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What is a social pattern? Rethinking a central social science term

Hernan Mondani[1,2] · **Richard Swedberg**[3]

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Abstract
The main aim of this article is to start a discussion of social pattern, a term that is commonly used in sociology but not specified or defined. The key question can be phrased as follows: Is it possible to transform the notion of social pattern from its current status in sociology as a proto-concept into a fully worked out concept? And if so, how can this be done? To provide material for the discussion we begin by introducing a few different types of patterns that are currently being used (patterns in nature, cultural patterns, statistical patterns, and computationally generated patterns). This is followed by a suggestion for what a strictly *sociological* concept of social pattern may look like. A useful and theoretically solid concept of social pattern can in our view be constructed by basing it on Weber's concept of social action. This means that *both* the behavior of the actors *and* the meaning these invest their behavior with must be taken into account. The article ends with a brief discussion of how to use the concept of social patterns in an effective way and what may endanger such a use.

Keywords Computational social science · Cultural pattern · Pattern · Regularities · Social action · Social pattern · Statistical pattern

This article attempts to look at the term *social pattern* and how it is used in sociology. The reason for doing this is that the term social pattern is used very frequently in sociology but has neither been discussed nor defined (see Tables 1 and 2). Neither is the term mentioned in sociological dictionaries (see e.g. Marshall, 1994; Johnson, 2000; Scott, 2014). Social pattern falls in other words into the category of what Robert K. Merton has called a *proto-concept*, that is, "an early, rudimentary,

✉ Hernan Mondani
hernan.mondani@sociology.su.se

[1] Department of Sociology, Stockholm University, Stockholm, Sweden

[2] Institute for Futures Studies, Stockholm, Sweden

[3] Department of Sociology, Cornell University, Ithaca, NY, USA

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Table 1 Commonly used terms in sociology (proto-concepts and concepts)

Term	Number of items
Social	469,057
Society	339,562
Class/es	282,882
Structure/s	267,935
Pattern/s	217,603
Interaction/s	146,834
Network/s	132,302
Norm/s	112,672
Charisma	7,531
Anomie	7,166

Source: JSTOR. Subject "Sociology", search for nouns in all fields and item types. Retrieved on August 23, 2020

particularized and largely unexplicated idea" (Merton, 1984:267). A *concept*, in contrast, is according to Merton a term that is "tagged, substantially generalized, and explicated [that] can effectively guide inquiry into seemingly diverse phenomena" (Merton, 1984:267).

Some further reasons to scrutinize the current use of social patterns are the following. The term social pattern is sometimes used to designate what sociology as a science should study, that is, its main object of study (e.g. Merton, 1968:104; Zerubavel, 2007; Goldthorpe, 2016:61; Bourdieu, 2020:9–22). When this is the case, the notion of social patterns becomes "decisive for [sociology's] status as a science", to cite a formulation by Max Weber (1978:24).

To this can be added that the term pattern is becoming increasingly popular today because of its frequent use in AI and the discourse of digital technology. Examples of this include pattern recognition and the kind of patterns that are used to visualize data. Many of these patterns are used to predict what will happen; others are used for practical purposes, such as surveillance, making a profit, and so on.

The main question, to sum up, that will be discussed in this article is the following: Is it possible to transform the current proto-concept of social pattern into a solid sociological concept, which can help to advance sociology? In trying to answer this question we shall first discuss the different types of patterns that exist, mainly in the social sciences. We will then suggest what a sociological concept of social pattern may look like. We will end by discussing some advantages and disadvantages with using a sociological concept of patterns. The following question will also be discussed: Can one produce a more useful notion of social patterns by linking it to that of social structure?

Different types of patterns

In this section we shall briefly outline the ways in which the term pattern has been used in the natural sciences as well as the social sciences (see Fig. 1). We will distinguish between five different ideal types: *patterns in nature*, *cultural patterns*, *social*

Table 2 Examples of citations in sociological studies using the term "patterns"

It appears that the particular behavior patterns and the total personality are overwhelmingly conditioned by the types of situations and trains of experience encountered by the individual in the course of his life	Thomas (1928). "The Behavior Pattern and the Situation", *Publications of the American Sociological Society* 22, p. 1
The basic requirement [for a functional analysis in sociology] is that the object of analysis represent a standardized (i.e. patterned and repetitive) item, such as social roles, institutional patterns, social processes, cultural pattern, culturally patterned emotions, social norms, group organization, social structure, devices for social control, etc	Merton (1949). *Social Theory and Social Structure*, p. 50
The pre-established pattern of action which is unfolded during a performance and which may be presented or played through on other occasions may be called 'part' or 'routine'	Goffman (1959). *The Presentation of Self in Everyday Life*, p. 16
All human activity is subject to habituation. Any action that is repeated frequently becomes cast as a pattern which can then be reproduced with an economy of effort and which, *ipso facto*, is apprehended by its performers as that pattern	Berger & Luckmann, (1966). *The Social Construction of Reality*, p. 53
Culture, as I use the term, refers to the aggregate patterns and dynamics that are on display in expert practise and they vary in different settings of expertise	Knorr Cetina (1999). *Epistemic Cultures*, p. 8
Individuals and social entities are not the elements of social life, but are patterns and regularities, defined on lineages of successive events	Abbott (2016). *Processual Sociology*, p. ix

Comment: The term pattern has often been used in modern sociology to capture central features of social life. The table contains a selection of quotes from works during the years 1928–2016. Many others could have been chosen (see e.g. Hughes, 1928:755; Homans, 1947:18; Blumer, 1948:545; Gerth & Wright Mills 1953:10; Lieberson, 1962:671; White, 1970:307; Blalock, 1979:892; Skocpol & Amenta, 1986:131; Abbott, 1995:98; Glaser, 2002:23; Lamont & Molnar, 2002:168; Martin, 2009:9; Lareau, 2015:3; Killewald, 2016:715; Salganik, 2018:31; Edelmann et al., 2020:8)

patterns, *statistical patterns* and *computationally generated patterns*. By ideal types we mean that an effort has been made to analytically accentuate certain features, in order to facilitate the discussion in this article.

