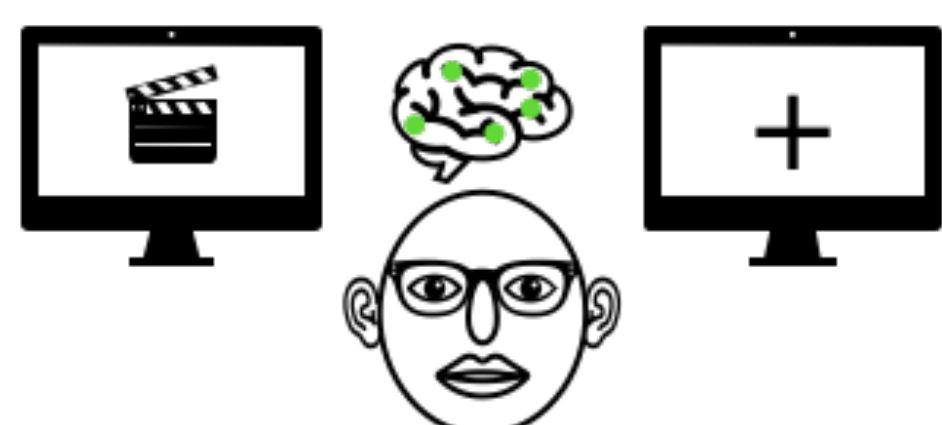


Introduction

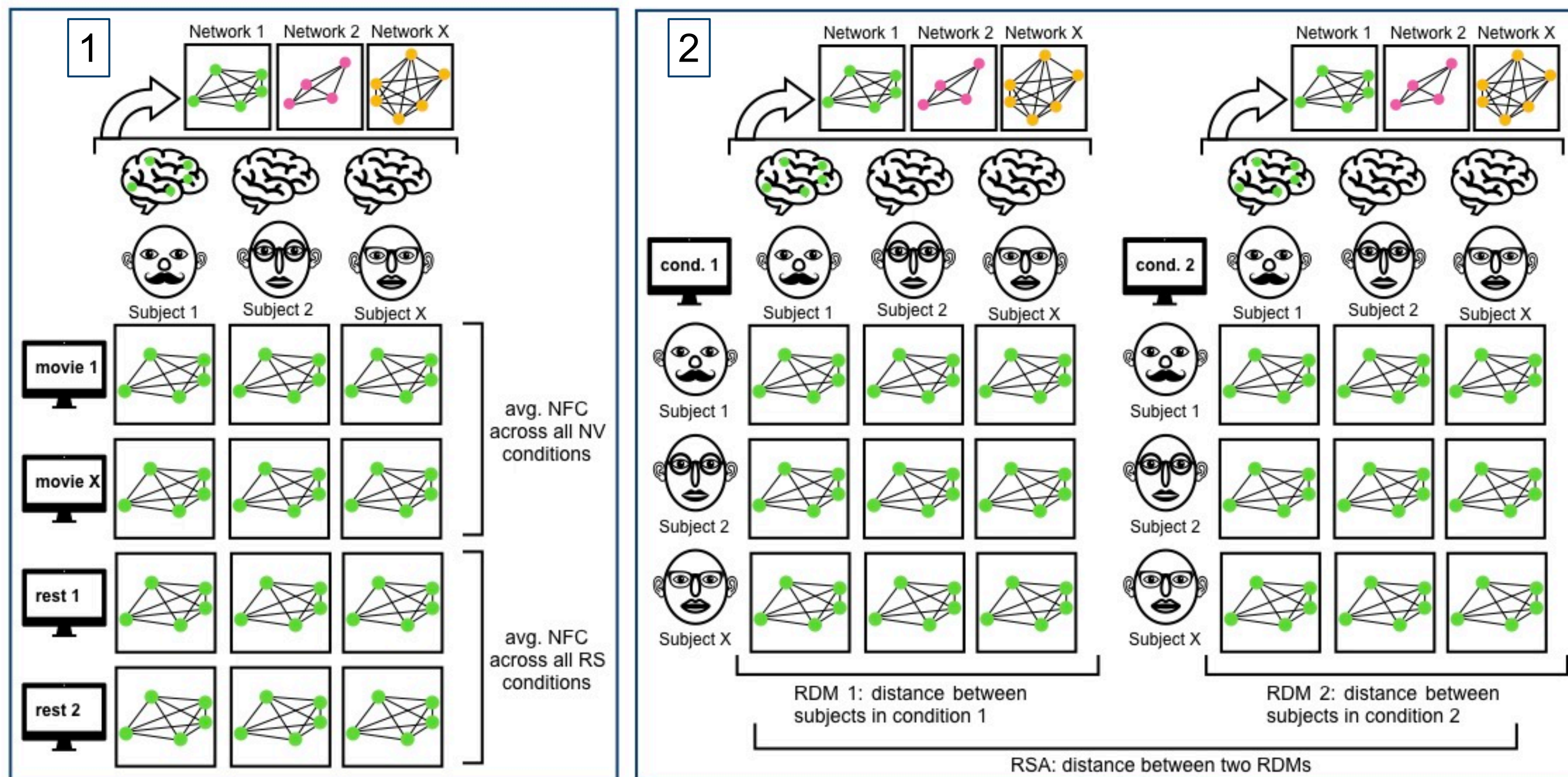
- Movies: more similar to real-life experiences because of continuity, complexity and dynamics**
- Life-like situations in naturalistic viewing (NV) might give controlled push into brain states emerging naturally outside the MRI (Finn et al., 2017)¹
- Induced brain states give basis to investigate inter-individual differences and clinical questions (Eickhoff, Milham & Vanderwal, 2020)²
- Effect of might be best measured in functional networks related to processing content and features of movie
- We investigate the effect of NV in comparison to resting state (RS) on network functional connectivity (NFC) in 14 meta-analytically defined networks**



