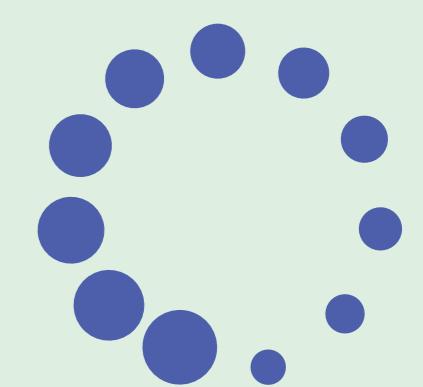




Anatomic evidence of stronger within-modality integration in corticopontine as compared to corticostriatal circuits



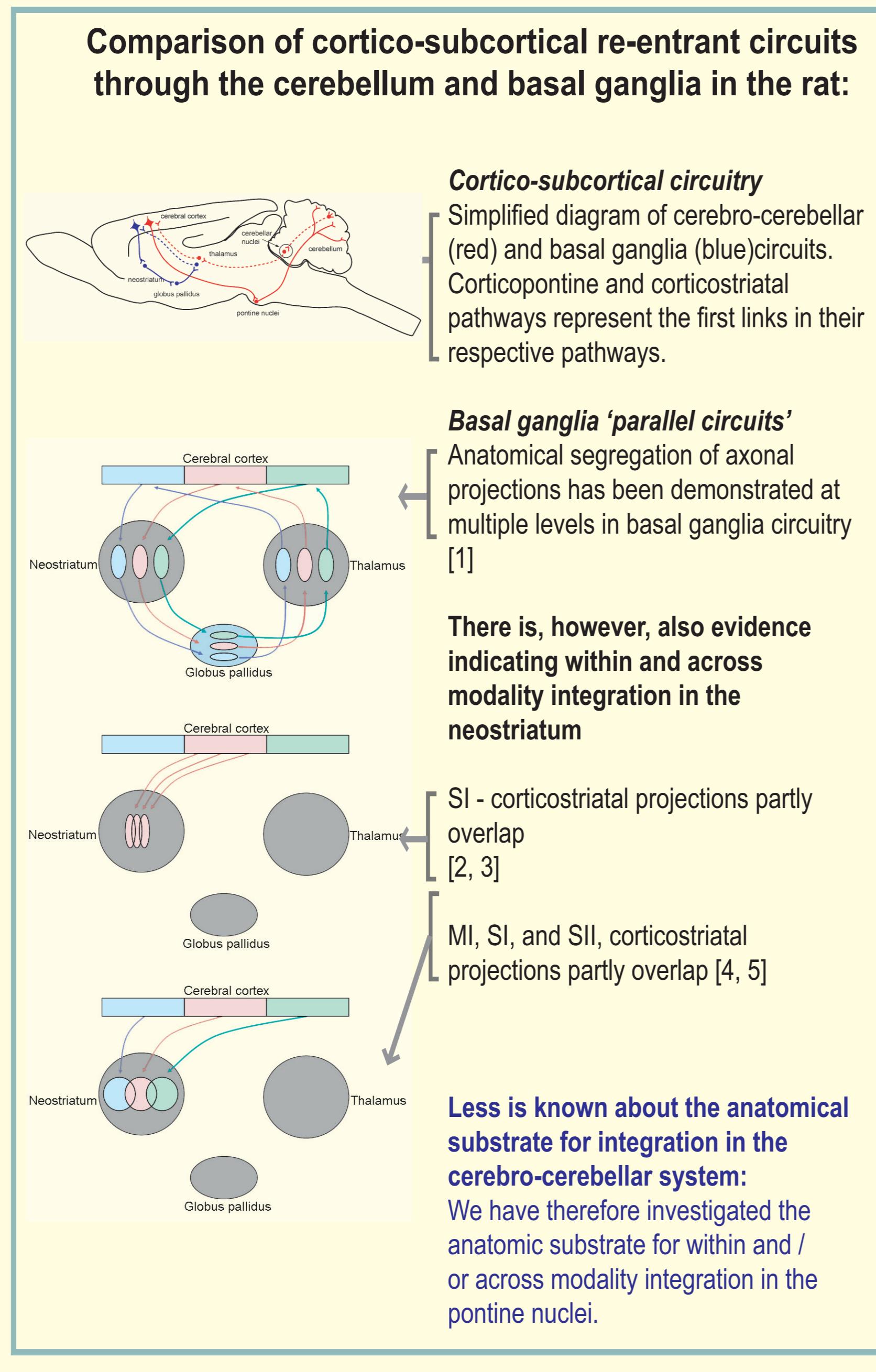
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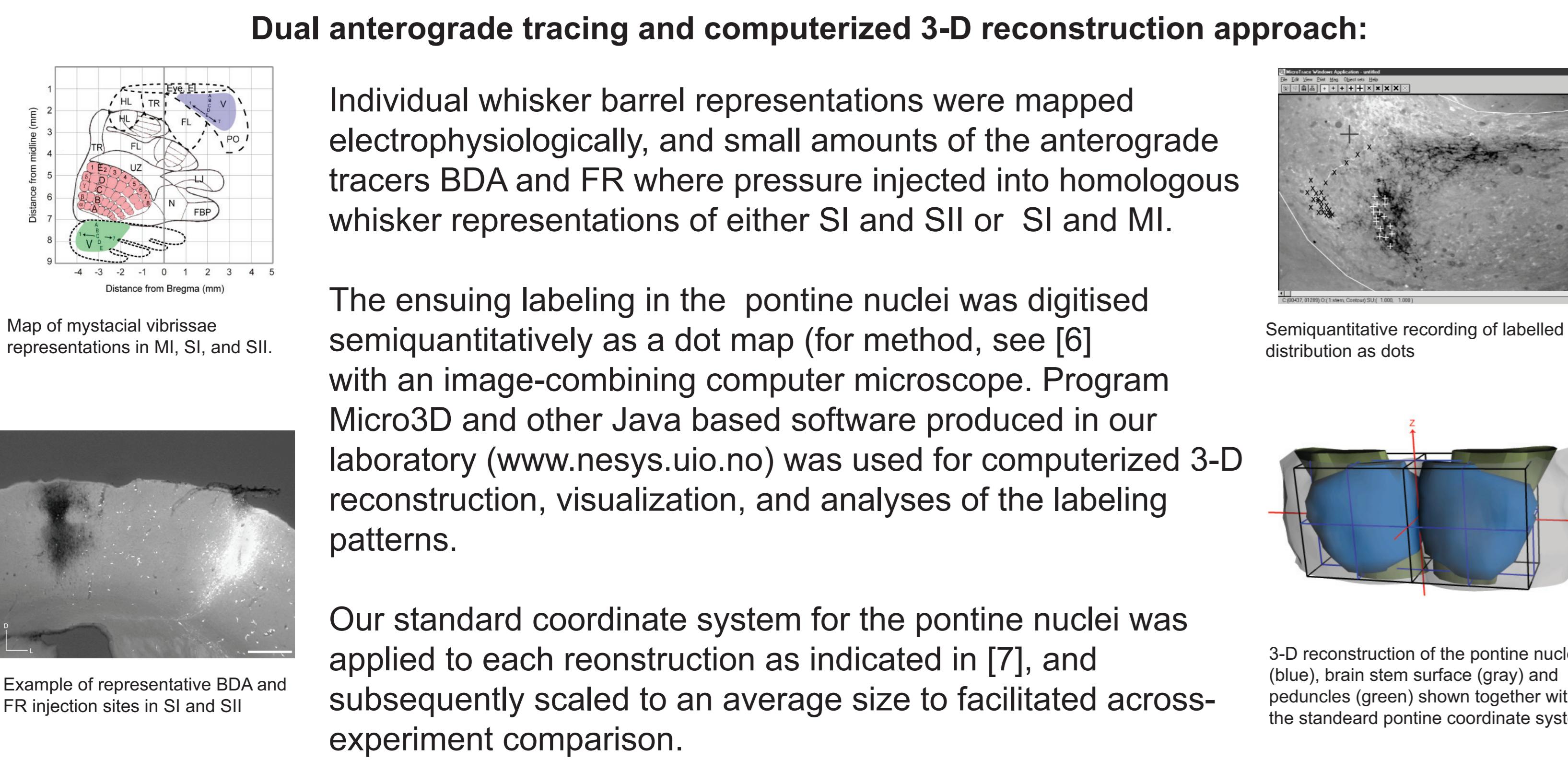
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Introduction

