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## **Overview of the Origin of Science and Social Sciences: Methodological Issues**

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### **ABSTRACT:**

*This paper outlines how the subject matter of disciplines came to be defined and how the approaches to study it is developed over the years. It does so by studying the origin of systematic knowledge through historical and philosophical analysis. While emphasising on the permanence of how the systematic study of knowledge has evolved and how methodology continues to be influenced by new findings, this paper shows that even as methodology plays a pivotal role in the representation of objectivity in the concerned subject matter, the research on the subject matter also conversely influences the shift in methodology. It reemphasised that discernment of pattern was the initial objective criteria of systematic research. But new facts and cultural differences continue to challenge interpretation and brings variation in understanding reality and thus refining the subject matter. This new development entailed the inevitability of methodological reflexivity to certain degree but occurring in a vast span of temporal interval. Within this quest for objective knowledge, researchers have emphasised on intersectionality of disciplines. This understanding also leads to the increasing significance of interdisciplinary research.*

**Keywords** – knowledge, interdisciplinarity, research methods, objectivity, subject matter.

### **INTRODUCTION**

This paper argues that by studying the notion of origin and evolution of systematic or scientific study which cannot change concomitantly informs us how progress in research has brought changes in the methodological understanding. It reveals that methodologies have ineluctably evolved and does not remain the same as understanding and interpretation of facts develops. So, to understand the methodological issues in disciplinary studies while trying to understand its specific objectives like the subject matter, this study revisits the development of systematic approaches across the disciplines through historical and philosophical analysis. This study is necessary because systematic or scientific approach to a problem illuminates observation and accrue knowledge of reality as Perter Lipton puts it in The Medawar Lecture organized by the Royal Society of London (Lipton, 2005). Lipton posits that the significance of methodological study sheds light on why science is needed in the first place even for someone who is not equipped to do the same like a good cyclist who may not be able to explain the physics and physiology behind that ability (Lipton, 2005). Albeit its advances in multitude of esoteric subfields, most of the illuminating observations of sciences that gives knowledge and the practical significance derived have taken years to evolve. The process started by identifying the subject matter and has evolved to mature and refine in its understanding. In the history of the origin of science, establishing scientific consensus on the

subject matter of a discipline remained one of the main focus (Kuhn, 1962). On the subject matter arrived concerning different disciplines, in both the natural and social world, science uses 'systematic and orderly' approach to gain a 'general knowledge' of truth and reality (Lee, 1948, p. 68). It is the ways of eliciting this systematic and orderly approach to knowledge, this study seeks to appropriate the social and contextual dimension of research. Historically it can be seen that Karl Popper's justification of truth through social criticism or falsification entailed social epistemology of science (Popper, 1934 [1959]). And in philosophical sense, the contextual dimension of systematic and orderly approach to knowledge is relevant because social problems unlike natural science does not have the space for experimental and observational study in many cases and thus it is hard to observe any pattern but remain context specific due to its momentary nature. For example, for a problem like riot, in one context it could be due to ethnic conflict, in another it could be due to religion or class assertion in unequal society among other reasons. The choice of methodology, that is, broadly, the approach and ways of arriving at methods to study the subject matter, like riot, therefore is contextual upon the research problem because of the changing variables of causality.

Methodology is broadly categorized into two camps: quantitative and qualitative. Quantitative methodology in statistics measures the magnitude, trend, tendencies, etc. of a research problem by using definite parameters like the mean or the standard deviation of controlled variables, whereas qualitative methodology is used to understand the subjective dimension of the research problem involving varying norms and values which cannot be controlled and it may be contextual as well. The qualitative methodology is therefore, equipped with techniques like key informant interviews, participant observation, and ethnography, etc. that gives insights on subjective dimensions of the object under study. It helps gain empathetic understanding of the research problem. So, methodology varies depending on the research problem at the same time it may converge across disciplines. For example, research problems of trade union may involve class assertion (for more space in decision making) or structured inequality (like gap in pay structure across gender, race, etc.). These problems entail quantitative as well as qualitative methodology that will again require trans-disciplinary knowledge like management studies of power, economics of income, sociological approach to class, race, etc. From the given examples, it shows that the systematic and orderly approaches to understand social problems will have to keep on evolving depending on how the problems are perceived and there could be nothing constant in the methodology. Such case of flux in methodology may be valid for many reasons. This apparent fluidity necessitated to address the problem of defining methodology, i.e., means of arriving at the subject matter and the need of systematically designing how to study it (Sjoberg & Nett, 1968).

