Connectivism: What is it? How to apply it.

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Objective

To present the core ideas of connectivism in both a knowing and learning context, in a sense unifying the ideas of discovery, interaction and education.

Overview

What is Knowledge?

What is Connectivism?

How Do We Learn?

Implications for Practice

Knowledge

Proposal: the core idea of education (into a science, broadly conceived), in which to learn a discipline is to become like a practitioner of that discipline.

Connectivism

Proposal: the core idea of connectivism, in which knowledge is literally the set of connections between entities, and learning is the growth and development of those connections.

Learning

Proposal: the idea that we learn and grow by becoming connected

- Distinguishing social knowledge and personal knowledge
- This is an additional goal of both science and education

Practice

Proposal: the 'how' of learning; what we need to do in order to 'become connected’:

- The ARRFF Process Model
- Success Criteria: Autonomy, Openness…
- Critical Literacies

What Is Knowledge?

Domain

Knowledge as a domain of discourse

- The set of objects we talk about: a,b,c,…
- The set of properties they share: P,Q,R,…

State Space

Rudolf Carnap: The Logical Foundations…

Pa Qa Ra Sa …
Pb Qb Rb Sb …
Pb Qb Rb Sb …
…

State Space

Rudolf Carnap: The Logical Foundations…

Pa Qa Ra Sa …
Pb Qb Rb Sb …
Pc Qc Rc Sc …
…

Detour:
- Bayes Theorem
- Data Analytics

Hypotheses

Hempel: The Deductive Nomological Model

if Pa then Rb (Observed)

(x,y) if Px then Ry (Hypothesis)

Pc, thus Rd (Prediction)

Positivism

Knowledge as the generation of general principles based on inference from observations

Pa Qb Rb Sd (Observation Language)

if p then q, p, thus q (Analytical)

Pc causes Rd (General Principle)

Two Dogmas

The Failure of the Positivist Foundations…

- Reductionism is False
- No Analytic-Synthetic Distinction
  (Quine, Two Dogmas of Empiricism)

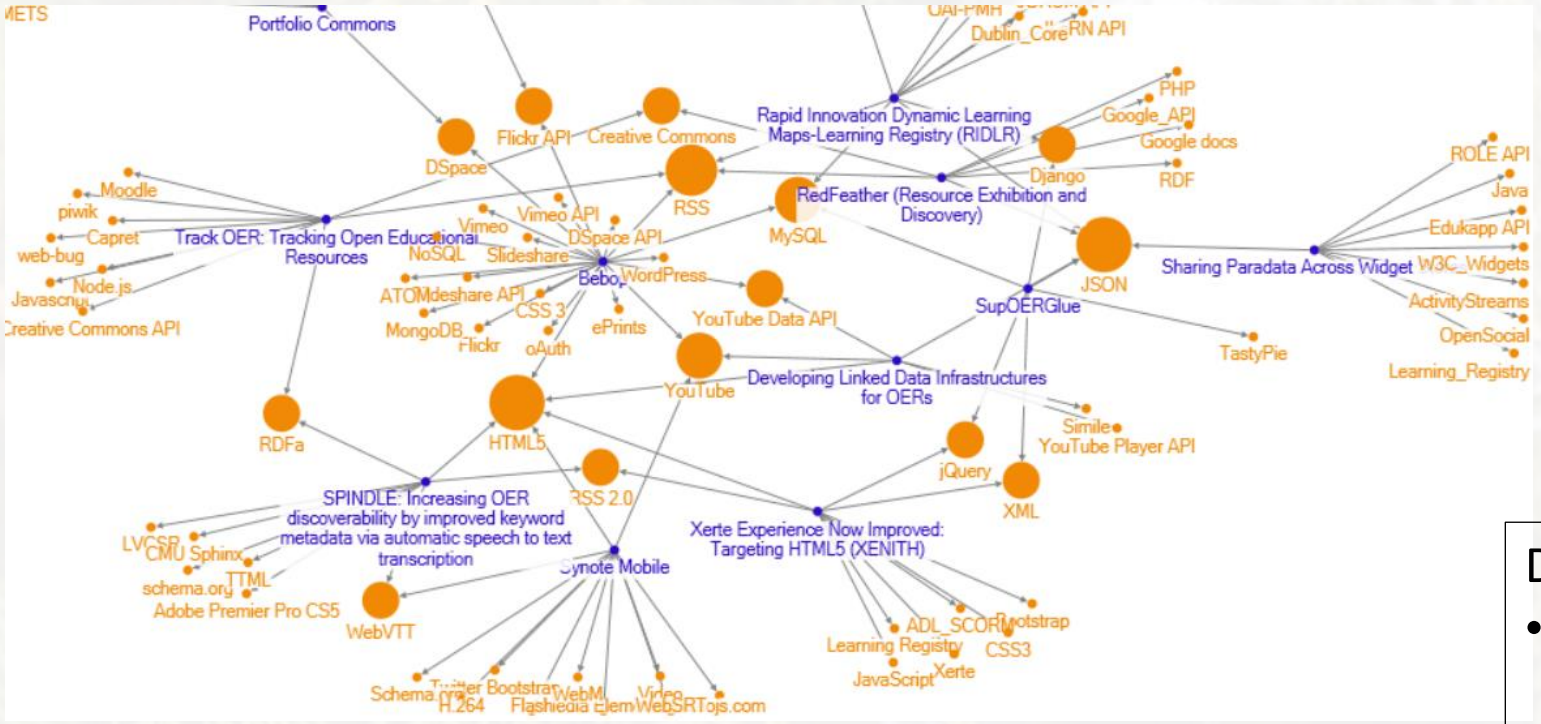
Paradigms

Data, Instrument and Theory

- Theory-Laden Data (Lauden)
- Scientific Paradigms (Kuhn)

Knowledge as commonly accepted languages, practices, questions → Way of Life

Community



Detour:

