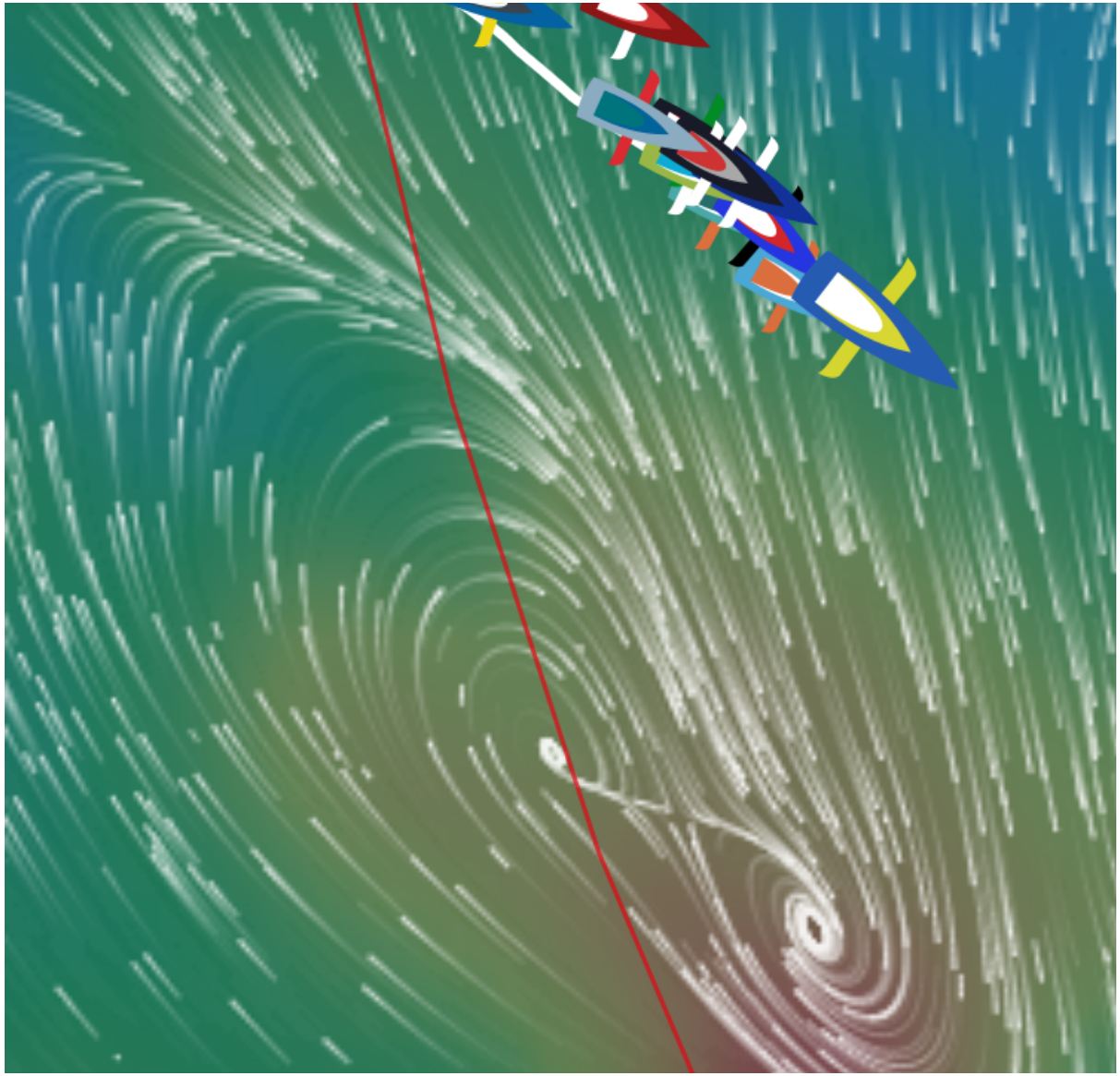
2024 Vendé Globe 24/11



What do you see ?