Throughout the article we will contrast the type of pattern we are discussing with what a sociological concept of social pattern in our view may look like. As will be discussed in more detail later in this article, we suggest that it would be helpful to base it on Max Weber's concept of *social action*. Weber famously defines a social

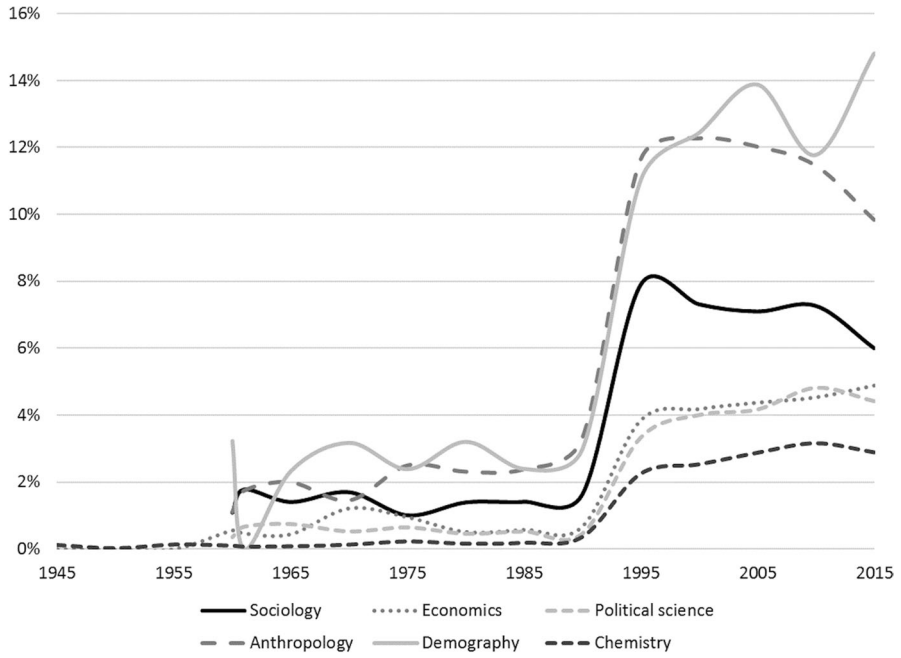

Fig. 1 Use of the term "pattern/s" in sociology and some other disciplines. *Comment*: Ratio of articles containing the term 'pattern/s' (in title, abstract or author keywords) to total number of articles within each discipline. Time evolution for selected Web of Science Subject Areas within the social sciences. Years 1945–2015. *Source*: Web of Science Core Collection, retrieved on September 19, 2020

action as consisting of two parts: (1) *behavior oriented to others* (2) *invested with a meaning* (Weber, 1978:4–24).[1] In what follows we will refer to these two criteria as "behavior" and "meaning". In the discussion that now follows of the five types of patterns, we shall also pay attention to the extent to which they take *both* behavior *and* meaning into account.

Type 1: patterns in nature

It appears that anthropology was the first social science in which the term pattern was used. It is also likely that the anthropologists imported the term from the natural sciences. The history of its use in the natural sciences has not been written, but the

[1] In the key passage in *Economy and Society*, sociology is presented as a science centered on "social action". This concept is defined as follows: "We shall speak of 'action' insofar as the acting individual attaches a subjective meaning to his behavior…Action is 'social' insofar as its subjective meaning takes account of the behavior of others and is thereby oriented in its course" (Weber, 1978:4). By "others" Weber also includes what he terms order (*Ordnung*) or a prescription for how to act that has acquired a certain independence (e.g. Weber, 1978:31, 33–6). He also emphasizes that the meaning of the actors is only *one* of the factors that can be used to explain social action. It cannot, however, be excluded.

term has been used in somewhat different ways in various sciences, to judge from the account in Philip Ball's standard work, *Nature's Patterns* (Ball, 2009).

Ball describes how scientists from a number of disciplines, such as zoology, biology and chemistry, have for long time been fascinated by the kind of patterns that can be found in nature, in the form of shells, spirals, waves, snowflakes and more. Two works that have helped to both popularize the scientific study of patterns and to advance it, are *Art Forms in Nature* (1899) by Ernest Haeckel and *On Growth and Form* (1917) by D'Arcy Thompson. Haeckel was a marine biologist whose drawings of patterns captured the imagination not only of scientists but also of artists. D'Arcy Thompson was more analytical in his approach and challenged the Darwinian notion that form follows function. The hexagon shape of the cells in a beehive may, for example, be due to the laws of physics.

Brilliant minds have not only been attracted to exploring the way that patterns look like in nature but have also tried to explain how they have come into being. Among the many outstanding ideas of this type, one can mention the morphogenetic pattern theory of Alan Turing (1952). There also exist the idea of autocatalysis in chemistry, and similar notions of self-generation that can take the form of patterns (e.g. Ball, 2009, 1:119–30; 2015).