- Communities of Practice

Sciences

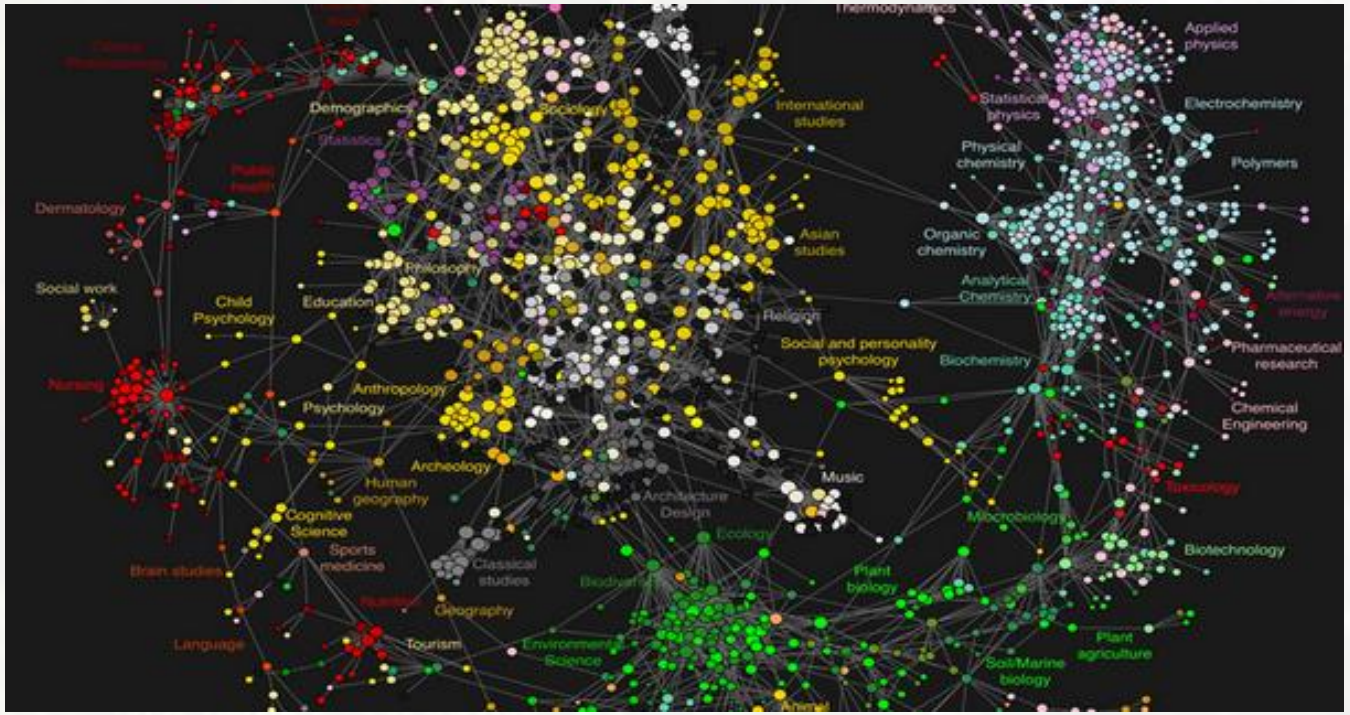


Image: http://blog.physicsworld.com/2009/03/12/the-atlas-of-science/

Construction

Knowledge as Construction

- Constructive Empiricism (van Fraassen)
- Constructing the World (Chalmers)

(But are we back to Carnap again?)

Chalmers review: http://ndpr.nd.edu/news/constructing-the-world/

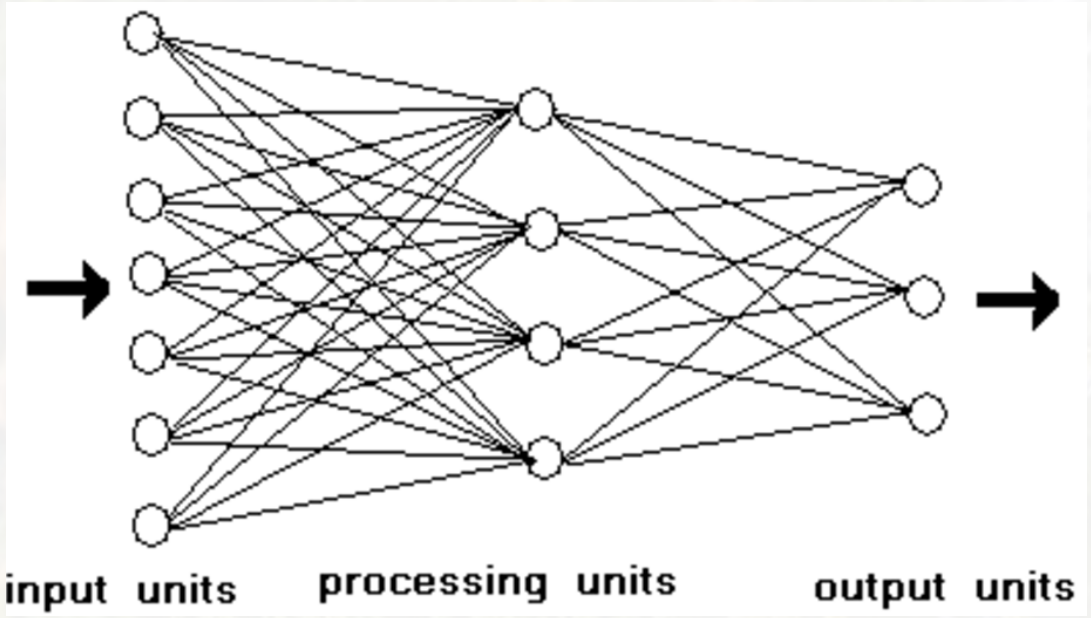
Point of Decision

Knowledge

- as construction?
  - Foundation in language, representation, models
  - Something me *make*
- as discovery?
  - Foundation in experience, immersion, practice
  - Something we *become*

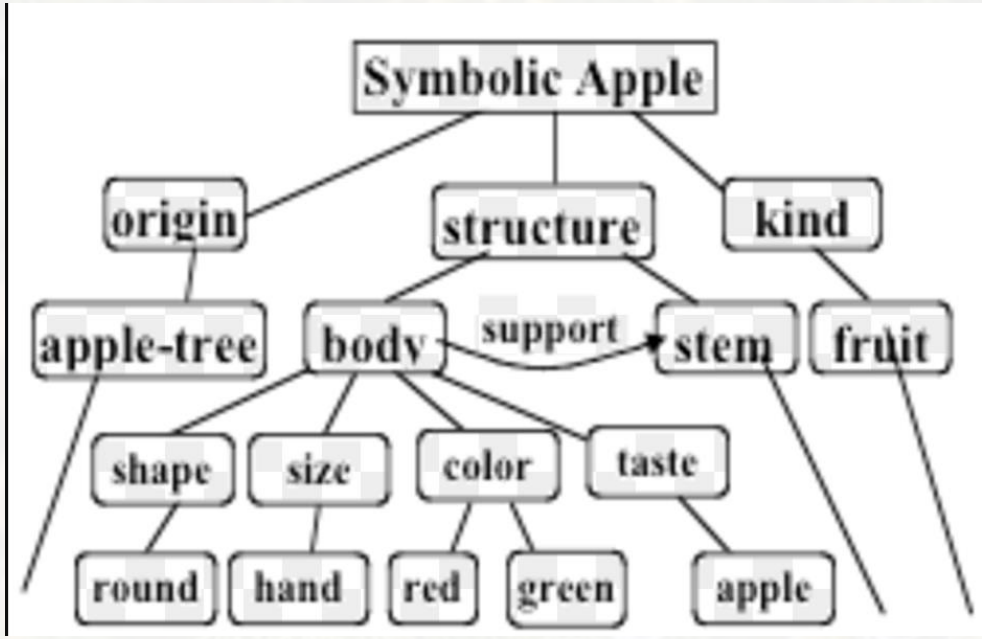
What Is Connectivism?

