- Three levels of analysis
  - normative principle : 定义需要计算的问题 (规范性原则)
  - algorithm
  - implementation

- Optimal Internal Model in V_1 (2011. Berkes)
  - 规: Internal Models relates neural activity ⇒ optimal
  - Algorithm: Bayesian model of sensory cortical processing
  - implementation: relating spontaneous & evoked
    ↓
    Markov Chain Monte Carlo = 用: sample distribution ≈ desired distribution
      - Markov Chain : equilibrium distribution

Attentional Spatial Temporal Shared Variability.

Neuron

- Shared ∨ Variability. Cortical △ ∨ Neurons respond different strength.
  - Attention modulation
    - Attention ⇒ shared variability.
  - Constraints of circit model.
    - low dimensional
    - attention modulation
    - attentional suppresion is substantial

- Spacially ordered network & correlation with slow inhibition
  - balanced network.
    - recurrent inhibition vs strong excitation ⇒ Neuron Variability.
  + spatial connectivity / disordered connectivity
    - inhibitory synaptic currents vs excitatory currents
      ↳ slower kinetic
  + slow inhibition

- Attentional Model
  - 3 levels — MT
    — V_1
    — Thalamus (Poisson Process)
  - first constraint
    ⇒ inhibition × faster
    × anatomically broader

- Spatiotemperal Patter Formation
  - ? recurrent circuit & shared vigor
  - Firing rate model
    - spiking network model
    - firing rates variable : Spatio temperal pattern formation
      - temporal & spatial scales of inhibition
      - stability , variability
    - attention : depolarization to inhibitory neurons
      - increase firing rate stability
    - predicts : variability : dynamical instability

- Internal Generated Variability ⇒ Attention .
  - Spiking Neuron Model
  - Chaotic population wide dynamics
    - Attended : low variability , corelation of V_1 & MT
    - Unattended : high variability
      - inhibition deprived state

- Discussion
  - External Modulation ?
    - Aronsal . aroused brain state
      - Top - down projections . Bottom - Up .
        V_1 & V_2 V_3
    - operating point of recurrent network

The Neural Basis of Decision Making

- Element of Decision
  - DV: — probability : Bayesian interference
    — evidence : conditional probability
    — value: costs & benefits
    +
    Time ?
  - Decision Rule :
    — value : support or oppose hypothesis
    — embodiment : perse a resultant action

- Signal Detection Theory (SDT)
  - Evidence → Categorical choice.
    senses or neuron spike
  - binary decision $l_{12}(e) = P(e|b_1)/P(e|b_2)$ l_{12} ✂ β
    - Accuracy $\beta = 1$ ↘ likely ratio
    - Maximize value $\beta = \frac{(V_{22}+V_{11})}{(V_{11}+V_{12})}\frac{P(b_2)}{P(b_1)}$ ⑤: 无法控制 β.
      +: time scale

- Sequential Analysis
  - Evidence & Time to stop or commit
  - Multiple evidences :
    $$\log LR = \sum_{i=1}^{n} \log \frac{P(e_i|b_1)}{P(e_i|b_2)}$$
  - stoping rule
    - positivie/negative criterion
    - SPRT (Sequential Probability Ratio Test)
      - random walk model
      - e is logLR ; e is gaussion distribution ⇒ diffusion with μ

- Experimem
  - VTF : Vibrotactile frequency
    - S1 : x presene DV

s

sensory evidence

- MPC: $f_2 - f_1$

s

sign ?

- challenge:
  - roles of each brain area: seperate? continuous flow?
  - decision elements: memory? delay activity? ⇒ f_1 frequency

· Random-dot motion

• Karl Friston — Free Energy Principle

数值计算.

Neural Dynamics.

↪ epfl

Leaky-Integral Fire. ⇒ LIF

F Stelzer. DNN a single neuron

卡哈尔

Brains can inspire new path: ?

·

Spontaneous emergency (simple action decision) + dopamine-modulated mechanism

neo-Hebbian RL (intrinsic motivations)

Model

- Cell Assemblies (CA) Neo.-Hebbian ~~Reinforcement~~ Learning

· 替代函数:

· Attention - SSVEP
连接性.

· 脑模拟. - HCP HCP ex

· ANN - SNN 转化 CIFAR 100

· 数据分类 . 加固效的策略. 2022.12

· Model Selection . ~~C~~ Akaiken's Informative Criteria

SSE . 黎曼距离

马氏距离

· ~~AEP~~ 预测

—

· Abide
ABIDE

—

精分：CSP
(分类)

· 兴奋抑制比：ASD

Autism Spectrum Disorder

Gustavo Deco：

· The Dynamic Brain: From Spiking Neurons to Neural Masses and Cortical field

· How Local Excitation-Inhibition Ratio Impacts the Whole Brain Dynamics

- · long range correlation ·
  - · intra-area correlations
- · short range correlation
- · FIC
  - local regulation mechanism
- · Large scale cortical dynamic mean field model