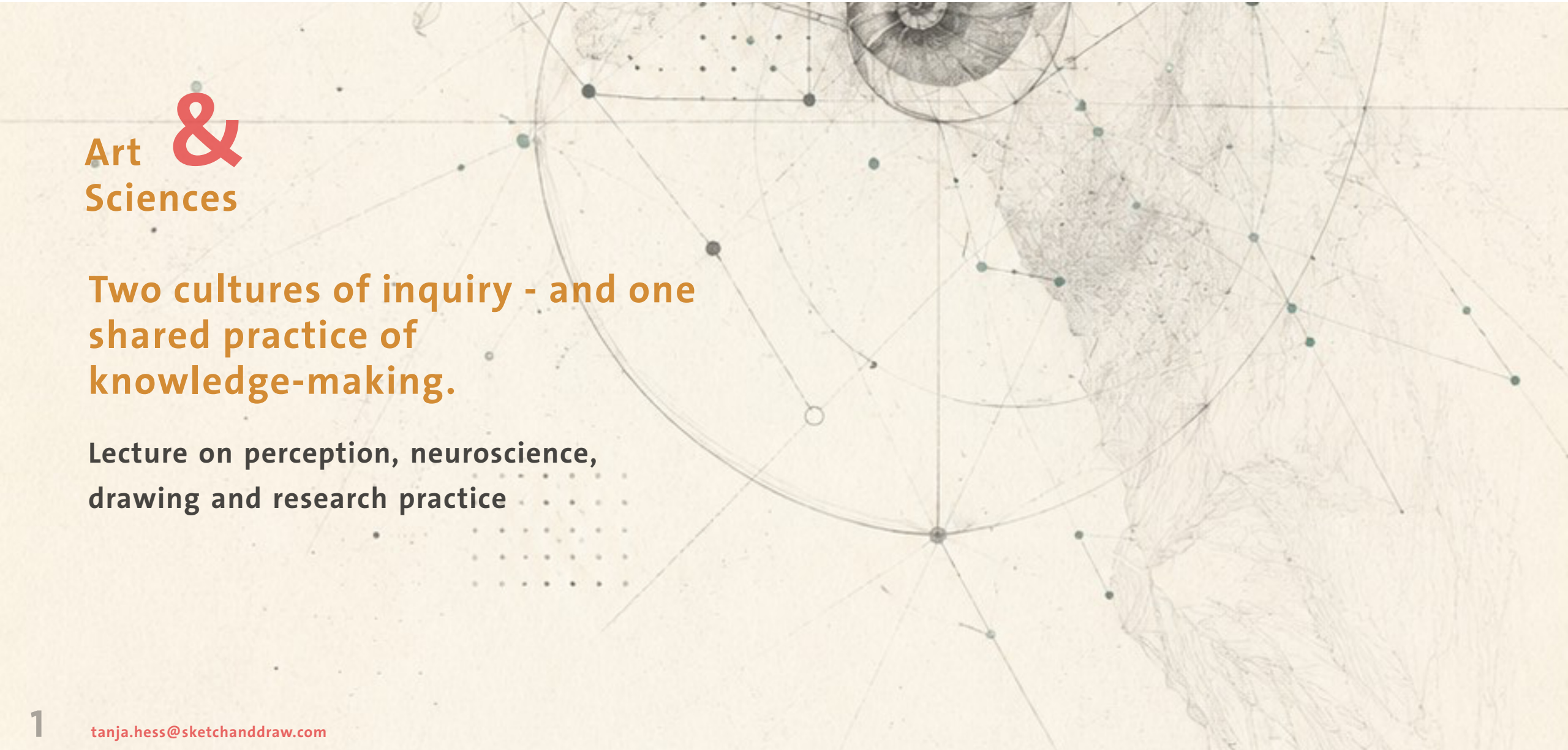

Art & Sciences

Two cultures of inquiry - and one shared practice of knowledge-making.

