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Research Article

Investigation The Relationship Between Science and Social Sciences

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Abstract – Philosophy offers the natural and social sciences essential principles for theoretical thinking, a method of understanding and perspective, and self-awareness, all of which are crucial for acquiring knowledge about reality. Although science and social science were initially considered a unified field during the early stages of scientific discovery, they were later separated into two distinct disciplines. These two branches of science, each of which has become a separate discipline today, had been initially included within philosophy. In this study, the intersection points of these two sciences and the reasons for their separation will be examined. The relationship between the natural sciences and the social sciences is both intricate and profound, bridging two distinct domains of knowledge while sharing common goals of understanding and explaining phenomena. While natural sciences primarily seek to explain the workings of the physical world, social sciences focus on understanding human behaviour, societies, and social systems. In addition, this study; explores the distinctions and intersections between these two fields, examining how they complement each other, the challenges they face in integration, and the interdisciplinary approaches that enable a deeper understanding of complex issues and emphasizes the importance of an integrated approach to solving real-world problems by highlighting specific examples of collaboration and interaction.

Keywords – Interdisciplinary research, Philosophy, social science, natural sciences, comparison

1. INTRODUCTION

This Philosophy offers the natural and social sciences essential principles for theoretical thinking, a method of understanding and perspective, and self-awareness, all of which are crucial for acquiring knowledge about reality [1-3]. Science and social science are often considered two distinct fields of study, each with its methods, objectives, and epistemological foundations. The natural sciences, such as physics, chemistry, biology, and astronomy primarily focus on uncovering universal laws that govern the physical world. In contrast, the social sciences including disciplines such as sociology, psychology, economics,

and political science explore the behaviors, structures, and interactions within human societies. Despite these differences, both fields share the overarching goal of improving our understanding of the world around us, and they are often deeply interconnected [4]. Discussions about the separation of sciences and the problems caused by this separation have been ongoing for centuries [5]. This division has become more pronounced with the development of modern scientific understanding, as the clarification of interdisciplinary boundaries and the rise of specialization have, at times, created difficulties in accessing knowledge, while the lack of collaboration between different fields has hindered the emergence of innovative approaches. At the same time, this type of separation has played an important role in shaping the production of scientific knowledge and educational systems, yet in contrast, advocates of the universal nature of science argue that a single scientific understanding does not prevent the creation of a common language across different fields [6-10]. It is important to know and analyze the discussions related to these two fields for the future as well as for today. Although there are many problems worth examining regarding the relationship between science and social sciences, we believe that few studies analyze this issue within the framework of scientific principles. In particular, there is a need for studies that will examine the subjects more deeply by limiting them [11].

The relationship between these two domains is not merely one of contrast, but rather one of complementarity. Understanding how science and social science intersect and collaborate is crucial for addressing the challenges faced by modern societies. This study aims to explore the nature of this relationship, examining how each field contributes to a more comprehensive view of the world, and how they can inform and enrich one another.

2. THE BEGINNING OF NATURAL SCIENCES

Natural sciences began with the observation and explanation of nature in Ancient Greece, and continued with scientific developments in the Islamic world in the Middle Ages. At the beginning of modern natural sciences, scientists created hypotheses, tested these hypotheses with experiments, and developed theories based on the results they obtained. The most important factor in the development of natural sciences was the adoption of the scientific method. Investigating the causes of natural events through experimentation and observation became the basis of scientific thought. With the Renaissance and the modern scientific revolution, the emergence of scientific methods based on observation and experimentation enabled the rapid development of natural sciences. Today, natural sciences are a fundamental tool for understanding the universe and include physics, chemistry, biology, astronomy, and geology [8, 12, 13].

Ancient Greece and Philosophical Foundations

The foundations of natural sciences were laid, especially in Ancient Greece. During this period, questions were asked about nature and the universe, and observation and logical thinking came to the fore. These philosophical thoughts evolved from mythological explanations that attributed natural events to the will of the gods to more scientific, nature-based explanations. Thales (624-546 BC), who is considered one of the first philosophers of the Western philosophy of science, defined the basic component of nature as water and began to make direct observations to understand the nature of the universe. This approach was the first step in removing mythological explanations of natural events and placing them on a more scientific basis. Pythagoras (570-495 BC) developed an understanding based on the mathematical foundations of natural sciences by establishing a connection between mathematical relationships and numbers and nature. Pythagoras and his students argued that the universe operated in an orderly manner with mathematical proportions [14-16].

