Musical mood induction and perception of facial emotions in depressed elderly patients

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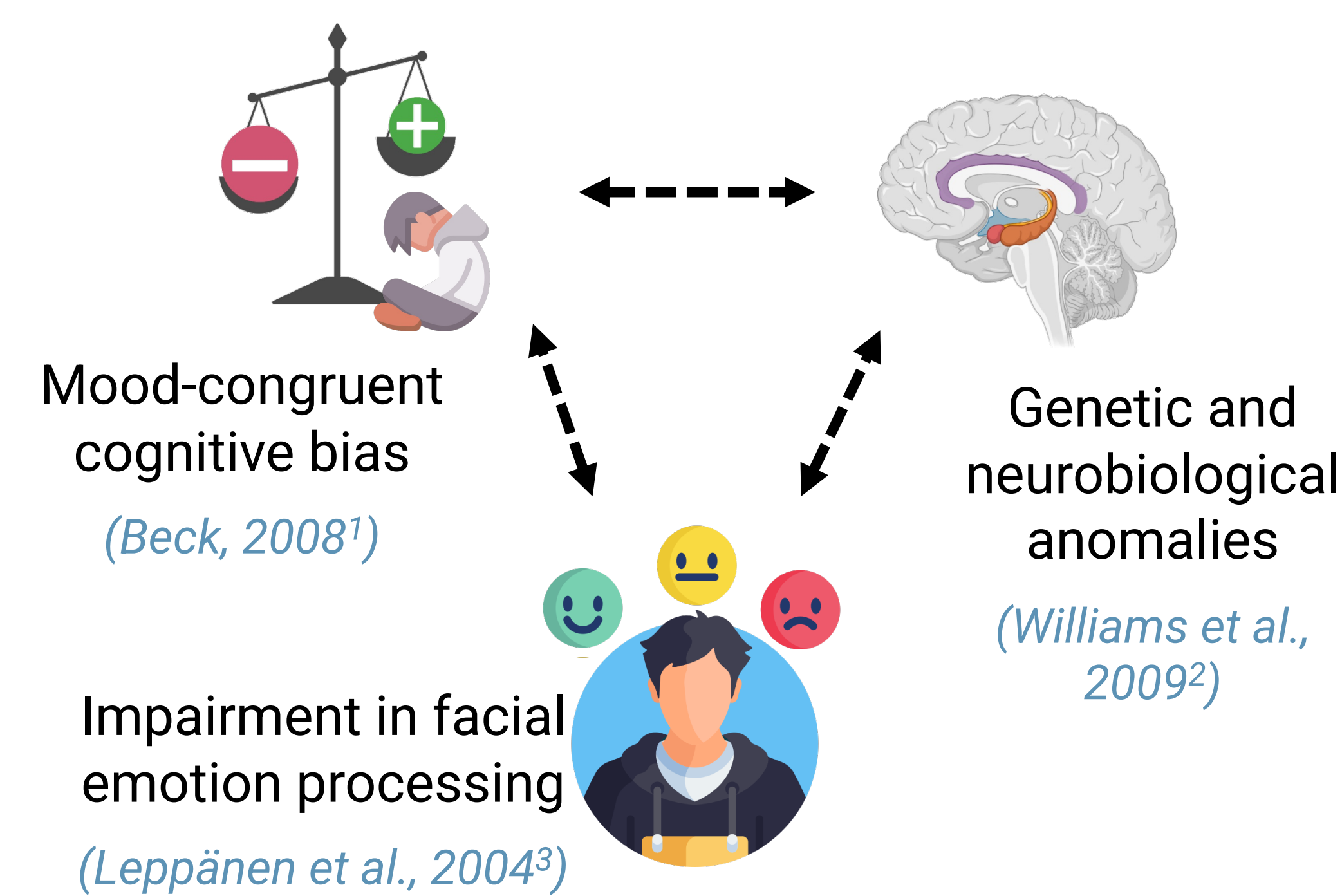
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OBJECTIVES

1. **Is late-life depression associated with negative bias** (vs healthy controls)?

