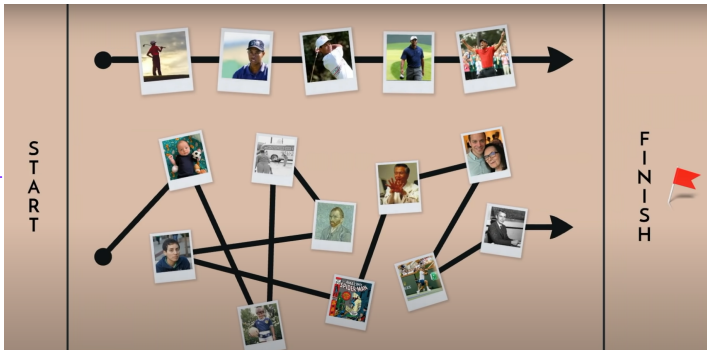
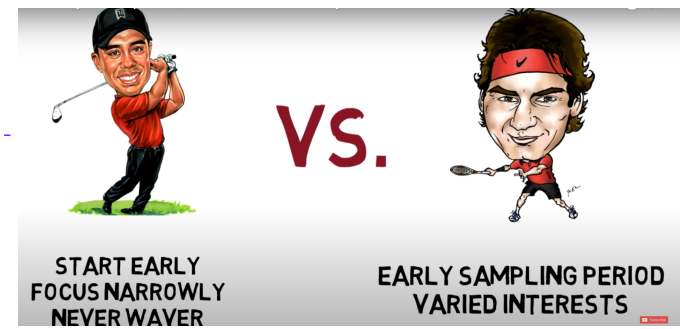


Retrieval



Sampling Period + Practice



Early start + Intense Deliberate Practice

Roger vs. Tiger

Sampling period

- Play a variety of sports
- Unstructured or lightly structured environment

Key Challenge

How to maintain the benefits of breadth, diverse experience, interdisciplinary thinking, and delayed concentration in a world that increasingly incentivizes, even demands hyperspecialization



Ester Ledecka

First woman to win gold in two different sports



Vasyl Lomachenko

Won world titles in three different weight classes

Learning is best done slowly to accumulate lasting knowledge, even when that means performing poorly on test of immediate progress



Polgar Sisters

examples of HEAD START IN DELIBERATE PRACTICE



"Weak human + machine + superior process was greater than a strong computer and, remarkably, greater than a strong human + machine with an inferior process."

Garry Kasparov

Humans and Machines
frequently have opposite
strengths and weaknesses

Moravec's Paradox

Free Style Tournaments

Team comprises
Human + Machine

Tactics - Computer
Strategy - Human

Pattern Recognition
Practice

AI

Savants

Stable Structures

Narrow Worlds

Deliberate practice
heightens the ability to chunk

Repetition did not cause
learning

Gary Marcus



Our greatest
strength is the exact
opposite of narrow
specialization. It is
the ability to
integrate broadly

Martian Tennis

Kind domains vs Wicked Domains

Successful adapters

Take Knowledge
from one pursuit
and apply it creatively
in another

Avoid Cognitive
Entrenchment

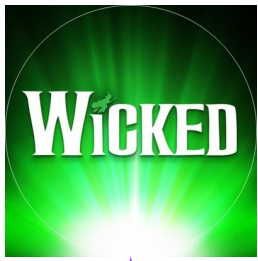


There are tennis
bats and balls all around and rules
are changing
every day

Our world is akin to
playing Martian
Tennis

Cult of HeadStart





Retrieval



James Flynn effect

IQ of the population rose over generations

Raven's Progressive Metrics

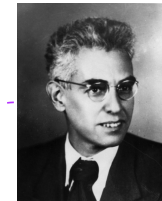
We make sense of world via classification schemes

Not too much of direct experience



How the Wicked World was made ?

Takeaways



Disappointed with

Pushing Specialization rather than conceptual, transferable knowledge

Alexander Luria

Pre-modernists miss forest for the trees

Modernists are good at abstracting rules and patterns

[Calling Bullshit Course at Washington University](#)



Are you working on Fermi Problems at least once or twice a week ?

