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Complexics as a Meta-Transdisciplinary Field

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Knowledge of knowledge (epistemology of complexity)

Abstract

'Complexics' as a meta-transdisciplinary field would bring together all contemporary efforts devoted to constructing tools, procedures, models and concepts intended for understanding and explaining the most interwoven and dynamic phenomena of reality. Our aim needs to be, as Morin says, not "to reduce complexity to simplicity, [but] to translate complexity into theory". New mathematical and computational contributions have already continued to grow in number, thanks primarily to scholars in statistical physics and computer science. However, human complexics must be seen as multi-methodological, combining quantitative-computation methodologies and more qualitative methodologies aimed at understanding the mental and emotional world of people.

Key words

meta-transdisciplinarity; modelisation; qualitative methodologies.

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1. ‘Complexics’: a terminological and theoretical proposal

The recognition that many phenomena relating to life are ‘complex’ in nature – i.e., that they are interwoven, self-organising, emergent and processual – has prompted us to re-examine how we have conceived of reality, both the way we have looked at it and the images we have used. This is the point of departure for the various efforts being made in the distinct (inter)disciplines engaged in refreshing such concepts and finding new ways of thinking that better fit the complex organisation of facts and events.

The theoretical and conceptual innovations in this vein can be grouped under headings such as ‘complex thinking, ‘sciences of complexity’, ‘complex perspectives’, ‘complex [adaptive] systems’, and so on. In turn, these can be brought together into a more overarching field, one that I propose calling ‘complexics’, echoing ‘mathematics’ and ‘systemics’. ‘Complexics’ denotes the *meta-trans-disciplinary* field specifically concerned with giving us suitable cognitive tools to understand the world’s complexity. Additionally, the use of the adjective ‘complexic’ would avoid the common confusion caused by the adjective ‘complex’, which belongs to everyday usage and already has its own connotations of complication and confusion. Thus, ‘complexic’ thinking and ‘complexic’ perspective would provide clearer terms, be freer of confusion, and refer more precisely to epistemic elements in contrast to the ‘complexity’ typical of many phenomena of reality[1]. In short, the world would be ‘complex’, but our way of looking at the world would be ‘complexic’[2].

The proposed meta-transdisciplinary field of ‘complexics’ would bring together all contemporary efforts in any specific disciplines or by any researchers specifically devoted to constructing tools, procedures, models and concepts intended for transversal application that are aimed at understanding and explaining the most interwoven and dynamic phenomena of reality. This would encompass Edgar Morin’s theories of complex thinking; the epistemological and theoretical contributions of Gregory Bateson and physicists such as David Bohm, Ilya Prigogine, M. Gell-Mann, Fritjof Capra, and

[1] Roggero also points to the problems caused by the many meanings of the term ‘complexity’, referring to difficulties observed in the reception of the work of Edgar Morin in the field of sociology: “The ambiguity of the same term ‘complexity’, which is often used as a synonym for ‘confusion’ or ‘faulty thinking’ or a ‘complicated’ objective, makes abundantly clear that Morin’s use of the word is not the common one” (2013:113).

[2] According to Ruiz Ballesteros, “the problem is not that we are using the notion of complexity to construct the world – which we already know is complex – but that we are trying to devise a way of thinking about the world, and this is where the greatest difficulty lies” (2013:154). This would be the mission of a meta-transdisciplinary complexics.

Jorge Wagensberg, or of cognitive biologists such as Humberto Maturana and Francisco Varela, and the proposals of ecologists such as Ramon Margalef and Timothy Allen and of sociologists such as Norbert Elias. It would also include, among many others, the most recent contributions of Albert & Barabási and Ricard Solé in network theory, and of Maxi San Miguel and Albert Díaz-Guilera in statistical physics, and the study and computer simulation of complex systems[3].

2. The construction of a theoretical vision

The task of building, in a coordinated and integrated manner, a meta-transdiscipline such as the one depicted here requires progress on both the theoretical and the methodological levels. Indeed, at present, there are advances being made in both domains, although they appear to lack integration and mutual communication.