2. What is the effect of **positive vs neutral musical mood induction** in depressed and control elderly subjects?
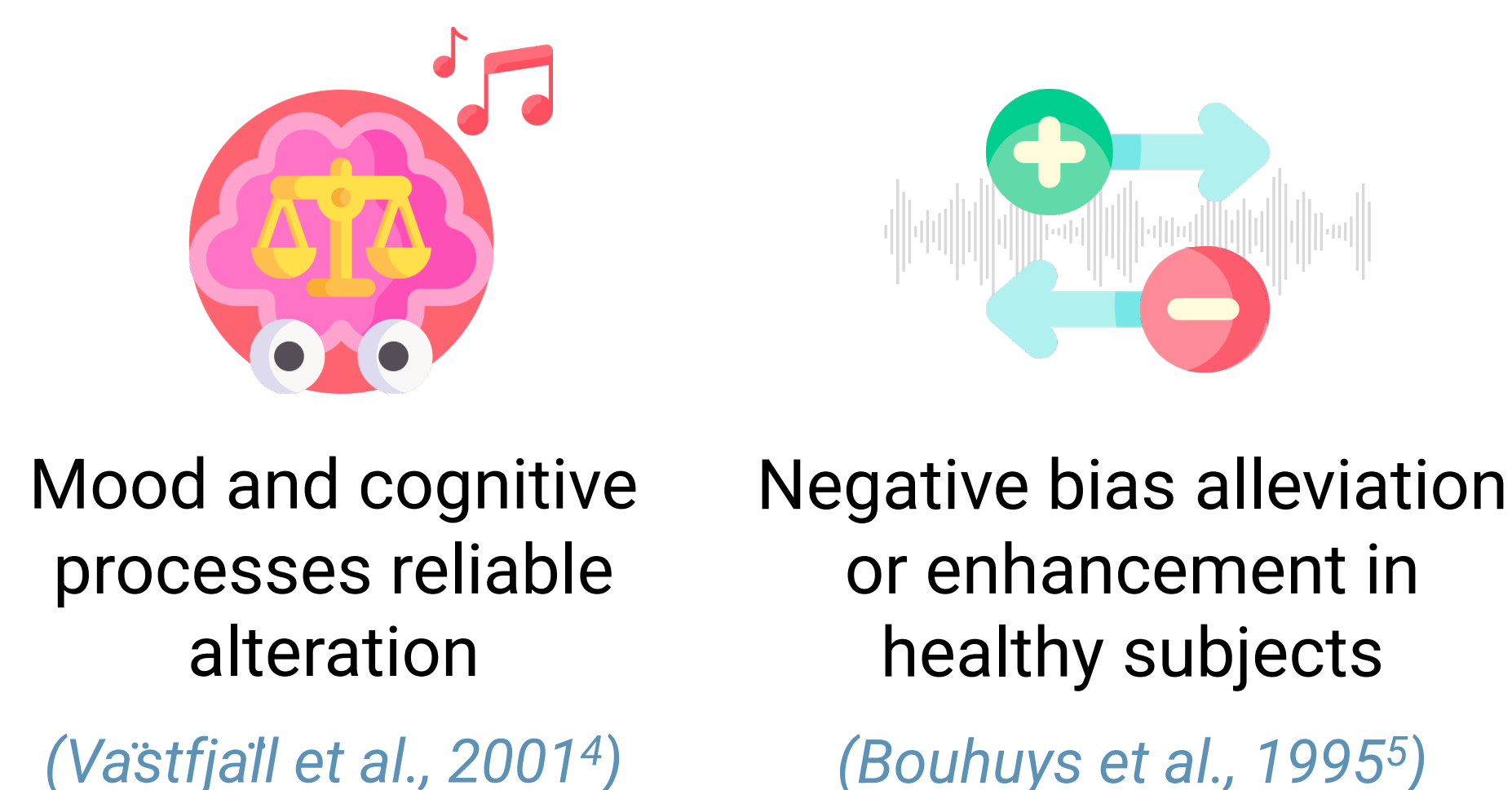
BACKGROUND

1. Negative bias and early-life depression

Mood-congruent cognitive bias
(Beck, 2008[1])

Genetic and neurobiological anomalies
(Williams et al., 2009[2])

Impairment in facial emotion processing
(Leppänen et al., 2004[3])

Negative bias in late-life depression ?

