Inclusion Criteria

A paper qualifies for our meta-analyses if all of the following criteria are met. The first couple (and maybe the third) can sometimes be assessed from the title/abstract alone, but the latter criteria typically require the full text and/or supplemental materials.

1) ☐ fMRI/PET Social Interaction task - participants engage in some form of reciprocal, interactive exchange with one or more social partners in real-time. The following two sub-criteria must be met for a study to qualify as s Social Interaction task:

a) ☐ **Social engagement -** The participants are aware of and engaging with one or more social partners in real-time, or at least believes that they are.
- Can simply be through being told that they are engaging with a real person
- Person can be outside the scan room or in a distant location connected digitally
- Has to that they are engaged with real-life social partner

b) ☐ **Interaction -** There is some form of reciprocal exchange between participants and their interaction partner, such that the behavior of one interactant (either participant or partner) is contingent on the other's.
- Reciprocated behavior does not have to immediate follow, as long as it is contingent on the other interactant's previous behavior
- Exchange can be through eye-gaze, hand gestures, digital chat, game play, etc.
- At minimum, either the participant or partner has to make one contingent response to the action of the other

2) ☐ Results from whole-brain contrast targeting social interaction – The paper have results from whole-brain analysis that compares social interaction task condition (definition above) against a control condition that does not meet criteria for social interaction. The following sub-criteria must be met for a whole-brain contrast to be included in our meta-analyses:

a) ☐ **Appropriate contrast condition –** Should isolate brain activity associated with *social interaction* by controlling for non-social interaction-related brain activity.
- Can simply not meet one of the sub-criteria of Social Engagement or Interaction
- E.g., contrasts comparing game-play against human versus computer partners aims to control for the brain activity associated with game-play and isolates what is unique to social interaction. Including but not limited to:
  - *Human > non-human interaction* (e.g., interaction with robot or computer)
  - *Social interaction > social non-interaction* (e.g., watching others interact)
  - *Real-time interaction > non-real-time interaction* (e.g., responding to an interaction prompt given by a person at a previous sesion)
  - *Live interacton > pre-recorded interaction partner or replay of interaction*

b) ☐ **Whole-brain voxel-wise results –** Only include results from whole-brain analyses so that we don't bias results toward brain areas that have prior theoretical relevance

- E.g., traditional univariate contrasts, searchlight multi-voxel classification
- No results from region of interest (ROI) analysis or masked analyses

c) ☐ **Includes 3D coordinates –** Results of qualifying whole-brain contrasts must include the spatial location of brain activity in the form 3D coordinates in either the Montreal Neurological Institute (MNI) or Talairach template space
    - This is the primary data needed to conduct CBMA (coordinate-based meta-analysis)
    - Sometimes paper visualize whole-brain results as images or figures without reporting the specific coordinates of each brain activity cluster
        - May be available in the supplemental materials
        - Can reach out to authors to see if it is available

d) ☐ **Healthy, non-clinical samples –** We focus on normative brain activity associated with social interaction, and therefore cannot include results from clinical or neurodiverse samples, unhealthy or diseased samples, or samples undergoing a drug or other chemical manipulation.
    - No between group contrasts comparing healthy and non-healthy samples

Exclusion factors

Even if all the criteria above are met, the following criteria would mean that we cannot include the paper in our meta-analysis.

- ☐ **Clinical populations:** Some papers investigating clinical populations (autism, schizophrenia, parkinson's, cancer patients etc.) will have a control group for which they provide results for, which we can use, but if they only do a between group comparison, don't provide the results just for the control group, or don't have a control group, we can't use the paper.
- ☐ **Pharmacological or other psychoactive manipulations:** If a study is examining the impact of a drug, medicine, or hormonal intervention on social interaction, we can't use it because those things likely won't reflect normative brain responses during social interaction.

- ☐ **Non-fMRI or PET:** We can't use neuroimaging data from other modalities other than fMRI and PET because those are the only ones that can give use the location of brain activation in a standardized space. This includes (but not limited to):
    - Electroencephalography (EEG) uses electrodes to record brain activity off the scalp. Some terms related to EEG are event-related potential (ERP), electrodes, oscillations, frequency bands, gamma, beta, alpha, delta or theta-waves etc
    - Magnetoencephalography (MEG) measures magnetic fields created by brain activity. Some terms related to MEG are superconducting quantum interference devices (SQUIDS), magnetometers etc

    - Functional near-infrared spectroscopy (fNIRS) measures blood oxygenation from the scalp using optodes.
    - Electrocorticography (ECoG) and intracranial electroencephalography (iEEG) is when the place electrodes straight on to the brains of patients (usually epilepsy) who have their scalp opened so doctors can localize where seizures start.
    - Terms for wrong neuroimaging modality to look out for:
        - fNIRS, NIRS
        - Electroencephalography (EEG), Event-Related Potentials (ERP)
        - Magnetoencephalography (MEG)
        - Spectroscopy
        - Electrocorticography
        - DTI, diffusion weighted imaging, structural connectivity,
        - Structural MRI, White matter, Gray matter volume, cortical thickness

- ☐ **Non-activation based fMRI:** We are focusing on the traditional approach to fMRI which is univariate activation analyses, but there are so many new ways of analyzing fMRI data some of which we can use, but many that we unfortunately cannot use for our meta-analyses. These include but not limited to:
    - Functional connectivity (FC) - in fMRI, rather than brain activations, this looks at how brain regions are connected.
    - Resting state fMRI or rsfMRI when participants don't engage in a task, but simply stare at a cross-hair. Typically, people use FC analyses on resting state data.
    - Multivariate pattern analysis (MVPA) that uses patterns of activity to decode cognitive processes. *MVPA can be used if they did a relevant "searchlight" analysis that produces whole-brain maps/coordinates tables like the ones we commonly use*, but definitely post questions if you come across a MVPA paper that might be relevant.
    - Representational similarity analysis (RSA) uses patterns of activity to look at similarity in cognitive processes. Similar to above, *RSA can be used if they did a relevant "searchlight" analysis that produces whole-brain maps/coordinates tables like the ones we commonly use*, but definitely post questions if you come across a MVPA paper that might be relevant.