Lecture on perception, neuroscience, drawing and research practice

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Guiding thesis

Not equivalence, but a kinship of movements of knowledge

Art and science are different media of inquiry.

They differ in institutions, regimes of truth and forms of validation. Yet they share fundamental cognitive operations: questioning, seeing, imagining, testing and sustaining openness.

The false opposition

The familiar divide obscures actual practice

Art

intuitive
expressive
subjective

Science

rational
objective
methodical

In actual practice, this opposition falls apart: artists test, compare and discard. Scientists imagine, model and interpret.

What both practices share

Five trainable operations

1 Questioning → 2 Seeing → 3 Imagining → 4 Testing → 5 Sustaining

This sequence is not a rigid method. It describes an attitude of thought: interrupting the familiar and forming a new relation to the world.

1 | Curiosity

Curiosity begins with a gap

The productive question is not: what is missing?
It is: which assumption holds the field together?

George Loewenstein describes curiosity as a response to a perceived knowledge gap. This gap creates tension and motivates inquiry.

> **“Curiosity arises when attention becomes focused on a gap in one’s knowledge. Loewenstein, 1994”**

Curiosity as paradigm break

The strongest questions attack the frame

Modern art asked:
Why must art represent anything at all?

In art: Impressionism, Cubism, abstraction, Conceptual Art.

Kuhn describes the same structural break in science: a paradigm is not improved, but replaced.

Examples: heliocentrism, relativity, quantum mechanics, plate tectonics.

2 | Observation

Seeing is not recording. Seeing is interpretation.

Trained drawers consciously shift between object, surface, tonal value, edge, negative shape and relation.

This is a trained perceptual skill. Observational drawing connects visual analysis, mental image processing and motor control.

Chamberlain et al. show links between drawing ability, artistic training and brain structures associated with fine motor control and procedural memory.

Predictive processing

The brain sees through expectations

Perception is a process of comparison: expectation … sensory input … prediction error … adaptation

Clark and Friston describe perception as an active, prediction based process. This is precisely where art can intervene: it irritates habit, delays certainty and forces new organization.

3 | Imagination

Before a theory can be tested, it must become thinkable

Einstein worked with thought experiments:
What would one see when traveling
alongside a beam of light?

Artistic work functions analogously:
The work is a hypothesis made visible.

“Einstein called it play. Picasso called it research.
Both describe the same movement:
creating spaces of possibility.”

Creativity in the brain

Neither dreaming alone nor control alone

Default Mode Network

- Imagination
- Simulation,
- Memory,
- possible future

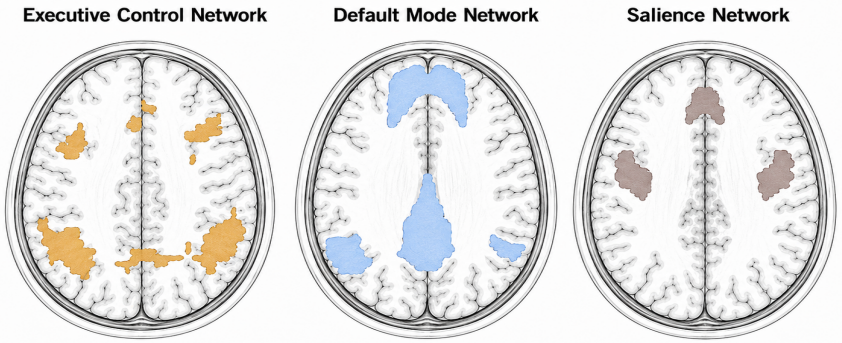
Executive Control Network

- Network
- Selection,
- Evaluation,
- Direction
- Revision

Salience Network

- relevance
- switsching
- attention

simplified teaching diagrams



Beaty et al. show that creative cognition emerges through the dynamic cooperation of large-scale networks. Free association and directed control work together.

For teaching, this means exercises should contain both openness and revision.

