COMPLEXITY THINKING IN TRANSLATION STUDIES: A CRITICAL REFLECTION[1]

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ABSTRACT: Taking stock of the emergence of a scholarly trajectory like complexity thinking is required every so often in order to orientate oneself to the developments, the problems and the unfinished tasks that remain ahead. This paper therefore invites a critical considering of a complexity approach to translation by engaging with some of the criticism. The main task, however, will be to map an agenda for further research, based on the critical reflection, to continue the development of the approach. The paper deals with the latest literature on complexity thinking generally and the complexity of constraints and absentials in particular to work out a nuanced conceptual framework with which to study the emergence of any semiotic trajectory through a process of translation. In addition, it considers a soft causality for social-cultural studies that is able to reflect the complexity of causality in these domains by further exploring the notion of 'propensity'.
KEYWORDS: Complexity; Translation; Soft Causality; Propensity

1. Introduction

I have a sense that the notion of complexity, in whichever form, has entrenched itself in scholarly thought all around the world over the past five decades or so. A simple Google Scholar search with the search term 'complexity' delivers a virtually endless list of scholarly sources on the topic, ranging from physics (Kauffman, 1993; Prigogine, 1996), mathematics (Nicolis and Nicolis, 2012) and biology (Deacon, 2013; Kauffman, 2019) to medicine (Barker, Toye and Seers, 2023), management and business sciences (Stacey and Griffin, 2006), philosophy (Cilliers, 1998), and theology (Van Kooten Niekerk and Buhl, 2004). Stochastic and probabilistic logic and calculation (Kruger, Daston and Heidelberger, 1987; Kruger, Gigenrenzer and Morgan, 1987) seem to be the norm in quantitative research these days. In the humanities and social sciences, both qualitatively and quantitatively, complexity is used widely (Byrne and Callaghan, 2023; Cilliers, 1998; Ingold, 2015; Williams, 2021). Even in cases where scholars do not expressly use complexity terminology or identify their approach as 'complexity', one can often pick up strands of complexity thinking. In translation studies itself, Toury (1995, pp. 259-279), Kiraly (2013), Robinson (1991, 2001, 2022a) and Pym (2023) are examples of scholars who use aspects of complexity thinking to varying degrees. I have not yet seen any wholesale refutation of the approach, which I think might mean that complexity thinking is taking up its position in the smorgasbord of onto-epistemological options available to translation studies scholars. Even criticism by the likes of Douglas Robinson (2022a, 2022b) and Anthony Pym (2023)

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does not amount to a rejection of complexity thinking. On the contrary, they both find it a valuable contribution, despite some reservations and suggested amendments.

The ubiquity of complexity thinking requires some reflection,[2] I think. In this paper, I reflect on the relevance of complexity thinking for translation studies roughly a decade after the publication of my first work on complexity. I start off with a brief recap of the origins and basic tenets of complexity thinking. Then I consider some of the criticism in how I, in collaboration with colleagues such as Reine Meylaerts and Kalevi Kull, went about explaining complexity thinking. I would then like to zoom in on one important contribution that I think complexity thinking could make to translation studies, namely a 'soft causality'. I close with a brief reflection on the relevance of complexity thinking for cultural sustainability, i.e., a broader cultural-political perspective.

2. Complexity thinking: origins and tenets

Opinions on the origins of complexity theory differ widely. Hence, my narrative here is one construction among many. In my view, the origins of complexity theory can be traced back to the mid to late 1800s in the natural sciences, in particular in mathematics and thermodynamics.[3] It stemmed from the basic insight in thermodynamics that not all causality is as linear as Newtonian physics argued. As Prigogine (1996, p. 20) explains, linear causality argues that one cause creates one effect, and this line of argument became problematic with the realisation that, in many cases, many causes create an effect or many effects. In response, complexity theory developed as an effort to understand and deal with non-linear or complex causality. After the initial interest in the 1800s, complexity thinking developed through a number of phases such as the emergentist thinking of the 1920s and 1930s (Juarrero and Rubino, 2010), the development of computational power from the 1940s onwards, chaos theory in the 1980s and the current wave of complexity thinking, since the 1990s (Coveney and Highfield, 1995; Kauffman, 1993, 2000; Mitchell, 2009; Waldrop, 1992). One should also keep in mind that complexity theory, like all scholarly endeavours, is not a monolithic approach. The probability theory approach, as a subsection of complexity theory, very much still operates on reductionist principles while philosophic approaches to complexity entail a much more poststructuralist interest (Cilliers, 1998). In translation studies, Pym (2023) is an example of a proponent of probability theory and its semi-reductionist interests while Robinson (2022a, 2022b) seems to be a proponent of a more poststructuralist, hermeneutic approach. It is interesting that responses to complexity thinking in translation studies very quickly fall into this binary while a complexity approach itself would try to avoid a choice between the binaries and find ways to integrate them or to maintain both options in some kind of complex conceptual system.

