# Detecting Idiographic Personality Change

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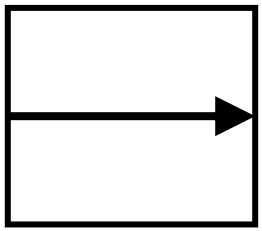
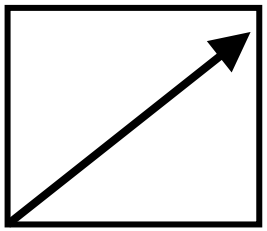
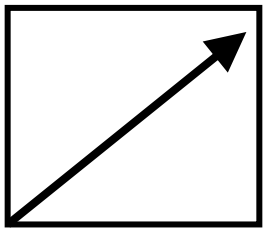
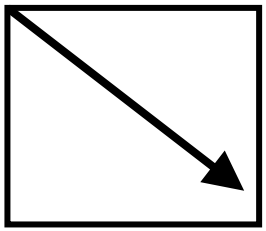
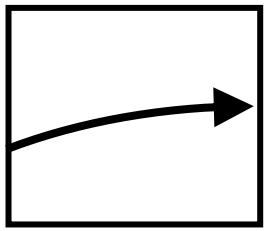
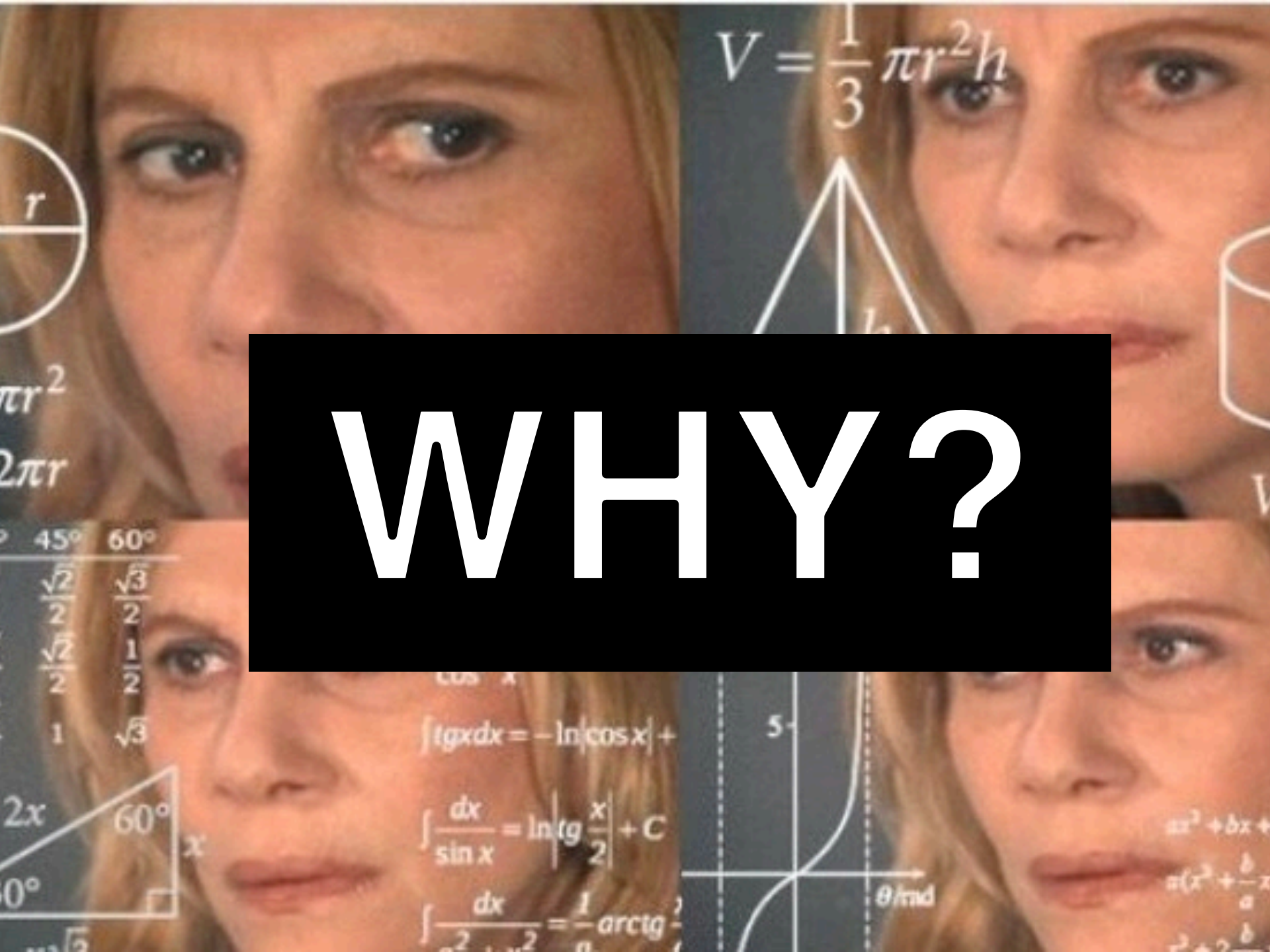
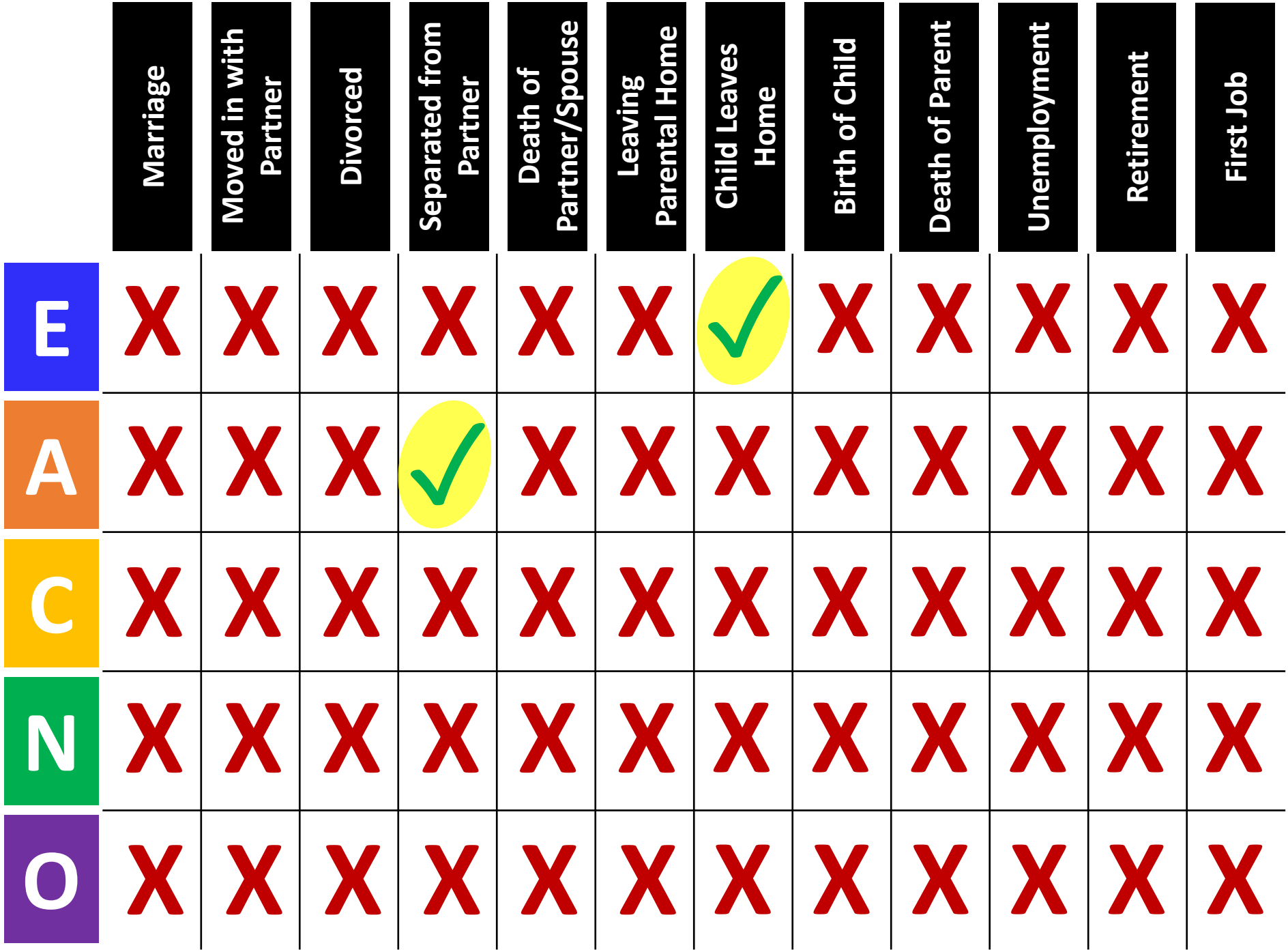
**Preregistration: https://osf.io/mfn8w/  Script, data, and results: github.com/emoriebeck/KCP**

| The Big 5 | Extraversion | Agreeableness | Conscientiousness | Neuroticism | Openness |
|---|---|---|---|---|---|
| Direction |  |  |  |  |  |
| Magnitude | -- | .6 SD | 1 SD | -.8 SD | .4 SD |
| Timing | -- | Lifespan | Lifespan | 10-35 | 10-20 |

Roberts, Walton, & Viechtbauer, 2006


WHY?



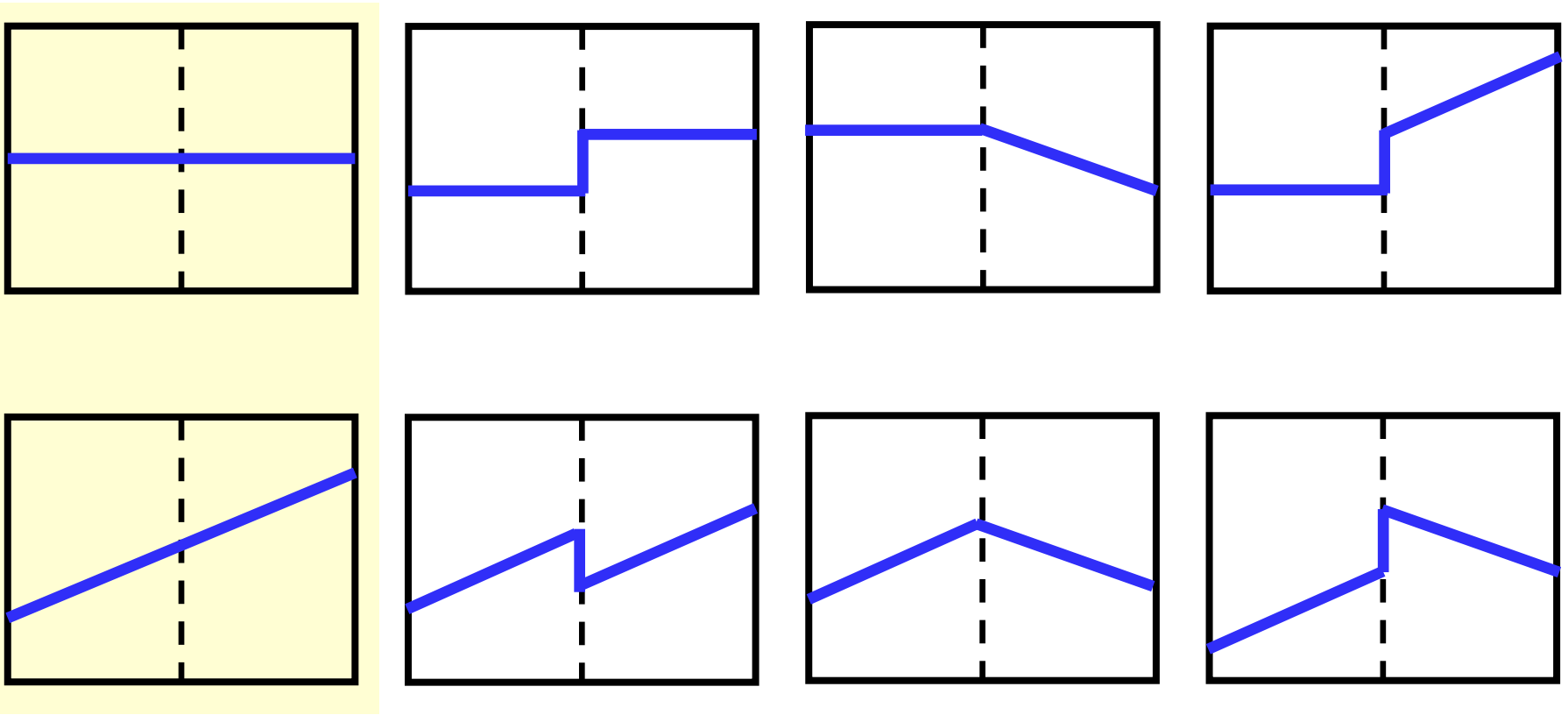

Beck, Specht, Bleidorn, & Jackson (2019)

