



VW BEETLE &
KARMANN GHIA

1954 thru 1979 □ All models

Automotive Repair Manual



THE
HIGHWAY
CODE



THE
JOY OF SEX



The Craftsman Learns

...or Learning the Craft

PROGRAMMING
LANGUAGE



EVERY MANUAL BASED ON A
COMPLETE TEARDOWN
AND REBUILD



Pete Goodliffe

*A programmer, a columnist,
an author, a teacher. Someone
who cares about code.*

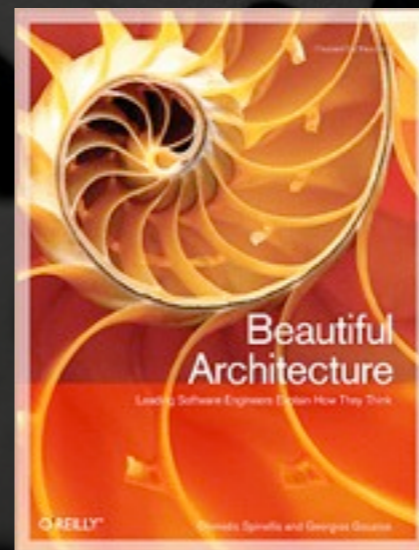
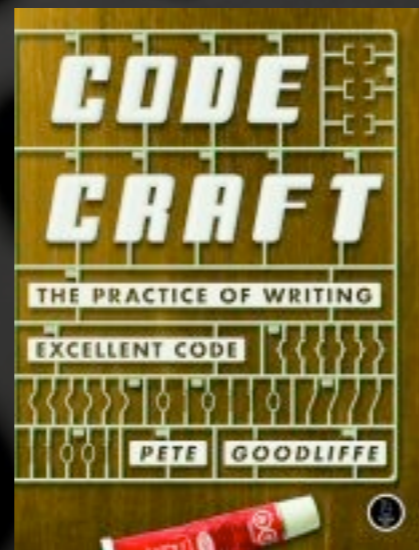
*www.goodliffe.net
goodliffe.blogspot.com*



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talk synopsis

Software developers should be perennial students.

Exceptional programmers aren't the ones who know it all. No one possibly can, no matter what the self-professed gurus would have you believe. Truly great software developers know their limits, and constantly strive to push them, to learn new skills and amass a catalogue of new techniques that can be applied to their craft.

As a programmer you constantly face fresh challenges; you will frequently be forced to learn a new language, a new technology, or a new project. And you will have to know it all by... yesterday. It's both our responsibility and, hopefully, our pleasure.

I this talk we'll investigate:

- ▶ *how the software craftsman approaches **learning***
- ▶ ***what** information to learn, and what to ignore*
- ▶ ***how** to learn new things effectively*
- ▶ ***techniques** for quickly picking up new technology*
- ▶ *healthy **attitudes** towards learning*
- ▶ *the craftsman's **curiosity**, and how to assuage it*

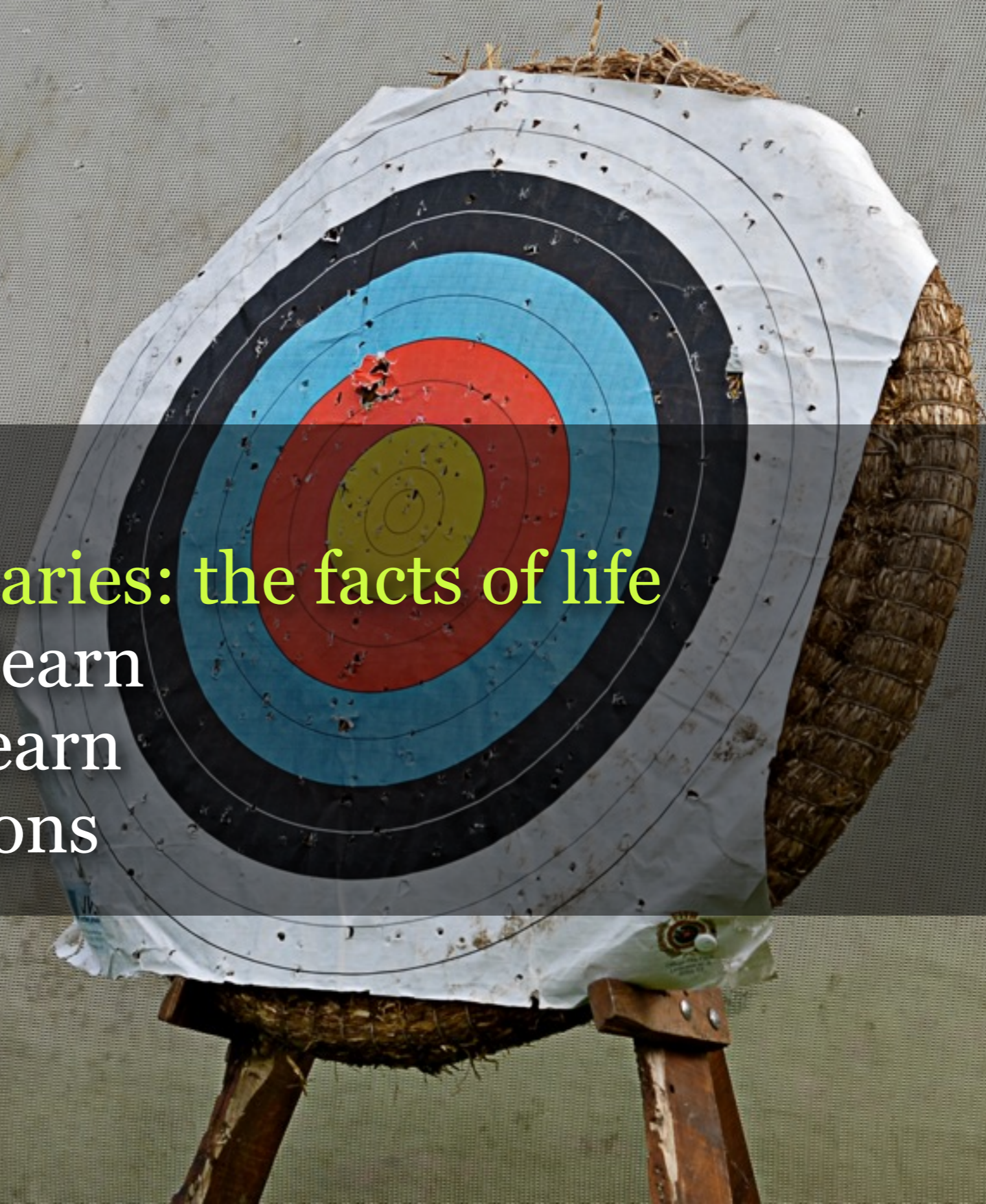
plan of attack

- ▶ preliminaries: the facts of life
- ▶ what to learn
- ▶ how to learn
- ▶ conclusions



plan of attack

- ▶ **preliminaries: the facts of life**
- ▶ what to learn
- ▶ how to learn
- ▶ conclusions



» The Facts of Life «

The prologue

LEARNING... We all do it

- ▶ *Software developers should be perennial students.*

all humans are

- ▶ *Some people do it **better** than others*
- ▶ *Some people do it **more** than others*
- ▶ *Our profession **requires** that we **constantly** learn*



Here are
some keys
to help us
improve

LEARNING... is frightening

- ▶ *It's hard **work***
- ▶ *It's extra **effort***

- ▶ ***Change** is good*
- ▶ *Learning is good*

LEARNING... is difficult

- ▶ *The problem is **getting worse***
 - ▶ *There is always a new **new thing***
 - ▶ *Increase in code **size***
 - ▶ *More **legacy** code*
 - ▶ *Increased **inter-connectedness***
 - ▶ *Career progression → increased **expectations***

10,000



10,0000

expert

8,0000

shows potential

4,0000

also-ran

10,000

expert

= 10 years

* 3 hours



= hard work

» The Facts of Life «

Categorising knowledge



*everything there
is to know*



“Reports that say that something hasn't happened are always interesting to me, because as we know, there are **known knowns**; there are things *we know we know*. We also know there are **known unknowns**; that is to say we know there are *some things we do not know*. But there are also **unknown unknowns** - the ones *we don't know we don't know*. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.”

Donald H. Rumsfeld
February 12, 2002
Department of Defense News Briefing

everything you know

everything you know you don't know

everything you know you don't know


everything you don't know you don't know

everything you've forgotten





In the actual presentation, this jumble makes perfect sense.
Animations, dontchaknow...



