Systems Theory and Algorithmic Futures: Interview with Elena Esposito

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> Abstract • By introducing us into core concepts of Niklas Luhmann's theory of social systems, Elena Esposito shows their relevance for contemporary social sciences and the study of unsettled times. Contending that society is made not by people but by what connects them – as Luhmann does with his concept of communication – creates a fertile ground for addressing societal challenges as diverse as the Corona pandemic or the algorithmic revolution. Esposito more broadly sees in systems theory a relevant contribution to critical theory and a genuine alternative to its Frankfurt School version, while extending its reach to further conceptual refinement and new empirical issues. Fueling such refinement is her analysis of time and the complex intertwinement between past, present and future – a core issue that runs throughout her work. Her current study on the future as a prediction caught between science and divination offers a fascinating empirical case for it, drawing a thought-provoking parallel between the way algorithmic predictions are constructed today and how divinatory predictions were constructed in ancient times. **> Keywords** • **Algorithms, communication, critical theory, future, heterarchy, Luhmann, paradox, prediction, semantics, sociology, subsystems, systems theory, time.**

« 1 » Elena Esposito is Professor of Sociology at Bielefeld University, Germany and at the University of Bologna, Italy. She studied philosophy with Umberto Eco and earned her doctorate in sociology with Niklas Luhmann. Her glossary on Luhmann's theory of social systems (Baraldi, Corsi & Esposito 2021) has become an introductory reference book for sociological-systems theory. Her current research project, "The Future of Prediction: The Social Consequences of Algorithmic Forecast in Insurance, Medicine and Policing" is supported by a five-year Advanced Grant from the European Research Council. In 2019/2020 she was a Fellow at the Wissenschaftskolleg zu Berlin. The interview was conducted there on 3 June 2020 by Katrin Sold and Bénédicte Zimmermann.

You did your PhD with Niklas Luhmann in Bielefeld. How did you come to study systems theory?

« 2 » Before arriving in Germany, I studied philosophy and sociology in Bologna. It was a very good learning environment, open to innovative international approaches. Umberto Eco, my supervisor in philosophy, was not only a reputable semiotician but also an important philosopher of the Middle Ages and a person with much world experience. In our sociology classes, we had to read the Luhmann–Habermas debate. In the 1980s, Luhmann and his social systems theory (Luhmann 1995 [1984]) was quite well known in Italy, primarily among legal scholars, while today there are not many researchers working with his theory. The environment in Bologna, however, wasn't a friendly one to Luhmann's position, which was considered rigid and lacking in imagination, while Jürgen Habermas was highly praised. But, as it happens, what I and a couple of friends found very interesting in the Luhmann–Habermas debate was the Luhmann side of it. The more I read, the more fascinated I became. It often happens to me that I will grow fascinated by something and then, after a while, the appeal fades – but with Luhmann the fascination has lasted all these many decades. So, for me it was a clear decision: this guy is alive, he is teaching in Germany, and I want to go there. I learned German for that reason and applied for a scholarship from the DAAD [German Academic Exchange Service]. When I got it, this was one of the happiest moments in my life.

« 3 » As far as I know, I was the only woman who did her PhD with Luhmann. When I started working with systems theory, I only had male colleagues. But I had no problems, there were no disadvantages – or, for that matter, advantages – to being a woman in Germany. It was more difficult after my PhD, when I returned to Italy, being a woman in the Italian system of academic patronage, which is based on personal relationships, and having a German mentor who was not part of that system.

Where would you situate yourself in the current field of systems theory?

« 4 » Systems theory, however influential, is a relatively small field. Unfortunately, Luhmann has only a narrow group of followers in the English-speaking world. The reason, in my opinion, is that systems theory has a feature that other theories do not: it becomes useful and enlightening only after attaining quite a high level of complexity. So, when you first start off you don't like it. Indeed, I hated it when I started reading Luh-

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mann. It is extremely complex for beginners, completely unfamiliar, because it involves a different way of thinking – which is especially annoying because you see no advantage in it. You cannot say well, sure, it's hard, but at a certain point I will attain something. You do not see what you should or will ever be able to accomplish by it. So, in the beginning it is difficult and frustrating. And nowadays this is hardly convenient, even less so than in the 1980s when we were more accustomed to complex theories. So, I can perfectly understand why people do not wish to engage with systems theory. Many absolutely competent colleagues do not know Luhmann. It is different with other theories. Everybody likes or at least knows Erving Goffman, you can use his theory and it is relatively easy to apply, whereas if you want to use Luhmann you have to enter a universe that many people consider an alien one and as competing with other theories. While this is an exaggeration, systems theory tends to have this polarizing effect, which is not particularly productive but still difficult to avoid.