The definition of what constitutes a pattern that can be found in Philip Ball's work qualifies as a standard definition. It reads: "a pattern is a form in which particular features recur recognizably and regularly, if not identically or symmetrically" (Ball, 2009, 1:20). There are two parts to this definition that can also be found in other definitions of pattern. The first is that *a pattern consists of units that have a special structure or form*. And the second is that *this structure or form is repeated.* Patterns in nature, Ball also notes, can be of a temporal kind, such as the beating of a heart. More often, however, they are of a visual and spatial type, like the pattern of a shell or on an animal's skin.

How does the use of the concept of patterns in the natural sciences compare to that in the social sciences? Bell does not address this issue, which is not very clear-cut. Still, it is clear that the natural sciences do not look at the meaning structures of human beings and how these vary in different societies, at least not for the purposes of their pattern-seeking and processing activities.

Type 2: cultural patterns

Among the social sciences, the term pattern seems to have been first used in anthropology, more precisely in the work of Franz Boas, one of the founders of U.S. anthropology. An important role in its diffusion was also played by several of his students who went on to become prominent scholars, such as Edward Sapir, Ruth Benedict and Alfred Kroeber (e.g. Caffrey, 1989:152–58). Sapir showed, for example, how patterns can be of help in the study of language; more generally, he also argued that "all cultural behavior is patterned" (Sapir, 1929:118). Ruth Benedict popularized the notion of pattern, and cemented its link to culture, for example in her bestselling study *Patterns of Culture* (1934).

Alfred Kroeber wrote an important article on the notion of pattern called "Structure, Function and Pattern in Biology and Anthropology" (1943). Kroeber linked the notion of pattern to structure and function, and also compared the way that it was used in anthropology to that of biology. He noted as well that the concept of pattern can be used at different levels of the analysis; there exist, for example, basic patterns as well as secondary patterns (Kroeber, 1938).

While in British anthropology, under the influence of Radcliffe-Brown, the concept of culture was primarily cast in terms of social structure, in U.S. anthropology it was primarily equated with patterns. Around 1950, according to an important survey in U.S. anthropology, it was clear that the so-called pattern thesis of culture was predominant:

> Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts, the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values. (Kroeber & Kluckhohn, 1952:181)

According to the pattern thesis of culture, culture consists of different types of patterns, at different levels. While behavior was viewed as part of culture, after World War II there has, however, also been a tendency among anthropologists to downplay its importance relative to that of mental phenomena, such as meaning, categories and the like. In 1958, for example, Alfred Kroeber and Talcott Parsons co-authored an article on the concepts of culture and society, in which they discussed the division of labor between anthropology and sociology (Kroeber & Parsons, 1958). In the past, they argued, anthropology was seen as the science that studied non-literate societies, and sociology literate ones, especially their own. It was, however, now time to replace the focus on concrete societies with a distinction that was analytical and not descriptive in nature. Anthropology, Kroeber and Parsons decided, should primarily focus on culture, understood as patterns of values and ideas; while sociology should primarily deal with society, understood as forms of interaction.

It is difficult to know how strong the tendency was among anthropologists to primarily equate culture with values, ideas and other mental patterns, as opposed to interaction and behavior. A few decades after the Kroeber-Parsons statement, however, Clifford Geertz presented an often-cited definition of culture which does precisely this. The notion of pattern plays a central role in this definition:

> the concept of culture to which I adhere…denotes an historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and attitudes toward life. (Geertz, 1973:89)

In the early 1990s, fellow-anthropologist Ulf Hannerz stated that "in the recent period culture has been taken to be above all a matter of meaning" (Hannerz, 1992:3). It would seem that anthropologists today have not been very interested

in defining what a pattern is. If one, for example, consults contemporary dictionaries of anthropology, there is no entry for "pattern" (e.g. Barfield, 2000; Morris, 2012; Vivanco, 2018).

By way of summary it can be said that since a few decades there has been a tendency in anthropology to equate culture, including pattern, with meaning. If we compare this view of pattern to that of Weber, we notice that behavior is not part of it. By the expression cultural pattern we shall therefore mean patterns that exclusively consist of meaning.

Type 3: social patterns

The term social pattern is today used in sociology, to repeat, in a loose way, that is, as a proto-concept. In this section we will also use it as a fully developed concept, based on Weber's concept of social action. Again, this means that two elements are required for there to be a pattern: behavior and meaning.

It is not clear if sociologists imported the term pattern from another science or from everyday language. If it was from a natural science, the likely candidate would be biology; if it was from a social science, it would be anthropology. One reason for anthropology being at least a major source is that in the 1920s Melville Herskovits, another Boas student, published an article in a sociological journal in which he strongly advocated that sociologists should follow the anthropologists and use the notion of patterns. The title of this article was "Social Patterns: A Methodological Study"; and it appeared in *Social Forces* (Herskovits, 1925; see also Herskovits & Willey, 1923; Caffrey, 1989:152).

The main purpose of the *Social Forces* article was to urge sociologists to start using the notion of pattern in their analyses. Much of sociology, Herskovits pointed out, ascribed what happens in society to a single factor, such as the economy, imitation or conflict. The notion of pattern could be used to break with this type of approach, he said. With its help the sociologist would be able to separate out special phenomena and analyze these in their own right. "The approach of the pattern concept makes it possible to recognize a more or less isolated phenomenon and study its workings" (Herskovits, 1925:62). After World War II some of the major sociologists in the United States started to use the term pattern in their works. It plays, for example, an important role in Talcott Parsons' theory of the social system, as exemplified by such terms as pattern variable and pattern maintenance (Parsons, 1951; Parsons & Smelser, 1956).