Here are more keys to help us improve

» Beware of the «

Four levels of incompetence

1. Conscious incompetence
2. Conscious competence
3. Unconscious competence
4. Unconscious incompetence



Here are more keys to help us improve

» The Facts of Life «

The ethics of learning

study is not something that
a teacher *does to you*

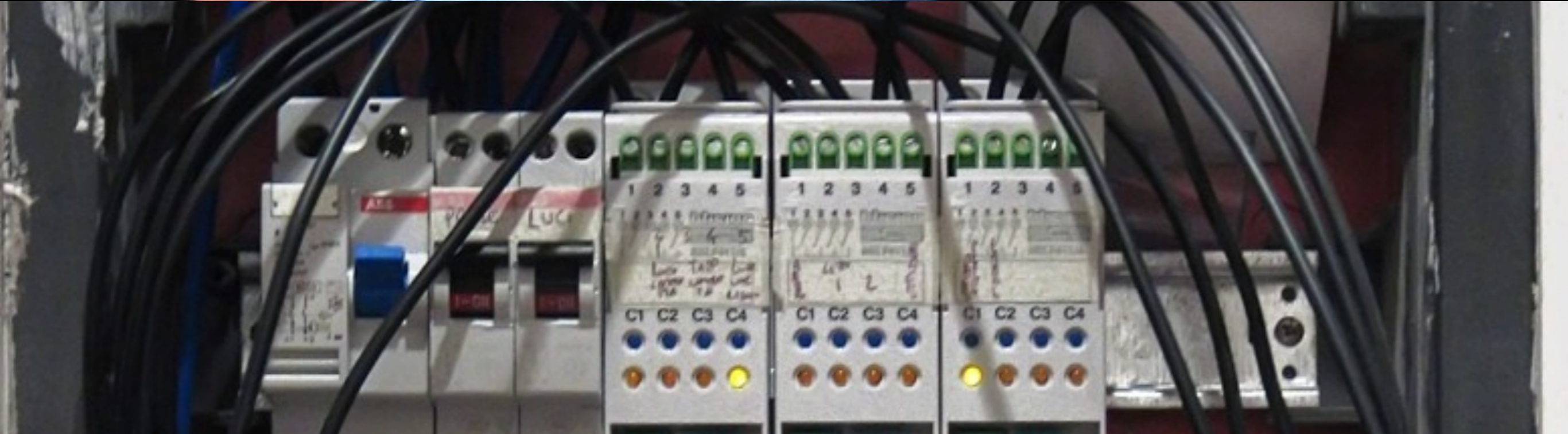
it is something *you do*

study is not something that

responsibility

it is something *you do*

professionalism



“*Learning is like **rowing upstream**: not to advance is to drop back.*”

Chinese proverb

Learning:

*You've either got to, or
you ought to.*

plan of attack

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plan of attack

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- ▶ how to learn
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your knowledge portfolio

the pragmatic programmer

PROBLEM SOLVED



problem domain

technology

new codebase

problem domain

- ▶ *Users*
- ▶ *Domain knowledge*
- ▶ *Who are the experts?*

technology

- ▶ *Programming language*
- ▶ *Library*
- ▶ *Framework/API*
- ▶ *Software tools*
- ▶ *Build system*
- ▶ *Issue tracker*

new codebase

- ▶ *Architecture*
- ▶ *Design*
- ▶ *Structure*
- ▶ *Idioms*
- ▶ *How to build*
- ▶ *How to run tests*
- ▶ *Development practices*





An aerial view of St. Paul's Cathedral in London, showing its large dome and two towers. The sky is overcast with grey clouds. The cathedral is the central focus, with its classical architecture and stone facade clearly visible. The foreground shows the surrounding city streets and buildings, slightly out of focus.

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

- ▶ *What is the **next big thing**?*
- ▶ *Different language paradigms*
- ▶ *New tools*
- ▶ *Libraries*
- ▶ *Frameworks*

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

- ▶ *How to read code*
- ▶ *How to write technical documentation*
- ▶ *How to manage software projects*
- ▶ *New techniques and methodologies (TDD, BDD, code generation, lean)*

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

- ▶ *How to understand others*
- ▶ *How to communicate*
- ▶ *How to listen (and understand)*
- ▶ *Understand the customer*

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

- ▶ *That’s why you’re here!*
- ▶ *New learning techniques*

new technology

technical skills

*how to work
with others*

how to learn

the “leftfield”

- ▶ *Foreign language*
- ▶ *Musical instrument*
- ▶ *Martial art*
- ▶ *New branch of science*
- ▶ *Art*
- ▶ *Philosophy*
- ▶ *Spirituality*

plan of attack

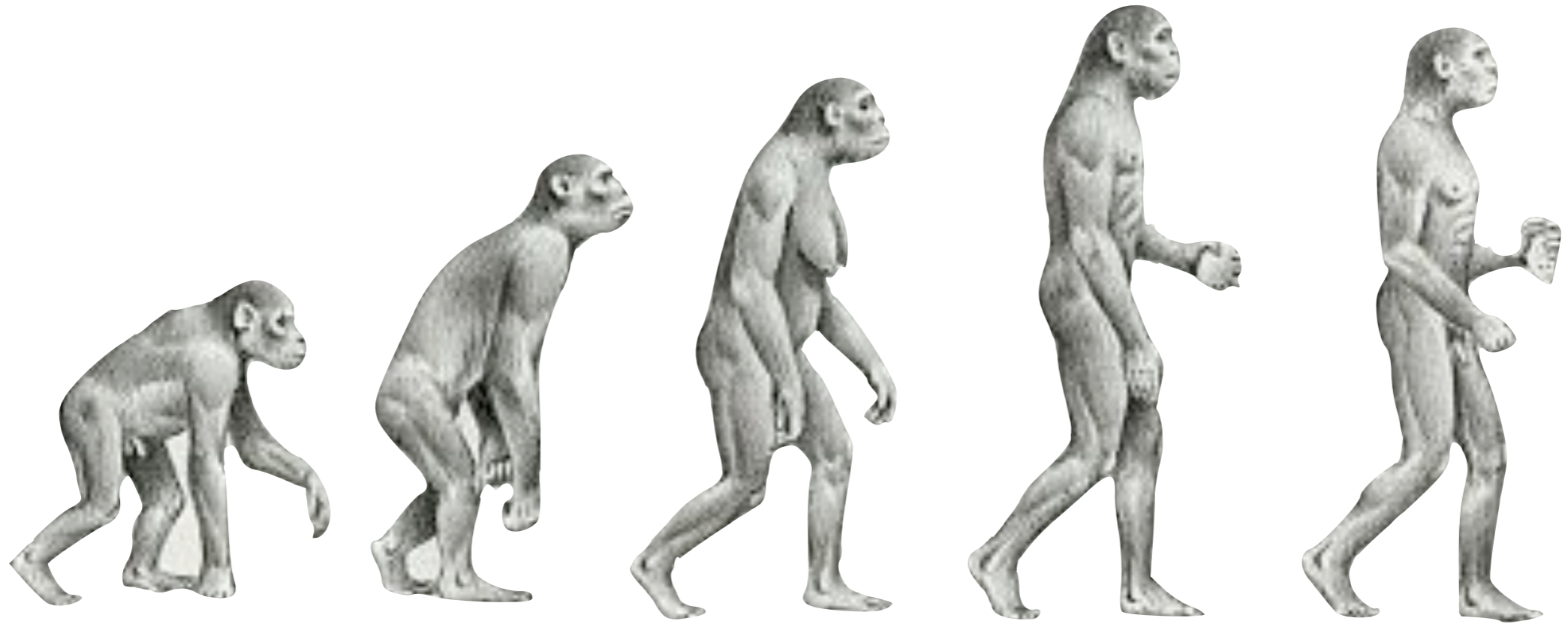
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plan of attack

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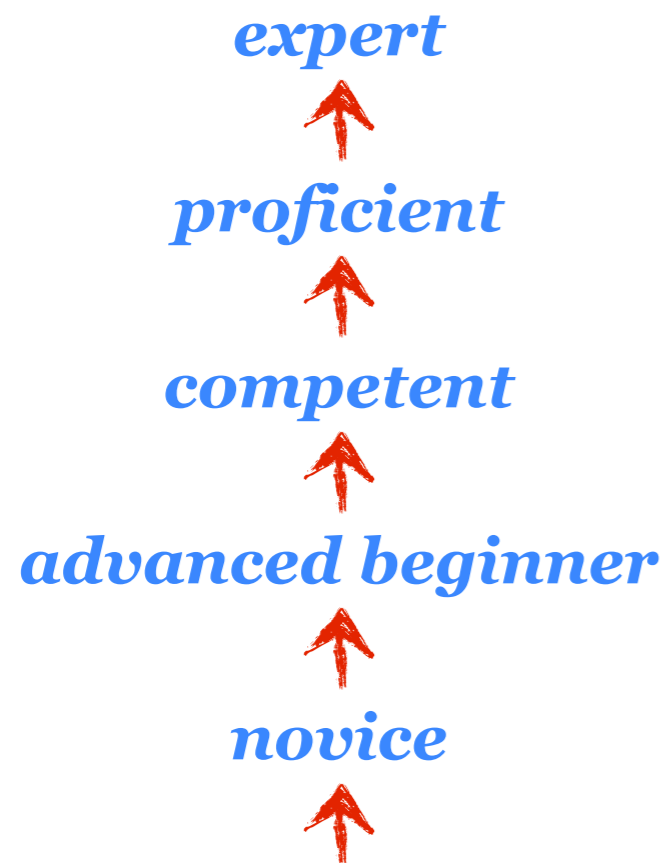




