



Fig. 1 | Modern imaging techniques provide unprecedentedly detailed information about brain activity, but data-driven analyses support only limited insights. **a**, Two-photon calcium imaging results¹²¹ show single-neuron activity for a large population of cells measured simultaneously in larval zebrafish while the animals interact with a virtual environment. **b**, Human fMRI results⁷⁰ reveal a detailed map of semantically selective responses while a subject listened to a story. These studies illustrate, on the one hand, the power of modern brain-activity measurement techniques at different scales (**a,b**) and, on the other, the challenge of drawing insights about brain computation from such datasets. Both studies measured brain activity during complex, time-continuous, naturalistic experience and used principal component analysis (**a**, bottom; **b**, top) to provide an overall view of the activity patterns and their representational significance. PC, principal component.