How They Represent Information

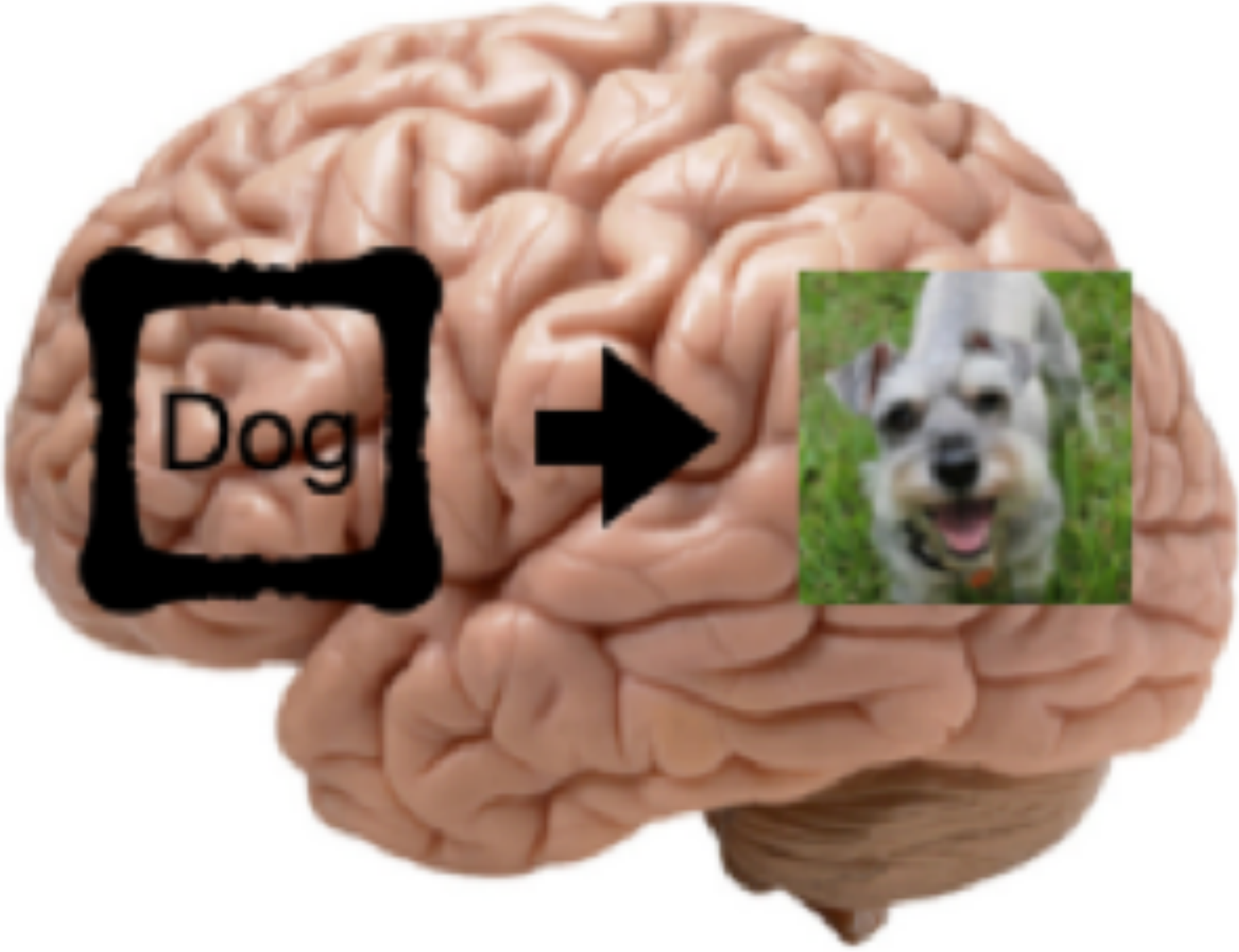
- The implication of what was discussed on the previous slide is that '**meaning**' (this is where it gets abstract!) isn't represented by any one singular part of the PDP model

  - Could this also have implications for how we think about localization of function? We're taking about representations and not functions here, but still…

- Rather, it seems to be an **emergent property** that can be understood to arise out of the interaction of all the parts of the system, not any one specific part itself

- While not what they were talking about, the Gestalt mantra applies here: 'The whole is more than the sum of it's parts!'