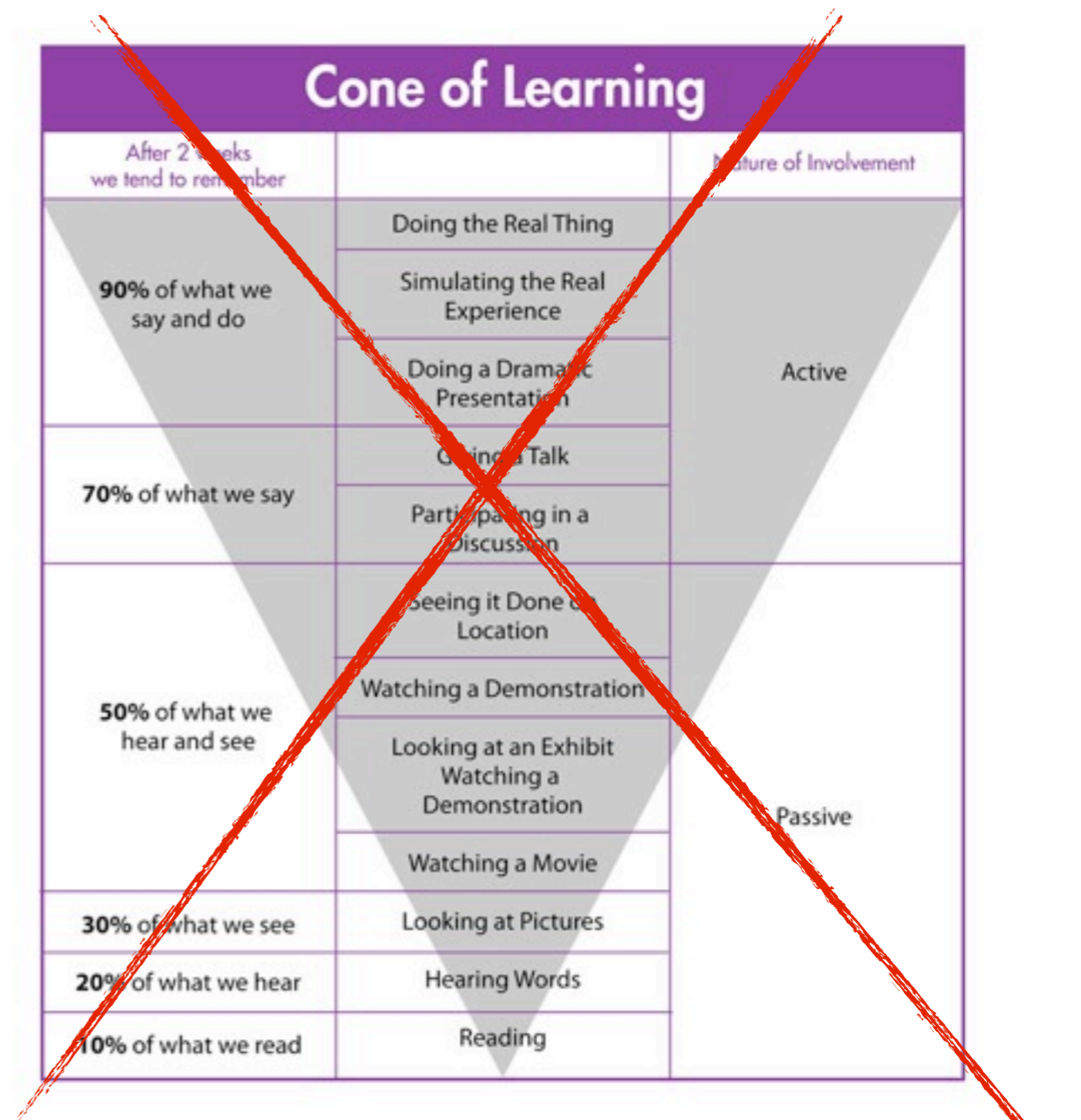
→ *apprentice* → *journeyman* → *master* →

→ *shu* → *ha* → *ri* →

dreyfus model



cone of learning



Source: Cone of Learning adapted from (Dale, 1969)

**Please
do not feed
the animals**

*“**Effort** is one of the things that gives meaning to life. Effort means you **care** about something, that something is important to you and you are willing to work for it.”*

Carol Dweck
Social Psychologist
*Self-theories: Their role in
motivation, personality and
development (1999)*

attitude

attitude

Responsibility

Continuous learning

Hunger

Curiosity

Humility

Self-belief

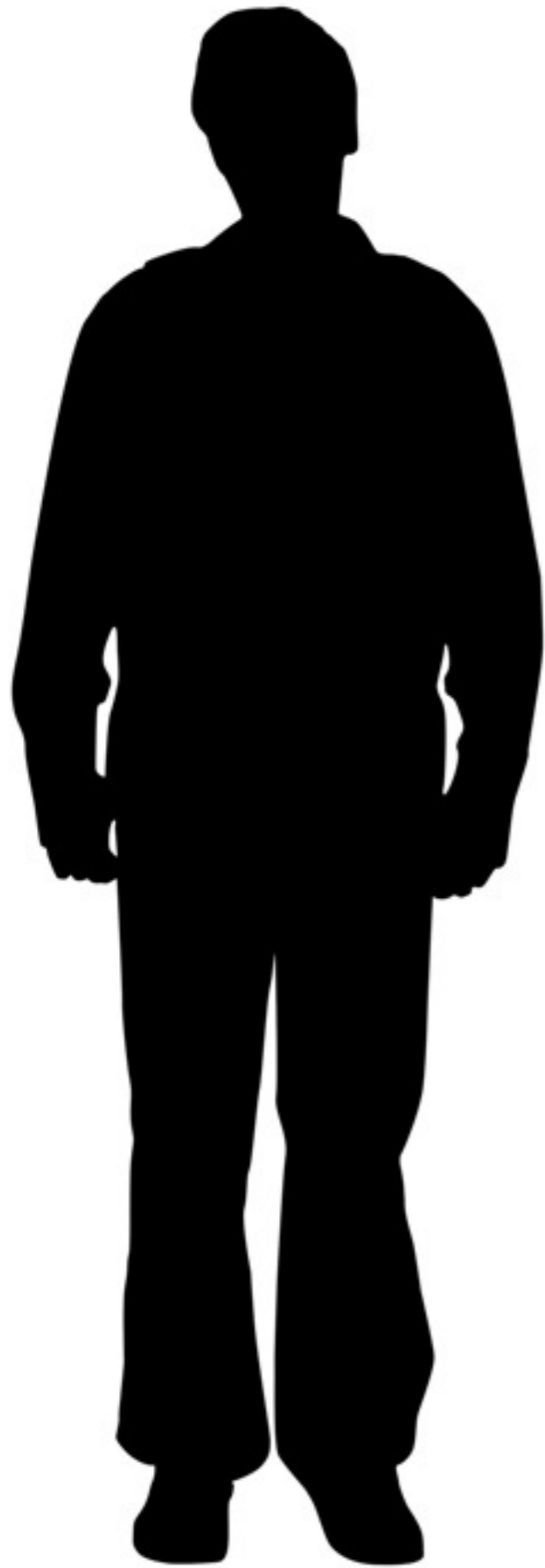
» How to learn «

Learning tools

Learning processes

Plans





The Ultimate Learning Machine





» *the user's manual* «

» Maintenance «



Use the correct fuel

- * *Amino acids from protein-rich food (meat, fish, cheese)*
- * *Vitamins/minerals (B, sodium, potassium, calcium, omega-3)*
- * *Keep hydrated*

