

The Individuation of Social Systems: A Cognitive Framework

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Abstract

We present a socio-human cognitive framework that radically deemphasizes the role of individual human agents required for both the formation of social systems and their ongoing operation thereafter. Our point of departure is Simondon's (1992) theory of individuation, which we integrate with the enactive theory of cognition (Di Paolo et al., 2010) and Luhmann's (1996) theory of social systems. This forges a novel view of social systems as complex, individuating sequences of communicative interactions that together constitute distributed yet distinct cognitive agencies, acquiring a capacity to exert influence over their human-constituted environment. We conclude that the resulting framework suggests several different paths of integrating AI agents into human society. One path suggests the emulation of a largely simplified version of the human mind, reduced in its functions to a specific triple selection-making which is necessary for sustaining social systems. Another one conceives AI systems that follow the distributed, autonomous architecture of social systems, instead that of humans.

Keywords: social systems, individuation, cognition, self-organization, communication, cognitive architecture

1 Introduction

In attempting to artificially emulate human cognition, one should not underestimate the degree to which cognitive activities are influenced (for better or worse) by the emergence and evolution of modern social systems. In this paper we argue that the latter operate as sui generis cognitive systems - autonomous, self-organizing loci of agency and cognition, which are distinct from human minds and manifesting behaviors that are irreducible to their aggregations. Though not biologically embodied, the manner these agencies individuate and their mode of operation is analogous to many other self-organizing processes of life.

We believe that while the most researched paths towards AI/AGI development address the fundamental aspects of the cognitive architecture of an *individual* human mind, they still amount to a somewhat narrow conception of cognition. We wish to present here a different, complementary perspective of cognition, one which originates from a sociological systemic view. From there, we derive a framework for a socio-human cognitive architecture that radically deemphasizes and simplifies the role of individual human agents required for both the formation of social systems and their ongoing operation thereafter. Naturally, the resulting view of the functioning of human agents as facilitators of social systems, is as partial as the one that focuses on individual minds. It may however open a potentially faster route for implementing AI systems able to generate outcomes comparable to those that are achievable for contemporary human agents in the context of social systems.

Our explication is based on Niklas Luhmann's (1996, 2002, 2012) theory of social systems, which we link with the ancient Heraklitian view of reality as ontologically constituted of processes instead of objects and with Gilbert Simondon's (1992) theory of individuation. This results in an understanding of social systems as complex sequences of *occurrences of communication*, which are capable of becoming consolidated to the degree in which they start to display an emergent adaptive dynamics characteristic to cognitive systems - and to exert influence over their own mind-constituted environment.

2 Individuation of Cognitive Agents

In our understanding of social systems as cognitive systems we shift from an object-oriented Aristotelian ontology to a process-oriented one, moving away from individuals as primary ontological elements whereas all transformations are secondary, to *individuation* (Simondon, 1992; Weinbaum & Veitas, 2016, 2016a) as the primary ontological (or more accurately ontogenetic) element. Individuation is a process where the boundaries and distinctions that define individuals arise without assuming any individual that precedes them. Individuation is a primary formative activity whereas individuals are regarded as merely intermediate and metastable entities, undergoing a continuous process of change.

In this view, the individual undergoes a continuous process of transformation and is always pregnant with not yet actualized and not yet known potentialities of change. According to Simondon, an individual is not the rigidly well defined Aristotelian element with a priori given properties, but a plastic entity, an on-going becoming. In (Weinbaum & Veitas, 2016a) the authors discuss in length the mechanisms of individuation and specifically how local and contingent interactions progressively achieve higher degrees of coordination among initially disparate elements and by that bring forth complex individuated entities with agential capabilities.

We argue that individuation can be understood as a general process of *cognitive development* once we consider cognition as a process of sense-making that facilitates spontaneous boundary and distinction formation. This approach is supported by the theory of enactive cognition that sees in sense-making the primary activity of cognition (Varela, Thompson & Rosch, 1992; Stewart, Gapenne, & Di Paolo, 2010; De Jaegher & Di Paolo, 2007).

We follow this notion but introduce the more radical idea that sense-making is the bringing forth of a world of distinctions, objects and entities and the relations among them. In that, sense-making precedes both subjects and objects and is necessary to their emergence. In this very sense we draw the line that associates sense-making to individuation: sense-making thus understood, precedes the existence of consolidated cognitive agents to whom the activity of sense-making would be conventionally attributed. Even though there is 'nobody there' as yet in the conventional sense,

processes of individuation constitute a distributed and progressively more coherent (as boundaries and distinctions are formed) loci of autonomous cognitive activity. Individuation is thus a general process of cognitive development taken out from its relatively narrow psychological context and projected into the much broader context of general systems. Sense-making entails crossing the boundary between the unknown and the known through the formation of tentative *perceptions* and *actions* consolidating them together into more or less stable *conceptions*.

