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CAUSAL MECHANISMS AND MECHANISTIC EXPLANATIONS IN SOCIAL SCIENCE

Mechanisms as tools for explaining social behavior: review of debates and issues. The idea of causal mechanisms and explaining causation is related to a broader range of ideas about organization and acquisition of scientific knowledge. During the last few decades social mechanisms and mechanistic (mechanism-based) explanations have received much attention in both the social sciences and the philosophy of science, provoking reflections as to the fundamental aims of social science. The literature on mechanisms has grown rapidly, sweeping across qualitative and quantitative methodologies, and experimental and non-experimental designs alike, creating fruitful interdisciplinary discussions, which is sometimes referred to as "a mechanismic movement" [7, p. 1500; 9; 13, p. 50; 16; 4]. The idea that science has to provide a mechanism-based explanation of phenomena has a long history in natural and life sciences, while in social sciences such accounts are more recent [13, p. 50]. In both cases the interest in mechanisms stems from the researchers' gradual distancing from the idea of a law-like explanation, and instead privileging a more fine-grained account that details 'wheels and cogs' of the causal process bringing about or preventing from happening the effect in question [13, p. 50].

Mechanism is an instantiation of our general interest in the idea of causation. Understandably, when research in an area is at the incipient stage, most of the attention is typically allocated to detecting a relationship between two variables of interest and securing evidence that it is causal rather than spurious, derivative of some methodological artifact, or a technical fault due to imperfection in measurement. Similarly, a corresponding to this phase research question of *whether* or *if* variety focuses primarily on whether the two variables are related, causally or otherwise, and in the social sciences it is a starting point of understanding the effects of some events in the social world [11, p. 5]. When the research niche matures and gains momentum, the attention tends to shift from demonstrating mere existence of an effect towards understanding its mechanism, or *how* and *under which circumstances* the effect occurs [11, p. viii]. The *how* question, or the question about the mechanism, references a deeper intellectual query and is likely to result in insights that are not only theoretically interesting but also valuable in an applied sense [11, p. viii].

Mechanistic explanations are popular in many sciences, and social scientists often discuss them and put them to use in order to explain how social phenomena come about. In the context of the social sciences such as sociology, anthropology, or psychology, the appeal of mechanistic explanation is in its ability to show us how social, cultural and psychological factors are related to each other to jointly create a mind-bogglingly complex social reality human groups inhabit. The general notion of a mechanism-based explanation of a phenomenon essentially implies demonstrating how the phenomenon emerges out of interaction of its constituent components [9, p. 35]. For the social scientists such interactions would primarily reference interactions occurring between individuals and how they further translate into group-level phenomena. Indeed, there has been a long-standing contradiction between the individual differences that allow individual group members to exercise choices that affect their lives, on the one hand, and the constraints imposed onto their behavior by the superorganic wholes, on the other [10]. With respect to the explanatory power of mechanisms, there is some debate as to the reductionist aspect of mechanisms, including them not being a necessary or sufficient condition to account for the effects in question (for example, regarding the transactions between the individual and collective level phenomena [9]). This fact, however, does not undermine the practical and theoretical value of mechanistic explanation for the social sciences, as it is instrumental in making the causal cycles of complexly interwoven social processes more intelligible [21]. To address this problem of ambiguity with respect to applicability of mechanistic explanation, the following sections attempt a review of different accounts of mechanisms representing various aspects in the debate about mechanistic explanation to illustrate its usefulness for social scientists.

Having thus outlined what some of the current issues and debates are, **this publication aims to** offer a review of how the concept of mechanism and mechanistic explanation have been used in the social

sciences, what some of the characteristic features of mechanisms are and what configurations of mechanisms that are most frequently employed for interdisciplinary theorizing to explain social complexity. Finally, some of the effective practices of teaching mechanistic explanations that facilitate their better understanding by the students and young researchers are discussed.

