Neuroscientists try to understand verbal ability and finger dexterity through brain-imaging studies. Most coordinate-based meta-analyses are only based on single keywords used frequently in publications. Lack of a universal vocabulary to describe these domains creates gaps in our understanding of brain-behavior relationships.

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Mapping Spatial Overlap in Neuronal Networks Revealed in Keyword-based Meta-analyses

Background
Neuroscientists try to understand verbal ability and finger dexterity through brain-imaging studies.

• Most coordinate-based meta-analyses are only based on single keywords used frequently in publications.
• Lack of a universal vocabulary to describe these domains creates gaps in our understanding of brain-behavior relationships.

NeuroQuery
Maps brain areas for a given query
Uses semantic relations between keywords
Can be applied out of sample

Objectives
1. To map the brain to identify regions involved in verbal ability and finger dexterity
2. To evaluate the overlap between the two domains

Methods
Analyze Activation Likelihood Estimates (ALEs)
Gather keywords related to verbal ability and finger dexterity from ALE meta-analyses

Eliminate Overlap from Keyword Maps
Group together subdomains of keywords based on predictions from NeuroQuery

Investigate Similarities Between Keyword Maps and Domains
Calculate Jaccard Index and carry out Principal Component Analysis (thresholded at \(|z| \geq 3\))

Union of Brain Maps
Created for keywords that share a high Jaccard Score

NeuroQuery is useful for mapping spatial overlap across various brain-behaviour relationships as identified in fMRI studies.

Results

Take Home Messages
Neuroscientists will gain a better understanding of the neural systems contributing to verbal ability and finger dexterity. Ultimately aids children with Autism, Cerebral Palsy and Acquired Brain Injuries, who have varying difficulties with these two domains.

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