Ecology of skills: How do we control the encounters with the environment?

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A mathematical biologist Robert Rosen once pointed out succinctly that a function of an organism can never be understood in terms of its internal structure simply because "a function requires an external context; a structure does not (Rosen, 2000, p.25)." Our skills are a form of function which is inherently directed toward controlling the encounters with the environment that afford benefit or injury. In this talk, I discuss how the emphasis on *encounters* between animal and the environment may be useful in guiding the research on skills. The talk consists of three parts: (1) what our skilled behavior is directed to, (2) dynamics of exploratory movement, and (3) informational basis for prospective control of encounters. The first part considers the issue of what structures the skilled behavior of an animal *as a whole*. It presents an empirical example of assembly of multi-element systems toward controlling the functionally-specific relationships to the environment. The second part focuses on a special kind of encounters in which an animal hunts for perceptual information. I highlight the recent finding about the characteristic dynamics of exploratory movement that effectively resonates to the ambient information. The final part of the talk discusses the issue of how the values of our *future* encounters with the environment can causally affect the course of our *current* behavior. Each part of the talk includes empirical studies on craftsmen (Nonaka & Bril, 2014), an artist (Nonaka, 2013), child development (Nonaka & Sasaki, 2009), and evolution of human tool-use (Nonaka, Bril, & Rein, 2010; Nonaka, 2012).

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