Connectionism

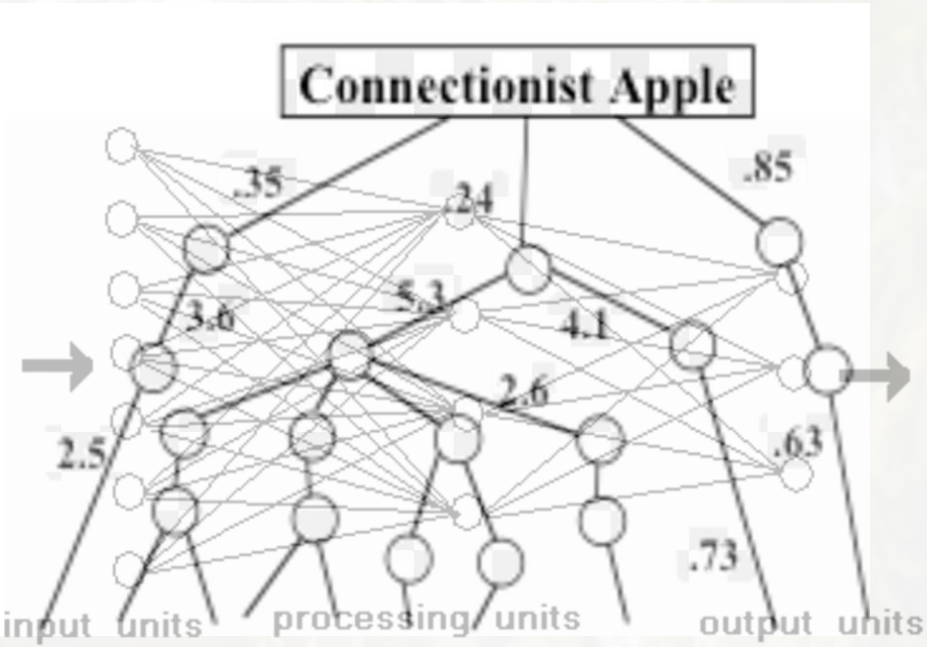


Network-based non-symbolic processing system

Representation



Symbols System – Model - Representation



Analogy – Image – Neural Network

https://web.media.mit.edu/~minsky/papers/SymbolicVs.Connectionist.html

Representation

Apple	.35	.24	.85	.36	.53	.41	.63	…
Pear	.30	.22	.87	.28	.57	.40	.65	…
Bear	.11	.12	.88	.98	.43	.90	.34	…
Wolf	.12	.19	.80	.88	.44	.99	.30	…

Vectors

Projection Game

Apple	.35	.24	.85	.36	.53	.41	.63	…
Pear	.30	.22	.87	.28	.57	.40	.65	…
Bear	.11	.12	.88	.98	.43	.90	.34	…
Wolf	.12	.19	.80	.88	.44	.99	.30	…

What word comes next?

Projection Game

What word comes next?

Bacon and _____

Projection Game

What word comes next?

Bacon and _*eggs*_

Wayne _____

Projection Game

What word comes next?

Bacon and _*eggs*_

Wayne _*Gretzky*_

American _____

Projection Game

What word comes next?

Bacon and _*eggs*_

Wayne _*Gretzky*_

American _*Idol*_

Justin _____

Projection Game

What word comes next?

Bacon and _*eggs*_

Wayne _*Gretzky*_

American _*Idol*_

Justin _*Trudeau*_

Tried and _____

Projection Game

What word comes next?