## **UNDERSTANDING METHODOLOGY**

Research basically starts with the question, what are researchers involved with. And then, can this knowledge of what one is involved with be arrived at through a distinctively quantitative or qualitative approach, or a mix of both. And, how do one arrive at the way of quantitative or qualitative research? To answer these research questions, we need to define methodology, specifically, the manner in which we chose our subject matter and its methods of scientific enquiry. In other words, methodology ask how is a trade union understood and how do a

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researcher choose the methods of studying it and give objective representation? Not only trade union, but in the social world, there are various other social problems and social phenomenon where quantitative studies alone cannot explain the research problem, like for instance, while trying to understand the cause of stress or in trying to understand the phenomenon of climate change. An interdisciplinary approach has emerged to respond to these kind of research challenges, where the study on stress and disasters reveals that the different perspectives like psychological, social and ecological dimensions needs to be emphasised (Edwards, 1998), and interdisciplinary approach to understand climate change gives stronger evidences for public engagement on its impact and mitigation (Bruin & Morgan, 2019). These examples also show that different disciplines study varying subject matter but also converge at some point giving wider scope of disseminating knowledge and greater degree of public engagement. While methodological study enriches the confluence of knowledge or amplifies the role of interdisciplinarity, it also plays a critical role to understand the scope and limits of a discipline to observe and present reality. These methodological underpinnings may be understood by asking certain important questions. In any approach to knowledge, whether it is revisiting certain claims or findings already made or connecting the facts through causal relations, it involves answering four questions. If those answers satisfy the questions, it can be understood as methodology in research. The four questions are briefly visited as follows. Firstly, what is the subject matter? In other words, what are researchers involved with? Whether it is social problem, market, power, mind, or knowledge itself, among others, the subject matter is a specific and focussed area of study.

Secondly, how is the subject matter constituted? For example, in Sociology, according to Weber, subject matter is ‘social action’ as interpreting it reveals the causal relations of the course and consequences of social reality while his contemporary sociologist like Durkheim evinced that the subject matter is ‘social fact’, like the rate of spread of Covid-19 pandemic, where depending on the rate (or social fact), the Standard Operating Procedures changes, and the individual’s agency in the society is constrained by it (cf. Durkheim, Lukes and Halls, 1982). In History, the subject matter is found in Archives and Archaeology. In recent times it has seen some shift as far as intellectual history to the extent of historical revisionism. In Economics, since it is the science of studying production, distribution and consumption, the subject matter is found somewhere in market dealing with wants, efforts and satisfaction of commodities and services (with the micro and macro studying different dimensions of economic behaviour). For Political Science, as it studies power, state was the only subject matter (that includes the system of government that concerns with the state’s legitimate use of power to ensure justice, liberty, equality, welfare, security, etc.), and latter it increasingly includes individual concerns (like issue of individual rights – the concept of [individuality](#) did not exist until the European [Renaissance from 14<sup>th</sup> century](#)).

Thirdly, what conceptual tools are to be used to understand the subject matter? The approach to the study defines the concepts, tools and procedure depending on the area of study. For example, nomothetic/ideographic research will determine the conceptual formulation accordingly. In a nomothetic research, since it tries to find a general principle, it looks for a pattern. Positivist like August Comte tried to discern a pattern in the progress of human society and espoused that there is a law of three stages in the society. In doing so, he used religious concepts, metaphysical analysis and positivistic approach. His approach is taken further by Durkheim stating that social facts should be treated as ‘things’ that will help the systematic study. Nomothetic research therefore favours quantitative research. On the other

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hand, in ideographic research like in psychology, researchers focus on the individual or a case of small group. Psychologist like Sigmund Freud used case studies and it prefers qualitative studies as it delves into the unique personal experience of human nature.

Finally, what is the limit of the subject matter? The scope, that is, in sociology the focus is on the cause and not constituents, for example, sociological research tries to understand the cause of tears and not the constituent of tears. This is also called limits of knowledge. In political science, it is limited to understanding the political activity and behaviour of state, groups, and individuals. In understanding the subject matter through methodological analysis, systematic study has developed certain other important concepts that help define the methodology. It is discussed in the next section.

