The Grammar of Time: Online Glossary[1]

Marcus Kreuzer, Villanova University

Version 1, August 2023

If you have suggestions for adding terms, or corrections, please let me know. (Marcus.Kreuzer@villanova.edu) I might update this version in the future. (Check my website for updates: Marcus.Kreuzer.com)

CHA draws on many different literatures in history, economics, political science, and sociology. These literatures oftentimes use different terminologies to describe near-identical concepts. This lack of a standardized vocabulary impedes communication within CHA as well as its dialogue with other non-CHA approaches. Most importantly, this lack of standard terminology is particularly confusing for CHA novices. I therefore offer a brief glossary of the key terms used in this book. Hopefully, this glossary will help you better navigate CHA. More details of these terms, please use the index in "The Grammar of Time" to find the relevant passages in the book.

[1] Please cite as: Marcus Kreuzer *The Grammar of Time. A Toolbox for Comparative Historical Analysis* (Cambridge: Cambridge University Press, 2023): online glossary appendix.

Annotation for Transparent Inquiry (ATI) is a new footnoting technology developed by the Center for Qualitative and Multi-Method Inquiry at Syracuse University to create more room for online, more discursive footnotes and link research with qualitative data stored in the qualitative data repository. Many journals have adopted ATI to give qualitative scholars the chance to be more transparent about how they use their data. It also is intended make qualitative data more readily available for replications or other research projects. (For an illustration see Kreuzer 2019 You need to read the article online in the HTML format.)

Annales historians refers to a wide range of French historians associated with the journal *Annales d'histoire économique et sociale.* The Annales school has since its interwar founding been associated with a wide range of historiographical perspectives. Among these perspectives, the Annales school arguably is most closely associated with efforts of its founders to extend its temporal perspectives beyond the short, eventful temporality of the then dominant political history. Annales historians emphasized the so-called longue durée that pays attention to slower moving social, economic structures or the even slower moving geological and environmental factors. *See also* longue durée analysis and cliometrics. (For histories of the Annales school, see Burguiere and Tackett 2009; Burke 1990; Hunt 1986; Stoianovich 1976)

Antiquarianism refers to the study of old objects and their history. It has a very narrow focus on collecting, inventorying, dating, and describing historical objects or documents. It is associated with the work of amateur historians often volunteering at the local historical society who lovingly but uncritically collect historical artifacts. Its emphasis on collecting comes at the expense of interpreting those historical artifacts from critical and theoretically informed perspective to generate more scholarly historical narratives. Antiquarianism frequently is motivated by nostalgia and a desire to preserve past that no longer exists. As such, it I linked to historical tourism. *See also* chronicling and genealogy.

Bounded change see polychronic time.

Bounded history is together with cyclical, serial, and eventful history one of the four types of historical time. It partially thaws the past and carves out a single time block that remains frozen, but it acknowledges those frozen blocks to be qualitatively different from the blocks preceding and following it. It recognizes historical boundary conditions without being interested in how one period is different from another. (*See also* cyclical, serial and eventful history)

Causation. See linear and historical causation.

Chronicling is a key element of historical description. It refers to the initial step of identifying relevant events and sorting them in the chronological order in which they occurred. Chronologies serve as a starting point for identifying continuities and discontinuities as well as causal connections across a series of events. Chronicling, however, is also used as a derogatory term for historical research that stops at chronicling. Such chronicling eschews asking questions about continuities and discontinuities and thus is too limited to generate insights into historical change. It therefore refers to historical analysis that, just like a town chronicle, limits its inquiry to mechanically sorting events according to their calendric order. *See also* antiquarianism and genealogy. (For a history of chronicles, see Rosenberg and Grafton 2010)

Chronopolitics see memory politics.