- "Semantic knowledge does not reside in representations that are separate from those that subserve perception and recognition, but emerges from the learned associations amongst such representations in different modalities." (Rogers, 2004)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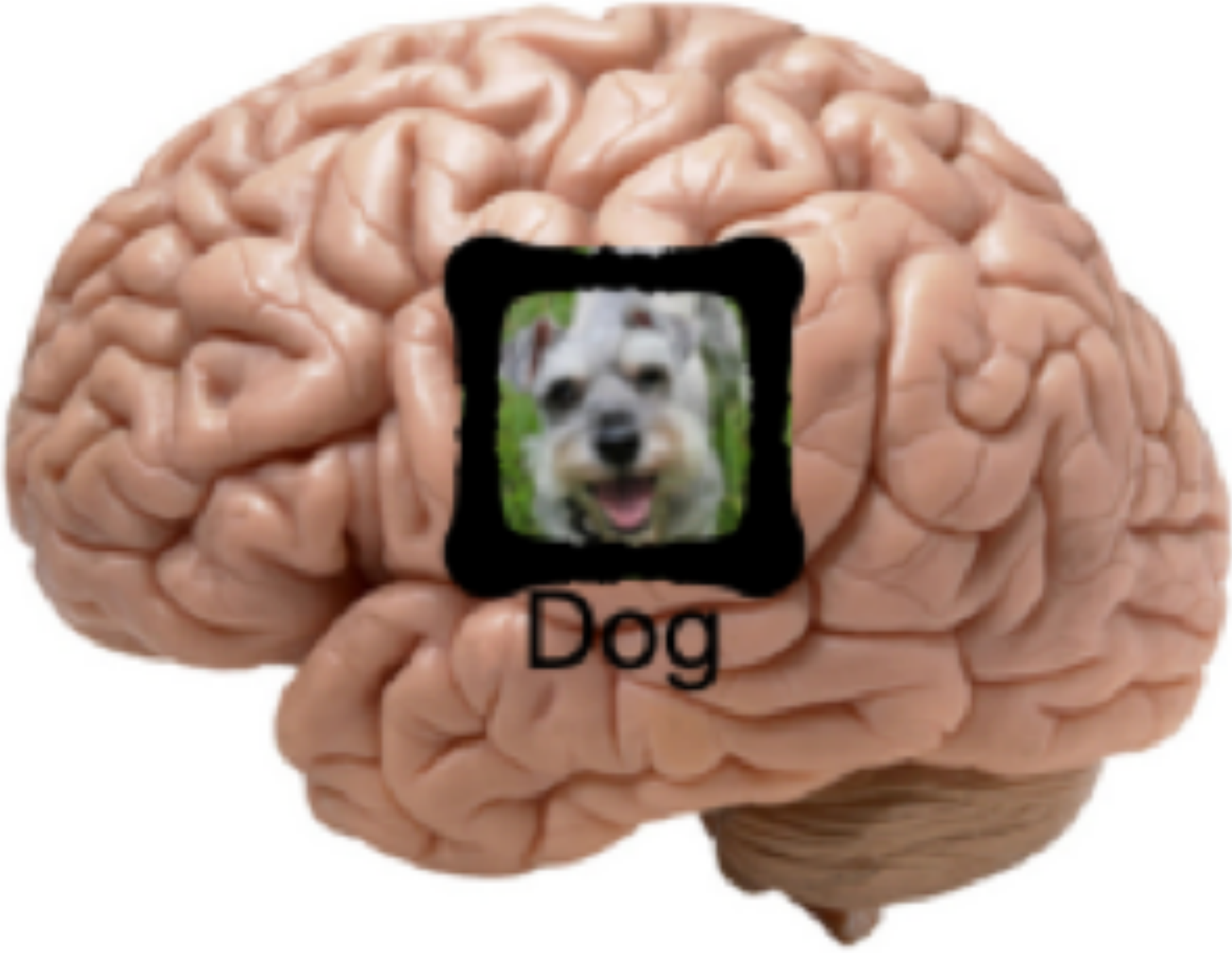
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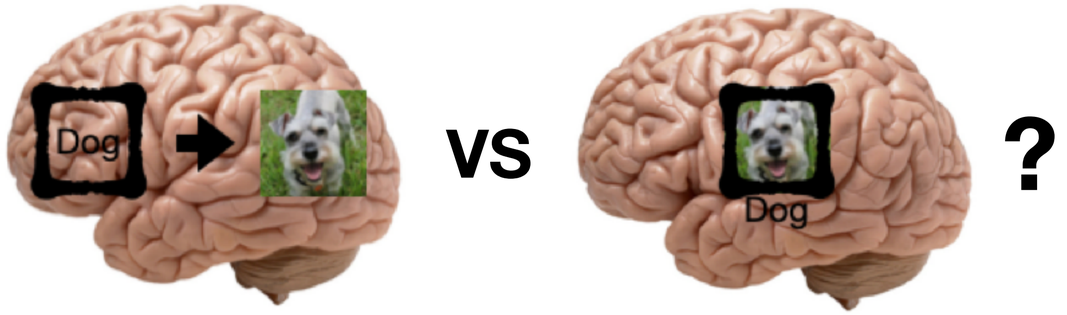
VS