Scientific Developments in the Middle Ages and the Islamic World

Although scientific studies in Europe progressed slowly in the Middle Ages, the Islamic world made significant scientific advances during this period. Islamic scholars took Greek philosophy and science and added their observations and innovations to it, making great advances, especially in fields such as astronomy, chemistry (alchemy), physics and mathematics [8, 16]. Thinkers such as Ibn-i Sina (Avicenna) and Ibn-i Rushd (Averroes) made significant contributions to both medicine and philosophy [17-19]. Scientists such as Al-Biruni and Al-Hazen made scientific observations on natural sciences and produced valuable findings in fields such as optics, astronomy and geology [20].

The Renaissance and the Modern Scientific Revolution

The Renaissance and the scientific revolution in the 17th century marked a period when natural sciences began to develop rapidly [21]. During this period, scientific thought was freed from old philosophical dogmas and an approach based on observation and experimentation came to the fore. Copernicus (1473-1543), put forward the sun-centered universe model [22]. This model shook the old Ptolemaic universe model and laid the foundations of astronomy. Galileo (1564-1642) discovered astronomical findings such as the moons of Jupiter with his observations with a telescope and strongly defended the scientific method. Galileo's observations contributed to the emergence of the modern understanding of science [23-26]. Kepler (1571-1630) developed mathematical formulas to explain the motion of the planets. Kepler's laws confirmed Copernicus' theory and correctly described the motion of the planets orbiting the sun [27]. Isaac Newton's (1643-1727) work "Principia" is one of the most important turning points in natural sciences. Newton created a turning point in natural sciences with his laws of motion and the law of universal gravitation and laid the foundations of modern physics. Newton used observations and mathematical modelling to explain the functioning of the universe explained [28].

3. THE BEGINNING OF SOCIAL SCIENCES

The beginning of the social sciences can be traced back to the emergence of human societies and the need to understand and organize the complexities of social life, human behaviour, and institutions. Social sciences are fields that study human society, relationships, and culture, and they evolved gradually from different intellectual traditions and disciplines[29-31]

Ancient Foundations

Early attempts to understand human behaviour and society were made by philosophers. Ancient Greek thinkers like Socrates, Plato, and Aristotle made significant contributions to early social science thinking, especially through ethics, politics, and sociology. Early historians such as Herodotus and Thucydides in ancient Greece began recording events in ways that sought to understand human actions and motivations in social and political contexts[32].

Medieval and Renaissance Contributions

During the Middle Ages, the Christian Church played a dominant role in shaping thoughts about morality, governance, and human behaviour. Thinkers like St. Augustine and Thomas Aquinas contributed to the development of theological and ethical ideas about society.The Renaissance (14th-17th centuries) encouraged a revival of classical learning and began to focus more on individualism, secularism, and humanism. This led to more systematic inquiries into politics, economics, and society, and laid the groundwork for later social scientific exploration)[33].

Enlightenment (18th Century)

The Enlightenment thinkers, John Locke (1632–1704), Montesquieu (1689–1755), Jean-Jacques Rousseau (1712–1778), and Adam Smith (1723–1790), emphasized the idea that human behaviour could be understood through rational analysis, scientific methods, and observation [34].

The Rise of Modern Social Sciences (19th Century)

The 19th century saw the formalization and establishment of the social sciences as distinct academic disciplines. This was influenced by the Industrial Revolution, which transformed societies, economies, and political structures. Auguste Comte (1798–1857), often considered the father of sociology, proposed the idea of "positivism," which sought to apply scientific methods to the study of society, and coined the term sociology, arguing that society could be studied systematically and scientifically [9, 35, 36]. Karl Marx (1818–1883) was crucial in developing sociological theory, particularly regarding class struggles, the relationship between economics and society, and the role of material conditions in shaping human history[37, 38]. Emile Durkheim (1858–1917), who further established sociology as a discipline, studied social realities, collective consciousness, and how societies maintain stability and order. His work on suicide and social integration are key examples of his contributions[39-41]. Max Weber (1864–1920), who contributed to the understanding of the relationship between culture, economy and social organization, laid the foundation for the role of ideas in shaping sociology and economic systems with his work "The Protestant Ethic and the Spirit of Capitalism." [42]. Herbert Spencer (1820–1903), an early figure in sociology, applied the theory of evolution to social development and popularized the concept of "social Darwinism." [43-45].

