

Supervised learning

Gergő Orbán

Learning frameworks

How can we phrase the goal of learning?

Learning frameworks

How can we phrase the goal of learning?

- Supervised
- Reinforcement
- Unsupervised

Perceptron

- .. from this point

Deep Feed-Forward Networks



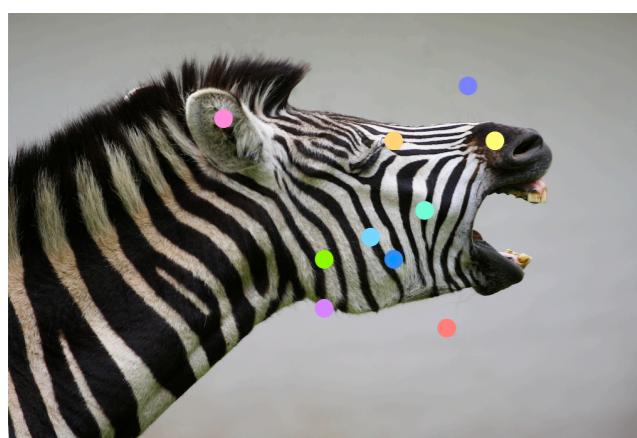
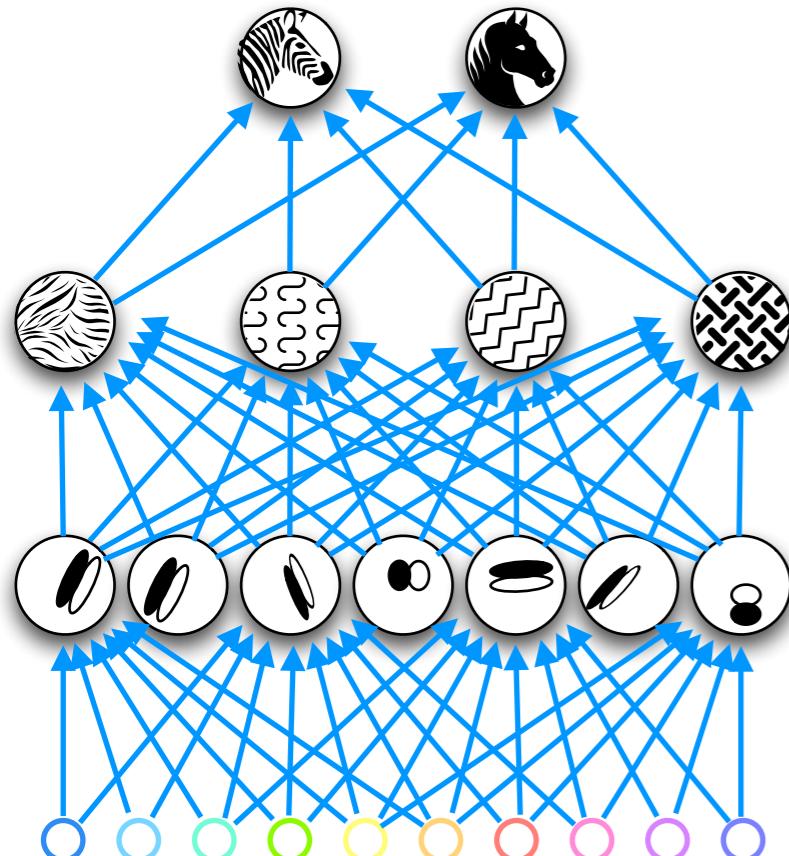
Deep Feed-Forward Networks