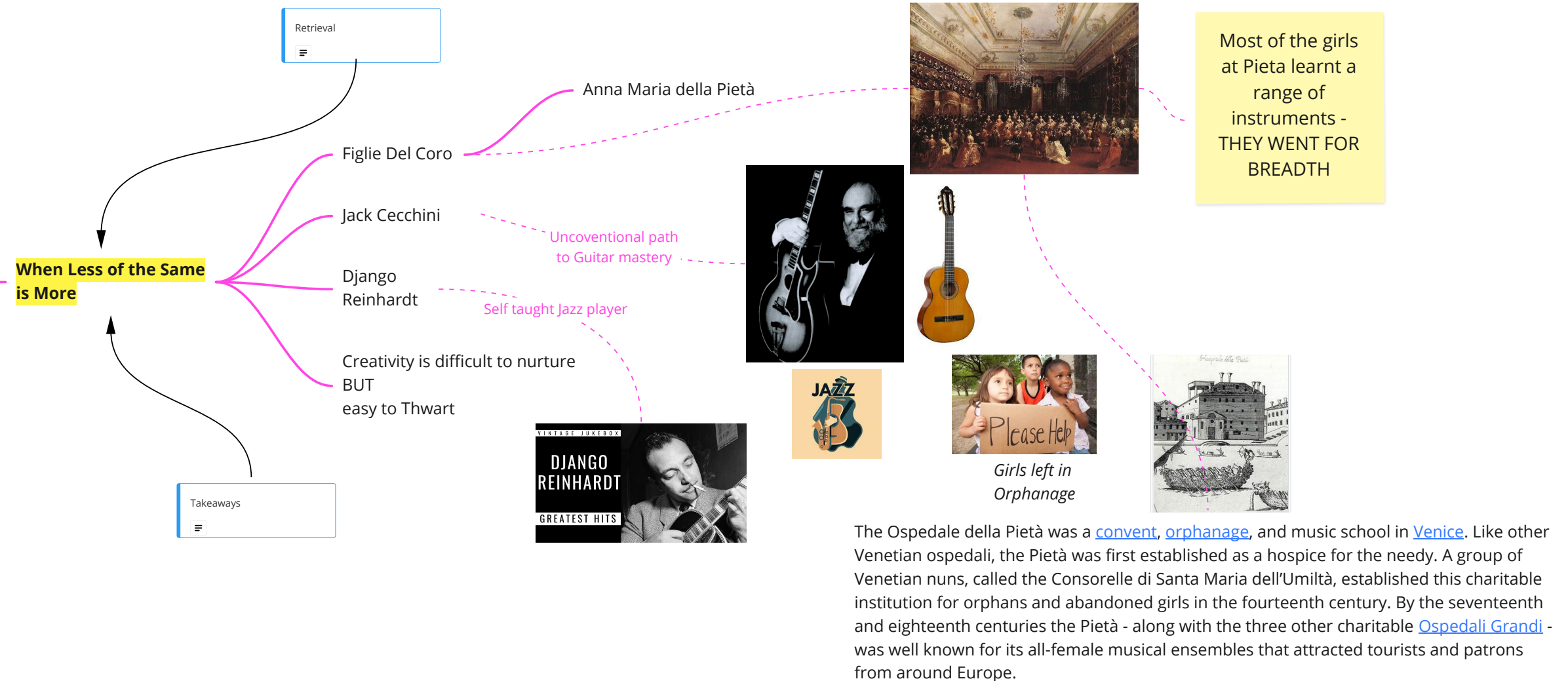


What does the wicked world demand ?

Conceptual reasoning skills

Connect new ideas and work across contexts

Not many datapoints available from direct experience



Learning Fast and Slow

Two main types of questions

Using Procedures

Making connection problems

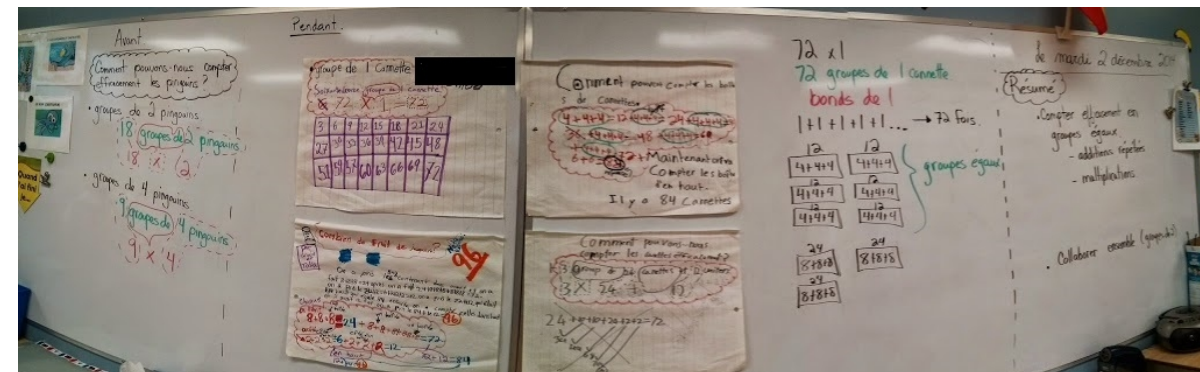
Often the "making connection" problems were turning in to "procedural problems"

