

MOTOR LEARNING NOTES

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p. s89f. Distinct mechanisms underwrite human timing

“We examined this question from the perspective recently introduced by Jirsa and Kelso (2005), who proposed a model construct that, dependent on the parameters, generates discrete or rhythmic movements. When prepared in the 'discrete' regime, a movement will be executed on in the presence of an external input, whereas in the limit cycle ('rhythmic') regime the system is autonomous (i.e. requires no external input). That is, distinct mechanisms underlie movement generation in both regimes.... Comparison of the human and computational data indicated that movements a low frequencies were generated in discrete fashion (except when instructed to move 'as smooth as possible'), whereas at higher frequencies the participants switched to rhythmic behavior. These findings indicate that discrete and rhythmic movements constitute two distinct classes (an externally driven and an autonomous system, respectively) and that the discrete system is operational only in a limited range of temporal constraints.”

[adaptation to higher speed/frequencies will be autonomous, spontaneous, whole-body]

Alain Berthoz, *The Brain's Sense of Movement*, Cambridge, Harvard Univ. Press, 2000.

p.13f. **Adaptation** (third function in movement [spontaneous utilization of reactive forces, elasticity, etc. corresponds to Bernstein's third phase of motor learning])

When action encounters surprises, it is impossible, or irrelevant, for corrective impulses to reestablish the initial plan of action. In this case, the receptor of information acts as an initiator (and not as a regulator) of adaptive changes in the program being executed. It does this by introducing either small technical changes into the movement or taking an adjacent trajectory. And it does it until the program is completely reorganized, even down to the repertoire of consecutive elements and the staging of motor action – in other words, it adopts a new tactical approach to the task.”

p. 15. Bernstein's **comparator**: “It does not function between successive or simultaneous receptors to compare two distinct events, but between flowing, continuous reception and an internal guide.”