SketchDraw

4 | Experimentation

Studio and laboratory think iteratively

No artwork.
No experiment.
No theory emerges fully formed.
Sketches, prototypes, measurement series, discarded versions, material tests: knowledge emerges in loops.

Schön: reflection-in-action - professional thinking happens in the midst of doing.

New theoretical layer | Ann C. Thresher

Science is not a machine Creativity belongs inside the method.

Thresher criticises the cultural image that science is exact, objective and algorithmic, while art is creative and subjective. In actual practice, science requires situated judgement: when designing experiments, reading data, choosing models and deciding what counts as evidence.

This does not weaken rigour. It explains how rigour is produced.

> **“Good science is a tangle of judgement and creativity.”**

Source: Ann C. Thresher, “The divide between art and science is a mistake”, IAI News, 2023.

Objectivity | Rigour | Method

Objectivity requires judgement

Objectivity is not a universal checklist

Climate science **Psychology** **Materials research**

What does avoiding bias mean?
What counts as a valid measurement?
How much should participants know?
When is a survey systematic?
How is “healthy” defined?

Objectivity is not the absence of judgement.
It is trained judgement under methodological conditions.

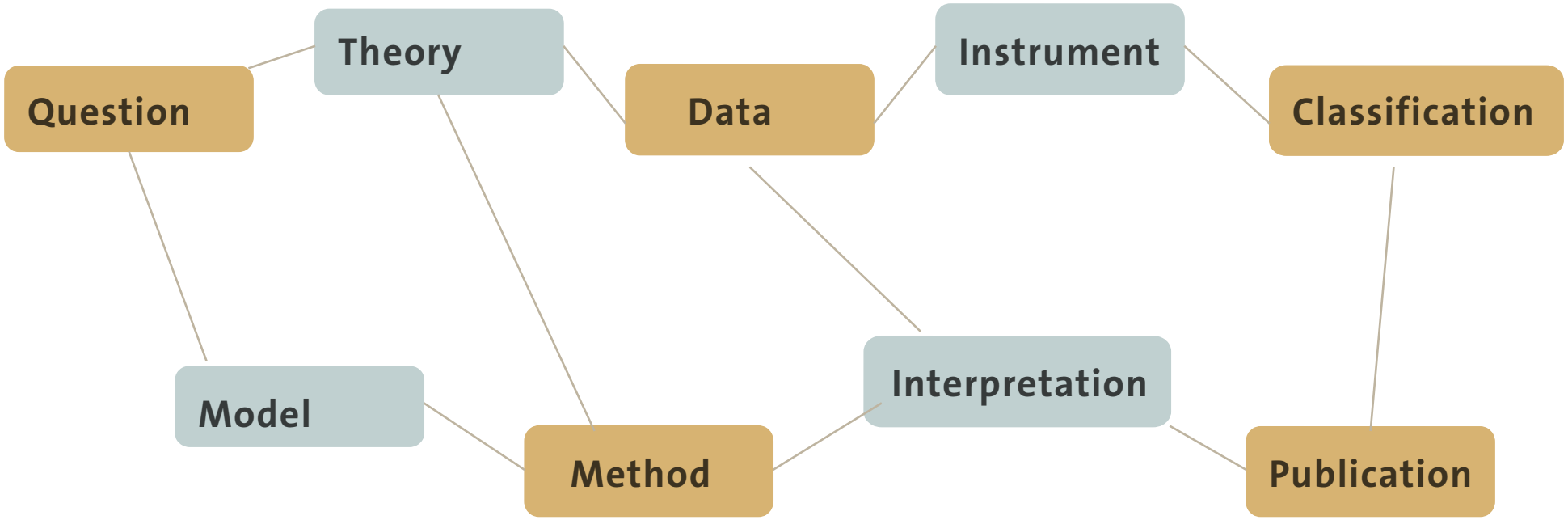
This is where art and science touch: both decide on viewpoint, framing, material, scale and relevance.

Following Thresher, objectivity, rigour and method must be determined situationally according to aim and context.