The second place in which the term pattern played an important role around this time is in the work of Robert K. Merton, especially in *Social Theory and Social Structure* (1949; 1957; 1968). The term pattern appears in a huge number of places in this book (436 times in a 700-page book; Merton, 1968). In most of these, the term pattern is used as a noun; but frequently also as a verb, in the sense of something e.g. being "patterned".

There are, for examples, references in *Social Theory and Social Structure* to patterned expectations and patterned emotions; and according to Merton "deviant behavior is itself patterned" (Merton, 1968:104, 217, 421). As a noun, pattern

is part of expressions such as the following: social patterns, normative patterns, culture patterns, overt and covert patterns and patterns of conflict (Merton, 1968:124, 218, 298). In a few places, Merton mentions that some patterns are caused by the social structure; but this is not the case with all patterns (Merton, 1968:142, 238, 298).

That the term pattern plays a central role in the work of Merton was well known to those close to him. According to Paul Lazarsfeld, for example, "throughout his writings [patterned behavior] is probably the technical term he uses most often" (Lazarsfeld, 1975:57). And according to Jonathan Cole, a colleague as well as a former student, Merton often used the term pattern in his lectures and seminars (Cole, 2020).

Merton, however, does not draw attention to the term pattern, in the way you would normally do with an important concept, nor does he define what he means with a pattern. It consequently is, to use his own terminology, a proto-concept as opposed to a concept (Merton, 1984:267). Once having established this, however, it should also be pointed out that there does exist a place in *Social Theory and Social Structure* where Merton discusses the term pattern in some detail. This is in a section that describes how observation should be carried out in a sociological analysis; and it reads as follows:

> In summary, then, the descriptive protocol [of the sociologist] should, as far as possible, include:
>
> 1) location of participants in the pattern within the social structure-differential participation;
> 2) consideration of alternative modes of behavior excluded by emphasis on the observed pattern (*i.e.* attention not only to what occurs but also to what is neglected by virtue of the existing pattern);
> 3) the emotive and cognitive meanings attached by participants to the pattern;
> 4) a distinction between the motivations for participating in the pattern and the objective behavior involved in the pattern;
> 5) regularities of behavior not recognized by the participants but which are nonetheless associated with the central pattern of behavior. (Merton, 1949:60–1; 1957:60; 1968:114).

Merton makes several interesting points in this quote which can be described as a mini-guide for how to make observations in sociology. He says, for example, that once you have laid bare a social pattern, it is important to also look at the types of behavior that are ruled out and not included in the pattern. He also draws attention to the emotional dimension of a pattern as well as its cognitive dimension.

It can furthermore be mentioned that Merton not only refers to patterns in his theoretical writings but also uses the term frequently in his empirical work (e.g. Merton, 1968:387–420; Merton & Zuckerman, 1971). This is also true for the giant study of two housing projects that Merton worked on in the 1940s and 1950s, but which was never published (for a description, see e.g. Fox, 2020). Its

title is *Patterns of Social Life: Explorations in the Sociology of Housing* (Merton et al. 1948).

While Merton was a pioneer among sociologists in using the notion of social patterns in interesting ways, there were also limits to his use. He did not, for example, state clearly that there is a difference between laying bare a pattern and explaining it. Nor did he emphasize that in an analysis of a social pattern you must look not only at behavior but also at the meaning the actors invest their actions with.

Type 4: statistical patterns

The expression statistical patterns will be used in this article for patterns that are generated by using statistical methods on quantitative (numerical) data from a population. Statistical methods, in other words, have been constructed with data in mind that are neither social nor sociological of the type advocated in this article (actions invested with meaning). Given this, it becomes important to discuss when and how statistical methods can be used to locate, describe and explain sociological patterns.

For various reasons these questions are difficult to answer. As a way of illustrating some of the problems involved, we will look at the way that one key sociologist has addressed them in his work. This is John Goldthorpe, who has made major contributions to sociology, both to the area of stratification and to sociology in general.

Social patterns or *regularities*, to use Goldthorpe's preferred terminology (even if he uses both terms), play a central role in his work. In an important article from 2000 he summarizes what in his view should constitute the three main phases in a sociological analysis:

(i) establishing the phenomena that form the *explananda*;
(ii) hypothesizing generative processes at the level of social action;
(iii) testing the hypotheses (Goldthorpe, 2000:151).

The object of study in sociology, Goldthorpe explains, consists of "social regularities…their formation, continuity, interrelation, change, disruption, and so on" (Goldthorpe, 2000:154). Sociology does not, in contrast, study so-called singularities, such as unique historical events and individual lives.

The use of statistics is according to Goldthorpe indispensable for *the description* of sociological phenomena. "If sociologists' *explananda* consist of social regularities of one kind or another, then statistics is, if not the only, at all events the most reliable and versatile means of demonstrating that such regularities exist and of clarifying their nature" (Goldthorpe, 2000:152).

But this is also where the important role of statistics ends in a sociological analysis, according to Goldthorpe. Statistical methods cannot be used for *the explanation* of the patterns/regularities. For this you need a theory, say in the form of a social mechanism or some generative process. The reason for this is that social regularities come into being through the actions of individuals. These make rational decisions; and statistics has nothing to say on this topic, according to Goldthorpe.