# Problems with Mean-Level Change

Timing

Independence of Traits

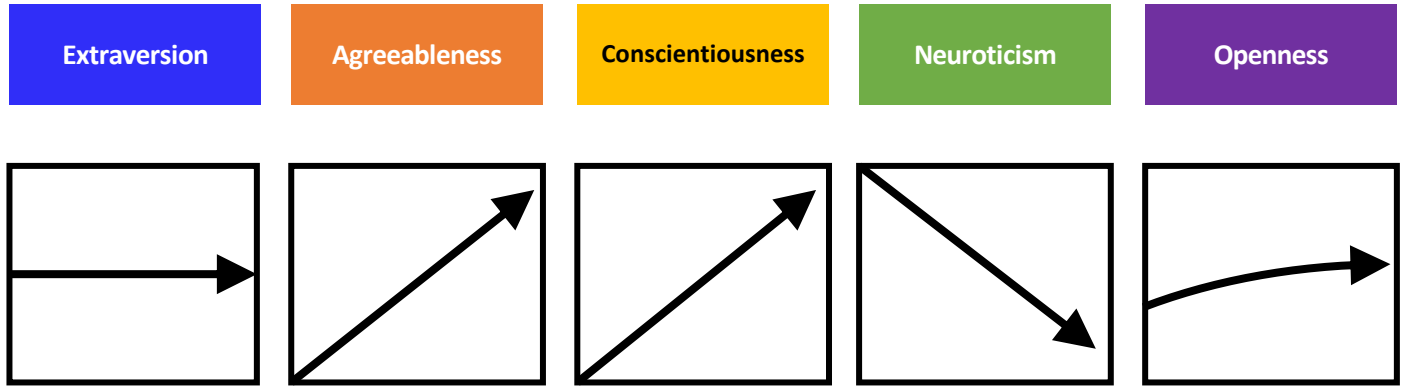
# Timing of Change



Schwaba & Bleidorn, 2017; Doss et al., 2009 ; Bleidorn et al., 2016

# “No trait operates alone”

Allport, 1937, p. 330




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

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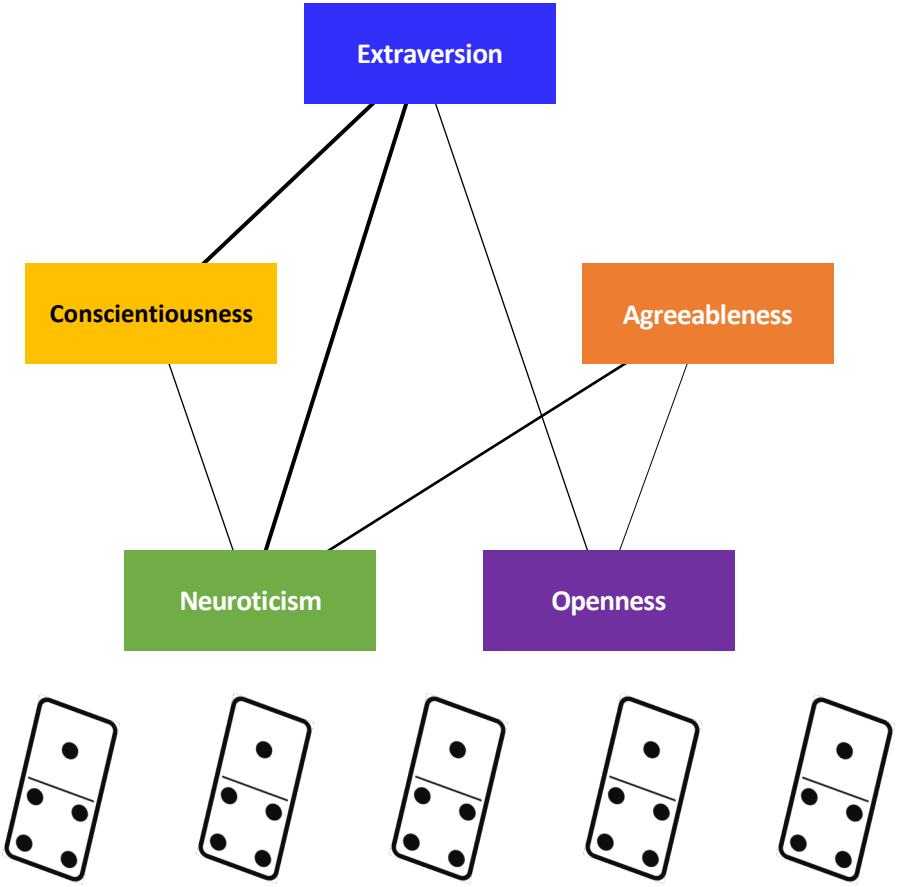
Allport, 1937, p. 330



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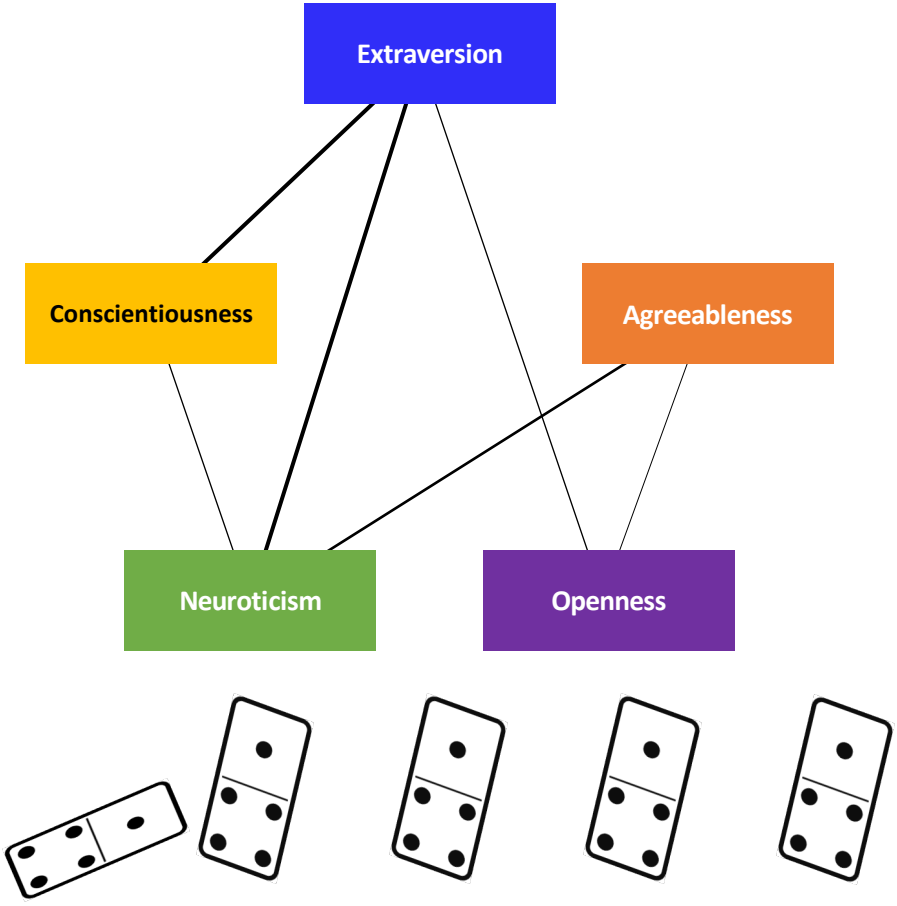

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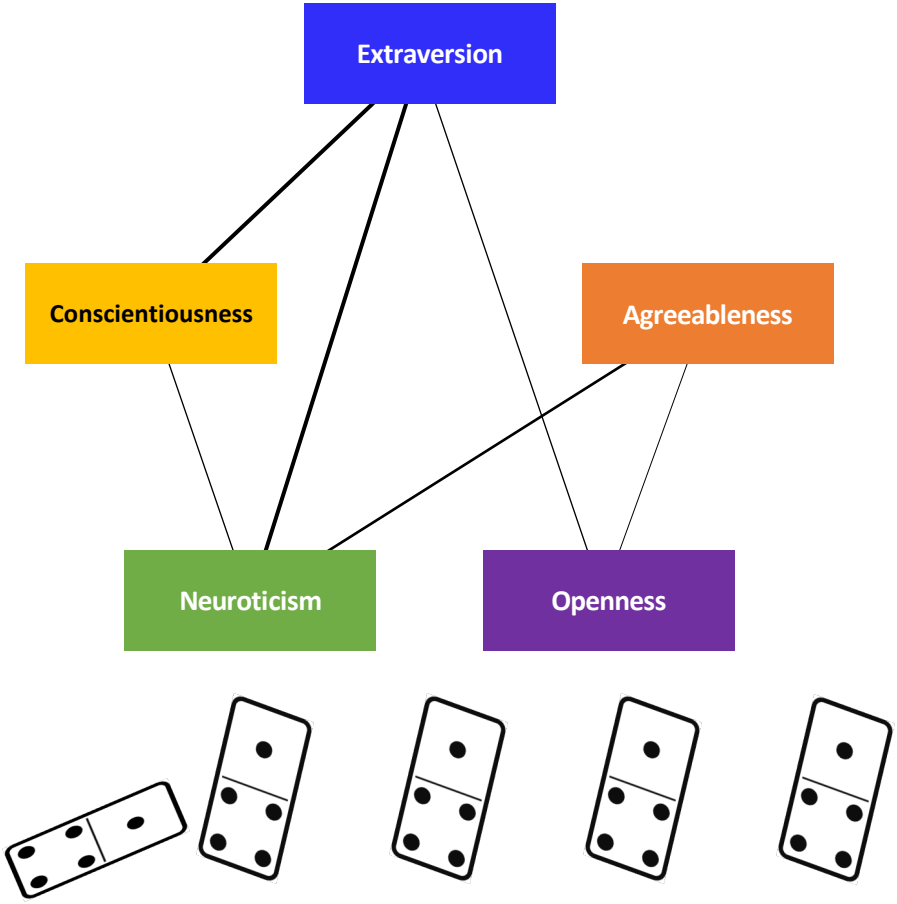


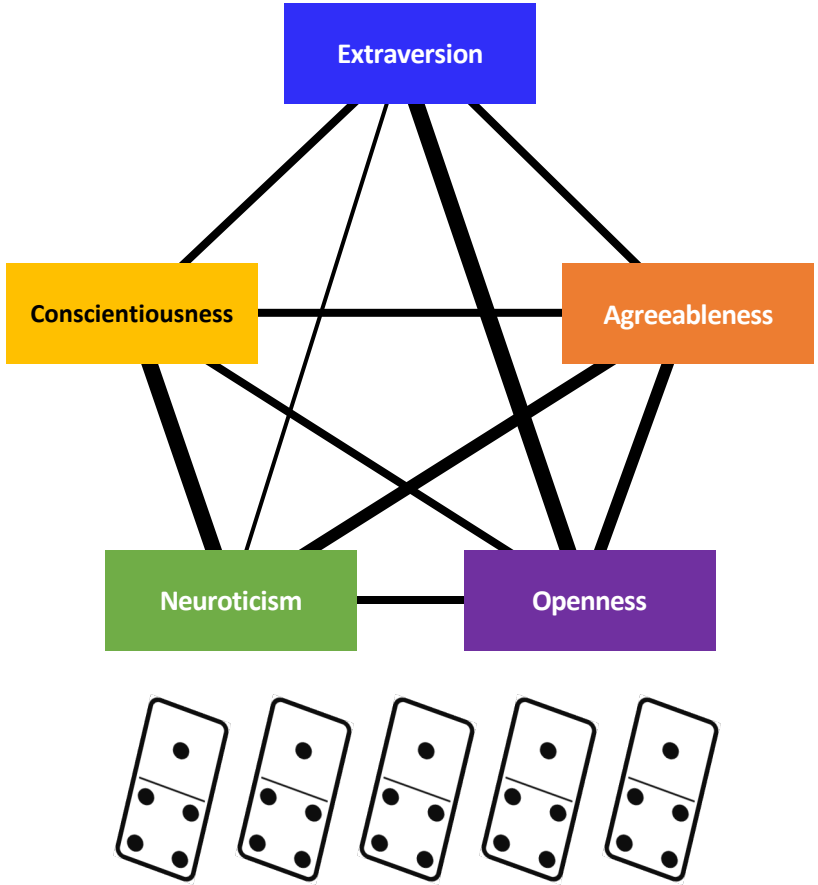

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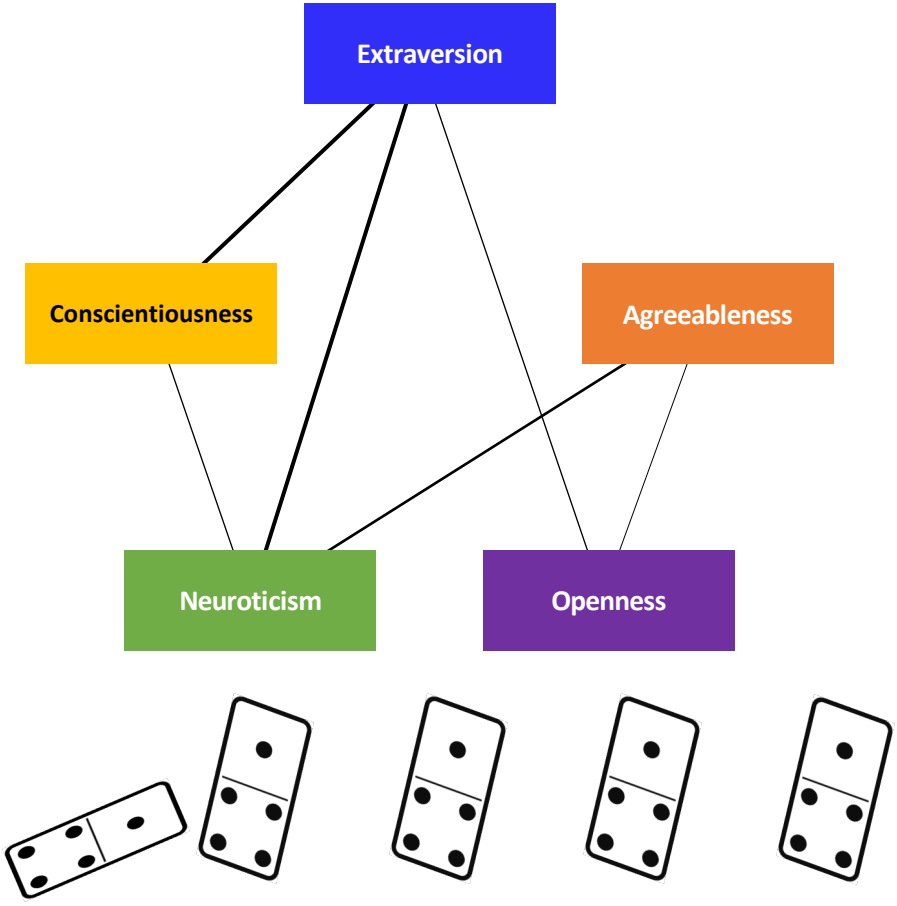


