

Teaching for Automaticity

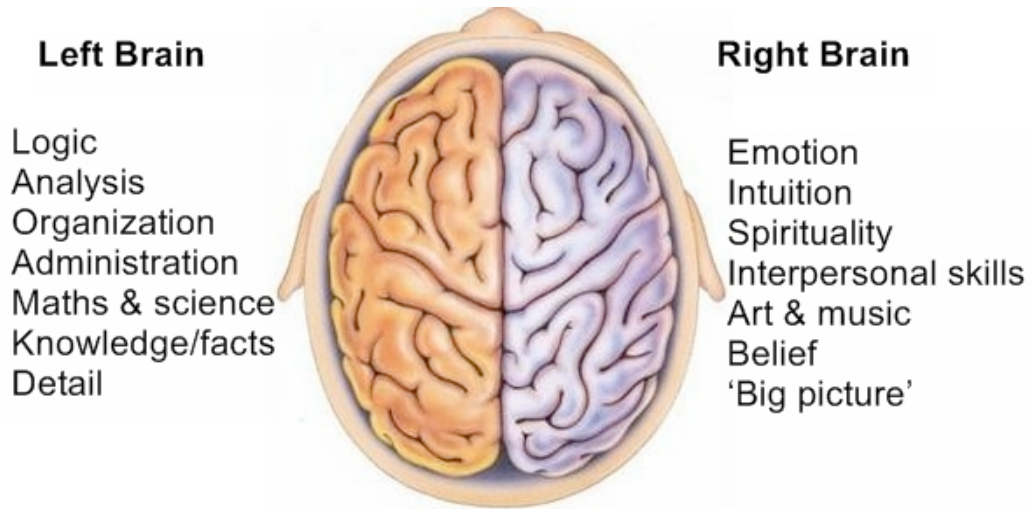
**You may end up
in two minds about this...**

Thinking theories

How do our minds work?

A couple myths to dispel...

Left and right brain dominance

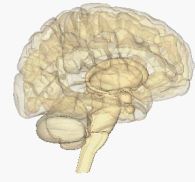


Women are better at multi-tasking than men



Daniel Kahneman

'Thinking Fast and Slow'



Two kinds of thinking, occupying the same neural networks: The integrated brain

Thinking is to humans as swimming is to cats; they can do it but they'd prefer not to.

System 1 and System 2

System 2 – Thinking Slow

Conscious
Sense of self or agency
Voluntary
Effortful – high energy use
Deliberate
Decision-making
Problem-solving
Logical and Mathematical
Weighs pros & cons
Creates abstractions
Tries to off-load to System 1
Effortful
Slow
Decision fatigue

In Everyday Life

- Focus on the voice of a particular person in a crowded and noisy room *.
- Search memory to identify a sound.
- Maintain a faster walking speed than is natural for you.
- Monitor the appropriateness of your behavior in a social situation.
- Compose an email
- Devise and learn a new password
- Tell someone your phone number.
- Compare two computers for overall value.
- Fill out a tax form.
- Check validity of complex logical argument.
- Listen intently for meaning
- Argue a view point



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Physical Signs

- Eyes dilate
- Looking up (into mind)
- Heart rate increases
- Frown
- Muscles tense
- Scratching head/forehead
- Biting pencil
- Around 20 mins of high cognitive load before ego depletion

What is the engine of System 2?

Working Memory

What is Working Memory

Our ability to temporarily hold and manipulate information to solve problems and perform cognitively



Holds information for a few seconds – it's temporary
(**hold on...is that slow?!**)