## **METHODOLOGY AND OTHER RELATED CONCEPTS**

While methodology is concerned with the approach to arrive at and the procedure of studying the subject matter, there are various concepts in research, though distinct from methodology, they are closely interlaced with it in the exercise of knowledge building. Without these concepts in research, it is also hard to define a distinct methodology. For example, even though theory is not a methodology, it is required to explain the same. This kind of relationships are described below.

### **Method**

It refers to the approach of scientific principles in collecting data. Once data is collected, its analysis gives the understanding of the reality. This principle is known as method. So, method is a subset of methodology. For example, research methods like field surveys, case study, ethnography, archive analysis among others may be decided based on the understanding of subject matter and research problem.

### **Techniques**

Research analysis requires specific strategy and concrete steps in the form of skills and ability which are tested and trusted to achieve the desired goals or objectives. It is etymologically rooted in the term technical and technology, an easier and reliable way of getting results. While method like case study has abstract connotation, technique has more specific and defined contours. For example, a case study uses techniques like personal interviews, direct observation, archival study, etc. to collect data.

### **Tools**

They are instruments to implement the techniques. E.g., laptop, projector, focus group discussions, statistical tools like STATA, SPSS, etc. These tools are immediately related to techniques and they help in executing the research methods by quantifying the data and analysing it.

### **Perspective**

It is the position of the researcher rooted in the inevitability of a person's point of view in conceptualizing and interpreting reality due to cultural circumstances. This will only give the researcher the subject matter (that is, the first criteria for methodology as mentioned above).

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A perspective is closely related to ontology and epistemology and alternately to methodology that will be explained in the following sections.

### **Theory**

R. K. Merton (1949), in his book *Social theory and social structure*, defines theory as the ‘logically inter connected sets of propositions’. Sjoberg and Nett (1968, p. 30) adds to it that theories are also ‘statements that are empirically meaningful’. For example, Merton’s Middle Range theory (MRT) is to guide empirical research. He felt that macro sociology is too ambitious, while micro theories had little practical consequence. His MRT like ‘reference group theory’ studies groups that does not encompass a meta narrative neither something as small as signs or gestures in symbolic interactionism. MRT is seen as a triple alliance of theory, data and method. In case of a research methodology where it is largely experimental, its relation with theory is such that even empirical facts and findings of the experiment are interpreted through theories.

### **BROADER ABSTRACTIONS RELATED TO METHODOLOGY**

#### **Epistemology**

Firstly, methodology is closely related with epistemology. Secondly, metaphysical reality is related with epistemological questions and so with methodology. Epistemology is theory of knowledge. When methodology tells you how the subject matter is to be constituted, that is where epistemology, the means of articulating whether certain statements could be justified or it simply remains an opinion, comes in. In order to understand the process of justification, epistemology can be explained through the nature, scope and foundation of knowledge. This may be better understood by framing questions and giving systematic responses. They are:

#### **What is knowledge?**

That is, the nature of knowledge. Typically, it concerns with the ‘subject’ of knowledge (a person), an ‘object’ of knowledge (what he knows), and some sort of rule that determines whether the subject ‘knows’ the object (Frame, 2015). Plato describes that rule as an ‘account’, so he defined knowledge as ‘true belief with an account’ (Frame, 2015). More recently, the account has been called ‘justification’, and still more recently, ‘warrant’ by the philosopher Alvin Plantinga (Frame, 2015). The warrant underpins the objectivity of the claims about knowledge. So, there is an increasing assertion that true belief that ‘warrants’ should be distinguished from religious beliefs. The assumption here is that any presuppositions or axioms which does not give warrant is not a knowledge and religious beliefs is considered to fall in this domain. The problem with such epistemological position is that, religious beliefs are considered as axiomatic conception with no object of knowledge to warrant. This elides the possibility that religions can have an object of knowledge because it has subjective biases that even natural science is not totally free from. So, one of the inferences is that the problems arising from religious fundamentalism is an issue of religious bigotry and not so much an absence of the object of knowledge.

On the object of knowledge, however, there are various debates again, one is ontological, that is, the study of being, which questions whether the object of analysis exist independent of the researcher, and those who say it does not, closer to what is known as relativist ontology

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(Rashid et al, 2019, p. 3). Another different stream of thought in ontological study posits that though the object of analysis exists, it cannot be known whether that reality exist on its own, so, knowledge in its totality cannot be known (epistemological dualism). Epistemological choice therefore affects the choice of research methodology (ibid.).