« 5 » Since there are few people working with systems theory, I wouldn't say that there are not different schools, but there are two different attitudes. On the one hand, some scholars develop their own voice and distance themselves a little from Luhmann, mostly scholars such as Dirk Baecker, Rudolf Stichweh or Armin Nassehi. They will refer to Luhmann while doing their own thing. On the other hand, there is the trend followed in Bielefeld by André Kieserling and his collaborators, who want to preserve and further interpret Luhmann's theory, including the unpublished manuscripts and his fascinating archive.

« 6 » Where do I position myself? In a sense I'm neither one nor the other. My chair at Bielefeld University is called "Sociology and its Interdisciplinary Network," which may sound very unusual but is an apt description of my professional occupation. I use systems theory in its interconnection with other fields. I am interested in developing the theory by *using* it to deal with pressing social issues. I think that systems theory is a good *tool* for a greater understanding of phenomena that I find interesting. And for this process of understanding, I often create links to other disciplines, like philosophy or media studies.

You have been working in the field of systems theory for several decades now. What distinguishes this theory from other sociological theories?

« 7 » The big advantage is that systems theory is a theory of society. There are not that many theories of society nowadays, and many great thinkers don't *want* to develop a theory of society. Theories like those of Pierre Bourdieu or Bruno Latour show that the trend in social theory is *not* to have a theory of society. Bourdieu, for example, didn't want to develop a theory of society. Of course, he refers to society, otherwise he would not be a sociologist. But he doesn't define society in his theory because he doesn't feel the need to start from a *concept* of society to analyze a certain phenomenon. For me, however, to refer to the larger framework of society and locate social phenomena in this context is an extremely productive approach. Systems theory starts from a concept of society. It addresses modern society as being functionally differentiated. Situating social phenomena within the general frame of a functionally differentiated society allows for the discovery of parallels and maybe paradoxes that you would not have otherwise perceived, without this conceptual matrix. The theory of society, for example, develops a surprising parallel between very different phenomena, like money, love, scientific truth, power or art, all interpreted as symbolically generalized media increasing the likelihood of communication. The theory makes it possible to look at social phenomena from an entirely autonomous point of view, taking into account the background of the observer and her specific tools. This is a perspective that is clearly different from those of social psychology, economics or theology. In systems theory you genuinely feel what it means to think sociologically: locating phenomena in relation to society.

What for you are the most useful concepts of systems theory for studying social phenomena?

« 8 » Systems theory identifies *subsystems* within society. In modern functionally differentiated society, these subsystems are the economy, politics, science, law, religion, families, the arts and mass media, among others. They all develop their particular way of looking at and dealing with phenomena along with developing their own criteria. A phenomenon is usually located in one subsystem – which does not mean that it does not belong to others, as well, but starting from this localization, one can study the interaction with other subsystems. A donation to a church, for example, clearly has religious significance, but it also has economic relevance and can have a political or even family meaning. The consequences are different in each subsystem and not necessarily coordinated. Our society is not hierarchical but heterarchical, which means that there are many different subsystems without one single hierarchy. Each subsystem has its own hierarchy situating itself at the top, and all of them are "right" and "wrong" at the same time. For a scientist, nothing is more important than research; for a politician nothing is more important than managing power, just as for economists everything revolves around the market and money. Each of these priorities can be justified, but none can be imposed on society in general.

« 9 » The assumption of a differentiated society becomes even more interesting in times of crisis. The Coronavirus pandemic, for instance, showed quite clearly that a differentiated society needs different criteria and approaches to respond to the crisis and that these approaches cannot and should not necessarily be fully coordinated – if coordination means that you have a unitary approach. Too great a coordination often does not allow for enough diversity, which is a resource. Every subsystem is different and characterized by its own logic, therefore it cannot be governed or supplemented by the logic of another system. You can negatively influence another subsystem, but you cannot positively act on it from the outside. It might be impossible to have a vaccine if you do not fund research, but you cannot expect to discover any such vaccine just by paying for it. Money creates the possibility, but then everything depends on the timing and procedures of scientific and medical research, not on economic criteria. Especially in times of crisis, therefore, we need to find a way that does not force us to choose a unitary approach. Systems theory offers an idea of integration and coordination that is not

necessarily an idea of unity. I explored this topic in my recent article in *Sociologica* (Esposito 2020).