Keep running smoothly

- * *Avoid stress*
- * *Adequate rest*

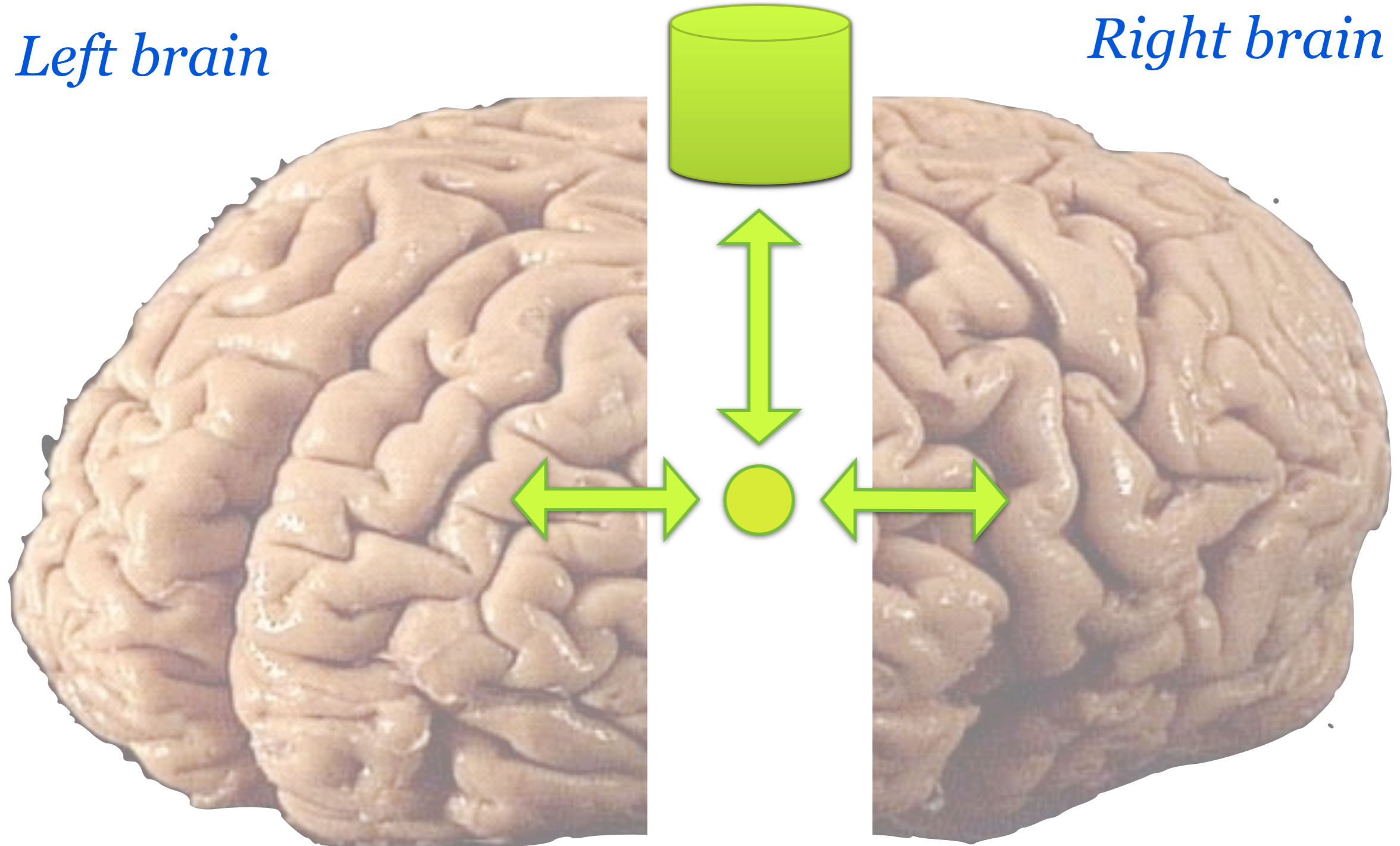






Left brain

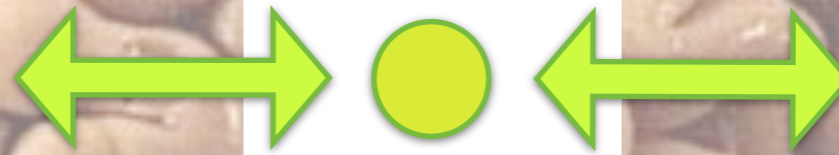
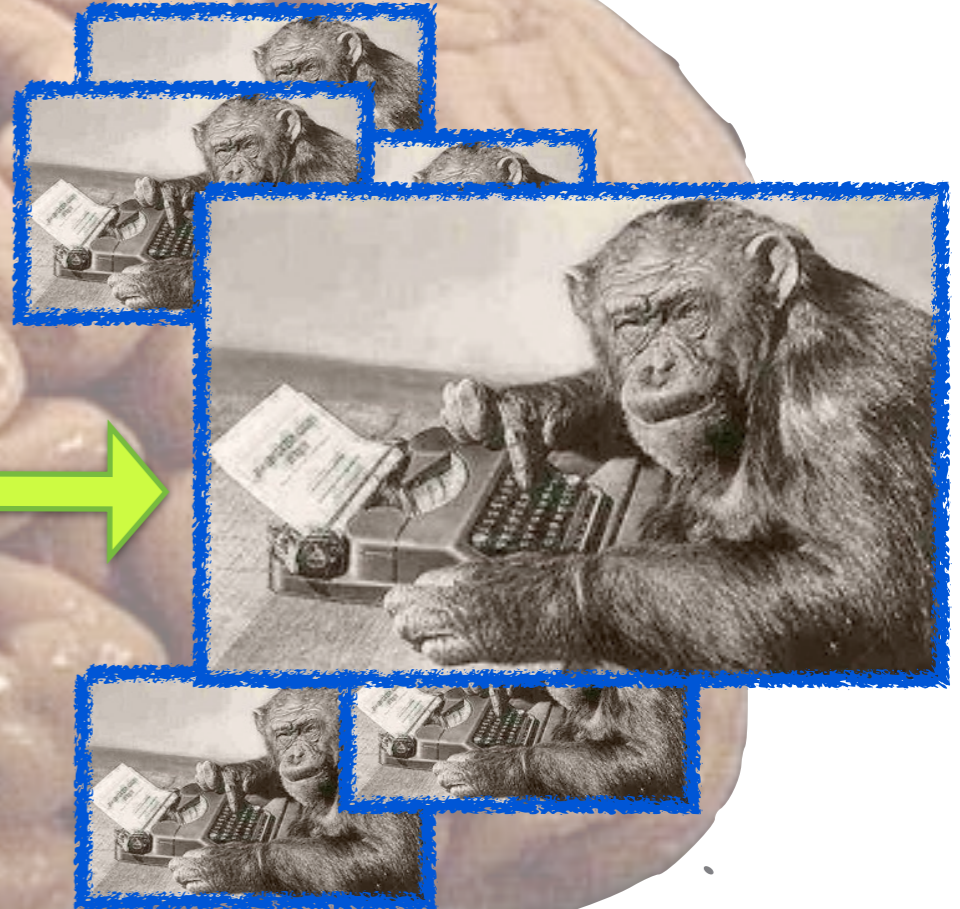
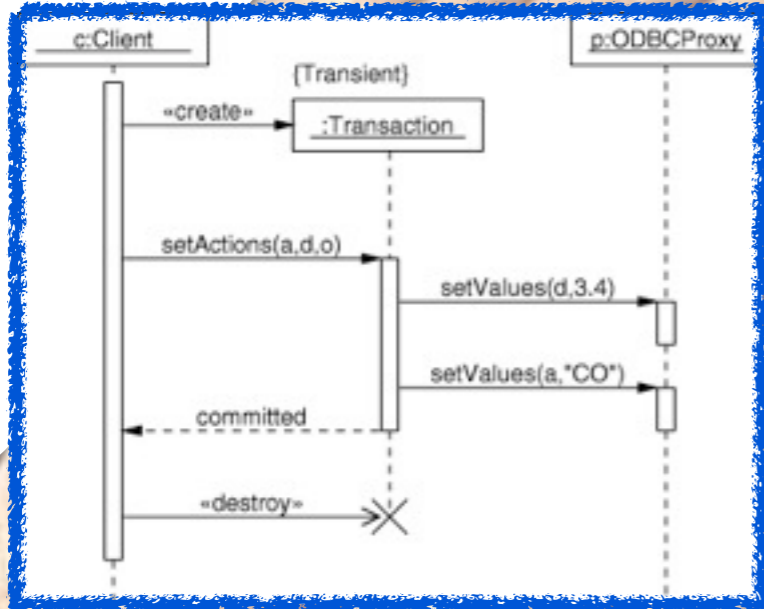
Right brain



PCI Bus
Person Control Interconnect

Left brain

Right brain



PCI Bus
Person Control Interconnect

Left brain

- * Verbal
- * Rational
- * Analytic
- * Linear
- * Logical
- * Temporal
- * Symbolic

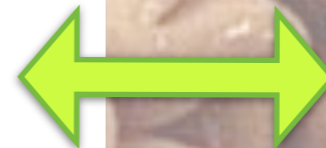
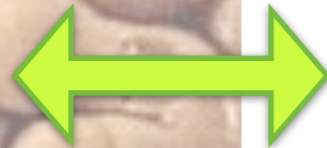
- * Single-threaded
- * Synchronous