"Discovering complexity": mechanisms, pathways and causality. The world contains different causal systems with different features. These different features lead to distinct investigative strategies and avenues for such systems to be represented, described and discussed [17, p. 151]. Furthermore, as entities and processes studied by different sciences are quite heterogeneous in their nature, it puts serious constraints on a possibility of offering a universally consensual definition of mechanism. 'Causal mechanism' can also carry multiple meanings; as illustrated in Gerring's writings, it can be understood as "(a) the pathway or process by which an effect is produced, (b) a micro-level (microfoundational) explanation for a causal phenomenon, (c) a difficult-to-observe causal factor, (d) an easy-to-observe causal factor, (e) a context dependent (tightly bounded or middle-range) explanation, (f) a universal (i.e., highly general) explanation, (g) an explanation that presumes probabilistic, and perhaps highly contingent, causal relations, (h) an explanation built on phenomena that exhibit law-like regularities, (i) a technique of analysis based on qualitative or case study evidence, and/or (j) a theory couched in formal mathematical models" [7, p. 1501]. There are, therefore, multiple accepted definitions of mechanism [13, p. 51].

While an argument can be made that a concept of mechanism is inherently ambiguous [7] or even reductionist[1] [9], in the absence of consensus characterization there are nonetheless some signature features that mechanisms share that are captured by many among the offered definitions. First, a mechanism implies some change – either in an effect of some kind or in some emergent phenomenon it produces. While various accounts of mechanistic explanations exist, they are usually described as sets of entities or activities that underlie and produce some effect of interest [17, p. 131]. Entities that are parts of mechanism are linked by pathways[2] – channels through which change occurs (Figure 1). There can be multiple causal pathways subsumed within a mechanism.

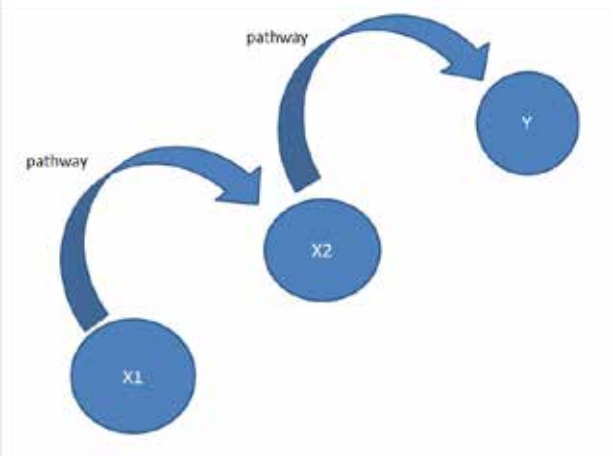

Fig. 1. Illustration of the elements of a causal mechanism and its pathways

Second, a mechanism is an inherently causal notion as its essence is in tracing influence that flows from one factor to the next. A mechanism is therefore sometimes conceived of as a concept intended to detect any generic causal structure and distinguish it from non-causal [17, p. 154].

Third, mechanism discloses some structure and is therefore internally organized in an orderly, non-random way. There is some regularity in bringing about change that underlies a mechanism. Even if the step-by-step organization of the process is unclear as it is in the case of 'black boxes', the compound nature of the mechanism is still implied.

Finally, fourth, mechanisms form a hierarchy, explaining each other, and can be nested into a larger, more complex causal construction within which one mechanism subsumes another [13, p. 50–52].

As the literature on mechanisms has proliferated remarkably quickly, the 'search for mechanisms' has solidified into a 'mechanism framework' consolidated as a distinct style of sociological theorizing in Peter Hedstr m's and Richard Swedberg's seminal edited volume. The notion of mechanism is particularly important for a discipline like sociology, where the theoretical complexity is highly specialized and divided into branches. Therefore, a generalized, unifying idea of an underlying causal mechanism is beneficial for this field. Furthermore, this mechanism-based sort of knowledge has some common points with Merton's idea of middle-range theories defined as "theories that lie between the minor but necessary working hypotheses that evolve in abundance during day-to-day research and the all-inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behavior, social organization and social change" [15, p. 39].

