

## APPLIED COGNITIVE SCIENCE

### CLASS WEEK 2: BODY OVER MIND: CIRCADIAN AND HOMEOSTATIC RHYTHMS PART 3

#### DATA ANALYSIS

Learning objectives: 1) To learn about modelling of cycles and its background in trigonometry. 2) To apply this knowledge in the mixed-effects analysis of the FaceStroop data, searching for evidence of a 24 hour circadian rhythm. 3) To conduct model comparison to investigate if the 24 hour cycle is a better model than other simple models.

Teaser: We will be using this knowledge when we get to talk about hearing and sound, which can be described as a combination of many different cycles ...

#### Data

Data has been uploaded to Brightspace as a zip-file (FaceStroopExp\_data.zip)

#### Data analysis

A script to aid data cleaning and analyses has been uploaded (FaceStroopExp\_analysis\_part2.Rmd).

#### Assignments to be answered in study groups

1. *Introduction1*. Consider response time as something that has a circadian rhythm, all else being equal. When would RT be highest (slow), when would it be lowest (fast)?
2. *Introduction2*. Consider freshness and mood as something that have circadian rhythms, all else being equal. When would freshness/mood be highest, when would it be lowest?
3. A) Go through the description of how a circadian rhythm can be modelled with a sine and a cosine function. Create a plot that contains a sine wave with one cycle per 24 hours. B) Add a line plot with a sine wave that has two cycles per 24 hours (hint: look at the cf variable).
4. A) Use the script to conduct two linear mixed-effects analyses with *response time* predicted by either time of day or a circadian oscillation. Use the `anova()` function to compare the two analyses. Which model is best at explaining the data? B) Make a plot of the two model fits.
5. A) Use the script to conduct two linear mixed-effects analyses with *freshness* predicted by either time of day or a circadian oscillation. Use the `anova()` function to compare the two analyses. Which model is best at explaining the data? B) Make a plot of the two model fits.
6. A) Use the script to conduct two linear mixed-effects analyses with *mood* predicted by either time of day or a circadian oscillation. Use the `anova()` function to compare the two analyses. Which model is best at explaining the data? B) Make a plot of the two model fits.
7. Repeat the three analyses with the two cycle circadian model you made in 3B). Is this a better model than the one cycle model?
8. Combine all three models (linear, one cycle, two cycle) in one. Did this perform better? Make a plot of the best fitting (and simplest) model.

9. Send one report with filename: "03Class\_GroupX\_assignment.pdf", where X is your group number to a member of the paired group (cc. MW): 1-10, 2-9, 3-8, 4-7, 5-6. Deadline Friday, this week.
10. Provide short written feedback (max 10 lines) on paired group's assignment: What was good? What was missing? Deadline Tuesday next week.