ACC Systematic Review Procedure

1. **Enter reviewer, working title, and topic in your workbook**

   a. Reviewer is you ('anonymous' optional).
   b. Working Title can be general: e.g. "Inequity aversion in primates"
   c. Identify the cognitive ability by:
   > Domain (e.g. "Social cognition")
   > Area (e.g. "Fairness")
   > Cognitive Ability (e.g. "Inequity aversion")

2. **Inclusion criteria (IC) for deciding whether a paper goes in your review**

   a. Paper must report unique empirical data (no theoretical/review).
   b. The data can be lab experiments, field observations or single case recordings.
   c. Your 'topic' must be addressed directly by the results (not 'has implications for...').

3. **Use a SEED to move forward to START**

   a. Take the most recent relevant paper you can think of. This is your SEED paper.
   b. Enter the SEED paper in google scholar and click 'cited by'.
   c. Select the *most recent* result that meets IC; click 'cited by' for *this* paper.
   d. Repeat until you find the most recent paper that meets IC: this is your START paper.

4. **Move backward from START**

   a. Read reference list in START, and identify papers that meet IC.
   b. Enter each one in your workbook.
   c. Read each paper's bibliography and record further papers that meet IC.
   d. Repeat with each new paper, until you can find no more papers meeting IC.

5. **Check for outliers – there may be papers you have missed**

   a. Enter each paper in your list in google scholar, and click 'cited by' to find more recent papers that cite it. If you find new papers repeat step 4c.
   b. Next, use google scholar to do a more general search using keywords.
      i. Adjust your keywords until some of the papers you already have in your list appear on the first page of your search.
      ii. Check the first 10 pages of results.
      iii. If there are new papers, record these and apply step 4c to them.
   c. Repeat in SCOPUS and PubMed (if you have access).

6. **Keep track of Progress using Source and Link Columns**

   a. For each entry, record the paper you used to *find* that entry under 'source' column.
   b. For database searches, under source add name of the database; the keywords; number of results; and date of search.
   c. Identify the nature of the link (enter 'seed', 'start', 'source refers to paper', 'paper refers to source' or 'search') under 'link'.

1. Picking a topic:

The goal of a systematic review and meta-analysis is to be informative. If the topic you choose is too vague (e.g. "do animals have food preferences"), this will not be informative, since almost every paper will be included (it will also take too long). If the topic you choose is too narrow, on the other hand, and results in maybe just one or two papers, this too will not be very informative. Try to find a topic that has already seen a good deal of investigation, but will yield distinctive results. One suggestion is to read a recent review paper of the topic you are interested in, if available.

2. Excluding/including papers:

General exclusion criteria for the ACC are that a) the papers must include new data (no reviews, no theoretical papers), b) they must explore the ability directly (rather than having probable implications for the ability in the species), and c) they must be focused on the species or group of species you have picked. But what if you find a paper that you think is on the right topic, but the authors don't mention that topic explicitly (e.g. a study you think reveals learning, but the authors describe as demonstrating something else)? We think it is a good idea to err on the side of including too much rather than excluding too much. Therefore:

1) If you find a paper that *you think* demonstrates the ability you are reviewing, then include it (*if you think it fits but the authors don't, include it*).
2) If you find a paper that *the authors* think demonstratives the ability, but you disagree, then include it (*if you don't think it fits but the authors do, include it*).

Papers would be excluded, then, only if neither you nor the authors think it falls under the topic.

3. Start with a Seed:

The way to begin your literature search is to pick the most recent paper you can think of on the topic. This can be called your 'seed' paper. The first step is to take this seed paper and enter its title into google scholar search, and use the 'cited by' function to find more recent papers that cite this paper. Apply the same step to these papers until you have found the most recent paper on the right topic. This is your 'start' paper.

4. Work backwards from Start:

Having found the 'start' paper you now move backwards through the literature. You do this by searching the reference list of your start-paper for other papers on your topic. In many cases it will be obvious if a paper is relevant or not (e.g. it's on the wrong species, or it's a statistics paper, etc). However, sometimes papers are 'borderline' cases, which we discuss next.

5. Check for outliers:

It is possible to conduct your review but miss papers that cover the topic you are reviewing. To check for outliers, once you have reached the last paper in your search by 'moving backwards from 'start'', put each paper in your list in google scholar and click 'cited by'. You may find new ones. If you do, check the reference lists of these papers, etc.

Another way to find outliers is to run searches in google scholar, PubMed, or Scopus on your topic. A search in google scholar depends on your keywords. To find the right keywords, we recommend the following strategy:

- Enter keywords in google scholar that seem right (e.g. 'primate+metacognition' if you are doing a review on metacognition in primates).
- If your search terms are good, you should see most of the papers you have already identified in your list in the *first few pages* of the results.
- If you do not see papers you have already identified in the first few pages, play with the search terms until they appear.
- Once the papers you have already identified appear in the first few pages of the search results, we recommend to check through the first *ten pages* of results.
- If you see no new papers relevant to your review, you can be confident there are not likely to be more papers.

6. **Record your progress so that your review can be replicated:**

In a systematic review, we keep careful track of how we compiled the review. In the ACC we keep track of these things using the **source** and **link** columns in the workbook (the last two columns).

For each paper you report, enter the citation for the place where you found this paper in the **source** column (for example, 'Call and Carpenter 2001', if you found a paper from the reference list of Call and Carpenter 2001). If the **source** named the paper in its reference list, enter 'source refers to paper' in the **link** column. If the source was *cited by* the paper (e.g. you found the paper using 'cited by' function in google), enter 'paper refers to source' in the **link** column.

For the first paper in your workbook (the 'seed' paper), the source will be the same as the paper. In this case enter 'seed' in the **link** column.

If you run a search in google scholar or scopus, then under **link** enter 'search'. Under **source** enter the details of the search, including keywords and the number of results, and date, as follows: 'google scholar; keywords: "primate+metacognition"; results: 10,500; date: 30/1/2020'.

Further Questions:

What is a row in the workbook?

Each row in the workbook is an *experiment in a species*. Because we want to represent the outcomes of perhaps the same experiment on different species distinctly in the ACC, we often have to break up a single experiment reported in a paper into multiple rows, if several species are described. If a single paper contains two experiments (one on fairness and one on deception), and each experiment is carried out with two distinct species (dogs and chimps), then this results in four rows in the workbook for one paper. Splitting experiments in this way allows us to represent the data by ability tested, by species.