The Growth and Specialization of the Social Sciences

In the late 19th and early 20th centuries, the social sciences began to specialize further in different areas. Based on earlier work by thinkers like Adam Smith and David Ricardo, economics developed into a formal discipline with scholars such as Alfred Marshall and John Maynard Keynes contributing to its foundations [46]. Psychology although rooted in philosophy became a separate discipline in the 19th century [47]. Figures like Wilhelm Wundt (founder of experimental psychology) and Sigmund Freud (father of psychoanalysis) shaped the field [48-50]. Anthropology began to focus on the study of cultures, societies, and human development. Franz Boas and Bronisław Malinowski helped establish anthropology as an empirical and scientific field [51-54].

Modern Social Sciences

In the 20th and 21st centuries, social sciences continued to evolve and diversify into numerous subfields such as Political Science, Sociology, Economics, Psychology, Anthropology and Geography.

The Role of Social Sciences Today

Today, social sciences are vital to understanding complex global issues such as climate change, inequality, migration, techn

ology, politics, and human rights.

Finally, the social sciences arose from philosophical inquiries about human nature and society, grew out of empirical and theoretical studies in the Enlightenment, and were formalized as separate disciplines in the 19th century. They continue to evolve as they address the changing needs and challenges of human society.

4. THE DISTINCTION BETWEEN SCIENCE AND SOCIAL SCIENCES

Natural Sciences: Objective, Quantitative, and Experimental

The main goal of natural science is to explain how the universe works from the smallest particles to the largest structures in the cosmos and to understand the laws and principles that govern the natural world. It involves the systematic study of physical phenomena and biological processes through observation, experimentation, and empirical evidence. That is, natural science aims to discover and explain fundamental laws of nature, such as the laws of physics (e.g., Newton's laws of motion, and the laws of thermodynamics) and chemical reactions that occur in nature. These laws help to describe and predict the behaviour of matter and energy in the universe. Biology, another important branch of natural science, focuses on the study of living organisms, their structure, function, evolution, and ecology. This includes everything from the smallest cells to entire ecosystems and aims to understand the processes that sustain life and how organisms interact with their environment. It also focuses on understanding the physical structure of the Earth, its processes (such as plate tectonics and erosion), and how human activities affect the planet. This includes the study of natural phenomena such as climate change and resource management. However, astronomy, another important branch of natural science, studies celestial bodies, the formation of stars, planets, galaxies, and the general structure of the universe. The goal is to understand the origins of the universe (e.g., the Big Bang theory) and its ongoing evolution. The focus of natural science also includes the application of the scientific method, a structured approach to inquiry that involves forming hypotheses, conducting controlled experiments, collecting data, and drawing conclusions based on empirical evidence [55, 56].

Social Sciences: Contextual, Qualitative, and Interdisciplinary

The focus of social sciences is the study of human society, behavior, and the complex interactions within various social, cultural, political, and economic systems. Social sciences seek to understand how individuals, groups, and institutions function, how societies evolve, and how different factors affect social dynamics. They also investigate how people think, feel, and act, both individually and in groups. This includes understanding motivations, emotions, decision-making, and social influences [57, 58]. Social scientists study the ways in which societies are organized and focus on institutions such as family, education, government, religion, and economics. They examine how these structures shape behavior and affect the lives of individuals and the cultures, beliefs, values, norms, and practices in different societies. This includes language, traditions, rituals, and customs, as well as how cultures evolve and interact. They also analyze issues such as class, race, gender, and ethnicity, and how these factors contribute to inequality of wealth, power, and opportunity within societies [59].

Political science, a major branch of social science, investigates how governments and political systems operate, how power is distributed, and how policies are made. It also examines political ideologies, party systems, elections, and international relations.

Researchers in the social sciences seek to understand problems such as poverty, crime, inequality, educational inequalities, and public health, and to find solutions that can improve people's lives.