### **Questions regarding scope of human knowledge.**

That means, to what extent knowledge is possible or what can people know (about reality/truth)? What can be known with certainty? and what can be left to beliefs/faith/opinion? Different epistemologists describe this tryst with the scope of knowledge (of truth/reality) in differing ways. According to Plato and Aristotle, a prominent Greek philosopher Heraclitus holds that, change is the only constant, so, for him there is no fixed reality (cited in Graham, 2019). Therefore, the philosophical influence is such that truth is seen as relative and partial. It concludes that an objective claim of truth or permanence of reality is a matter of faith statement and it cannot be justified. Even subjectivist, such as sophist and modern existentialist holds that knowledge is within ourselves – truth for me and truth for you – there is no universal truth. But rationalist like Parmenides holds that knowledge is possible because of human faculty of reason<sup>1</sup>. Plato also holds that reason is trustworthy and is seen as the final judge of truth from falsity. This system of philosophy also holds that there are statements of belief and faith not necessarily of religion but it forms certain opinion and are not justifiable/does not warrant to be called a knowledge. For example, my father is the best (axiomatic ideas). There are also statements of faith based on certain justification but are not necessarily true. For example, based on weather forecast by the Indian Meteorological Department (IMD) you believe that it is going to rain on a particular day and you speak about your plans. But there could be weather variation in time and space. Such faith statement based on IMD forecast cannot be totally justified because it is an expression of belief in the causality of variables to totality that is in question. Thus, it is being generalized that knowledge is the intersection of belief and truth, and so its scope can only be limited when it is subjective (disciplinary) and putatively when distinguished from religious beliefs.

### **What is the proper foundation of knowledge?**

Philosophers have tried to argue that the foremost source of knowledge is sense perception influenced by Aristotelian tradition (Bennet and Toivanen, 2020). It holds that it is through perceptual observation of the five senses we try to have knowledge. And out of this sense perception, the first stream of knowledge – empiricism was born, prominently articulated by John Lock and David Hume (ibid.). The second stream of knowledge is gained from rationalism of Plato's Parmenides (Samuel, 2020). It holds that you have to rationalize or think to know. So, the first rationalist to be considered was Plato. According to Plato, as soon as we started thinking, a form emerges in our mind. For example, 1. All men are mortal. This type of expression cannot be seen or felt. No human beings can verify it. Only a form emerges in our mind and we express it as valid. 2. You are given a rock to carve a statue. What you are given is empirical reality but how you carve out the statue and what shape it can take comes from your rationality, your innate understanding with drawing analysis. Rationalist believe that human reason is the final judge of what is true or false. This is where two types of reasoning emerge: inductive and deductive reasoning. Where the proof of the reason is in the premise (an absolute), that is deductive reasoning. Since the premise is absolute, the conclusion can be certain (general to particular). In inductive, the premise

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provides partial proof. So, conclusion is probable (particular to general – therefore questionable). Then came Emmanuel Kant (with his influential theory of scepticism), who critiqued that source of knowledge can neither be derivative of only empiricism or only rationalism, rather you can have knowledge only by confluence of the two. This is so because according to Kant, reality presents itself in abundance (discussed in Catherine, 2018). So, the source of knowledge lies in both the above source (empirical and rational), according to Kantian philosophy. For example, you walk on the road and stop at the red light; it is because the knowledge of rules (empirical) has been internalized and rationalized (rational).

### **Metaphysics**

Metaphysics asks the question, what is the fundamental element of this universe? Is the understanding of the element (fact) dependent on theory or vice versa? Two school emerges to answer these questions:

#### **1. Materialist considers that fundamental element (FE) is matter.**

The materialist assumes that there is a notion of motion in the matter, because of this, the matters break or unite, and when they unite, life is born. Once it is born (e.g., the universe) it is running on its own. Karl Marx is a materialist. For him the material facts like the economic substructure determines theory, for instance, in his explanation of historical materialism, history is defined by who owns the means of production, the material.

#### **2. Idealist like the German philosopher Hegel, on the other hand posits FE is idea.**

According to him, ideas exist prior to form. Ideas are derivative of a totality which tells us about reality otherwise we are nowhere. It holds that any expression in order to make sense has to relate to a totality. A preconception or presupposition of a totality is required to express a problem or ask a question or make a claim. Totality may not be comprehensible in its entirety but it can be perceived. Perceiving involves abstraction of mental categories (e.g., temperature, colour, texture, etc.). This is referred to as breaking down of ‘complex totality’ that aids analysis (Cullenberg, 1999). Hegel used ‘expressive causality’ to articulate the mental categories which are parts of complex totality (ibid.). Therefore, for an idealist, totality exist prior to the parts. Idealist believes in supernatural power that encompass the complex totality. They believe all the institutions of the earth are trying to fulfil the destiny laid down by it. The manner in which Cullenberg (1999) argues has the propensity to imply that the totality in itself is an idea and does not have an object of its own.

