



Toward a Quantitative Study of Meaning in Human History: Deep-Level History, Super-Inventions, and Long-Term Patterns

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ABSTRACT

Human history has a discernible meaning is a question that has attracted philosophers, historians, and social scientists for centuries. It is less clear whether such meaning can be identified through evidence and examined systematically. This considers that question from a quantitative perspective. A focused review of discussions on meaning in history suggests that relatively little attention has been given to developing datasets capable of examining historical meaning at a fine level of resolution. One reason may be the continued emphasis on conventional event-based history, which records wars, political changes, discoveries, and other prominent events but does not always capture the deeper processes connecting them. This paper therefore turns to the idea of deep-level history, understood as the underlying changes and cumulative developments that shape human societies over extended periods. It outlines how these deeper historical processes can be organized into a manageable dataset and examined quantitatively. Attention is given to super-inventions and their possible classification as a way of tracing major changes in human capabilities and collective development. The approach does not claim that history follows a predetermined purpose. Instead, it suggests that meaning may become visible through recurring relationships, patterns, and directions that emerge when human history is examined as a connected whole. Further empirical work is needed to determine whether this approach can produce consistent and independently verified.

KEYWORDS: Meaning of History; Human History; Deep-Level History; Historical Change; Super-Inventions; Quantitative History; Historical Patterns; Human Development.

INTRODUCTION

The question of whether human history has a discernible meaning has occupied scholars for more than two centuries. Philosophers, historians, and social theorists have proposed different explanations for the direction and significance of human development, but these explanations have generally remained qualitative [1]. A more difficult question is whether the long-term development of humankind contains patterns that can be represented numerically and examined independently. If such patterns exist, an important issue follows: why have they been difficult to identify using conventional approaches to history?

This article addresses these two related questions by proposing a quantitative framework for examining long-term human development. The approach builds on a dataset of 315 super-inventions, originally compiled in Directionality of Humankind's Development. History [1]. Rather than treating the dataset simply as a chronological collection of important discoveries, the present paper considers whether systematically selected human-made developments can provide an empirical basis for examining historical direction.

The purpose is therefore not to replace established historical interpretation, but to explore whether a different level of analysis can reveal patterns that are difficult to observe in conventional event-based accounts.

FRAMEWORK FOR EXAMINING THE MEANING OF HUMAN HISTORY

The distinction between history and prehistory has traditionally been associated with the emergence of written records. The earliest known writing systems appeared in Mesopotamia during approximately 3200–3100 BCE [2,3]. Under this conventional definition, written history covers only about five millennia of human experience, while much of the earlier development of Homo sapiens is placed within prehistory. This division, however, creates an analytical difficulty when the objective is to understand long-term human development. Major changes such as the development of agriculture, increasingly complex technologies, symbolic expression, and social organization occurred long before written records became available.

For the purposes of this study, humankind refers specifically to modern Homo sapiens rather than to the entire evolutionary

history of the genus Homo. The proposed historical boundary is consequently extended well beyond the appearance of writing. Evidence of early symbolic and cultural activity provides a basis for considering a much longer period of human development. For example, evidence from Indonesia indicates that Homo sapiens produced figurative cave art approximately 45,500 years ago, while the disappearance of Neanderthals occurred considerably later in the broader chronology of human evolution [4]. Such evidence illustrates why a quantitative account of human development cannot necessarily begin with written records alone.

FROM QUALITATIVE INTERPRETATIONS TO QUANTITATIVE QUESTIONS

The search for meaning in history has produced a wide range of interpretations. Thinkers including Karl Marx and Friedrich Engels, Georg Wilhelm Friedrich Hegel, Oswald Spengler, Arnold Toynbee, Pierre Teilhard de Chardin, Vladimir Vernadsky, Nikolai Berdyaev, Karl Popper, and Yuval Noah Harari have approached the subject from very different intellectual positions [1,5]. Despite their differences, many of these approaches were primarily concerned with explaining the character, direction, purpose, or significance of historical development.

A quantitative approach asks a somewhat different question. Instead of beginning with the assumption that history has a predetermined purpose, it asks whether measurable historical patterns can be identified in the available evidence. One formulation used in earlier discussions is that when a historical trend can be demonstrated, its underlying meaning may become more accessible [6]. In this sense, meaning is treated not as a philosophical conclusion imposed on the past, but as something that might emerge from a consistent and observable historical trend.

The distinction is important because a quantitative interpretation requires more than a chronological list of famous events. It requires observations that are sufficiently comparable, consistently defined, and numerous enough to permit meaningful analysis [7].

THE LIMITATIONS OF AN EVENT-BASED APPROACH

Attempts to quantify long-term historical development have often relied on lists of major events or transitions. Carl Sagan's Cosmic Calendar, introduced in 1977, provided an influential example of compressing an enormous span of time into a chronological representation [7]. Later approaches by Theodore Modis, Alexander Panov, and researchers including Leonid Grinin, Andrey Grinin, and Alexander Korotayev also examined long-term patterns of development using historical milestones and phases [8-9].