On the level of theory, complexics needs to provide a set of principles, concepts and conceptual landscapes that can be applied transversally to distinct areas of knowledge and phenomena of reality, enabling us to gain a much firmer grasp of the complex aspects of their existence than we currently have. For this reason, our aim needs to be, as Morin says, not "to reduce complexity to simplicity, [but] to translate complexity into theory" (1994:315).

To achieve this objective, one of our first tasks is to acknowledge the difficulty of putting into words a reality that is dynamic, processual and changing, using terms from our languages that are based on a rather static and stable view of the world's phenomena. In fact, we need to shift from a science 'of nouns' to one 'of verbs' ('languaging', 'bilingualing, 'identitying', etc.) (Arthur, 2013). By using forms of motion, we not only help our brain/mind to escape from its 'conservative' furrows and open ourselves up to a more creative conceptualisation, but we also draw much nearer to the 'truth' of the characteristics of the observed facts, which are certainly the product of ceaseless interaction among real agents and elements.

One of the other profound changes that we need to address from the epistemological perspective of complexics is the tendency to disconnect the elements of reality once we

[3] For a broader look at the perspective as a whole, see the excellent overview provided by José Luis Solana Ruiz (2013). Shorter summaries can be found in Bastardas (2013 and 2014) and Massip (2014).

have given a distinct name to each of them. Apparently, the act of assigning different names tends to lead us to think of these elements as existing independently, not interrelatedly, when, in reality, what is most typical is precisely their interdependence and interwovenness. If we turn our thoughts to 'society', for example, we imagine an entity not only different from the agents – human beings – who comprise it and give it existence, but also an entity that is separate in space. Society, we say, is 'on top of us'. In the case of sociocultural facts, Norbert Elias proposes in his figurational sociology that we do not think in terms of 'human beings and their environment' or the 'social framework', but in terms of configurations constituted by groups of individuals (with oneself among them): "Nobody would think to define the process of a game involving a player as the player's 'environment' or 'milieu' or 'framework'" (Elias, 1982:115). Morin concurs; based on his recursive thinking, in which the products and their effects are necessary for their own production, he says: "Individuals are not in society as in a box. There are interactions among individuals that produce society, which never exist without the individuals. (…) [W]e produce a society that produces us. We are part of the society that is part of us" (Morin, 1994:304-05). Our task here is to change our habitual images and develop visions that are closer to what actually occurs in reality.

3. New methodologies for new approaches

It is clear that the appearance and/or consolidation of these new theoretical perspectives must necessarily have ramifications at the more practical level of methodology. New tools for the conception, apprehension and treatment of the data of experience will need to be devised to complement existing ones and to enable us to make headway toward practices that better fit complexic theories.

One of the interesting theoretical-methodological examples is 'network theory', to which researchers such as Barabási & Albert and Solé have contributed. Their formulations have resulted in enhanced tools for the representation and mathematical treatment of interconnections at distinct levels of reality. As a result, these tools have been applicable to a variety of disciplines. In the field of sociocultural and communication sciences, however, this contribution may yet be at an excessively one-dimensional state, given that greater stress is being put on the 'internal' interactions of a system than on what happens between the system and its other systems or

environments. Indeed, network theory could be 'ecologised' more in order to include the interrelated multidimensionality of reality. This is what lies behind the addition of 'adaptive' to the phrase 'complex systems' in the terminology of 'complex adaptive systems' (CAS), which was popularised by the Santa Fe Institute, in New Mexico.

New complexic mathematical and computational contributions have continued to grow in number, thanks primarily to scholars in statistical physics and computer science, who are now taking an interest in social and economic phenomena (cf. Epstein & Axtell, 1997; Wolfram, 2002; Abrams & Strogatz, 2003; Ball, 2005; Epstein, 2006). Drawing on analogies involving the study of systems that arise from the interaction of given agents and their rules in physics and in other disciplines, there are a rising number of contributions seeking to apply the new computational possibilities to our understanding of human social phenomena. This has also reached certain aspects of linguistics, such as the evolution of language, evolutionary contact and change[4].