Out of the contestations of these two schools (idealist and materialist), dualism is born (Cartesian dualism). It states that mind and matter are both reality of this universe. They are two in one. Descartes argued, ‘I think therefore I am’. In other words, Cartesian reality argues that parts exist prior to totality and that parts constitute the whole.

From the above development, there emerged the third way of understanding reality – ‘decentered totality’ (Cullenberg, 1999). This school of thought holds that parts are in itself constantly changing. So, with such presuppositions, it holds that ‘momentary inference’ may best suit a research outcome (Cullenberg, 1999). For example, there cannot be a second reality in the sense that even the millions of cells in the same you change after few days, so who you are is defined by the moment.

Fourthly, there is the notion of ‘paradigm’ in research (Kuhn, 1962). A paradigm denotes a fixed disciplinary matrix of normal science in the form of exemplars: the values, theories,

instruments and metaphysical assumptions to solve the puzzles prevalent during a specified period. But in a scientific revolution, even the disciplinary matrix of a mature science goes under revision. According to Kuhn, the change in exemplars presents a paradigm shift in research. A paradigm therefore gives a general assumption about the disciplinary matrix which solves the puzzles within a period of time. The positivist philosophy as Popper (1959) opines is consistent with the paradigm of quantitative research methodology (cited in Johnson & Onwuegbuzi, 2004, p. 14). Later in discipline like sociology, methodologies of qualitative paradigm emerge due to the increasing voice of interpretivist, phenomenologist and ethnomethodology contrary to the positivists. Also, in organisational studies, in response to the positivist paradigm (quantitative), the realist gives importance to ideographic research that is based on explanation of cases (Tsoukas 1989, p. 551). In organisational studies, therefore, the realist paradigm insists on knowing the causality of events based on explanation of generative mechanism/power operating independent of the events they generate. They evinced that the generative mechanism is important because ‘the world does not consist of atomistic events, but real, complex, intransitive things. In other words, structures exist independently of our knowledge of them’ (p. 552). While acknowledging the significance of quantitative and qualitative research, Johnson and Onwuegbuzi (2004) opined, that the current phase of research is a mixed research (quantitative and qualitative) paradigm. More recently, it has also been identified with interdisciplinarity or trans-disciplinary research (Darbellay, 2015).

The orientation to metaphysical perceptions and paradigms gives different perspectives to individuals and groups. These areas of inter related enquiry in methodology are very significant because it shows that individuals, groups or community’s world view concerning metaphysics, epistemology, idealism, materialism and paradigm among others plays a vital role in determining research methodology (Sire, 2004). Different school of thoughts have differing and sometimes conflicting articulations about knowledge. Therefore, the politics of knowledge as a highly contested area of study in academics had also emerged (Law, 2004). The contestation of knowledge mostly deals with the problem of subject-object distinction where the researcher is a part of the society being researched entailing the difficulty of complete detachment to the identified object of study. Moreover, there is the problem of appropriating absolutism as universal knowledge and particularising of certain others, like the colonialists and the indigenous where the need for decolonizing methodologies arises (Smith, 1999).

### **EVOLUTION OF SYSTEMATIC ENQUIRY**

As society progress, debates and development in the domain of knowledge building continues. In the fourth century BC, Aristotle, considered by many as the first scientist in postdate, ‘pioneered the techniques of logic, observation, inquiry and demonstration’ largely known as the natural philosophy of knowledge (Presti, 2014, p. 250). These approaches to knowledge ‘would shape Western philosophical and scientific culture through the Middle Ages and the early modern era, and would influence some aspects of the natural sciences even up to the eighteenth century’ (p. 250). Later, in the nineteenth century, what was considered to be natural philosophy of knowledge, slowly progress to be known as science and scientific disciplines were formed (Cahan, 2003). Then, there arise the question of what is science, and when do social science become part of science or which one of them precedes the other?