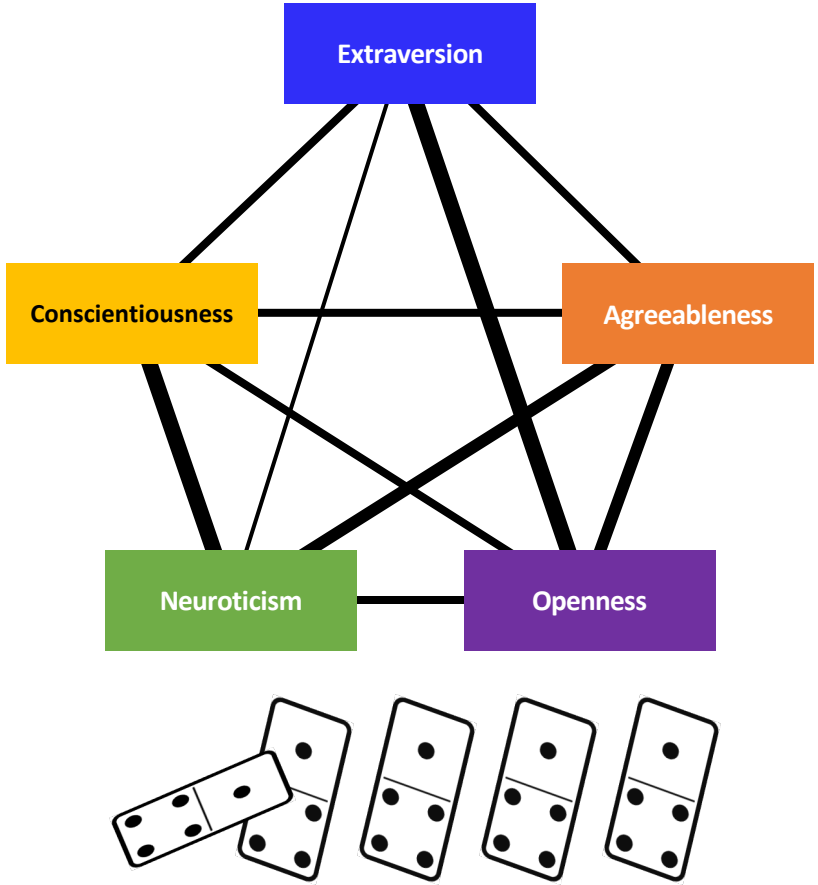

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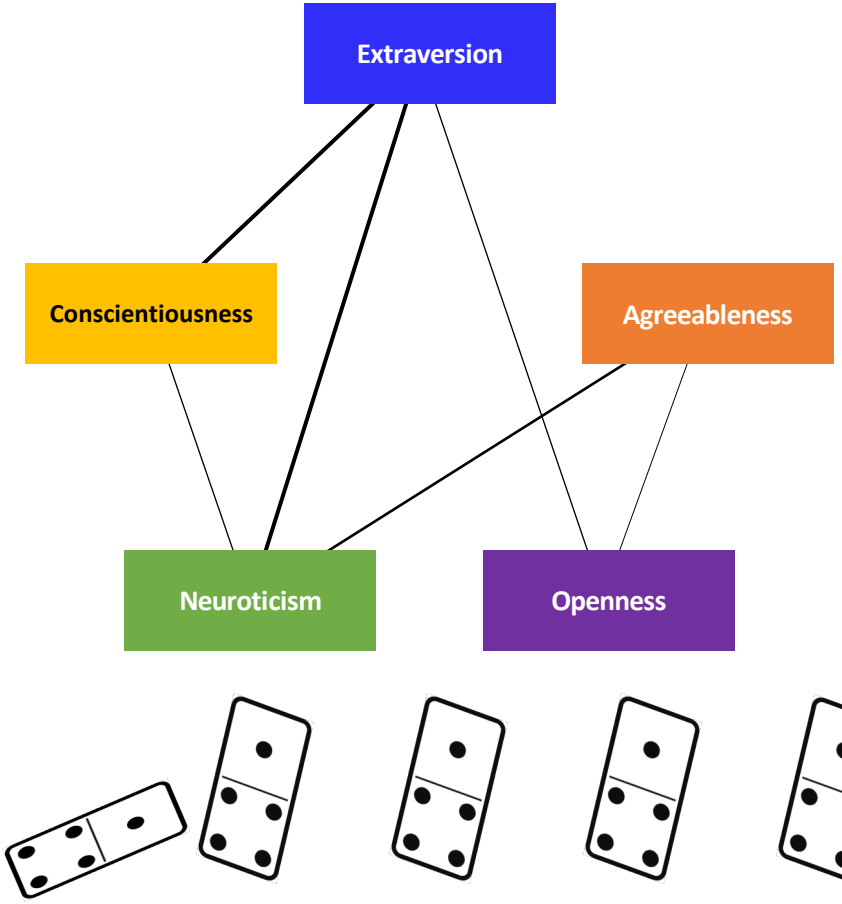


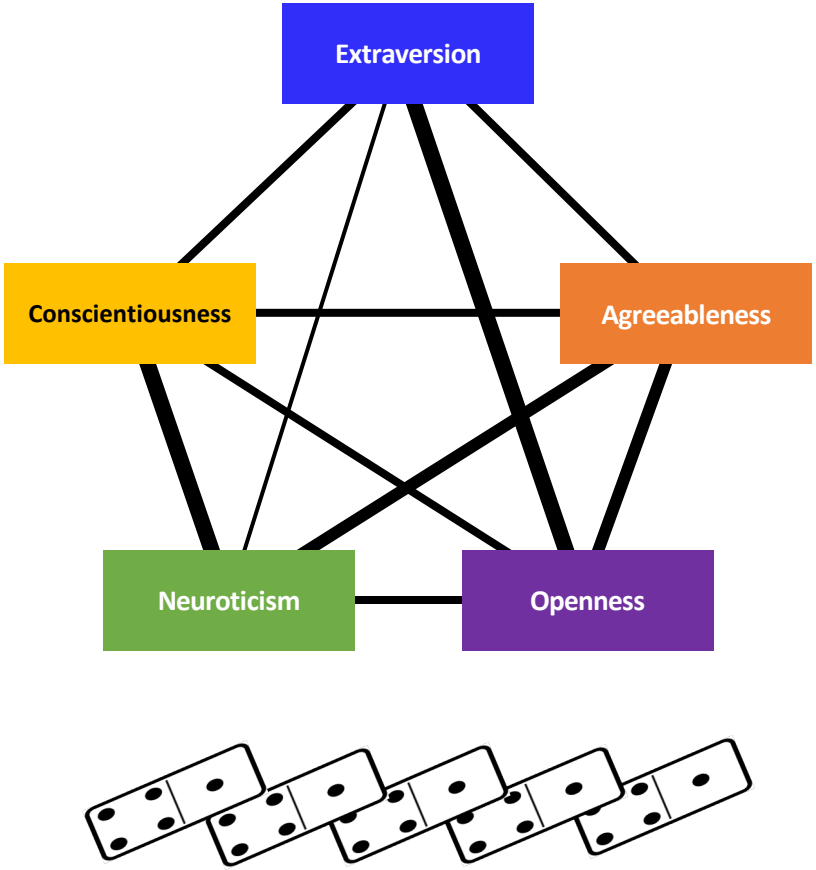

SCIENTIFIC REPORTS

OPEN

# Testing for the Presence of Correlation Changes in a Multivariate Time Series: A Permutation Based Approach

Received: 23 August 2017
Accepted: 11 December 2017
Published online: 15 January 2018

Jedelyn Cabrieto[1], Francis Tuerlinckx[1], Peter Kuppens[1], Borbála Hunyadi[2,3] & Eva Ceulemans[1]

# Fraley Longitudinal Project

| | |
|---|---|
| E | Extraverted, enthusiastic<br>Reserved, quiet (-) |
| A | Critical, quarrelsome (-)<br>Sympathetic, warm |
| C | Dependable, self-disciplined<br>Disorganized, careless (-) |
| N | Anxious, easily upset<br>Calm, emotionally stable (-) |
| O | Open to new experiences, complex<br>Conventional, uncreative (-) |

N = 388 participants (total N = 21,790
60 possible assessments

## Personality

Baseline — 60 weeks

## Life Events

Preregistration: https://osf.io/mfn8w/

**1** Moving Window Correlations

**2** Gaussian Similarity between all possible phases for different k

$$Gk(\boldsymbol{R}_i, \boldsymbol{R}_j) = \exp\left(\frac{-\left|\left|\boldsymbol{R}_i - \boldsymbol{R}_j\right|\right|^2}{2h_R^2}\right) \qquad \boldsymbol{R}_i = \begin{bmatrix} w_{i,1} \\ w_{i,2} \\ \vdots \\ w_{i,\frac{V(V-1)}{2}} \end{bmatrix}$$

**3** Calculate average within-phase Variance of Gaussian Similarity

$$\hat{R}(\tau_1,\ \tau_2,\ \ldots,\ \tau_K) = \frac{1}{n}\sum_{p=1}^{K+1}\hat{V}_p,\ \tau_1, \tau_2, \ldots, \tau_K$$

$$\hat{V}_{p,\tau_1,\tau_2,\ldots,\tau_K} = (\tau_p - \tau_{p-1}) - \frac{1}{\tau_p - \tau_{p-1}}\sum_{i=\tau_{p-1}+1}^{\tau_p}\sum_{j=\tau_{p-1}+1}^{\tau_p} Gk(\boldsymbol{R}_i, \boldsymbol{R}_j)$$

**4** Repeat steps 1 and 2 for 1000 permuted data sets

**5** Perform the variance test

$$p_{variancetest} = \frac{\#(\hat{R}_{min,K=0,perm} > \hat{R}_{min,K=0})}{B}$$

**6** Perform the variance drop test

$$p_{variancedroptest} = \frac{\#(\max\ variance\ drop_{perm} > \max\ variance\ drop)}{B}$$

**7** Declare significance if either the variance or variance drop tests passes

**8** Keep k of minimum penalized average within-phase variance

$$pen_K = C\frac{V_{max}\ (K+1)}{n}[1 + \log(\tfrac{n}{K+1})]$$

$$\hat{K} = \arg\ \min \hat{R}_{min,K} + pen_K,$$

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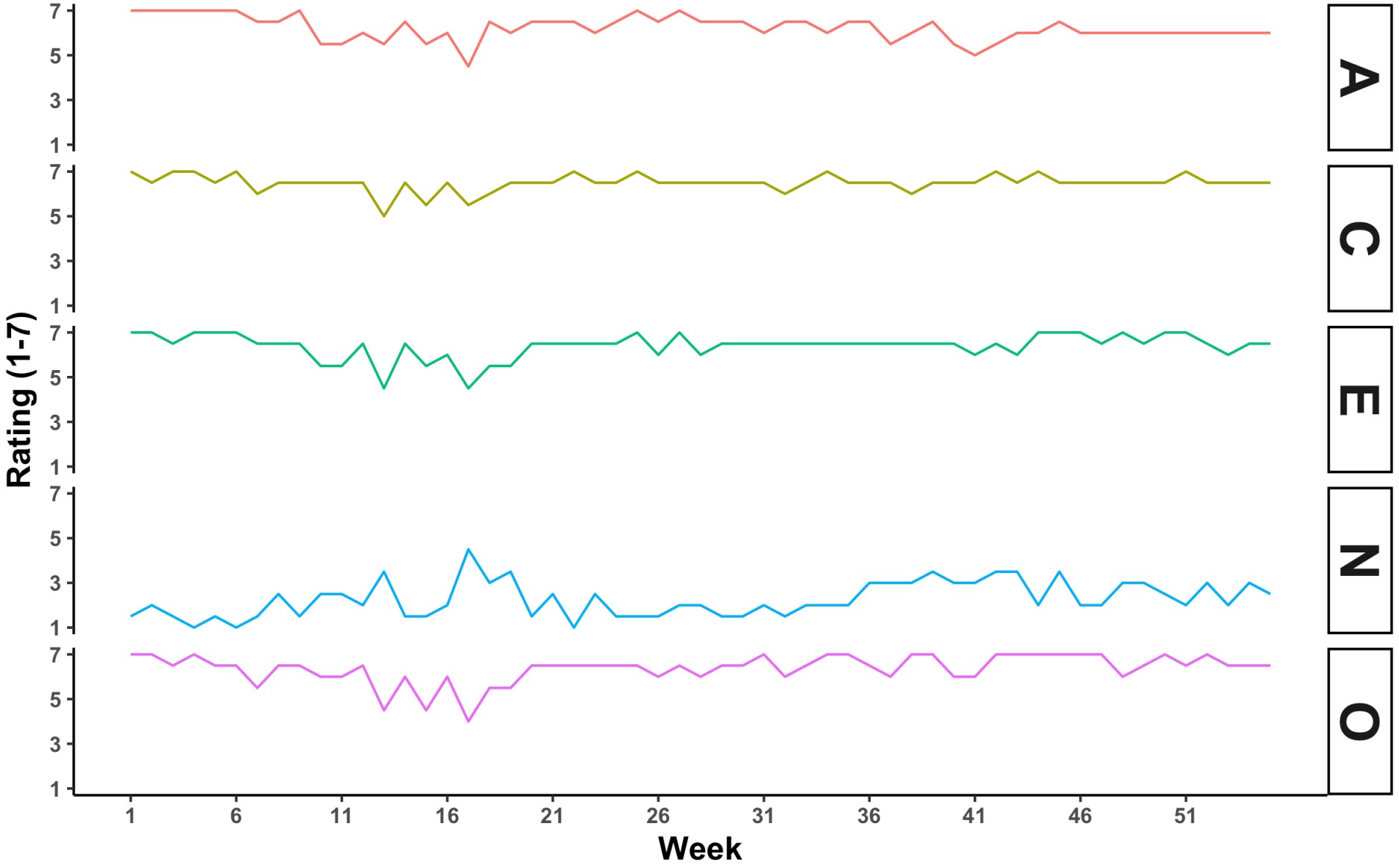
# Idiographic Time Series



