The neural idea factory: how new ideas come about

Jaan Aru
What is the underlying mechanism in our brain?
What is the underlying mechanism in our brain? Is it worth implementing in artificial intelligence?
Practical tips and tricks
Learning from the best: Andrew Wiles
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$a^n + b^n = c^n$
for any $n > 2$
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*Pierre Fermat, 1637: I have discovered a truly marvelous proof of this, which this margin is too narrow to contain.*
"You enter the first room of the mansion and it’s completely dark. In complete blackness. You stumble around bumping into the furniture, but you gradually learn where each piece of furniture is.
"You enter the first room of the mansion and it’s completely dark. In complete blackness. You stumble around bumping into the furniture, but you gradually learn where each piece of furniture is. Finally, after six months or so, you find the light switch, you turn it on, and suddenly it’s all illuminated. You can see exactly where you were."
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You need to be able to “stumble around in the dark”
Arvo Pärt: “Life and death agonizing inner conflict”
Talent is overvalued, struggle, stumbling around is undervalued
But what kind of struggle?
The struggle of innovation: balancing appropriateness and originality in the quest for achieving your goal(s)
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Goal: What do you want to achieve? (In science, business, life)
**Appropriate:** know the field, know the players, know the pieces
Original: relentlessly combine the pieces and try to push the borders of the field
How does this innovation happen in our brain?
Patient H.M.
Patients with hippocampal amnesia cannot imagine new experiences

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Cortex

Sequences of combinations

Hippocampus
AI systems that make use of neural idea factory?
Questions?
Progress

The hard part

Time
Progress

The hard part
Progress

The hard part

Aha!

Time
Progress

Aha!

The hard part

Time
How can you get rid of the box?
Open, relaxed
Bus, Bed & Bath
Henri Poincaré

:: The incidents of the travel made me forget my mathematical work. … we entered an omnibus to go some place or other. At the moment when I put my foot on the step, the idea came to me, without anything in my former thoughts seeming to have paved the way for it.
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The paradox: to find work-related solutions, we need to take time off
What can you do to enhance innovative thinking?
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Put yourself into a position to obtain the pieces!
Combine them!
Don’t be satisfied with the first version
In 1819, Anton Diabelli invited fifty-one of Austria’s most prominent musicians to each submit one variation on a waltz theme he had created.
A. Brandt: “Beethoven was radically novel and non-repetitive, never following the most straightforward solution and never duplicating himself.”
James Dyson: “We have to embrace failure and almost get a kick out of it.”
stumble around in the dark …
embrace failure …
Thank you!

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