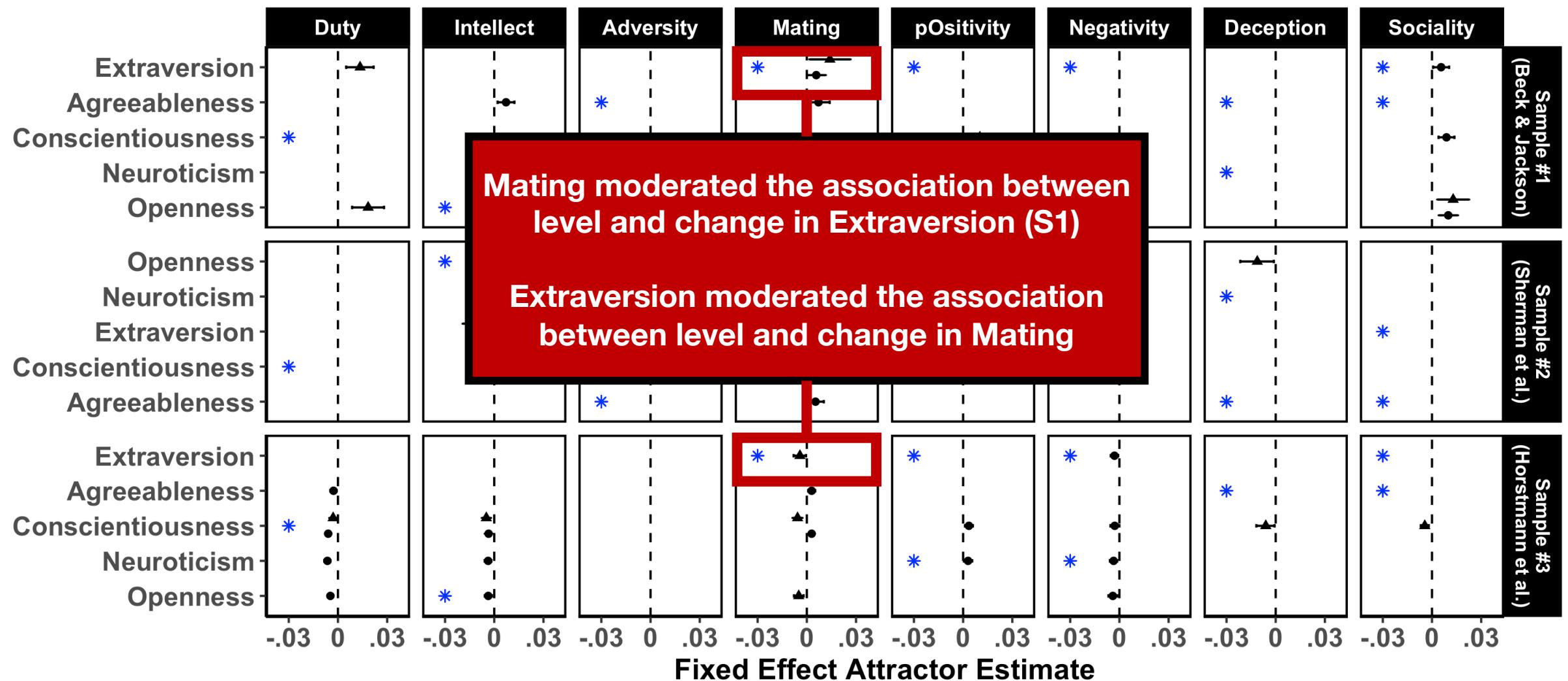
- Change in Personality States ▲ Change in Situation Characteristics