CHAPTER 6
Entrainment & synchronisation of oscillators

Entrainment of phase oscillators

- Continuous sine coupling
- Pulsed sine coupling (sine map)

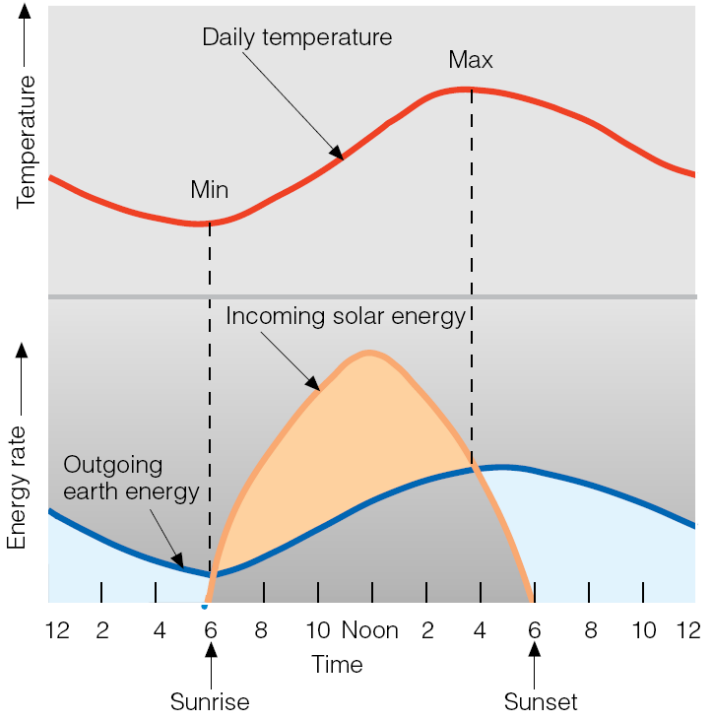
Kuramoto model

- Collective synchronization in a population of oscillators

Let’s talk about entrainement


TACOMA BRIDGE
COLLAPSE
BRITISH
PATHÉ
PATHE GAZETTE

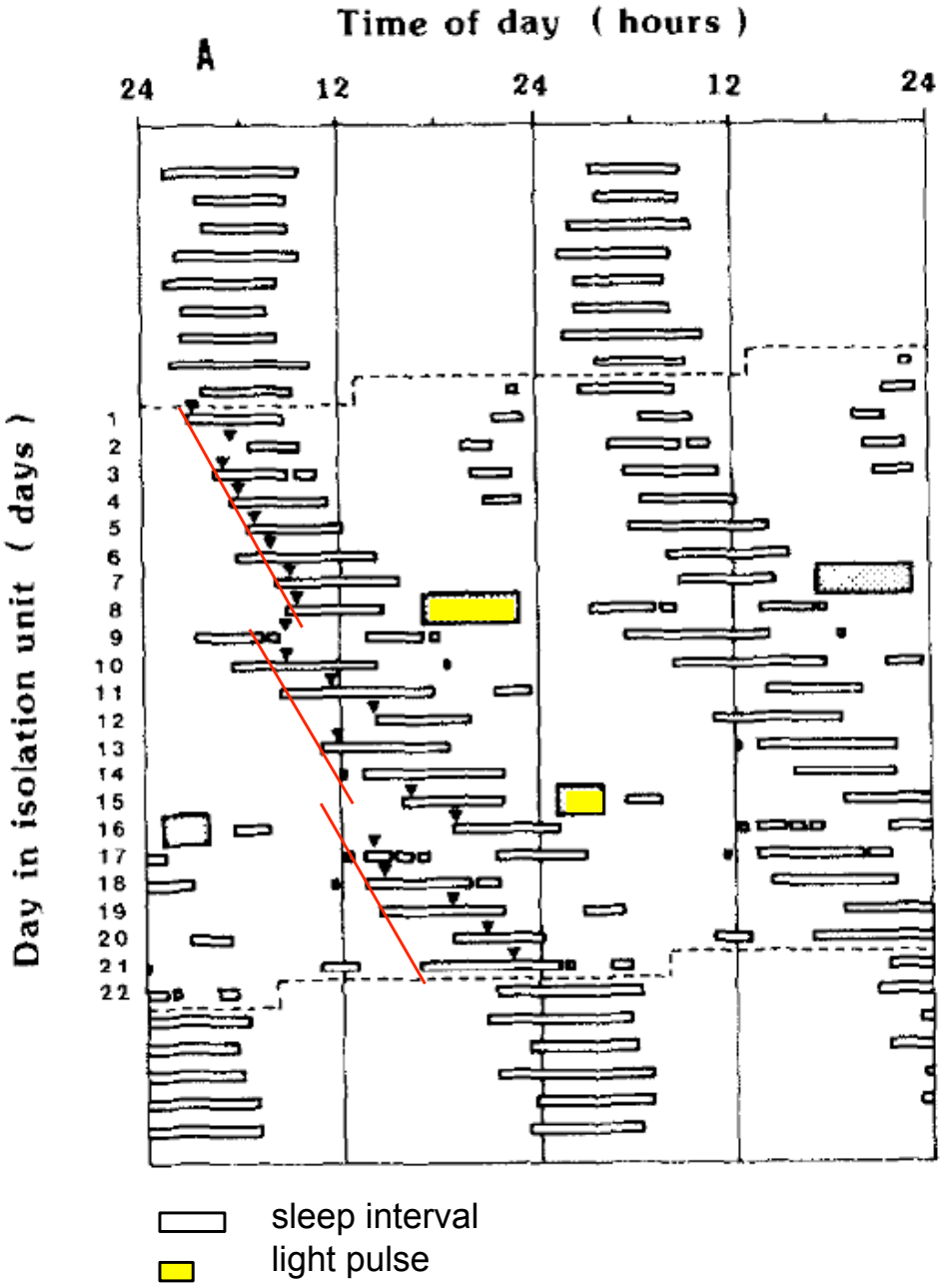