2. Musical mood induction

Mood and cognitive processes reliable alteration
(Västfjäll et al., 2001[4])

Negative bias alleviation or enhancement in healthy subjects
(Bouhuys et al., 1995[5])

Musical mood induction and depressed subjects?

METHODS

Prospective randomized controlled trial
Cross over design
20 depressed patients + 20 healthy controls

Day 1:
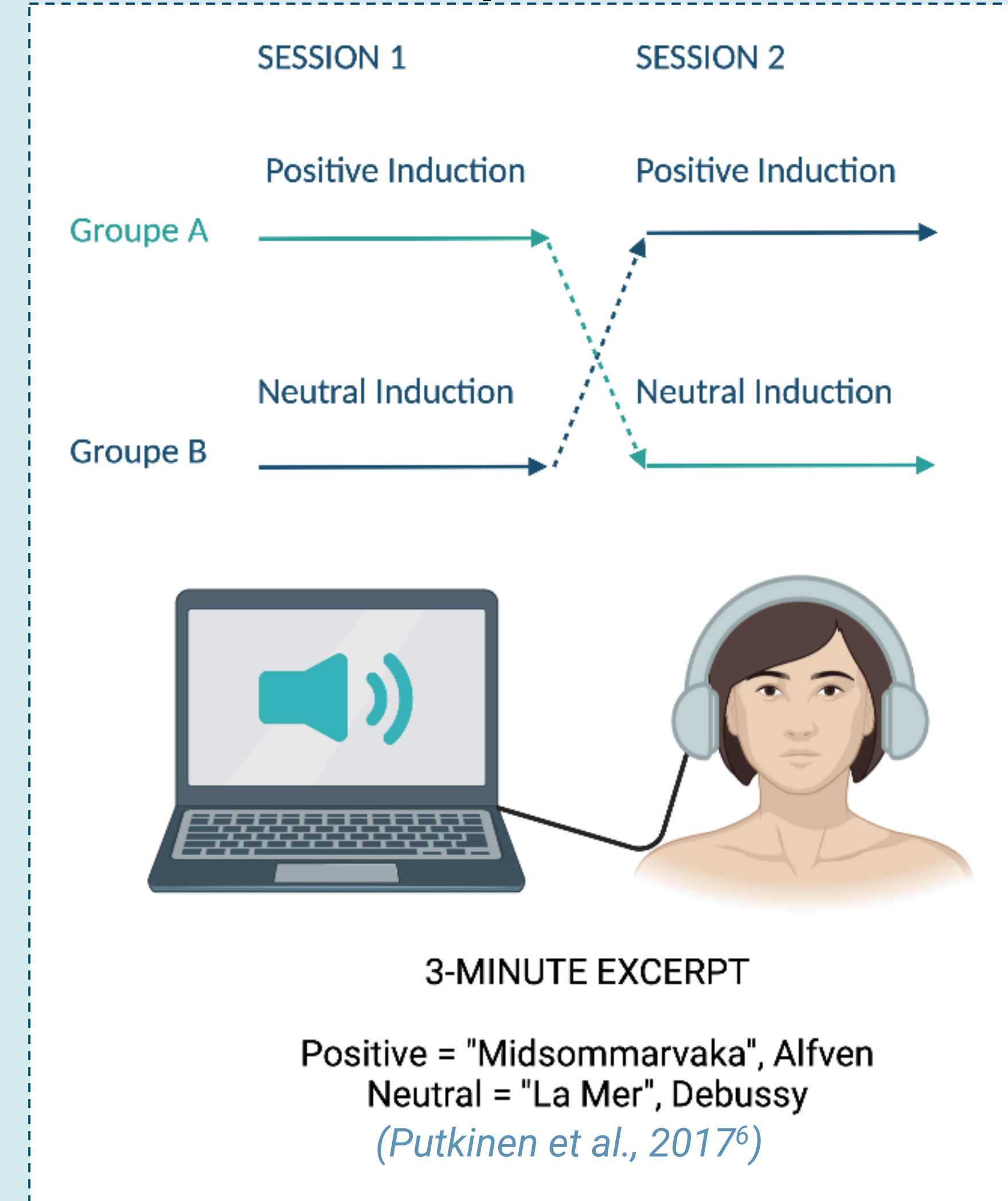- Mood induction protocol
- Facial emotion recognition task