The interdisciplinary use of mechanistic explanation. An important feature of the mechanistic approach is its interdisciplinarity. Historiographi-

[1] Gundersen's writings [9] provide an extensive review of the polemics regarding this issue.

[2] For some explananda (i.e. the phenomena to be explained) pathway information is explanatory and mechanistic information is not [17, p. 146–147].

cally, the term "system" is more widely used in natural sciences; in biology and chemistry "mechanism" is preferred (in contrast to "law" which is more common in physics where the use of term "mechanism" is avoided even in explanations which are actually grounded in mechanisms) [12, p. 2–3]. Often the term "vitalism" is pitted against "mechanism" to underscore the doctrinal point that life cannot be reduced to any mechanicism. In social sciences, for example, sociology and psychology, the term "mechanism" is sometimes used, especially in cognitive psychology where it is a key concept; meanwhile, institutions are more favored in sociology [12, p. 3]. Mechanistic approaches are also widely used in economics. While sociological theory is less interested in the explicit postulation of explanations that are based on mechanisms, there is a gradient in mechanisms, ranging from simple correlations to nomological regularities, as well as "black-box"-like mechanisms the internal organization of which is not transparent (Schelling, 1998). Classical sociology, while using the term, does not explain it in detail, and the development of social mechanism as a concept does not happen before the end of the Second World War, when in Merton's texts the formulation of "social mechanisms" is declared the jurisdiction of the middle ground theory and their identification, emergence, and requisites – the main task of sociology [12, p. 5–6]. In terms of mechanistically-minded theory the social sciences generally lacked the well-stocked armory, instead giving way to the metaphor of different levels of analysis [19]. Meanwhile, mechanisms have high explanatory value in sociology and cognate disciplines, most especially at the level of individual processes, as they are likely to give us an understanding of how different elements of various social and psychological processes are interconnected, and add a substantial depth to this explanation, including the improvement of explanations at the theoretical macro-levels [9; 14]. Thus, as discussed in the literature, it is quite legitimate to ask questions such as: Are the mechanisms small, middle or large-scale phenomena, and what are they exactly? Would gossiping, sighing or laughing be considered a social mechanism? Would the arms race, Inglehart's values dynamics or inflation be examples of mechanisms [18, p. 32]?

Using mechanistic explanations in teaching. Any theory consists of concepts and interrelations between them. Explaining and emphasizing the mechanisms of processes and interactions is not only conducive to better understanding the empirical associations but also potentially helpful for a better understanding of the link between theory and data; moreover, it makes research gaps more visible which is of great use for constructing critical literature reviews and formulating innovative research questions.

One of the simplest and available tools for teaching and developing causal mechanistic explanations is *using analogies* [17, p. 151]. Metaphorical thinking makes us search for the necessary words and constructions that are most fitting; this is key factor for conveying the important characteristics of associations between the elements of a mechanism effectively (Figure 2). For example, a stress response can be likened to a fire alarm, or the outcomes of chronic stress – to a malfunctioning smoke detector. Analogies are useful not only during lectures while trying to explain a concept, but also for encouraging students to use analogy to make their own thoughts more 'tidy' or ideas for their paper more specific or flowing in a more coherent manner.

A schematic visual demonstration of how the elements of a mechanism interact is another way of presenting mechanistic explanations during teaching. Mechanisms can vary substantially, and there can be multiple configurations of mechanisms under one category, including causal ones. Causality of an association is an important characteristic for both demonstration and explanation, as causation can look different. *Visualizing and schematizing* the architecture of different junctures of a process will help students to comprehend the nuances of complex interactions which can be both direct and indirect (i.e. mediated or moderated) (Figure 2). The schema presents three examples of causal scenarios: (I) causal chain illustrating sequential causation (for example, a dissolution of important social bond leads to negative affect and concentration loss, which, in their turn, undermine one's academic and professional performance, thus potentially leading to stress that is capable of exacerbating the depressive symptoms and damage one's job prospects or academic standing); (II) co-determination when two interacting causal factors are involved (for example, both exercise and eating healthy affect weight; stressors and coping strategies co-determine the outcomes of a stressful situation in terms of anxiety it produces) and (III) a complex causal chain with several causal factors (marked as A, B and C on the graph) that are effective at different time points (X_1, X_2, X_3). It helps to isolate the principal elements of the mechanism, work out connections between them, their vectors, including the relationships characterized by bidirectionality (i.e. a reciprocal influence between variables, which implies that not only two entities are affecting each other but that they are also responding to that influence in return) as in the example of self-rated health and depression etc.