Humans are resonating too



Humans resonate to the ligh-dark cycle

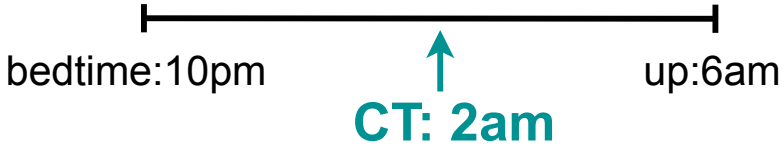
Phase-dependent shift of free-running human circadian rhythms in response to a single bright light pulse

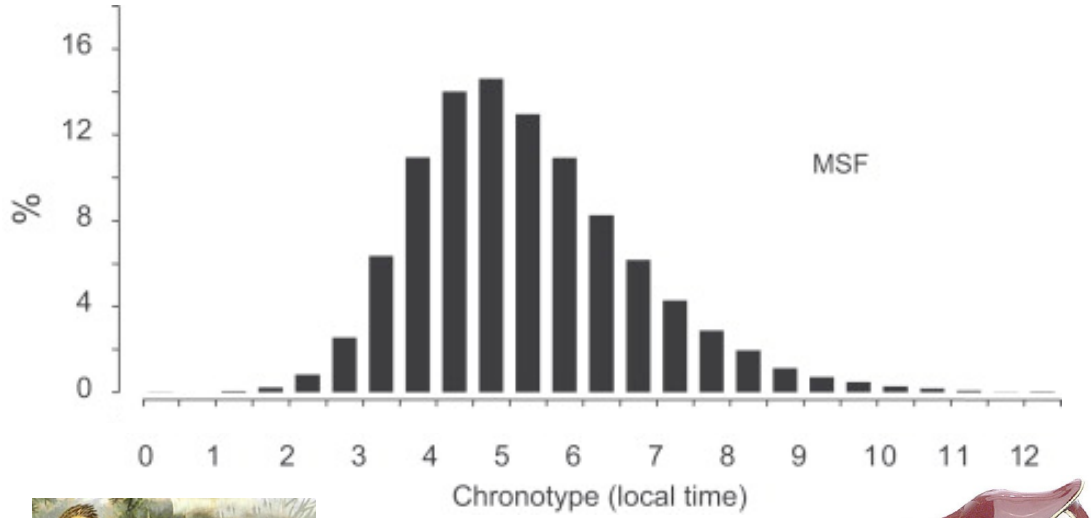
K. Honma, S. Honma and T. Wada* Experientia 43 (1987), Birkhäuser Verlag, CH–4010 Basel/Switzerland



