Encoding and Decoding
quantified sensory input

sensory coding

neuronal activity

decoding, decision making

percept, behavior

psychophysics
Schematic model for texture discrimination: the kinematic “signature” of whisker vibrations is encoded by neurons. In this scheme, vibrations take the simplest possible form, sinusoidal waveforms.

Year 2003
stimulus set for measuring cortical encoding of vibration
Onset response
barrel cortex encoding of vibration velocity at stimulus onset
Coding of vibration frequency $f$ and amplitude $A$ …

… and the resulting ambiguity
decoding barrel cortex activity to mean (across cycles) whisker speed
No sign of temporal code
decoding barrel cortex activity to mean (across cycles) whisker speed
But is it really the mean speed ($Af$) of a vibration that the rat feels???

Adibi, Diamond, Arabzadeh, 2012
Figure A: Graph showing performance vs. frequency and amplitude for Rat 3 and Rat 4. The graph illustrates the effect of different frequencies (f, 2f) on performance (A, 2A). The performance is measured in terms of percentage.

Figure B: Graph showing performance vs. frequency and amplitude for iso-Af and delta-Af conditions. The graph illustrates the effect of different frequencies (f, 2f) on performance (A, 2A). The performance is measured in terms of percentage.
delta f
delta A
iso Af
delta Af
End lesson 3 / start lesson 4