Individuation as an on-going formative process, manifests in the co-determining interactions taking place within heterogeneous populations of interacting agents. These populations are the “raw materials” from which new individuals emerge. The sense-making activities are distributed over the population and have no center of regulated activity or synchrony. Coordination - the recurrent mutual regulation of behaviors is achieved via interactions that are initially contingent. These interactions are necessary for the consolidation of any organized entity or system. We see then a strong parallel between cognitive development and individuation bringing forth actual agents --be them biological organisms, social systems, AIs, or any other. Consequently, in this very broad sense that we find particularly attractive in the context of transdisciplinary research we can assign cognitive agential competences to general systems applicable to diverse categories and scales.

3 Social Systems as Cognitive Individuals

We can now apply this rationale to social systems. By a ‘social system’ we mean here any metastable form of social activity --such as organizations, projects, social movements, economies, governments, states, religious organizations, cultural organizations, discourses, narratives, linguistic activities such as conversations, stories, reports etc. Using Luhmann’s theory of social systems as our point of departure, we will a) demonstrate the individuation of social systems, i.e. the sense-making activity that brings them forth, and b) identify social systems as the metastable individuals that they are. This will support our thesis that social systems can be considered as loci of cognitive activity or in other words as distributed cognitive agents.

According to the Niklas Luhmann’s theory of social systems (2002, 2012) events which forge the social reality happen as single occurrences of *communication*, while each such occurrence is combination of three difference-making selections: (a) a selection of *information*, (b) a selection of the *utterance* of (a form to carry out) that information and (c) a selection of *understanding* of that utterance (Luhmann, 2002:157).

Once such three selections have been made as combined together, they form a unity of a communicative event, which temporarily becomes an individual by itself. This means that it distinguishes itself from its environment (i.e. any other processes or events) by the means of three provisional boundaries, which the event sets forth: a) an ‘information-making boundary’ between the marked and unmarked sides of a distinction being made (Spencer-Brown, 1994), i.e. delineating the selected information (marked - M) and the non-selected one (unmarked - Un-M), (b) a ‘semiotic boundary’ (Lotman, 2001) between the thus created *signified* (SD) and a particular *signifier* (SR) selected to carry the information, and (c) a ‘sense-making boundary’ between thus created *sign* (SGN) and the *context* (CX), i.e. delineating the understanding of information within its situation (Lenartowicz, Weinbaum & Braathen, 2016).

The three selections and corresponding boundaries of an event make the communication available to interact with or to be referred to by another communicative event constituted by another triple selection. E.g., the inside of a distinction may select another marked and unmarked side of an information boundary in another instance of a communicative event; the form that was selected as an

utterance may be reused in the future, or may be referred to as the selected information; the context side of the sense-making boundary may be re-selected in the understanding of a following communication, etc.

Once recorded or remembered, all communicative events and all selections become endlessly available to be referred to, independently of their proximity in location or time of utterance. This allows them to freely interrelate in a variety of ways that give rise to the emergence of countless transient, original sequences and configurations. However, closed networks of communication, which are typical to humans, are likely to tighten the intertwining and associative relations of communicative events to such a degree that they converge into self-reinforcing recurrent sequences (Lenartowicz, 2016). Once stabilized, such assembled sequences may become quite difficult *not* to be related to by following specific instances of communication, even if in a form of negation, or critique. Thus, out of ephemeral instances of single primitive communicative events, complex individuated sequences and patterns arise. We call such individuals *social systems* and we consider the process of their self-organization to be a clear case of individuation as described in section 2 (Lenartowicz, Weinbaum & Braathen, 2016).

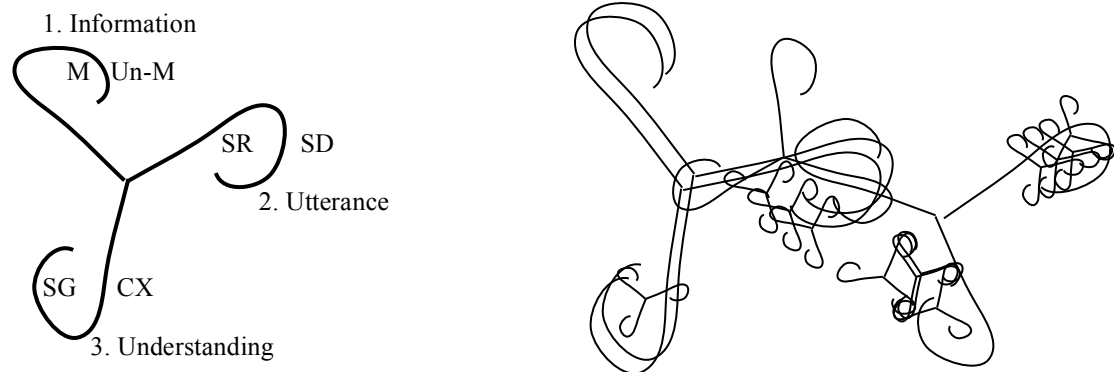


Figure 1: (A.) A single occurrence of communication and (B.) self-organization of a sequence of communication

