Are my cognitive maps the same as yours? …or even, the same as mine?

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Interests

- Spatial sound (fascinated at age 8 - choirboy in Sheffield Cathedral)
- Spatial perception (interested age 19 - steering supertanker - delayed feedback)
Rudimentary artificial spatial sound

- 20th century spatial sound (music) disappointingly flat.
- Stereo, surround (quadrophonics, Dolby surround), ambisonics, WFS
But

- This model of perception as essentially passive, simplistic:
  Sensation + ‘cognitive factors’ (the mysterious workings in the ‘black box’) = perception.
Open the box...

- If the ‘black box’ is so inaccessible, is it *remotely* possible to describe how ‘prior knowledge’, memory, prediction, cognition, conception integrate in *real time* with the ongoing influx of sense data?
Cognitive map

- A simplified ‘cartoon’ that highlights salient features
- Like the London Underground map?
Are my Cognitive Maps the same as yours? ...or even, the same as mine?

- If not:
  - Can different maps do similar jobs, and
  - Can similar maps do different jobs
  - Are some maps more useful than others
  - Do people actually use the best maps for the job?
Why posit maps at all?

- Ecological approach (Gibson, J): why ‘represent’ what’s already out there?
- Cognitive constructivism: “information bandwidth” insufficient for the richness of perceptual content
What problems ameliorated by ‘maps’?

- Signal-to-noise ratios (information overload)
- Momentary sensation impoverishment
- Real time interaction (‘quick-and-dirty’ processing of salient features)
- Anticipation ...
The fire

Prisoners

Roadway where puppeteers perform

shadows cast on wall
Plato’s Cave

- Perhaps we don’t perceive underlying, objective reality, merely our (subjective) maps of it?
  “the map is not the territory” (Alfred Korzybski)
- “As if...” argument
Cognitive maps:

- Spatial
- Temporal
- Causal
- Other...
Spatial maps

“Where” (Ungeleider and Mishkin)
Direction/dimension/distance -
Representing *position* in *place*
Representing ‘place’ itself (but what is actually represented?)
Spatial maps 2

“What” Mapping of “things”
Size, shape, orientation, mass, construction…. “affordances” (?)
Spatial maps - frames of reference

- Egocentric (various) - “me-” or “mine-” centric
- Allocentric (various) - overview - the way things are from no particular viewpoint
Spatiotemporal maps

- Route maps (sequence of signposts and actions)
- Events: trajectories, vectors, speeds, amplitudes, rotations changes of spatial relationships (BioMotionLab Demos/BMLwalker.html)
Causal mapping

- **What, Where** and **How** (Milner and Goodale) spatiotemporal mapping
- Extend into the future (predict, anticipate, adjust, interact); not “now” but “next”
- Counterfactuals (Gopnik and Wellman) - should/not, might/not - event trajectories - expectation/surprise
Intuitive physics

- Rough-and-ready reckoning of how items *can* interact (Piaget, Baillargeon, Spelke, Gibson[E], Van de Valle)
Intuitions of animate behaviour

- Physical capabilities
- Estimates of intentionality (territoriality, theories of other minds?)
“Opportunity map” For fun, profit and survival

- Mapping territoriality:
- Near, far, adjacent, connected, ‘way’ open, blocked, vantage, shelter, tool
- Prey, predator, competitor, ally - intercept, avoid, hide, negotiate, threaten, placate, persuade
Mapping meaning

- Essentially, we have discussed perception as mapping meaning - representing the local causal environment *appropriately*
- ....
Modular meaning, modular maps?

- Modular ‘through-and-through’? (Sperber)
- Or more modular at more primitive stages, less so at more complex, abstract stages (Fodor)?
- Are mode-specific modules more peripheral and/or more ‘primitive’ than amodal, transmodal or multimodal ones?
Multi-perspective mapping

❖ Can discipline-specific descriptions of spatial perception map to each other?
“In the wild”

- Dancers, race drivers, crane drivers, taxi drivers, ball players pilots, actors, dogs and kings....

- Specialise in quite different spatial behaviours, probably have finely tuned neural spatial representations specific to their lives...
Transferable skills?

- If specific spatial skills can improve through learning, does this amount to the assertion that spatial perception can be taught?

And indeed, forgotten? (age-related deficits)… and re-learned?
“Theory of others’ maps”?

- Do people understand others’ maps?
- Do people have incomplete or pared-down representations of others’ maps?
- Individual differences in this?
- Are effective predators, and formidable competitors, better at representing others’ maps?
Map modules and metaphors

- Not to suggest the literal topographic mapping of causal circumstances onto specific neural substrates, but
- is this merely convenient metaphor?
- are there better metaphors?
References and Bibliography


