Evolving Intelligence Research Relating Diverse Forms of Inquiry

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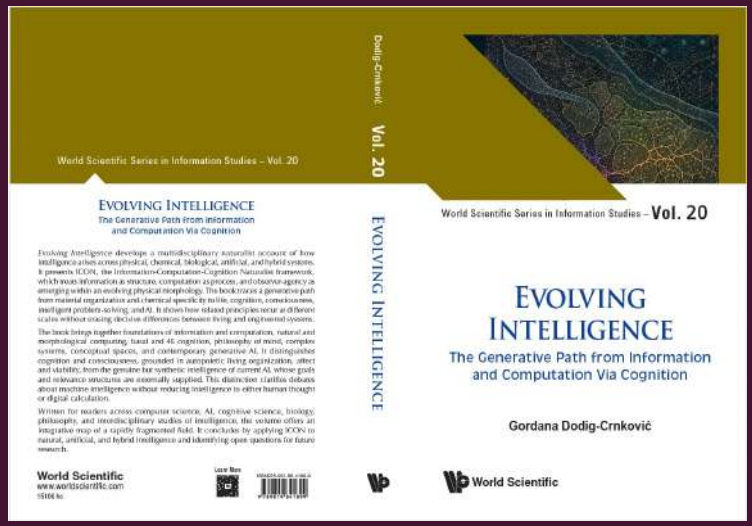

The way to understanding – natural process or invented artefact

My point of departure: Information–Computation–Cognition Naturalist Framework (ICON)

Within ICON, invention is a process within nature.

Subjects and artefacts are particular natural organizations.
Their capacities depend on how they are organized.

ICON on Evolving Intelligence

With life, cognition and minimal subjecthood emerge.

Nature	Evolving morphology and interacting observer-agents. A network of networks of infocomputational observer-agents.
Information and computation	Relational structures (information) with their transformations (computation)
Cognition	The process of life: autopoietic, viability-based activity

Observer-agents across levels of organization

Organization form	Observer-agency basis
Physical and chemical	Registration and transformation through interaction
Living	Autopoietic activity driven by viability. Distributed process of morphological computation.
Human and cultural	Language, reflection and institutions expanding inquiry
Artificial and hybrid	Engineered systems participate in organized interaction

Observer-agency is broader than minimal subjecthood in nature.

Relational information and morphological computation

Organization	Determines which differences can become effective ("make a difference")
Interaction	Actualizes (updates) information for an observer-agent
Transformation	Changes morphology and thus future possibilities for activity

The same book can be meaningful text for a human reader
and food for a bookworm (insect). It relates to Umwelt (von Uexküll)

The minimal subject within ICON

The minimal subject in ICON

Emerges with life (basal cognition).
No reflective self-awareness required.
On the hierarchy of levels of living observer-agents subjects and their perspectives evolve but all of them belong within nature.

Subjectivity is the living organism's mode of existence.
Keijzer (2025) offers a contemporary philosophical characterization that can be used to characterize ICON as "full naturalism".

Infocomputation as a generative mechanism

Infocomputation generates organization across nature

Information	Structure arising relationally through interaction
Computation	Transformation of morphology (informational structure)
With life	Cognition and minimal subjecthood emerge together

Infocomputation operates in all of nature, before life and throughout its evolution.

Intelligence as dynamic relations on different levels of organisation

Physical and chemical	Material organization and its transformations
Organismic and environmental	Adaptation, symbiosis, development, learning, anticipation, planning.
Social and symbolic	Language, institutions and shared practices
Artificial and technological	Engineered capacities and material infrastructures

The contributions of different knowledge fields

Inquiry	What it contributes
Physics and chemistry	Material mechanisms and conditions of possibility
Computing	Generative processes of information transformation (morphological computing) in natural and engineered systems
Evolutionary biology	Historical emergence of new forms and behaviors
Cognitive science and AI	Perception, action and reasoning; construction and simulation
Anthropology and cultural inquiry	Language, institutions, technologies and norms
Systems and information theory	Models of organization, interaction and information communication
Philosophy	Conceptual, ontological, epistemological, normative analysis

ICON: relational and generative explanation

Translation into ICON	Physics, mathematics, chemistry and biology expressed in ICON terminology
Relational and generative mechanism	Infocomputation generates and transforms natural forms and processes through interaction
Levels of organization	The mechanism takes different forms at different levels of natural organization
Evolving Intelligence	A search for intelligence's roots in nature's relational and generative processes

Philosophy makes difference in several ways

Conceptual clarification	Identify what changes when a term crosses levels
Ontological clarification	Specify the organizations and relations an account assumes
Normative clarification	Examine what counts as success, relevance or justification
Reciprocal criticism	Show how one inquiry can revise another's explanation

Fragmentation, reduction and coordinated inquiry

Fragmentation	Explanations remain disconnected or talk past one another
Reduction	One vocabulary displaces distinctions needed by other inquiries
Coordinated inquiry	Connections preserve the contribution and limits of each account

The relational and generative account grounds ICON's proposed unification.

Understanding of intelligence within evolving nature

ICON proposes unification through a relational generative account of nature that appears as infocomputation for cognizing agents att different levels of organization.

Infocomputation generates and transforms organization through interactions of morphological observer-agents.

Evolving Intelligence investigates roots of intelligence within these relational and generative processes.

References

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