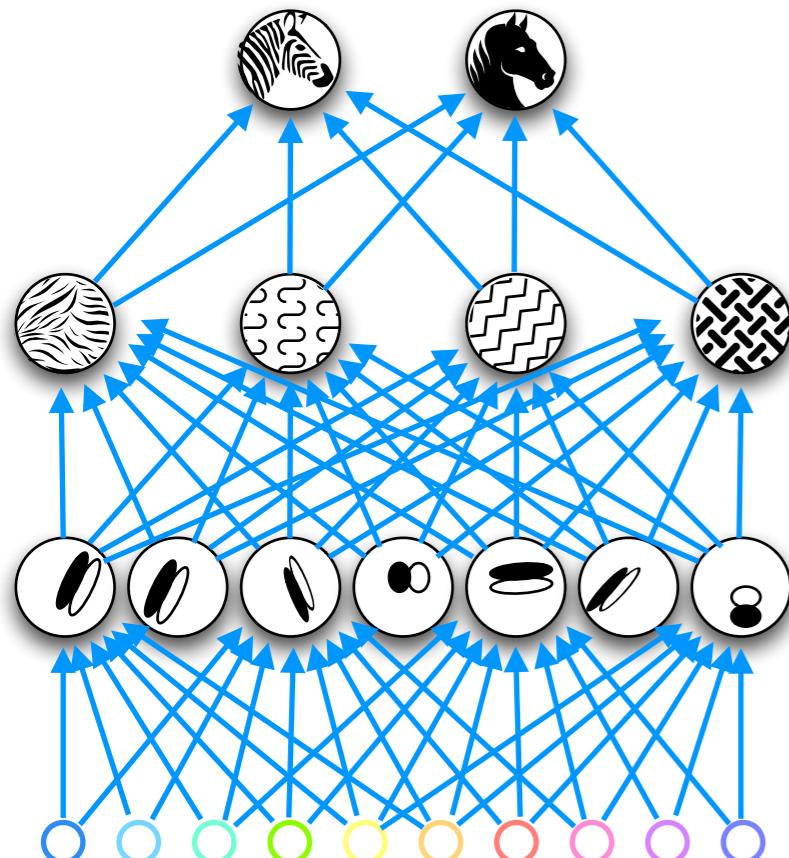
Deep Feed-Forward Networks



Deep Feed-Forward Networks



Deep Feed-Forward Networks



COMPUTATIONAL GOAL
classification

ARCHITECTURE
hierarchical feed-forward

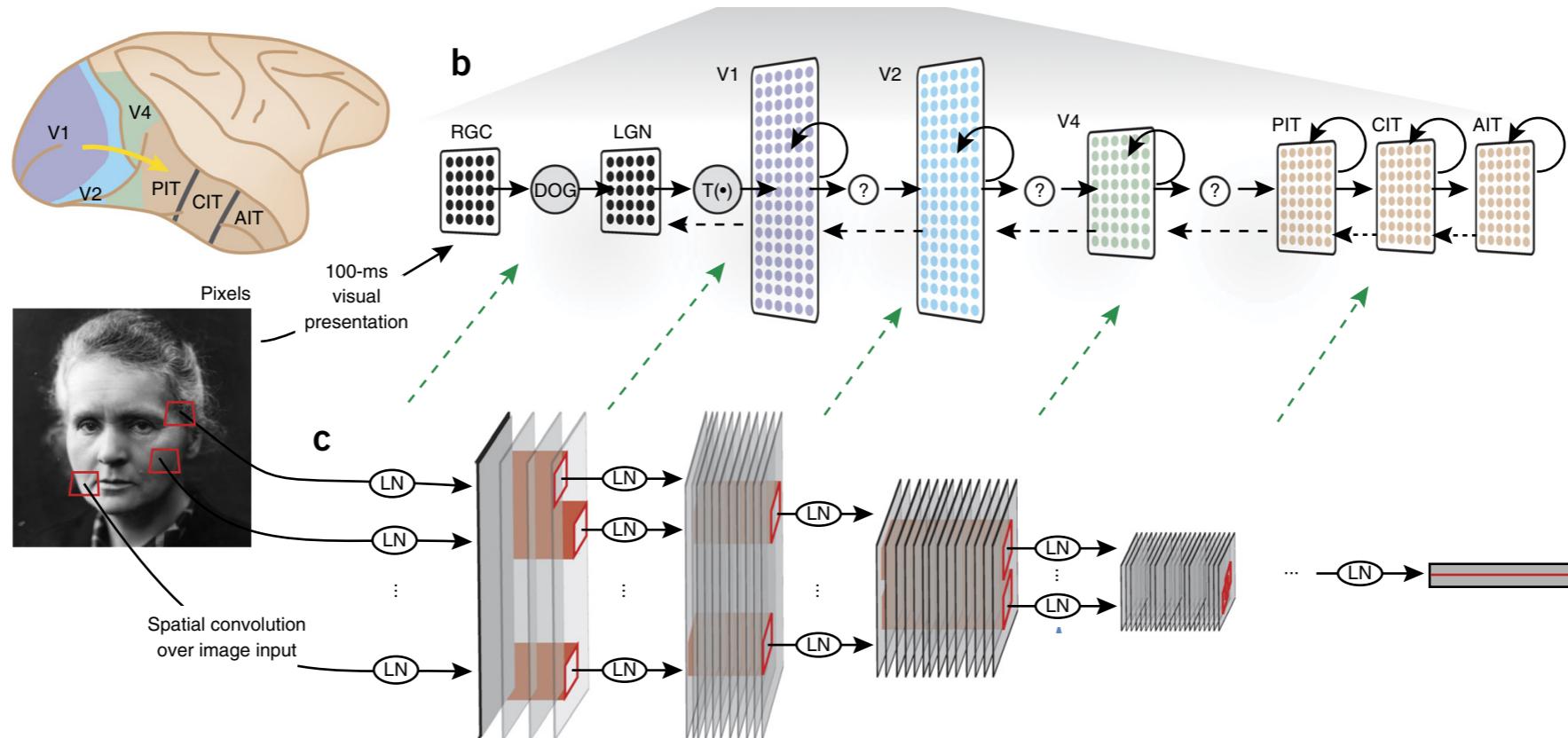
LEARNING
supervised

REPRESENTATION OF UNCERTAINTY
no

DATA HUNGER
immense

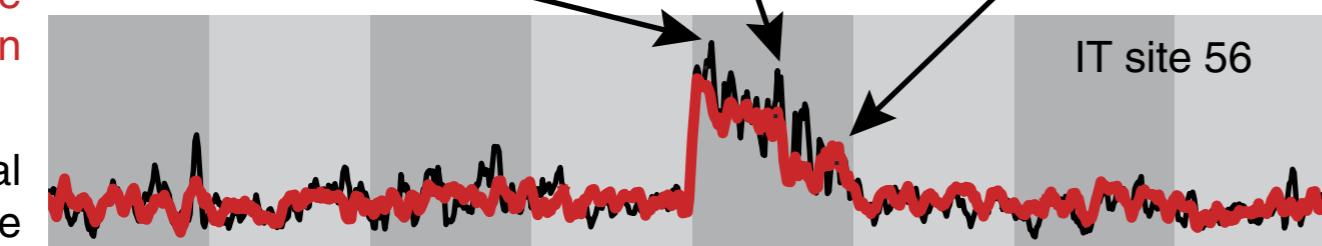
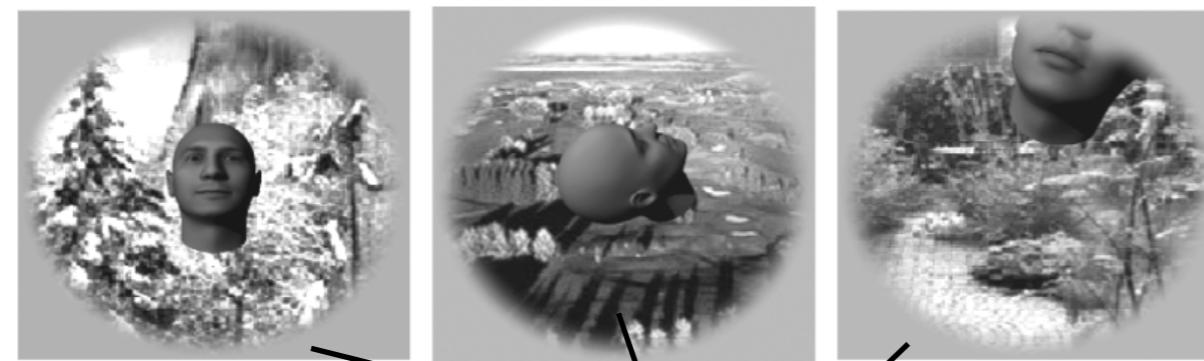
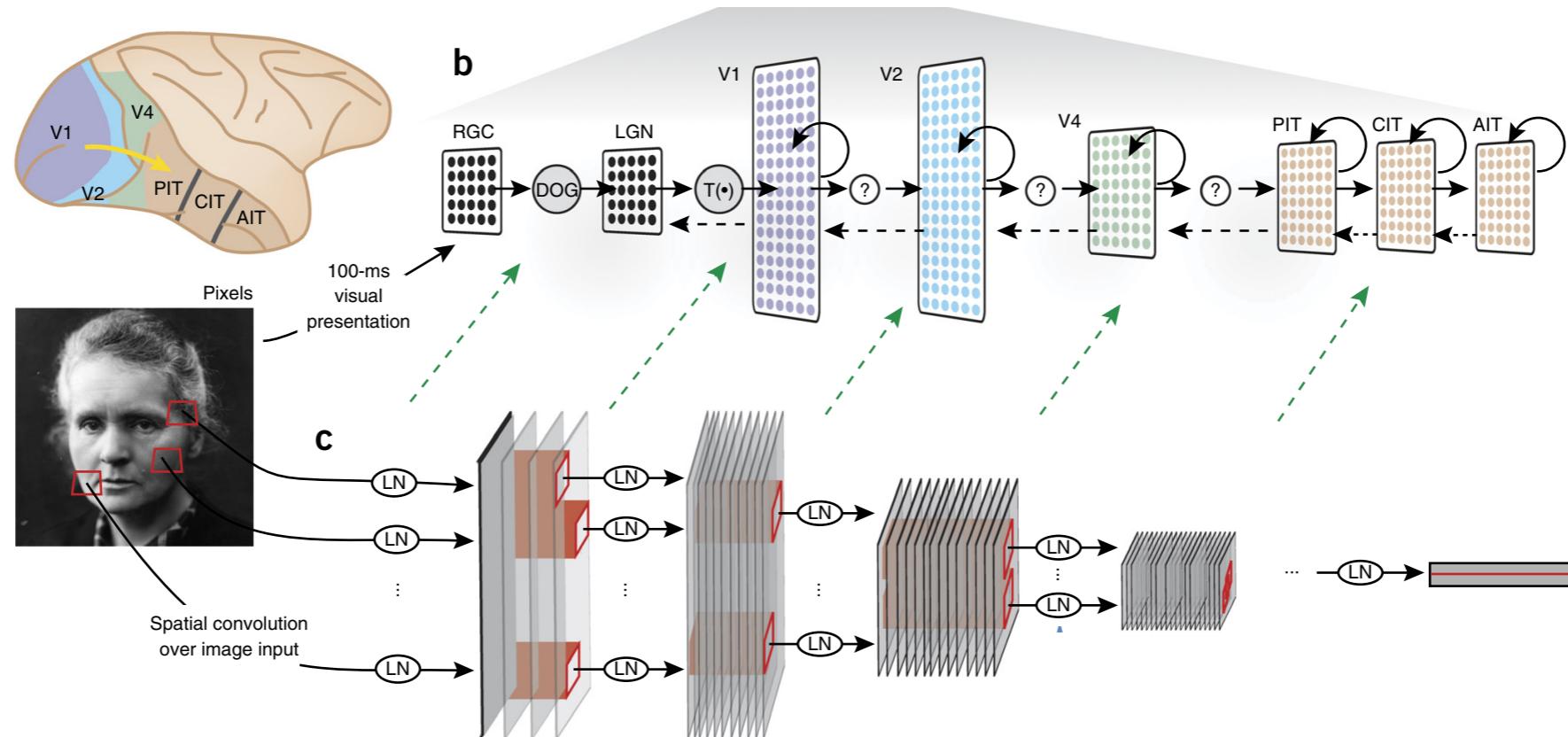


