WEEK 7- BRAIN AND COGNITION- expertise

Expertise vs problem solving- these 2 capacities are related but…

Expertise involves people being at solving problems similar to those they have experienced and solved many times before, such as driving. Therefore, experts use *domain-specific* knowledge. They build up knowledge of how to solve similar issues for the future. E.g. checking blind spot.

Problem solving however involved people trying to solve novel problems and so must rely on *domain-general* knowledge using flexible, general heuristics. E.g. not reversing actions- if getting lost we wouldn't go all the way home and back to the house to then leave again- we take short cuts using sub stages.

Problem solving- the Hanoi task. Final goal is to move all disks to the far peg whilst keeping smaller disks on top of bigger disks. THOMAS found people generally make several quick movements then paused to divide the problem into a series of sub-goals. EGAN & GREENO found when people were trained on 3 problems then transferred to 4 they used general domain independent heuristics (ie didn't reverse previous moves).

NEWELL&SIMONS problem space theory- LIMITATIONS- real world problems use prior knowledge

Why are some people expert?

NATURE- is it talent? Or NURTURE- is it practice?

What do experts have?

- A superior ability to recognise type of problem and knowing what is important
- A large store of previous problems and solutions
- Domain-specific heuristics for their expert domain
- Improved representation of deep structure of problems
- A better understanding of categories of problems in the domain.
- High levels of expertise = many years of intensive practise!!

ACT- Adaptive Control of Thought- ANDERSON- tries to explain how we adapt to our environment using cognitive mechanisms-

1. Declarative memory- stores general, domain-independent, explicit (can be reported) knowledge used when we start to learn a new skill
2. Procedural memory- stores production rules that build on info in declarative memory using knowledge compilation- these rules are domain-specific and are implicit.
3. Working memory- this stores the currently active info from the declarative memory or procedural memory or both.

Anderson argues that skill acquisition involves fine tuning chunks of domain-specific knowledge and compiling them into procedural memory by the process of composition where a series of productions are combined into a single production.

As knowledge becomes more procedural it becomes less verbally accessible, less effortful and more automatic and so we find it difficult to verbalise/teach what we are doing.

PERCEPTUAL-MOTOR EXPERTISE- like experts at cognitive tasks, experts in other domains seem to read situations quicker and better than novices so they are better at predicting what might happen and preparing/executing an appropriate response. It is not that reaction times for example are significantly faster for experts than novices.

We can test this using an occlusion paradigm- e.g. hiding information

DELIBERATE PRACTICE- ERICSSON- says practice hugely improves performance, however he argued deliberate practice is necessary to achieve expertise but also it is largely sufficient to become an expert. He said this practice must be:

- Repetitive
- Challenging
- Monitored
- Allow for correction of mistakes

However, it must not be too hard. This helps us to minimise problems caused by out limited working memory by training us to gain greater access to information in LTM by increasing the info stored in LTM and by improving its retrieval.

He said that you won't become an expert by deliberate practice if you are doing it for fun (i.e. not focusing on getting better) or if you're trying your best to do it (i.e. too focussed) although both factors provide some improvement.

CLAIM- only practice leads to expertise- nature has no role… evidence- SLOBODA found best young musicians needed as much practise as weaker musicians= more due to practice than innate talent.

NATURE VS NURTURE- the balance is not fixed- it depends on the world we live in- if we lived in a fair and equal world i.e. free school/ university/ good food and health for everyone- then innate talent and differences would dominate… but this is not the case.