Right brain

- * Non-verbal
- * Non-rational
- * **Intuitive**
- * Spatial
- * Relational
- * Perceptive
- * Holistic

- * Multithreaded
- * Asynchronous



PCI Bus
Person Control Interconnect

Left brain

Right brain



the trick:

harness both sides



PCI Bus
Person Control Interconnect



listen: music

describe

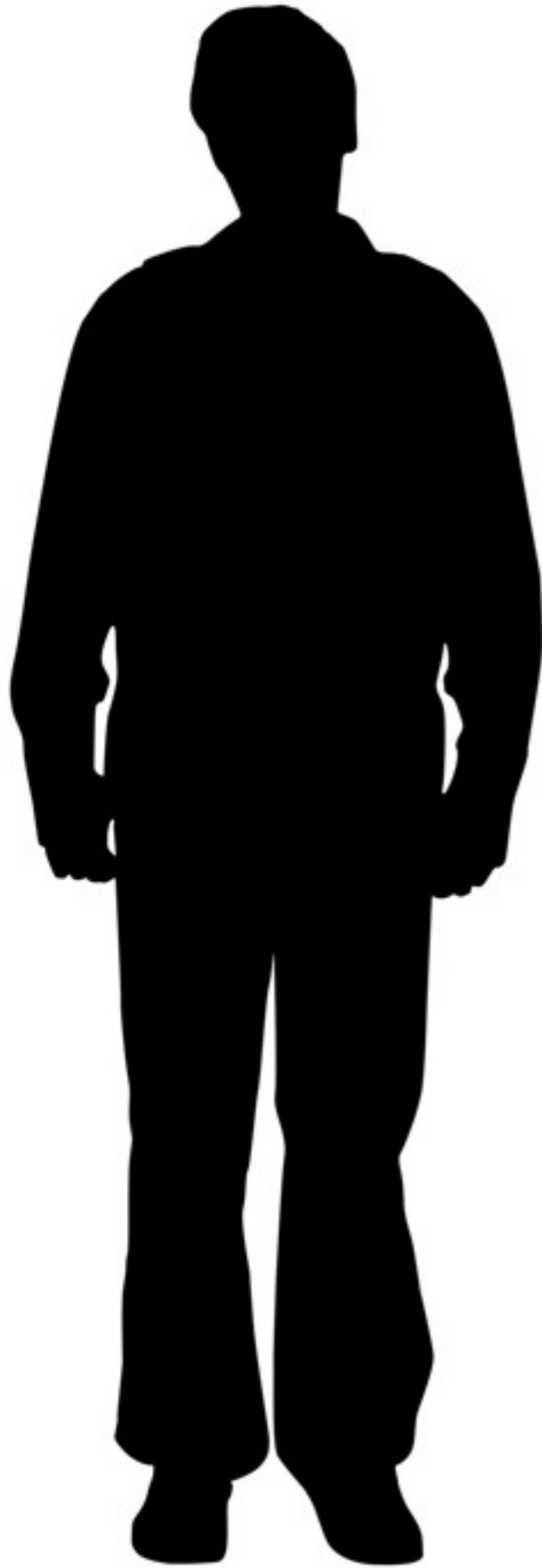
twiddle

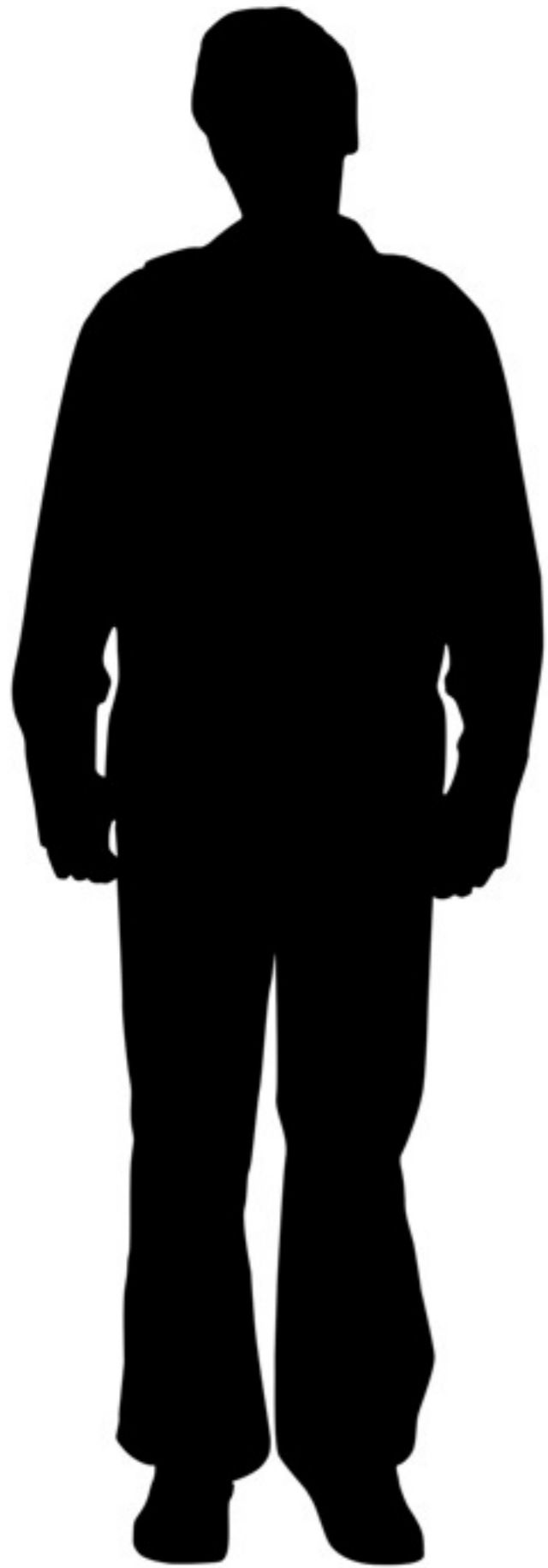
doodle/draw

meditate

The Ultimate Learning Machine

» *multimode learning* «





practice

practice is not a noun



practice

practice is not a noun



deliberate practice
katas
dojo

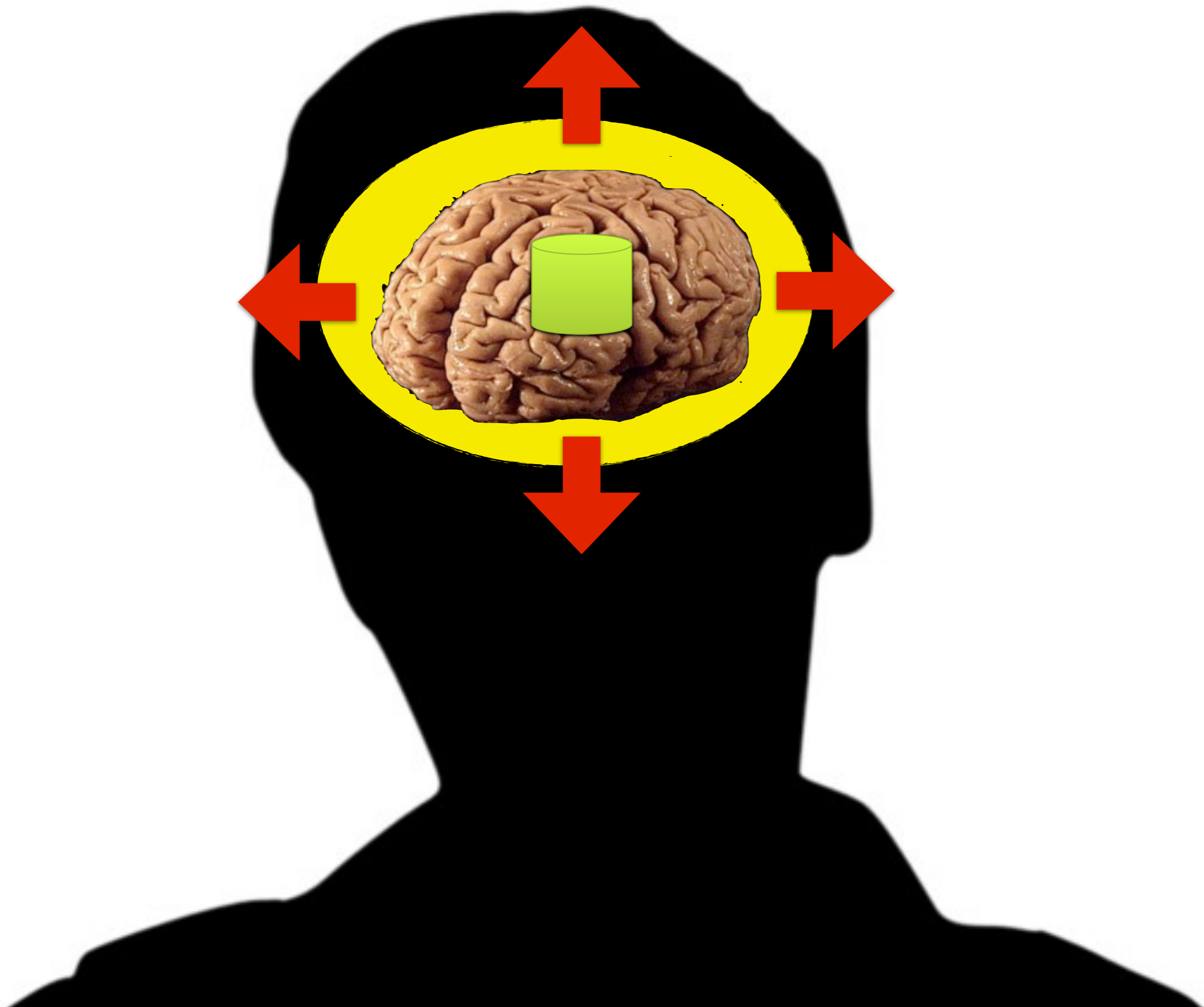
“Tell me, and *I will* forget.
Show me, and *I may*
remember. *Involve me*,
and *I will* understand.”

