Reconstruction

Interuniversity Microelectronics Centre (IMEC) (2009) Wireless Sensor Systems Enable A Better Sleep. *ScienceDaily*. (Photo: Holst Center)

Bayesian estimation

Extend decoding of s $\rightarrow$ s*(t)

The role of the conditional mean

Want an estimator s_{Bayes}

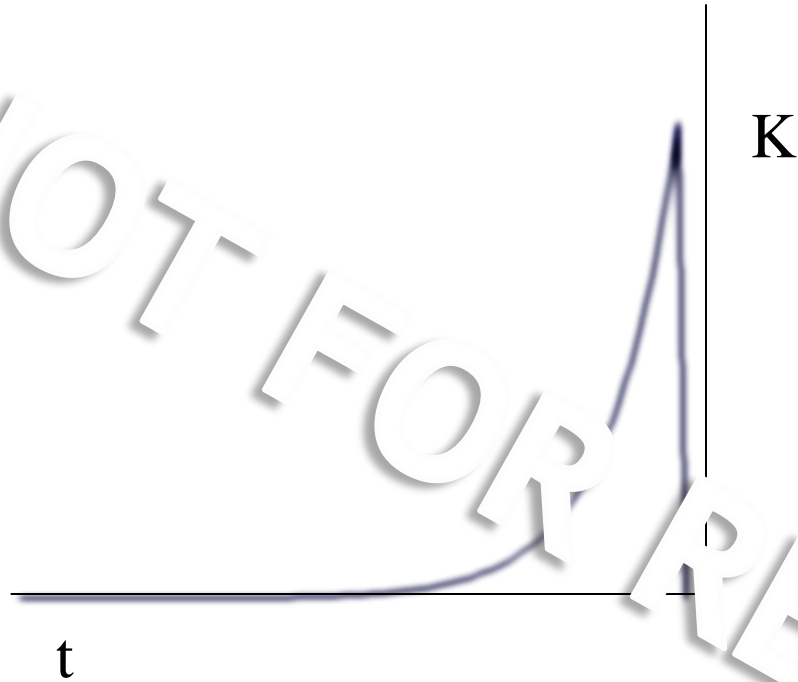Introduce an error function, $L(s, s_{Bayes})$; minimize error.

$$\int ds\, L(s, s_{\text{bayes}}) p[s|\mathbf{r}]$$

For least squares co$\cdots$ $L(s, s_{Bayes}) = (s - s_{Bayes})^2$;
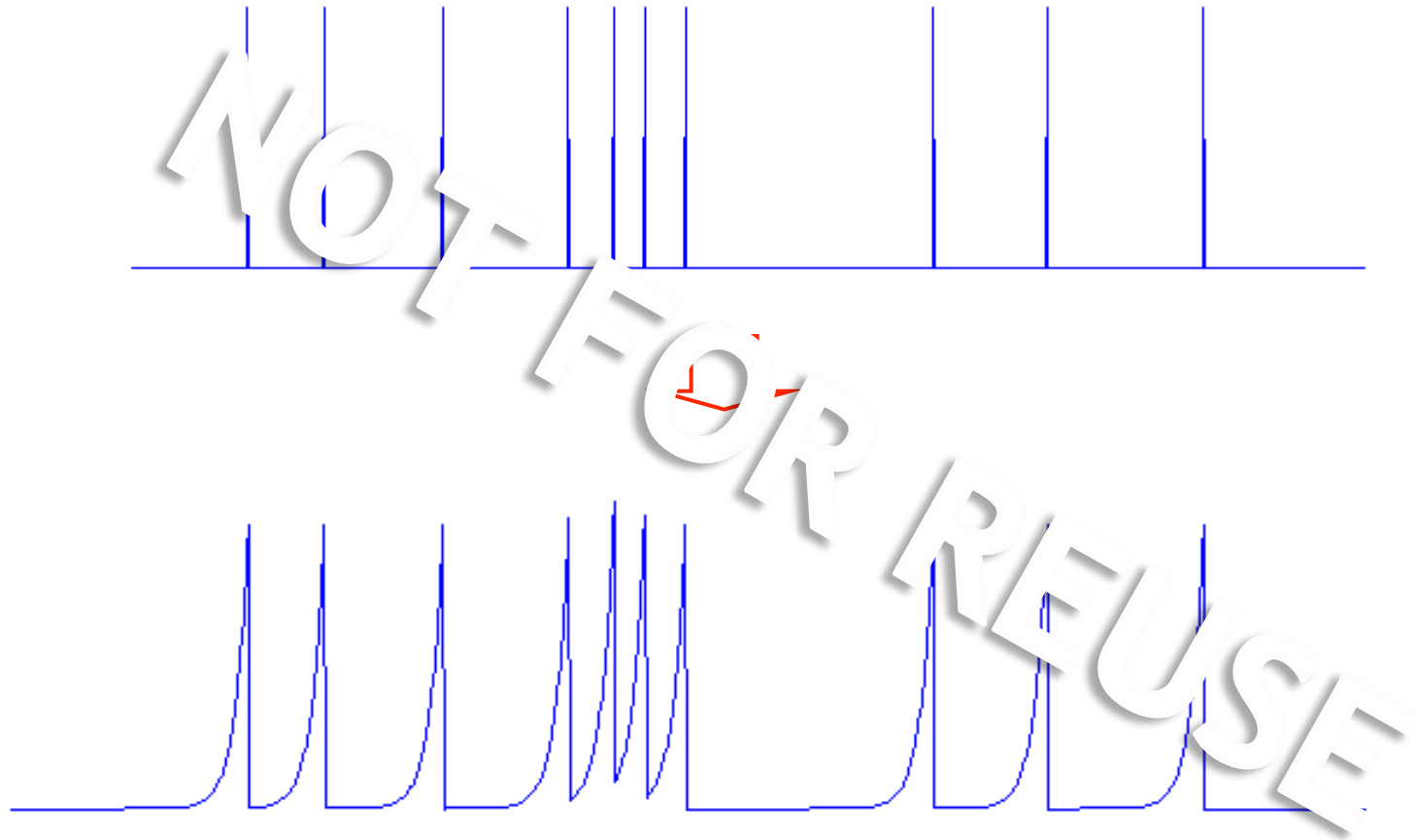
Solution: $$s_{\text{bayes}} = \int ds\, p[s|\mathbf{r}]\, s$$

