The biophysics of balanced living: balancing is (one aspect of) organism-level mechano-homeostasis

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Résumé

What exactly does my sense of balance sense? What exactly is kept, when I keep my balance? On current views, the sense of balance is arguably just an abstraction from diffuse sensorimotor activity involved in not falling over. The task of balancing remains under-defined, reliant upon the intuitive notion of not falling over rather than formal concepts. The outcome, balance (noun) is conceived as epiphenomenal; a mere consequence, not a cause, of balancing activity. This poster will present a radically new conception of balance as one aspect of organism level mechano-homeostasis, organised by control loops akin to thermic homeostasis. On this view, balance (noun) is (like body temperature) a proper, measurable physical entity. Specifically it is, almost tautologically, a certain field of mechanical force (i.e. that which perfectly cancels gravitational acceleration of the body). This force field is both what is sensed and what is kept, in the same sense as body temperature is what is sensed and kept by thermo-regulation. This force field may appear impossible to characterise in a general manner because it is fluid and dynamical, unique to each morphology and configuration. However animal evolution has found a way to do it, which this poster will explain in formal and conceptual detail. This homeostatic conception of balance is relevant to topics covered in keynote talks on contributions to the sense of self from vestibular activity (Prof Lopez), and protective agency (Prof de Vignemont). Mechano-regulation and thermo-regulation may contribute to the sense of self in very similar ways.

Mots-Clés: balance, homeostasis, mechano, regulation, sense of balance, sensorimotor

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