# Chemogenetic down-regulation of macaque V4 responses produce reversible deficits in core object recognition behavior

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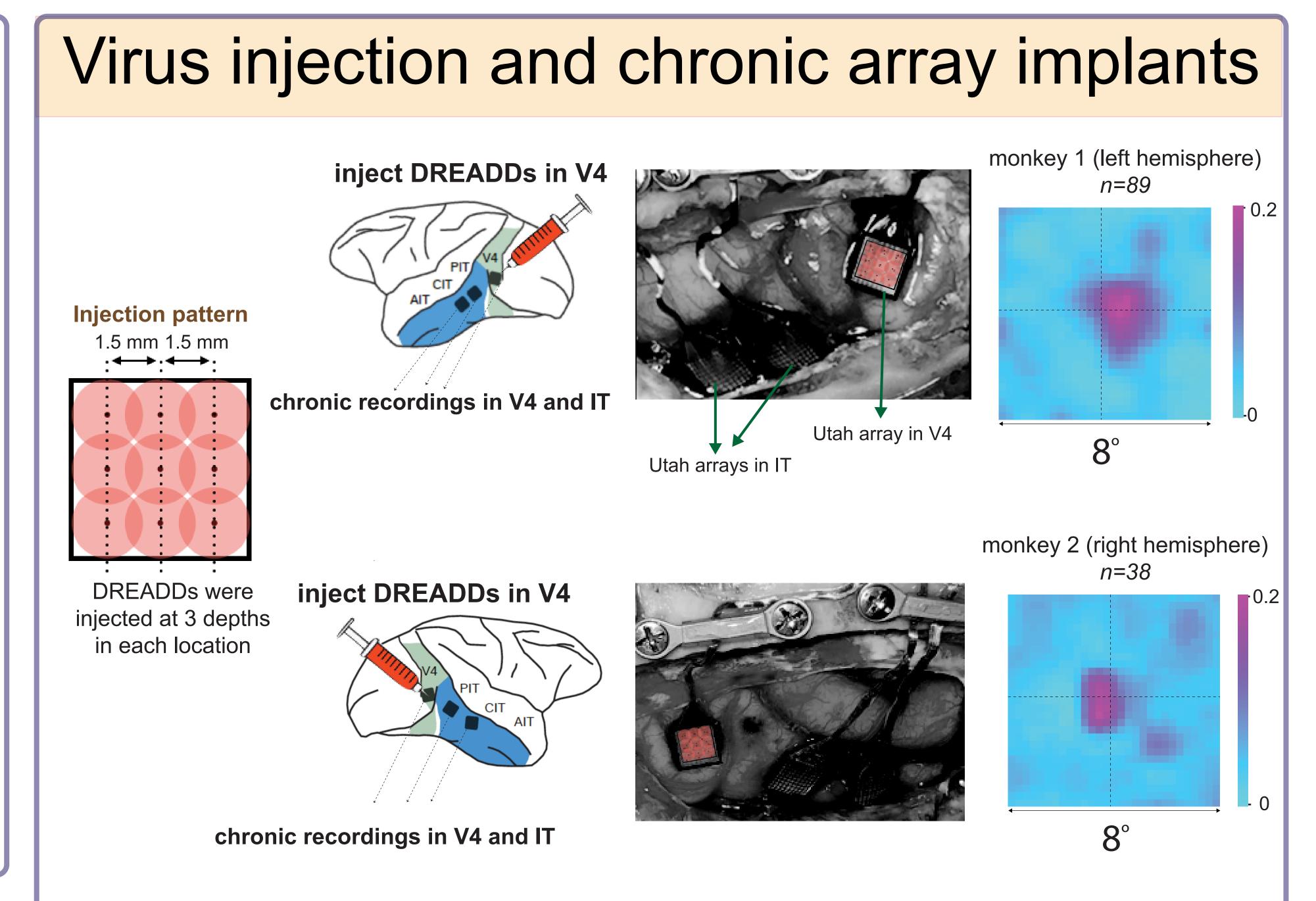
### Introduction

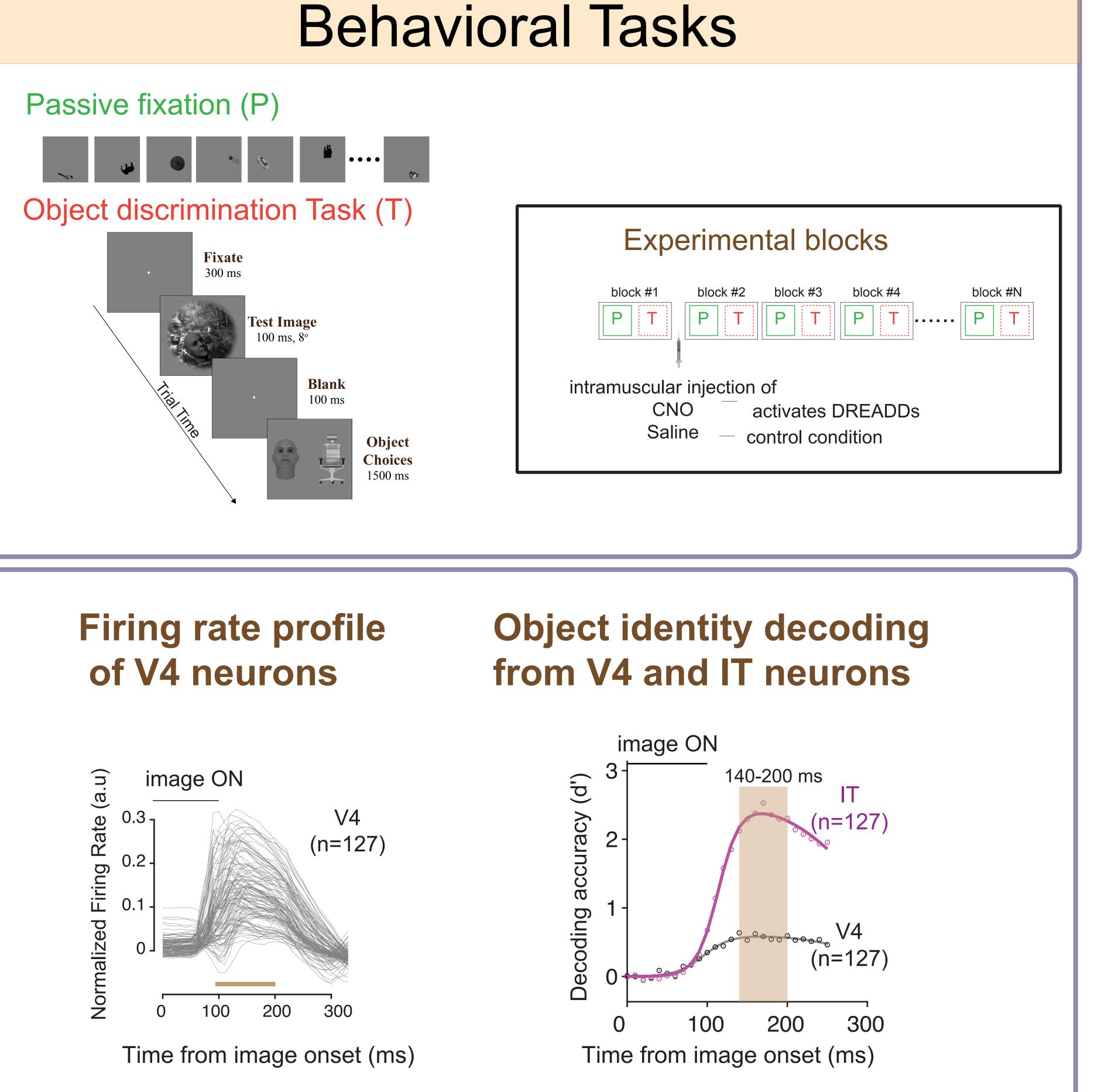
To constrain the development of more accurate models of the brain, we not only need large scale neural recording data along the cortical hierarchies, but also need to **discover the nature of causal dependency** of the studied behavior on the specific circuits at each of these cortical stages. It is therefore critical to test and develop causal perturbation tools that allow us to <u>reversibly interrogate with these cortical circuits</u> in an awake behaving primate <u>with the possibility of high throughput data collection</u>.

