How to ORGANIZE BEHAVIORS in DFT

Movement generation by humans and robots: a dynamical systems perspective
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SIMULATIONS OF discrete nodes
ORGANIZING behaviors
TRADITIONAL
sequence generation

![Graphs of traditional sequence generation](image-url)
IRREGULAR vs TIMING
• conflict between stability and sequentiality
• there must be a structure in the (neural) representation of an action
Behavior

Elementary BEHAVIOR

$u_{\text{int}}$  
intention field

$x$  
sensory-motor system

$u_{\cos}$  
CoS field

$y$
3 COGNITIVE MODELS of sequences

chaining

A  B  C

ordinal

A. B. C.

positional

A  B  C

(Henson, 1998)
2 TYPES of organization

1 Serial order

2 Behavioral organization
1 SERIAL ORDER
arbitrary sequences
serial order architecture

(Sandamirskaya, Schöner, 2010)
a ROBOTIC example
2 Behavioral Organization

flexibility
3 COGNITIVE MODELS of sequences

chaining

ordinal

positional

(Henson, 1998)
**PRECONDITION constraint**
COMPETITION constraint
a ROBOTIC example
(almost) the whole ARCHITECTURE
GRASPING and POINTING
ACTIVATION over time
\[
\tau \dot{d}_i(t) = -d_i(t) + h_d + c_0 f(d_i(t)) \\
- c_1 \sum_{i' \neq i} f(d_{i'}(t)) + c_2 f(d_{i-1}^m(t)) \\
- c_3 f(d_i^m(t)) - I_c(t)
\]

\[
\tau \dot{d}_i^m(t) = -d_i^m(t) + h_m + c_4 f(d_i^m(t)) \\
- c_5 \sum_{i' \neq i} f(d_{i'}(t)) + c_6 f(d_i(t))
\]