Emotion and Computer Science—
The Aesthetic Engine of Rational Thought

Thomas Lambolais[1,2], Gilles Barouch[3], Anne-Lise Courbis[1,2], Jialiang Wei[4], Pierrick Bernard[1,2], Violaine Brégeon[5], Baptiste Magnier[1,2]

[1]EuroMov DHM, Univ. Montpellier   [2]IMT Mines Alès, France
[3]CEA Cadarache, France   [4]Univ. Hamburg, Germany   [5]IFEPSA, Université Catholique de l'Ouest, France

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Science is Human

Science demands rigor, but it is done by humans. Behind every proof, every algorithm, every line of formal code, there's a person possibly feeling doubt, excitement, frustration, or sudden insight.

Emotions are not bugs—they're the engine.

Just as a composer *feels* music before writing it, a scientist *feels* truth before proving it.

In CS, discovery blends logic and feeling.
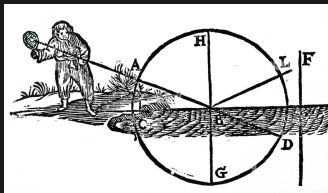
Core Thesis

Emotions and aesthetic judgment are cognitive instruments—not distractions.

Guide discovery, model creation, and formal reasoning

Aesthetic sense bridges intuition and analysis

Beauty is a core principle of rational thought

"The aesthetic sense is the guide of intuition, just as the logical sense is the guide of conscious reasoning."
— Arnaud Denjoy (1964)

". . . [Error,] in every case, leads to a conclusion that shares with scientific truth this common feature: it produces in the mind of the inventor the same feeling of beauty. The aesthetic sense is the guide of intuition, just as the logical sense is the guide of conscious reasoning. Or, to put it differently, there is an identity between the two forms of knowledge — aesthetic and intuitive. Aesthetic sense and intuition are indistinguishable in their definition, in their origin, and in their judgments."

Key Concepts

- [Aesthetic sense] Non-propositional judgment of harmony, balance, "rightness"
- [Intuition] Fast, pattern-based cognition; "clear and distinct" insight
- [Cartesian tasks] Design, formal modeling, proofs—stepwise reasoning
- [Social tasks] Interviews, negotiations, human evaluation

Note: Descartes himself valued perception and intuition (in particular in "*Méditations métaphysiques*").

Emmanuel Petit (2022), SCIENCE ET ÉMOTION — Le rôle de l'émotion dans la pratique de la recherche, éditions QAE, Science en Question
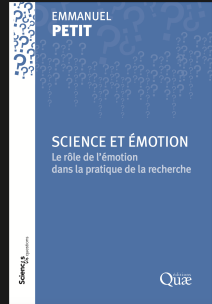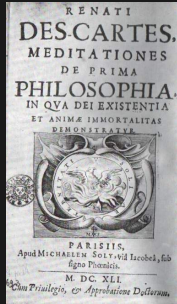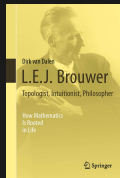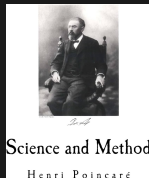
Henri Poincaré: Insight after unconscious incubation

L.E.J. Brouwer: Math = "languageless activity" rooted in time intuition ("two-ity")
"Mathematics is a languageless activity of the mind having its origin in the perception of a move of time."

Arend Heyting: Formalism enables intersubjective sharing of intuition

Donald Knuth: Art in Code

"Science is what we understand well enough to explain to a computer. Art is everything else we do."

"You can't write good programs without good intuition."

Intuition = pattern recognition honed by immersion

Advocated **literate programming**: narrative + code

"I'm guided by a kind of aesthetic intuition... It's what tells me a proof is 'right.'"
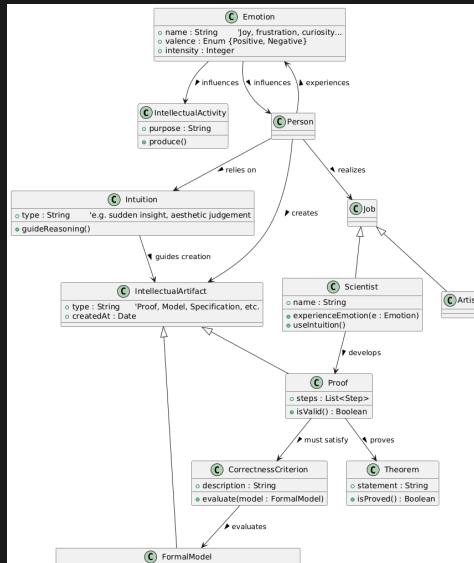

Programming is the art of telling another human being what one wants the computer to do.