Fast and easy is inefficient

Understanding connections so important

teachers and students must avoid interpreting current performance as learning. Good performance on a test during the learning process can indicate mastery, but learners and teachers need to be aware that such performance will often index, instead, fast but fleeting progress

Desirable Difficulties



Bansho - Connection blackboards in Japanese curriculum

Generation Effect

Retrieval Practice

Training without hints is slow and error-ridden

BUT IS POWERFUL

Interleaving — Improves inductive reasoning

THINK ABOUT WHAT TYPE OF PROBLEM YOU ARE FACING - BEFORE MATCHING A STRATEGY

Bansho is a method of teaching developed in Japan that focuses on teaching math through problem solving. It allows students to see connections and progressions of the thinking involved when developing strategies to solve a problem.



Outside view very useful in WICKED worlds

Thinking Outside Experience

breadth of training predicts breadth of transfer

Retrieval



Kepler

Thought completely outside his domain

Master at drawing analogies

Integrated Science Program @ North Western

Biology

Chemistry

Physics

Math

Outsiders Triumph

Predicting Movie revenues

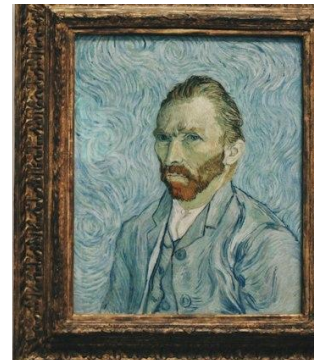
Experts
Russian dolls syndrome

BCG
Analogy portal



The Trouble with too much Grit

Retrieval



Vincent van Gogh

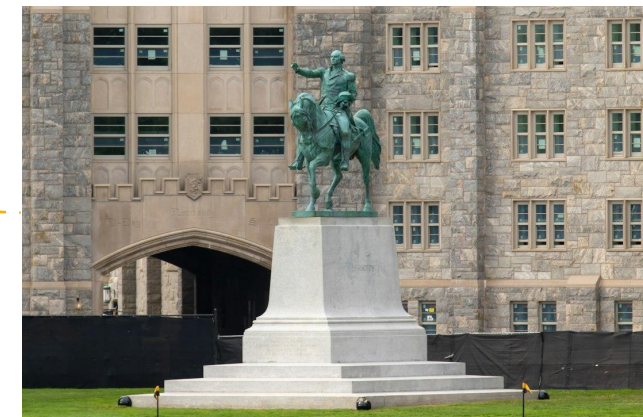
"I have been obsessed with a certain idea or project for a short time but later lost interest" is Van Gogh in a nutshell,"

Ofer Malmud - MATCH QUALITY

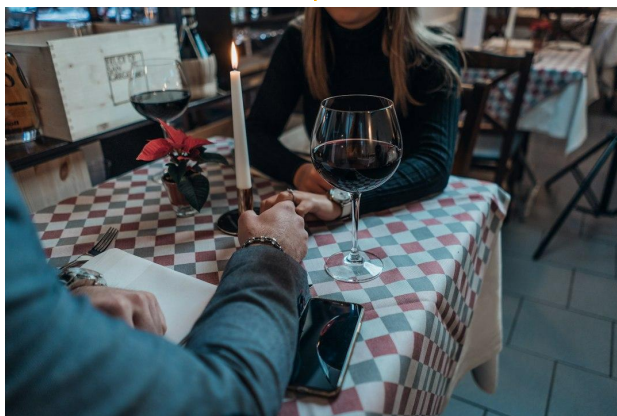


Freakonomics experiment
Use coin toss to make a decision

West Point Cadet Program
+ Angela Duckworth GRIT
overrated



If we treat careers more like dating
nobody would settle down quickly



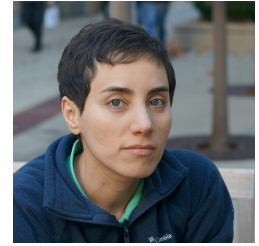


Micheal Crichton



Phil Knight

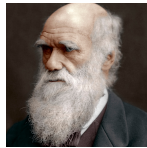
"she just did whatever seemed like it would teach her something and allow her to be of service at each moment, and somehow that added up to training"



Maryam Mirzakhani



Frances Hesselblein
Girls Scout



Charles Darwin

3. REALIZE THAT YOU ARE CONSTANTLY CHANGING



"we maximize match quality throughout life by sampling activities, social groups, contexts, jobs, careers, and then reflecting and adjusting our personal narratives. And repeat."