Day 8 ± 2:
- Mood induction
- Facial emotion recognition task
- Implicit memory task
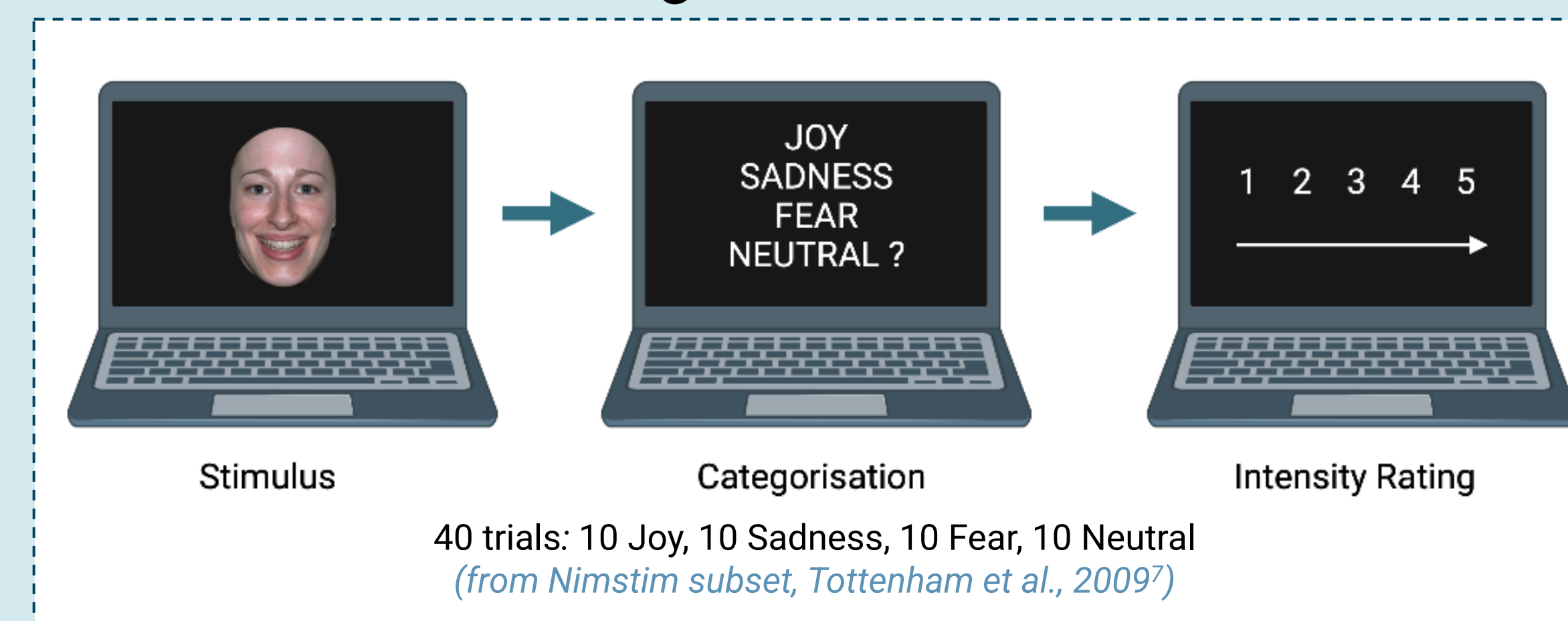- Questionnaires