[2]I would like to acknowledge Reine Meylaerts, Kalevi Kull and the various members of the Complexity Discussion Group for working with me and helping me to work out some of the implications of complexity theory for translation studies, as much as I do not think the work is done.
[3]For instance, see Prigogine (1996), who situates it a bit later.

Over the past 150 years or so, a number of basic features of complexity theory have been proposed (Marais, 2014, pp. 26-43). The first would be that complex systems are sensitive to initial conditions. This feature is well known from the chaos-theory formulation in the 1980s about the butterfly flapping its wings somewhere and causing a massive storm on the other side of the globe. In other words, minor differences in initial conditions can have major consequences because the causality that follows the initial conditions is not linear. Also, non-linear causality is not reversible. In contrast to Newtonian causality, where the direction of causality is reversible, complexity means that, even in matter-energy systems, time plays a role, and the trajectory of the system is irreversible. In translation studies, this phenomenon is known through the problems with back-translation. Thirdly, in complex systems, the trajectory of the system also tends towards what is known as an 'attractor'. This means that complex systems can have similar trajectories without these ever being exactly similar. Here one can think about patterns in the economy or traffic or, in interlingual translation, patterns in retranslations. Fourthly, complex systems are said to operate at the edge of chaos. In other words, one would find both some stability and some instability in the system, but efficient systems, so the argument goes, tend towards the instability side of the spectrum without being completely unstable. Fifthly, complex systems are also said to self-organise. There is no invisible hand that organises traffic flow, thinking or the economy, and yet patterns emerge as if out of the blue. This would lead to the next point, namely that complex systems show emergent properties. Emergence means that the future of a complex system cannot be predicted from the characteristics of the parts. In addition, complex systems tend to be viewed as hierarchically ordered. Hierarchy here does not mean that one level of the system is more important than the other but that historically one level emerged before the other – or ontologically, that the existence of one level is required for the next to emerge. An 'interdependent heterarchy' is therefore perhaps a better term than 'hierarchy'.

One of the major implications of complexity theory is that it argues that it is impossible to predict perfectly the future trajectory of a truly complex system. Pym (2023) in particular rallies against this problem, arguing that scholarship is aimed at solving problems and that the complexity of problems needs to be reduced in order to solve them. This is exactly what one component of complexity theory suggests through their work on probabilistic mathematical calculations to at least make some predictions despite the unpredictability (Kruger, Daston and Heidelberger, 1987; Kruger, Gigenrenzer and Morgan, 1987). Others like Paul Cilliers (1998, 2000, 2002, 2005; Osberg, Biesta and Cilliers, 2008; Richardson, Cilliers and Lissack, 2001) argue that endeavours to reduce complexity is not really complexity theory because it still assumes reductionism as the solution to problems. I take a position midway between these two extremes. In other words, a complexity approach to the problem at hand should argue that there are many types of causality and many types of approaches to deal with those, ranging from reductionism through reductionist complexity through completely unpredictable complexity. As much as I agree with Pym that, if the management of a problem is your goal, some kind of reduction is

inevitable, I would also argue that one should honour the complexity of the factors that influence your managerial decisions as far as possible. I do, however, not agree with Pym's utilitarian argument that solving problems is the only goal of scholarship and would argue, from a complexity perspective, that scholarly work has a complex of goals.

In my view, the history of complexity has given us at least three broad approaches to complexity. The one is complexity theory, which originated and is steeped in the natural sciences and probability theory (see references in the introduction). The second is complexity philosophy, of which Morin (2008) and Cilliers (1998) are prime examples, taking a philosophical and not a theoretical approach. Reine Meylaerts and I have used the term 'complexity thinking' to indicate a combination of the theoretical and philosophical approaches (Marais and Meylaerts, 2019, 2022; Marais, Meylaerts and Li, 2022), which mean that we worked at combining the philosophy of complexity with a qualitative version of complexity theory in our version of complexity thinking.