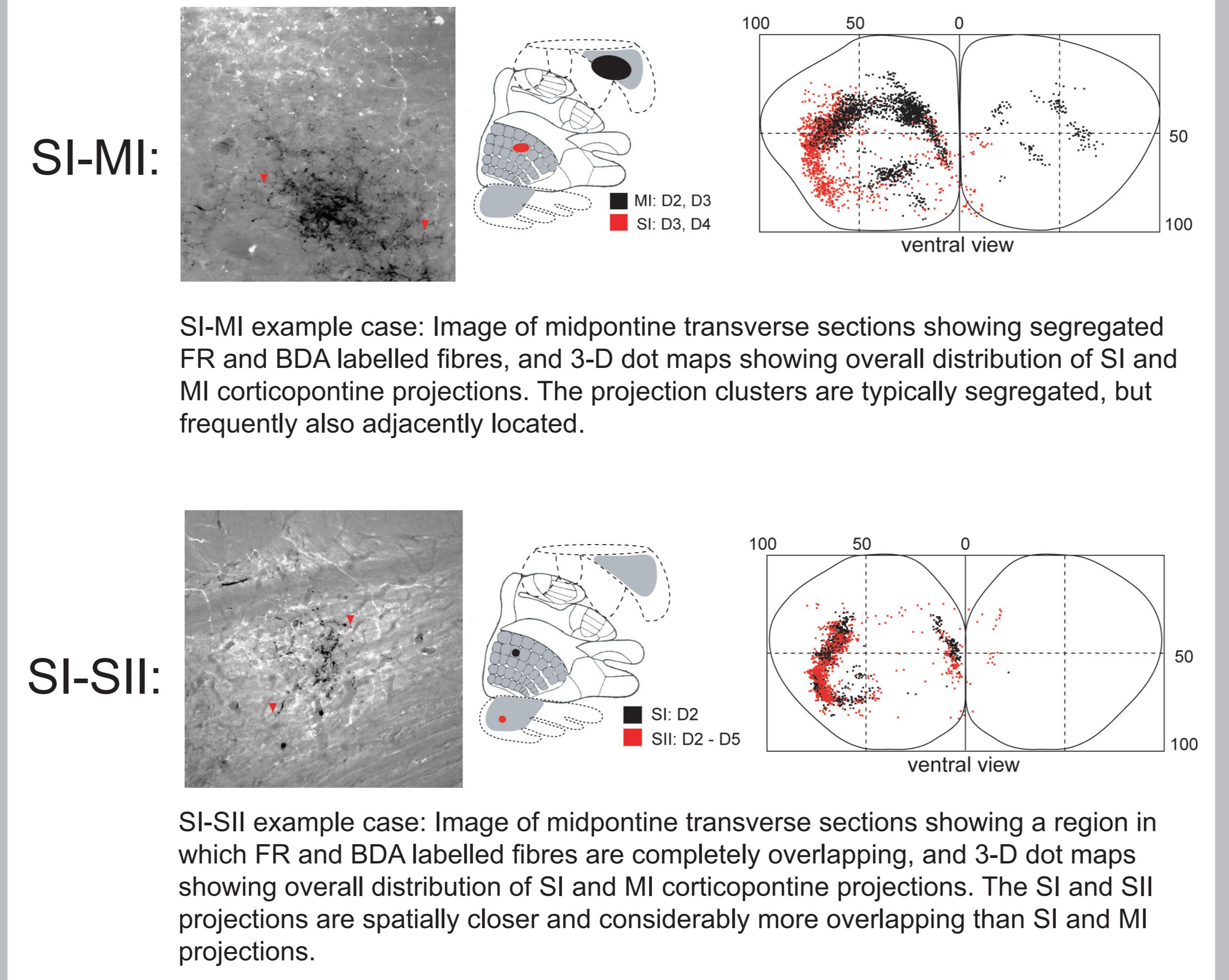
The basal ganglia and the cerebellum are both part of large projection systems that originate in the cerebral cortex and return to the cortex via the thalamus. The presence of distinct topographic organization at multiple levels in these circuits has been interpreted to represent anatomically segregated pathways or 'parallel circuits'. While segregation is prominent in these pathways, there is also evidence suggestive of integration within and across functional modalities. To resolve whether overlap occurs within and /or across modalities in the pontine nuclei (the first link in the cerebro-cerebellar pathways), a dual tracing approach was used to map the spatial relationship between corticopontine projections originating in the primary somatosensory cortex (SI), the secondary somatosensory cortex (SII), and the primary motor cortex (MI). The ensuing results were compared with previously published data on corticostriatal projections in the same experimental animals.