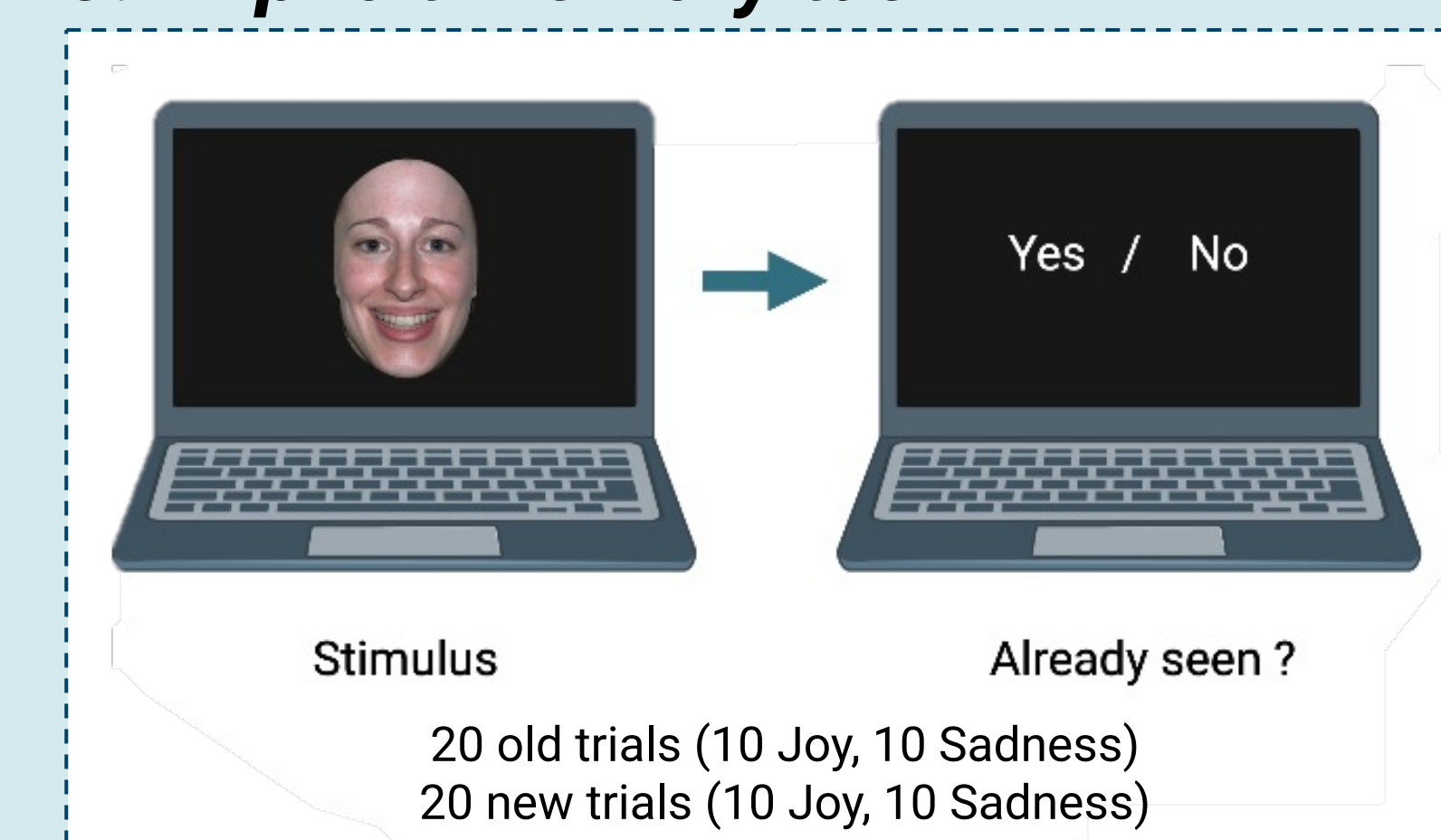Age ≥ 60 yo

MMSE ≥ 26

MADRS ≥ 20 or ≤ 7

1. Mood induction protocol

SESSION 1 — SESSION 2

Groupe A: Positive Induction — Positive Induction / Neutral Induction

Groupe B: Neutral Induction — Neutral Induction

3-MINUTE EXCERPT

Positive = "Midsommarvaka", Alfven
Neutral = "La Mer", Debussy
(Putkinen et al., 2017[6])