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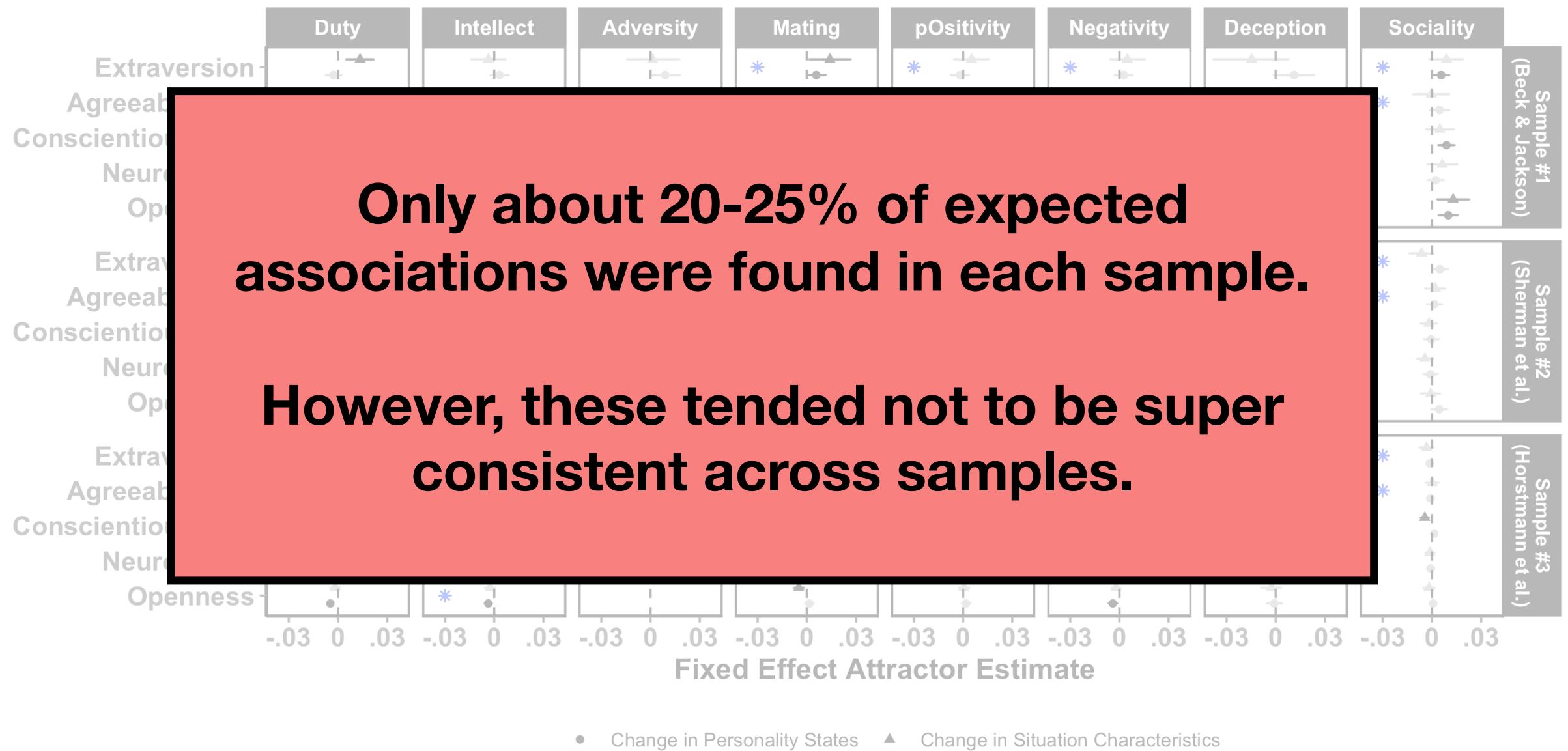
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- Change in Personality States ▲ Change in Situation Characteristics

2. Are there conceptually expected coupled associations between personality states and situation characteristics (bivariate)?



3. Are there individual differences in the topology coupled associations?

Short answer:
Yup – in lots ways.

Let's see some examples.