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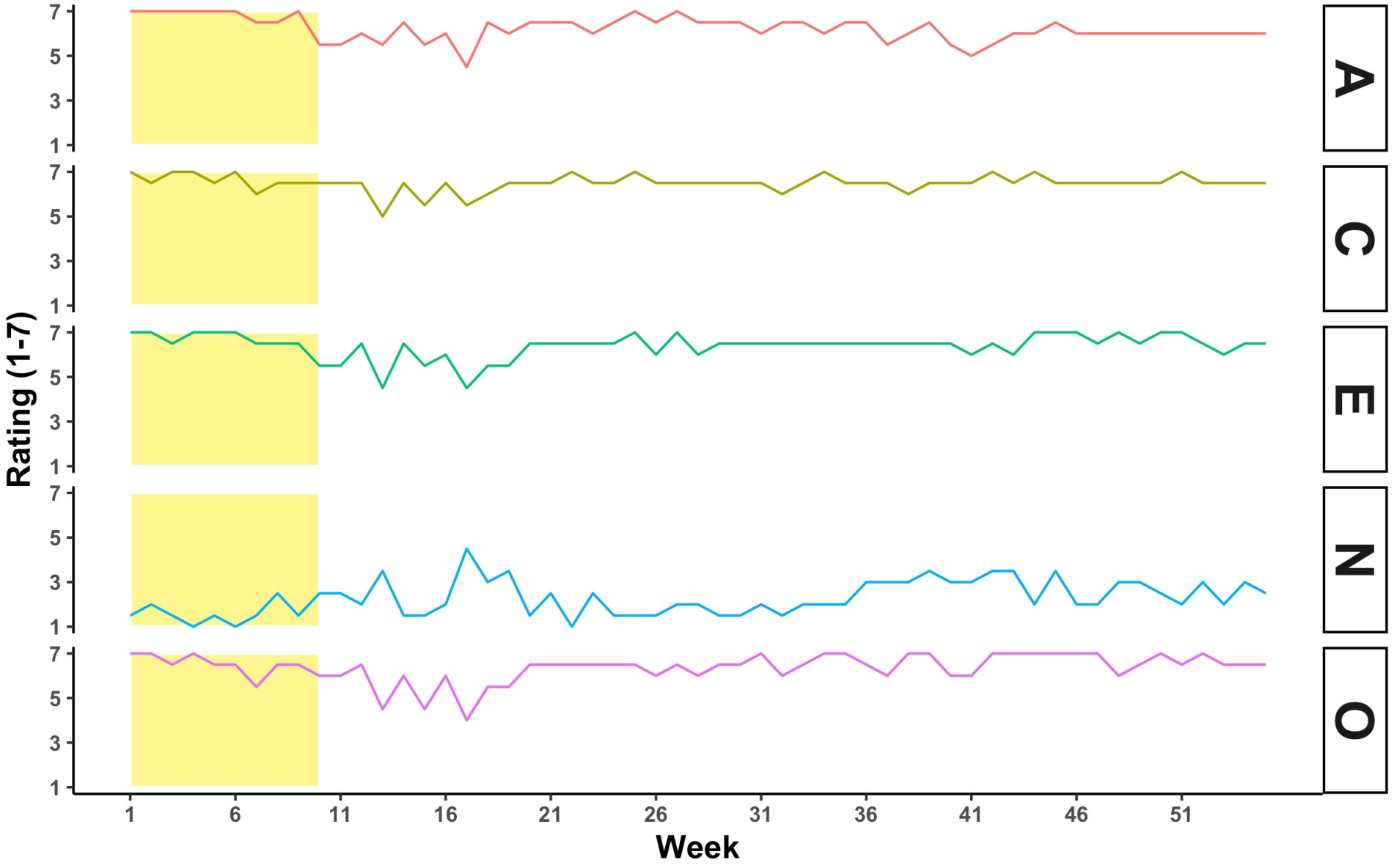

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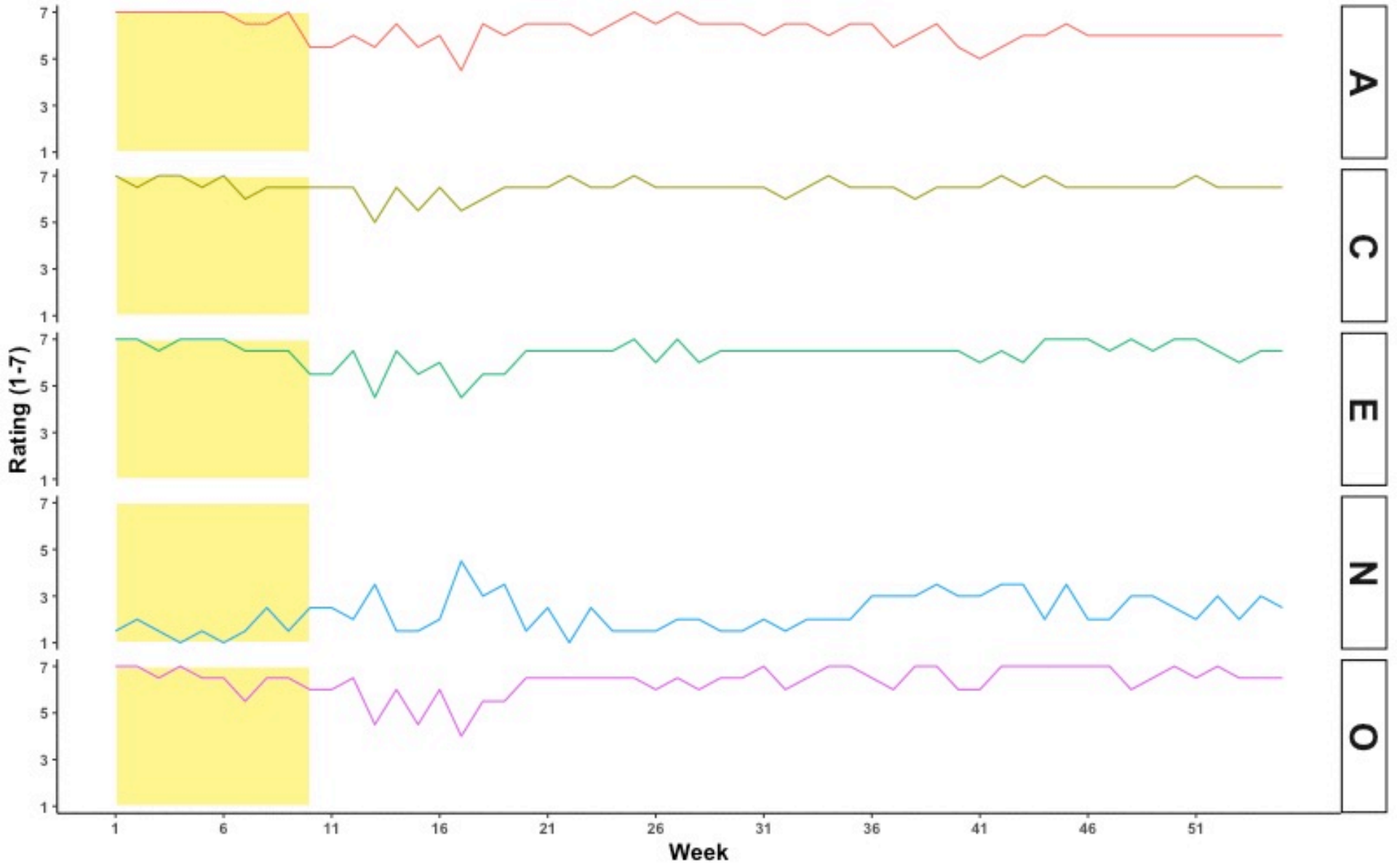
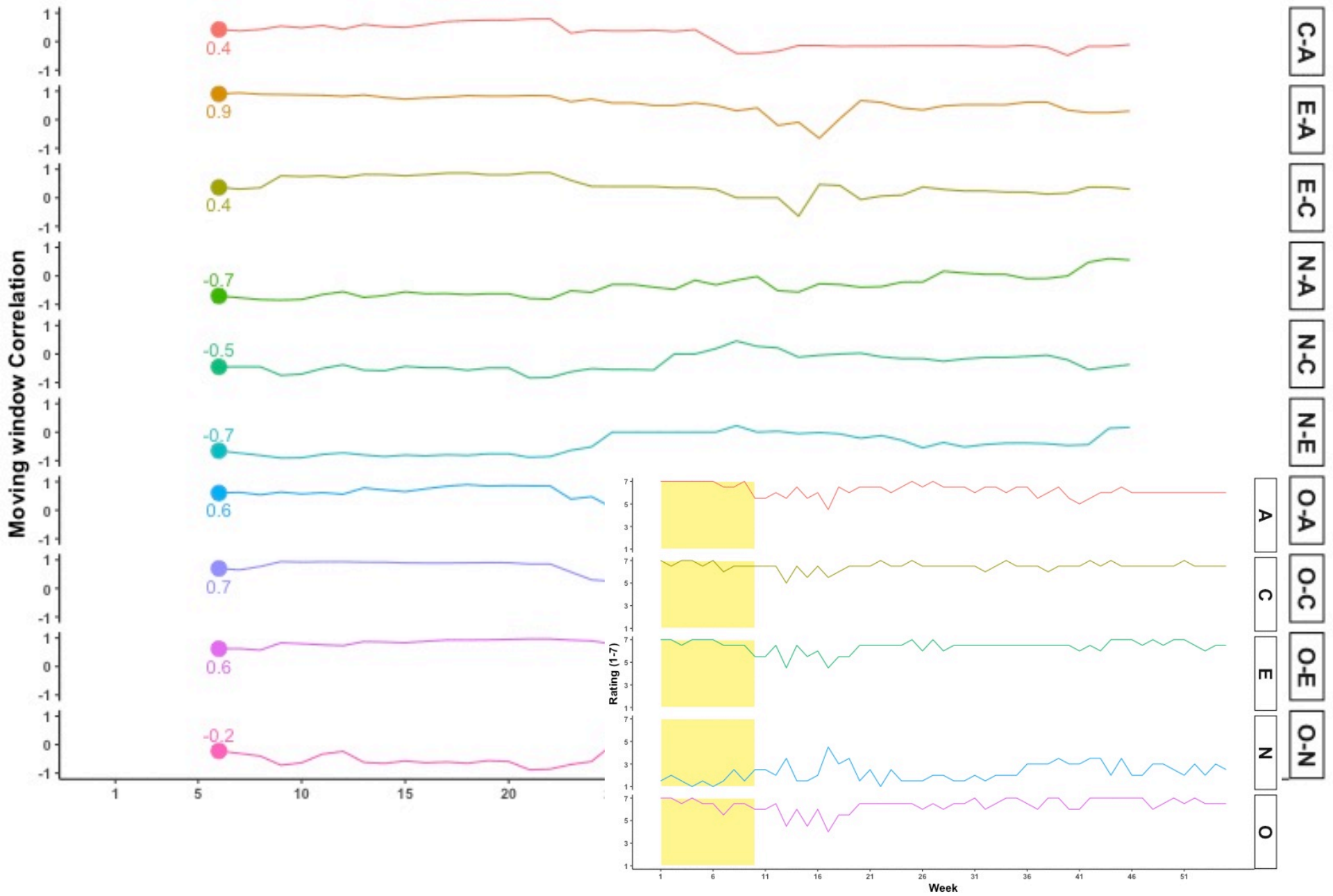