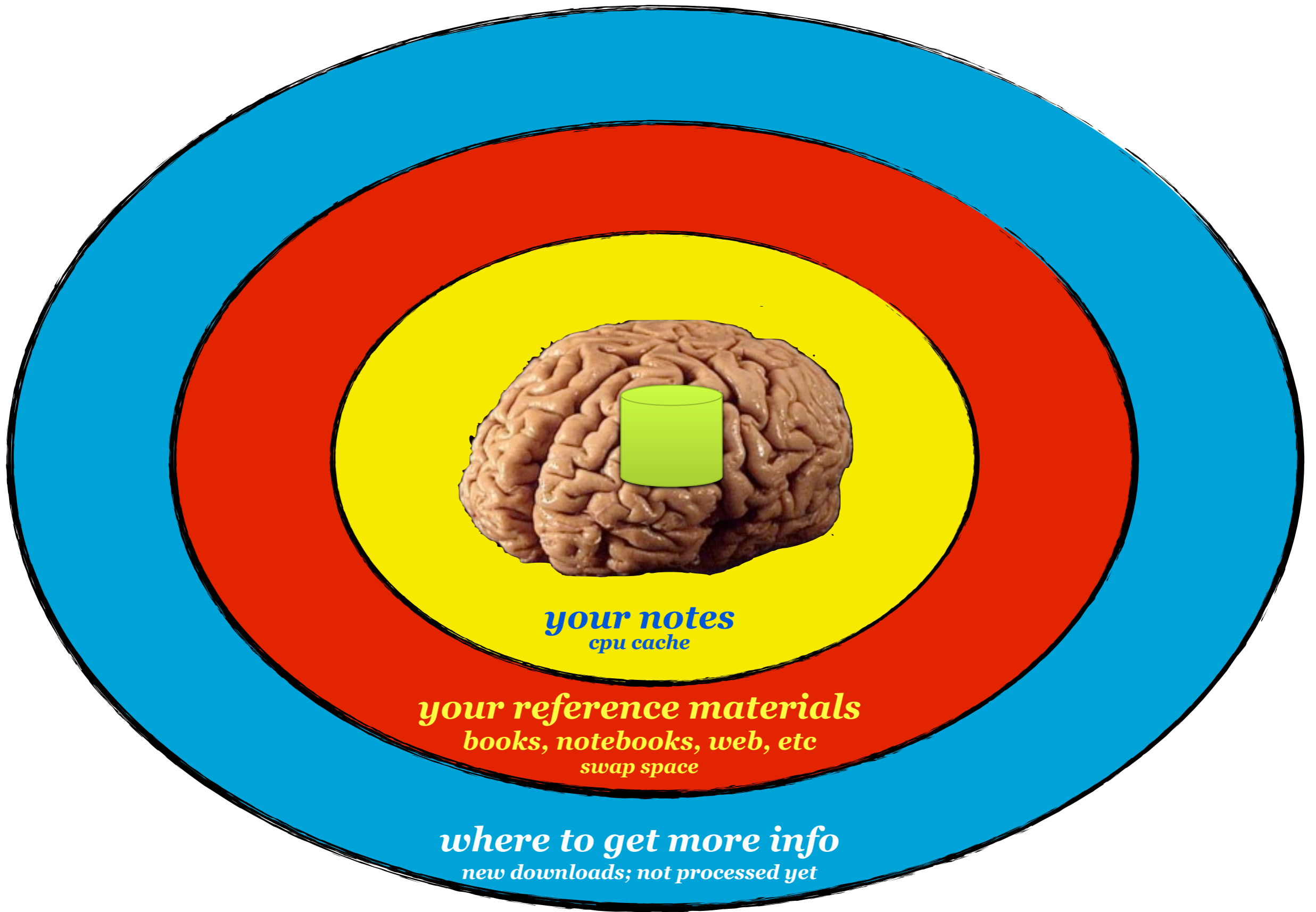
Confucius



test driven learning

- ▶ *Planned study*
 - ▶ *How will you know you've successfully learnt?*
- ▶ *Repeated test and recall*
- ▶ **Not** *repeated study*
 - ▶ *Real **experience** aids recall*
- ▶ *If you can't demonstrate it, you don't know it*