Visual cortex vs. Feed-forward deep neural network



Yamins et al (2016) Nat Neurosci

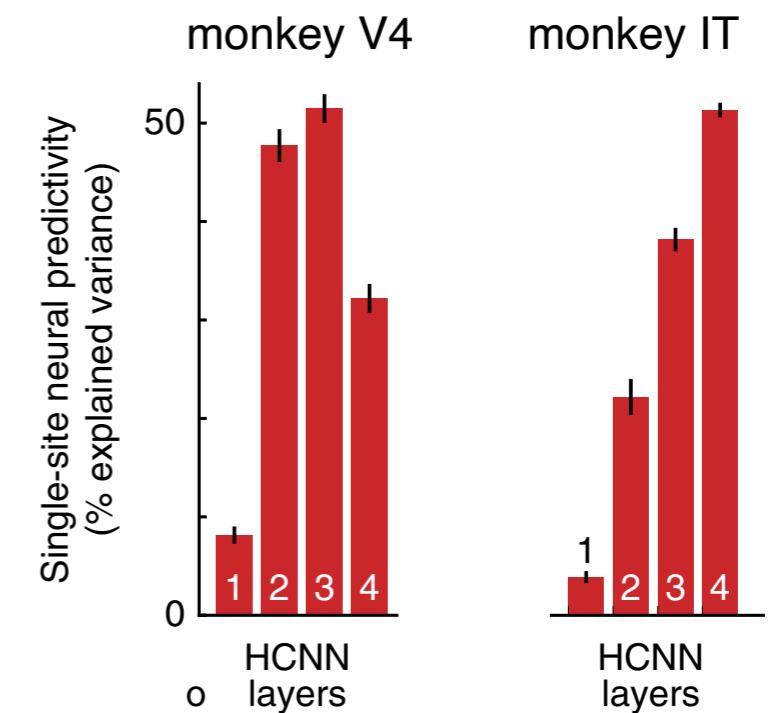
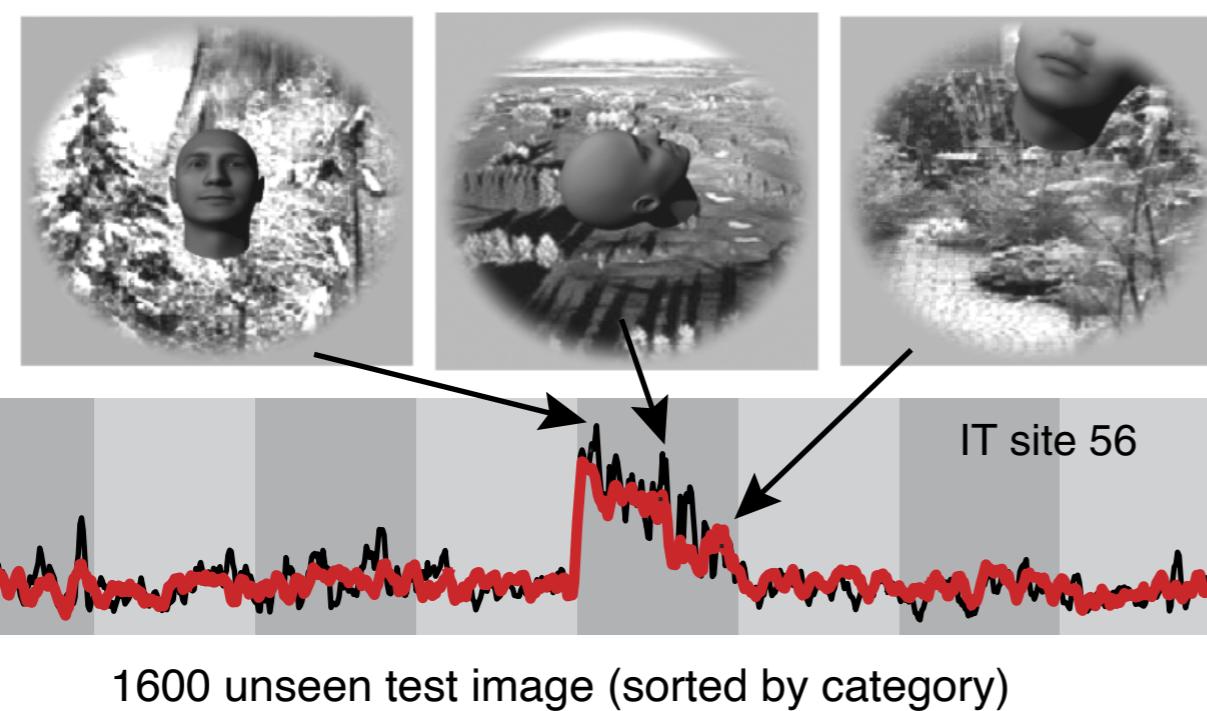
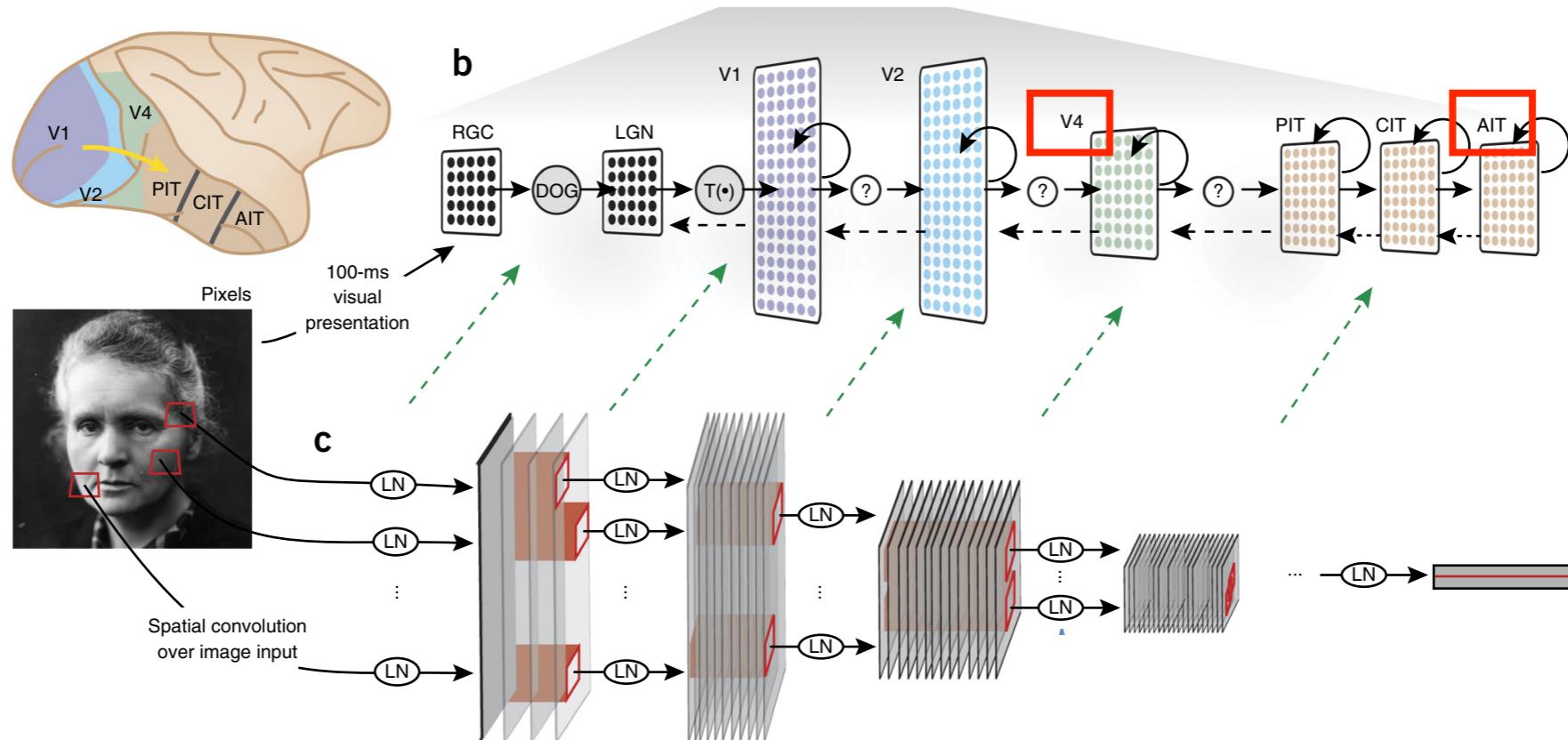
Visual cortex vs. Feed-forward deep neural network