4. Integrating theory and methodology

Certainly, these methodological innovations put into question and again make us take note of the excessive separation between the training received by researchers in the 'sciences' and in the 'arts'. Closer collaboration between these two subsets of researchers would, in all likelihood, be much more energising and creative than their current mutual distance.

Nevertheless, we need to have a critical eye and ask to what extent these transdisciplinary computational models, probably valid for other phenomena, are also the most appropriate for an understanding of shifting human phenomena. Their utility – which is based primarily on the simplified representation of human beings as 'agents' with little autonomous, creative cognitive-emotional activity – may be limited if we want to grasp not only the possible evolutions of a situation with 'stably' defined rules, but also, as a whole, the causal dynamics that have given rise to and determined the actions of its units[5]. That said, nobody can deny the importance of the studies conducted

[4] The applications of computational and complexic perspectives are also of great interest in the field of general linguistics, cognition and communication. See, for example, the works of Luc Steels.

[5] One characteristic of this kind of modelling is that it uses few parameters. This clashes with the aspiration of complexic theory to build a comprehensive ecology out of the elements involved: "The idea

to date from the perspective of complex systems, or the utility of modelling, which has brought us nearer to the essential elements of processes and to the expression of their interrelationships with the utmost clarity. It seems obvious, therefore, that human complexics must be seen as multi-methodological, insofar as necessary combining quantitative-computation methodologies and more qualitative methodologies aimed at understanding the mental and emotional world of people. The epistemic foundations of complexic theory, set on gaining a deeper understanding of the world, seem to put this as a clear demand. As do human facts, with their peculiarities and their difference in relation to the dynamics that occur at hierarchically 'inferior' levels of organisation in the universe (cf. Malaina. 2012). I think we must also be cognizant of the peculiarities of human phenomena, which are characterised by the existence not only of purpose and regularity in the control of behaviour, but also by the significant degree of agents' cognitive and interpretative autonomy and by the powerful influence of the emotional dimension.

This differential fact seems to pose a contradiction for the two fundamental orientations of complexics developed to date. On the one hand, the more epistemological and philosophical contributions lead us to postulate the inevitability of taking into the account the brain/mind and everything that arises bio-cognitively from it in order to understand complex human behaviours. On the other hand, the proposals put forward by physics and computer science move in the opposite direction, postulating the selection of a few 'practical' parameters that can computationally 'explain' the observed facts.

Faced with this sort of dilemma, the need in my view is for the two lines to come to a meeting of the minds, stop disregarding one another as they have done, and take steps toward a mutual integration based on the acceptance of the shortcomings of each approach, achieving progress through a non-contradictory complementarity of perspectives. It must be conceded that the practical and methodological applications of

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is to capture the essence of different social behaviours by simple interaction rules: following the idea of universality classes, in collective emergent phenomena details might not matter" (Castelló, 2010:24). Morin (2005:4) takes a rather more critical view: "Restricted complexity has enabled important advances to be made in formalisation, in the possibilities of models, which in turn stimulates the potential for interdisciplinary efforts. But one is still within the epistemology of classical science. (…) In some sense, complexity is acknowledged, but it is decomplexified.". To gain an adequate view of the whole and to understand the *how* and *why* of the process pursued by the agents in reaching the states that guide their decisions, as Xavier Castelló has similarly put it, it will probably be necessary to use computational research together with other types of research that are closer to the changing cognitive and emotional activity of the agents (cf. Rodríguez & Rogero, 2011, and Rodríguez Zoya, 2013).

basic complex ideas need to be developed much farther in order to apply them to specific research. At the same time, the limits of complex adaptive systems as computational strategies must be accepted in the pursuit of a better understanding of the dynamic and evolutionary processes typical of human beings. In the final analysis, models always have a *narrative* running behind them that reflects the attempts of a human being to understand the world, and models are always interpreted on that basis. This is precisely what Allen and Hoekstra have recognised in the field of ecology: "Narratives are the bottom line in science. Yes, there are hypotheses, predictions, theories and models, but all of these devices are in the service of achieving compelling narratives. (…) The end product of science is a story improved by models and made convincing by predictions" (2015:310).

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