These approaches demonstrated that historical change can be represented quantitatively, but they also present

a methodological problem. Some models combine events from very different domains, including biological evolution, geological change, the development of life, and human cultural activity. When observations belonging to fundamentally different processes are placed on the same temporal scale, it becomes difficult to determine what exactly the resulting trend represents. A biological event and a human technological development, for example, do not measure the same type of phenomenon [10].

A second limitation concerns the number and distribution of observations. Conventional history is overwhelmingly event oriented. Important political events, wars, migrations, discoveries, inventions, and social transformations can be documented individually, but selecting a limited set of events from thousands of years of human experience inevitably produces a relatively sparse dataset. Such sparsity becomes especially problematic when the objective is to investigate changes in the rate or direction of development over time.

This issue can be illustrated using the framework proposed by Grinin, Grinin, and Korotayev [10]. Their model identifies 20 phases associated with four production principles. Depending on whether the beginning or midpoint of each phase is used to represent its temporal position, the sequence extends over several tens of thousands of years while containing only a limited number of observations. The resulting average interval between observations is therefore measured in centuries or even millennia. Although the model is useful for identifying broad historical transitions, its temporal resolution is insufficient for examining shorter-term changes in the pace of human development [10].

The present approach attempts to address this problem by moving from a small number of large historical phases toward a larger set of more consistently defined human-made developments. The proposed super-invention taxonomy is intended to provide a denser chronological record while maintaining a common criterion for inclusion. In principle, increasing the number of comparable observations makes it possible to investigate changes in historical development with greater temporal resolution than is possible using a small collection of major historical events.

RETHINKING CONVENTIONAL HUMAN HISTORY

For more than two millennia, historical scholarship has largely developed around accounts of events involving people, societies, institutions, and political communities. Beginning with Herodotus and continuing through modern historiography, this approach has produced an extraordinarily rich record of the human past. Its strength is also its principal difficulty: the historical record contains an enormous number of potentially significant events, and their interpretation frequently depends on the perspective, evidence, and analytical framework of the researcher.

Consequently, constructing a single quantitative representation from conventional historical events is challenging. Different researchers may disagree about which events deserve inclusion, how their importance should be assessed, and whether events from different periods are genuinely comparable. A dataset based solely on such judgments can therefore become highly dependent on interpretation [9].

The alternative proposed here is to examine deep-level history—the underlying developments that persist beneath individual historical events. Rather than asking which event was most important, this perspective asks what human capability, practice, or innovation changed because of developments occurring over time. The focus consequently shifts from isolated episodes to cumulative changes in what human beings were able to create, organize, communicate, produce, or accomplish.

DISCUSSION

The analysis developed a framework for examining whether meaning in humankind's history can be approached through measurable historical patterns rather than through narrative interpretation alone. The proposed framework distinguishes traditional event-based history from deep-level history, with particular attention to the type, consistency, and temporal distribution of the observations included in each approach.

The comparison suggests that conventional historical analysis is primarily concerned with events, individuals, political changes, conflicts, and social transformations. Such an approach is valuable for understanding the circumstances and consequences of periods, but it can produce a highly fragmented dataset when the objective is to examine long-term patterns across the entire history of *Homo sapiens*. Deep-level history approaches the problem differently. It focuses on underlying developments that represent changes in human capabilities and practices and can therefore be examined as part of a more consistently structured historical sequence [8].

A central element of the proposed framework is the identification of super-inventions. Their inclusion is based on defined criteria intended to distinguish significant human-created developments from ordinary historical events. Applying common criteria is important because it reduces the extent to which the selection of historical observations depends on individual judgments about which events are considered important. A systematically constructed taxonomy can consequently provide a more manageable basis for examining changes in the pace and direction of human development.

The analysis also indicates that deep-level history has a broader potential area of application than simply measuring the occurrence of inventions. It may provide a framework for studying long-term changes in human knowledge, technological capability, communication, production,

organization, and other forms of cumulative development. Its usefulness, however, depends on the reliability of the classification system and on whether different researchers can apply the proposed criteria consistently. These issues will require further empirical testing before stronger conclusions about historical directionality can be drawn.

One notable characteristic of deep-level history is what it deliberately leaves outside the primary dataset. Wars, revolutions, dynasties, political leaders, and other prominent historical personalities may have substantial importance in conventional historiography, but they are not necessarily central units of analysis within this framework. For readers accustomed to understanding history primarily through narratives and major events, this may initially appear to be a limitation. From a quantitative perspective, however, the exclusion can also be an advantage. By reducing dependence on political narratives and individual historical prominence, deep-level history seeks to focus attention on developments that can be defined, classified, ordered chronologically, and compared across long periods.

CONCLUSION

This presents a quantitative way of examining meaning in humankind's history by focusing on deep-level history and a structured dataset of super-inventions rather than relying only on conventional historical events and narratives. The approach provides a basis for examining long-term patterns in human development and may offer a useful starting point for further historical research. Importantly, the proposed framework is not limited to identifying a single pattern or interpretation of human development; the same dataset could be used to investigate other changes over time. Future studies, for example, could examine how the proportion of technical and non-technical super-inventions has changed across different periods and whether such changes correspond to broader transformations in human development. Independent validation, refinement of the classification criteria, and statistical analysis of the dataset will be important for determining the reliability and wider applicability of this approach.

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