fMRI meta-analyses I of II:

Marie Arsalidou

NUG seminar

12 February, 2018

https://social.hse.ru/en/psy/brainresponses/about

www.neuropsylab.com

Meta-analyses vs Systematic Review

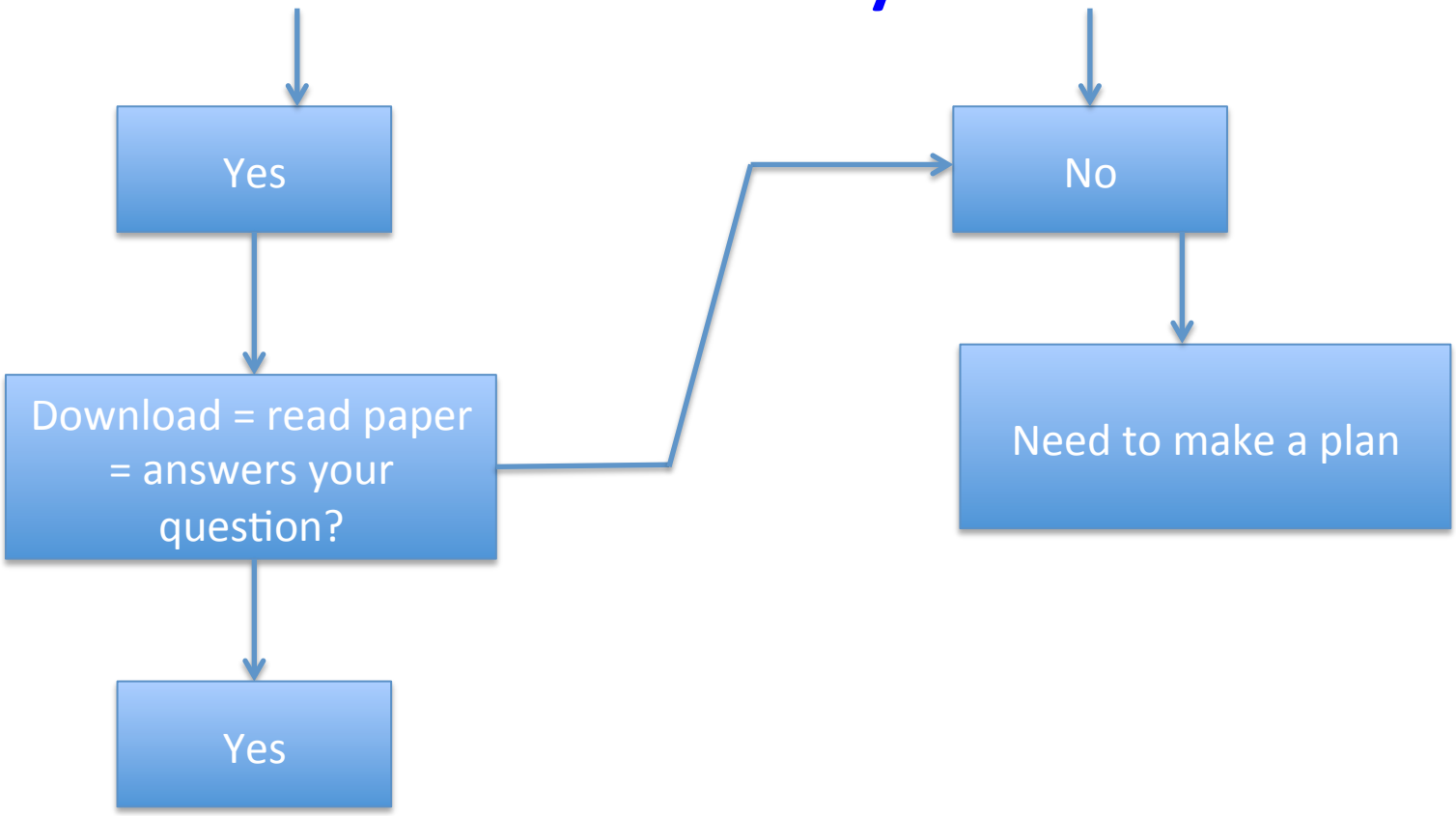
	Meta-analyses	Systematic Review
Systematic literature search	Yes	Yes
Predefined eligibility criteria	Yes	Yes
Statistical analyses	Yes	No

fMRI meta-analyses

- Function based: hypothesis focuses on brain areas associated with a mental function (e.g., math, finger motion, motion, reward)
- Area based: hypothesis focuses on the functions associated with a predefined brain area (i.e., insula).