Cliometrics refers to the application of formal economic models and econometric techniques to the analysis of historical trends and events. It was pioneered by economic historians, demographers, and is closely linked to the efforts of the early Annales historians to make historical analysis more scientific. Cliometric techniques proved most useful for slow moving, longue durée processes for which time series data is readily available. Its reliance on serial history and freezing geography has limited the appeal of cliometrics among historians because it can only engage in a narrow set of historical questions. It has recently seen a resurgence in the social sciences under the historical political economy (HPE) label. (For synopsis on HPE Gehlbach, Scott, Charnysh, Volha, and Finkel, Eugene 2022; For earlier efforts to introduce econometrics to history and its pitfalls, see Haupert 2016, 2016; Gauthier 2022)

Concatenation refers to a series of interconnected things or events. Concatenating thus refers to the activity of figuring out those links and understanding complex processes. Historians employ the terms to explicate connections between events that are mechanically arrayed a long a chronology. These connections serve to identify the elements of historical continuity and discontinuity, the lumping of events into periods, or the intercurrences among several multi-chronic, concurrent processes. *See also* intercurrences.

Conditional independence is together with unit homogeneity one of the key ontological assumptions of statistical analysis. It stipulates that the value of any measurement is independent from earlier measurements. The speed of a train, for example, is unaffected by the speed of an earlier train. This independence allows treating each measurement as a single snapshot without having to understand the larger historical process in which it is embedded. It permits ignoring dates and the past to understand the present. *See also* unit homogeneity.

Comparative historical analysis (CHA) is an umbrella term for a range of literatures exploring macro-historical questions in sociology, political science, evolutionary psychology, and economics. It anchors its analysis in two elements of time. It emphasizes the historical nature of its objects of analysis. It recognizes that these objects are subject to qualitative changes over time and that consequently the questions, concepts, and theories need to be continuously updated. Furthermore, CHA employs a more complex historical notion of causality and recognizes the effects of four temporal causal mechanisms: sequencing, timing, tempo, and duration. These four causal mechanisms together constitute a second physical notion of time. The interplay between the historical and physical notions of time constitutes the shared foundation of the otherwise very heterodox literatures constituting CHA.

Contextual comparisons explore categorical differences in kind across geographic units of analysis. It rests on assumptions of frozen history and unfrozen geography. It describes categorical differences as varieties and frequently produces taxonomies. See also cross-sectional, serial and historical comparisons. (The term was coined by Locke and Thelen 1995; Schaffer 2021)

Cross-sectional comparisons explore ordinal or interval variations in degrees across geographic units of analysis. It rests on assumptions of frozen history and geography. It is most widely employed by variance-based analysis. *See also* serial, contextual and historical comparisons.

Cyclical history is together with bounded, serial, and eventful history one of the four types of history. It assumes that history repeats itself and thus is reversible. Its repetitive nature makes the past, present and future qualitative equivalent and deprives history of the possibility of any actual qualitative (i.e. historical) change. Cyclical history informs variance-based methodologies and rests on an entirely frozen notion of history. *See also* bounded, serial and eventful history. (On the ambiguous standing of cyclical history in CHA, see W. Sewell 1996; W. H. Sewell 2008; William H. Sewell 2012)

Data visualization encompasses a wide range of graphs to describe cross-sectional or longitudinal patterns. It is linked to explanatory data analysis or descriptive statistics. It plays a prominent role in longue durée analysis to capture long-term trends and in macro causal analysis to visualize causal processes. Data visualization have played a prominent role in social inquiry going back to the 18th century but its exploratory contributions have, at least in the social science, been overshadowed more recently by the focus on causal inference. (For excellent introduction to data visualization, see Schwabish 2021; For its history, see Friendly and Wainer 2021)

Demographic explanations are subcategory of historical explanations that focus on demographic changes. They explain demographic changes in terms of life cycle effects (i.e. biological changes that recur across different life stages or events), generational effects (i.e. effects shared by an age cohort and linked to major historical events), and period effects (i.e. effects shared by all age cohorts and linked to major historical events). (Duffy 2021, 1–35)