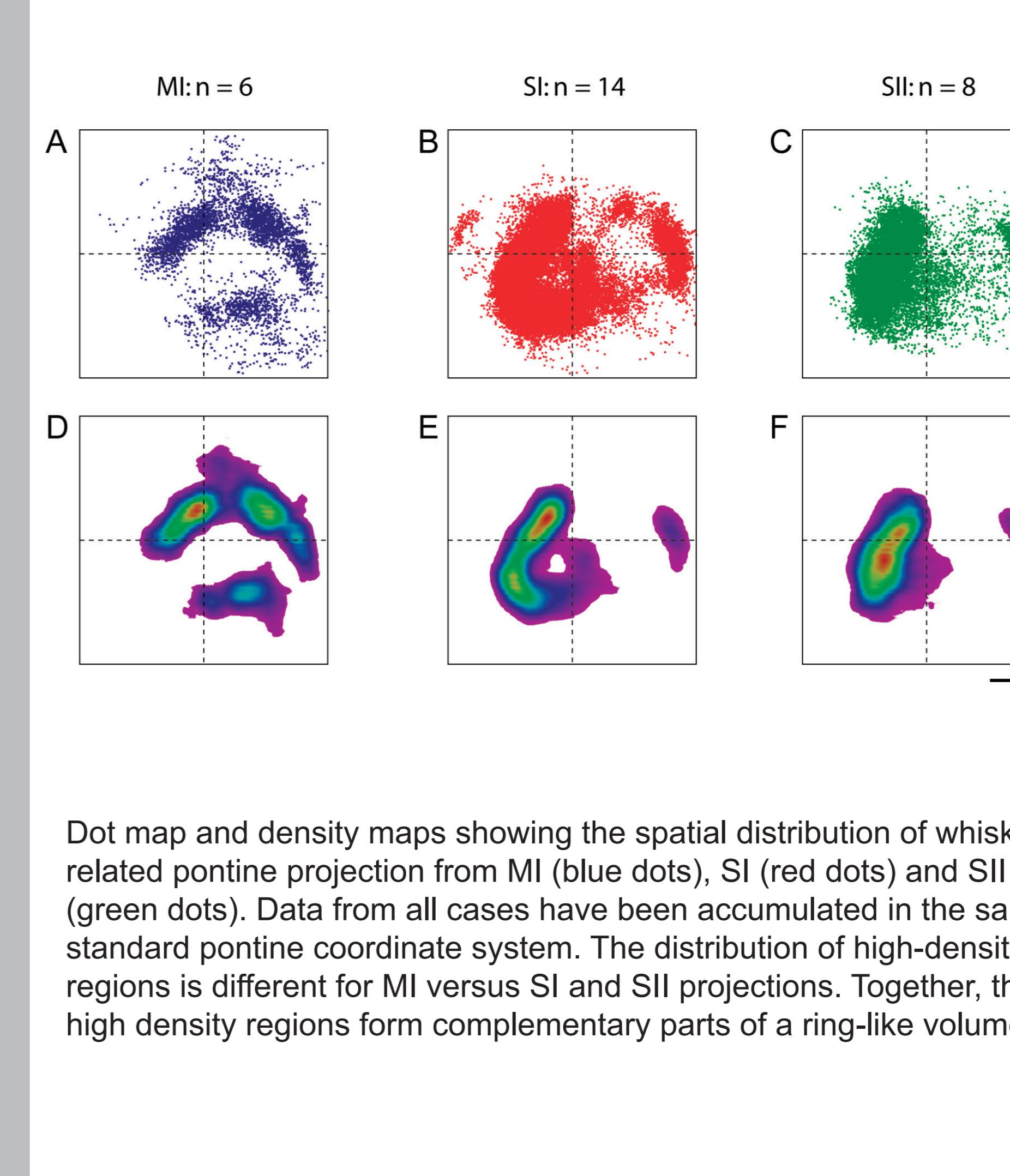
Methods



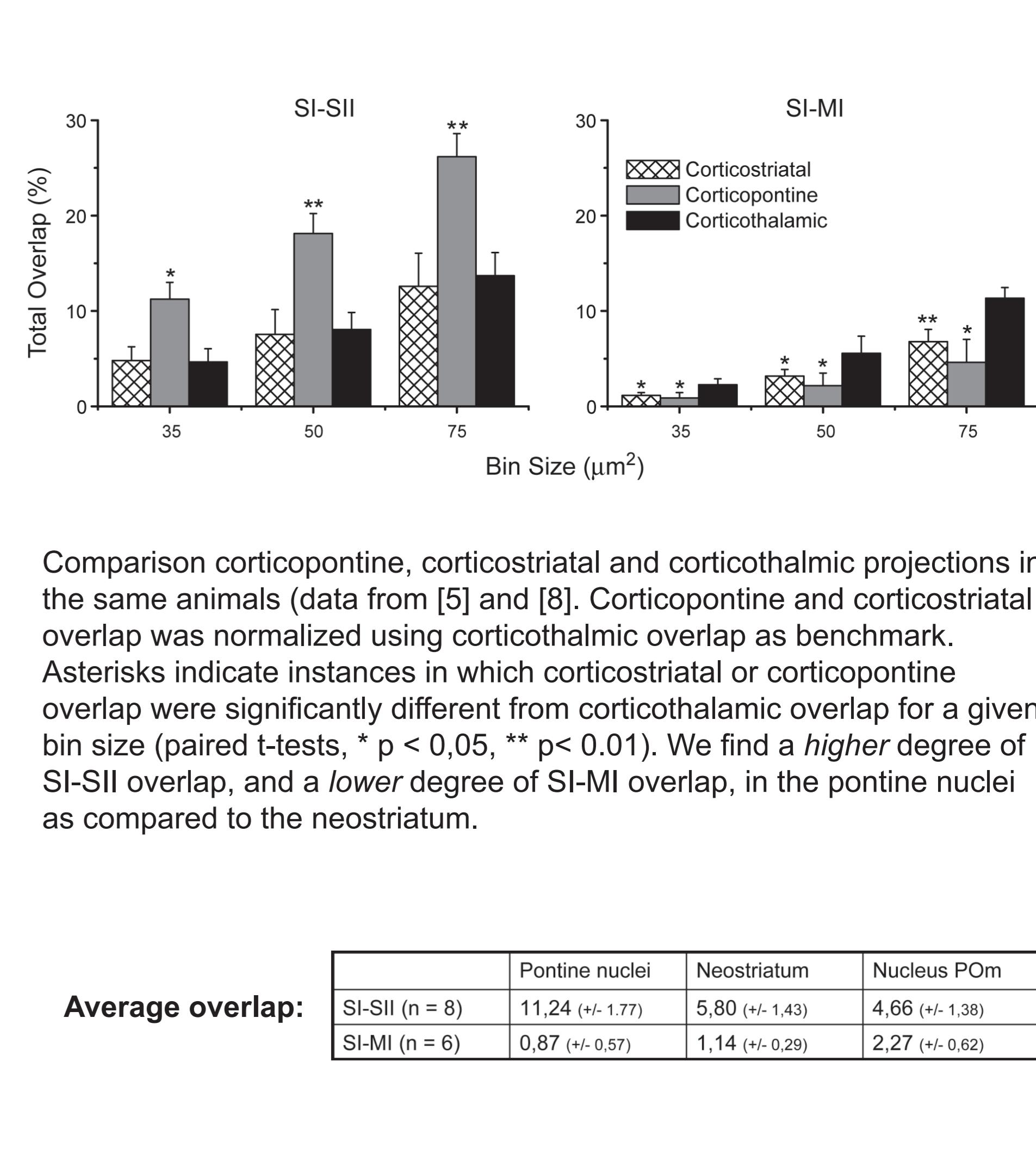
3-D computerized dot maps



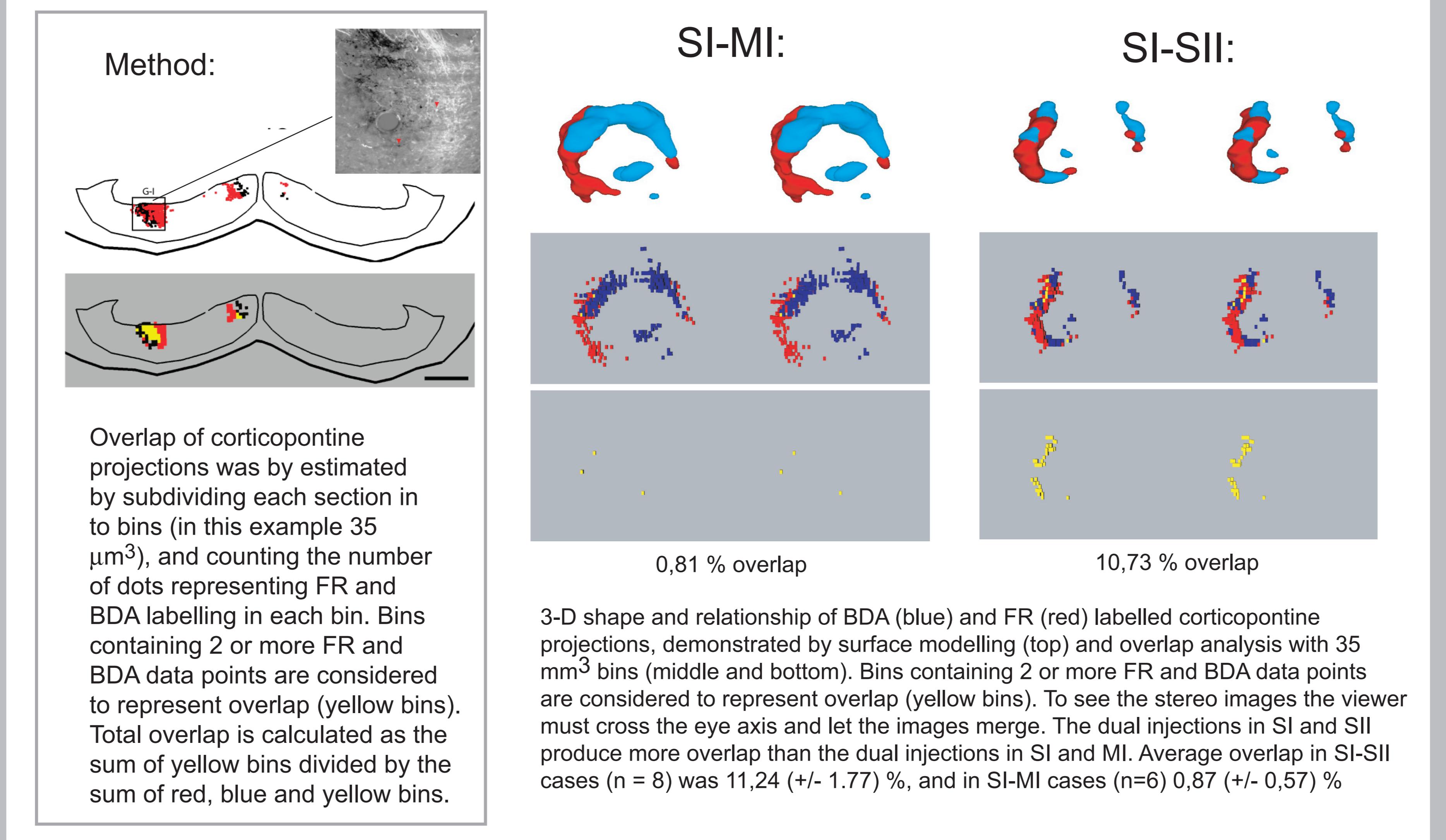
Accumulated data



Regional comparison



Overlap analysis



Summary and conclusions

- SI contributes significantly higher amounts of corticopontine projections than MI.
- Whisker-related projections from SI and MI are largely segregated but occupied partly adjacent territories of the pontine nuclei.
- Projections from corresponding representations in SI and SII are to a larger degree co-located, with considerable spatial overlap of the terminal fields of labeling.
- Comparison of corticopontine and corticostriatal projections in the same experimental animals reveal that this SI-SII overlap is significantly larger in the pontine nuclei than in the neostriatum.
- This larger opportunity for within modality integration in the pontine nuclei may facilitate transfer of information about selected behavioral states to the cerebellum.

- Literature**
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Financial support:
The Research Council of Norway to TBL and JGB
European Community Grant QLRT-2000-02256 to JGB
National Institutes of Health Grant NS-37532 to KDA