5. POINTS OF INTERSECTION BETWEEN SCIENCE AND SOCIAL SCIENCES

Empirical Data and Research Methods

The natural and social sciences rely on empirical data and information gathered through direct observation or experimentation as the foundation for their findings. While the methods of data collection may differ between the two fields, they share the goal of producing reliable, reproducible knowledge. For

example, both fields use statistical analyses to interpret data and validate hypotheses, though the types and manner of interpretation may differ [60]. The methodologies used in the social sciences such as ethnography, interviews, and case studies are influenced by natural sciences in their desire for empirical evidence. Similarly, some natural science disciplines, such as psychology or behavioural neuroscience, borrow techniques from social science fields to understand human behaviour and social phenomena [61].

Interdisciplinary Approaches and Problem-Solving

Real-world problems often require an integrated approach that draws on both scientific and social science knowledge. For instance, global challenges such as climate change, public health, and poverty are complex and multifaceted, involving both scientific and societal dimensions [62, 63]. Addressing such issues effectively requires the application of natural science to understand the phenomena and the application of social science to understand the human behavior, policies, and societal structures that influence them.One clear example is the interdisciplinary field of environmental science, which blends biology, chemistry, physics, economics, sociology, and political science. Environmental science seeks to understand ecological systems while also accounting for human impacts and societal responses to environmental issues. Similarly, studies of public health integrate medical sciences with sociology, psychology, and economics to understand how diseases spread and how social systems can address them [64, 65].

The Influence of Scientific Discovery on Social Change

Scientific discoveries can have profound effects on human societies and can lead to social change. The discovery of antibiotics, the development of renewable energy technologies, and the exploration of artificial intelligence all have direct social, ethical, and political implications. Understanding the societal impact of these technologies requires input from the social sciences, including economics, political science, and ethics.For example, the advent of genetic engineering and CRISPR technology has raised significant ethical and social questions about its use in humans, food production, and other areas [66]. These questions go beyond the scientific implications of the technology and require a deep understanding of societal values, regulations, and cultural attitudes. Social sciences help guide public policy and ethical decision-making in these areas.

6. CHALLENGES IN INTEGRATING SCIENCE AND SOCIAL SCIENCES

While the relationship between the natural and social sciences is mutually enriching, there are challenges to integrating these fields effectively.

Complexity of Human Behavior

One of the biggest challenges in combining the two fields is the inherent complexity of human behaviour. Unlike the physical world, where natural laws can often be generalized and applied universally, human behaviour is influenced by a wide array of psychological, cultural, economic, and environmental factors. This makes it difficult to apply the same rigorous experimental methods used in the natural sciences to the study of social phenomena [67, 68].

Ethical and Normative Concerns

The social sciences often work with human subjects and deal with sensitive issues such as identity, power, inequality, and ethics. The ethical implications of social science research especially in areas like psychology, economics, or political science are more pronounced compared to the natural sciences, where

ethical concerns generally focus on animal and human testing. This complicates the direct application of natural science methods to social research [69].

Differences in Methods and Terminology

The natural and social sciences use different terminologies and research methodologies. For instance, natural sciences prioritize precision and reproducibility, while social sciences often accept subjectivity and variation in human experiences. These differences can make interdisciplinary collaboration challenging, as researchers from different fields may approach the same problem with different assumptions, goals, and methodologies [7, 70].

7. CONCLUSION

The primary focus of natural science is to explore, understand, and explain the natural world through systematic and empirical methods. It involves investigating everything from subatomic particles to the largest cosmic structures, always relying on observation, experimentation, and evidence-based reasoning to uncover the workings of nature. However, social science focuses on understanding how people interact with each other, form communities, and affect the world around them. It investigates various aspects of human life, from individual behaviour to large-scale social systems.

Despite their differences, the natural and social sciences are increasingly recognized as complementary rather than separate. As the world faces increasingly complex challenges ranging from environmental crises to technological advancements an integrated approach that combines the insights and methodologies of both fields is essential. Whether addressing issues like climate change, public health, or technological ethics, solutions must draw upon both natural science and social science to be effective, sustainable, and equitable.

The future of research and problem-solving lies in interdisciplinary collaboration. By combining the strengths of both fields, we can gain a more holistic understanding of the world, foster innovation, and create more impactful, long-lasting solutions to the problems we face.

While science and social sciences differ in their methods, subject matter, and objectives, they are complementary and increasingly interdependent. Understanding the natural world and human society requires an integrated approach incorporating scientific inquiry and social analysis. The relationship between the two fields is essential for solving complex, real-world problems that span the domains of biology, technology, economics, and human behaviour.

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