Meta-analytically defined networks: autobiographical memory (AM)³, cognitive attention control (CogAC)⁴, extended multiple demand network (eMDN)⁵, emotional scene and face processing (EmoSF)⁶, Empathy⁷, theory of mind (ToM)⁸, emotion regulation (ER)⁹, extended socio-affective default (eSAD)¹⁰, mirror neuron system (MNS)¹¹, Motor¹², reward (Rew)¹³, semantic memory (SM)¹⁴, vigilant attention (VigAtt)¹⁵, working memory (WM)¹⁶

- Data:** 60 healthy German native speakers (33 male, mean age 23.4 years, SD = 3.6 years)
- fMRI acquisition on 3T Siemens Prisma
- 2 resting state (RS) scans**, approx. 8 min
- 8 movie scans**, 7 individual clips (approx. 7-10 min each, „Dirty Dancing“, „Dead Poets Society“, „Dead Man Walking“, „Forrest Gump“, „Life is Beautiful“, „Scream“, „The Good, the Bad, the Ugly“), 1 compilation of 12 shorter clips from commercial movies (approx. 10 min, „Short Sequences“)
- fMRIPrep preprocessing incl. skull-stripping, motion correction using ICA-AROMA, slice-time correction, resampling into MNI152NLin6Asym standard space, smoothing using a 6mm FWHM Gaussian kernel, GSR
- Functional connectomes** based on pairwise correlations between nodes of 14 meta-analytically defined networks were calculated using in-house code

