



## Sleep and Order

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Life is equilibrium among order and chaos: while physics naturally tends to maximize entropy, thus disorder, biology and life is instead a costly way to locally invert such process (globally inexorable) in order to keep information on cells, organs, individual as far as possible for a certain amount of time until death. Order is thus nice, it allows life, complete disorder brings to death, the main disorder each of us can suffer. On the other side, too much order is not good anyway: it is not just a moral suasion, thinking for instance of a past also degenerating in Holocaust, but a precise biological need: too precise functioning is less robust to adversities, always happening in the statistical variability of life. At species level, this is proven by the success of sexual reproduction, able to produce individual slightly different from each other, allowing and grounding Darwinian evolution, favoring the survival and reproduction of the most fit, that could vary from time to time accordingly to the environment evolution. At individual working level it is sufficient to think to hearth rate variability, allowing vagal-sympathetic balance to be ready to react to stress or relaxation in a compliant way with the controlled organs: denervated hearth after transplantation became weaker also because the absence of such phenomenon, while not surrogated by appropriate variable implanted adaptive pacing.

Sleep is not escaping such general consideration, both being an ordering opportunity for the organism and being quite ordered while well working. On the former hand, one of the functions of sleep is to suspend consciousness at a certain amount with respect to external stimuli, thus letting the conscious brain to relax and probably reorganize, thanks also to dreams. On the latter hand, sleep is known to be a sequence of cycles, each during about 90 minutes, of progressive deepening, even if not always completely monotone but suffering oscillations, toward the paradox stage of dreams, where there is a sort of consciousness and of course brain works. In the young adult, at least subsequent four of such cycles with no conscious awakening among each two consecutive ones, constitute the classical almost-8-hours paradigm usually constituting what could be called ordered sleep. Most of us, not anymore

so young, have experienced such, and often complain it is not anymore like that: is that a disorder? Probably yes, even if causes and severity is probably worth to be discussed.

First of all, the recalled sequence of about 4 consecutive cycles each during a bit less than a couple of hours is not just more than we keep to be able to do when aging, presenting interruptions besides difficulties to fall asleep and/or stay awake, but also much less than needed to a newborn, whose main activities are frequent alimentation and sleep in between subsequent meal, for an amount globally surely longer at least at the beginning, That already means that if sleep is involved in order, in both the recalled senses of pacing and following order, makes such necessary time consuming activity in the center of our life. A sure disorder is on one side sleep chronic auto induced deprivation bringing to death, or on the other side narcolepsy leaving alive without a real life. In between, all our experienced situations, ordered enough to be compatible with life, but not enough not to need pacing and/or support. A natural variability has already been recalled from birth to aging, showing a progressive decreasing of the quantity of sleep: is sleep just less needed with aging, or just less easy, for both inner and exogenous needs? The “social” evolved sleeping concentrated at night is the (unique) physiological way? It does not seem so: a genius like Leonardo da Vinci is reported to work day and night while sleeping just a few minutes every few hours when exhausted, in a so called polymodal fashion that is not dissimilar from babies as frequency, except for reciprocal awake/asleep ratio. Most children, some adult, many elderlies do at least a short nap in the early afternoon, thus mimicking just one of such cycles. Many do naps when quietly traveling.

There is an order, in progressive deepening toward dreams when reposed, while deep immediate jump in dreams and deep when exhausted, but a great variability is compatible with reasonable life even when heavy disturbances like sleep apneas reduce quality and interrupts quality of sleep. Studying sleep is thus still important in order to help people better sleep, to better live awake