2. Facial emotion recognition task

Stimulus → Categorisation (JOY SADNESS FEAR NEUTRAL ?) → Intensity Rating (1 2 3 4 5)

40 trials: 10 Joy, 10 Sadness, 10 Fear, 10 Neutral
(from Nimstim subset, Tottenham et al., 2009[7])

3. Implicit memory task

Stimulus → Already seen ? (Yes / No)

20 old trials (10 Joy, 10 Sadness)
20 new trials (10 Joy, 10 Sadness)

VARIABLES OF INTEREST AND STATISTICAL ANALYSES

Measuring the negative bias in emotion recognition task:

✓ **Accuracy** *(lower in categorizing all emotions)*

🌡 **Intensity** *(negative emotions > positive emotions)*

⏳ **Response times** *(negative < positive emotions [facilitation])*

▦ **Misjudgement pattern** *(happy faces → neutral → negative)*

Objective 1 :
ANOVA RM 2 factors (Group x Emotion) after neutral mood induction (= baseline state)
Confusion matrices

Objective 2 :
ANOVA RM 3 factors (Group x Emotion x Induction)
Confusion matrices

PRELIMINARY RESULTS

Included yet:
8 depressed subjects (69.9±5.2 yo) and 13 healthy controls (70.2±5.8 yo)

Objective 1 (negative bias in late-life depression ?):
No statistical effect of the "group" factor on the dependent variables (accuracy, intensity ratings, response times).

Objective 2 (effect of musical induction):
- Healthy controls : more accurate to label neutral emotions *(p=0.001)* and judged neutral faces more positively than after neutral mood induction.
- Depressed subjects and controls : slower to rate intensity after positive mood induction *(p=0.048)*.
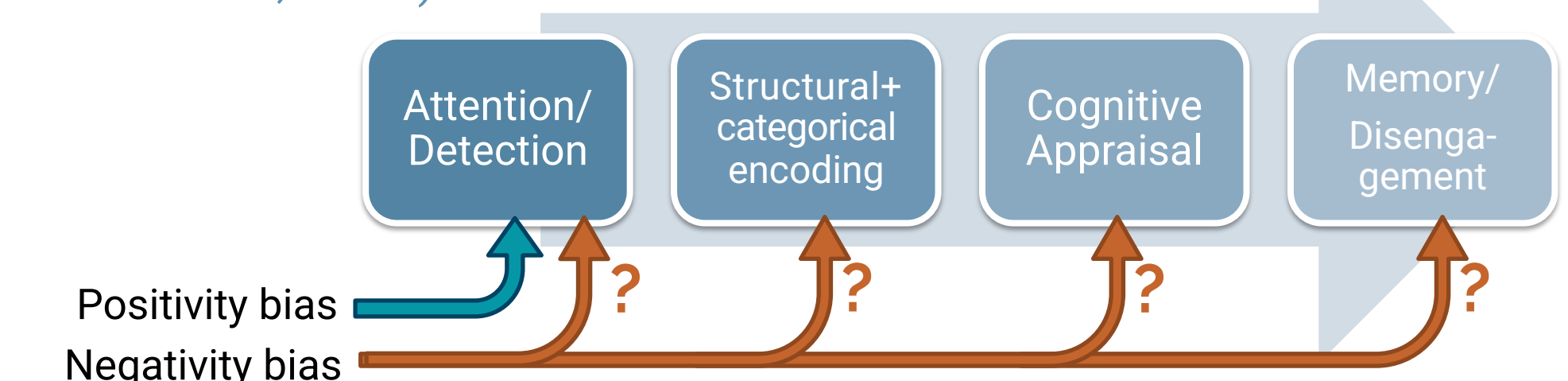- No other effect of mood induction in depressed subjects so far.