3. Critical voices

In this section, I briefly deal with criticism expressed against a complexity thinking approach to translation studies in my (and Reine Meylaerts)[4] work. As much as I do not agree with all aspects of the criticism, I value the critical engagements because they allow me to clarify my own ideas and adapt or strengthen them where necessary. Robinson (2022a; 2022b) mainly directed his criticism against what he perceives to be a lack of agency in (my version of) complexity thinking. To some extent, I agree with this criticism, for two reasons. On the one hand, I acknowledge that my thought was biased towards systems thinking, with its concomitant lesser consideration of individual agency, because one of the strands of complexity theory is complex-adaptive systems theory with a strong influence from general systems theory. I have to point out, however, that complex adaptive systems theory does not, per definition, exclude individual agency as it is indeed interested in the very micro changes that have non-linear effects. In addition, the complex adaptive systems version of complexity theory makes compelling arguments about self-organization, arguing that these systems self-organize without 'anyone' overseeing or constructing the self-organization. In a human body, for instance, there is no homunculus (Deacon, 2013, pp. 46-79) that controls the processes of the body. Rather, the body self-organizes and distributes control throughout the whole body. In other words, one could look at semiotic processes like translation as self-organizing (Queiroz and El-Hani, 2006a, 2006b; Queiroz and Loula, 2010). Admittedly, that would then only be one perspective on an extraordinarily complex process, and Robinson is at least correct in arguing that one should also consider the agency of semiotic agents, as do Sharov and Tønneson (2021). I worked out my understanding of translational agency in two following monographs (Marais, 2019a, 2023a), arguing first that this agency is semiotic in nature and second that

[4] I take sole responsibility for the views expressed in this paper.

agency is a complex interplay between material and ideational constraints as instantiated in organisms.

Robinson (2022b) also critiqued my use of complexity thinking as positing a binary between reductionism and complexity thinking. As much as some of my formulations could have been clearer, I think that Robinson misunderstood my intention with complexity thinking. Throughout *Translation theory and development studies: A complexity theory approach* (Marais, 2014), I proposed complexity thinking as a 'meta' position, not a binary to any other position. A complexity thinking approach to reality, including social-cultural reality, suggests that one should not reduce everything to complexity but allow for a rich complex of causalities, where rich complex does not signify large numbers, primarily, but non-linear interactions. There are cases where reductionism is sufficient to explain what needs explanation, and I granted that back in 2014. There might also be cases where some reductionism is required to explain what needs to be explained or to serve as ground for action, e.g. probability theory (Pym, 2023). And there might be cases where reductionism is insufficient to explain what needs to be explained. This insight would lead to two claims. Firstly, one needs to judge the situation at hand and decide how much of which epistemological position is needed to study or explain what you are studying or explaining. Complexity thinking suggests that that judgement need not be reduced to one answer but might entail a complex of answers. The second implication is that complexity thinking usually tries to move one level of observation or thinking higher than the binaries that it tries to overcome. I say usually because as Peirce has argued, there are also binaries that need to be considered as such.

Robinson (2022a, pp. 158-176, 2022b) also took umbrage at my reservations about activism and constructivism. In my view, these two concepts are related in current humanities thought in that constructivism sees the agency of knowledge in the human constructor, which gives her the power to activism. Both concepts are, in my view, steeped in Western humanism, if not anthropocentrism, where humans are special cases endowed with constructive and activist powers – in contrast to other living organisms and inanimate matter (Barad, 2007; Cronin, 2017). As much as I would agree that all knowledge is constructed, an ecological and sustainable approach to knowledge creation should, for ethical reasons at least, allow for the thing or organism or idea about which knowledge is constructed to co-constrain the construction process (Marais, 2024). Secondly, as much as we, as a species, are thankful to the activists of our time such as Mandela, Ghandi, Tutu, King, or Greenpeace, this kind of visible and strong activism is not the only thing that sustains and drives a society or culture. This argument was behind my point that the 'proverbial translator' in her stuffy office also has agency, also contributes to the emergence of a society and that translation studies should also consider this kind of 'invisible' agency. Ethically, translation studies has the responsibility to acknowledge the complexity of agency and constructivism by not limiting its interest to humans and by acknowledging 'small' acts of activism that contribute to the emergence of a society. Writing at a time when 'great men' around the globe are again trying to shape the world

in their image, everyday people standing their everyday ground provides a complex counterpoint to the notions of individual agency and construction.