Furthermore, theoretical generalization with respect to the formulation of a mechanism can be helped by exercises such as *step-by-step tracking* of a mechanism when real-life case studies are consi-

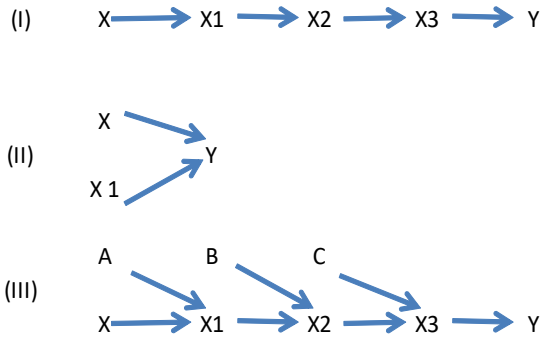

Fig. 2. Schematic illustration of different causal scenarios

dered [21]. This way different segments of a studied mechanism can be traced in sequence, one after another. For example, by looking at different scenarios of how adverse childhood experiences can affect behavior and coping strategies in adulthood we can help pinpoint the crucial junctures in life history theory research [3; 1; 6].

Branching out of this technique, there is a similar practice of partitioning one's tasks into meaningful units associated with different phases of a mechanism in question, during which the *complexity of causal mechanistic explanation accumulates gradually* and finally becomes integrated into one whole at the last step. For example: (1) formulate a definition of life history orientation strategy; (2) explain, what life stress is and how lived stressful experiences can affect health throughout life; (3) explain how various traits that are attributes of slow or fast life history orientation strategies can interact with accumulated stress and its health outcomes through life; (4) apply these observations to specific issues in the domain of mental health (e.g., depressive disorder).

Conceptual mapping is another useful strategy that invites students to make their own sketches of schematic relationships between research constructs in order to deepen their understanding of the mature of those relationships, but also to grasp the extent to which they are all explained. Creating conceptual maps is a useful tool for finding inconsistencies in conceptualization or similar research gaps that can eventually lead to acquiring a new perspective on one's research problem or notice an aspect of it one did not see before.

Conclusions. Producing insights linking a single variable x to a single outcome y is part and parcel of empirical research in the social sciences. Each theory requires an analytic approach that seeks to explain a social mechanism that is responsible for creation and validation of the associations observed among the events [12]. There are various kinds of explanations that can be worked out of research questions of different kinds [2]. Sociocultural entities and processes studied by sociologists and anthropologists require stepping away from the individual-level explanations *sensu stricto* and working out aggregate explanations of how social forces come into motion to create intersubjectively powerful social facts, resulting in reciprocal shaping of human culture and psychology [5; 10; 8; 20]. Mechanism-based explanation offers an important kind of knowledge in that it opens 'black boxes" and provides the essential ingredients to our understanding of how social phenomena happen and how the social fabric is held together. Mechanism-based explanations are widely discussed in contemporary social science. Over the course of the last few decades we have witnessed an increased interest in social mechanisms and mechanism-based explanations in the social sciences. Causal mechanisms have been cast into a sharper relief in social science and philosophy literatures, where it has blossomed as an alternative for nomological theory and raised questions about the mission of social science. One of the prominent virtues of mechanistic explanation resides in its ability to show how social and psychological factors are related to each other, and to add depth to our understanding of that interrelation. Formulating mechanisms demands seeing a complete picture and therefore is a useful tool for scholars attempting to survey social reality. As a practice, sketching mechanisms is useful for producing high-quality critical literature reviews, effective research gap spotting, and, eventually, designing interesting research questions.

