# On the dynamic interplay between perception and action - a connectionist perspective

Haazebroek, P.

# Appendix

HiTEC incorporates realistic neuronal integration/decay properties, non-linear response (output) functions of excitatory and inhibitory neural units, as well realistic voltage-dependency of feedback connections and associative Hebbian learning. Incorporating these realistic neural properties implies various parameters in the model. The default values for all parameters are listed in Table 4.

**Table 4.** Default parameter values for HiTEC simulations

| **Category** | **Parameter** | **Default value** |
|---|---|---|
| External inputs | External input sensory codes | 0.5[a] |
| | External input motor codes (during learning) | 0.3 |
| Sensory weights | Sensory – feature forward | 0.4[b] |
| | Sensory – feature backward | 3.0 |
| Stimulus features | Feature –task forward | 1.3[c] |
| | Feature – task backward | 0.2 |
| Response features | Task – feature forward (location, intensity, etc.) | 1.3 |
| | Task – feature forward (other) | 0.9[d] |
| | Task – feature backward | 0.2 |
| Inhibition | Excitatory to inhibitory paired unit | 1.25 |
| | Inhibitory to other excitatory codes within layer | -0.75 |
| Code parameters | $d_a$ decay parameter | 0.1[e] |
| | $q_a$ sigmoid parameter in response function | 0.9 |
| | $n_a$ sigmoid parameter in response function | 4 |
| | $\gamma_{exc}$ scale parameter | 0.9[f] |
| | $\gamma_{inh}$ scale parameter | 0.9[g] |
| Noise | Mean | 0.025 |
| | Standard deviation | 0.015 |
| Code thresholds | Voltage threshold ($VT$) | 0.5 |
| | Learning threshold ($LT$) | 0.6[h] |
| | Response threshold for motor code selection | 0.6 |
| Learned weights | Learning rate ($LR$) | 0.1 |
| | Weight decay ($d_w$) | 0.0005 |
| | Weight scale factor ( $\varphi$ ) | 0.8[i] |
| General parameters | Action effects trials | 10 trials per motor code |
| | Action effect duration (= cycles of weight learning) | 50 cycles |

**Exceptions (see Table 4)**

a. 0.6 in Simulation 6
b. 0.45 in Simulation 4 for the sensory to feature connections (visual to word); 0.3 for 'forward' and 'backward' in Simulation 6
c. 1.5 in Simulation 6
d. 0.55 in Simulation 2 and 0.6 in Simulation 3
e. 0.2 for sensory codes (all simulations)
f. 0.8 for sensory codes in Simulations 1 to 5; all codes 1.0 in Simulation 6
g. 0.8 for sensory codes in Simulations 1 to 5; all codes 1.0 in Simulation 6
h. 0.5 for Simulations 1 and 2
i. 1.0 in Simulation 6

Note that we have attempted to eliminate various scaling parameters in the model instance sued for Simulation 6. That is, $\gamma exc$ , $\gamma inh$ and  have been set to 1.0. In order to retain the model dynamics, some of the other parameters were adjusted accordingly: external input and task-feature (other) weights.