Concordance across studies = Agreement across studies

Has it already be done?



Resources

- https://www.ncbi.nlm.nih.gov/pubmed/19622551
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS medicine, 6(7), e1000097.

Resources

- https://www.ncbi.nlm.nih.gov/pubmed/19622551
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS medicine, 6(7), e1000097.
- Electronic databases:
- Web of Science: webofknowledge.com
- Pubmed: https://www.ncbi.nlm.nih.gov/pubmed/
- Scopus: https://www.scopus.com/sources.uri?zone=TopNavBar&origin=searchbasic

Resources

- https://www.ncbi.nlm.nih.gov/pubmed/19622551
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS medicine, 6(7), e1000097.
- Electronic databases:
- Web of Science: webofknowledge.com
- Pubmed: https://www.ncbi.nlm.nih.gov/pubmed/
- Scopus: https://www.scopus.com/sources.uri?zone=TopNavBar&origin=searchbasic
- http://brainmap.org/
- Publications: http://brainmap.org/pubs/
- Software: http://brainmap.org/software.html
- Manuals: e.g., http://brainmap.org/ale/manual.pdf

Literature search

- Keywords:
- fMRI AND math
- fMRI AND arithmetic
- fMRI AND addition

- Options to combine searches

Lit-search Steps

- Note date of literature search.
- Download all pdfs.
- Save the search

PRISMA

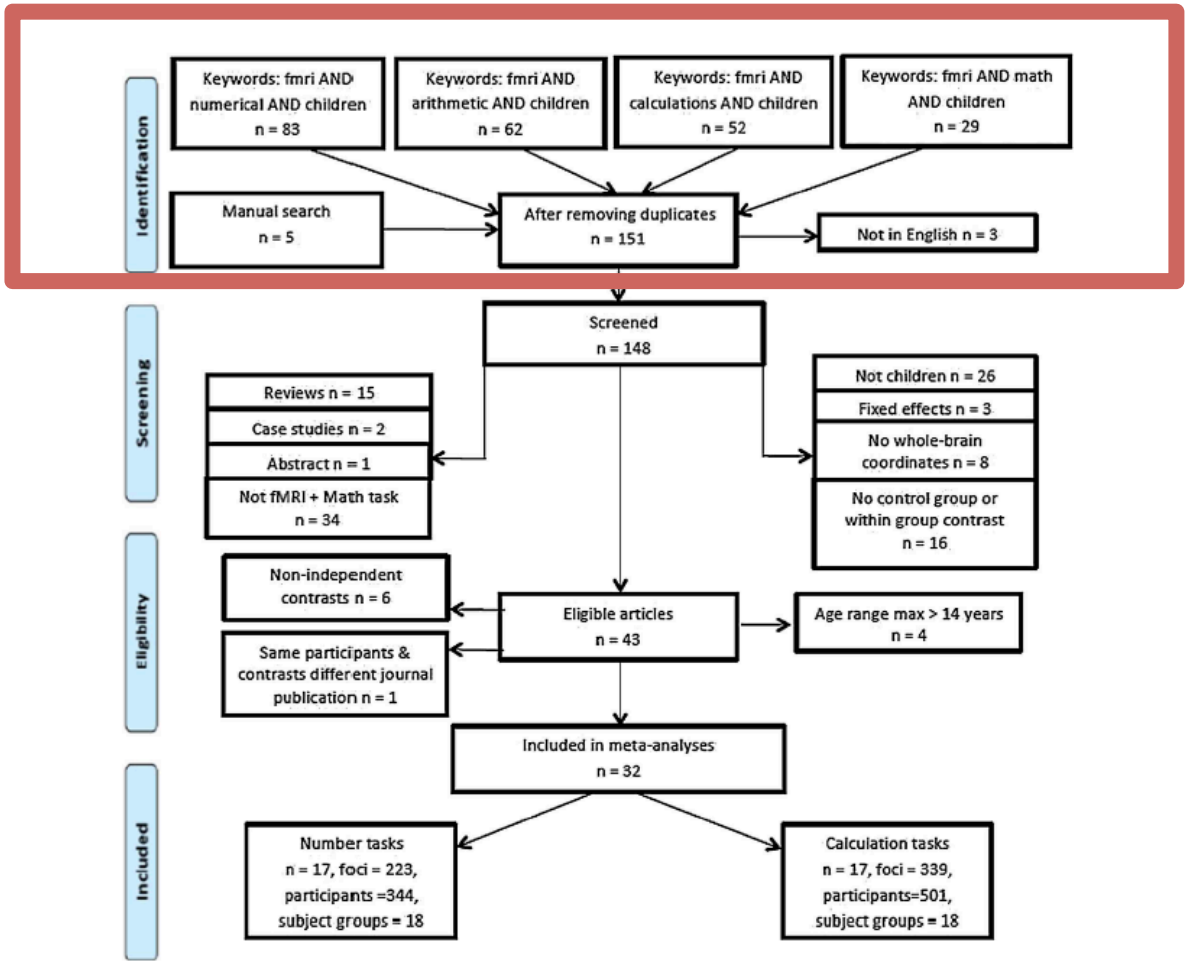


Fig. 1. PRISMA flowchart for identification and eligibility of articles (template by Moher et al., 2009). n = number of papers.

Arsalidou et al., in press

Eligibility criteria

- fMRI research article
- Relevant task
- Stereotaxic coordinates in MNI or Talairach
- Whole brain analyses
- Random effects analyses
- Healthy participants
- Age range specifications
- Direct contracts/experiment

PRISMA

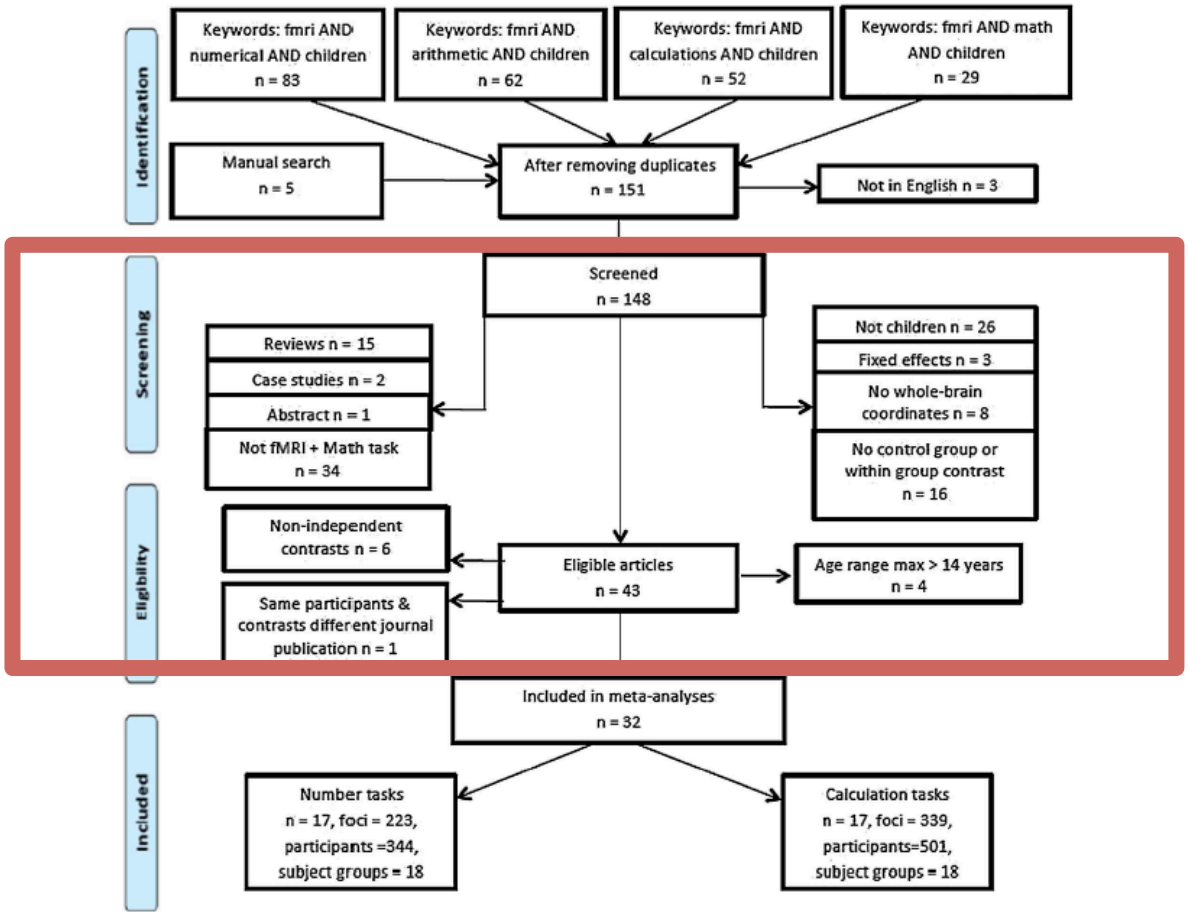


Fig. 1. PRISMA flowchart for identification and eligibility of articles (template by Moher et al., 2009). n = number of papers.