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Анотація

Мальцева К. С. **Механізми причинності та механістичні пояснення в соціальних науках.** – Стаття.

Останні кілька десятиліть позначилися чималим інтересом до соціальних механізмів, і питання «механістичного» пояснення набуло значної помітності в наукових дисциплінах. Механізми спричинення отримали багато дослідницької уваги як в соціальних науках, так і в філософії науки, створюючи нову літературу, яку подекуди характеризують як «механістичний рух». Такий живий інтерес до механізмів походить від поступового відходу дослідників від законоподібних наукових пояснень і більшого ентузіазму до більш конкретних пояснень, що розписують всі складові процесу до останнього гвинтика для пояснення виникнення певного наслідку (або для його запобігання). Ця зміна також міняє типи дослідницьких запитань, які ми можемо ставити до наших даних. Тим часом, як на початковому етапі розвитку будь-якої дослідницької ніші більшість зусиль спрямовано на детекцію зв'язку між досліджуваними змінними та наведенню доказів, що він є причинним, із подальшим розвитком досліджень в цій сфері увага зміщується від демонстрації наявності зв'язку до розуміння *яким чином* і *за яких умов* він постає. Питання щодо «як?», чи питання щодо механізму, є більш глибоким і його переслідування відкриває цінні можливості у прикладній площині. Однак оскільки у світі існують різні каузальні системи з різними атрибутами, а їхні елементи мають різну природу, запропонувати універсальну дефініцію механізму, з якою погодилися б усі, є складним завданням. Звідси множинність дефініцій причинного механізму, що існує в літературі. Деякі характерні ознаки механізмів, спільні для всіх визначень, розглядаються нижче. Ця стаття пропонує огляд поняття механізму та механістичного пояснення у його застосуванні в соціальних науках та за їх межами; які характерні ознаки механізмів виділяють і які конфігурації механізмів найчастіше використовують в міждисциплінарному теоретизуванні для пояснення складних соціальних взаємодій. Розглядаються деякі ефективні техніки викладання, що залучають каузальні механізми, для кращого розуміння процесів причинності в студентській аудиторії та серед молодих дослідників.

Ключові слова: вимірювання, каузальність, механізми, пояснення, кількісні методи.

Summary

Maltseva K. S. **Causal mechanisms and mechanistic explanations in social science.** – Article.

The last few decades have witnessed an increased interest in social mechanisms, effectively casting the issue of "mechanistic explanation" into prominence in different scientific disciplines. Causal mechanisms have received much attention in both the social sciences and the philosophy of science generating novel literature sometimes characterized as "a mechanismic movement". Such keen interest in mechanisms stems from researchers' gradual distancing from the idea of a law-like explanation and ushering in a more concrete account that details 'wheels and cogs" of the causal process bringing about the effect in question (or alternatively, preventing it from happening). It further changes the kinds of research questions we can ask of data. While at an early stage of the development of any research niche most of the attention is typically allocated to establishing if the two variables of interest are related and securing evidence that this relationship is causal, when the research niche matures, the attention shifts from demonstrating mere existence

of an effect towards understanding its mechanism, or *how* and *under which circumstances* the effect occurs. The *how* question, or the question about the mechanism, addresses a deeper intellectual query and can also be valuable in an applied sense. However, the world contains different causal systems with different features, and with the entities and processes studied being heterogeneous in their nature, offering a universally consensual definition of mechanism is difficult. Therefore there are multiple definitions of mechanism. Some of their shared signature features are discussed below. This publication aims to review how the concept of a mechanism and mechanistic explanation have been used in the social sciences and beyond; what some of the characteristic features of mechanisms are and which configurations of mechanisms are most frequently employed for interdisciplinary theorizing to explain social complexity. Some of the effective practices of teaching mechanistic explanations that facilitate their better understanding by the students and young researchers are discussed.

Key words: measurement, causality, mechanisms, explanation, quantitative methods.

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