Methods



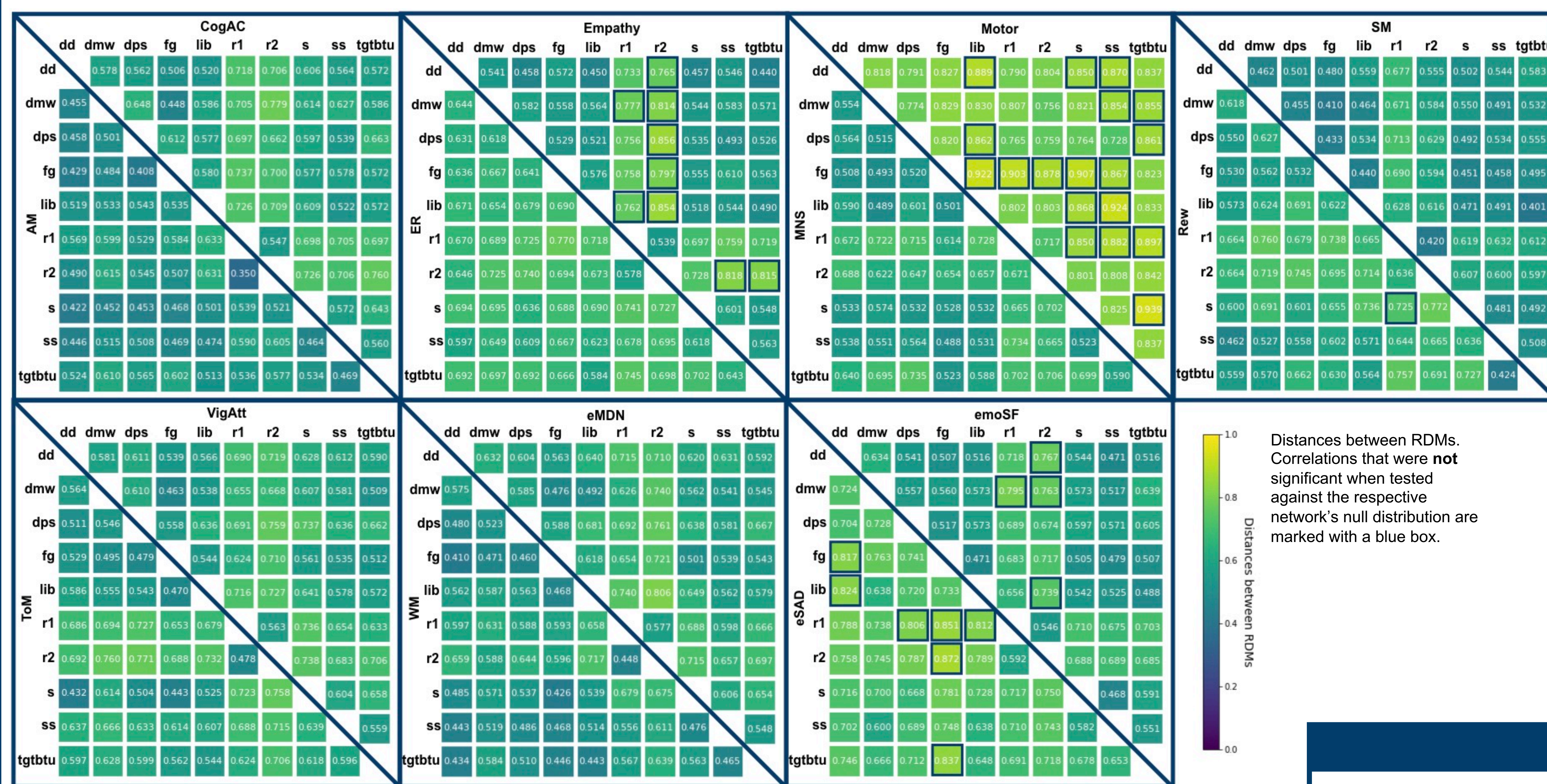
1: Analysis of averaged network functional connectivity (NFC) across networks

- Average NFC was calculated for every network, once across movie conditions and once across RS conditions
- We used a repeated measures ANOVA with factors condition (avg. movie vs avg. RS) and network to test which network's FC is affected by NV in comparison to RS

2: Representational similarity analysis (RSA) of different scanning conditions across networks