Anthony Pym (2023) more recently suggested that complexity thinking, as practiced by Reine Meylaerts and myself, does not allow for empirical thinking, a point that the empirical work in our publications easily refutes. He further argues that it is only empirical work that creates new knowledge. I would counterargue that empirical research is crucial in knowledge construction, but a complexity perspective suggests that empirical and conceptual work are entangled in the emergence of new knowledge. Pym further suggests that all empirical research should be of a probabilistic nature and that probabilism is the answer to managing the threat of complexity thinking, namely that it might lead to knowledge that is too relative/complex to act upon – and for Pym, knowledge is meant to be acted upon in order to solve problems. A complexity approach to this problem would again relativise Pym's strong claims about empiricism and probabilism, arguing that there might be cases where old-fashioned linear reductionism suffices, although these cases would be severely limited in the domain of culture-society. There might be cases where probabilism, with its mathematical underbelly, suffices, but there might also be cases where a soft, non-reductionist, qualitative argument is required. For example, in the sociology of translation, probabilistic theory could well explain large-scale publication tendencies while a softer, qualitative argument might be needed to explain the habitus of a particular translator. There are cases where one needs knowledge upon which you can act, and in those cases, the complexity of the data that informs the knowledge should indeed be acknowledged and managed – and reductionism of some kind seems to be the only solution. When one does reduce the complexity of the data, one should, however, acknowledge your political act in reducing the complexity and take responsibility for the outcomes of such a reduced process (in management sciences usually known as 'unintended consequences' and in medicine as 'side effects'). However, there are also cases in which knowledge is not necessarily linked to socio-political action, e.g., literary interpretation. There are also genuinely complex cases, such as ethical conundrums that require action, where no amount of reductionism will help. So, I find Pym's insistence on empiricism valuable but one-sided or reductionist – reducing the broad spectrum of knowledge creation to one aspect thereof. The way in which Pym reduces scholarship to an instrumentalist goal is in itself an argument for a complexity thinking approach to translation studies.

After ten years and the interactions upon which I commented above, I think it is fair to say that complexity thinking, as a onto-epistemological approach, not a theory or a methodology, is a valuable addition to the conceptual toolkit in translations studies, and neither Robinson nor Pym seems to disagree on this score. Work in translator education (Kiraly, 2013), language and translation policy (Meylaerts, Gonne, Lobbes and Sanz Roig, 2017), hermeneutics (Robinson, 1991), Bible translation (Naudé, Miller-Naudé and Wilson, 2022) and the sociology of translation (Tyulenev, 2011a, 2011b) have used aspects of complexity thinking with great success. Whether complexity thinking needs to be an

identifiable approach or just be integrated into the conceptual tools is for the field to decide.

4. Towards a soft, complex, qualitative causality

In my view, however, the most useful contribution that complexity thinking could make to translation studies at this point in time is to provide a framework for a soft(er) non-linear causality. I am not suggesting a soft causality as a binary to stronger causalities. Rather, I view is as an expansion of the options available when thinking about social-cultural emergence and the role of translation in it. I think we need a softer causality when we deal with living organisms and their social-cultural work because as much as they are simultaneously matter-energy, living organisms and their social-cultural work are not only subject to the laws of physics. They are also biological and semiotic systems that do not follow 'laws' but evolve and develop under sets of constraints. Except for the fact that living organisms are caused not by force alone but also by evolution, living organisms, through their semiosic abilities, bring absential things like ideas and intentions to the table. Ideas, in my view, do not cause in the same way that matter causes. These differences, therefore, suggest that a softer version of causality might be valuable.

Juarerro (1999, 2023) argues that the 'billiard ball' model of causality still mostly holds sway in most domains of scholarship. Causality is, in this view, a linear – or even non-linear (Prigogine, 1996) – bumping of one thing into another, and it is this bump that causes the other thing(s) to behave in a certain way. It is highly improbable that translation studies scholars would conceptualise translational causality in terms of 'bumping', but the popularity of Dawkins' application of genetic biology in cultural studies through meme theory still suggests that scholars are comfortable with explaining causality in terms of small parts bumping or carrying information from one domain/brain to another, i.e., a kind of discrete causality. To be fair, bumping obviously accounts for some causality. Juarrero's argument is just that it does not account for all causality.

If one looks at conventional wisdom in translation studies regarding causality, it is not always clear what translation studies scholars think causality is. Gideon Toury (1995, pp. 264-267) proposes probabilistic laws that explains causality in translation. As much as Toury is looking for scientific laws in translation studies, he grants that these cannot be completely linear. Therefore, he suggests laws of the nature of "if x, then y" or "if x, then the greater/the lesser likelihood of y" (p. 265). He also suggests ordinal ordering of the probabilities under observation, for example "if X_1 and Z_1, then the likelihood that Y is greater than if X_1 and Z_2, and even greater than if X_1 and Z_3" (p. 266). In my interpretation, therefore, Toury's views on causality include probability as a factor to consider, and probability is, to some extent, linked to complexity, though they are not necessarily similar. In this sense, Toury has already in 1995 proposed aspects of a complexity, i.e., non-linear, probabilistic, theory of causality. A given variable(s) raises or lowers the probability of a particular effect. However, I think we could be clearer on the way in which this non-linear, probabilistic causality plays out. In other word, how are things caused, how do things

emerge, how do things come to be? And what is the role of other things in them being caused, emerging, or coming to be?

