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Cyberology in the Cognitive Era

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O mundo mudou
As máquinas mudaram
A vida mudou

Agora precisamos:

Cyberologia

Cyberology

We define cyberology as the study of the benefits, harms, nature, and steerage of digital technologies.

cyberontology
systematic approach to the conditions of cognitive era

categories

Conditions	MVIF	massive, volatile, immediate, fragmented
Technologies	ARUC	AI, robotics, ubiquitous computing, connectivity
Life	HEWB	health, education, work, business

matrix

MVIF x ARUC x HEWB	This gives a reference grid of $4^3 = 64$ 3-tuple (fuzzy) cells, e.g. <M,A,E>, e.g. interpreted as "education in the use of AI for mass data"

Cyborgia and Change

We have entered a new age. It has been called the “Cognitive Era”, the “Second Machine Age”, the “Fourth Industrial Revolution”, the “Second Digital Revolution”.

Cyborgia. It involves a **synergistic** relationship with machines. This is no longer simple tool-use, but a collaboration with machines which also collaborate with each other.

Fast Change. It involves fast change, fast communication, volatility. The world is no longer stable and predictable, and we need to **adapt** to unexpected situations and tasks. E.g. in business it is recognised that “volatility” of circumstances requires “agility” of response.

Operational Transversality

These conditions mean that tasks and situations arise which are multi-faceted and unexpected.

We live in an increasingly fluid and volatile world in which we need the **transversal** competence of combining and adjusting our existing knowledge and skills in response to such tasks and situations as they arise.

This may be at an individual level or as teamwork, and involves “pick-and-mix” of tools and resources in response to particular challenges.

Success then requires a type of synergy: making things work together for a particular purpose, on a need-to-use basis.

This transversal skill prioritises experience and practice but de-prioritises knowledge and information (to some extent).

pick-and-mix

Cyberology and Transversality

Cyberology is inherently transversal. As we estimate the opportunities, harms, nature, and steerage of digital technologies, a multitude of disciplines, methods, and skills may be relevant on a case-to-case basis.

E.g. law and robotics may be involved in one case, philosophy, computer science and education in another, human-computer interaction and psychology in another, etc.

Transversality and Executive Function

There is at least an analogy between the task of operational transversality and the executive function (EF) of the human brain.

EF is an organiser which selects, schedules, and adjusts our “schemas” for action and perception.

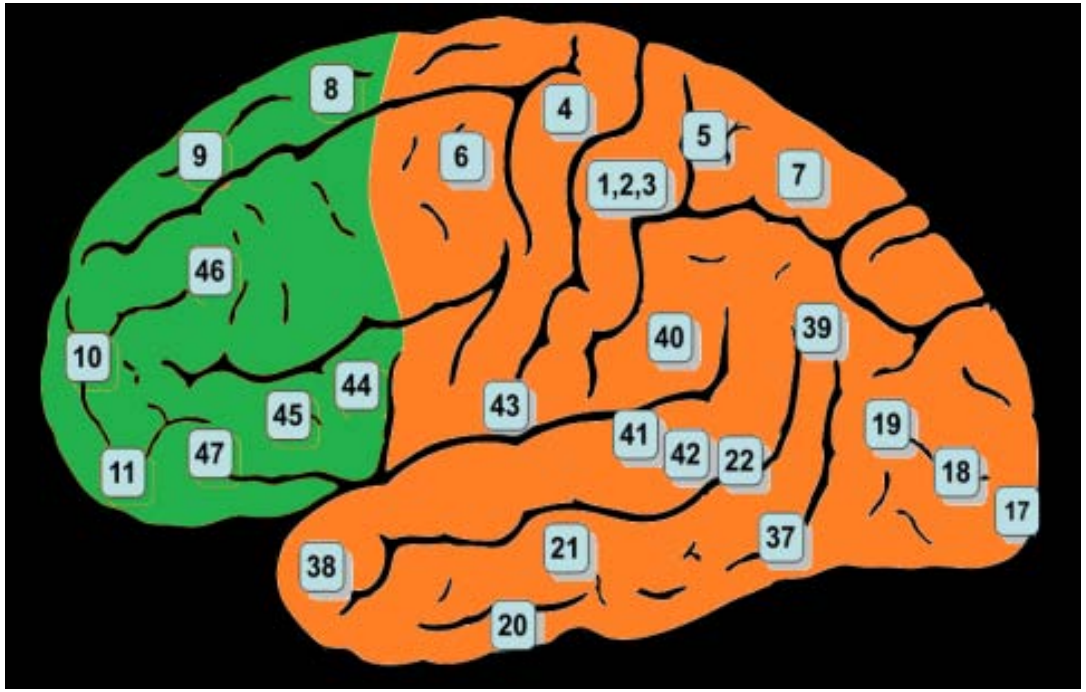
EF determines which schemas are prioritised (working memory or mental set), when they are activated (´contention scheduling´), and the handling of unexpected situations (´supervisory attention system´, SAS).