The scientific method

Not a straight line, but a tangle

Science consists of many interacting parts that must be constructed and adjusted



“There is no mechanical process that can capture all the nuances of scientific practice.”

Following Thresher: science is a network of experiments, data, devices, measurements, classifications and practices.

Nature is an artful modeller

Nancy Cartwright via Thresher

The world does not reveal its rules mechanically

Thresher uses Nancy Cartwright to make a deeper point: nature itself is complex, situated and model-like. Science needs creativity because the world is not a simple machine with instructions printed on its surface.

Researchers therefore reconstruct recipes: through models, analogies, measurements, experiments and revisions.

If nature mixes, models and hides rules, research must also model, test and compose.

A bridge to field research, botany drawing, material practice and Sketch&Draw.

Nancy Cartwright, Nature, the Artful Modeler (2019); discussed by Ann C. Thresher, IAI News, 2023.

Error as discovery

Expertise means being able to read deviations

In school, error is often treated as a deficit. In art and research, it can become a moment of insight.

Fleming reads contamination as a clue.

The artist reads the stain as a new form.

The drawer reads the wrong line as direction.

“The difference is not making no mistakes. It is recognising mistakes as information.”

5 | Ambiguity

Not wanting to know too soon

Uncertainty is not a deficiency. It is the working space of knowledge.

Artistic processes often begin before it is clear what the work will become.
Basic research often begins before it is clear whether a question is solvable.

Tolerance for ambiguity means sustaining multiplicity without simplifying too soon.
It is trainable - especially through open, iterative practice.

Body and material

Thinking does not stay in the head

The hand draws. The eye probes.
The body measures distance. The material responds.

In art this is obvious. It is also true in science:
laboratory work, field research, microscopy, preparation,
mapping and model-making are embodied practices.

Merleau-Ponty: perception is embodied and
anchored in the world. Ingold and Sennett show
material and craft as forms of thinking.

Models, diagrams, sketches

External thinking tools

A diagram does not merely explain. It thinks along.

Scientific models reduce the world in order to make relations testable. Artistic models open perception in order to make relations experienceable.

Tversky: movement, spatial arrangement and diagrams shape thought. Root-Bernstein: creative people use similar tools across disciplines - pattern, analogy, model, play.

Regimes of truth

Related does not mean identical

Science asks:

- **Is it testable?**
- **Is it reproducible?**
- **Does it explain more than before?**

Art asks:

- **What becomes visible?**
- **What becomes experienceable?**
- **Which perception shifts?**

The difference is not a problem. It makes the dialogue productive.

Historical perspective

The divide is younger than the practice

Leonardo did not separate drawing, anatomy, mechanics, botany and aesthetics.

The modern divide is largely produced by institutions: academies, laboratories, journals, museums, funding logics and disciplines.

Sketch&Draw as a bridge

Drawing trains movements of knowledge

The method works with visual noise: fluttering lines, line bundles, crossings, open lines and highlights.

The brain must decide, search and compare.
A sketch becomes controlled uncertainty.

> **“The line is not only the result of a thought. It is a place where thoughts emerge.”**
> **Application thesis**

Mini exercise for the lecture

3 minutes of perceptual shifting

Choose an object in the room.

1 minute: draw it as a thing.

1 minute: draw only surfaces and spaces in between.

1 minute: draw only energy, weight and direction.

Then ask briefly: what became visible when the category disappeared?

For discussion

Three productive questions

1. **Where does knowledge begin: in the head, in the hand or in the material?**
2. **When does an error become a discovery?**
3. **What kind of knowledge does a drawing produce?**

Aim: to understand art not as an illustration of science, but as its own form of research.

Closing image

A shared orientation towards the unknown
Art and science are different cultures of inquiry.

Both interrupt certainties. Both make models.
Both test reality.
Both need imagination, discipline and patience.

The difference is not that one side feels and the other thinks.
The difference lies in how thinking becomes visible,
testable and experienceable.

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For further work

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