Description explores the journalistic who, when, where, and how questions. Descriptions serve to establish a basic understanding of phenomena that is necessary to figure out what is going on and formulate or update research questions. Descriptions can also involve re-describing existing descriptions in light of new evidence. They can be thick ethnographic or historical that involve narratives. Or they employ a wide range data visualization when panel data is available. *See also* data visualization. (Gerring 2012, For more on description, see; Kreuzer 2019; Smith and Simmons 2021)

Developmental typologies extrapolate from context-specific periodizations more general categories of historical change and thus are similar to stage models. Developmental typologies typically are used to capture region specific patterns of change. They assume that cases within that regions differ only marginally and ultimately pass through the same developmental phases, albeit at slightly different points in time. By contrast, stage models are more context independent than developmental typologies and are applied to more heterogeneous cases. They consequently allow for greater differences in the timing of similar developmental patterns. *See also* stages and periodizations.

Directionality is a secondary dimension that comparative historical analysts use to identify large meta pattens of change. Directionality compares multiple discontinuities, which constitute together with continuities the primary dimension of change, and analyzes whether these moments of changes\ add up to a direction. Directionality includes among others cumulative effects of change, convergence or divergence among cases, or expanding or shrinking geographic range. Directionality often is difficult to differentiate from teleological accounts of change that stipulate a priori a theoretically constructed directionality. *See also* teleology and historical tourism.

Duration measures the time elapsed between a starting and end date and permits a *long and short* differentiation. Tempo is an element of physical time and non-linear causation.

Entangled history see polychronic time, Annales historians.

Equifinality refers to the situation in which an identical outcome is caused by different causal factors across cases. The term is associated with qualitative comparative analysis that departs from the frequentist notion of unity homogeneity under which identical outcomes generally always are caused by the same causal factors. *See also* multifinality. (For QcA, see Ragin 1987; Schneider and Wagemann 2012)

Eventful analysis involves one of the three strands of CHA. It employs unfrozen eventful history, pays close attention to dates, chronologies, periods, intercurrences, historical description and concept formation.

Eventful history is together with cyclical, bounded, and serial history one of the four types of history. It entirely unfreezes history and represents the notion of history employed most frequently by historians. It pays close attention to dates and events and analyzes the unfolding of the past in terms of periods to demarcate continuities and discontinuities. *See also* cyclical, bounded, and serial history.

Events are central units of analysis in eventful analysis. They are constructed by scholars to lump chronologically anchored, thematically related, and temporally bound factors into units of analysis. Events typically are related to moments of historical change. They are distinct from mere occurrences because events are deemed to be analytically relevant.

Evolutionary explanations play an ambivalent role in CHA. They frequently are invoked to explain long-term, slow moving institutional or normative changes. They stipulate that one set of institutions or norms was chosen over another because they proved more efficient or were in some way superior to alternative options. Evolutionary explanations rarely ever provide empirical evidence to demonstrate the efficiency of one option over another. They consequently are accused of reading history backwards or functionalism. *See also* historical tourism.

Exceptionalism involves a historiographical claim that the history, typically of a nation state, is so distinct from the histories of all other cases that it is non-comparable. Social scientists often believe that because of historians' reluctance to generalize that all historical accounts are exceptionalist. This belief, however, overlooks that historians regularly challenge exceptionalist accounts and criticize their fellow historians for overlooking similarities across cases and thus under-generalize. (For examples of exceptionalist debates, see Bell 2023; Blackbourn and Eley 1984; Kreuzer 2003)

Frequentist analysis is a loosely used term that refers to qualitative, variance-based methodologies. It also is used more narrowly within statistics to differentiate approaches that base causal inference on probability distributions (i.e. observed frequencies) from Bayesian approaches that employ subjective probability judgements about the likelihood that inferences might be correct.