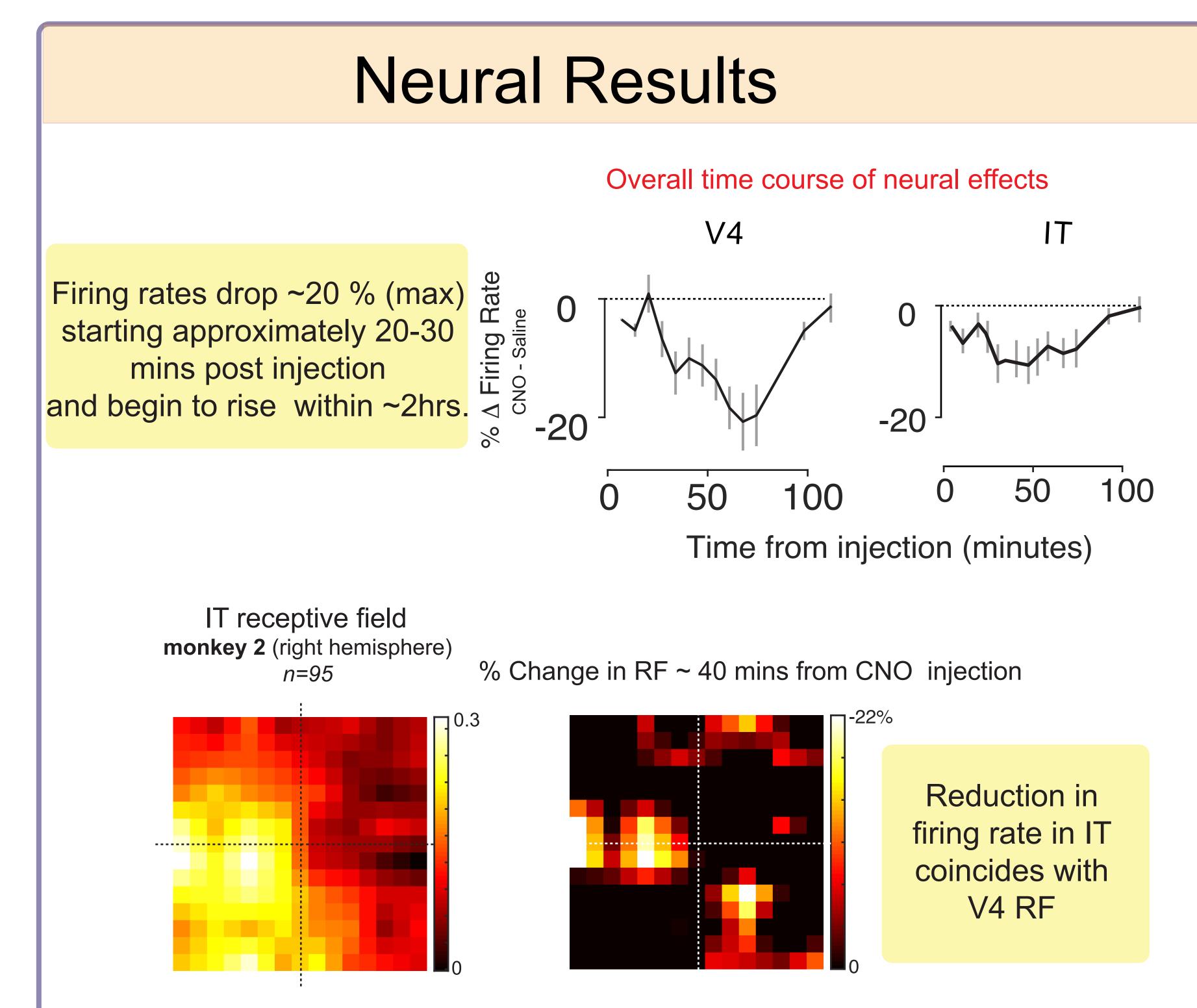
### Advantages of using DREADDs

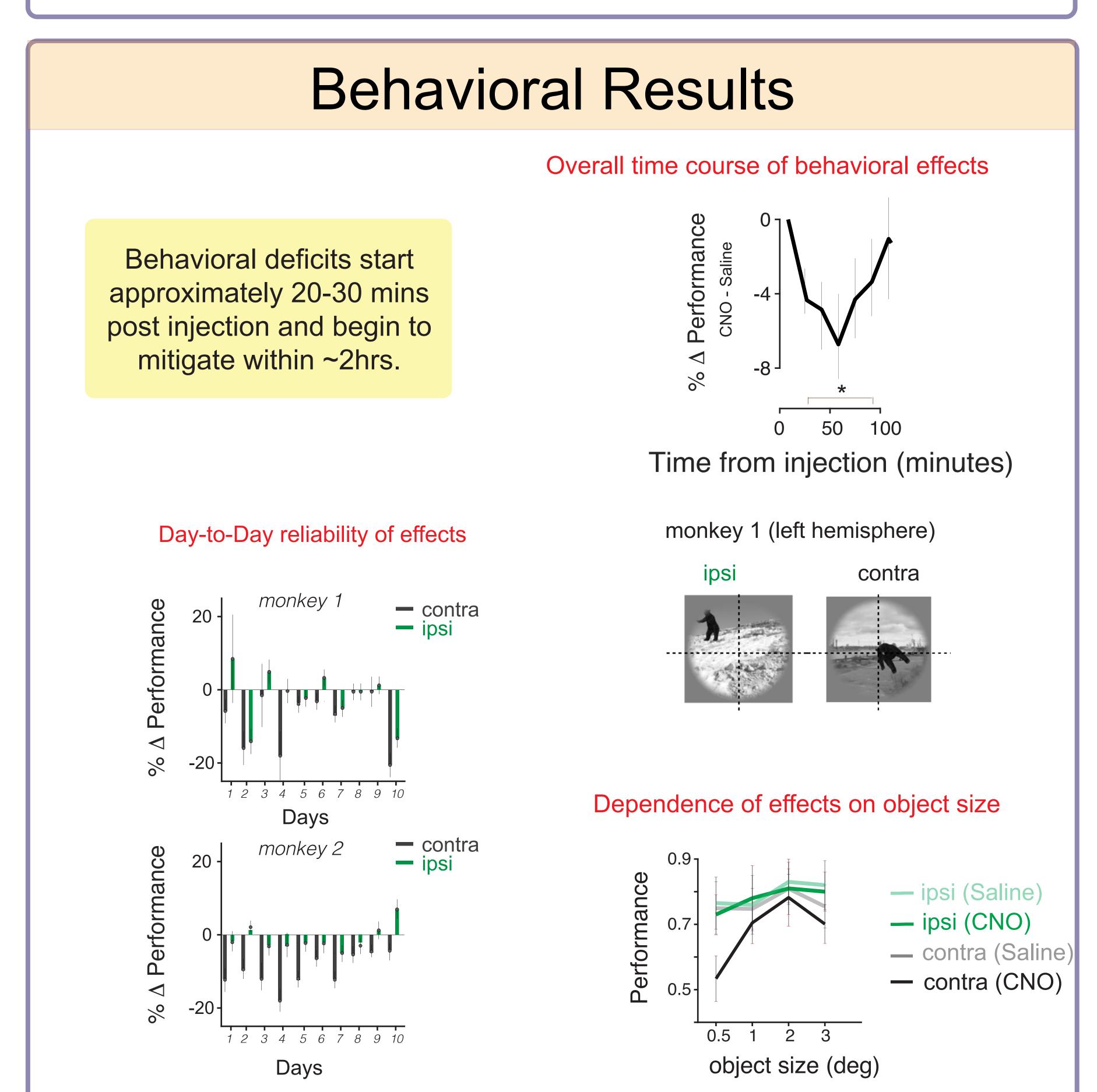
- Less invasive
- Larger coverage
- Larger feasibility of scaled-up high throughput behavioral data collection

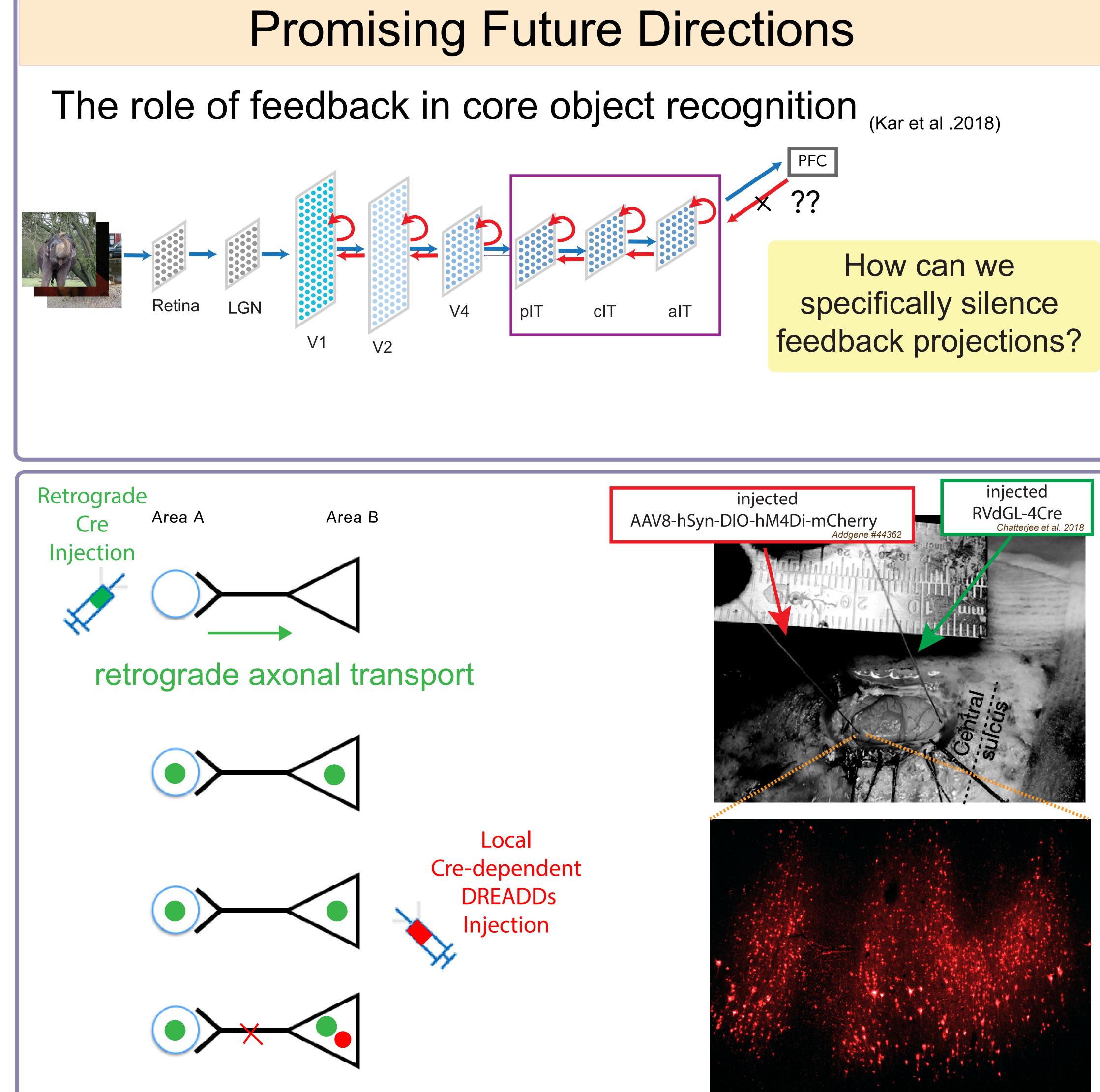
# Testing injection parameters AAV8-hSyn-hM4Di-mCherry expression across multiple cortices 1μL 1μL 2μL 2μL pre-motor cortex cortex A 2μL injection at 1000 nL/min produces a virus transduction zone of ~1.5 mm Multiple injections (~1.5 mm apart) produce overlapping transduction zones AAV8-hSyn-mCherry 1.5 mm











## Conclusions

- Our results demonstrate the ability of DREADDs to reversibly down-regulate neural activity in a 9 mm<sup>2</sup> patch of macaque V4 and affect a behavior that it was assumed to support.
- This opens up the possibility of directly testing the causal link between multiple cortical areas and object recognition tasks, with the goal of guiding the discovery of the next generation of ventral stream neural network models.

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