Another influential thinker about causality in translation is Andrew Chesterman. He formulated his view of causality in translation as follows: '*Causal models*, in their simplest form, look like this: Causal conditions > Translations > Effects' (Chesterman, 2017). In as much as he also makes it clear that causality in translation is not linear and quite often of a complex nature, he does argue that translations are both causes and consequences. I think Chesterman's is a valid argument (Marais, 2019b), but the question remains: How does it happen? What exactly do we mean when we say that translations 'cause' or that translations are 'effects'?

For Douglas Robinson (2017), translations are caused by human brains that interpret texts that came before the translation. Translations are therefore caused hermeneutically through the biological interpreting processes of the brain and distributed icotically in a society through mirror neurons and the material markings left by patterns of interpretation. Translations are therefore caused by and cause effects through the agency of a human brain and its interpretation and communication processes, which are all complex adaptive processes. Apart from the problem that Robinson seems to ignore translation processes in non-human living organisms, his theory does indeed suggest a softer causality that is embedded in the indeterminate and complex nature of hermeneutic process.

In Mona Baker's (2006) narrative approach, which is clearly closer, though not similar, to Robinson than to the Toury-Chesterman-Pym approaches, she considers the possibility that translations cause and are caused through the ways in which they are narrated within larger narratives or systems of meaning-making. Translation is causative to the extent that translations themselves are narratively framed and to the extent that they are used in larger narratives.

Piotr Blumczynski embeds translation in process philosophy based on Whitehead's work. It seems that Blumczynski tries to equate causality and translation when he writes: "When we assume a causal (i.e., translational) relation …" (2016, p. 112). This is a position with which I would not agree because causality entails a relation, as Blumczynski rightfully argues, but there are, in my view, relations that are not translations as much as all translations entail relations. However, Blumczynski (2016, p. 111) does move the debate in the direction of "conditioning", which is much closer to the kind of causality that complexity thinking suggests. Referring to Whitehead again, he argues that events, occasions and occurrences "condition" the formation of events, occasions and occurrences that might follow (Blumczynski, 2016, pp. 111-112). It is this conditioning or the creation of possibilities that I think complexity thinking proposes for translation studies.

In my view, scholars in translation studies, including the ones cited above, are suggesting a conceptualisation of causality that tends to be, firstly, non-linear and, secondly, trying not to follow the billiard-ball version of causality that is dominant in the natural sciences. Despite the differences between them, they all seem to espouse a

conceptualisation of causality built on the work performed by constraints to create enabling possibilities, opportunities, or conditions rather than directly causing things to happen as suggested in Newtonian causality. What complexity thinking can add to these insights is a more nuanced approach to non-linearity that goes broader than mere probability.

I would like to contribute to this debate on a nuanced causality and suggest a complex, soft causality built on the notions of constraint, propensity, and trajectory. My point of departure is my earlier conceptualisation of translation in terms of semiotic process, i.e., a process that entails the negentropic semiotic work performed under a complex of constraints, including matter-energy constraints (Lotman, 2019; Marais, 2023b). If one argues that translation entails work, or action in the functionalist tradition, one needs to explain what work entails. Work, Kauffman (2019, p. 19) argues, entails the constrained release of energy into several degrees of freedom. This means that work entails the utilisation of energy, and energy only emerges as a difference between two states of affairs. This difference or energy gradient is used to perform work. The simplest example of this would be that the air in my garage is all in equilibrium, under normal conditions. This lack of difference means that I cannot perform work with this air. However, if I applied constraints to the air, e.g., a metal tube with a plunger on one side and a tiny outlet on the other side, I could squeeze the air to such a high pressure that I could pump the tyres of my bicycle. It is the constraints on the air that create difference in air pressure that can be used to perform work, i.e., pumping the tyres. The first point, therefore, is that for anything to happen, there must be constraints that cause differences that are harnessed as energy to perform work. Kauffman (2019, p. 22) formulates it simply yet elegantly: “So surely, no constraints, no work. And often, no work, no constraints. Call this the Constraint Work cycle.” To summarise, difference emerges when constraints operate on the states of affairs, and this difference can then be harnessed as energy with which to perform work.