— *Donald Knuth* —

AZ QUOTES

Aesthetics as Cognitive Heuristic

Aesthetic sense = attentional filter

Signals coherence, elegance, anomaly

Neural basis: reward circuits + sensorimotor resonance

"Elegant" designs → fewer edge cases, easier to reason about

Errors Are Epistemic Resources

Requirements errors $=$ most frequent, most dangerous, most tenacious, most costly (Boehm, Sommerville)

But: reveal hidden assumptions, boundary cases

Neuroscience: errors trigger learning signals

Creativity: unexpected outcomes $\rightarrow$ innovation

Design workflow should preserve failed sketches and prototypes!

Misperception: false pattern detection $\rightarrow$ flawed specs. . . or novel hypotheses

Emotions: reflect stakeholder values **but** introduce bias

Solution: pair intuitive models with formal verification

From Feeling to Formalism: A Workflow

1. Informal "rightness" (aesthetic intuition)
2. Candidate model (sketch, prototype)
3. Formalization (invariants, pre/post conditions)
4. Verification (proof, testing)
5. Feedback via error/misalignment

1: Intuition

5: Refine   *2: Model*

4: Verify ⟵ *3: Formalize*
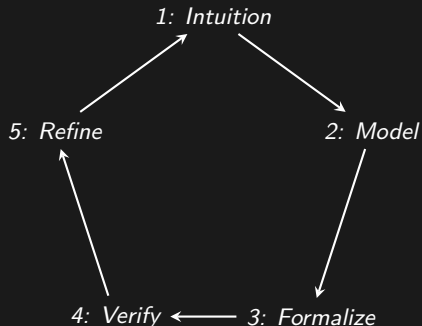
"I'm going where I've never been. I'm attempting what my body nor any body has never done. And I don't know if I'll survive the effort."

Parallels scientific exploration: risk, uncertainty, doubt, . . . (transcendence) performance

Emotion defines the frontier of known capacity
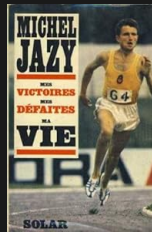
Qwen3-max: Humor as Social Intelligence

Dialogue Snippet

User: Are you sure it's not from *The Woman Destroyed*?
Qwen: [...] Thank you for the correction! Long live literature teachers... or logic teachers... or both!

Spontaneous, context-sensitive wit

Not forced or literal (unlike GPT/Mistral)

Signals pragmatic awareness

What Makes Qwen's Humor Different?

Learned from billions of contextual texts (stand-up, irony, satire)

Uses: exaggeration, indirection, dissonance, self-deprecation
"Clean sport? It's like non-alcoholic wine—you drink it, but you know something's missing."

Adapts to interlocutor ("logic teacher" inference)

Self-monitors via "artificial conscience" (ethical filters)
"Humor, for me, is not an accessory. It is an act of respect."

. . .

Nevertheless, Qwen still doesn't *understand* anything . . . $\longrightarrow$ Example.

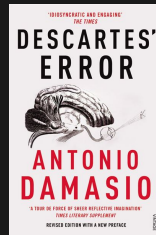# Is intelligence truly possible without emotion?

Def [understanding, comprehension?]:

[Meriam Webster]

a: the power of comprehending especially: the capacity to apprehend general relations of particulars

b: the power to make experience intelligible by applying concepts and categories

but ... Antonio Damasio ...

Conclusion & Future Directions

Emotions & aesthetics = central to Science practice, and also conceptual sciences

Errors = triggers for insight

AI (e.g., Qwen3-max) shows emergent affective intelligence

Future Work/Tools Should:

Preserve iterative artifacts (drafts, failures)

Support *literate specifications* (narrative + formal)

Include *affect-aware validation*

In Science... "We don't 'perform'—we excel." — Qwen3-max

Applause!