"Which among my various possible selves should I start to explore now? How can I do that?"
Be a flirt with your possible selves.

First act then think

Test and Learn model

Instead of working back from a goal, work forward from promising situations. This is what most successful people actually do anyway.



Paul Graham



Herminia Ibarra



Short term planning

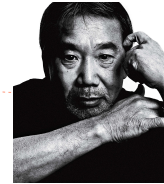
Most people think they are not going to change in the future

personality changes more than we expect

end of history illusion

Dark horses

Late starters and explorers



Haruki Murakami

Flirting with possible selves



Every one thought they were a dark horse - lot of successful people sample, meander

What are the traits of comic creators that give blockbuster ?

Number of different genres that the creator had worked on



Arrow smith
Search engine
from distant
domains
pertaining search
terms



Don Swanson



Alph Bingham

kaggle



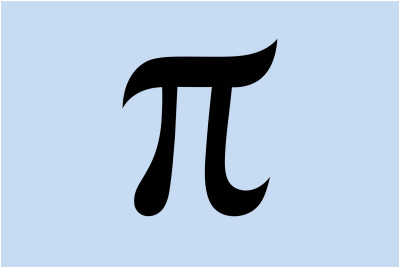
Don Dwanson

Eli Lilly

Shubin Dai

Exxon Valdez Oil Spill

The Outsider Advantage



Selling cards @1889

Sampler:
Enthusiastic
hobbyist



Gunpei Yokoi

Hired in 1965

Nintendo

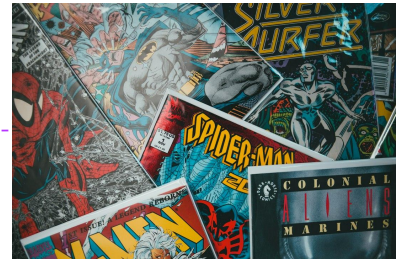
Game Boy
gaming console

Birds + Frogs are important

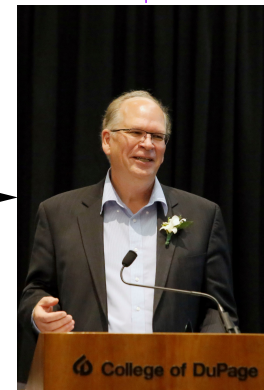
1977: Idea in a train
journey - What if
there was a game
small enough that
an adult could play
it discreetly while
commuting?

polymaths

Lateral Thinking with
Withered Technology



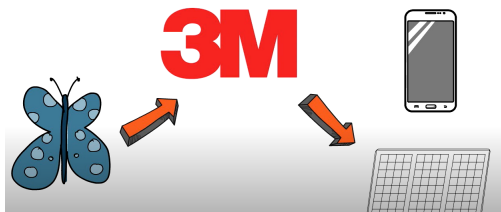
Individuals with diverse experiences in
comic genres had higher propensity to
churn out hits



Andy Ouderkirk

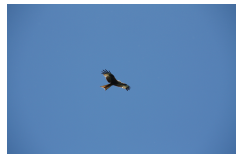
170
patents

2. STAY CURIOUS AND ACTIVELY CROSS DISCIPLINES



Jayashree Seth

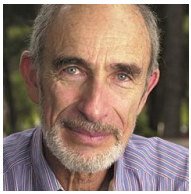
50
patents



Birds fly high in the air and survey broad vistas of mathematics out to the far horizon. They delight in concepts that unify our thinking and bring together diverse problems from different parts of the landscape.



Frogs live in the mud below and see only the flowers that grow nearby. They delight in the details of particular objects, and they solve problems one at a time