Bacon and _*eggs*_

Wayne _*Gretzky*_

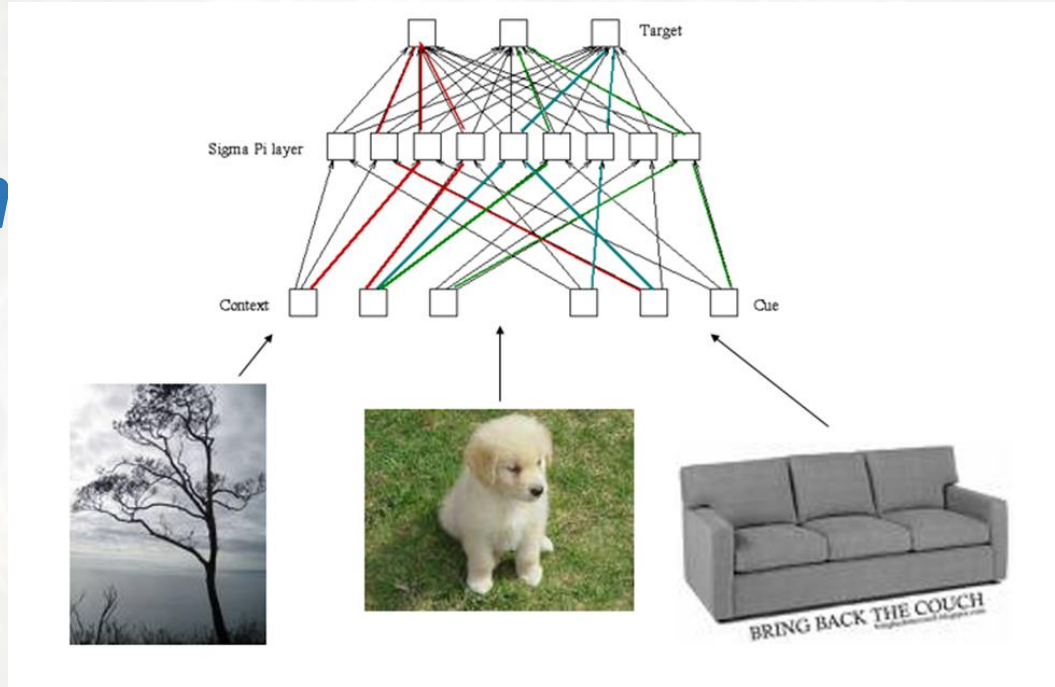
American _*Idol*_

Justin _*Trudeau*_

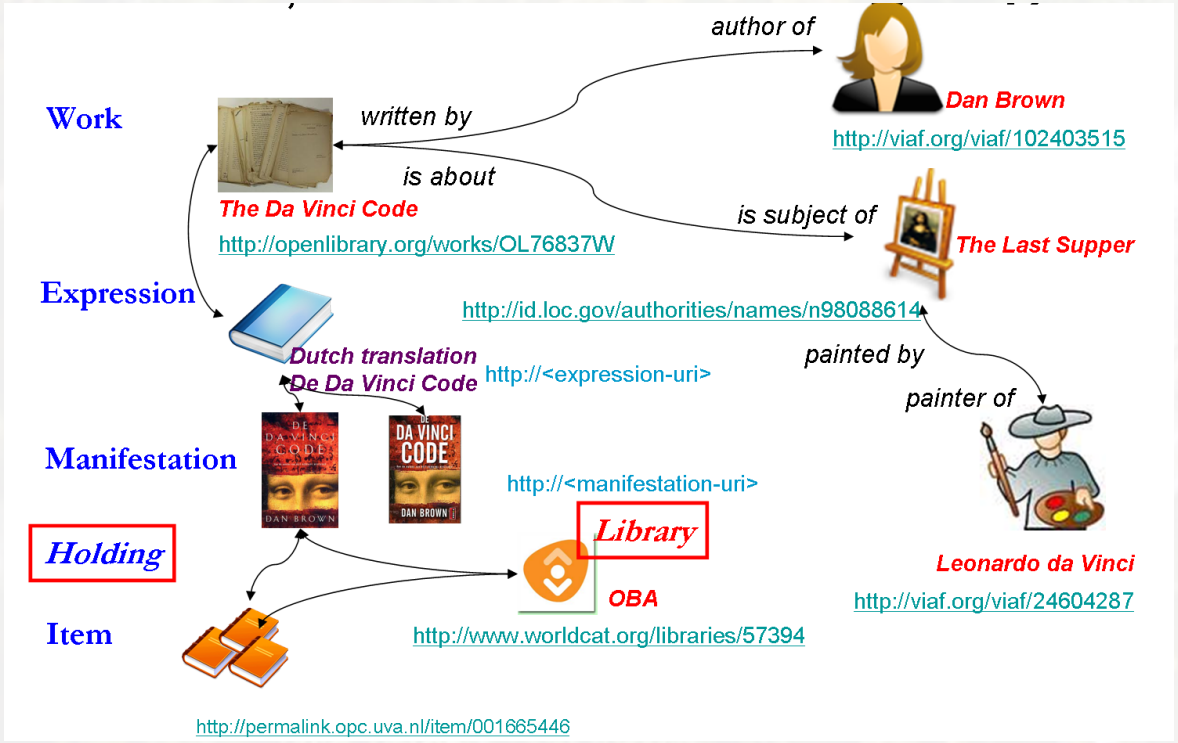
Tried and _*true*_

Distributed

A ‘concept’ is a *pattern of connection* described by vectors in a network



Linked Data

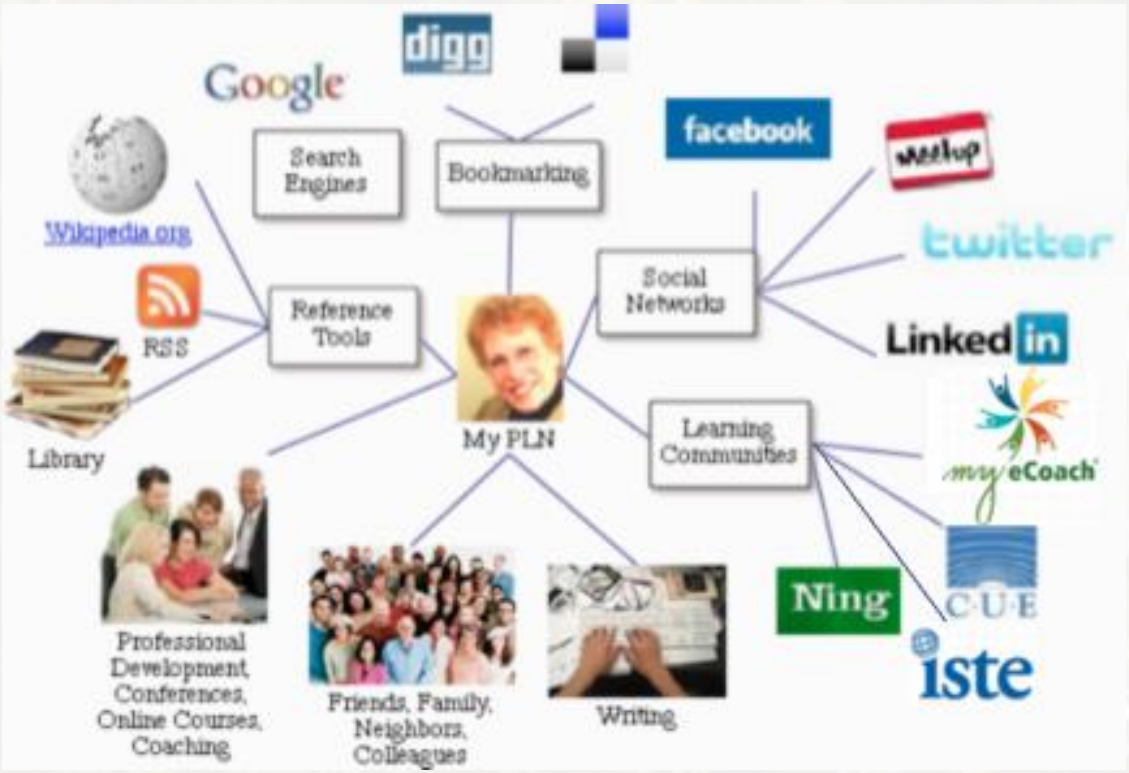


Though still employing symbols and language, steps away from *inference* and toward *association*

Detour:

- Semantic Web

PLENK



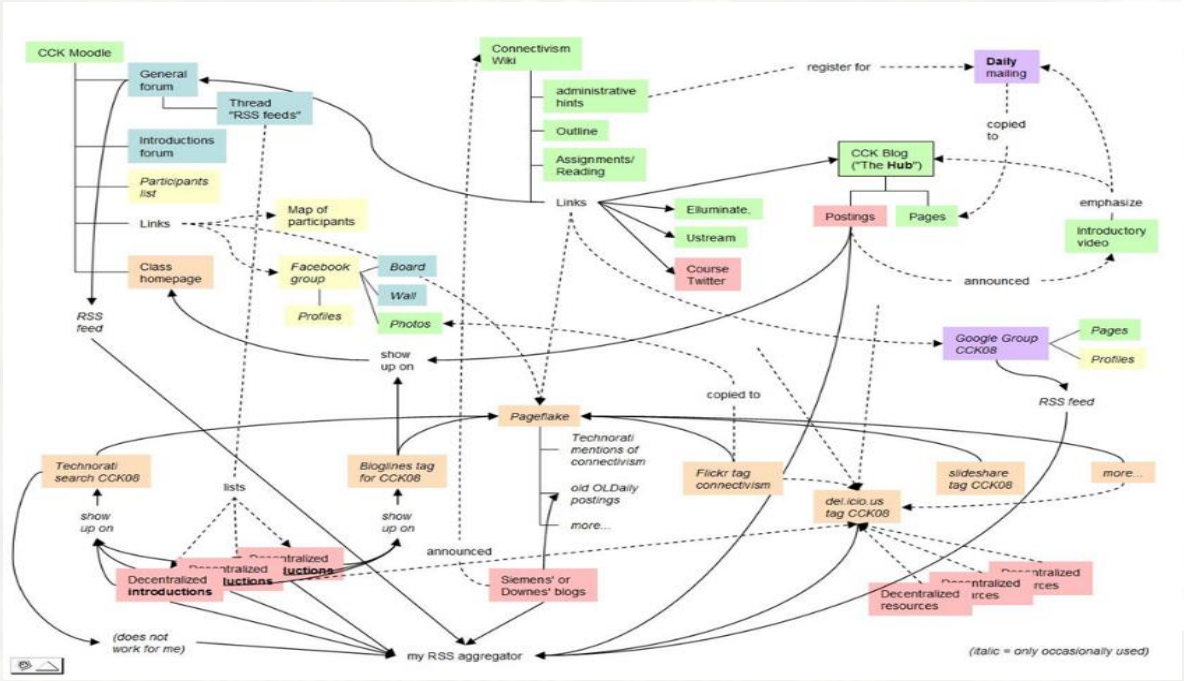
Personal Learning Network & Environment

- Your friends
- Your concepts
- Your learning

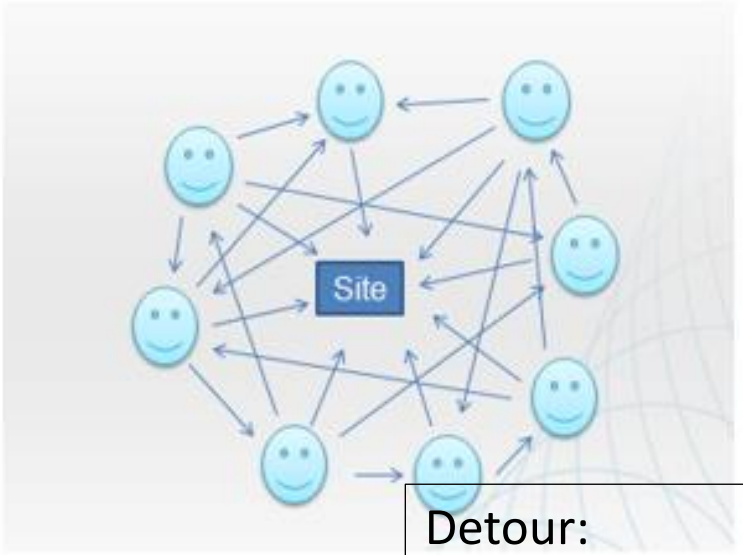
Detour:

- Personal Learning Environments

MOOC



A MOOC is a Web, not a Website



Detour:

- MOOC

https://sites.google.com/site/themoocguide/home

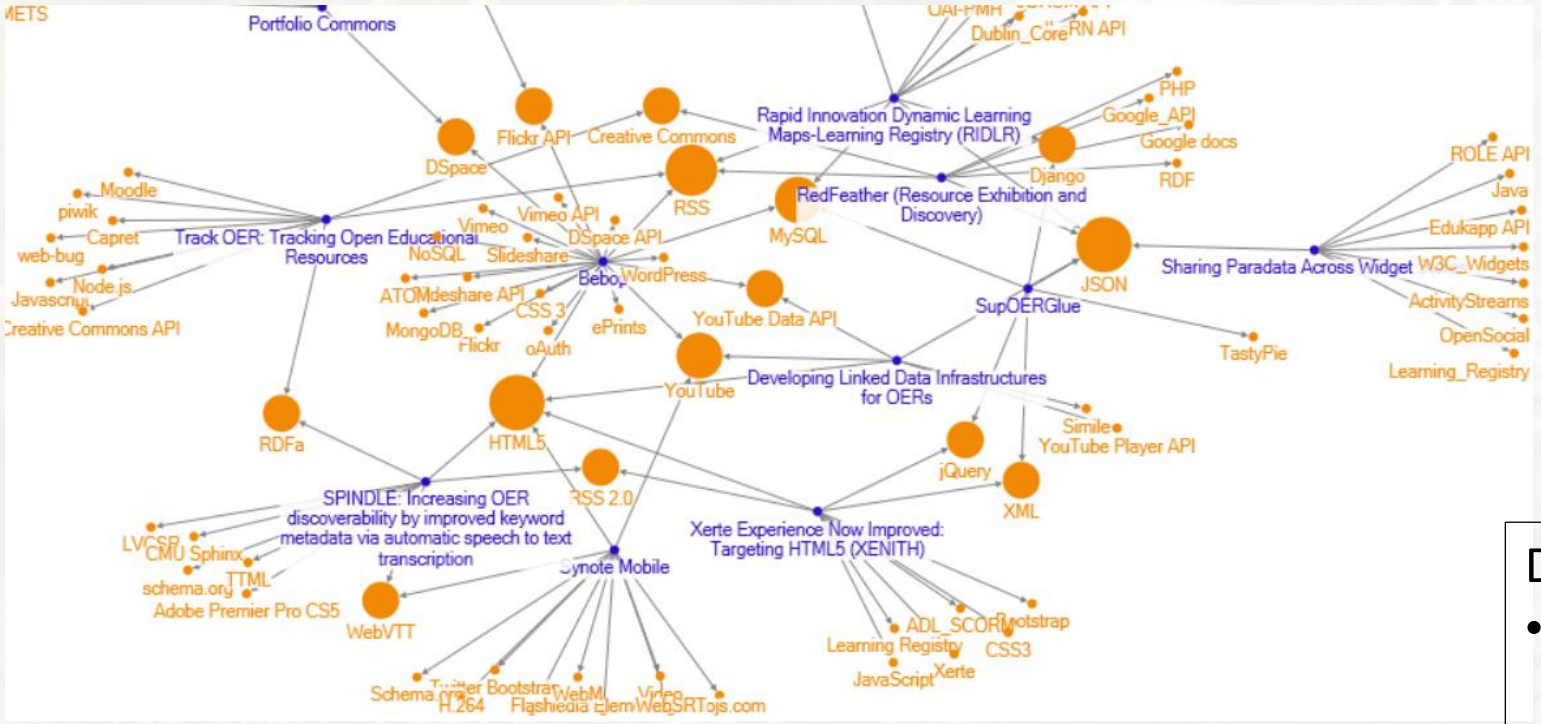
MOOC

Instead of seeing a course as a series of contents to be presented, envisions a course as a network of participants who find and exchange resources with each other (2008)

MOOC

- An initial structure is developed and ‘seeded’ with custom-built or (preferably) existing OERs
- Participants are encouraged to use their own sites to create or share resources
- A mechanism (such as gRSShopper or BuddyPress) is employed to connect them

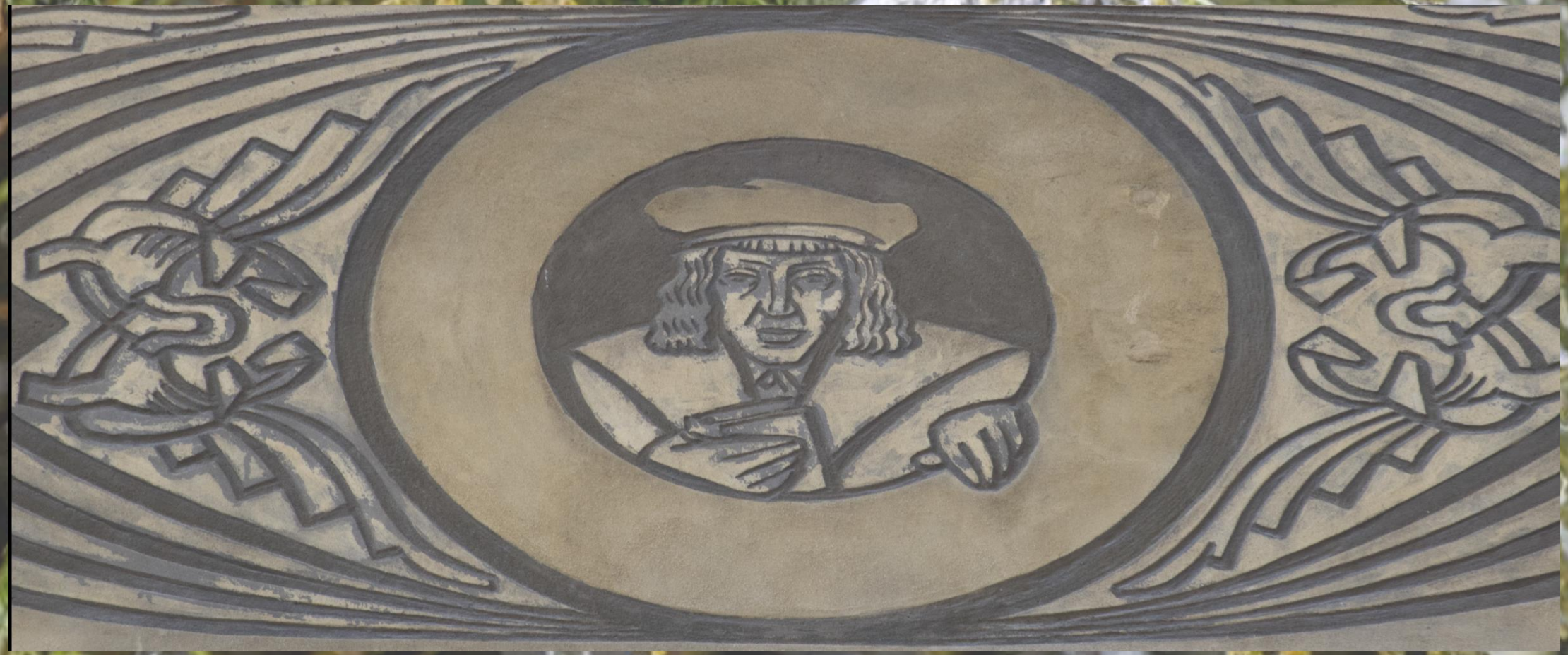
Community



Detour:

- Group vs Network

What Is Learning?