1600 unseen test image (sorted by category)

Yamins et al (2016) Nat Neurosci

Visual cortex vs. Feed-forward deep neural network

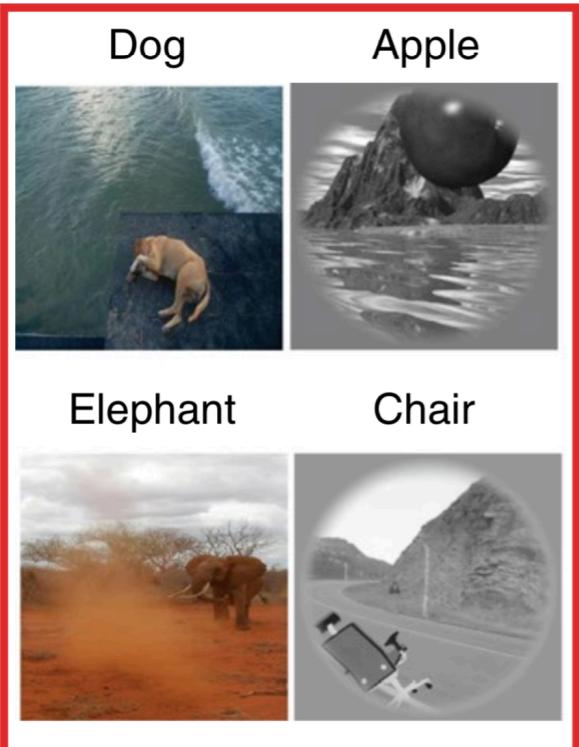


Yamins et al (2016) Nat Neurosci

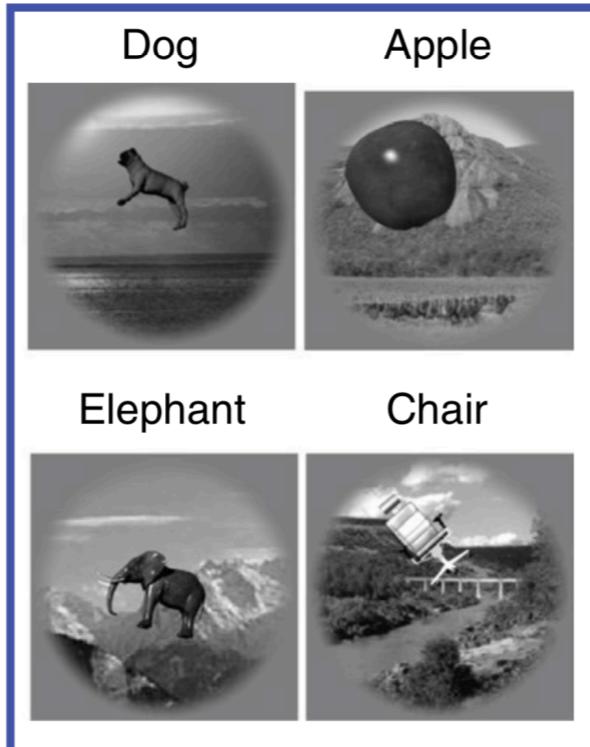
Visual cortex vs. Feed-forward deep neural network

Image examples

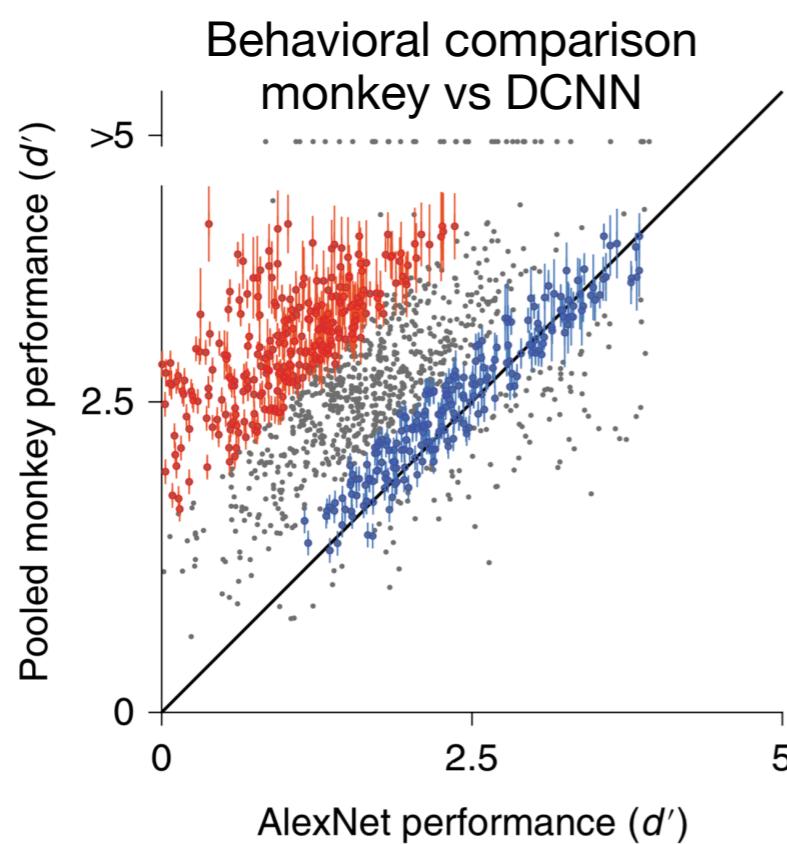
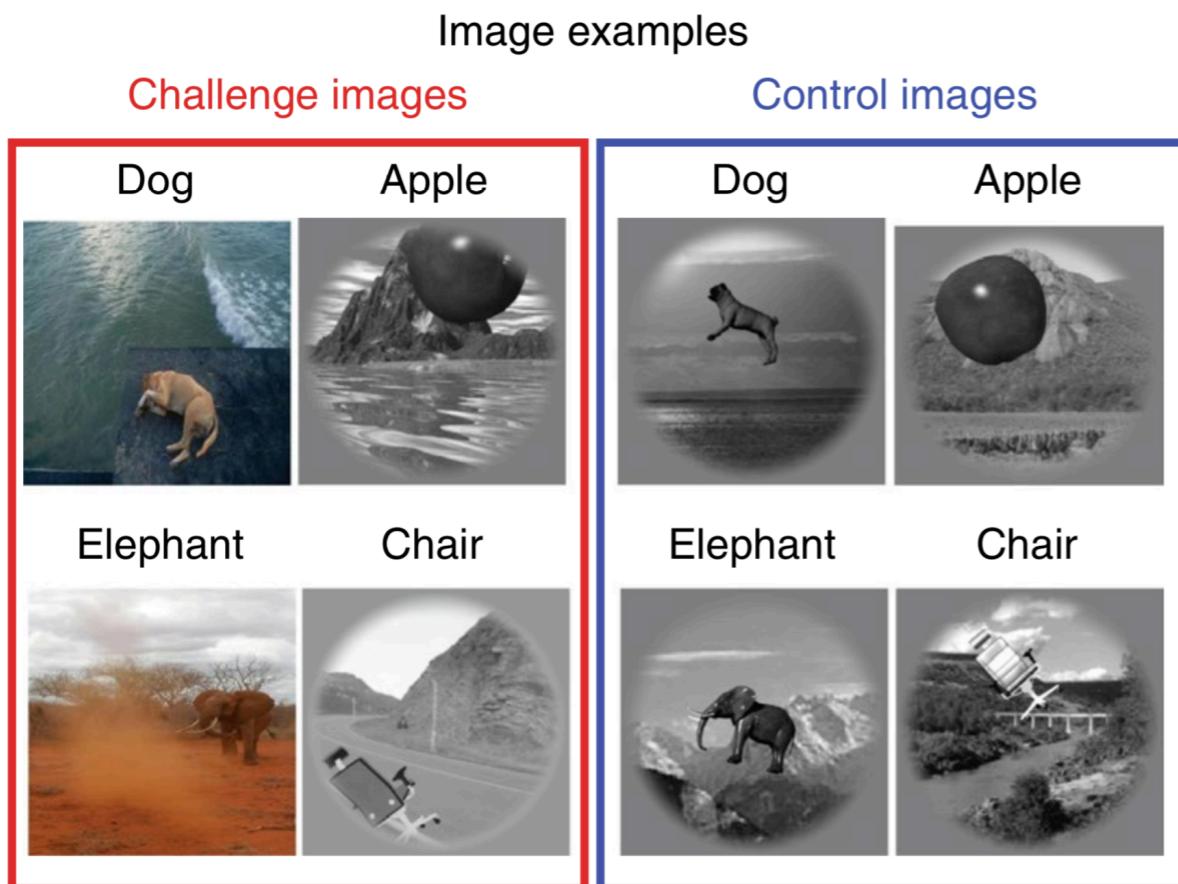
Challenge images