# Moving Window Correlation Time Series



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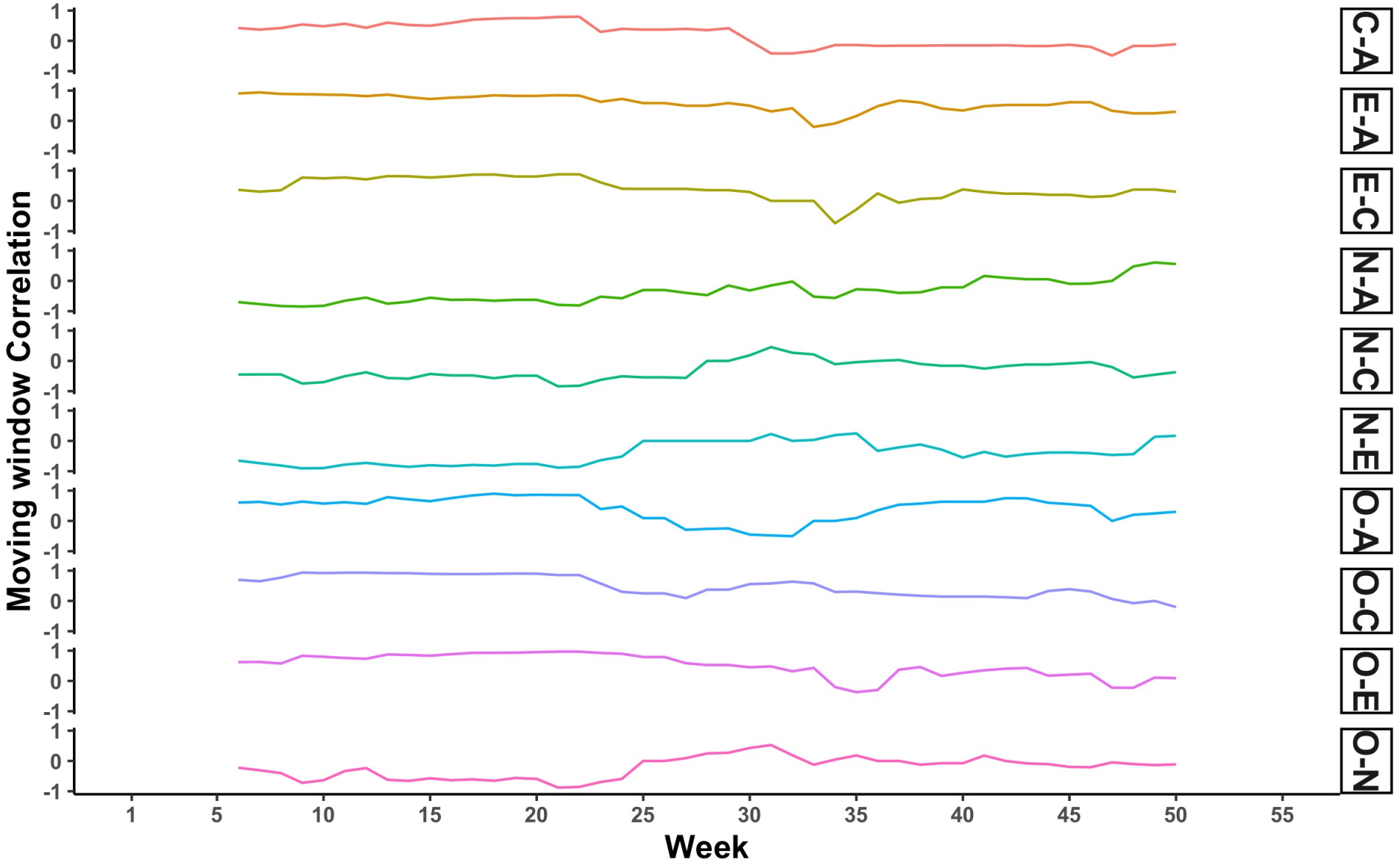
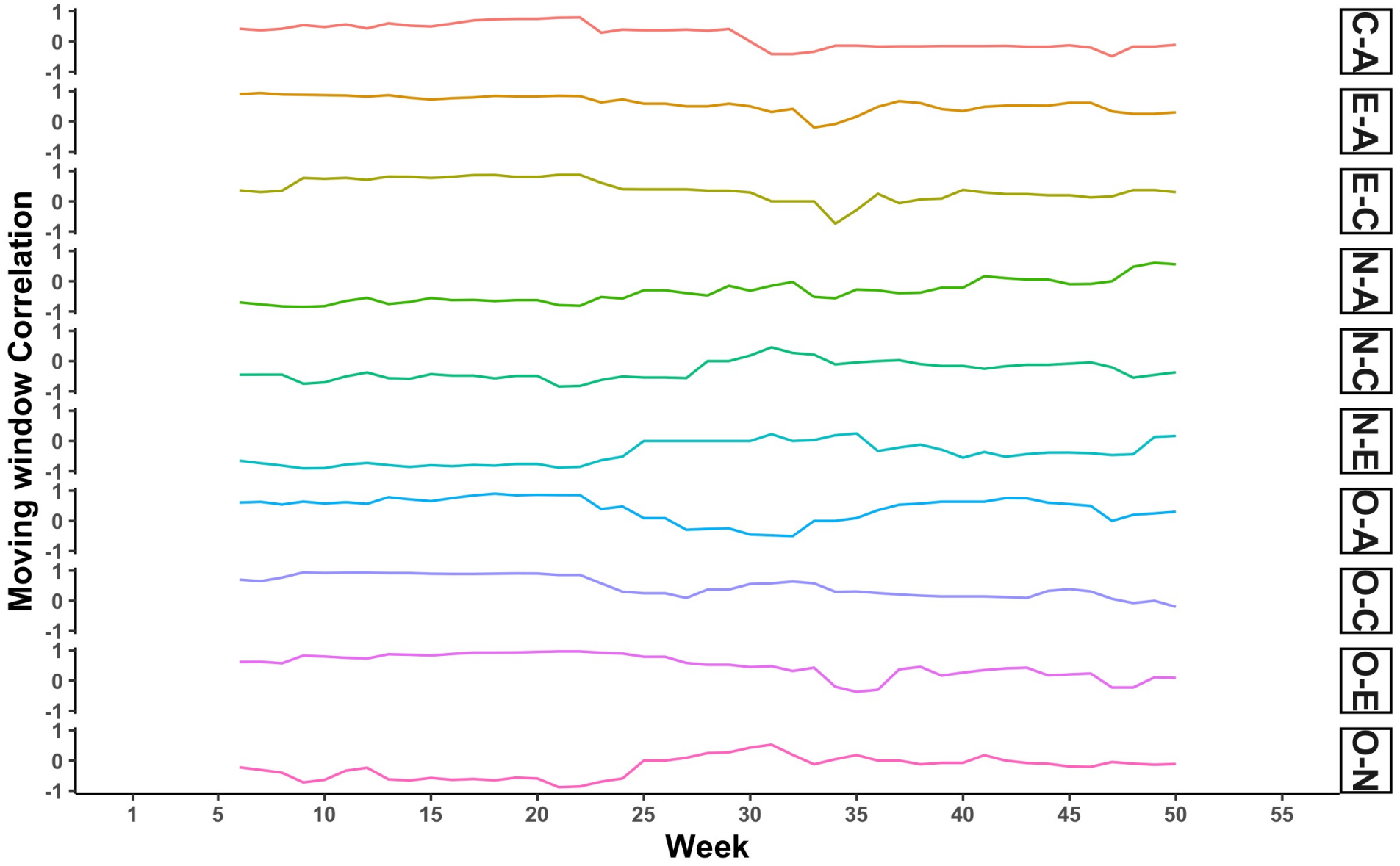
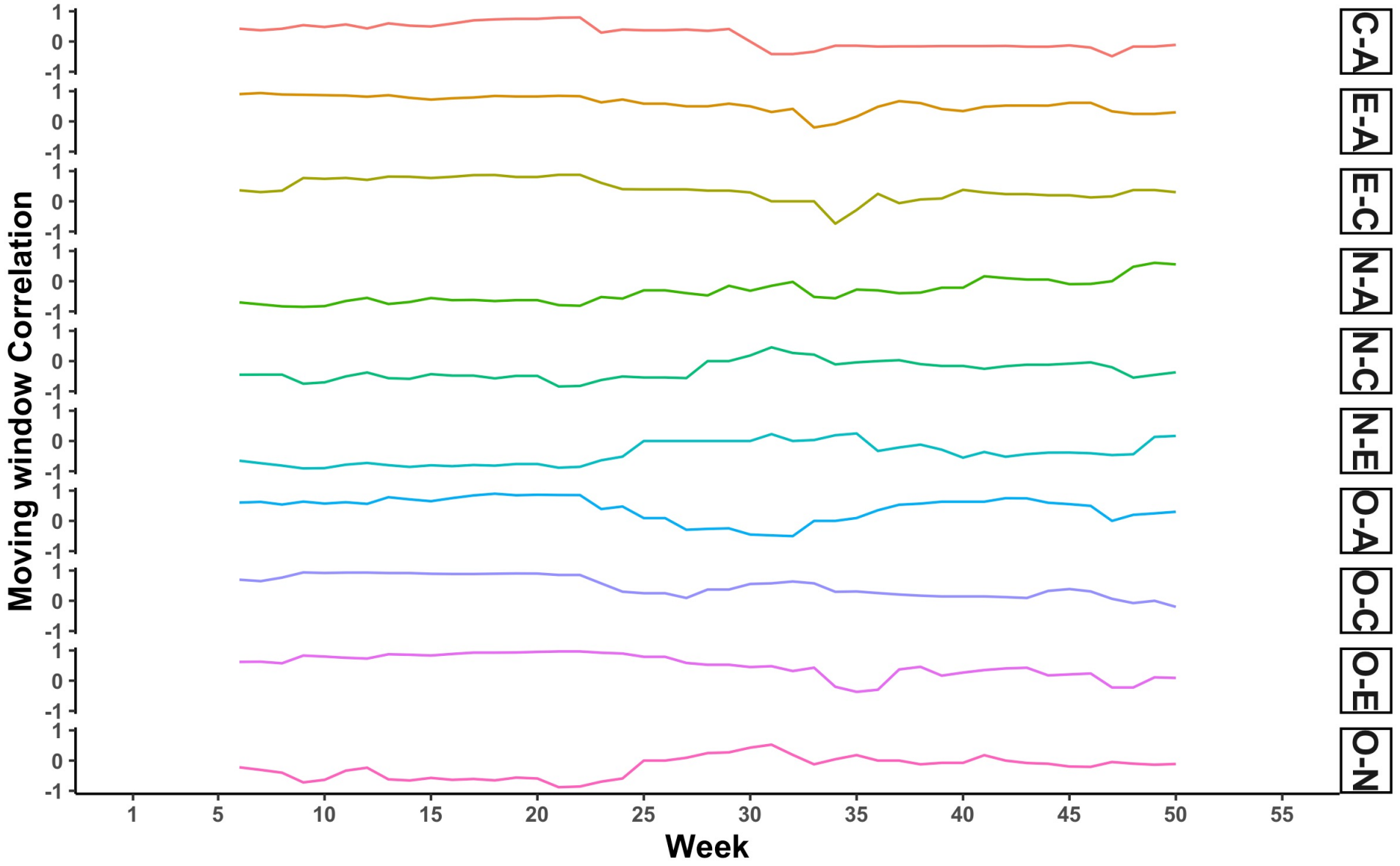


# Phases: $k = 0$


Moving window Correlation
1
0
-1
1
5
10
15
20
25
30
35
40
45
50
55
Week
C-A
E-A
E-C
N-A
N-C
N-E
O-A
O-C
O-E
O-N

# Correlations within a phase should be homogeneous

# Phases: $k = 0$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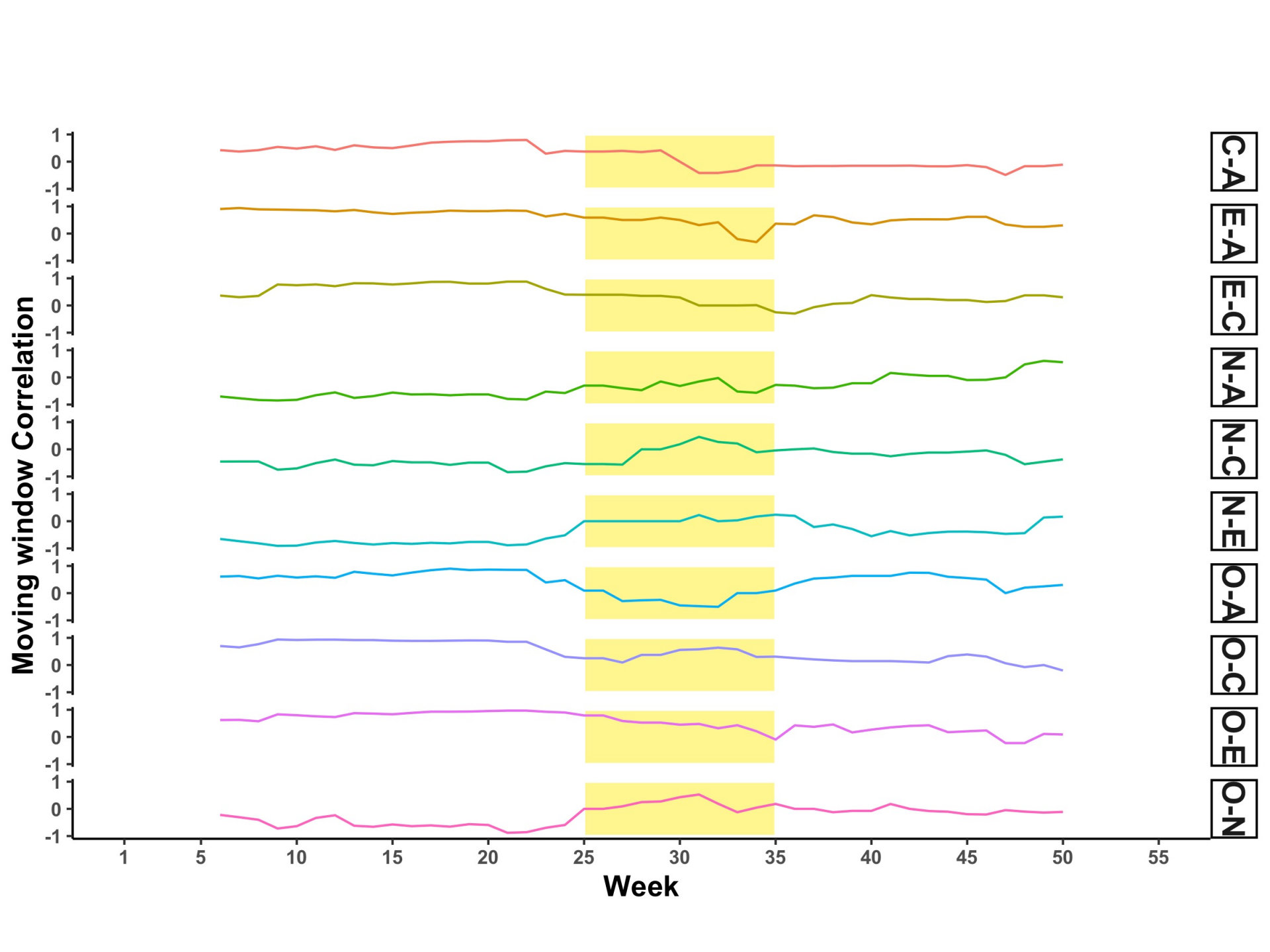
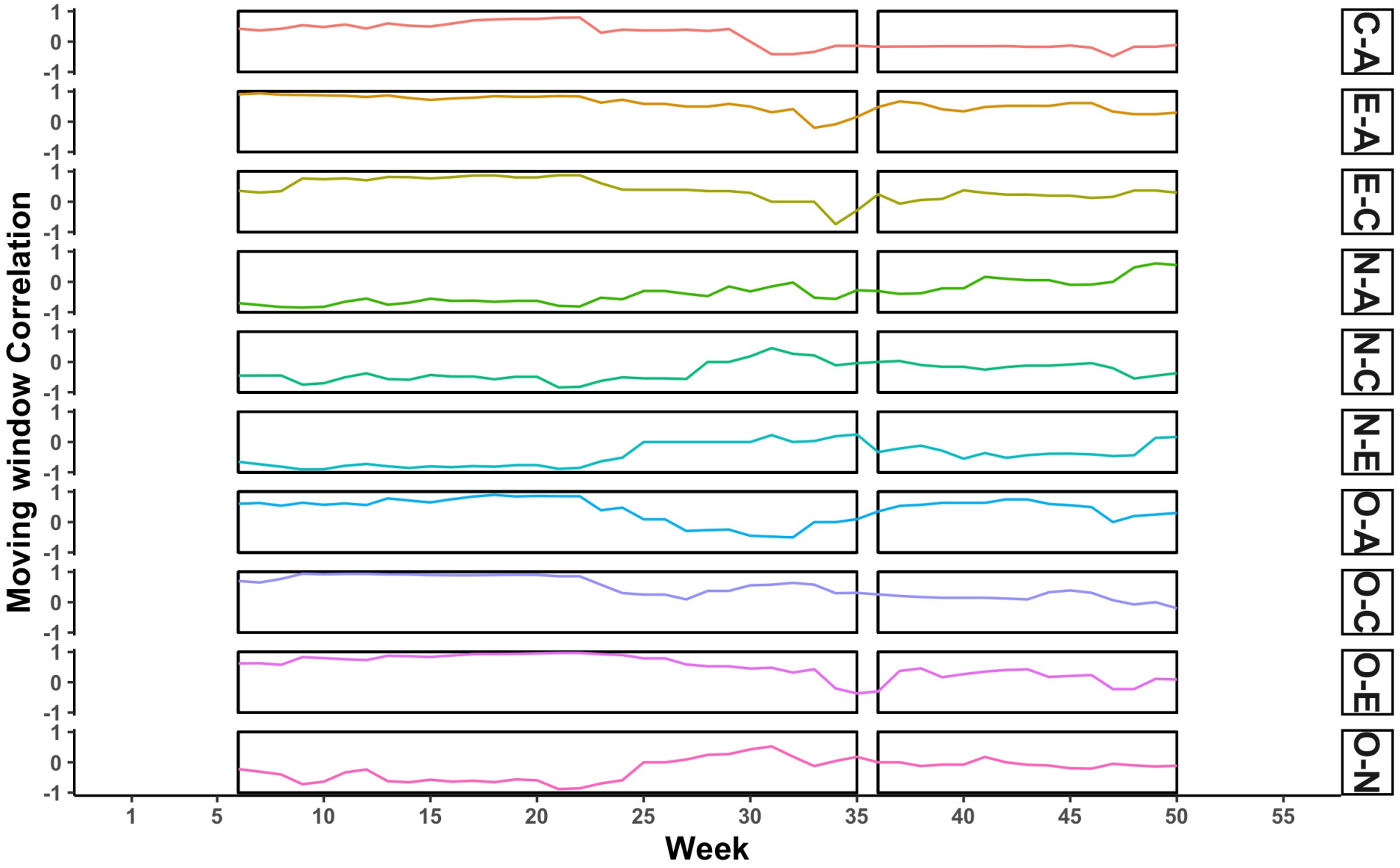

