Regional divergence patterns during mouse brain development

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Background:

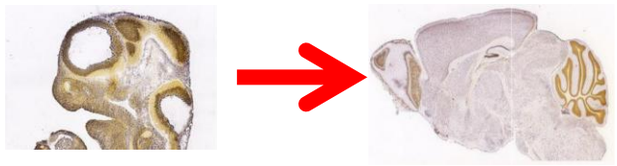
Structural and functional divergence of brain regions should be reflected in specialized, regional gene expression profiles.

Research questions:

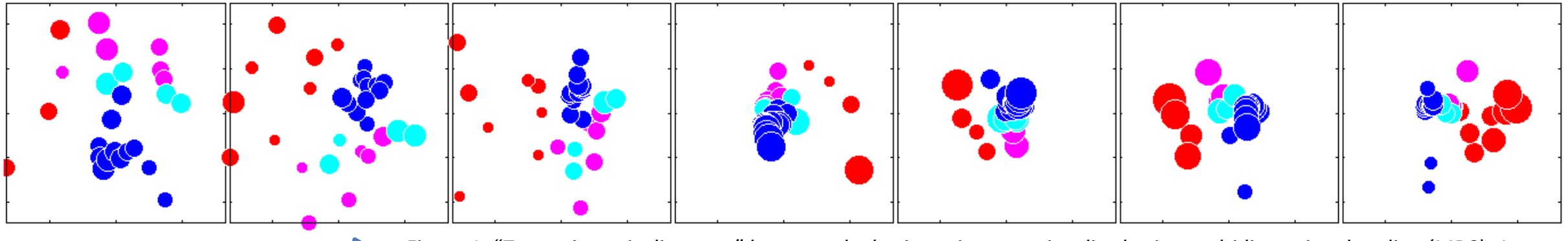
- How different are neural regions from each other in terms of the genes they express?
- How do these differences change during development?

The data:

- Neural ISH measured over development, from the *Allen Developing Mouse Brain Atlas*
  - *7 time points – starting at E11.5 until P28*
  - *30 brain regions*
  - *2002 genes*



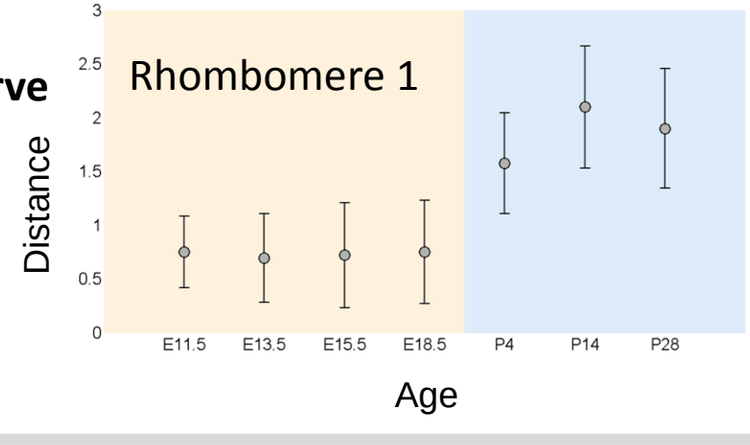
Visualization of inter-region distances:



Time

Figure 1. "Transcriptomic distances" between the brain regions are visualized using multidimensional scaling (MDS). A transcriptomic distance is defined as 1- corr(r1, r2), where r1 and r2 are the gene expression profiles of regions 1 and 2. The regions are color-coded by their embryonic vesicle of origin.

Expression specialization curve for a single region



Conclusions:

- Neural regions are more divergent during embryonic time points
- Regions with the same embryonic origin tend to cluster together
- Rhombomere 1, precursor to the cerebellum, undergoes expression specialization after birth, possibly reflecting its functional specialization