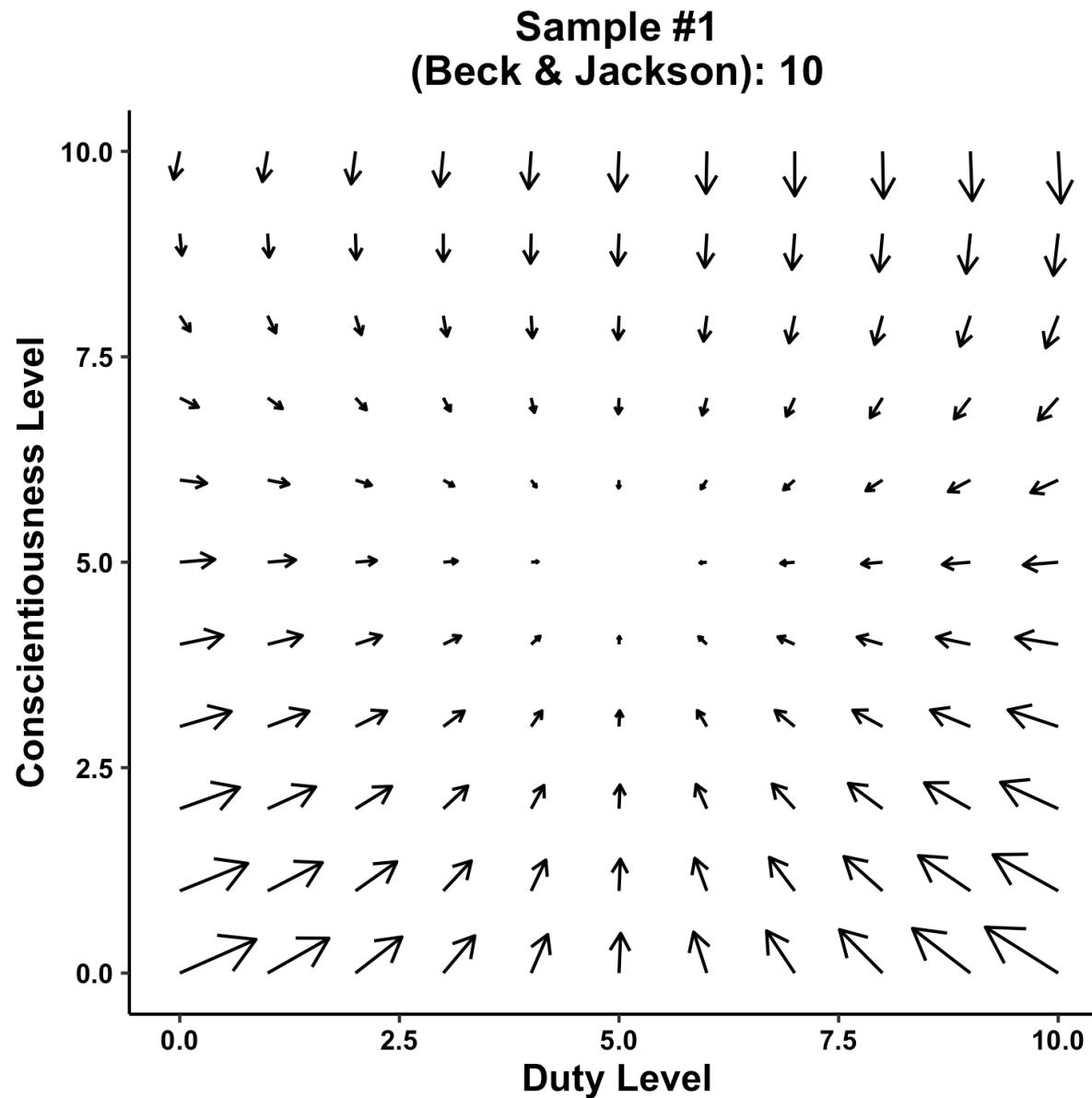
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Figure 19. Combinations of Lyapunov exponents and two-dimensional typologies.