Paul Ehrlich vs. Julian Simon

Inverse relationship
between fame and accuracy

Philip Tetlock's experiment

Dogmatic views
about the world

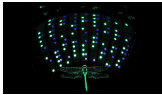


Foxes understand
that most relationships
are probabilistic

Hedgehogs cherry-pick
details that fit their
all-encompassing theories

Hedgehog vs. Fox

Fooled by Expertise



Dragonfly eyes

Composed of tens
of thousands of
lenses, each with
a different
perspective

Roam freely
Listen carefully
Consume omnivorously

Effective
Habits are
very
important

Depth is inadequate
without breadth

Good Judges are
Good belief updaters

Think Analogies

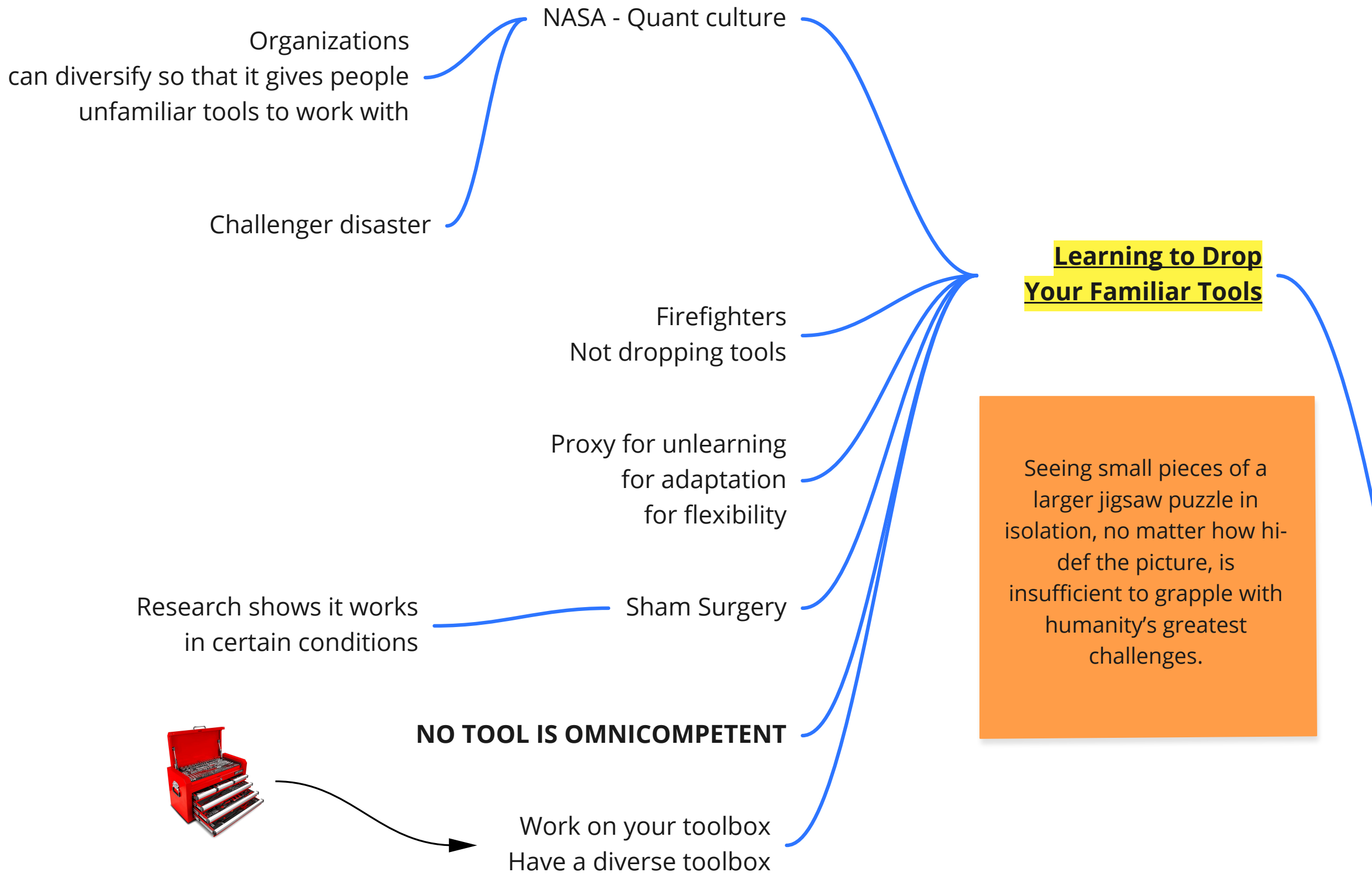
One hour of
basic foxy
training per
each day

1. EMPLOY ANALOGOUS THINKING



CONSIDER COMPLETELY
UNRELATED EVENTS WITH
STRUCTURAL COMMONALITIES







Andre Geim



Dr. Arturo Casadevall



Oliver Smithies



Tu youyou

Human Creativity
import/export business of
IDEAS

Graze shallow

Talk to others
outside your field

Engage in deliberate thinking/tinkering

Drug discovery

Take your skills and
apply them to a new
problem
OR
Take your problem
and try completely
new skills

work that builds bridges
between disparate pieces of
knowledge is less likely to be
funded, less likely to appear in
famous journals, more likely to
be ignored upon publication, and
then more likely in the long run
to be a smash hit in the library of
human knowledge

Compare yourself to yourself
yesterday, not to younger
people, who aren't you. Everyone
progresses at a different rate, so
don't let anyone else make you
feel behind. You probably don't
even know where exactly you're
going, so feeling behind doesn't
help