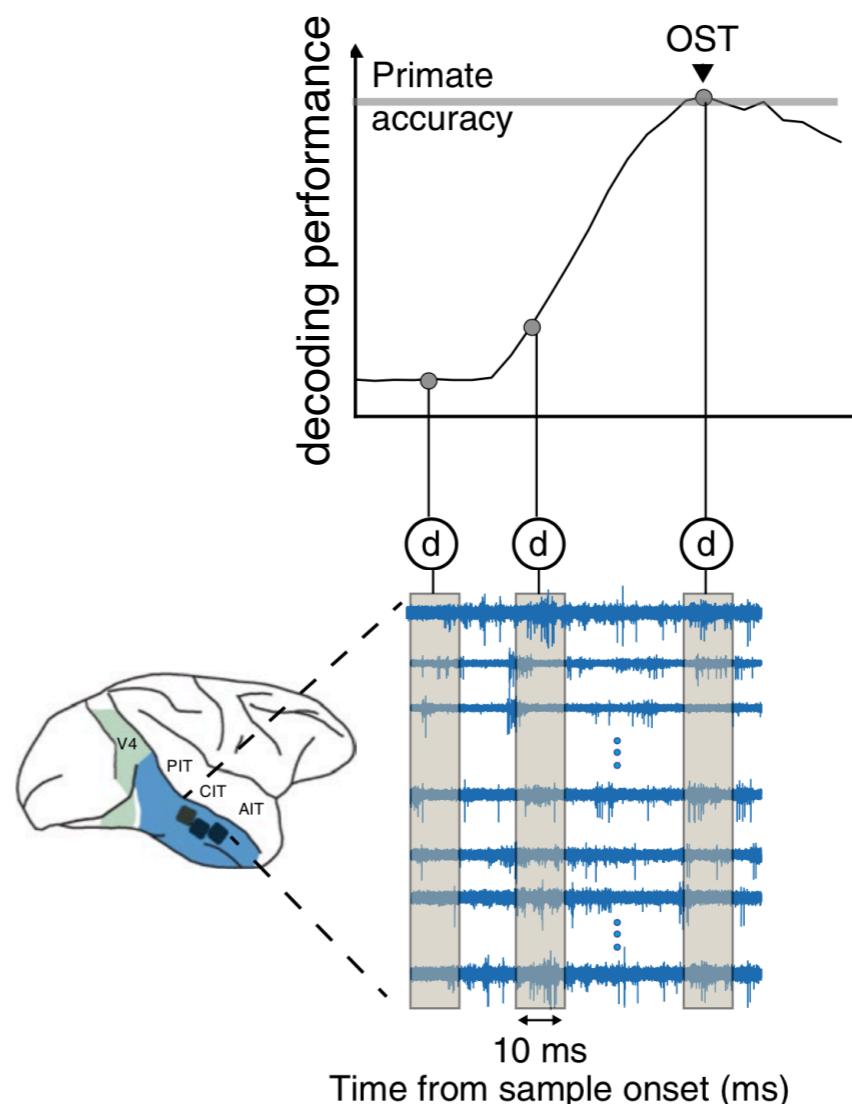
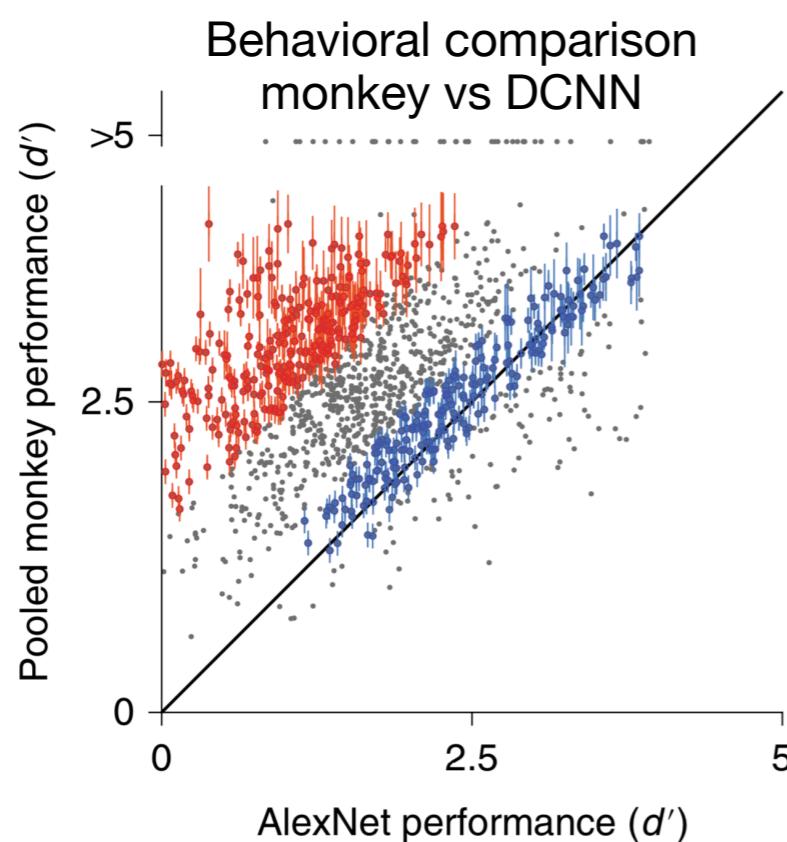
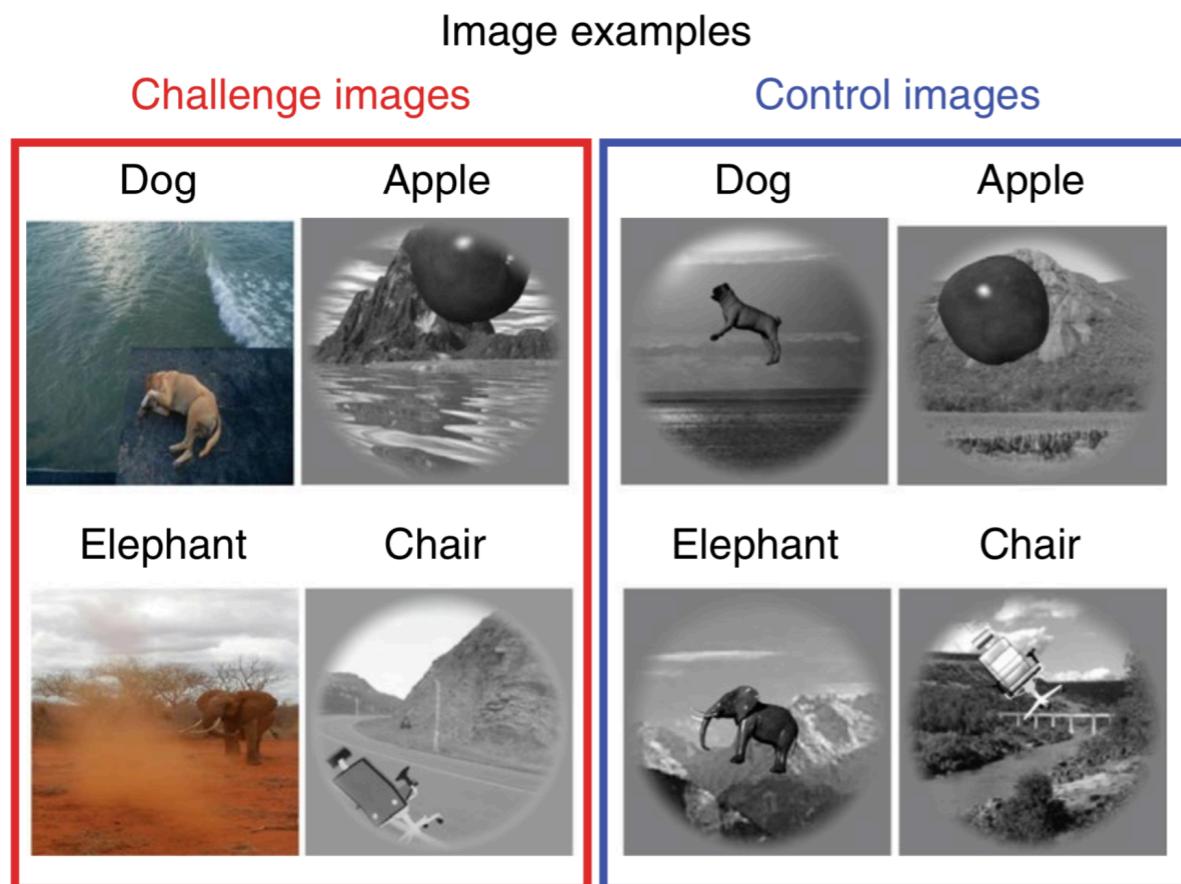
Control images