Sjoberg and Nett (1992) in their book, *A methodology for social research* writes, ‘science is an approach to knowledge which is far more disciplined and calculated than ordinary inclination’. This disciplined and calculated approach in the words of Anthony Giddens (2006) means, the use of ‘systematic methods of empirical investigation in the analyses of data, theoretical and the logical assessment of arguments to develop a body of knowledge about a particular subject matter’ (Giddens, 2006, p. 78). On a different disciplinary enquiry, yet in the same fashion, in his book, *Open the social sciences*, Immanuel Wallerstein (1996, p. 2) defined social science as ‘an approach in the enterprise of modern world which attempts to develop systematic and secular knowledge that can be validated empirically.’ Following the discourse on knowledge and the understanding adopted to define science as well as social science, it reveals that, it was science which first systematically dealt with knowledge and then social science used that knowledge to study modern world, so, one can say that science comes first and then social science follows. Moreover, Social science only emerged in the 14<sup>th</sup> and 15<sup>th</sup> century but not ignoring the fact that individual/social thoughts have been there since the dawn of the humanoid era.

According to Ladyman (2002), the first step in the scientific acquisition of knowledge was discernment of pattern. Second was the invention of technology and implements. Third was farming through technology and equipment. Fourth, it led to surplus creation. And fifth, it gave rise to the literati class, then writing emerged. This led to diffusion of knowledge and civilization dawned. From this evolution of scientific enquiry, two types of knowledge emerge:

1. The philosophical knowledge of the literati class based on speculative observation (conjectural), and
2. The working-class with practical knowledge (detached from epistemology).

This gave rise to the understanding that science is philosophical knowledge along with practical knowledge. For example, Science in Greek perception use to be a philosophical knowledge. Aelius Galenus, an ancient Greek anatomist produced an anatomical theory (considered scientific then) without actually performing any dissection. His dissection was mostly done on monkeys and pigs. This was part of Greek science, and it continued to influence western science for 1300 years until Andreas Vesalius challenged this theory by actually performing dissection on human body. So, science is the result of the confluence of philosophical and practical knowledge.

## **MAJOR IMPACT OF SCIENTIFIC KNOWLEDGE**

This section answers the question, then how did the early findings of the scientific knowledge influence the thinking of people? The study finds that there are four major areas of knowledge consensus where scientific knowledge had a major impact. They are:

1. Copernicus gave a clear mathematical model of heliocentrism during 16<sup>th</sup> century renaissance.
2. Galileo’s critique of Aristotle – from Aristotelian physical categories of celestial (the aether or fifth element) and four terrestrial elements (fire, air, water and earth) and their differential directional natures of motion (circular, up and down), Galileo left only one element in their place, corporeal matter (Machamer, 2017).

3. Newton espoused that every natural thing is governed by law.
4. History of cosmos became clearer through the origin theory, through the scientific revolution, the infinite world was taken to finite world (Ladyman, 2002).

This knowledge led to geographical discoveries (Christopher Columbus, Vasco da Gama, etc.), commercial revolution (14<sup>th</sup> century - discovery of new trade routes by the Portuguese which challenged the Italian trade monopoly, dynamic changes in the trade relations, rise of banking - credit system, paper money, and rise of new middle class) and industrial revolution, and the nature of property changed. For example, agriculture was initially based on tools and equipment that requires manual labour. Then industry introduced machineries, mass production, and more surplus. Means of exchange evolved from barter of goods or metals, etc. to money. Progress in this respect also gave rise to exploitation. Social reformers emerged to address this issue. They try to discern whether the form of exploitation is natural or artificial. They became aware of the structured inequality or the inequality that is embedded in the social structure (values and norms) and it gave rise to French Revolution (1789). The term ‘social’ with attached meaning of ‘groups with rights’ was juxtaposed as equivalent to the prevailing ‘subjects’ who must obey the monarch or the aristocratic impositions. This brought revolution against the monarch. These social changes consequently led to reorganization of universities in three ways in European countries, mainly France, Germany, and UK:

1. Place of knowledge (earlier monarch is the seed of knowledge)
2. Producers of knowledge (Research should be encouraged in universities – from the palace and religious institutions to universities)
3. Professionalization of knowledge (who will practice what become independent).