« 10 » Underlying the theory of society and its subsystems is the concept of *communication*. The definition of communication was Luhmann's main idea, which made him unpopular for a long time. If you are a sociologist, he said, you look at a phenomenon from the point of view of communication, and communication is not what people think. Society is not made of my thoughts, your thoughts, or the thoughts of eight billion people. It is made of something that *relates* (or irritates) these different thoughts and that we call communication. Society then *is* communication, while human beings stand outside of it. What I mean by this is that society is not made by people but by what connects them, everyone developing more or less compatible yet autonomous interpretations of what is being communicated.

« 11 » Finally, closely related to the concepts of society and communication, I would mention *semantics* and *paradox*. Semantics includes any possible content that can be meaningfully communicated (ideas, concepts, in general, what we call "culture") and in Luhmann's theory concepts change with the evolution of society, especially in differentiated societies. When society becomes more complex, concepts change, become more or less plausible, and contradictions or *paradoxes* may emerge. Paradoxes can be found in every functionally differentiated subsystem. They are the result of something that Luhmann calls *second-order observation*. You observe another observer, knowing that the other observers are likewise observing you. You can also observe yourself as an observer. Each of these points of view has a blind spot, however, because no observation viewpoint enables one to observe everything – what escapes one is typically the very perspective of the observer. If one tries to observe one's own blind spot, though, a paradox emerges. One should always be aware of this condition because it implies that every observational perspective can produce a paradox.

« 12 » This is particularly relevant for sociological observation. Sociology is a discipline observing society – of which sociology itself is a part. The observer observing society is inside and outside it at one and the same time. If you observe something without assuming that you are outside of it, you always have a paradox. When you use systems theory, you have to take this condition into consideration because you never look at society from the outside. The entire structure of systems theory is an effort to take this condition seriously. We try to build a theory that starts from the assumption that it will always be incomplete. In systems theory, though, a paradox is not necessarily something negative. System theory does not use the concept of paradox in a normative way, like the "paradoxes of capitalism," as a pathological condition. A paradox is simply something that you find whenever you start working and that you cannot solve but only bypass – or face.

In your article "Critique without crisis: Systems theory as a critical sociology" (Esposito 2017) you argue that systems theory can make a contribution to critical theory. What form does this contribution take?

« 13 » Critical theory – in the sense of the Frankfurt School – has no monopoly on critical thought. To be a critic means developing an individual perspective, which is detached from the perspective of a text or the opinion of other people. Critical theory, then, is a theory that observes different attitudes and points of view towards a certain object. In this sense, systems theory can be considered a critical theory. However, traditional critical theorists like those of the Frankfurt School do not only take a detached perspective, they implicitly claim that they are *right*. They often lack a self-referential attitude, avoid criticizing their own position and tend to distance themselves from the world they criticize. Systems theory, on the contrary, cannot make this claim, because it starts from the idea of different observational perspectives. These perspectives observe one another, but none of them is the right one because – as mentioned before – all observational positions have their own blind spots and weaknesses. In the perspective of systems theory, developing a critical attitude does not imply that you are exempt from critique. In this sense, systems theory could be considered an even more critical version of traditional critical theory.

Systems theory addresses communication as that which holds a differentiated society and its subsystems together. An important aspect of your research deals with digitalization and digital life. Should the digital realm be considered a social subsystem of its own? Or is it merely a means of communication?

« 14 » One answer might be that it is a form of mass media. Mass media is a functional subsystem strongly affected by digitalization. We had broadcast media, now we have personalized media; we had anonymous media, now we have individualized media. But I would say that the digital realm is more than that: it is also a new medium of communication. Studying how the forms of communication have changed with the evolution of society is a very important approach within systems theory. Differentiating between oral communication, written communication, print communication and mass media – like journals, newspapers, television, and so on – offers a very productive perspective on society. The complexity of the forms of communication is related to the complexity of a differentiated society. If we consider the digital realm as a form of communication, then it is relatively independent from the different subsystems. In my opinion, this is a more productive approach, because digitalization is everywhere and affects all parts of society.