By repeatedly referring and being referred to (with some degree of variation) the elements of social systems maintain both continuity and coherence while they undergo a continuous individuation. Coherence is maintained and reinforced due to distinction-based composition: since, while recurring, a sequence of communications repeats (with high probability) its previous selections, in a manner similar to the dynamics of Markovian processes. Boundaries that are initially contingent, become reinforced and stabilized. On account of their repetition, a social system can be said to develop perceptions (i.e. reappearing selections of information and understanding), actions (i.e. reappearing selections of utterance) and conceptions (percept – action associations) that dynamically bind them. Each such assemblage thus becomes a locus of identifiable cognitive activity, temporarily stabilized within a flux of communication.

4 The Role of Human Cognition

The selections needed for a social system to individuate i.e. the three selections of information, of utterance, and of understanding, are all performed by other individuated cognitive systems, namely:

human beings. Once a certain degree of coherence of the social system is achieved, this activity is nudged by the internal pattern of that system, which orients and guides the human-made selections. The mental environment provided by humans actively facilitates the further individuation of the system by searching for and/or initiating new instances of communication that promote clarity, coherence and the determination of yet undetermined details in previous communications.

The necessity of the engagement of human cognition and actions may call into question both the actual agency, which we attribute to social systems, and the appropriateness of the concepts of self-organization and individuation being applied to them. However, it must be emphasized that the power of influence of a single human individual over the social organization she is part of is always relative and dynamic. Whether water will wash a seedling out, or will be consumed towards its growth, is contingent on the relative difference of their mass and capacity. By analogy, an individual person, who may normally be capable of generating an unprecedented occurrence of communication, is typically much less capable, or incapable at all, of being oblivious and restraining from contributing to the production of a fully blown, massive social system, such as a culture, an economy, a discourse, or a paradigm. The reason lies in the relative difference of strength between the two individuals: human and social. When the social system is at the very beginning of its potential individuation, consisting of a single, hardly contextualized occurrence of communication, the human individual may freely influence its shape. But when the social system becomes massive and its pattern is confirmed by an immense number of other communications, selections made by the same person are much more likely to simply follow the groove. Additionally, if a single selection *does not* follow the pattern, typically it will neither stop the operations of the system, nor reorganize it. The overwhelming presence of other instances of communication that *do* follow will suffice for it to continue. It is the power of large numbers and memetic imitation that helps to consolidate the social system.

Taking into account a variety of powerful factors that guide all the linguistic activities of humans: (a) the relative simplicity, associative coherence, frequent recurrence of the cognitive operations once they become consolidated in a social system (b) the rarity of context-free (e.g. completely exploratory and poetic) communications that is reinforced by the density and entanglement of all “language games” in which contemporary humans are all immersed in, and (c) the high level of predictability of human selection-making inputs observable from the sociological standpoint; it will be reasonable to set the boundaries of our modeling of the general phenomena of human cognition in such a way, which delineates the dynamics of two different kinds of individuating cognitive agencies operating at different scales: the human individual and the social system. Instead of reducing all cognitive activities to the human individual we can clearly distinguish cognitive agencies operating at different scales.

5 Conclusion

Taking into account the strength of the influence that the cognitive operations of social systems are capable of exerting on the cognitive operations of humans, as well as the relative simplicity of the role of the humans once it becomes reduced to the triple selection-making, it seems worth to explore the possibility that in the attempt to replicate human cognition in AI systems a similar split architecture could be introduced.

While the implication that individual human beings compliantly follow patterns laid out by social systems may invoke resentment or even denial, a similar degree of socially induced amenability might prove desirable, if displayed in robots. Provided that a deliberate consensual choice can be made in respect to the kinds of social systems which would be beneficial to humans and human communities

in general, an artificial cognitive architecture designed specifically to follow the operations of social systems could probably minimize the threat of AI systems becoming “too creative” or “too independent” and thus posing a threat from the perspective of human societies.

Yet, the interpretation of social systems as individuating cognitive systems opens up possibilities other than just the one of designing AI as contributors of the triple selection-making. Another interesting possibility is to conceive AI systems that follow the distributed architecture of social systems, instead of that of individual human cognition. In this approach an intelligent artificial architecture would be envisaged as a self-organizing cloud of occurrences of communication, which seeks self-consolidation and expansion via opening up of triple selection-making opportunities for other agents: humans, software systems or machines. Seen from this perspective, and taking into account the open-ended nature of individuation and evolution, it is conceivable that such an individuating system may emerge out of any simple autonomous organization.

And, clearly, in the most sophisticated and unpredictable implementation both paths would be followed simultaneously: designing a multi-scale AI system that involves both the individual and social perspectives we explored. Artificial systems could be designed to implement both the selection making populations of individual agents and a selection-constituted distributed systems -- a complete artificial social reality might thus be created.

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