In 2016 Goldthorpe expanded on these ideas in *Sociology as a Population Science*. Statistical methods are as central to his vision of sociology as a population science as in the early version of these ideas. Not only are statistical methods viewed as necessary to establish the existence of patterns or regularities; they also thereby *create* the object of study in sociology. "Statistics are to be seen as in this way foundational for the social sciences in a deeper sense than is often appreciated – *that is, as actually creating their objects of study*" (Goldthorpe, 2016:61; emphasis added). Goldthorpe's understanding of patterns is also "representational", in the sense that the object of study is created with the help of a statistical representation of aggregated population phenomena.

What causes these statistical regularities or patterns to come into being can, once again, not be established through statistics, according to Goldthorpe. For this *theory* is needed; and only with its help is it possible to get a handle on the social mechanisms or generative processes that produce them. The variability that is characteristic of social action is also linked to the fact that individuals tend to act in a rational way. This rationality is of a fairly mild nature; and Goldthorpe describes it as a "rationality of everyday life", as opposed to the rationality of the "demonic" type that is used by the economists (Goldthorpe, 2016:35–6). There also exists an ontological dimension to human actions, according to Goldthorpe. Human beings are endowed with a "capacity for culture" as well as a "capacity for society", both of which are important for the generation and variability of social action (Goldthorpe, 2016:18).

By way of summing up this section, it can be said that Goldthorpe's work has been used to illustrate what may happen when statistics is used in the analysis of social patterns. The issue that his work raises, from the perspective of this article, is not if statistics can be used in the analysis of social patterns or not; if you need to count, you need statistics. It is instead that distortions may be introduced into the analysis if it is not made clear that social phenomena (based on social action) consist of a combination of behavior *and* meaning. If this is not done in the analysis, the social patterns or regularities that are laid bare may not capture what happens in reality. Actions that look alike when only behavior but not meaning is taken into account, may, for example, be of different types. As Weber puts it, "whenever statistical data…indicate the course or the consequences of a behavior containing some element that may be interpreted intelligibly, we only consider them to be 'explained' when they also actually, in the concrete case, been interpreted in terms of their meaning" (Weber, 2012:279).

Type 5: computationally generated patterns

Special patterns are not only created when statistical methods are used on a (non-social) population; this also happens with computational methods, which may include but are not limited to statistical methods. And just as with statistics, when computational methods are used on *social* data, it is imperative not only to take behavior into account but also the meaning of the actors.

That the notion of pattern is central to computer science can be illustrated with the following editorial statement from the first issue of *Patterns* from 2020:

> First, and most importantly, looking for patterns in data is what scientists do. Data scientists take that one step further in that they're using complicated algorithms to tease knowledge from messy, noisy, and complicated datasets, looking for patterns that can tell us something new about the structure of our world. (Callaghan, 2020)

While computer scientists are interested in patterns in general, computational *social* scientists have the general ambition to use computational methods on digital records to produce social science. Computational social science can be described as an interdisciplinary enterprise that has attracted people from computer science, sociology and several other disciplines. An attempt was made some years ago to create something called computational sociology (e.g. Hummon & Fararo, 1995; Macy & Willer, 2002). This type of analysis, however, has today become part of computational social science.

It is clear that computational social science is still young and has its most important work ahead of it. To give the reader a sense of what kind of topics it has dealt with so far, and what it has been able to find out, a few studies in this genre type will be quickly described. These are all by sociologists; all also use the term patterns. According to one study, the very size of teams that do research in science and technology has important consequences for their success in developing new ideas. While large teams are good at developing existing ideas, small teams are considerably better at coming up with new and disruptive ideas (Wu et al., 2019). According to another study, messages on Twitter show that people wake up in a good mood; they are also happier on week-ends than during the week (Golder & Macy, 2011). The findings of a third study are that segregation displays distinct patterns, caused by individual choices that are identity-based. These patterns also show the impact of clustering and related types of dynamics, based on race, income and social location (Bruch & Mare, 2009).

While computational social scientists cover a wide range of topics in their analyses and use different methods, they also have some things in common. One of these are the huge data sets they work with. According to a programmatic article in computational social science:

> The basic questions that are being asked of these data are questions of simplification and sense-making: how do we reduce the raw data to manageable but still meaningful dimensions – particularly without sacrificing their richness – and what kind of patterns can we discern? (McFarland et al., 2016:16)

Most of the huge data sets that are being produced today are unavailable to academic researchers. Often these also have a practical and non-scientific purpose, for instance, as transactional data in a commercial enterprise. In the few cases when this type of data sets become available for social science research, they often have to be repurposed. In some cases, however, not even this may be possible since bias has

been built into the data themselves, for example through racial profiling (e.g. Jefferson, 2020).

To this can be added that big data tend to be about behavior and be observational in nature; they are rarely based on interviews. This makes it difficult for the analyst to take the meanings with which the actors invest their actions into account, and to decide how these affect their behavior. To cite a textbook in computational social science, written by sociologist Matthew Salganik: "some of the most important social outcomes and predictors are *internal states*, such as emotions, knowledge, and opinions. Internal states exist inside people's heads, and sometimes the best way to learn about internal states is to ask" (Salganik, 2018:88).

But even if some computational social scientists are aware that they often lack data on what the actors themselves intend with their actions, and also that most big data sets are unavailable to them, they nonetheless have a strong sense that the type of social science they are trying to create will result in a novel and much improved type of analysis. According to Salganik, who is one of the key figures in computational social science, this type of analysis is part of the much broader transition in the modern world from an outmoded analog age to the new digital age. And according to Duncan Watts, another key figure in this field, the emergence of huge masses of digital data constitutes the equivalent of Galileo's telescope for social science (e.g. Watts, 2011:266; see also e.g. Golder & Macy, 2014:130; Cioffi-Revilla, 2010:259). Watts ends one of his books with the following words: "Let the revolution begin…" (Watts, 2011:266).