4.1 Constraint

This raises the question: What are constraints? Terrence Deacon (2013) presents a philosophical argument for reverting to constraints when thinking about causality. On the one hand, he uses Eastern philosophy to argue that absence has causal effect. He does so to be able to explain how something that is materially absent, such as an intention, can cause changes in matter-energy. If intentions are constraints, his argument goes, one could explain the causal effects of mind on matter. On the other hand, he is aware of the criticism against downward causation (Kim, 2008), and therefore, he shifts the causality to the context or environment, i.e., outside of the system. It is therefore not the system as a whole that constrain its parts, but the constraints that operate on the system that do the work.

Stuart Kauffman also thinks along these lines. His focus is on the notion of possibility or what is known as the ‘adjacent possible’. This means that every state of affairs entails a

number of possible future states of affairs. Not all these possible future states of affairs are realised, but the one (or more) that is realised, was realised because it was possible for it (them) to be realised. This might at first sight seem like a tautology, but it has far-reaching implications. Kauffman (2019, p. 3) argues that "(h)istory enters when the space of the possible is vastly larger than what can become actual". Physicists call this feature of history 'nonergodic'. Each thing that comes into existence or each event that happens creates a new set of possibilities that makes possible the emergence of things that were not possible before because constraints limit possibilities and hence also allow for the emergence of new possibilities. In Kauffman's (2019, p. 117) own words, "'(e)nablement' not 'cause', enters our explanatory vocabulary". Rather than think in a strict cause-and-effect paradigm, Kauffman suggests that we consider a causality of enablement. In his view, when something new comes into existence, it creates a new context, which entails new opportunities or possibilities that do not strictly cause but rather enable other things to come into existence (p. 110). One could also say that with each new thing that comes into existence, new adjacent possibles emerge (p. 124). In Kauffman's (2019, pp. 130-132) view, this holds as much for biology as for the economy, society, and culture. It is clear that these opportunities or possibilities are possibilities for a living organism, or semiotic agent, that can be seized. It is the positive, complexity version of Murphy's law: If something can happen, it eventually might. That said, it is only actuality that attest to which of the possibilities did happen.

Another influential scholar working on the notion of constraint is Alicia Juarrero who has written two monographs on the topic (1999, 2023). Juarrero has two main interests, namely, to be able to explain how wholes come to exist in the first place and to provide a broader theory of causality than the billiard-ball model. Her argument is that constraints offer us a fruitful alternative to universalist and physicalist versions of causality. I think this aligns well with and further develops efforts in translation studies to explain causality, as discussed above. I quote a conceptualisation directly from Juarrero (2023, p. 40):

> Constraints are entities, processes, events, relations, or conditions that raise or lower barriers to energy flow without directly transferring kinetic energy. Constraints bring about effects by making available, structuring, channeling, facilitating, or impeding energy flow. Gradients and polarities, for example, are constraints; others include catalysts and feedback loops, recursion, iteration, buffers, affordances, schedules, codes, rules and regulations, heuristics, conceptual frameworks, ethical values and cultural norms, scaffolds, isolation, sedimentation and entrenchment, and bias and noise, among many others.

Anything under the sun could therefore operate as a constraint. One identifies constraints by their influence on energy flow, which means that the effects that constraints entail are not of the billiard-ball or final-cause kind. Rather, constraints have influence on or effect through "… making available, structuring, channelling, facilitating, or impeding energy flow" (Juarrero, 2023, p. 40). If one takes the argument further and posits a close link between energy and information (Bateson, 2002), and hence significance (Deacon, 2007, 2008; Marais, 2023a), it becomes clear that constraints are relevant in the humanities,

generally speaking, and in translations studies, in particular. Researching constraints on information, whether material or ideational, is thus one of the ways in which humanities scholars can use constraint theory. Lotman (1990, 2019) built his translational theory of culture on this notion of difference, and with the theory of constraints we can now be more specific about it. Whether in the realm of matter-energy or that of society or that of culture, difference between systems is what drives the emergence of new forms of existence, and these differences are caused by constraints. To quote Juarrero (2023, p. 50) "The point is a general one: conditions that promote or impede energy flow need not be material walls; they are inhomogeneities in possibility space."

Juarrero identifies two broad types of constraint. The first is context-independent constraints. These could probably be described as the universal laws of physics, where they still make sense as explanations. If one considers the point that, had there been no constraints, all of reality would have been in equilibrium, meaning that nothing would have existed, it becomes clear that context-independent constraints take conditions away from equilibrium (Juarrero, 2023, p. 49). Taking conditions away from equilibrium is what allows for energy that can be harnessed to perform work – and create things. Most constraints are, however, context dependent. Whereas context-independent constraints take conditions away from equilibrium, context-dependent constraints take conditions away from independence (Juarrero, 2023, p. 67). In other words, context-dependent constraints have a mereological function, i.e., as things start to emerge once conditions are no longer in equilibrium, those emergent things themselves become constraints that form 'wholes' or systems out of the individual parts. For instance, as atoms emerged, they were constrained into existing in patterns such as H_2O (water) or NaCl (table salt) or societies. One of the advantages of thinking in terms of constraints is summarised as follows by Juarrero (2023, p. 64):

> But because complexity and hierarchy theory are sciences that traffic in contextual constraints and not universals, they can reveal phenomena at much finer-grained resolution. Complexity science and hierarchy theory focus on subtle individuating differences, not on commonalities and averages. In consequence, understanding complex dynamics can facilitate context-sensitive and timely decision-making and action.