We have been talking about society, communication and paradoxes as central concepts of systems theory. What about the concept of time?

« 15 » On the one hand, for systems theory, time is one of the three dimensions of meaning (*Sinn*) – i.e., the social, the material and the temporal –, with meaning being the core concept for analyzing society. So, the official answer would be that time is not the most important dimension, because it is only one of three dimensions of *Sinn*. On the other hand, I nevertheless consider time to be a particularly relevant reference in systems theory, because of the central role played by the concept of *contingency* – indicating what exists but might also not be there, or might be there but could be

otherwise. Time is the dimension that is directly linked to contingency, because everything is transient and might soon change. Luhmann developed his idea of time as the temporalization of complexity, referring to Reinhart Koselleck's concept of "futures past" (Koselleck 2004 [1979]). Time starts from a present that immediately disappears and refers to a future not yet arrived and a past, which is no more. These different horizons of time are reflexive, because, in both the past and future, there are other presents with their own past and future horizons. There are horizons within horizons. Our present, for example, belongs to the future of a past present. And in our present, we refer to future presents, for which our present will be in the past. Our present decisions can influence how this future present will look. This intertwining of temporal horizons is a striking example of open possibilities or *contingency*. Things can be and could have always been different. The possibilities are open-ended but they depend on one another. What will be possible in the future depends also on what we do today, and this is a consequence of past events.

How has systems theory helped to bind these temporal moments together – the past, the present and the future?

« 16 » The specificity of systems theory, in my view, is to connect the concept of time to social structures. Like other concepts, the concept of time itself changes over time, and this process is closely linked with the evolution of society. In the ancient world, the idea of time was very different from ours, which is a typically modern idea. In the past, time was not structured along the distinction between *past* and *future* but along the distinction between *eternity* and *tempus* – with eternity referring to the time of God and tempus to the (limited) time of human beings. From the point of view of systems theory as a theory of society, with the dawn of modernity and the evolution of a differentiated society, the idea of time changed progressively, developing this kind of reflexive structure of past, present and future that we observe today. So, the sociological question is: Why?

« 17 » To answer this question, systems theory refers again to the structure of society. The relatively simple dualism of eternity and tempus corresponds to a rather traditional society understood as a cosmos of order. This order is the same for every human being throughout their time on earth – tempus – and remains stable. But when society became more complex through functional differentiation, the temporal structure of tempus and eternity was not complex enough. Things changed too quickly during people's lifetime, which led to a redefinition of the distinction between the past, the present and the future. The contribution of systems theory is to highlight this relationship between the semantic structure of time and the state of society.

If time is so important in systems theory, why has it been criticized for its alleged lack of historicity?

« 18 » Well, I do not agree with this criticism and would say that it is a misunderstanding. Of course, systems theory can be criticized, but not for any lack of interest in time and history. It is a deeply historical theory. Luhmann himself stated: I always think historically. This criticism might be related to Luhmann referring to Talcott Parsons at the beginning, and Parsons's theory is not utterly historical – even if it is more historical than people think. Another typical critique of systems theory with respect to time relates to the question of stability versus dynamics. While systems theory is sometimes blamed for thinking in terms of stability to the detriment of change the opposite applies. In Luhmann's theory, nothing is stable. He refers to structures rather than to processes, not because structures are stable, but because they are subject to change, whereas processes simply happen. We need to look at structures to see how things change. So, the focus on structure does not accompany any focus on stability, quite the opposite. If you want to see change, you have to look at something that may be capable of changing.

As you underscore it, time raises the issue of the past as well as the future. How exactly does systems theory address the future?

« 19 » First of all, we have to remember that the future does not yet exist. The future is uncertain; it is produced by our decisions. We therefore have to distinguish between the present future and the future present. The present future is the future as we can imagine it now, according to our information and current probabilities. We develop future scenarios on the basis of what we know now and take decisions according to what we expect. That which will manifest itself in the future – we call this the future present – can be very different from these scenarios, especially because our plans can change the shape of that future. Due to our decisions, the future present can become different from the future that we now imagine. A very interesting example is how finance deals with the future. Finance has all sorts of plans and predictions that very often are thwarted; the failure may have occurred *because* they have been followed, thereby changing the conditions of the future they were expected to predict. Sociologists ever since Robert Merton have acknowledged these dynamics of self-fulfilling and self-defeating prophecies, but the performativity debate helped clarify it even further (e.g., MacKenzie 2006). I myself elaborated these topics in my work on the temporality of finance (Esposito 2011).