Flow indicators capture fluctuation within a fixed range and are suitable to capture short-term, quickly changing directions in trends. Inflation, unemployment, or electoral volatility capture short-term, and oftentimes cyclical changes. The flows are presumed to be qualitatively stable over time and thus permit comparing flow patterns across different time periods. Flow indicators are less suited than stock indicators to describing long-term secular historical trends. See also stock indicators.

Freezing history refers to ontological choices that a given theory makes about backgrounding considerations of historical change and thus freezing history. The freezing analogy is meant

to highlight that history is not dichotomous but is constructed to different degree where it becomes either cyclical, bounded, serial or eventful. Freezing history thus refines the statistical assumption of conditional independence which treats history in a more dichotomous manner.

Freezing geography refers to the ontological choices that a given theory makes about background considerations of geographic heterogeneity and thus freezing geography. The freezing analogy is meant to highlight that geography is not dichotomous but that theories vary in how much or little geographic heterogeneity they permit. Freezing geography thus refines the statistical assumption of unit homogeneity which treats geography in a more dichotomous manner.

Genealogy refers to the study of past and present members of a family. It is narrowly interested in ancestry based on birth or marital connections that it establishes through the study of birth and marriage certificates. It employs genealogical family trees to visualize those ancestral connections. Genealogical research long played an important role because economic, political, and more modern times, racial privileges were linked to ancestry. It is distinct from biographies in limiting it research to just ancestral connections. It thus constitutes a very thin version of historical analysis. *See also* antiquarianism and chronicling.

Heterodoxy does not have a specific technical definition. Within CHA, it is used to identify method-driven research traditions in which the questions determine the methodologies. Heterodoxy refers to the pragmatic bricolage of different methodological tools that are most appropriate for a research question. It typically pays equal attention to elements of exploration and confirmation. It is distinguished from orthodox methodologies that are far more formalized, operate under more restrictive ontological assumptions, and primarily are interested in the technicalities of causal inference. *See also* orthodoxy.

Historical causation is a loosely defined term used to describe more complex notions of causality that deviate from linear notions associated with the potential outcomes model or average treatment effect. Historical causation treats causation as involving a temporal process in which causal antecedents do not produce causal effects that are immediate, simultaneous, additive, and symmetrical. Instead, the temporal order of causal factors varies in their sequencing, timing, tempo, or duration. *See also* logical positivism, linear causality. (Abbott 1988; P. Hall 2008; Jervis 1998)

Historical comparisons explore categorical differences across chronological units of analysis. It rests on assumptions of unfrozen history and, to a lesser extent, unfrozen geography. It describes these categorical differences through periodization schema that lump historical events into periods of continuity and discontinuity. Its ultimate goal is to identify historical transformations and mutations.

Historical tourism is a non-technical catch-all term to capture conceptualizations of historical time that stipulate persistence and thus preclude historical change. Historical tourism also invokes notions of historical change so deterministic that there is no room for contingent factors and human agency. Finally, historical tourism refers to historical analysis that only chronicles events without identifying patterns of continuity or discontinuity. *See also* cyclical history, teleology, Whiggish history, functionalism, antiquarianism, genealogy, chronicling. (Kalyvas and Federowycz 2022)

Historical thinking is the term used by historians to emphasize the role exploration and description play in identifying new and important research questions. Historians also talk

about historical thinking in the context of problematizing an already well researched topic by looking at it from a new analytical lens (e.g. complement existing political history with new social or post-colonial perspective). CHA uses historical thinking more explicitly to refer to the early, exploratory stages of a research cycle where social inquiry is not yet constrained by restrictive ontological assumptions. Such restrictive assumptions typically are the by-product of theories or methodologies.