Point of Decision

Learning

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- as discovery?
  - Foundation in experience, immersion, practice
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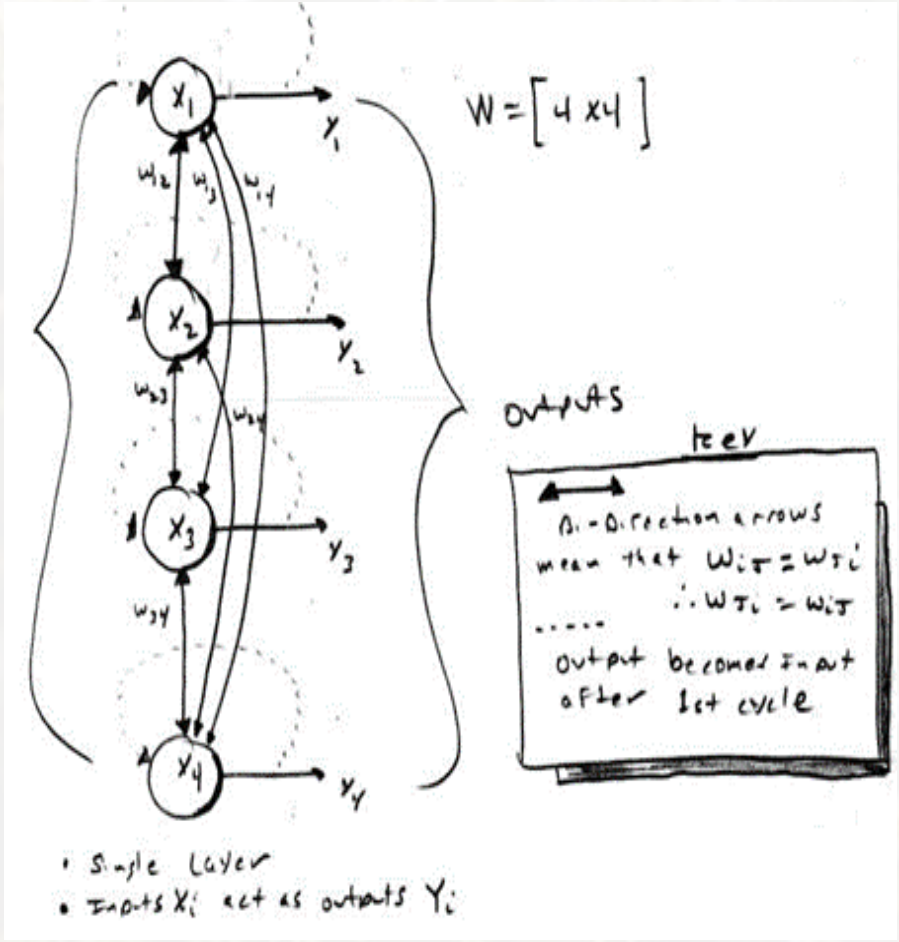


Network Learning

…is the creation and growing of connections

- Hebbian associationism
- Back propagation
- Boltzmann ‘settling’, annealing

Detour:

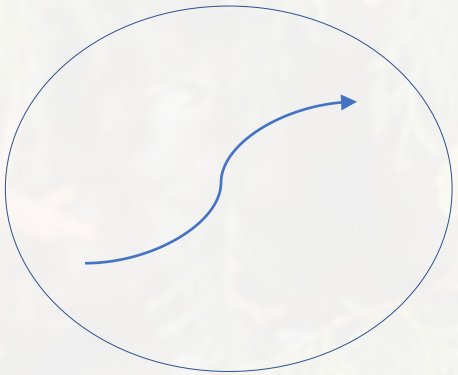
- Learning Theory

Network Learning

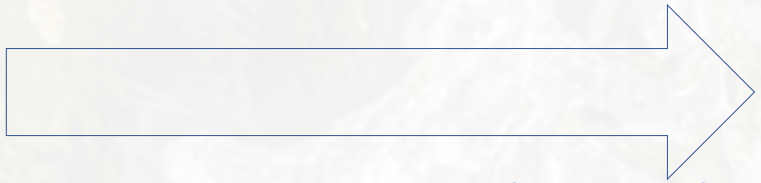
…is the development of these networks

- A focus on both personal experience and social networks
- Learning is a matter of practice and reflection
- To know is to recognize