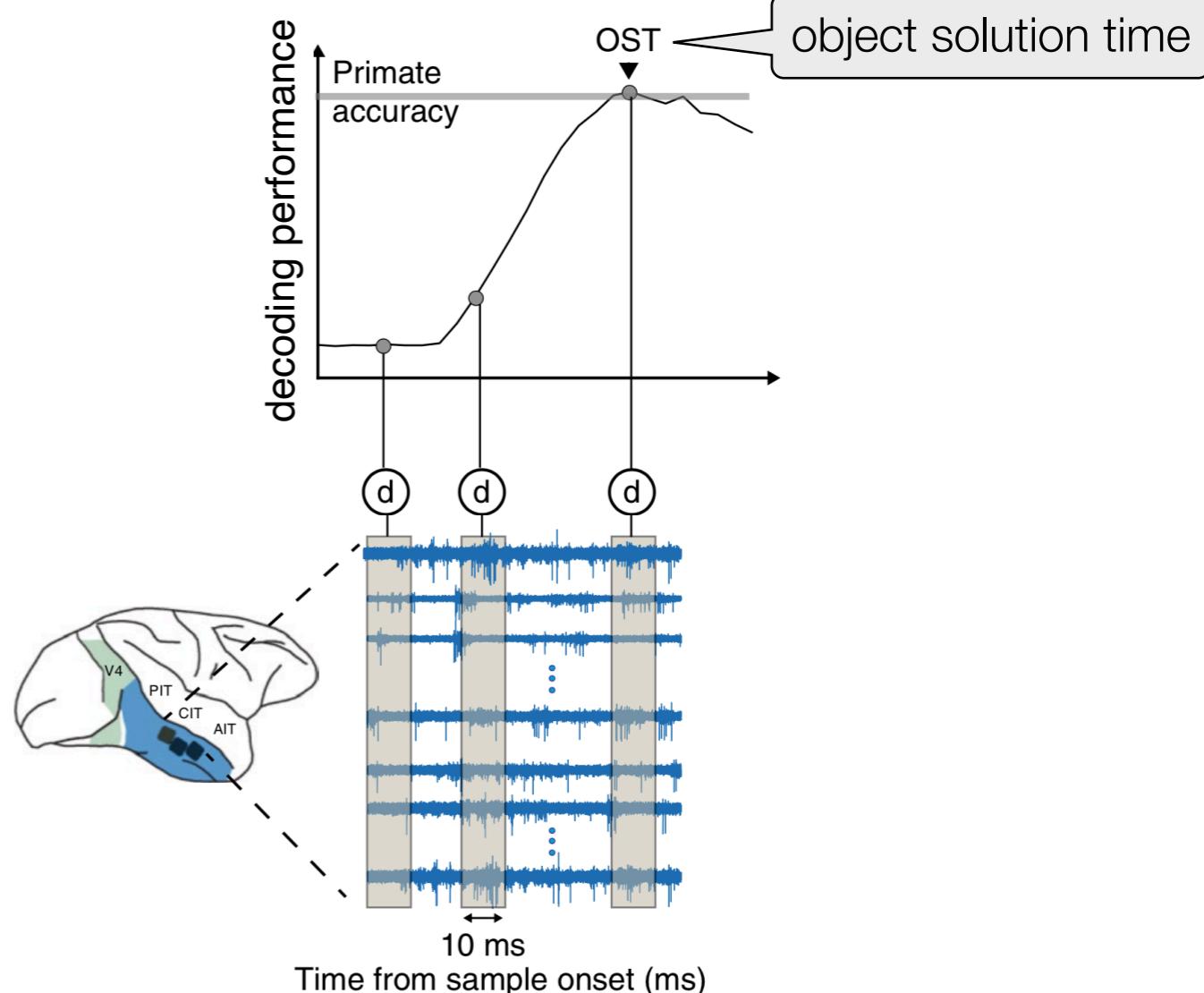
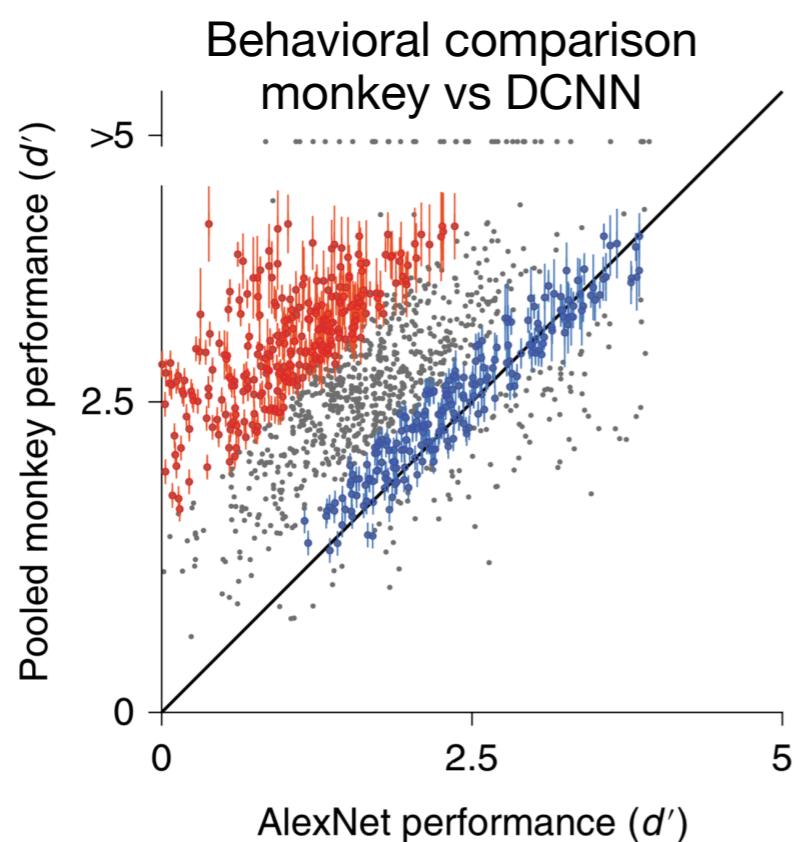
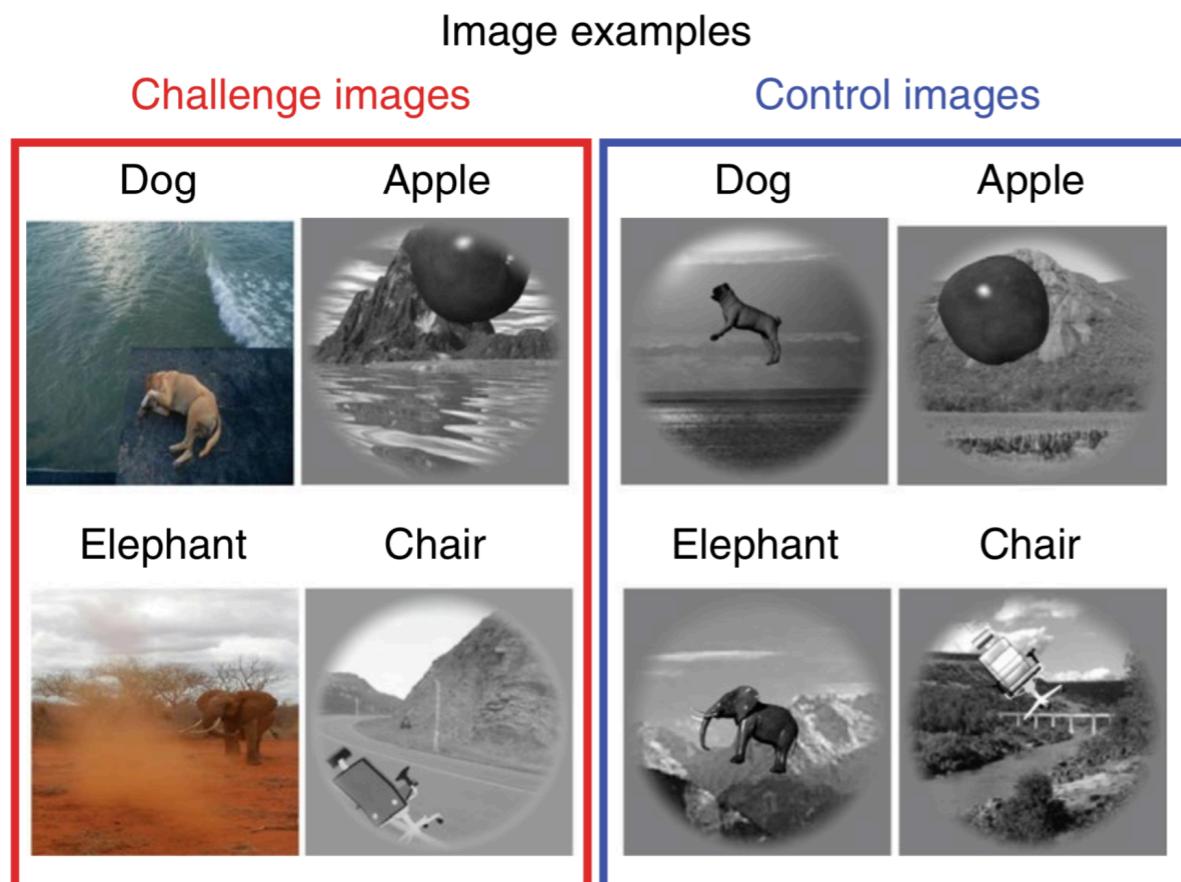
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