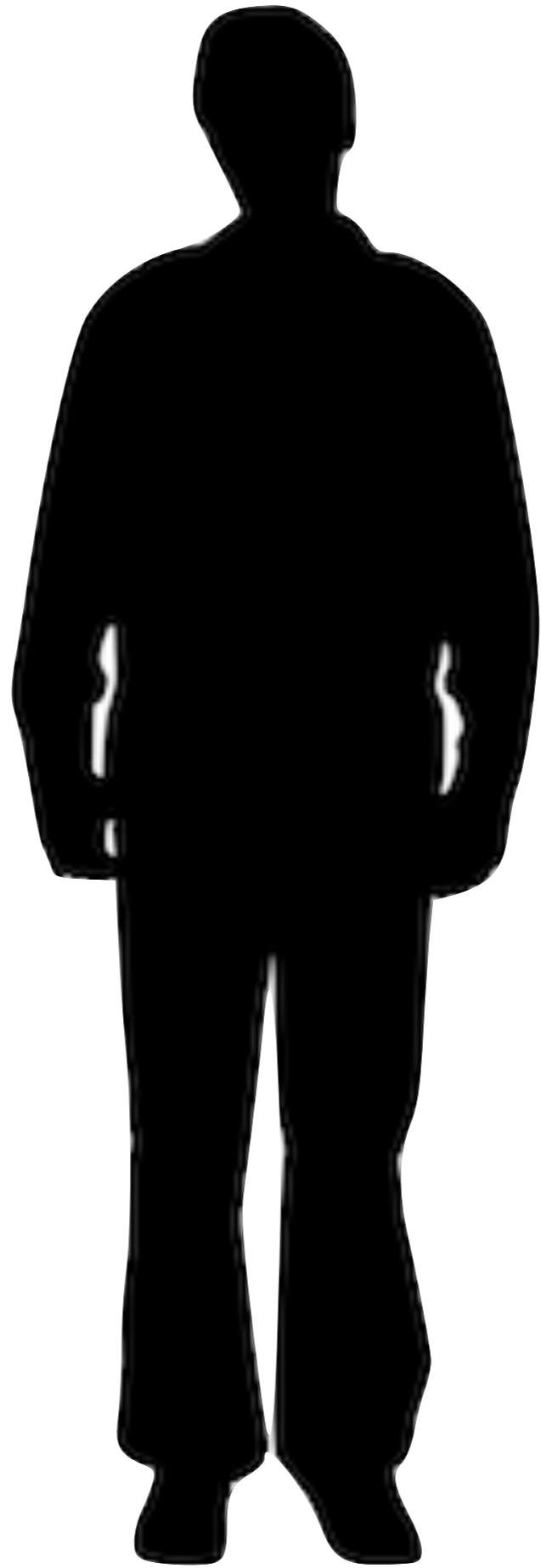


your notes
cpu cache

your reference materials
books, notebooks, web, etc
swap space

where to get more info
new downloads; not processed yet

future input





networking

networking

pair programming

study groups

mentoring

teaching

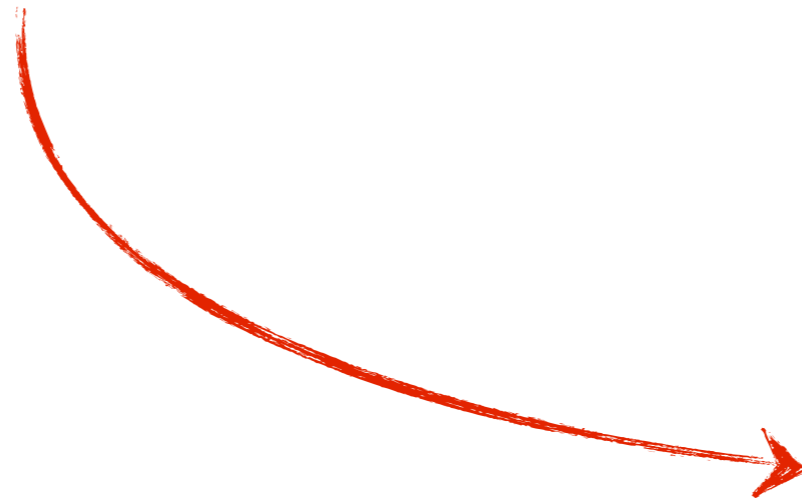
write articles

discuss

*give
knowledge
back*

*find
someone to
learn from*

*be less afraid of
your ignorance*





build a mental map



build a mental map



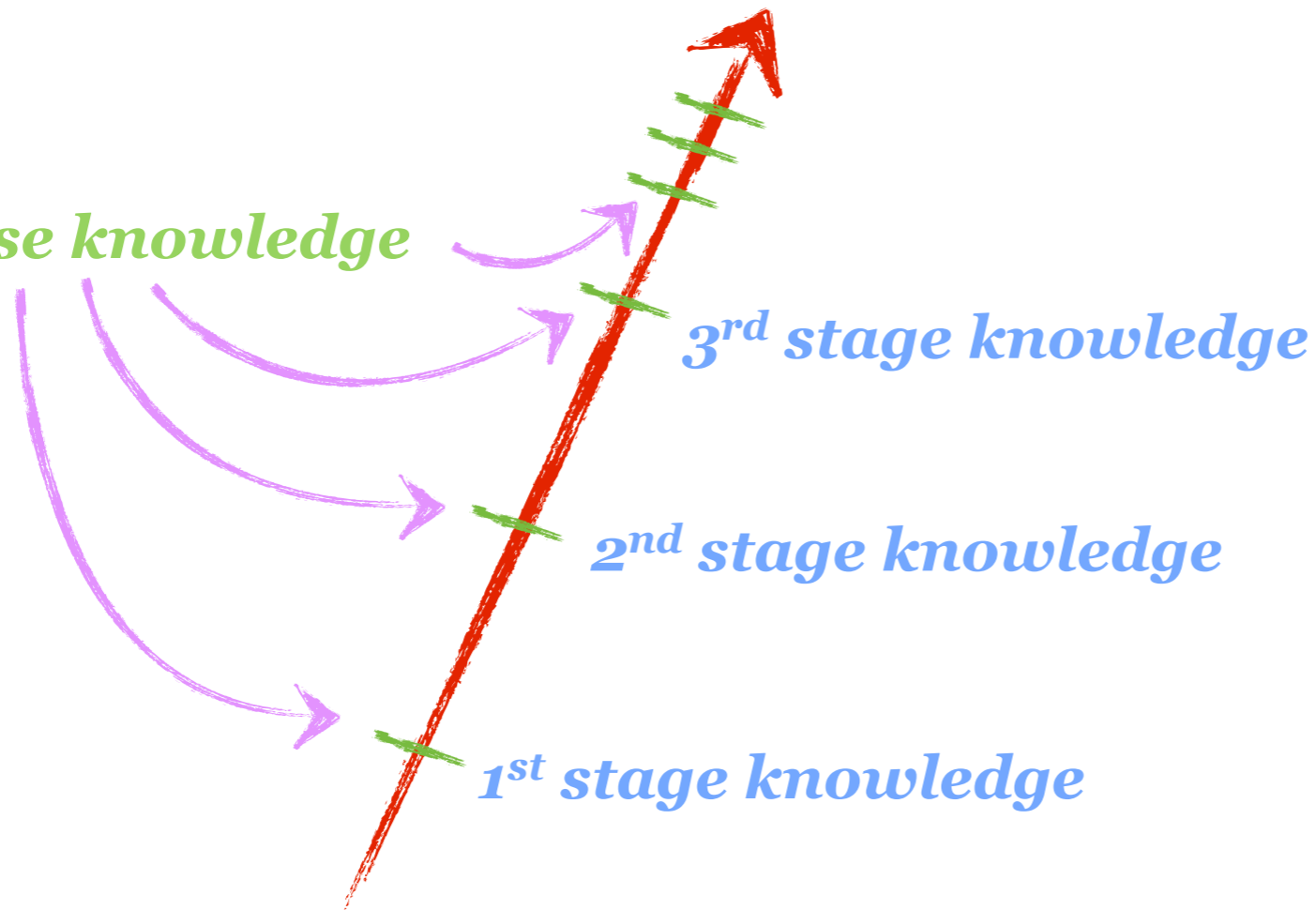
a hierarchy of knowledge retrieval



plan your learning

what you need to know

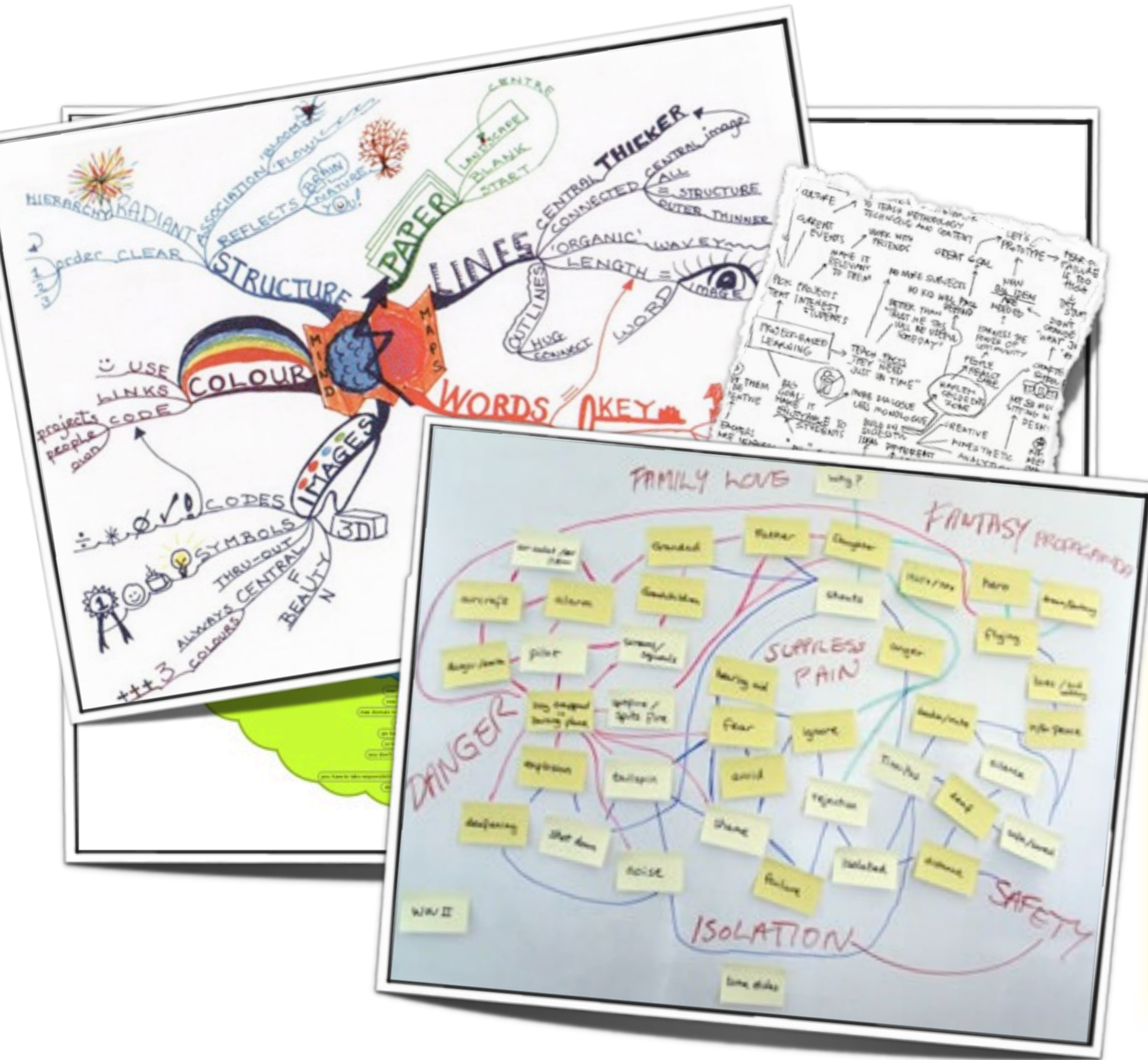
test & use knowledge



what you know



mind maps



always question

- ▶ *Question what you're learning*
 - ▶ *Question this talk!*
- ▶ *Ask **why**?*
- ▶ *Beware of the obvious*
- ▶ *Unlearning*
 - ▶ *Question your preconceptions*