Stimulus reconstruction

Stimulus reconstruction

Stimulus reconstruction

Reading minds: the LGN

Reading minds: the LGN

Yang Dan, UC Berkeley

Reading minds: fMRI

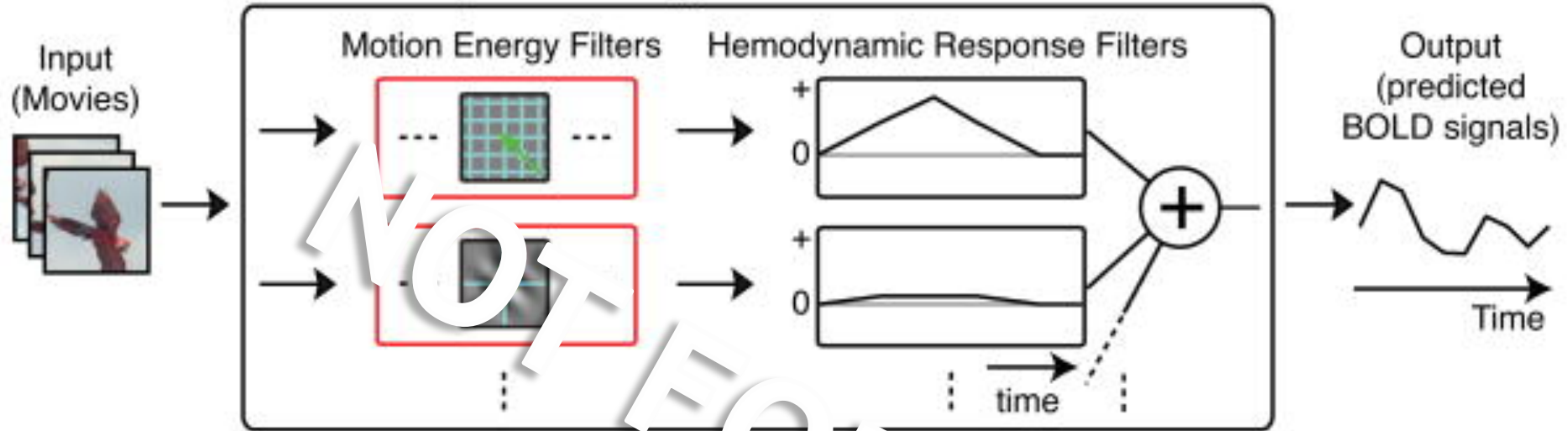Nishimoto et al., Current Biology, 2011

Reading minds: fMRI

$$P(s|r) = P(r|s)\, P(s)$$

Reading minds: fMRI
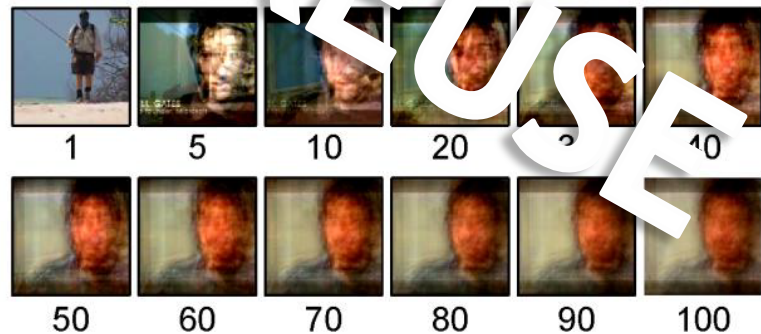

A stimulus-response encoding model for one voxel
