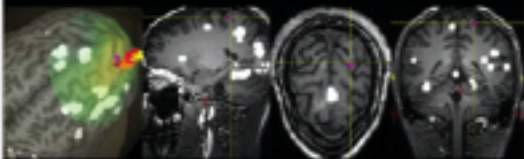


RDPModels

How They Work

- **PDP models** are conceptual in many ways (like cognitive models), yet the fact that the essential ‘pieces’ look/work a whole lot like how we understand neurons look/work (i.e. communicate) means it has a biologically plausible form that we could consider a sort of ‘**neural network**’ (hence the role/application in **artificial intelligence**!)
 - This is similar to how repeated firing of connected neurons can strengthen those connections (**Long-Term Potentiation, LTP**: ‘*Neurons that fire together wire together*’: Donald Hebb)
 - Can also relate **Long-Term Depression (LTD)** to these models, in which repeated firing can also (depending on how everything is connected) selectively weaken connections
- This interplay between strengthening/weakening certain connections to ‘fine-tune’ operation of the system to accomplish some goal can be compared to what happens when neural networks ‘learn’ to do things (usually through trial/error) by modifying connection weights



ESSENTIALS OF COGNITIVE NEUROSCIENCE

Bradley R. Postle

WILEY Blackwell

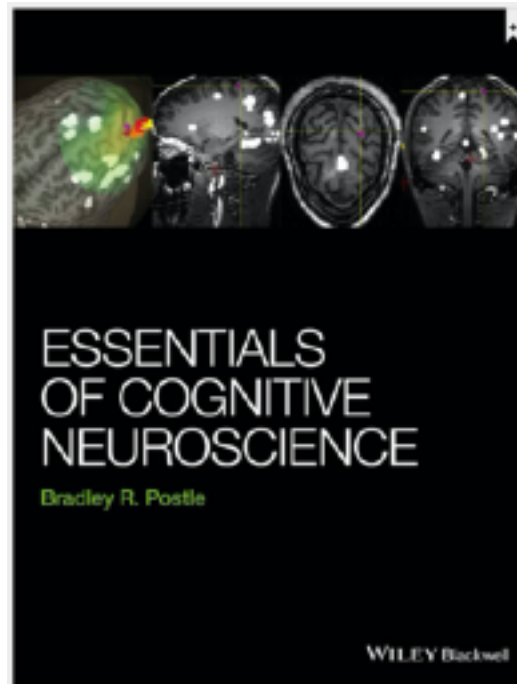
METHODOLOGY BOX**9.1 Parallel distributed processing (PDP) modeling of cognition**

PDP Models

How They Work

METHODOLOGY BOX

9.1 Parallel distributed processing (PDP) modeling of cognition



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PDP Models

How They Work

- PDP networks consist of 3 'layers' of units:
 1. **Input units:** activated by stimulation from the environment
(e.g. retinal activity when viewing pictures of faces during an experiment)
 2. **Hidden units:** receive signals from input units
(e.g. feature detectors in visual cortex that receive signals from the retina, neurons involved in perceptual judgments and decisions making, etc.)
 3. **Output units:** receive signals from hidden units
(e.g. the neurons involved in generating a verbal response by the experimental participant being shown pictures)

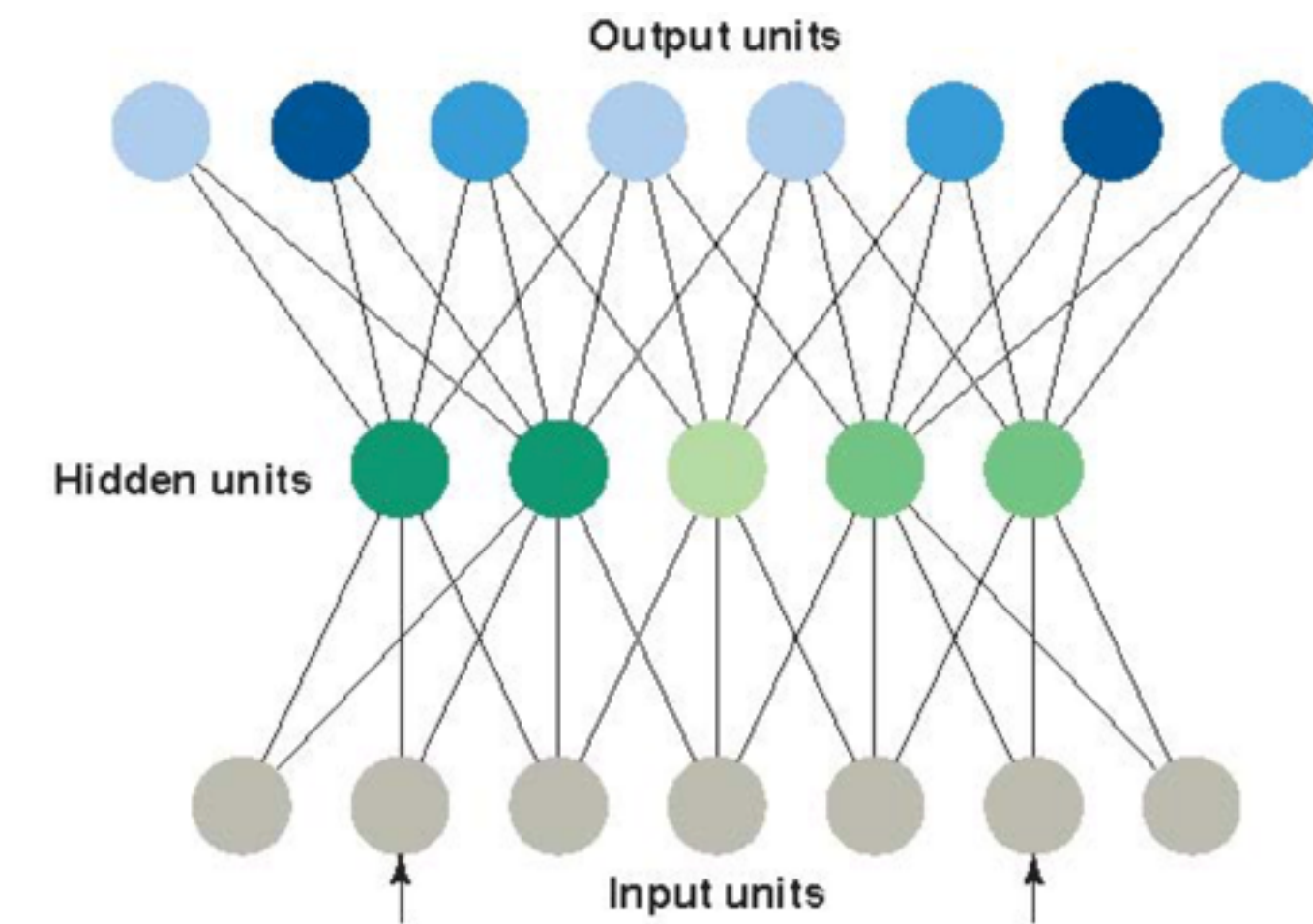


Figure 9.17 A parallel distributed processing (PDP) network showing input units, hidden units, and output units. Incoming stimuli, indicated by the arrows, activate the input units, and signals travel through the network, activating the hidden and output units. Activity of units is indicated by shading, with darker shading indicating more activity. The patterns of activity that occur in the hidden and output units are determined both by the initial activity of the input units and by the connection weights that determine how strongly a unit will be activated by incoming activity. Connection weights are not shown in this figure. © Cengage Learning