Moving window Correlation
Week
C-A
E-A
E-C
N-A
N-C
N-E
O-A
O-C
O-E
O-N
1
5
10
15
20
25
30
35
40
45
50
55
1
0
-1

# Phases: $k = 1$


Moving window Correlation
1
0
-1
C-A
E-A
E-C
N-A
N-C
N-E
O-A
O-C
O-E
O-N
1
5
10
15
20
25
30
35
40
45
50
55
Week

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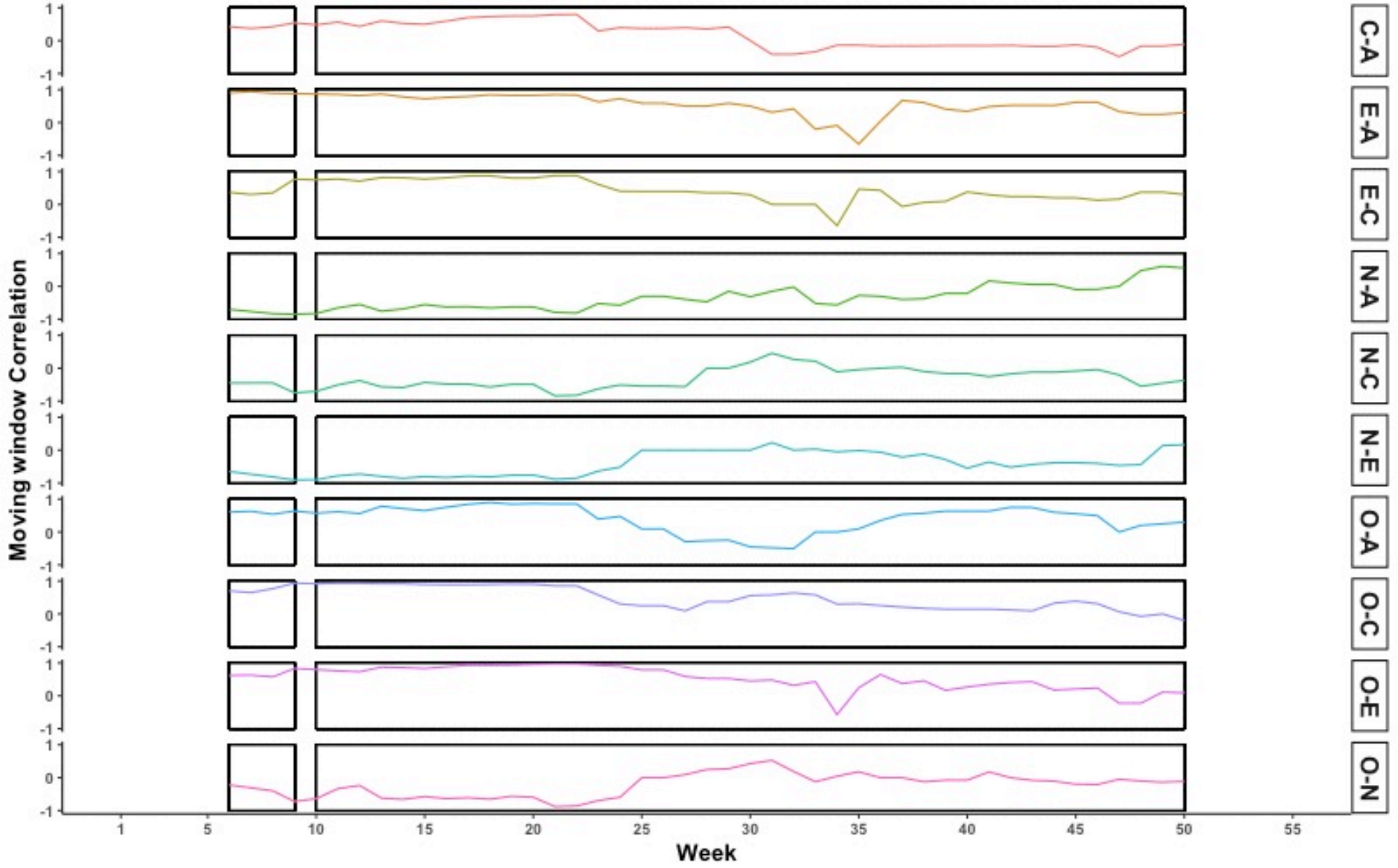

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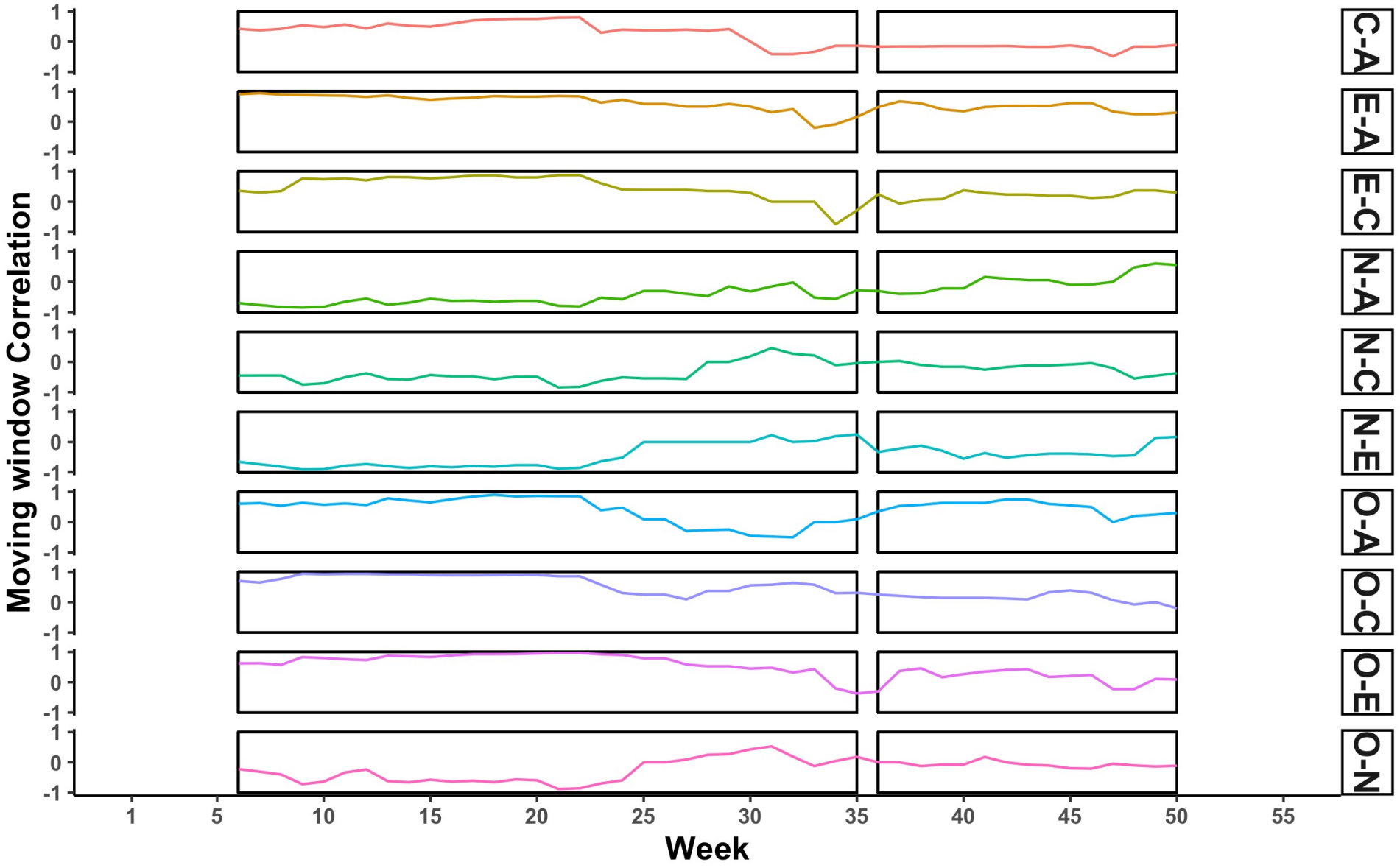
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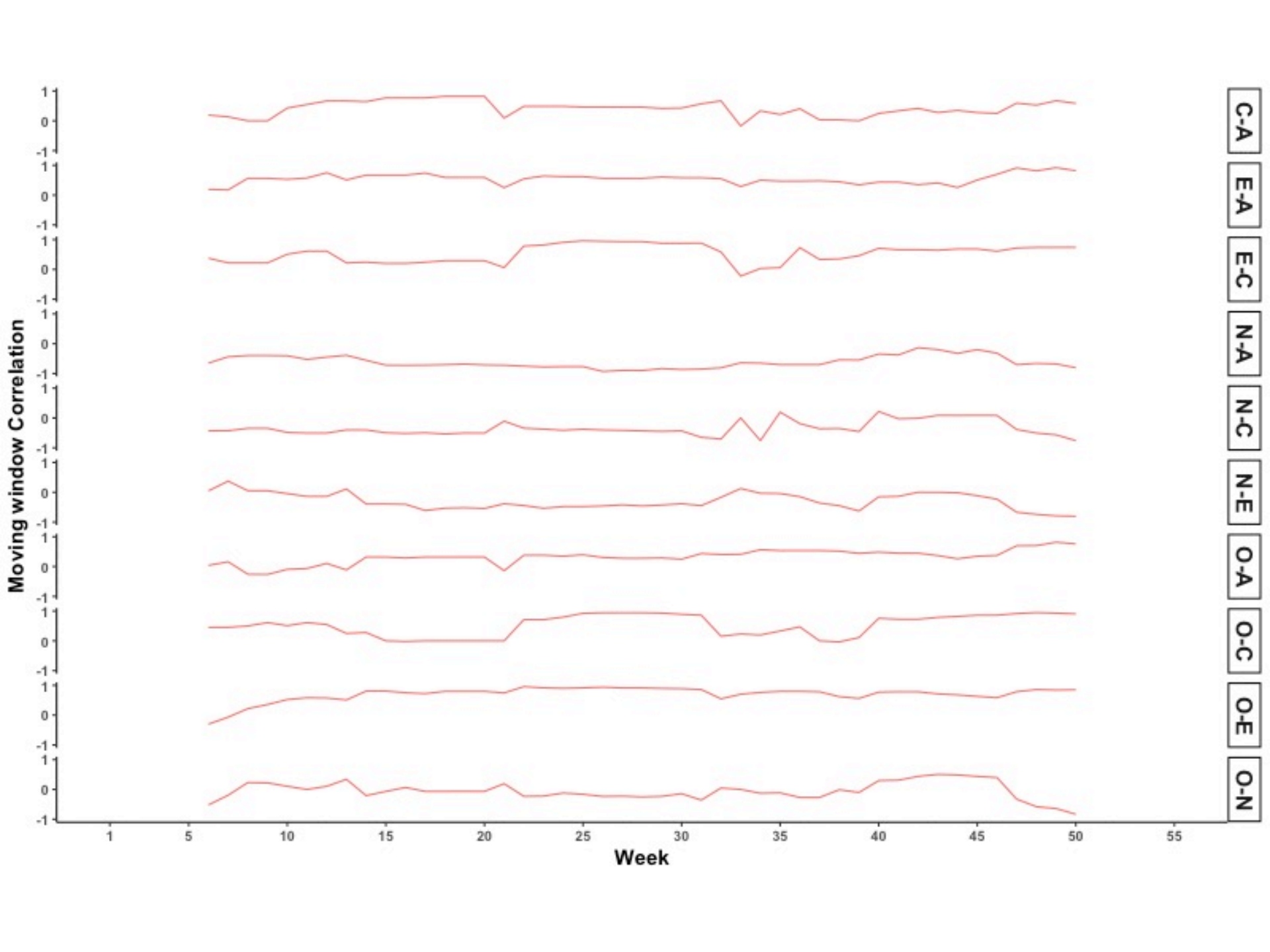
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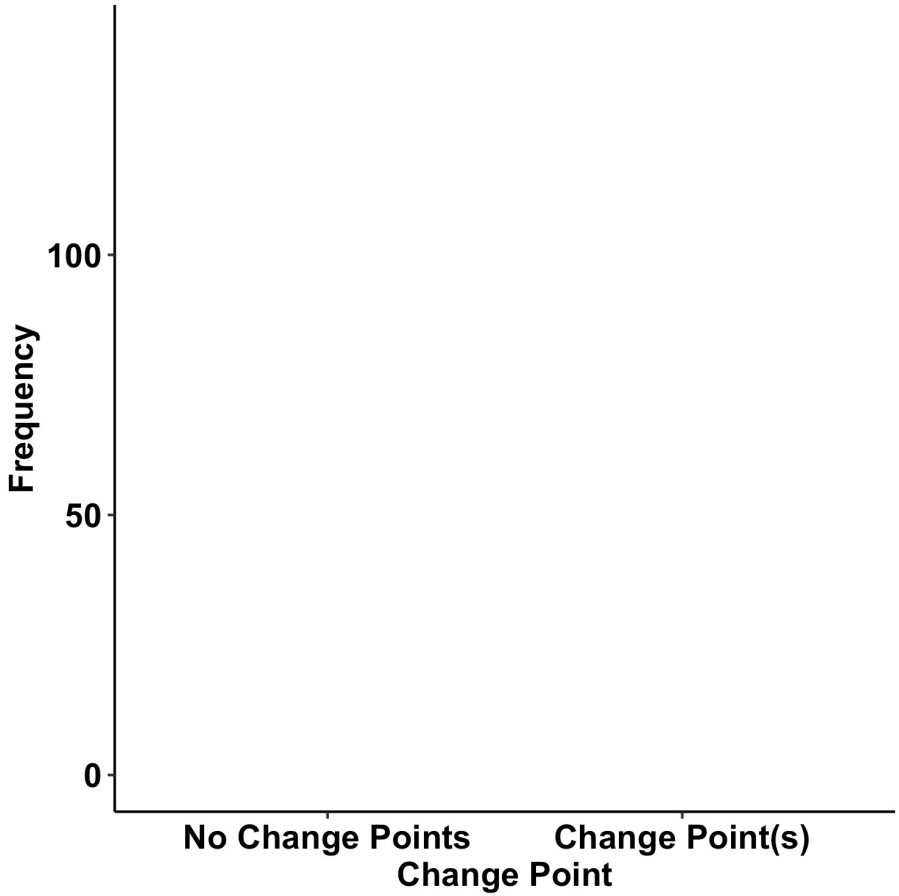
# Correlations within a phase should be homogeneous