It is clear from this formulation that complexity thinking holds advantages for nuanced or fine-grained decision-making and action, a point about which Pym (2023) is justifiably concerned.

Juarrero also identifies two types of context-dependent constraints, namely enabling and governing constraints. Enabling constraints constrain any number of parts so that they become interdependent, which means that they have now become "a whole" (2023, pp. 71-73). Interdependence does not mean that the parts change. Rather, it means that the relationships or organization between parts change, thus giving rise to the emergence of novelty. This is related to but somewhat different from simple bottom-up emergence because it situates the cause of the emergent process outside of the emerging system. It

is constraints 'on' the parts that make them interdependent, hence a whole. This also means that enabling constraints make the probability of an event occurring conditional on other events. The second type of context-dependent constraint is governing constraints, which are akin to what is traditionally known as top-down causation, and it means that the newly emerged whole now also constrains the parts (Juarrero, 2023, pp. 79-82). As with enabling constraints, governing constraints do not change the parts, but they do change the relationships between the parts or the degrees of freedom that parts have once they have become part of a whole. These governing constraints stabilizes the process of emergence, i.e., it creates a pattern or a whole. The governing constraints is therefore what allows for coherence to emerge (Juarrero, 2023, p. 80). As governing constraints could also be described in terms of the control that the whole exercises over the parts, governing constraints are relevant to social and cultural studies, including translation studies. As an aside, I think that the role of enabling constraints in the emergence of culture is something that requires attention, but I do not have space in this paper to address it. To quote Juarrero (2023, p. 82) directly:

> I submit that human cognitive and value frameworks are likewise evolved versions of top-down constraints; they, too, are second-order constraints that regulate and control behavior in terms of emergent properties.

One could therefore say that constraints create possibilities for the emergence of new forms of matter-energy and society-culture. I follow Juarrero (2023, p. 47) in her argument that "… possibility spaces are not solely epistemic; they are real, bounded, and sculpted by constraints. These can be physical, chemical, linguistic, axiological, psychological, sociocultural, ecological, and so on." The conceptualisation of causality that emerges here is therefore one that considers the process of emergence as starting with possibilities. Because of constraints, not all possibilities are realised, hence the notion of probability, i.e., some possibilities are more likely to be realised than others, or complexity, i.e., it is not possible to predict the outcome of a process. Stuart Kauffman (2019) argues that life emerged because it was possible for it to emerge. This means that not everything is caused as explained by the billiard-ball theory of causation. Some things become because it was possible for them to become. Reversely, they would not have become if it were impossible for them to become.

The next point in this argument is thus that constraints create propensities for certain things to happen rather than other things. Kauffman argues that constraints create possibilities and then probabilities. In his view, the way in which life and later on society-culture emerges is through the creation of possibilities. Each new step in the evolution of life/society/culture makes it possible for new things to happen. However, these possibilities are never equally realisable because they themselves emerge under constraints, i.e., the possibilities exist under a propensity for one or a combination of them to happen rather than the other or another combination.

This line of argument, which also features elsewhere in scholarship (Popper, 1990 [1995]) has been picked up by at least two British sociologists, David Byrne (2005, Byrne and Callaghan, 2023) and Malcolm Williams (2021). They expanded the argument to the emergence of society or culture, which means that society-culture also emerges under the imposition of constraints. Because certain constraints apply, a particular society-culture is more likely to emerge in way A than in way B. The argument starts with the notion of trajectories. If, as Juarrero and Kauffman have argued, one think in terms of constraints and the possibilities of emergence, any given state of affairs could be regarded as entailing possibilities for the future of that state. Byrne and Callaghan (2023, p. 27) then say that any future developments of that state of affairs can be regarded as the trajectory of the system. Trajectory, one could also say, entails the process of the emergence of a particular system. In Byrne's (2005) sociology, one can use comparable cases to help sociologists understand the emergence of particular trajectories. Byrne points out that cases are always nested in larger complexes of cases, and they have nested in them smaller complexes of cases. Byrne's method entails identifying as many of the influences in a particular case as possible, comparing those with the influences in other cases. Thus, by studying trajectories of social-cultural emergence in different contexts, one could compare them in an effort better to understand them.