DISCUSSION
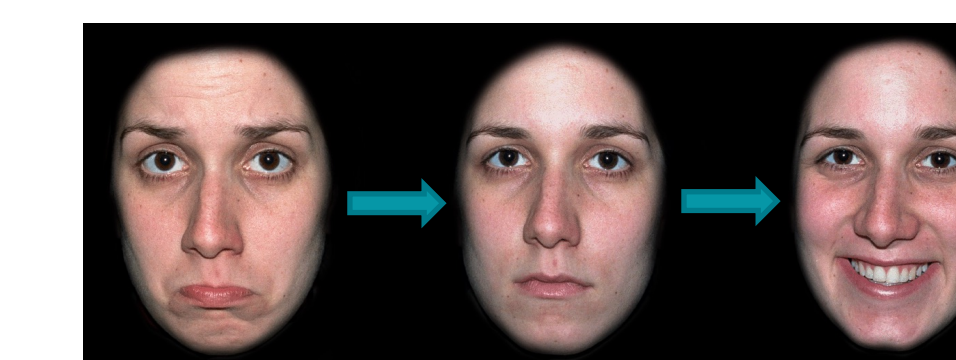
Positivity Bias in normal aging
- Attention stages
- Top-down attention towards positive emotional cues
- Counteracts negative bias of depression ?
(Johnson et al., 2013[8]; Mather et al., 2016[9])

Different stages of facial emotion processing
(Güntekin et Basar, 2014[10])

Attention/Detection → Structural+ categorical encoding → Cognitive Appraisal → Memory/Disengagement

Positivity bias
Negativity bias

CONCLUSION AND PERSPECTIVES

- **No evidence of negative bias in late-life depression in this study so far.**
- **Interesting effect of positive mood-induction in healthy controls.**
- Pending completion of inclusion for the final analysis.
- Challenge: development of neuroscience-informed therapies.

FOR MORE INFORMATIONS

1- A. T. Beck, The evolution of the cognitive model of depression and its neurobiological correlates. *American Journal of Psychiatry.* 165, 969–977 (2008). 2- L. M. Williams, J. M. Gatt, P. R. Schofield, G. Olivieri, A. Peduto, E. Gordon, 'Negativity bias' in risk for depression and anxiety: Brain–body fear circuitry correlates, 5-HTT-LPR and early life stress. *NeuroImage.* 47, 804–814 (2009). 3- J. M. Leppänen, M. Milders, J. S. Bell, E. Terriere, J. K. Hietanen, Depression biases the recognition of emotionally neutral faces. *Psychiatry Research.* 128, 123–133 (2004). 4- D. Västfjäll, Emotion induction through music: A review of the musical mood induction procedure. *Musicae Scientiae.* 5, 173–211 (2001). 5- A. L. Bouhuys, G. M. Bloem, T. G. G. Groothuis, Induction of depressed and elated mood by music influences the perception of facial emotional expressions in healthy subjects. *Journal of Affective Disorders.* 33, 215–226 (1995). 6- V. Putkinen, T. Makkonen, T. Eerola, Music-induced positive mood broadens the scope of auditory attention. *Social Cognitive and Affective Neuroscience.* 12, 1159–1168 (2017). 7- N. Tottenham, J. W. Tanaka, A. C. Leon, T. McCarry, M. Nurse, T. A. Hare, et al., The NimStim set of facial expressions: Judgments from untrained research participants. *Psychiatry Research.* 168, 242–249 (2009). 8- D. R. Johnson, W. L. Whiting, Detecting subtle expressions: Older adults demonstrate automatic and controlled positive response bias in emotional perception. *Psychology and Aging.* 28, 172–178 (2013). 9- M. Mather, The Affective Neuroscience of Aging. *Annu. Rev. Psychol.* 67, 213–238 (2016). 10- B. Güntekin, E. Başar, A review of brain oscillations in perception of faces and emotional pictures. *Neuropsychologia.* 58, 33–51 (2014).