Some analysts of big data in computational science pay little attention to theory; a few even explicitly deny its importance and argue that analyses can perfectly well be carried out without any theory whatsoever (e.g. Anderson, 2008). Most computational social scientists, in contrast, reject this stance and emphasize the importance of theory (e.g. Watts, 2014; Salganik, 2018:61–2; Edelmann, Wolff & Bail, 2020:13).

What this theory should look like, however, is not clear. Many computational social scientists, including those who are trained as sociologists, regard sociological theory as old-fashioned and mostly irrelevant; and they see no reason why they should try to relate their findings to the sociological tradition (Weber-Durkheim-Merton-Bourdieu, etc.). Neither are they interested in the kind of sociological theory that has been developed by statistically oriented sociologists, such as Goldthorpe and his colleagues. What they seem to be on the outlook for is a new and different type of theory. In the meantime, however, they mainly rely on generalizations based on induction, in combination with a general sense of what is "social".

This is not so different from what is known as grounded theory in sociology, a perspective that is looked upon with distinct approval by several computational social scientists (e.g. Carley, 2002; Salganic, 2018:62; Nelson, 2020). That computational social scientists view grounded theory in this positive manner has mainly to do with its tendency to create theory from scratch and not bother too much with what passes for theory in sociology. You just go out and observe.

The main theoretical novelty and importance of computational social science would seem to lie elsewhere than in its attempt to create a new type of grounded theory. This is that some of the computational methods, especially supervised machine

learning, have as their goal to *predict*, and especially to make *practical predictions* (e.g. Molina & Garip, 2020). The capacity to do so, with the help of computational methods, is much stronger than with the methods that are used in mainstream sociology today. As computational social science develops, one can therefore expect to see more studies of social patterns in which the focus is on prediction and practical issues (e.g. Hoffman, Sharma & Watts, 2017; Watts, 2017). These predictions may also end up interacting with existing ways of behaving in complex ways (e.g. Fourcade & Johns, 2020).

A mention should also be made of the attempts to analyze culture with the help of computational methods (e.g. Mohr et al., 2020). This is typically done by analyzing huge amounts of texts (as well as less traditional formats such as audio and video records) and in this way try to establish patterns of meaning. This is usually done without much guidance of theory, sociological or otherwise, and is very much driven by the appearance of huge data sets and the availability of cheap powerful computation power to process them. There is also the fact that the behavior part is often not included in text analysis. Moreover, using complex computational algorithms to identify meaning structures in text entails the risk of finding an ever-increasing number of spurious patterns in complex data (Mohr et al., 2020:169–72). When the meaning part is excluded from the analysis of social patterns, there is a danger that it will literally be meaning-less. In this case, however, the risk is that the analysis will be cut off from society as an ongoing, active process.

By way of summing up this section, it can be said that computational methods are likely to advance the study of social patterns in several ways. These are methods that have been developed to work well with huge data sets; they are also well suited to make predictions. One drawback, however, is that computational methods have been developed to deal with data where people's meaning structures do not have to be taken into account. And when meaning structures are the focus of the analysis, as in text analyses, the action part tends to be left out, similar to what happens in cultural patterns.

The different types of patterns and their use for sociological purposes

After this account of different types of patterns, something should be said about their advantages and disadvantages for sociological purposes. In doing so we will highlight the extent to which they take both behavior *and* meaning into account, along the lines that Max Weber advocates that sociology should do.

The strength of cultural patterns has to do with their focus on mental activities. This means symbols, myths, religions, categories, narratives and the like. This type of topics is not studied in the natural sciences but are unique to the human experience. A drawback with the notion of cultural patterns, however, is that they tend only to focus on one of the two basic parts of a social pattern, namely meaning. Behavior is at best implicit.

Most patterns, as conceived by sociologists, are proto-concepts; and they do not explicitly refer to the two constituent parts of a social pattern. Despite this, it is clear that especially Merton has made an important and helpful effort to theorize social patterns. He has, for example, shown the close affinity that exists between the notion of social pattern and a middle-range approach to sociology. He has also emphasized that you need to take emotions and cognitive structures into account when you analyze social patterns.

Statistical patterns are by definition non-social patterns since statistics is not a social science. Exactly what happens when statistical methods are used to produce social patterns, is not clear. This was exemplified with the analysis of regularities or patterns that can be found in Goldthorpe's work. Goldthorpe should nonetheless be credited with having made clear that a description of a social pattern must in principle be followed by an explanation of how it has come into being. Goldthorpe has also tried to extend the theory of social patterns to include a theory of human nature. In his view, human beings look after their interests in a rational manner; they also have an inborn capacity for culture as well as for sociality.

Computational science is similar to statistics in that it does not explicitly focus on meaning in its analyses. This creates many of the same problems as for statistics, plus a few additional ones since computational science uses many other methods than statistical ones. Computational social science, however, is somewhat different in this respect. It is still young and promising. Its focus on prediction and practical use are also healthy additions to today's sociology.

A definition of social pattern

The time has now come to address the question of what a strictly sociological definition of a social pattern would look like. To have such a definition would assist in the effort to transform the notion of social pattern from a proto-concept to a concept. A good definition would also make it easier to use the term social patterns as an effective tool in sociological analysis.