Chronobiology, larks and owls

ChronoType (CT): time corresponding to mid-point in sleep





from Roenneberg et al. Epidemiology of the human circadian clock. Sleep Med Rev (2007)

larks

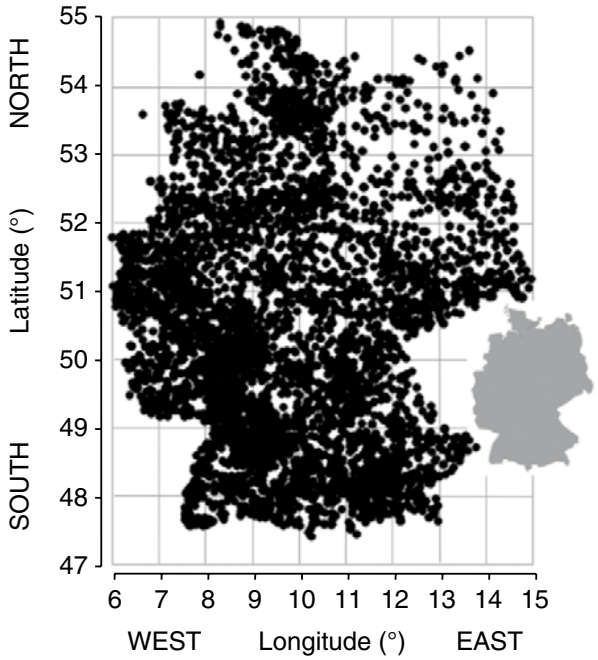
owls

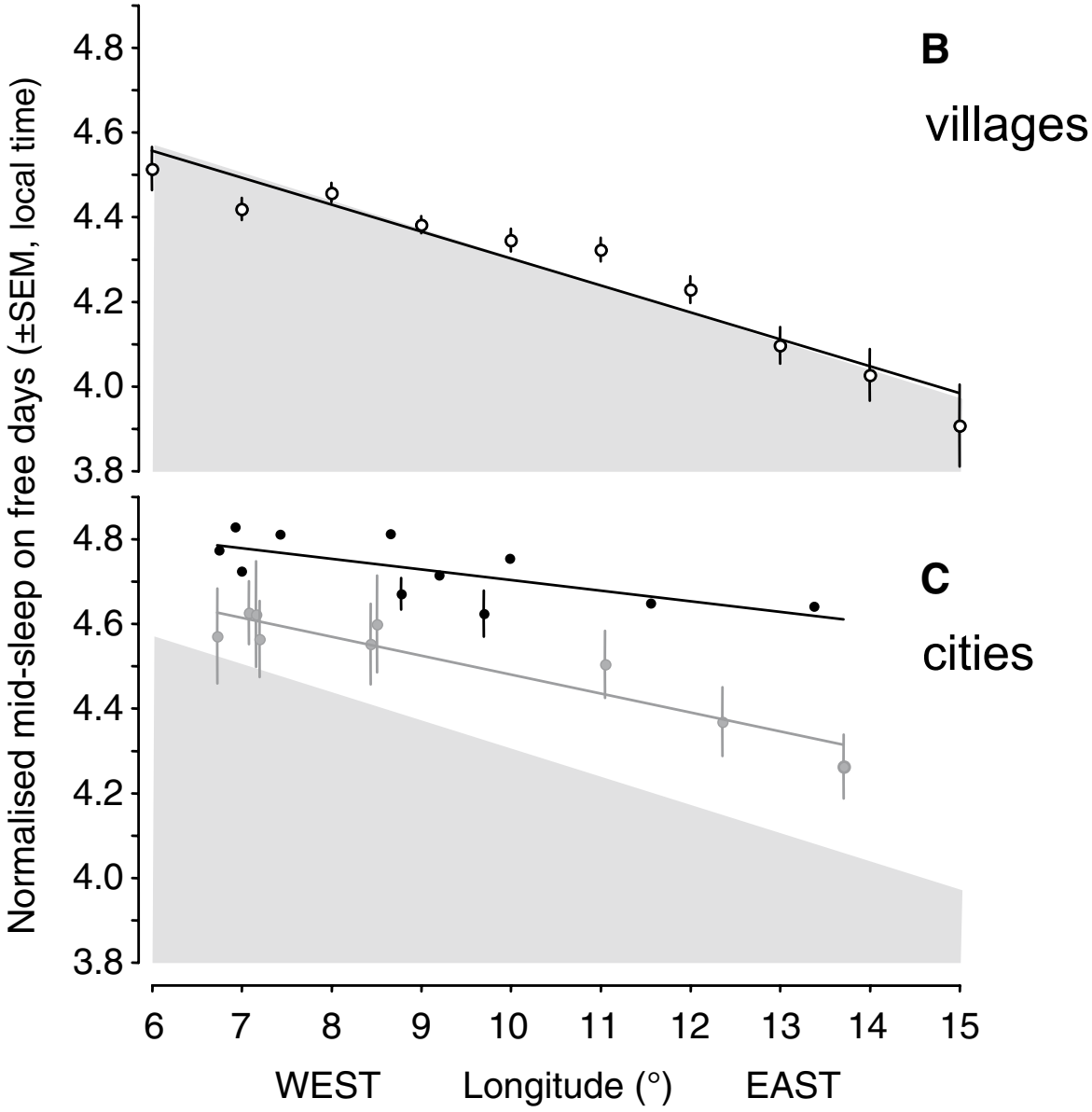
Interpretation: Chronotype as a fixed point φ^* (see 6.1)