learn from your
mistakes

plan of attack

- ▶ preliminaries: the facts of life
- ▶ what to learn
- ▶ **how to learn**
- ▶ conclusions



plan of attack

- ▶ preliminaries: the facts of life
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you are here
(enjoy the view)



attitude

- ▶ *It's your responsibility*
- ▶ *Learn deliberately*

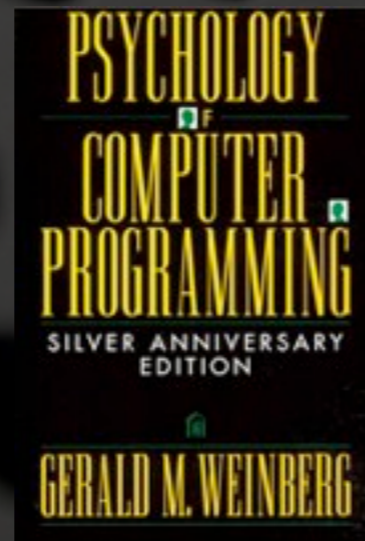
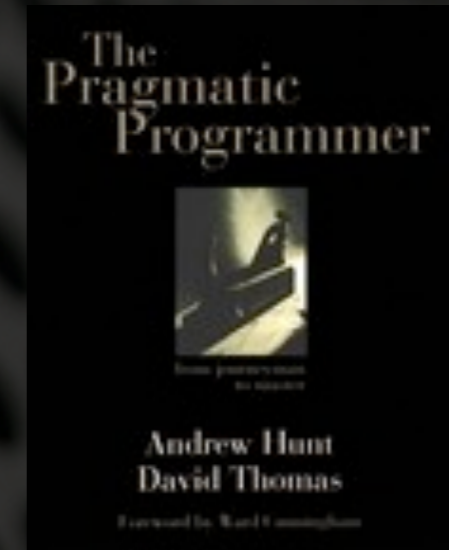
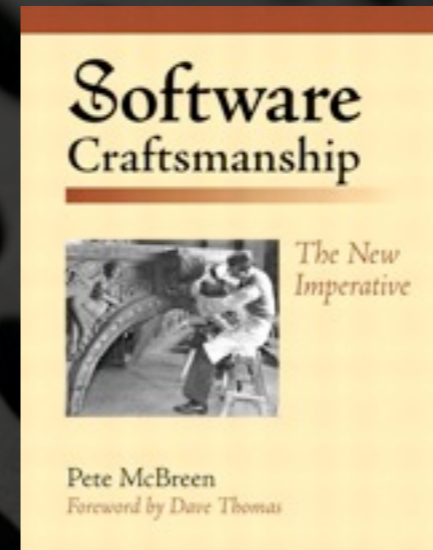
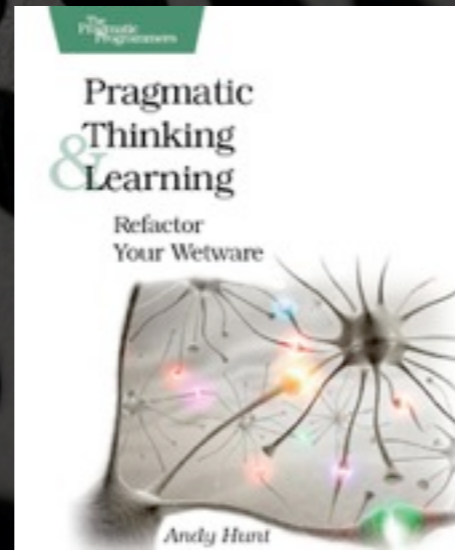
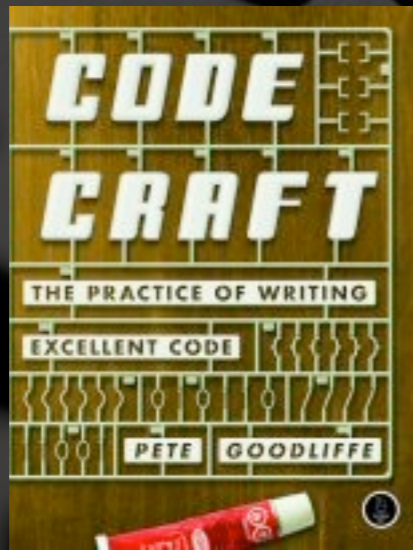
goals

- ▶ *Live to love to learn*
- ▶ *Take responsibility for your learning*
- ▶ *Learn one language per year*
 - ▶ *The Pragmatic Programmer*
- ▶ *Scratch an itch*
 - ▶ *Learn an interest, do some open source*
- ▶ *Read at least one book every two months*
- ▶ *Build a mental map and brain cache*
- ▶ *Try to use both sides of your brain*
- ▶ *Deliberate Practice & Exercise*
- ▶ *Learn from others*
- ▶ *Teach others*
- ▶ *Apply knowledge cautiously*



KEEP
CALM
AND
CARRY
ON

references



references

10,000 hours

Outliers. The Story of Success.

Malcom Gladwell. Little, Brown and Company. ISBN 978-0-316-01792-3. Chapter 2.

The Role of Deliberate Practice in the Acquisition of Expert Performance.

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The last man who knew it all

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Robert B. Cialdini. Pearson Education. ISBN-13: 978-0321011473

Four levels of incompetence

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See: http://en.wikipedia.org/wiki/Four_stages_of_competence

Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments

Justin KRUGER, David DUNNING. Psychology, 2009, 1, 30-46

Knowledge portfolio

The Pragmatic Programmer. Hunt, Thomas

Shu Ha Ri

See: <http://en.wikipedia.org/wiki/Shuhari>

Dreyfus Model of Skills Acquisition

See: http://en.wikipedia.org/wiki/Dreyfus_model_of_skill_acquisition

Stuart E. Dreyfus; Hubert L. Dreyfus (Feb 1980), ***A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition***, Storming Media

Effort/Importance of self-belief

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Carol Dweck ***Self-theories: Their role in motivation, personality and development*** (1999)

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R.W. Sperry. In Neurosciences Third Study Program. F. Schmitt and F. Worden (Eds.), Cambridge: MIT Press 3:5-19 (1974).

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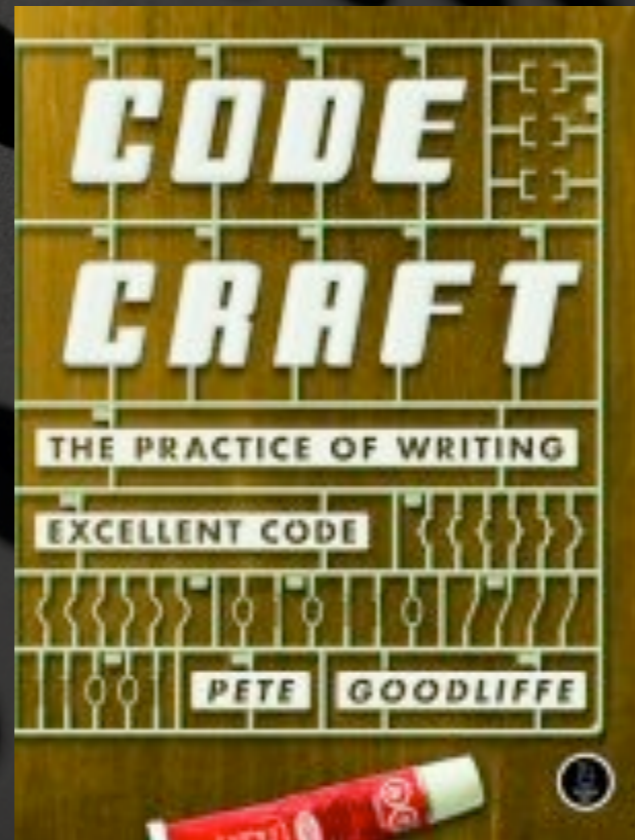
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The Mind Map Book: How to Use Radiant Thinking to Maximise Your Brain's Untapped Potential.

Tony Buzan and Barry Buzan. Plume, New York, 1996.

This amused me: <http://lifehacker.com/288763/a-beginners-guide-to-mind-mapping-meetings>

references



this really is marvellous



KEEP
CALM
AND
CARRY
ON