*Compared to permuted time series

# Results

# Did people show correlational changes?



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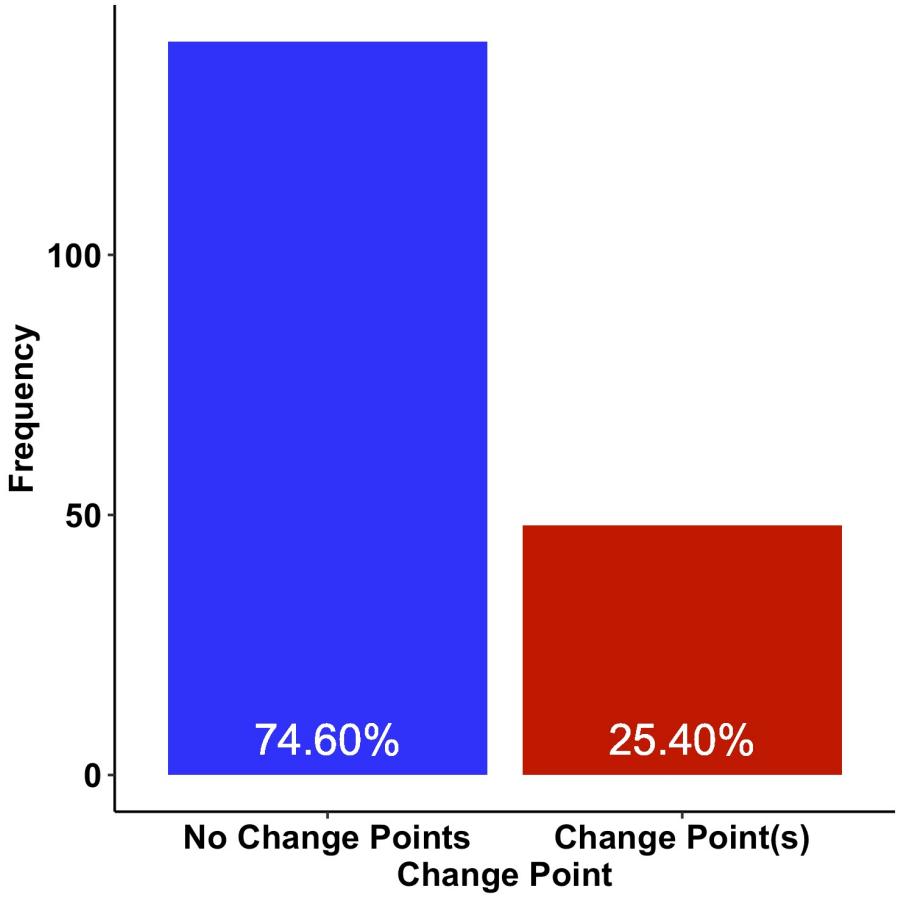


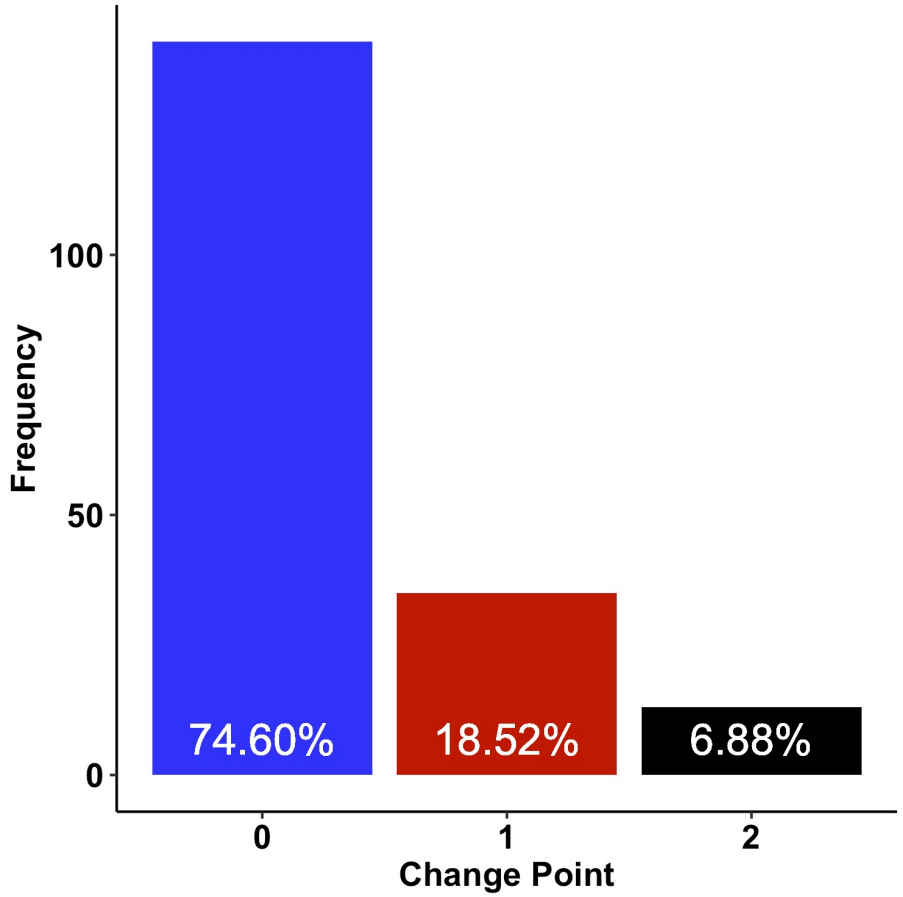

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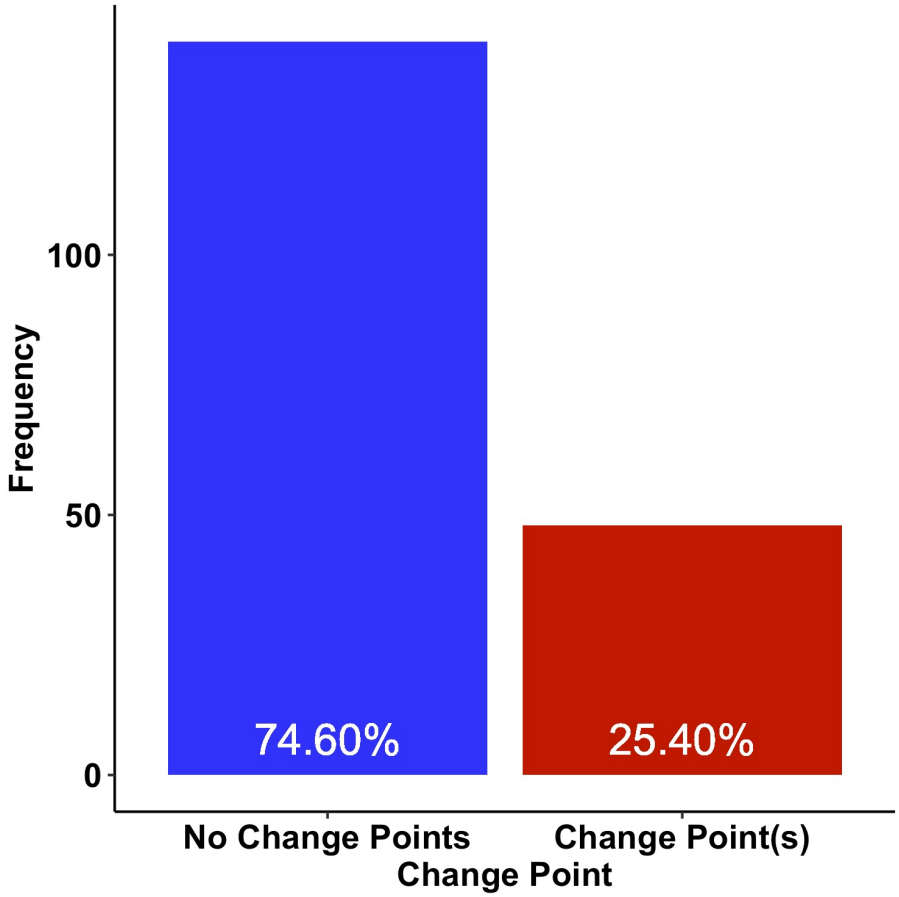


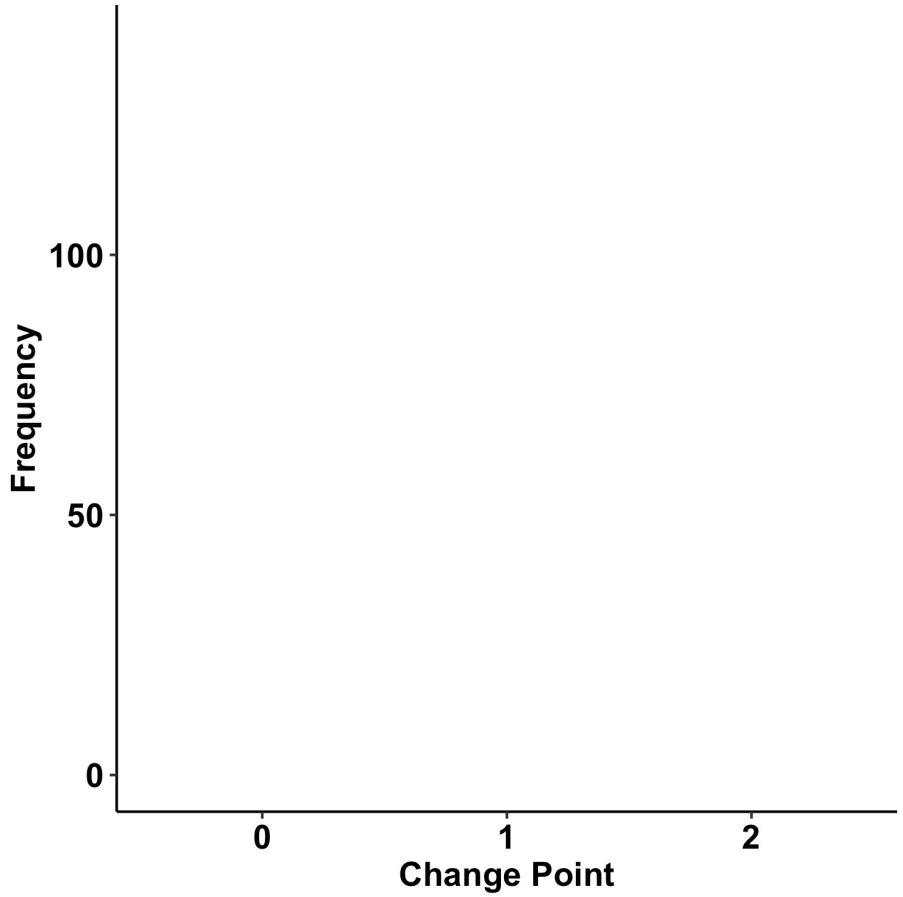

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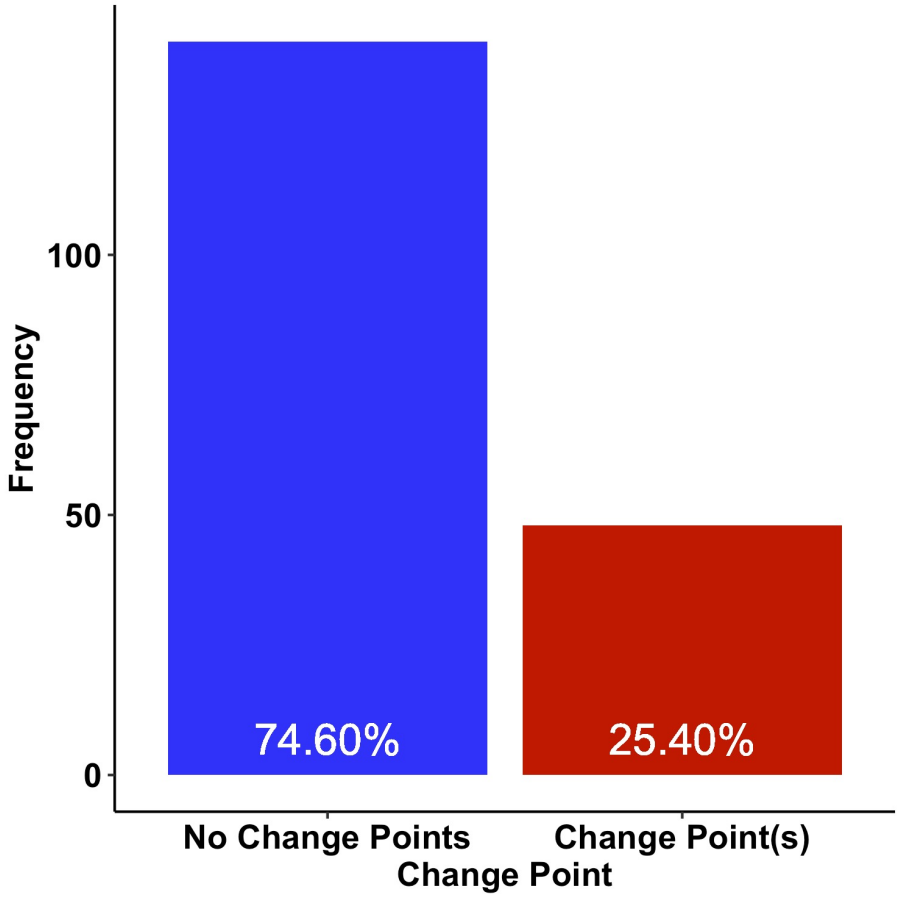