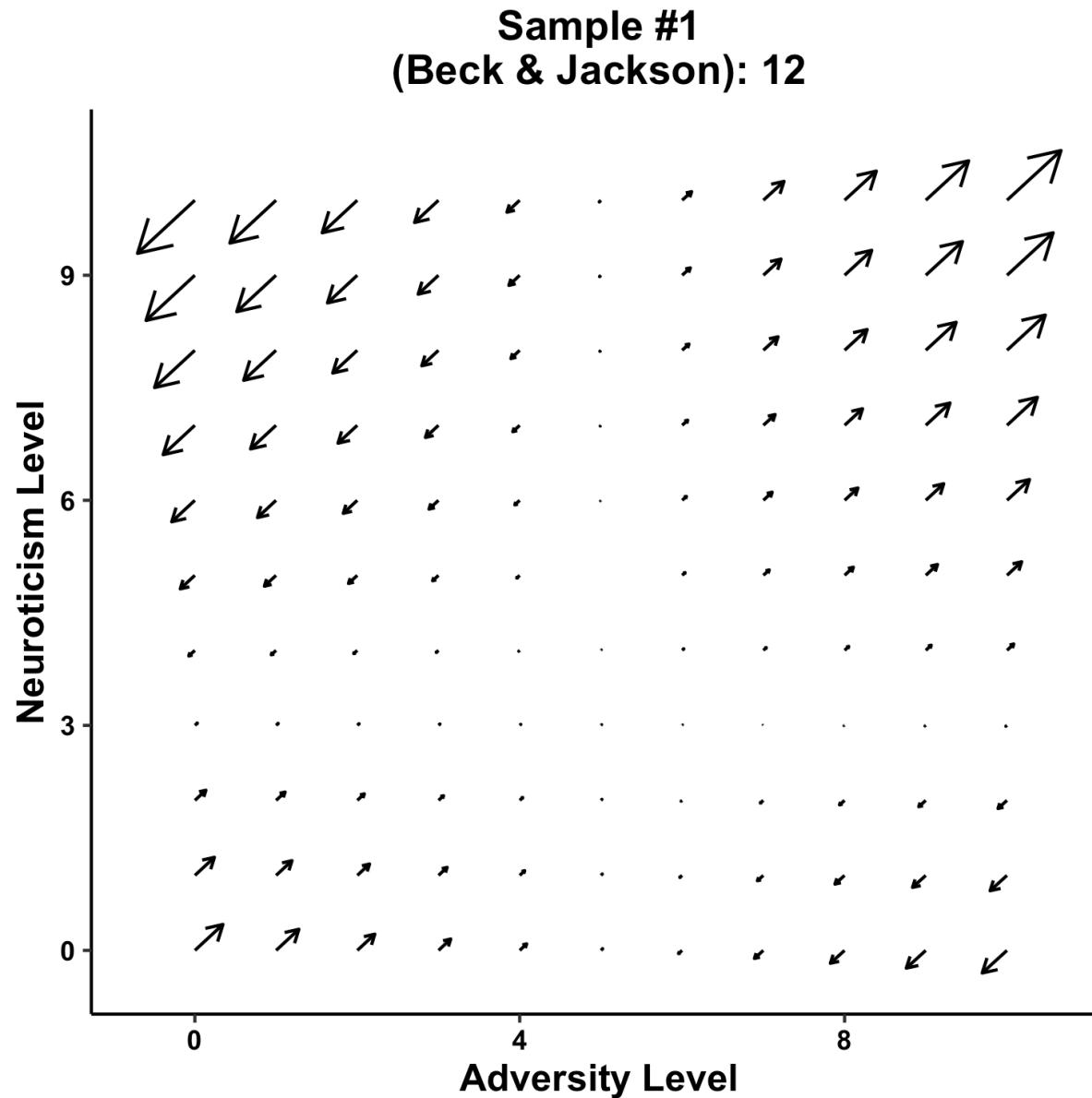
3. Are there individual differences in the degree and pattern of coupled associations?