## **EVOLUTION OF DISCIPLINES**

The scientific impact and the concomitant social change led to disciplinary development and refinement. Surmising on the history of disciplines, Darbellay (2015) noted, ‘The process of the disciplinarization of knowledge is an intrinsic aspect of the history of the modern university which contributed to the fragmentation and division of the disciplines which make up the scientific field in its entirety’ (Darbellay, 2015, p. 202). Among the disciplines, first, History emerged. Earlier they were in the form of hagiography (biographies of rulers and saints consisting of eulogies and are speculative in nature). Then its evolution led to the questioning of epistemology (Archives and Archaeology). So, based on this, history is context specific, therefore it holds that there cannot be universal history. It gives rise to ideographic history (particularity). Now it has other dimensions as mentioned in the beginning (historical revisionism – historical interpretation changes with time as people discover new facts about themselves). Secondly, Economics emerged. Earlier it was studied with politics as political economy. Their epistemological enquiry led to two aspects of study: 1. Universal individualistic psychology of consumption pattern. 2. Laissez Faire (economic activity with freedom from the state). So, economics is nomothetic (it search for generality). Third came Sociology. Earlier it was practiced by NGOs – advocated social rights and knowledge evolved. It took different shape in various countries: in France, Newtonian physics model was dominant, therefore, positivism emerged. Poverty was defined through structured inequality, using ‘social facts.’ In Germany, from Cartesian dualism,

phenomenology emerged. In Russia their proclivity to revolution was at large and so Marxist sociology became dominant. In America, first attempt was to reform the society. So, reformist sociology took off initially. In Japan, they did not follow western model of ‘abstracted empiricism’ (following the methods of natural science), but the psychology of resistance to western dominance affected them and operated systematic enquiry on their own, mostly using raw empiricism (Mills, 1959). This is mostly because Japan remained largely free from outside influence until 1945. Sociology in India emerged with a strong element of nation building (Patel 2016). So methodological nationalism inclined to Brahminical order was prevalent in the initial years.

In the fourth was Political Science. With its philosophical distinction, it become an independent discipline with state and power becoming the basic subject matter. It is nomothetic. Fifth was Anthropology. It emerged because of colonialism. Colonial people discovered social groups without written history, they could not understand their language, they have no standing army, and their religion was confined. These people were called tribes (broadly). To understand the tribes, participant observation emerged. Then, wholistic study started, as you cannot study one institution independently. The discipline came to be called as Anthropology. Therefore, the prominent French social scientist Claude Levis Strauss said, anthropology was a handmaiden of colonialism (cited in Patel 2016, p. 35). Sixth was Orientalism. Some of the colonies were found to have written records since ancient times like *The Eloquent Peasant* in Egypt, *The Muqaddimah* of Ibn Khaldun in the Arabs, and in India, they found *Manu smriti*. But the colonialist could not understand their language, therefore, book-view was born to learn their language, mostly known as philology. But book view was criticized that it was descriptive, prescriptive, normative and static. And that one cannot understand contemporariness with book view. Now it is often mixed with the method of participant observation or community approach.

These six disciplines were born and became more refined by the World War II. By then, their discipline’s name and subject matters were settled. The three disciplines that could not become part of social science were psychology (because it is drifted towards biology), geography (at that time it was more related to earth, crust and rivers rather than people), and law.

## **METHODOLOGICAL IMPLICATIONS OF DISCIPLINARY EVOLUTION**

From a methodological perspective, understanding this reorganization of universities and the emergence of social science disciplines with its relationship to science is important because these whole processes were governed by two classical school of sciences prevalent then:

1. One school was dominated by Newtonian Physics Model (NPM). NPM was very dominant starting from late seventeenth century, and Janiak (2019) commenting on Newton’s contribution wrote, ‘it is difficult to grasp the history of philosophy in the late seventeenth and early eighteenth centuries without considering Newton’s role’ (Janiak, 2019).
2. Cartesian dualism (it holds that there are two kinds of foundation: mental and physical. This philosophy states that the mental can exist outside of the body, and the body cannot think). When Newton was in the universities in England, Descartes was considered the greatest modern philosopher of nature. Newton studied Cartesian philosophy and came to

criticize it at latter point (ibid.). Thus, the rise of NPM also witnessed the decline of cartesian philosophy.

When Europe was facing uncertain upheavals, up till 18<sup>th</sup> Century, the elites then thought that adopting the dominant method of natural science like the two mentioned above could help them solve the social problems. Since Newtonian physics was dominant then, the philosophy of positivism became one of the most prominent methodology.