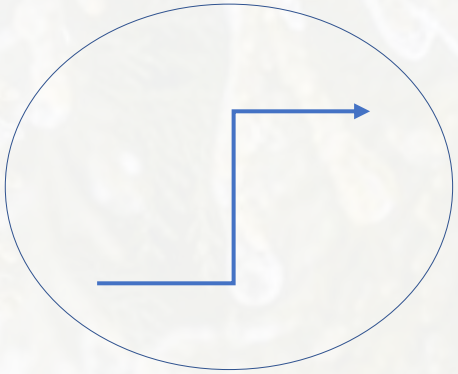
Parameters



- Current state
- Activation function

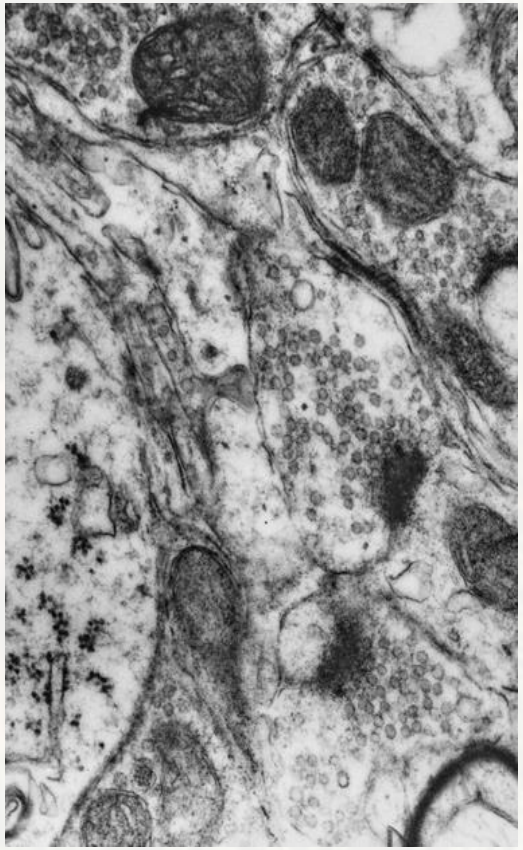


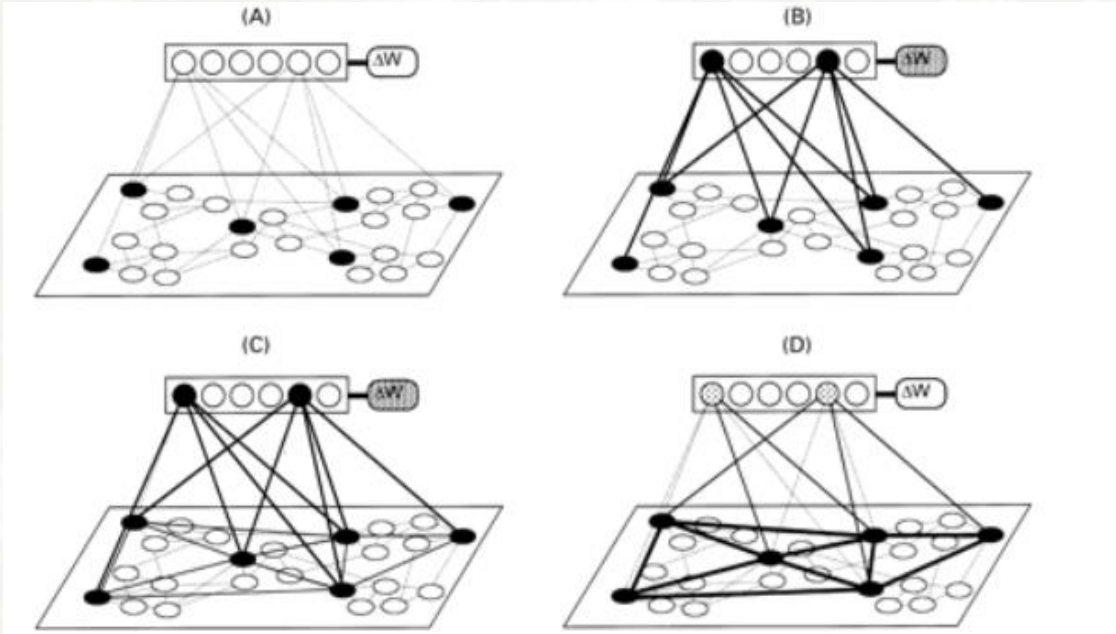
- Bandwidth (weight)
- Signal / Noise



- Threshold value
- Increments

Synapses





Core Concepts

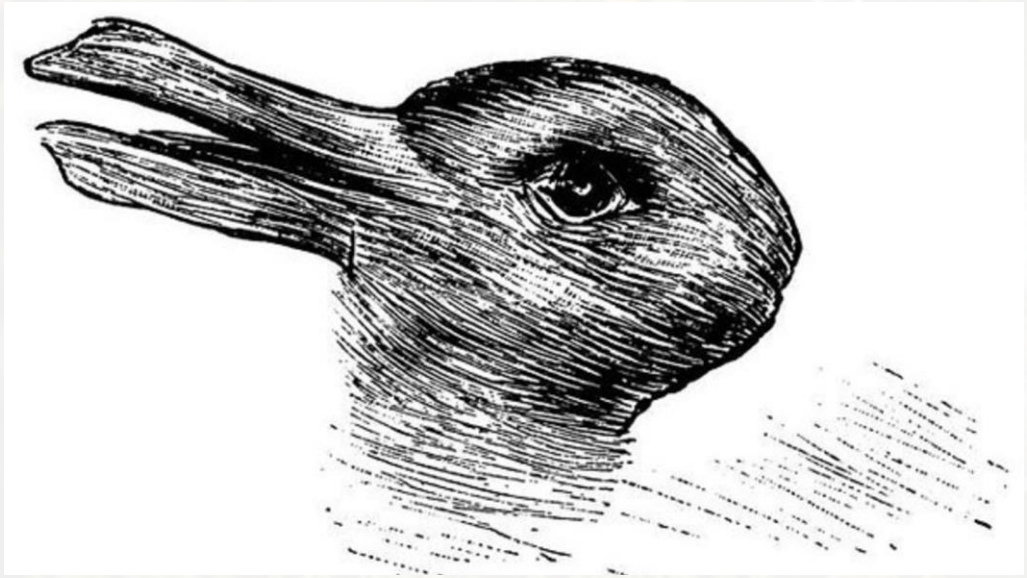
Emergence

Recognition

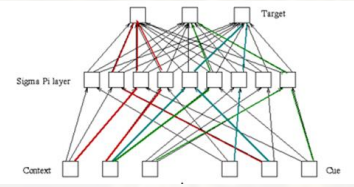
Emergence

- The creation of apparent order out of patterns
- Depends on perception, culture, way of seeing
- Self-Organization

Recognition



Gestalt
Duck-Rabbit
Pattern Activation



Implications for Practice

Objective

To present the core ideas of connectivism in both a learning and scientific context, in a sense unifying the ideas of discovery, interaction and education.

Method

Method as Discovery:

- To discover something is to be immersed in it, to speak it and listen to people speaking in it
- To immerse oneself in the world is to try listening and to try speaking

Principles

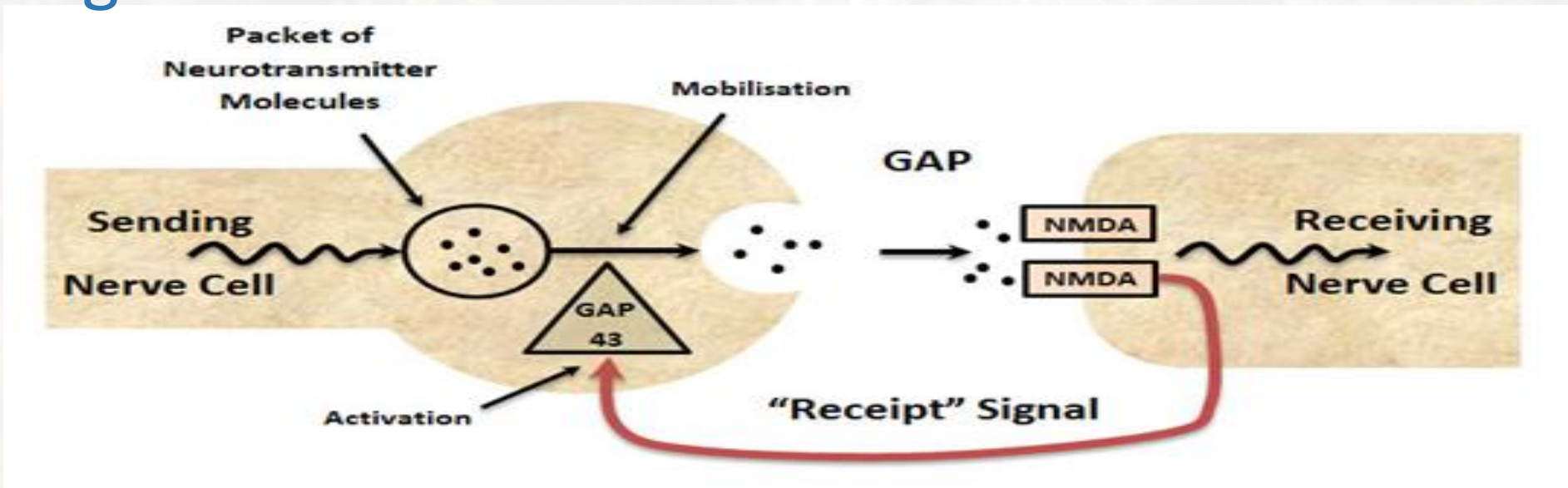
- Autonomy – each entity has its own values and objectives and decides for itself
- Diversity – each entity in a network is unique in role, function and perspective

Principles

- Openness – membership in the network is fluid; content (signals, messages) enter and exit network
- Interactivity – knowledge in the network is created by the interactive process (as opposed to the content of signals propagated through the network)

Process

Being a neuron in the network



Process

- Aggregate – seek out connections and obtain resources through those connections
- Remix – join the resources from multiple links together
- Repurpose – adapt the remixed resources
- Feed Forward – send the newly created resources on to the next nodes in the network