As mentioned earlier, there are two parts to the standard definition of patterns, as this term is used in the natural sciences. Patterns consist of *forms*; and these are *repeated* (Ball, 2009, 1, 20). Since what the natural sciences typically study do not include human consciousness or the capacity to create and understand meaning, this element plays no part in their definition of patterns. Consciousness or meaning has, on the other hand, to be part of the way in which patterns of people's actions are understood and analyzed in the social sciences. This also means that a conception of social patterns must make it clear that there only exists *a probability* that the next form will come into being.

To summarize what has been said so far, there are four parts to our suggested definition of what constitutes a social pattern: (1) a form (2) which consists of social actions (behavior plus meaning); (3) a repetition of the form in time, space, context etc.; and (4) some probability that it will occur again. By using Weber's concept of social action as a foundation for the definition of a social pattern, it becomes firmly

linked to the sociological tradition and central concepts such as social interaction, domination and the state (Weber, 1978:4–24).

A formal definition of this type would read:

> *A social pattern consists of forms of social actions that are repeated and have some probability of recurring again. These forms are in their turn caused by social actions as well. Social actions are behavior in which a meaning is invested; they are also oriented to other actors or to an order (Weber).*

Since a definition is usually followed by a commentary, in which its key features are explicated, the following can be added, even if most has already been said. A pattern is typically made up of different but interconnected social actions, which create a form. This form exists in the mind of the actors and expresses itself in different ways, depending on the social actions it consists of. An analysis of social patterns should as a rule also contain an explanation of how these patterns have come into being. The general rule is that social actions (here as a social pattern) are caused by other social actions (here a pattern shaped in some form). By social action is meant what Max Weber refers to by this term in *Economy and Society* (1978:4–24). Its two elements are: (1) behavior of an individual that is oriented to other actors or to an order (2) which is invested with a meaning by the actor.[2]

To conceptualize social patterns as forms does not mean that agency is invested into these. Following Weber we argue that only individual actors have agency. Forms such as firms, groups and so on may, however, take on a life of their own *in the minds of the individual actors*.[3] A pattern, in other words, cannot act. Individuals, however, may act in response to a pattern.

While it is often helpful to have a formal definition to refer to, there also exist some drawbacks. A definition can, for example, give the illusion that the problem of understanding some phenomenon has been solved once and for all. In this particular case this would be a pity since the aim of the article is to start a discussion, not to end it. Other definitions are no doubt possible (e.g. Zerubavel, 2007).[4]

It can also be argued that it is more useful to approach the notion of a social pattern from a practical perspective than with the help of a formal definition. In this particular case, practical advice could, for example, take the following form. When you look for a social pattern, you first of all need to establish that the phenomenon consists of social actions in Weber's sense. Both the behavior and the meaning need therefore to be investigated and established. Second, since a pattern is often complex, a plurality of social actions will need to be laid bare and fitted together. Third, it is necessary to establish that the form of social actions is repeated with some regularity. And fourth, once the social pattern has been established, the question of how

[2] See note 1.

[3] See note 1.

[4] In an interesting article Zerubavel draws on the work of Georg Simmel to suggest a concept of social pattern that he views as part of formal sociology or social geometry. The focus in this type of pattern is on the comparability and universality of certain social phenomena. The element of meaning, however, is not part of this approach. A similar failure to single out both behavior and meaning can often be found in another type of formal sociology, namely network analysis (but see e.g. Fuhse, 2009).

it is generated must be addressed. Also, here the main focus should be on social actions, in order to avoid a behaviorist approach.

Discussion: pitfalls and potentials with using the concept of social pattern in sociology

In 1952 Alan Turing published an article called "The Chemical Basis of Morphogenesis", in which he presented a theory of pattern formation or what he called morphogenesis (morphogen = shape former). Today this term is used in biology and refers to such phenomena as the formation and development of the shape of cells, tissues or organisms. One of the questions that will be discussed in this concluding section is if something similar is also possible in sociology. We shall do this by discussing some of the drawbacks that come with using the concept of social pattern as well as what can be accomplished through its use.

If we begin with potential pitfalls, there is first of all what is known as *apophenia* or the tendency to see a pattern where none exists. Looking at a cloud, you may see an animal; and looking at a mark on a wall, a face. One well-established form of apophenia is the tendency to create patterns out of random events. If, say, three out of five random events are similar, the mind immediately tends to see a pattern (e.g. Kahneman, 2011:115–17).

Another potential pitfall with using the concept of social patterns is what is known as the problem of induction. If something has happened several times, one might think that it will also happen again. This, however, is not the case. Establishing a pattern does not mean that a safe prediction can be made. This is true both at the micro level and the macro level; "surprises" happen at both (e.g. Maier, 2009).

There exist several potential pitfalls related to the theme of social patterns and their explanation. The task of laying bare a social pattern can, for example, be so difficult that one may feel that once this has been done, the work is finished.

To explain why a social pattern keeps reappearing is not necessarily the same as explaining how it initially came into being. The forces that sustain a pattern may differ from those that made it emerge in the first place. According to Max Weber, for example, a certain type of religion helped modern capitalism to come into being, but has not played a role in its continuing existence.

A problem may also emerge in the following way. If a social pattern has been observed without any guidance from a theory of what to observe, the explanation of how it came into being will be weak. The reason for this, as especially Charles

Sanders Peirce has shown, is that there always exist many different explanations of any phenomenon (e.g. Peirce, 1960:496). Merton refers to this as the problem of *post factum* explanations (Merton, 1968:147–49). The remedy here is to start with a theory.