**1 Attractor
(both negative)**



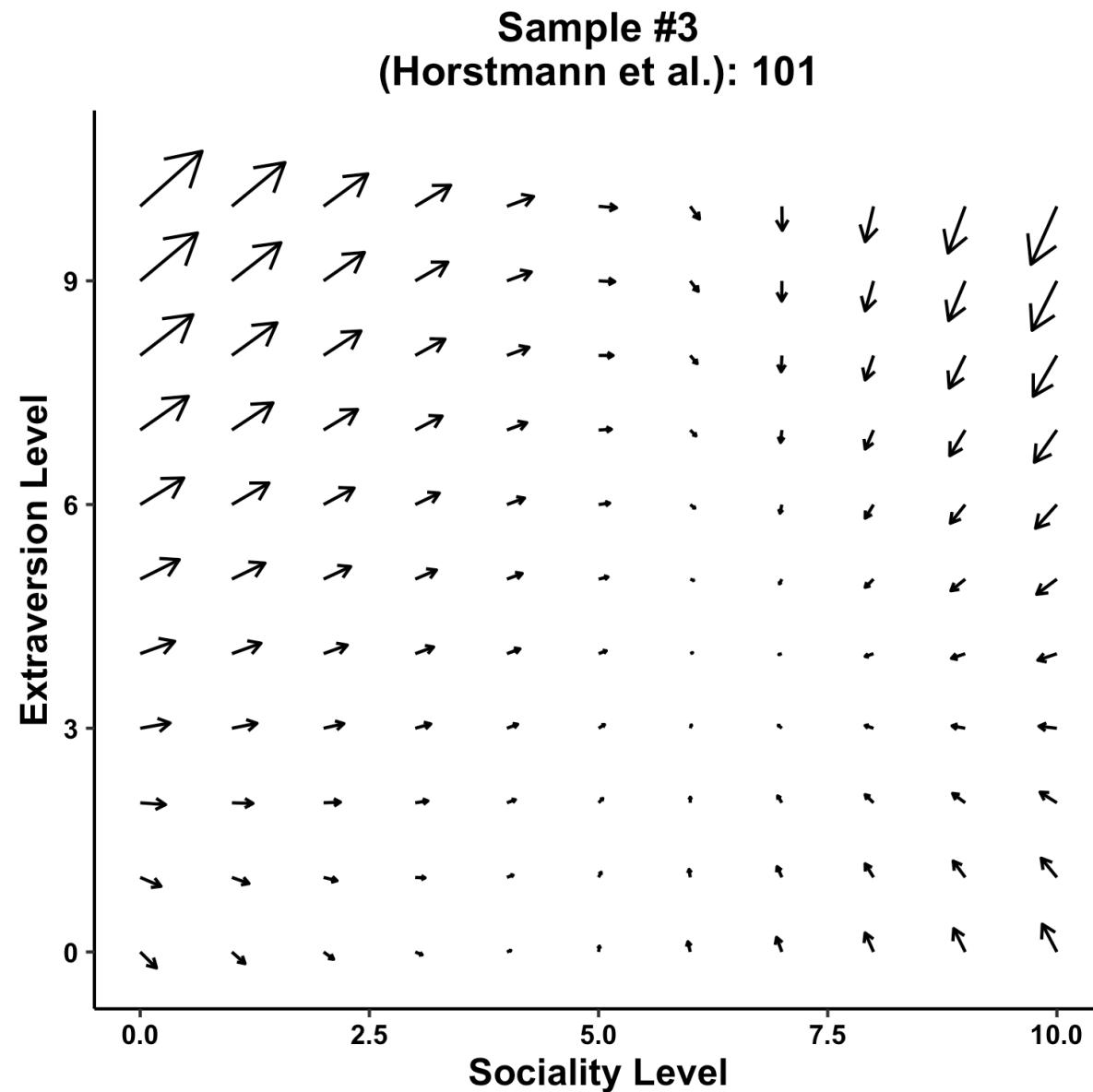
3. Are there individual differences in the degree and pattern of coupled associations?