Model

70-20-10 Model of Learning & Development

Experience

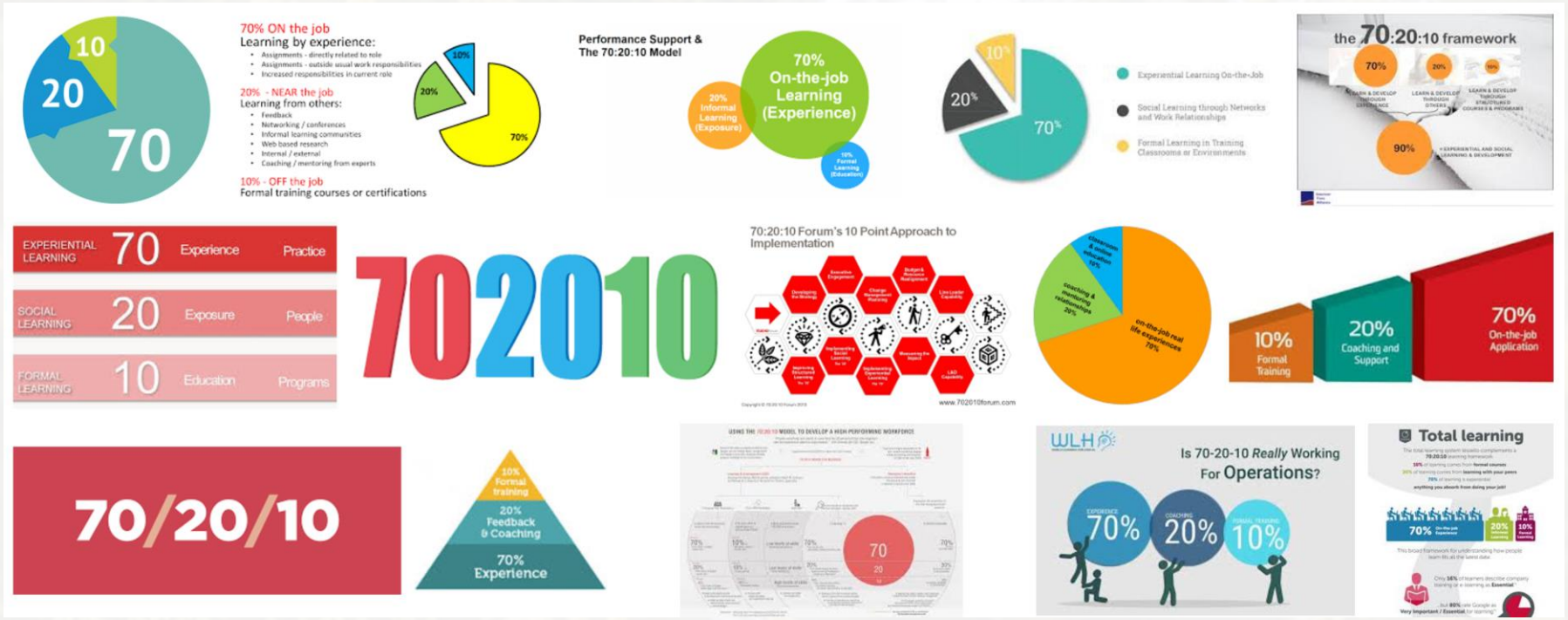
Social

Classroom

Detour:

- Immersive Learning
- VR and Sims

Method


10
20
70
70% ON the job
Learning by experience:
Assignments - directly related to role
Assignments - outside usual work responsibilities
Increased responsibilities in current role
20% - NEAR the job
Learning from others:
Feedback
Networking / conferences
Informal learning communities
Web based research
Internal / external
Coaching / mentoring from experts
10% - OFF the job
Formal training courses or certifications
10%
20%
70%
Performance Support &
The 70:20:10 Model
70%
On-the-job
Learning
(Experience)
20%
Informal
Learning
(Exposure)
10%
Formal
Learning
(Education)
10%
20%
70%
Experiential Learning On-the-Job
Social Learning through Networks and Work Relationships
Formal Learning in Training Classrooms or Environments
the 70:20:10 framework
70%
20%
10%
90%
EXPERIENTIAL LEARNING 70 Experience Practice
SOCIAL LEARNING 20 Exposure People
FORMAL LEARNING 10 Education Programs
702010
70:20:10 Forum's 10 Point Approach to Implementation
www.702010forum.com
10%
Formal
Training
20%
Coaching and
Support
70%
On-the-job
Application
70/20/10
10%
Formal
training
20%
Feedback
& Coaching
70%
Experience
70
20
10
WLH
Is 70-20-10 Really Working For Operations?
70%
20%
10%
Total learning
70%
20%
10%

Model

70-20-10 Model of Cognition

Recognition

Reasoning

Remembering

Model

70-20-10 Model of Cognition

Recognition

Experience, practice, reflection, creation, sharing

Reasoning

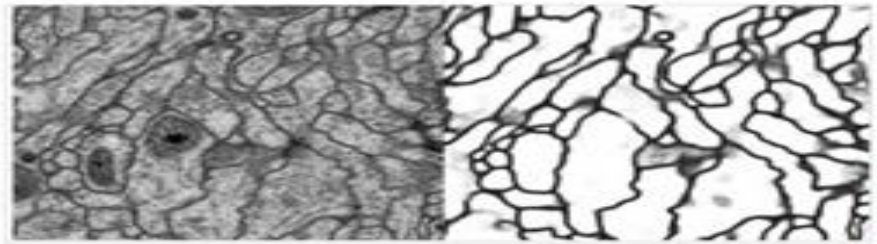
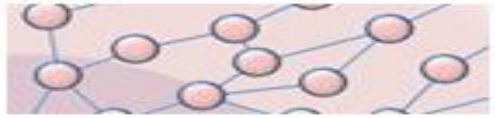
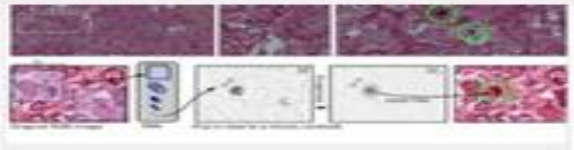
Models, inference, representation, theorizing

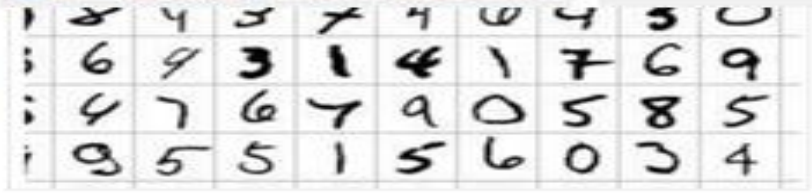
Remembering

Facts, data, names, content

Reading the World

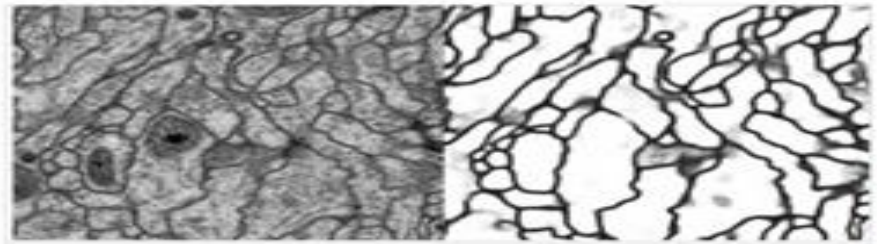
I don’t see the world as neat and ordered, like logic and mathematics – I see it as messy and complex

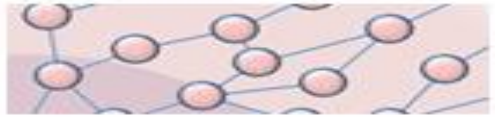




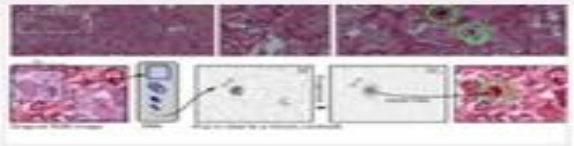


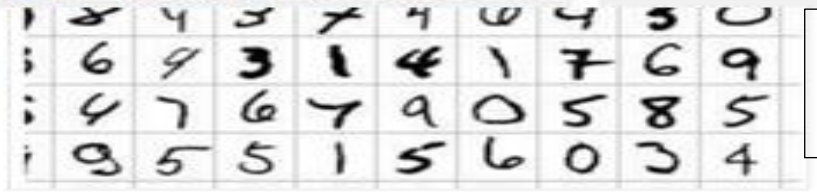
Reading the World

It’s not one language, but many languages; not one way of seeing, but many ways of seeing, not one way of being, but many ways









Detour:

- Critical Literacies

Thank You

Stephen Downes
http://www.downes.ca