Prediction is one way of dealing with the uncertainty of the future. In your current ERC research project, you address new forms of prediction through algorithms. What is the difference between probabilistic and algorithmic predictions?

« 20 » The relation between probabilistic and algorithmic forms of prediction is a huge topic. In the ERC project, we try to focus on the sociological aspect of this relationship and particularly on what we call *shared uncertainty*. Nobody can know the future in advance, it is uncertain for everyone. But a probabilistic calculus offers tools to face the uncertainty of the future in a controlled way, in the form of forecasts referring to average values. One example of the model of shared uncertainty is the insurance system. Since nobody can predict the future, we all share the same uncertainty about possible future damage, so we are willing to pay a little insurance premium calculated on average future probabilities.

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For most of us this will be to little purpose, but as we do not know who will be hit by an accident, everybody wants to be protected. A similar phenomenon can be observed in other spheres of our society, like medicine or policing, which together with insurance are the ERC project's three fields of research. Nobody knows in advance who will be sick or who will commit a crime or even a murder, so everybody is mobilized to cope with this uncertainty.

« 21 » Different from probabilistic calculus, algorithmic forms of prediction promise to deliver individual predictions. Instead of predicting what will happen in general for an average group of persons, they predict – rightly or wrongly – what will happen to individual persons. The results are still uncertain, but the central question is: How does the use of these predictive tools affect the structure of a society that until then relied on shared uncertainty? Going back to the example of insurance: If we knew precisely who will have a car accident or a health problem, why should everybody pay an insurance premium? The mutualization of risk, which is the basis of the insurance system, would be profoundly endangered. I want to study how these different ways of dealing with uncertainty affect society in the long term.

In your work you draw a parallel between algorithmic techniques and divination (Esposito 2021). What is the rationale for such a parallel?

« 22 » There is a fascinating parallel between the way algorithmic predictions are constructed today and the way divinatory predictions were constructed in ancient times. In the intervening epoch, people used probabilistic calculus and averages to deal with the uncertainty of the future. Probabilistic calculus is connected with a scientific method that can explain phenomena – and thereby project what will happen in the future. Algorithms follow a different

procedure: they predict without explaining. By referring to correlations and patterns, they allow for individual predictions for the future. This is technically a return to some of the main features of divinatory forms of prediction, which were discredited when probabilistic calculus was established. Divinatory forms of prediction also refer to correlations and patterns, predict individual events instead of averages, and claim certainty instead of managing uncertainty. In both cases we are dealing with procedures (oracular responses and new "deep learning" techniques) that are basically nontransparent for human beings.

« 23 » The rise of algorithmic predictions tells us a lot about the relationship between science and non-science. Probabilistic calculus is the basis of many scientific procedures, whereas divination is considered non-scientific – like magic and other forms of superstition. However, scientific methods produced the statistical and informatics tools that led to algorithms – and now algorithms seem to be returning to non-scientific divinatory practices. This relates to a debate triggered by a famous and very controversial article by Chris Anderson, in 2008, called "The End of Theory," claiming that in this time of algorithms, science no longer needs theory – it needs neither explanations nor causality.[1] Correlations are enough. It is sufficient to see the *what* instead of asking *why*. For example, according to this approach, if you examine the genome, you can find patterns and predict illnesses; if the results are reliable, you do not have to explain why. There is no time to explain the why, you trust the what and deal with it. This perspective on science is oversimplified and highly debatable, of course, but the development of algorithms challenges basic principles of science such as theory, causation and explanation. I want to explore why tools like algorithms, developed with scientific procedures, lead to the questioning of scientific methods and principles.

This issue also raises the question of how we can influence the future…

« 24 » This is an open issue. Nowadays an important way to deal with uncertain futures is planning, and we use predictions for this purpose. In most previous societies, predictions did not result in plans. In many cases we know that plans increase the complexity of the future, so very often plans predict something that they instead help to prevent from happening. The problem is that plans based on interventions in society and its sub-systems permit us to address the present future as we can imagine it here and now, but the future present that eventuates might be completely different. According to evolutionary theory, something might be planned but the evolution of society ultimately dictates the future.

1| "The end of theory: The data deluge makes the scientific method obsolete" Wired, 23 August 2008, https://www.wired.com/2008/06/pb-theory/

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Competing interests

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