Holds only 4 to 7 items at a time – has limited capacity



Holds and manipulates information



Depends on control of attention and mental effort

System 2 – Thinking Slow	At School
<p>Conscious Sense of self or agency Voluntary Effortful – high energy use Deliberate Decision-making Problem-solving Logical and Mathematical Weighs pros & cons Creates abstractions Tries to off-load to System 1 Effortful Slow Decision fatigue</p>	<ul style="list-style-type: none"> • Answering evaluative and inferential questions about what has been read. • Synthesising (putting ideas together) • Sitting an exam • Constructing an essay, write in genre • Self-assess using a rubric • Learning complex new spellings (sometimes sys 1) • Memorising facts/vocab • Acquiring a new sports skill • Solving quadratic equations or just adding 2 sets of 3 digit numbers • Making a presentation and presenting • Solving any problem • Negotiating with a teacher/friend • Listening intently for meaning • Practising anything with a focused intent on improvement • Following instructions
Working Memory	

A Game

Preparation

- Take 5 papers each
- Label them 1 – 5 in top right corner
- You are playing against your table

Once game starts

- Write your answer quickly...
- Hold up paper when finished
- Last person to complete writing is out and puts theirs in the centre of table
- Everyone else stacks their answers in front of them

System 1 – Thinking Fast

Sub-conscious
Involuntary
Effortless – low energy use
Low cognitive load
Intuitive
Fast - instantaneous
Habitual, heuristics (Rules of thumb)
Looks for and acts on patterns
Speedy at times of crisis
Creative-associative (seeks pattern)
Completes routine/repetitive tasks
Triggers emotions
Creates stereotypes
Makes mistakes

Automaticity

In Every Day Life

- Detect that one object is more distant than another.
- Orient to the source of a sudden sound.
- Complete the phrase “bread and . . .”
- Make a “disgust face” when shown a horrible picture.
- Walk to your kitchen/office/classroom
- Detect hostility in a voice.
- Read (at your comprehension level)
- Drive a car to a well known location
- Sudden ‘out of the blue’ inspiration
- Language choice for spoken interactions (Interleaves with System 2)
- Entering password on computer

A few possible biological origins

- Taking care of muscular movement
- Respond swiftly to dangers
- Navigation (mental maps)
- Visual filtering
- Translating thought to language

System 1 – Thinking Fast

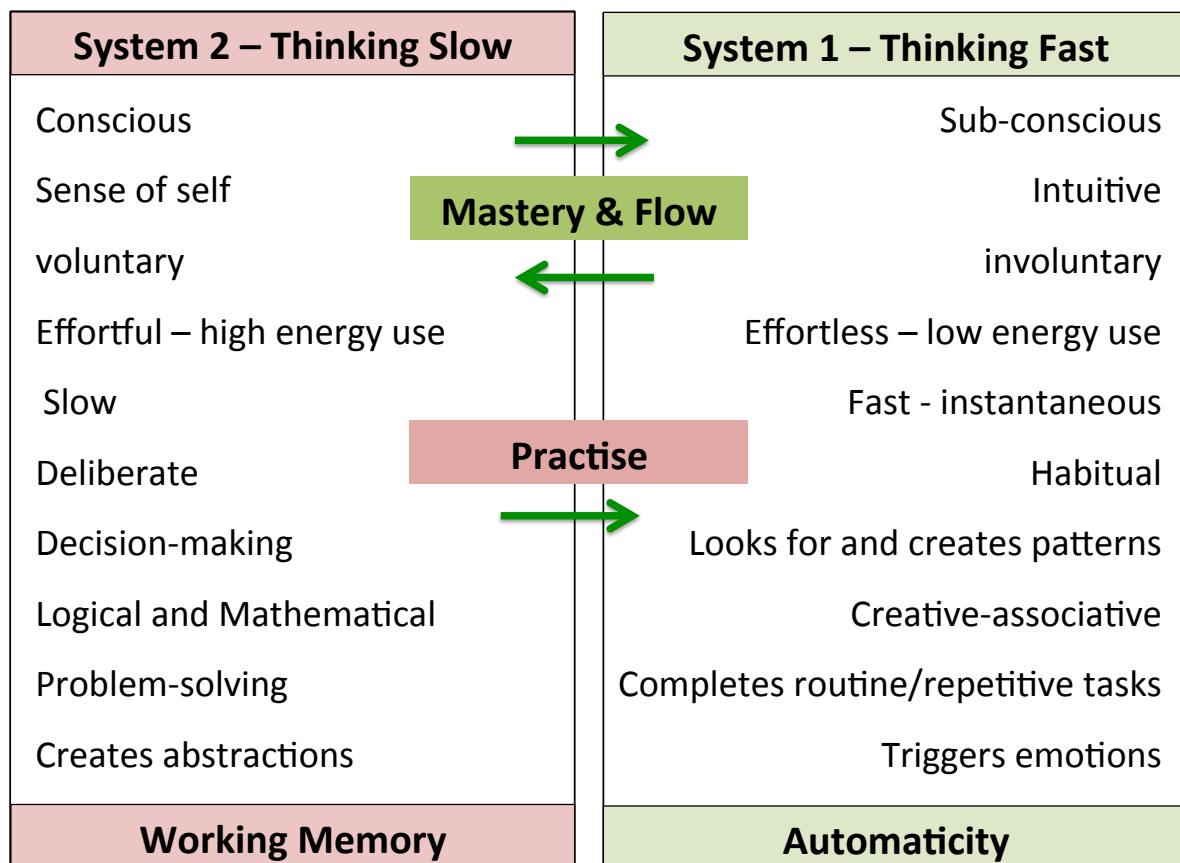
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Automaticity