Arsalidou et al., in press

Templates

- Organized approach for entering article information, participant demographics and data needed for analyses.

Reporting

Table 1
Descriptive information of articles and contrasts used in the meta-analyses.

Author	Year	Sample (N)	F	Hand	Age	Number tasks	Foci
Ansari	2005	12	n/r	n/r	10.4 (9.2–11.11)	Distance effect (small > large)	8
Ansari	2006	9	3	R	10.4 (9.11–11.11)	Distance effect (small > large)	3
Berteletti	2014	20	11	n/r	11.5 SD = 1.7 (8.6–13.1)	Numerosity Task	1
Berteletti	2015	39	22	n/r	11:4, SD = 1:6 (8:5–13:7)	Numerical Processing Large vs Small	4
Bugden	2012	17	14	R	105.5 m SD 6.09 m (95–116 m)	Distance effect ratio	5
Cantlon	2006	8	5	n/r	4.75 (4.25–4.95)	Number > shape	7
Demir-Lira	2016	33	20	n/r	10.9 ± 1.5 (8–13.8)	Spatial localizer (dot arrays) at Time 1	4
Emerson	2012	24	n/r	n/r	8.24 SD = 2.26 (4.32–11.86)	Number network	5
Gullick	2013	16	6	R	10y;8 m (9;11–11;9)	Fifth graders: Positive > Negative numbers	11
						Fifth graders: Negative > Positive numbers	1
						Fifth graders: Positive distance effect	9
						Fifth graders: Negative distance effect	19
						Fifth graders: Positive > Negative distance effect	5
						Fifth graders: Negative > Positive distance effect	14
		15	5	R	12y;8 m (11;9–13.5)	Seventh graders: Negative > Positive numbers	1
						Seventh graders: Positive distance effect	12
						Seventh graders: Negative distance effect	9
						Seventh graders: Positive > Negative distance effect	9
						Seventh graders: Negative > Positive distance effect	5
Kaufmann	2008	12	4	R	8.6 SD = 1.2	Nonsymbolic numerical processing	2
Kersey	2017	35	22	n/r	5.45 (3.6–6.99)	Conjunction:Adaptation and numerical deviant effect	5
Kucian	2011	15	7	n/r	10.6 SD 1.5	Non-Symbolic Numerical distance effect	14
Kucian	2011	16	n/r	n/r	9.5 SD 1.1	Order vs. control task	11
Libertus	2009	15	7	n/r	8.8 (8y 11 days–9y 1 mon)	Digits > (Letters and Faces)	3
Meintjes	2010	18	n/r	R	(8–12)	PJ > control task	17
Park	2014	21	12	R	5.55 (4.82–6.59)	All Number Tasks	16
						Numerical > Nonnumerical	7
						Symbol > Dots	9
						Close > Far	2
Vogel	2015	19	13	n/r	10.2 SD 2.55 (6–14)	Parametric modulation for number adaptation	5

Arsalidou et al., in press

Recommended readings

- Eickhoff, S. B., Laird, A. R., Grefkes, C., Wang, L. E., Zilles, K., & Fox, P. T. (2009). Coordinate-based activation likelihood estimation meta-analysis of neuroimaging data: A random-effects approach based on empirical estimates of spatial uncertainty. Human brain mapping, 30(9), 2907-2926.
- Turkeltaub, P. E., Eickhoff, S. B., Laird, A. R., Fox, M., Wiener, M., & Fox, P. (2012). Minimizing within-experiment and within-group effects in activation likelihood estimation meta-analyses. Human brain mapping, 33(1), 1-13.
- Eickhoff, S. B., Laird, A. R., Fox, P. M., Lancaster, J. L., & Fox, P. T. (2017). Implementation errors in the GingerALE Software: description and recommendations. Human brain mapping, 38(1), 7-11.

Спасибо за внимание
Thank you for your attention

NEUROPSY LAB

marie.arsalidou@gmail.com