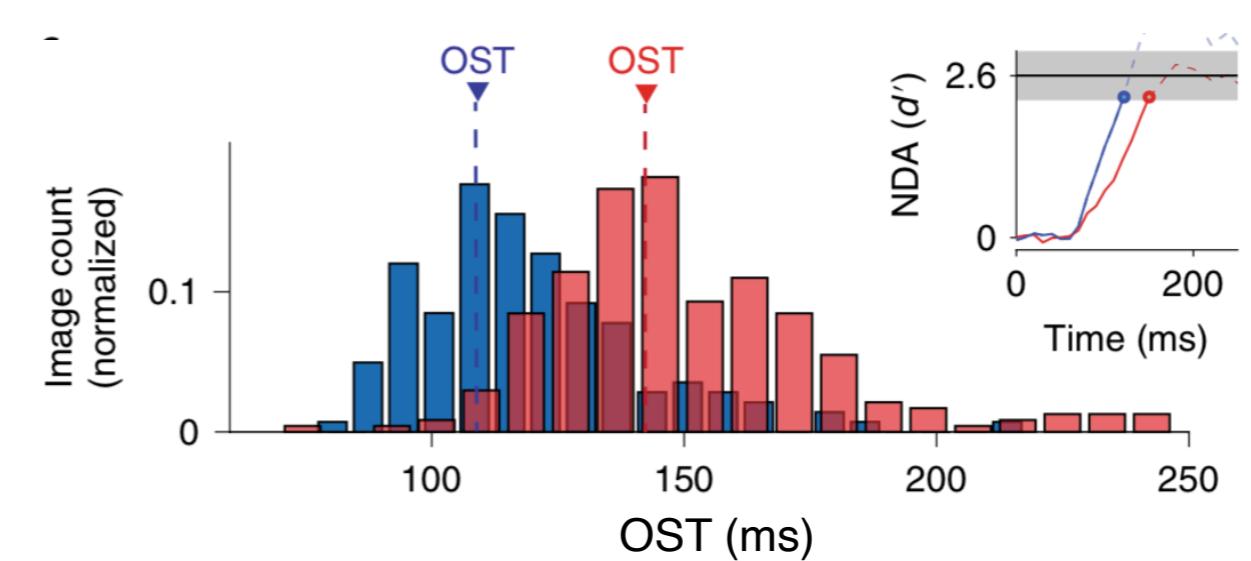
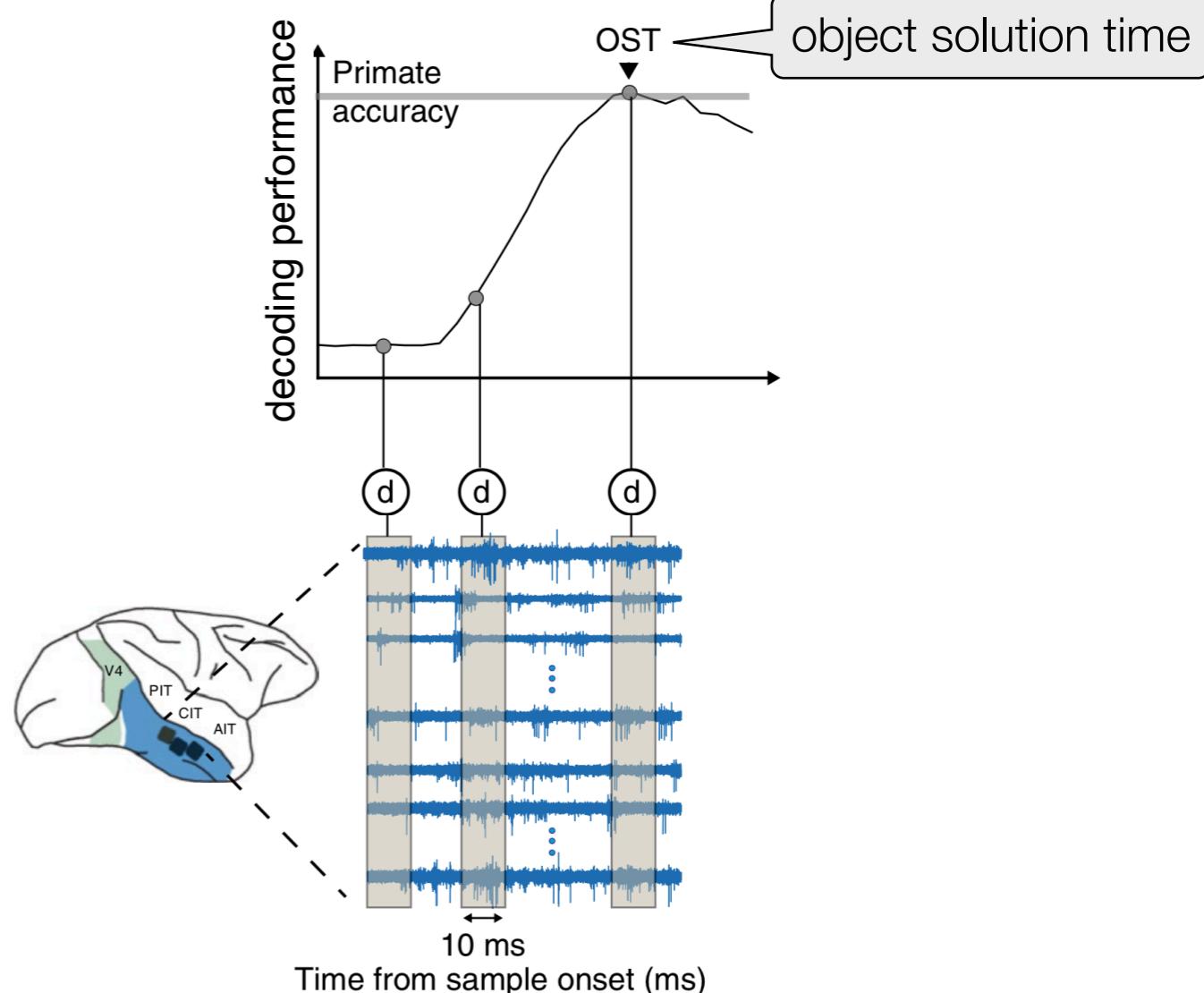
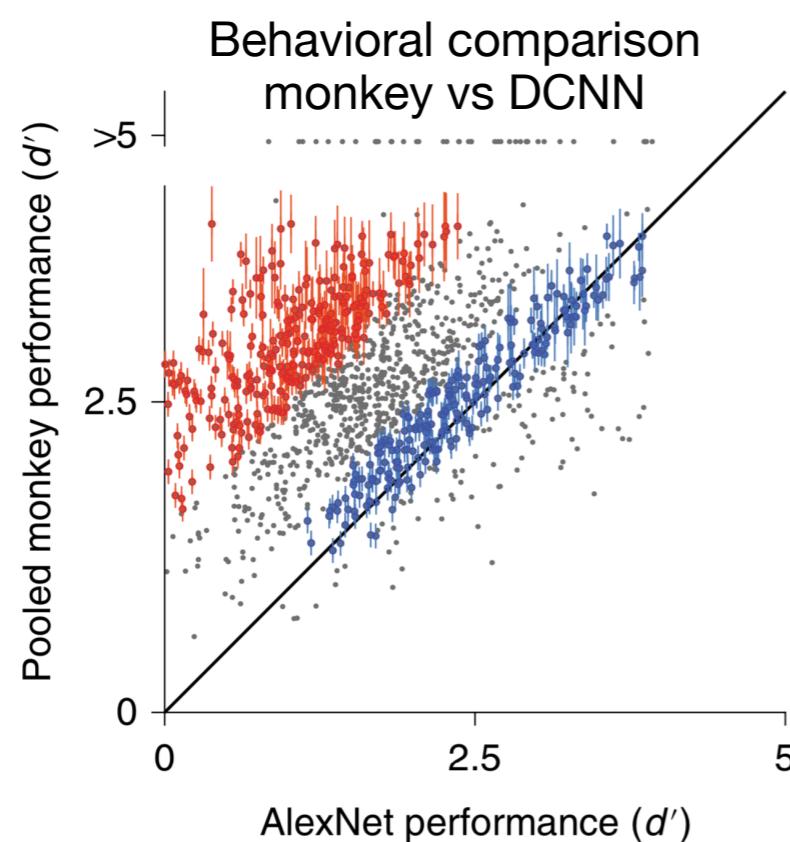
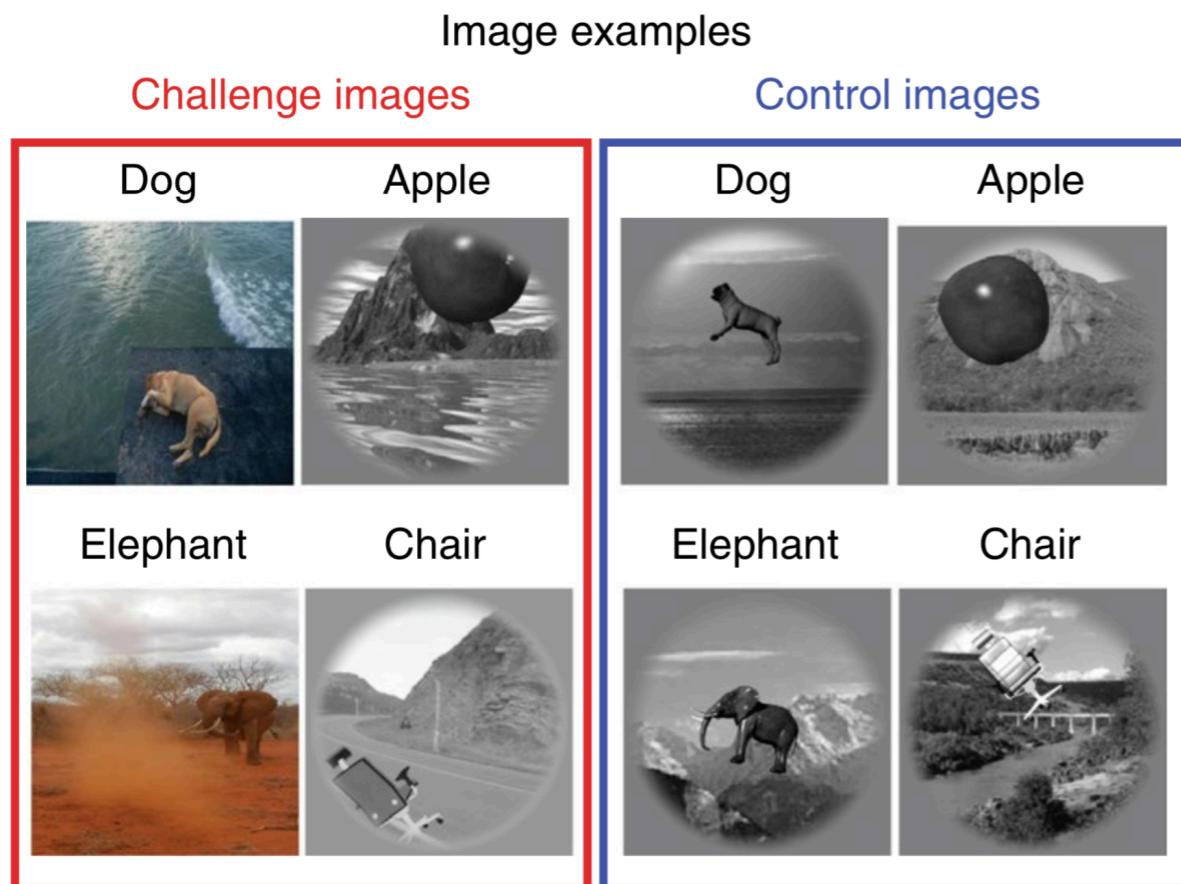
Visual cortex vs. Feed-forward deep neural network



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Visual cortex vs. Feed-forward deep neural network



Kar et al (2019) Nat Neurosci