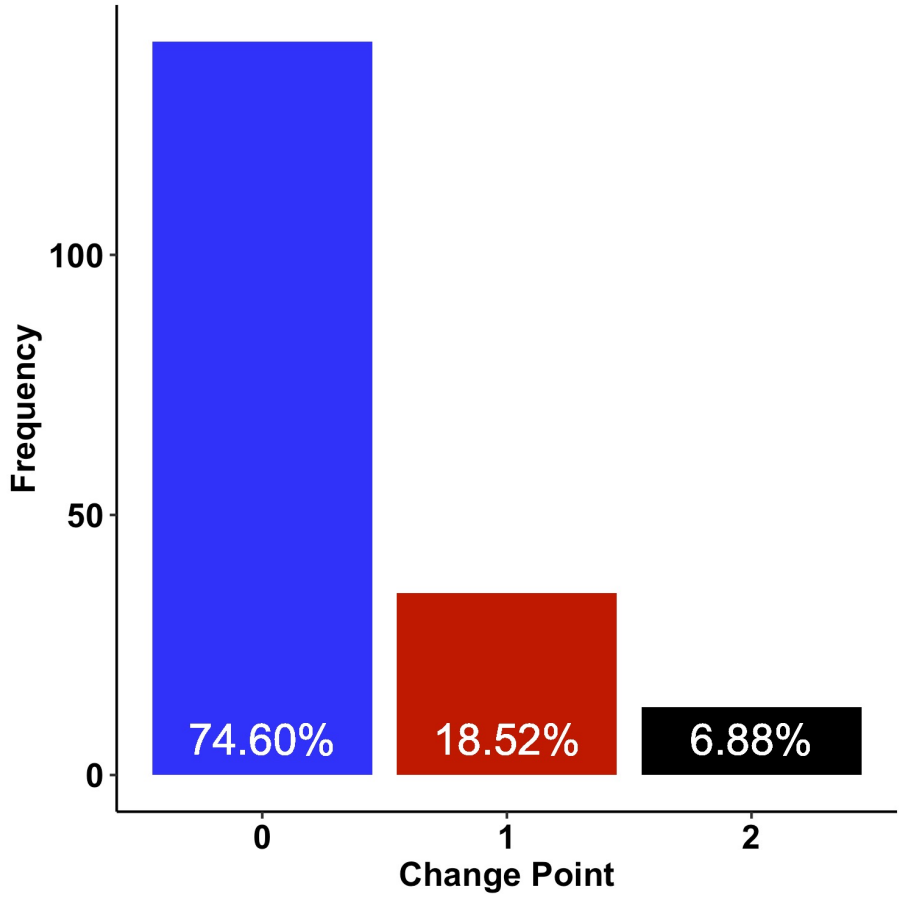

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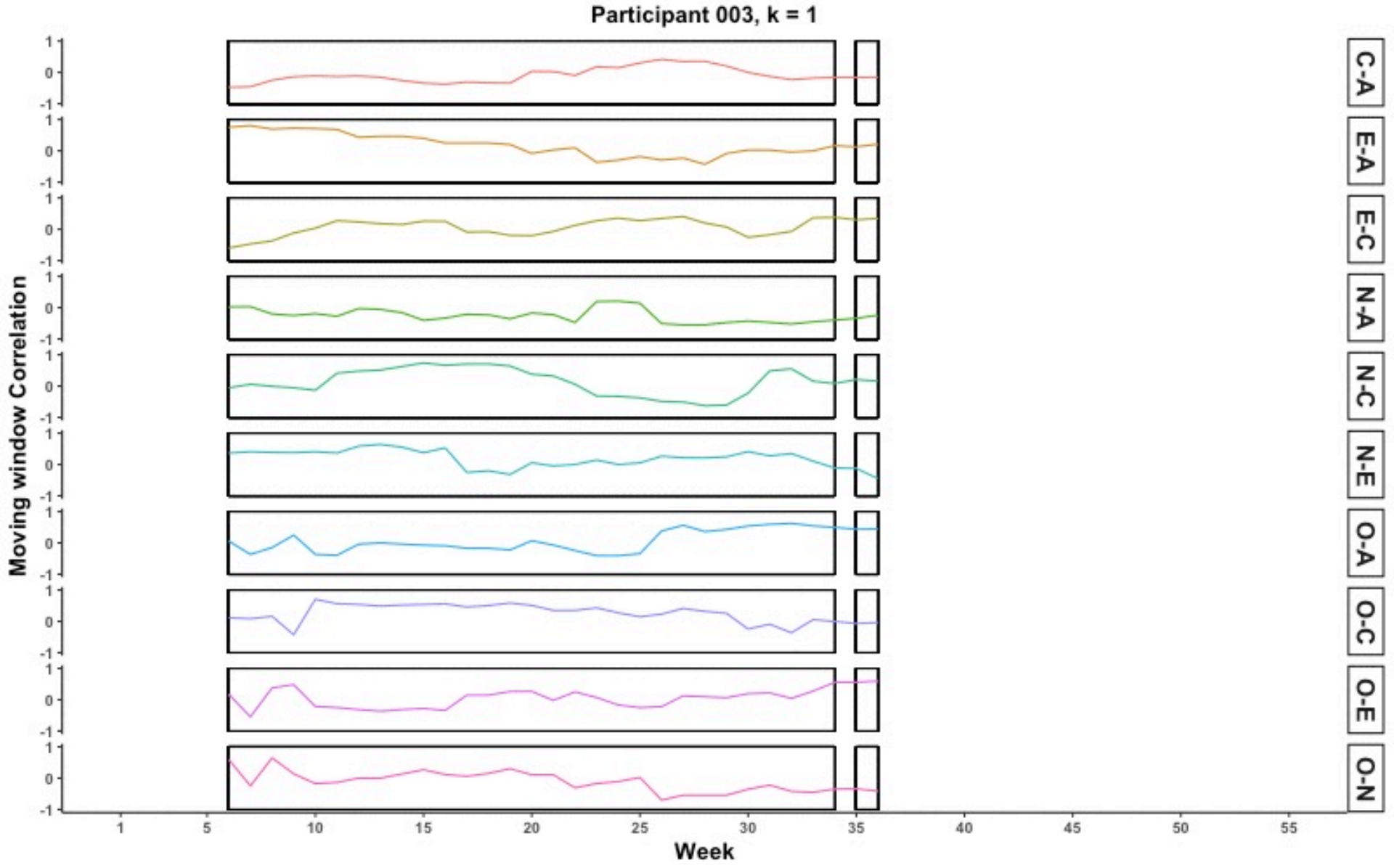
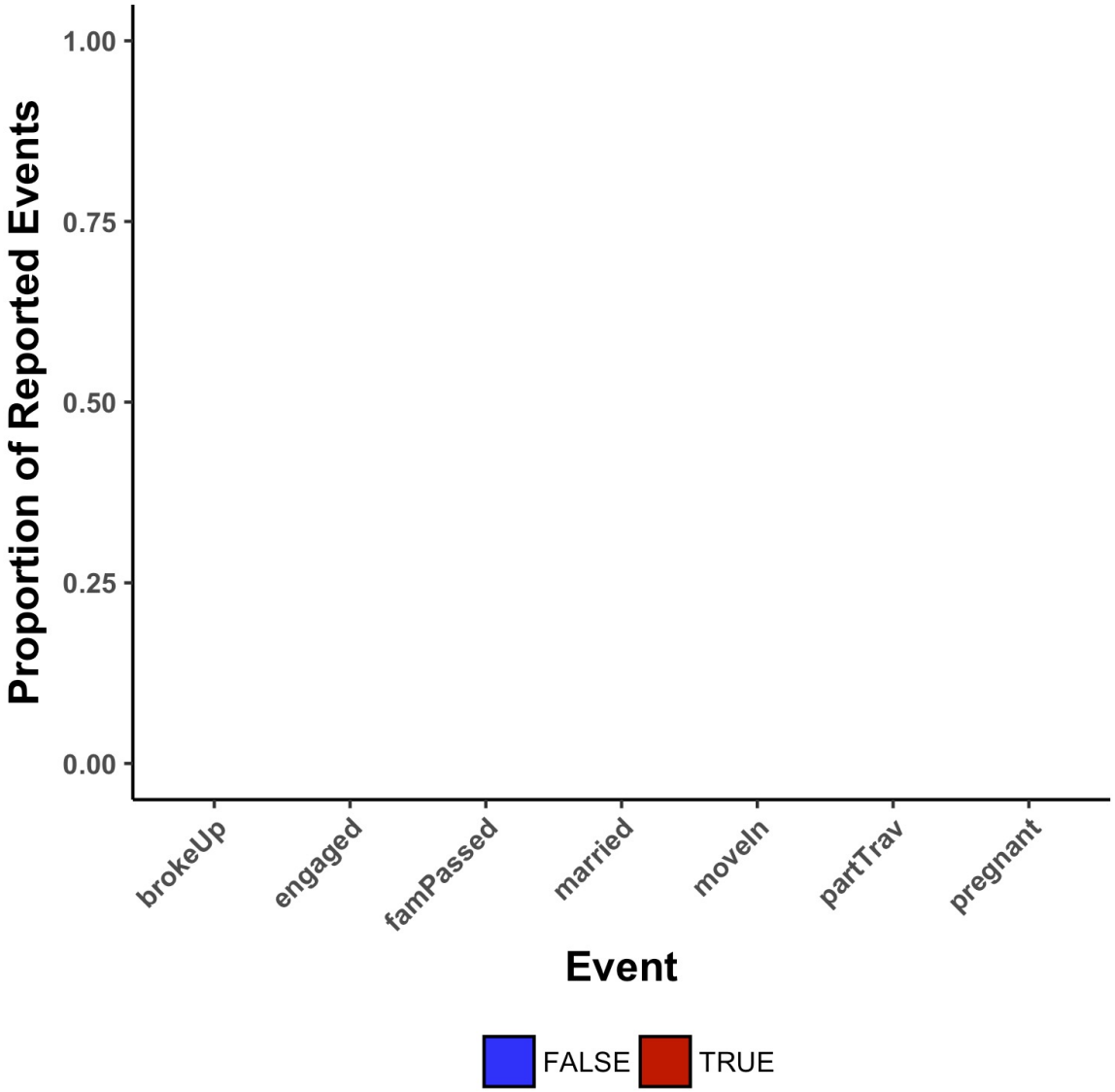


# Did changes map onto events?



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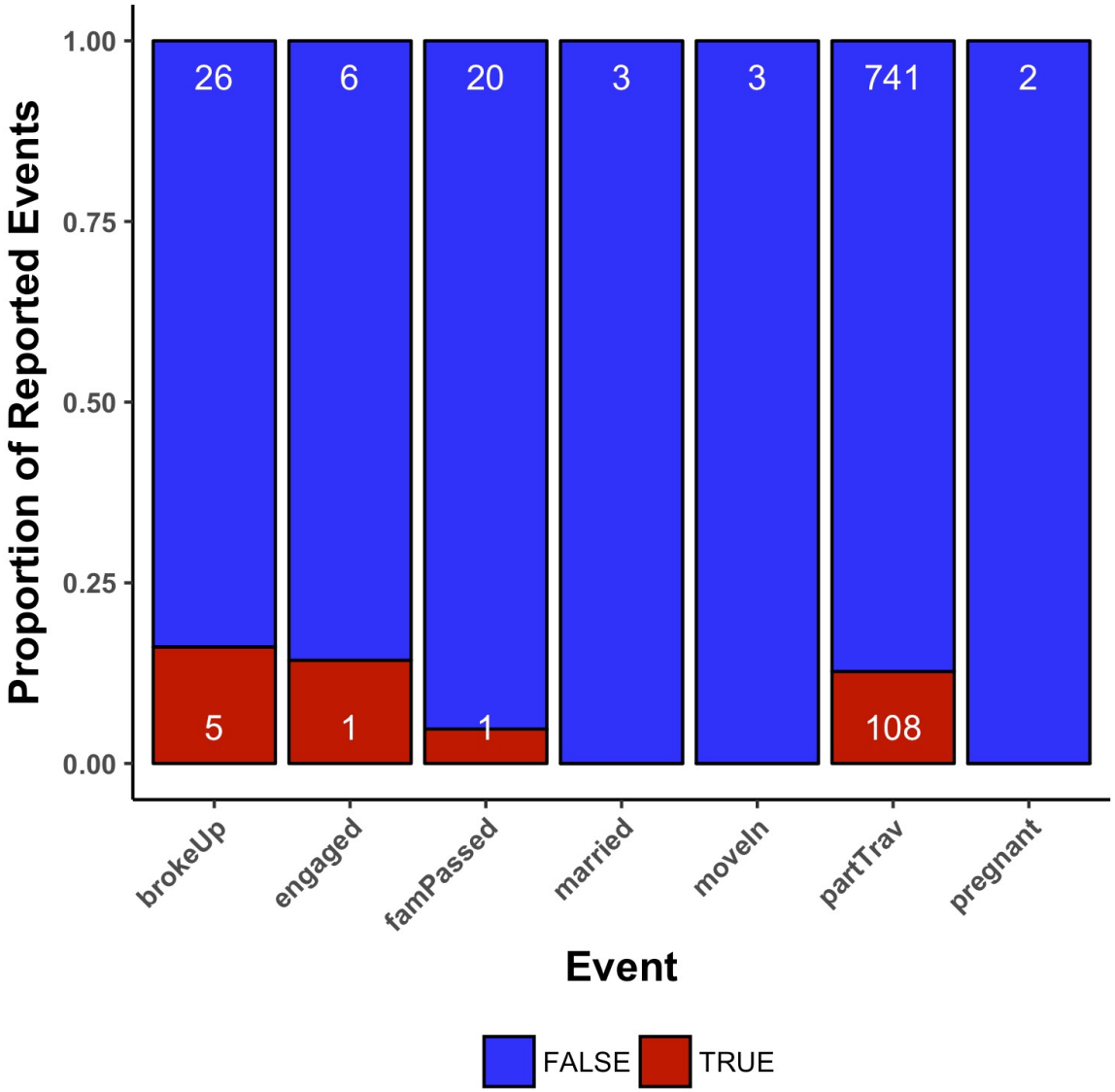

We can detect idiographic change?

We should be thinking about personality at the level of person and as a system

Happen at different time scale
Seem to be lasting at least in terms of months

Do life events do anything?????????????