Lecture 14.1 Exercises

1. Implement a perceptual schema that detects a moving object on a 100-pixel wide monochrome one-dimensional retina. Assume that objects are encoded on the retina as "1"s against a backdrop of "0"s. The schema should take as input a sequence of retinal snapshots and have an activation value that varies over time (according to the equations given in the text), increasing if/when that sequence represents a moving object and decreasing otherwise. Assume that schema is operationalized by a cyclic system that stores the previous input and increases activation if and only if the current input is a 1-unit translation (left or right) of the previous input. Assume also that detection occurs when the schema's activation exceeds a threshold (e.g., of 0.80). Explore the effects of parameters such as decay and excitation due to movement detection.

2. Extend the implementation by adding a second schema that detects only large moving objects (defined as objects greater than 4 pixels in width). Consider in particular the role of lateral inhibition between competing schemas as required by option b and option c in figure 14.1 of chapter 14.

Project

Develop an implementation of Lara et al.'s (1984) model. To do this you will need to consider how to code all possible inputs and outputs, as well as how to treat hierarchically structured schemas. Explore the behaviour of the model given prey located behind a barrier and prey located beyond chasms of different width.