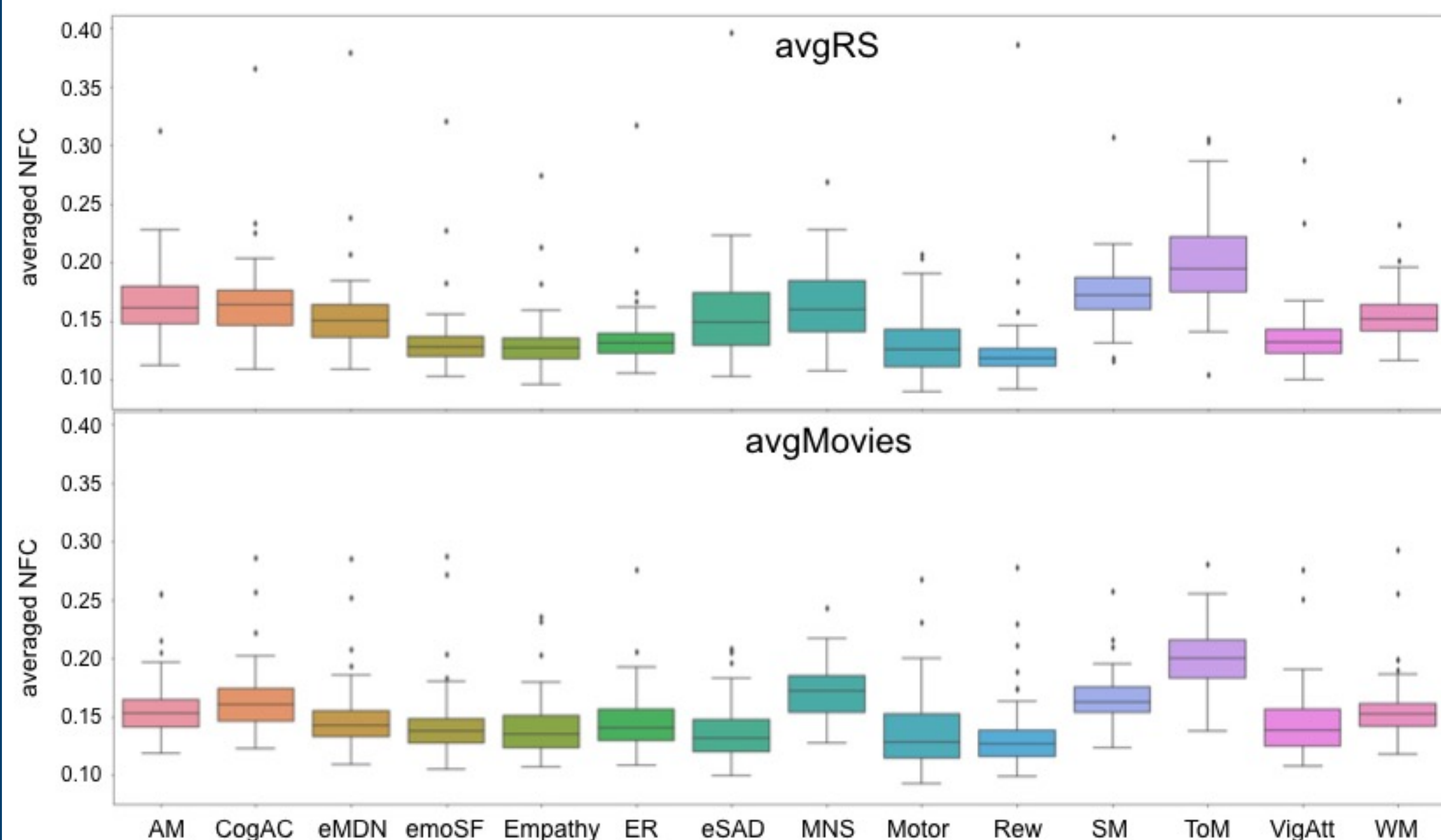
- Representational dissimilarity matrices (RDMs) were calculated between subjects in every condition and every network based on Spearman rank correlations
- RDMs of different conditions in the same network were correlated to calculate RSAs
- 1 – Spearman correlation coefficients create the distances between the similarity of subjects in different conditions
- Significance was tested against family-wise null distribution in each network

Results



2: Representational similarity analysis (RSA) of different scanning conditions across networks

- Correlations between RDMs of different conditions in same network tested against null distribution of respective network: **all conditions sign. in most networks, except Empathy, Motor, Rew, eSAD, emoSF**
- Differences between networks in distances between RDMs:
- Motor network shows highest distances between conditions overall
- AM and WM networks show lowest distances between conditions overall
- Often higher distances between movie and RS conditions, while RS conditions and movie conditions show lower distances among themselves respectively; greatest differences in Empathy network**



1: Analysis of averaged network functional connectivity (NFC) across networks

- RM ANOVA: **sign. network*condition interaction** effect $F_{(13,832)} = 13.067$, $p < .001$
- Bonferroni-corrected post-hoc test: **sign. difference between avg. movies and avg. RS only in eSAD** ($t = -4.004$, $p = .045$)

Discussion

- Averaged NFC only shows significant differences between NV and RS conditions in one network
- Might be too unspecific to detect effect of NV vs RS on NFC, RSA allows closer inspection of effect of condition on NFC in different networks
- Investigates the distances in the similarities of subjects in different conditions, how similar is the covariation in NFC of subjects across conditions?
- Some non-sign. results: no association between covariation in NFC in these conditions, but covariation patterns seem to be shared in most conditions across networks
- Different patterns across networks, but often subjects' NFC covaries more similarly among NV and among RS conditions, respectively
- Hints towards **shared brain states among NV and among RS conditions, and NV and RS separable**
- Differences between networks in distances between different NV conditions: open question of effects of content and features of movies