The point about historical trajectories is, however, that not all possible trajectories are equally probable, which means that not all possible trajectories eventually emerge. This is where Malcolm Williams' (2021, pp. 39-68) notion of propensities is, in my view, handy in explaining the kind of causality that happens in living systems, including society-culture. A given state of affairs, by not being in equilibrium, has entailed in it the propensity for the adjacent possible itself to be skewed towards a particular trajectory rather than others. Put simply, any state of affairs makes possible some rather than other trajectories or, one could say, because of the constraints that a state of affairs exercise on the future of the state of affairs, i.e., its trajectories, a propensity has been created that make some trajectories more probable than others. What Deacon, Kauffman, Juarrero and Williams have in common is that they are adding, as it were, another layer to the causal chain. Where Chesterman had 'Conditions>Translations>Effects', this softer causality suggests 'Conditions/States of affairs>Propensities>Translations>Propensities>Effects'. In other words, the conditions do not cause. Rather, they create propensities that enable the emergence of effects.

Above, I used life and society-culture as examples of emergent phenomena. One could also apply this logic to micro-contexts. For example, the interpretation of a text in order to translate it is subject to constraints such as genre, style and context of production and reception. None of these constraints strictly speaking causes the translation, but they create propensities under the influence of which a translation emerges.

The kind of causality that we are talking of here is therefore soft or weak. Things become because it is possible for them to become. They are not caused per se, as pushed by a force. Rather, the existing constraints at a given moment allow for or create a

propensity for something else to emerge. This propensity is non-linear in that it does not, in determinate fashion, causes something. It is also probabilistic, whether qualitative or quantitative. Rather, the propensity makes it possible for something to emerge and makes it more likely that thing A will emerge than thing B, but none of this means that either thing A or thing B will necessarily emerge. It should be clear that a soft causality is not a binary to stronger causalities. Rather, it is an effort to expand the complex of causal explanations available.

In my view, this soft causality can be useful in a variety of approaches to translation studies. In descriptive translation studies, it can be used as a more nuanced version of Toury's probabilistic logic. In functionalist approaches, it can be used to provide a fine-grained analysis of the relative influence of brief, source text, target culture, et cetera on the translation process. In social-cultural analyses it can be used to describe historical trajectories and the complex of propensities that allow for their emergence. In multimodal translation studies, it provides the vocabulary to describe how the affordances of each mode contribute to a propensity to interpret the multimodal text in a particular way. I also suspect that it could be useful in cognitive translation studies to explain the cascading effect in the brain. In interpreting studies, this framework for soft causality might be useful in describing the complexities of interpreting, i.e., various coping strategies, the role of context in interpreting, the positionality of the interpreter.

5. Conclusion: Complexity and cultural sustainability

One of the major challenges of doing scholarship in the 21st century is the ecological crisis, which is in my view closely related to the problem of cultural sustainability. In my view, it is as much an ethical crisis as anything else. The ethical problem is the status of the 'Other', be that inert matter-energy, living organisms of all kinds, or fellow human organisms. A part of this ethical problem is therefore a problem of onto-epistemology. If we denounce ontology or relegate it to biology, as Pym (2023) does, both the living and non-living 'Other' exists in the humanities and translation studies only as representations or ideas, only in relation to what human organisms have made of them. If one operates with a strong idealist or constructivist epistemology (Robinson, 2017; 2022a; 2022b), the 'Other' yet again has only the status that human ideas or constructions afford it. This epistemological reductionism, in my view, contributes to the ethical problems that contribute to the ecological crisis.

It seems to me that complexity thinking suggests that we consider the ontological as well as epistemological status of reality. By refusing to reduce our relationship with the 'Other' to epistemology, by insisting on the complex of ontology and epistemology, we at least start to provide a way of thinking about the other as an existence in its own right, as something that also constrains the knower while the knower constrains it. In other words, an onto-epistemological position based on complexity is interested in the question: "What is the role of the (human, non-human, inert) Other in the construction of human

knowledge?" as much as it is interested in the question "How do humans construct knowledge of Others?"

A complex onto-epistemology is what Deely (2001, 2009) calls the real postmodern position, which holds that matter-energy and idea-culture mutually constrain each other in the 'web of experience'. A complex onto-epistemology could therefore make a modest contribution to a stance towards a complex reality, be that material or spiritual, biological or cultural, energetic or ideational, overcoming these binaries and reductionisms.

I realize that this is a speculative ethical position, and only time will tell whether it holds any value.

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