PDP Models

PDP Models

How They Represent Information



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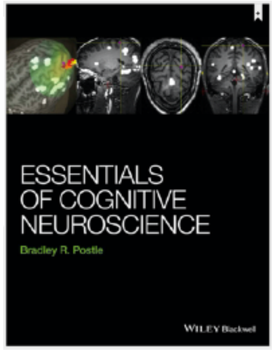
PDP Models

Modelling Recognition

RESEARCH SPOTLIGHT

9.1 Where's the recognition in visual object recognition?



- Veering back into more practical territory, building specific kinds of PDP models can be built to test hypotheses
- Imagine we want to test whether we can get a PDP model to 'behave like' (in any number of ways) a human would when performing a particular task
- Rogers et al. (2004) built a PDP model to simulate what happens when humans make judgments about faces

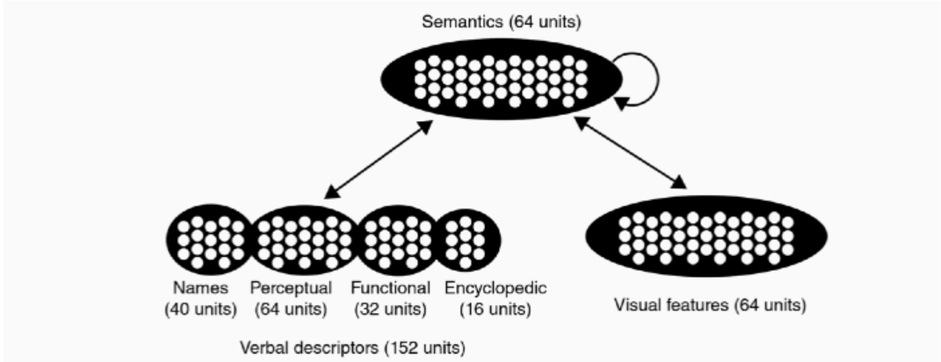


FIGURE 9.2.B PDP model of visual cognition. Source: Rogers, Lambon Ralph, Garrard, Bozeat, McClelland, Hodges, and Patterson, 2004. Reproduced with permission of APA.

The model was trained with 48 simulated items, half corresponding to living things (birds, mammals, fruits) and half to nonliving (vehicles, household objects, tools). Each item was presented both as a visual object and as a verbal label once per block, for 400 blocks. Upon completion of training, the model could be presented with any stimulus in either modality, and produce the appropriate response in the other modality. E.g., present the word "apple" to its verbal layer, it produces the representation of *apple* in its visual layer, and vice versa. The key implication of this result is that the model achieved object recognition without explicitly containing two kinds of "internal" representation – those that encode structural information sufficient to support stimulus recognition, and those that encode semantic content, or "meanings." This challenges not only explicit neuropsychological models (e.g., *Figure 9.2.A*), but also the common intuition held by scientists and nonscientists alike, conveyed in the Fuster (2003) statement, that "Perceiving must essentially involve the matching of external gestalts to internalized representations in long-term memory." The need for putative "grandmother" units is obviated.