We may have a standard way of doing something, or an impulse to do something, but EF will select what is to be done, when it is done, and how it is done.

So in effect EF performs a pick-and-mix of knowledge schemas on a need-to-use basis for particular tasks and situations.

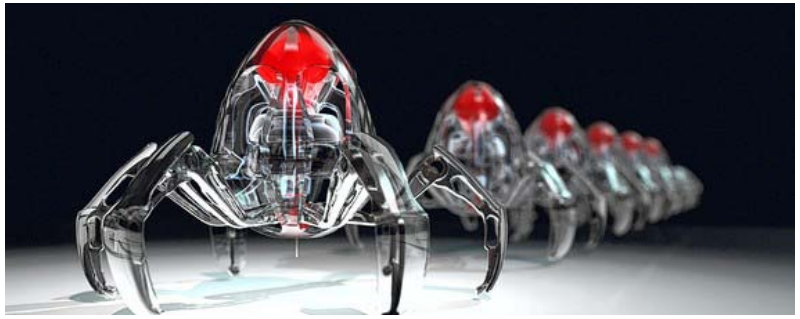
What is interesting in the present context is that EF is distinct from particular items of knowledge, but greatly influences the success of action based on them.

Executive Function (EF)



EF is associated with the pre-frontal cerebral cortex (the green part above), and also with several other brain areas

pick-and-mix



Toolbox Pedagogy

Employers have tasks which may require multiple skills. So consult employers about the skill-sets they need, which are in demand and will be in demand soon, and what goes wrong in these combinations.

A pedagogical strategy would be to set team (or individual) projects for students according to the skill-sets identified by employers. Problems could be approached at increasing levels of complexity (e.g. adding stakeholders, data sources, company takeovers and expansions, task extension, etc.).

One subject area for this is cognitive computing (e.g. IBM Watson). This is already applied in multiple industries, requiring transversal treatment.

Analogy. A carpenter has a toolbox containing various tools (= disciplines). These are used on demand (singly, together, not at all) for different tasks. Skill and experience are needed to pick relevant tools and use them together (pick-and-mix is normal but not easy).

Paradigms. Re. transversality in education, this talk emphasises action and tasks (projects) above knowledge (exams), it uses a manual metaphor (tool use) above a visual one (perspective), and it emphasises employer-consultation (empiricist) above pre-conceived curriculum (rationalist) --- in response to the transversal (pick-and-mix) demands of modern life and work.

cyberlexicon
articulation of the cognitive era

cyberlexicon	A vocabulary for cyberology
cyberology	The study of the benefits, harms, nature, and steerage of digital technologies
cyberphronesis	Practical wisdom in cyberspace (cf Aristotle, Nichomachean Ethics, book 6)
cybersense	Good judgement in cyberspace
cyberstoicism	Self control in cyberspace (cf Epictetus et al)
cyberstress	Stress caused by information overload, fragmented attention, disenchantment, etc. in cyberspace
ditropic	A technology which has good effects, bad effects, or both, according to context of use
metarobotics	Human employment due to robotics
steerage	Deliberate utilisation of technologies for beneficial effect

Change has been so fast that the dictionary and education are many years behind technogenic reality. So we need new vocabulary. Can you find anything in the dictionary which expresses **exactly** what these terms are used here to express?

Conclusion: A New Balance?

The cognitive era creates a need for cyberology as a subject for schools, universities, short courses, etc.

It also creates an increased need for transversal competence in addressing new and surprising tasks and situations in a fluid and fast-changing world.

There is at least an analogy between transversality and the brain´s executive function which may help to illuminate the nature of operational transversality.

This suggests a new balance in education between traditional subject knowledge and transversal skill.