The need for an explanation to accompany the observation of a social pattern can also be shown by introducing the notion of social structure into the discussion. The reason for this is the following. A pattern is a metaphor that refers to something that exists on the surface of things as well as something that is repeated. The archetypical examples of patterns are to be found in descriptions of such objects as textiles and tiles. These tend to catch the eye directly. A structure, in contrast, is a term that often refers to the fixed and hidden juxtaposition of essential parts of some phenomenon (e.g. Arendt, 1978:22–30; Foucault, 1970; Crothers, 2015). What this means is that the term pattern invites to an analysis of what happens on the surface and to an answer to the question of *what*? That of a structure, in contrast, invites to an analysis of how something operates in a certain way and to answer the question *why*? From this perspective, in short, it is useful to use the notion of social pattern in conjunction with that of social structure.[5]

There also exist a few other pitfalls in using the term social pattern that are not related to the need to explain how the pattern has come about. When you focus a study on a specific pattern, there is for example a danger that no attention will be paid to what is excluded. This could mean, for example, that no attention is paid to early forms of what may become a pattern ("*the not-yets*") as well as to failed attempts to establish a pattern ("*the didn't quite-make-its*"; Hughes, 1984:53).

[5] To this should be added that if one wants to get a better handle of what constitutes a social pattern by linking it to the notion of social structure, the latter should not be defined in terms of the former. This, however, is not uncommon in contemporary sociology. In the latest major work on social structures, *Social Structures* (2009) by John Levi Martin, the following definition of social structure is given: "Social structure is here considered to refer to recurring patterns of social interaction, where the patterning is in regards to concrete individuals (and not roles or classes)" (Martin, 2009:9; see also Martin and Lee, 2015:713). A similar tendency to define social structure with the help of the notion of social patterns can also be found in network analysis. Barry Wellman writes, for example that "the most direct way to study a social structure is to analyze the pattern of ties linking its members. Network analysts search for *deep* structures – regular network patterns, beneath the often complex surface of social systems" (Wellman, 1983:157).

Social structure, however, does not need to be defined in terms of social patterns; in fact, this would seem to be a relatively recent development. The problem with proceeding in this way is accentuated by the fact that the notions of social pattern and social structure are both metaphors; and these can be hard to get to work together in an effective way (for problems with using metaphors in sociology, see e.g. Swedberg, 2020). The historical origins of the notion of pattern are mentioned in the article; for those of the term structure, first used in botany and then in biology, see especially Foucault (1970:132 ff., 226 ff.). Robert K. Merton tried to set the notion of social structure at the very center of the sociological analysis during the post-WWII period in US sociology; and he did this by constructing the notion of social structure with the help of the biological-medical metaphors of structure and function (see Merton, 1949; 1957; 1968; see also Coser, 1975). Merton's way of looking at social structure was, however, not accepted by other sociologists; and it was soon replaced by a plethora of different views (e.g. Blau & Merton, 1981). The lack of consensus is also characteristic of the situation today, as noted, for example, by John Levi Martin in *Social Structures* (Martin, 2009:5).

Complexity will in this way be excluded from the analysis; with a kind of whig history as a result.

As earlier mentioned, studies of social patterns can also be based on biased data, which is the case when for example racial profiling is used. It is clear that this can have severe consequences for certain groups, something that has been documented several times (e.g. Burrell & Fourcade, 2021:223–25). Patterns and prejudices sometimes go together.

What has so far been said about various pitfalls in working with the idea of patterns applies not only to the social sciences but also to the natural sciences. What will now be said, however, is only applicable to sociology. If the element of meaning is not included in the analysis, the result may be that distorted or even non-existing patterns are created through the analysis. This may be called *the problem of meaning-less patterns*.

Having now outlined some of the problems that should be kept in mind when the concept of social pattern is used, the time has come to emphasize the advantages that come with using it. For one thing, the term social pattern is already in use, something which means that there exists an audience for the idea of an improved version of this term, that is, for a fully articulated concept of social pattern that can replace the existing proto-concept.

It would also seem that the concept of social pattern is a useful tool to start an analysis with. When you make a first scan of some social phenomenon, especially a new one, the idea of looking for patterns can be helpful. More generally, the chance of locating a meaningful and useful pattern will increase if you cultivate your capacity to translate figures and social observations into patterns. And it will form into a skill to rely on if you often enough engage in this type of pattern thinking. Patterns will then literally jump out at you.

A social pattern is also a very flexible concept, in that it can be applied to a huge number of social phenomena and at different levels. It can also be used to detect structural similarities between social phenomena that at first may look very different.

When the concept of social pattern is based on Weber's concept of social action, as has been advocated in this article, it becomes directly linked to the sociological tradition. This facilitates the attempt to incorporate the results of a new study into what is already known. It also makes it easier for other researchers to use its results.

Finally, and to conclude, we now return to the term morphogenesis that was mentioned at the beginning of this section. In the spirit of Turing, we feel that the term pattern also invites to a discussion of why patterns exist in the first place. For sociologists, this question translates into the following one: Why do human being create patterns when they act and interact? According to Goldthorpe, the answer has to do with the human capacity to make rational everyday decisions. One can also think of other possible reasons, for example that human beings have an inborn capacity to create and analyze patterns of various kind.

In the last hand, the notion of pattern, as Turing realized, also raises some very intriguing and basic questions. One reason for this is that the notion of pattern is related to a very fundamental question in science: why do certain elements

form into structures that are repeated and even become permanent in some cases, rather than behave in some random manner and disperse?

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