Humans (mostly) resonate with solar time, not social time

The human circadian clock entrains to sun time

Till Roenneberg[1],
C. Jairaj Kumar[2] and
Martha Merrow[3]



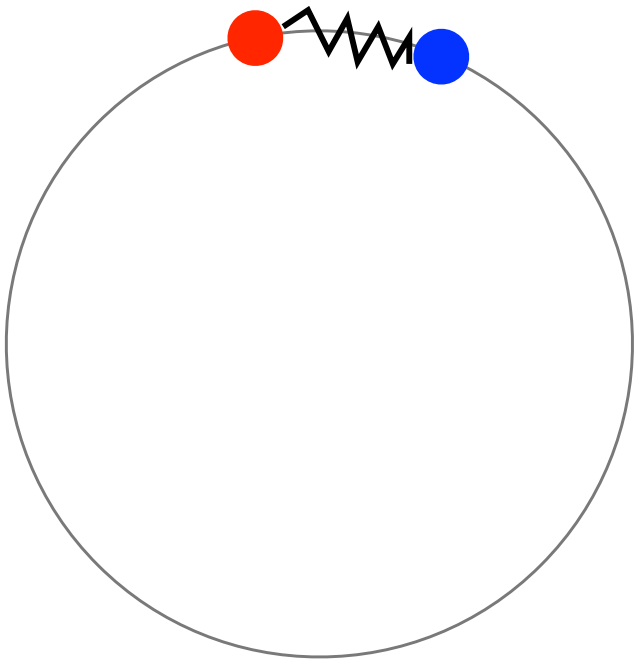


Current Biology

Two model of coupling: continuous and pulsed

Model I (6.1)

- $\dot{\alpha} = \Omega$
- $\dot{\theta} = \omega + K \sin(\alpha - \theta)$



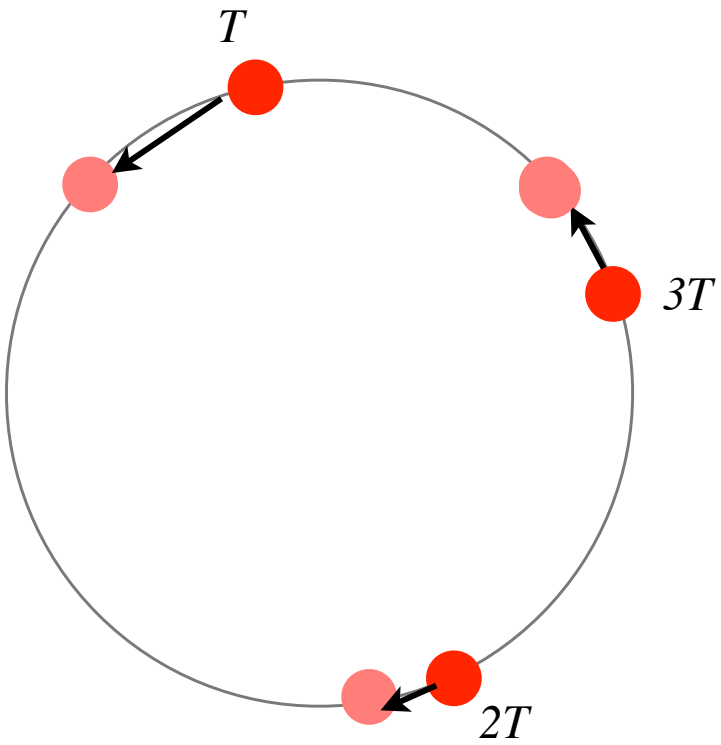
'Like a spring'

Model II (6.2)

- $\dot{\theta} = \omega + \sum_n \delta(t - n\,T) g(\theta(t))$

$$\theta_n = \theta_{n-1} + \omega\,T + g(\theta_{n-1})$$

$$g(\theta) = e\,\sin(\theta)$$



instantaneous kicks