At School

- Answer to $2 + 2 = ?$
- Times Tables (once learnt)
- Read (at reading level)
- Spell (known words)
- Speaking
- Write (handwriting, once fluidly acquired)
- Pencil grip
- Touch-Typing (when proficient)
- Tie shoe laces (when practiced)
- Dabble a football (if we play enough)
- Breath control whilst swimming (sting-rays)

System 1 frees System 2 (working memory) resources for higher order thinking and learning processes



Further clues to the existence and interactions of System 1 & System 2

- Going back to check whether the door is locked or the oven/iron/lights are switched off
- Driving/walking somewhere very familiar and not remembering the journey
- Going into a room and forgetting what we went for
- Meeting someone new and not remembering their name afterwards
- Having a 'bright idea' – and the subsequent process of converting this to reality

System 1 and 2 work both in tandem and in antagonism

Quirkology Channel

THE COLOUR CHANGING CARD TRICK

www.RichardWiseman.com

Automaticity and Learning

"Automaticity (becoming more automatic with a process) reduces the load on the working memory. Fluency difficulties impact working memory, because less fluency increases the load on the working memory. One of the ways to improve fluency is to increase automaticity by **practice and repeated exposure**, resulting in **overlearning** of material."

"Fluency in academic skills can also be increased through similar practice. Speeded drills...**may help develop automaticity that can free up the cognitive resources in service of more complex tasks.**"

Dr Paulina Bruce, Californian Psychologist

Teaching/Learning for Automaticity

- Takes place in System 2...practice happens here!
- Is consciously aimed at building System 1
- Builds on our natural imperatives to:
 - Simplify and automate processes and knowledge
 - Save cognitive energy and reduce mental load
- Anything requiring problem-solving, evaluation or critical thinking cannot be passed to System 1

Take-aways from Chapter 7

1. When automaticity is lacking:
 - Capacity to think and comprehend is reduced.
 - Cognitive load increases (ego-depletion or energy depletion)
 - Confidence and self-esteem drop
 - Slower future learning

If you can't read more than 2 words a second, comprehension becomes impossible
'Knowing' $2+3=5$ helps solve more complex problems eg. $6X - 31 = 2+3$
2. 'When basic skills are automated, mental space for deeper thinking and understanding becomes available'.
3. 'Achieving expertise brings with it a level of obliviousness about effort and time required to learn'.
4. Automaticity is the key component of mastery
5. Effective programmes can boost learned automaticity

The Myth of Fidgets for ADHD

- Children with ADHD perform better when they are allowed their involuntary micro-movements (fidgeting)
- Children with ADHD find it difficult to sustain attention and control (Working Memory)
- Where does fidgeting fit, System 1 or System 2?
- Asking a child to consciously fidget whilst trying to concentrate adds another item to their already overfull or poorly managed Working Memory