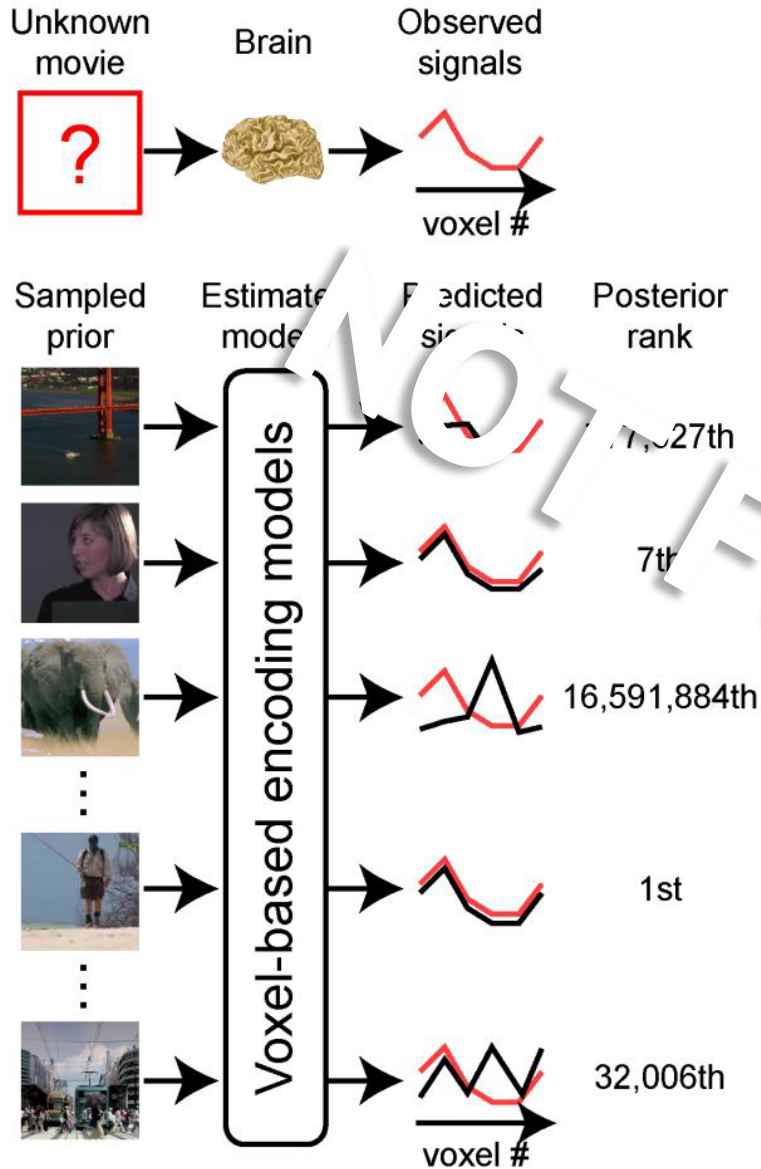
Input (Movies) → Motion Energy Filters → Hemodynamic Response Filters → Output (predicted BOLD signals)

Nishimoto et al., Current Biology, 2011

Reading minds: fMRI
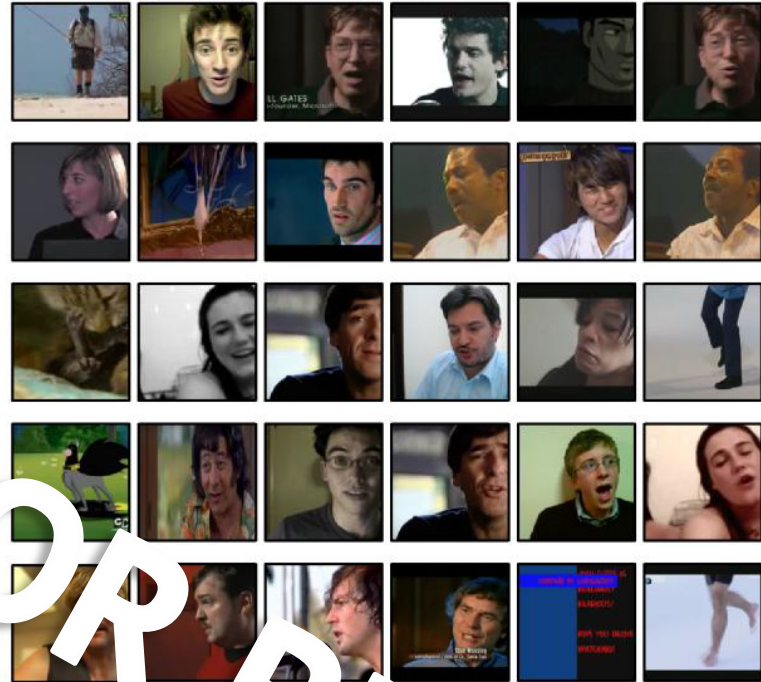
Nishimoto et al., Current Biology, 2011

Coming up next

- Guest lecture by retina wizard Fred Rieke!

- Information and coding principles