### **THE PHILOSOPHICAL ASPECT OF NPM**

Janiak (2019) identified four philosophical aspects of NPM:

1. There is symmetry between past and future. If you know the origin, you can know the present. So similarly, social science started the origin study of property, family, etc.
2. Every phenomenon in natural world is governed by a law. So, August Comte talked about law of three stages, Marx wrote on the law of evolution of society, etc.
3. Every phenomenon occurs in gravity. Social scientists thought culture is the natural or universal force in which every social phenomenon occurs. So, the theory of culture flourishes as linear/evolutionary/primordial/later as constructivist and ethnomethodology, etc.
4. There is certainty in the process of nature. Scientist began to claim the knowledge of the starting point of nature and its end.

Newtonian physics relied on empiricism against the school of thought prevailing then – rationalism – based on deduction – deducing reality from grand narrative. NPM emphasised on observing and experimenting the reality. Out of this, in social science, positivism was born. The standard of proof (the nature of investigation of natural world) was applied to social world. Quantification of social world was born. So, quantitative methods in social science are the extension of Newtonian physics model.

### **OPPOSITION TO NPM**

The Kantian and neo-Kantian school of thought emerged in opposition to NPM. They hold that social world is different from natural world so we cannot apply natural science method to understand social world. They emphasised on the individuals who have thinking will (internality). And this will cannot be understood without interaction. According to Wilhelm Dilthey (1989 [1883]), Individuals have inner state (internality)<sup>ii</sup>. This can be understood because of two reasons:

1. Everyone has ‘similar life chances.’ E.g., We get angry and happy in similar ways, and
2. Individuals have ‘outward expression’ of the inner/internal life. e.g., laughing, frowning – these outward expressions imply similar things (Dilthey, 1989).

Dilthey (1989) emphasised on the human aspect that is different from natural surroundings. So, he espoused that human science is different from natural science. Qualitative analysis was born out of this. This is where humanism/phenomenology/qualitative analysis emerged. And it was enriched by Weber’s interpretivist Social Action Theory. Social Action is different from behaviour. Behaviour is biological representation and when you attach meaning to behaviour, it becomes action. According to Weber when action is oriented in its course, it becomes social action. Therefore, you can analyse social action. Two ways to understand social action are:

1. Through the psyche of the individual, and
2. Symbolic representation (structure of the language which is part of the culture).

However, qualitative research has contentions within itself. E.g., For Weber, solidary prayer is not a social action. Peter Winch said it is (Winch, 1958). Solidary prayer in some culture is an expression of internal life of an individual and is oriented in its course to external force (Winch, 1958). So, interpreting social action depends on culture. This way culture becomes important in social science studies.

## CONCLUSION

Tracing the theory of origin of systematic study helps realise that methodology does not remain the same even for a specific discipline, entailing variation in the choice of concepts and methods. It has variations depending on the context of the subject to be studied: of nature like physics and biology or of social phenomenon like poverty, conflict, politics, etc. Moreover, even if the context is different, methodology could converge giving wider scope of knowledge. Poverty for instance, after the French revolution was increasingly seen as a consequence of structured inequality through social analysis which was predominantly influenced by quantitative approach. Nowadays, the multidimensional perspective to poverty with increasing use of interdisciplinarity has become the international yardstick. The methodology in other disciplines like history also evolves with new findings. Apart from the contextual variations and convergence, the evolution in methodology however is dispersed within a wide span of temporal interval. This also open up the space for plurality of methodologies to study a particular phenomenon, for instance, phenomenology increasingly questioned the objectivity and reliability of positivist approach in social sciences. Occasioned by the existence of multiple methodologies, politics of knowledge also emerges (Baert & Rubio, 2012; Law, 2004). The notion of different perspectives on reality also became important due to the rising cultural assertion across the globe. Ultimately, to a great extent, knowledge produced have propensity to be inclined on how the respective disciplines define their subject matter and accordingly the methods and techniques that the individuals and organisations chooses to do their research. Thus, it alludes to how methodology plays a pivotal role in the representation of objectivity in the concerned subject matter, at the same time how the research on the subject matter also influences the shift in methodology.

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## ENDNOTES

<sup>i</sup> According to Graham, Heraclitus was also a rationalist. But his rationalism follows inductive reasoning rather than deductive reasoning that Plato and Aristotle follow.

<sup>ii</sup> Dilthey was deeply influenced by Kant's philosophy of the difference between the social and the natural world, but he had different viewpoints in some areas at the same time, his views had been differentiated from the neo-Kantian philosophy (see Makkreel, 1969).

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