1 Saddle
(1 negative, 1 positive)

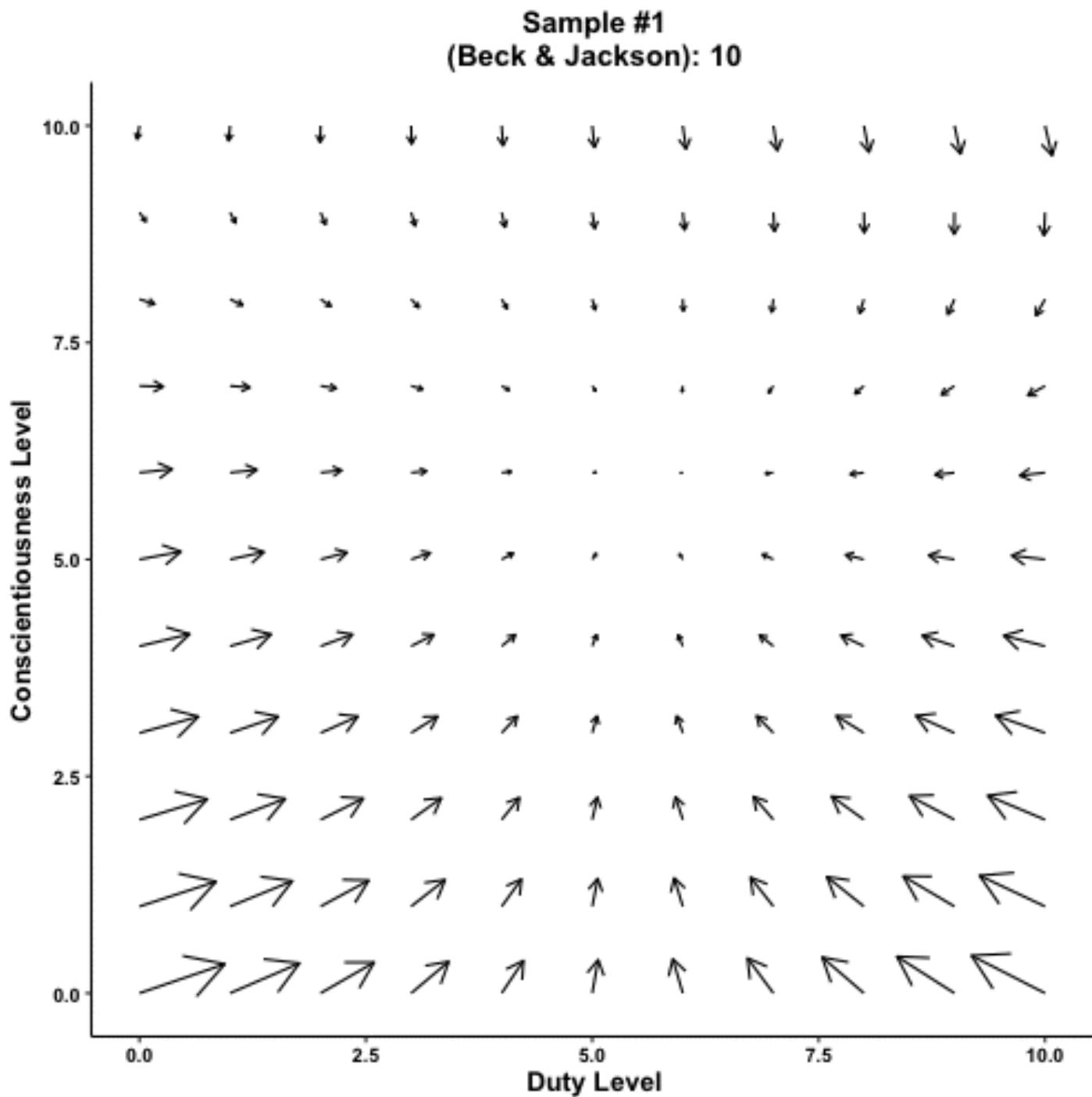


3. Are there individual differences in the degree and pattern of coupled associations?

**1 Spiral
Attractor**
**(2 negative, with 1
higher order term)**

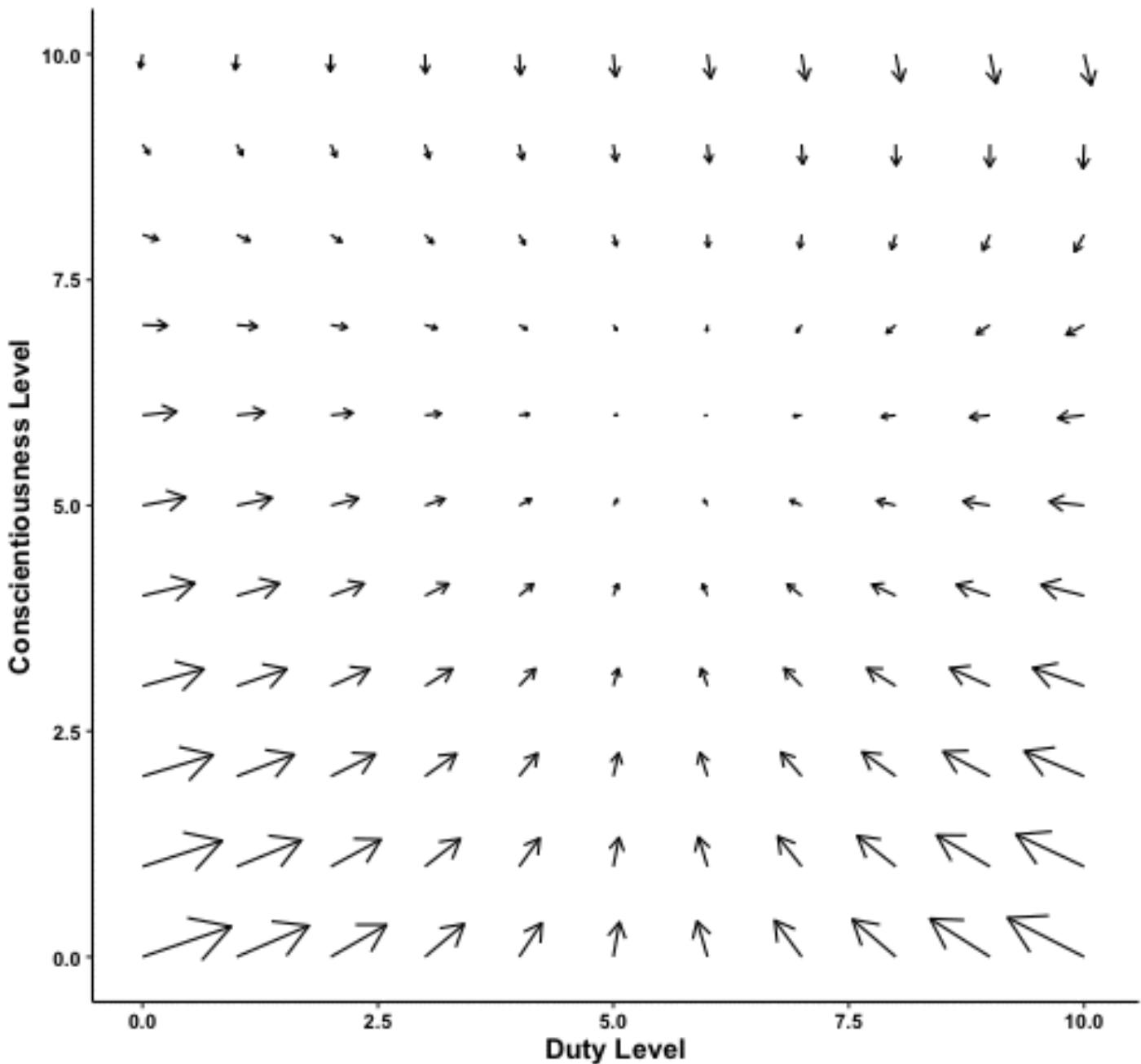


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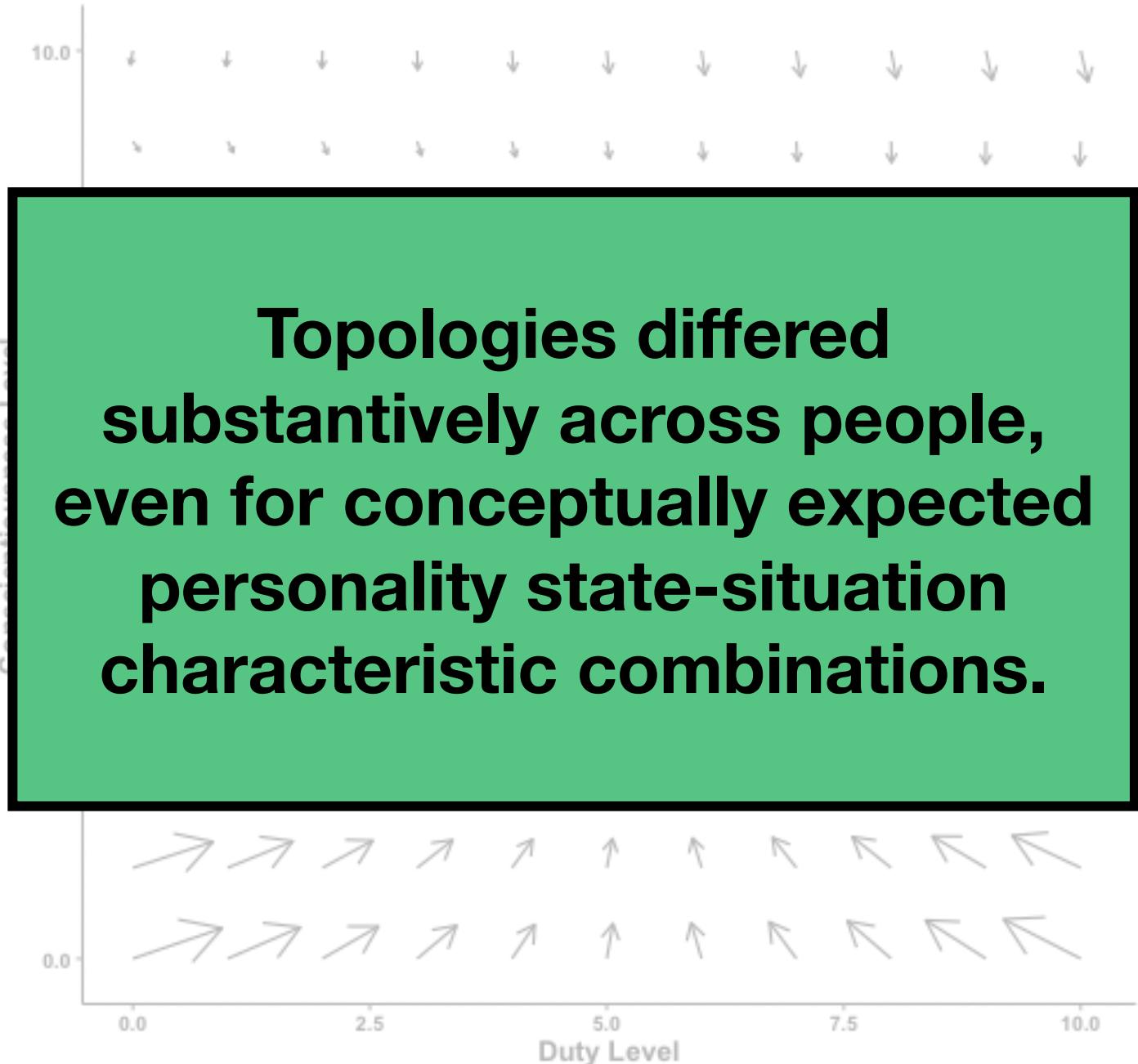
3. Are there individual differences in the topology coupled associations?

Sample #1
(Beck & Jackson): 10



3. Are there individual differences in the topology coupled associations?

Sample #1
(Beck & Jackson): 10



Wrapping Up: Big Takeaways

1. Are there individual differences in attractor location and strength of personality states and situation characteristics (univariate)?

Yes – but more for location than strength.

2. Are there conceptually expected coupled associations between personality states and situation characteristics (bivariate)?

Somewhat -- ~20-25% of interactions.

3. Are there individual differences in the degree of coupled associations?

Individuals showed (1) different kinds of topological features in (2) different locations in the topology.

Wrapping Up: More to Come

- 1. Are attractor location and strength associated?**

- 2. How are location and strength associated with trait measures?**

- 3. Does the degree of personality state-situation characteristic coupling associate with trait measures?**

Thank you!

Please send comments,
questions, and concerns to:

 **edbeck@ucdavis.edu**

 **@EmorieBeck**

Open data, materials,
results, and slides:

<https://github.com/Emoriebeck/ps-change>