Historiography refers to critical analysis of prior historical scholarship that establishes the baseline for new historical research. It serves the same function that literature reviews play in other disciplines. Unlike standard literature reviews in the social sciences, historiographies are more detailed, more empathetic, and emphasize complementarities across historical works. The goal of historiographies is to problematize existing scholarship to identify new perspectives or still unanswered questions. It is less concerned with pitting competing theoretical accounts against each other. Historiography also is distinct from source criticism which focuses more narrowly on the provenance and reliability of archival sources. (Howell and Prevenier 2001; Lustick 1996)

Historicism refers to debates about proper conceptualization of historical change and whether those conceptualizations are sufficiently historical. The attribute historical in this context references notions of history, like cyclical or bounded history, that are too frozen to capture elements of change foregrounded by serial or eventful history. The attribute historical also can refer to various forms of historical tourism that ignore change altogether (e.g. antiquarianism, genealogy, chronicling) or employ overly deterministic notions of historical change (i.e. teleology, functionalism). In short, historicism is mindful that the historical change you see, is determined by the notions of history you employ. *See also* historical tourism, antiquarianism, functionalism, chronicling.

Historical change: CHA starts from the premise that we live in a constantly changing world that requires updating research questions, concepts, and theories. It consequently treats actors, events, or even concepts as moving objects that qualitatively change over time. It views those transformations as categorical changes in kind rather than continuous changes in degree. It follows historians in using dates to demonstrate that the past does *not* repeat itself (i.e. is not frozen), that it is not just prior to the present, but that it also is qualitatively *different* from it (Schiffman 2011, 2). Exploring these qualitative differences—varying referred as discontinuities, transformation, ruptures, or mutations—describing and explaining them is a key objective of CHA.

Historical causation refers to non-linear causal mechanisms that do not conform to the simultaneity, addition, immediacy, and symmetry attributes of linear, variance-based causality. It pays close attention to the causal effects of the four elements of physical time (Sequencing, timing, duration, and tempo), as well as generative and increasing return mechanisms.

Historical explanation explains historical continuities and discontinuities by advancing separate explanations for each. It explains discontinuities in terms of so-called generative mechanisms (also referred as originating or genetic causes) and accounts for continuities by focusing on increasing returns (also referred to as sustaining causes, positive feedback loops). Historical explanations employ non-linear, historical notions of causation (see historical causation) and oftentimes pay close attention to the causal effects of physical time. Historical causation also are referred to as punctuated equilibria, critical juncture,

etiological, ecological, path dependent or genetic explanations. *See also* demographic explanations.

Intercurrence refers to the interactions among multiple, concurrently unfolding historical process. It is a useful term employed in the literature on American political development (APD)**.** Historians also use entangled histories as a synonym. Intercurrences constitutes an effort to borrow from the Annales historians the idea that history unfolds multiple concurrent processes, that each process develops at a different tempo, and those process interact with each other. They offer a multi-chronic alternative to the monochronic and episodic periodizations. *See also* Annales historians, and periodizations. (The term was coined by Orren and Skowronek 1996)

Linear causation also is referred to potential outcomes, average treatment effect or Granger causality and is closely associated with variance-based analysis. It involves short/short explanations (see temporal construction of explanations), assume cyclical, frozen history and uniform, frozen geography. It assumes that antecedents produce causal effects that are immediate, simultaneous, additive, and symmetrical. (Abbott 1988; Jervis 1998)

Logical positivism is a form of positivism, developed during the interwar period by members of the Vienna Circle, which tried to differentiate science from non-science by arguing that the only philosophical problem worthwhile to study are problems that can be addressed through logical analysis. Many members of the logical positivists emigrated to the US and profoundly influence American social science. Their differentiation between a domain of discovery and domain of confirmation narrowed methodology writing to questions of causal influence and the dominance of linear notions of causality. CHA was less influenced by logical positivism because it established itself as a distinct research tradition well before its post-war ascendancy in the social science. *See also* linear causality, historical causality.

Longue durée analysis refers to one of the three strands of CHA that was heavily influence by the French Annales school. The Annales historians shifted historical analysis away from political history, that emphasized specific events and human actors, to what they called longue durée analysis. This shift served to pay closer attention to slower moving environmental factors, socio-economic structures, formal political institutions, and cultural norms that constrained the more eventful, faster moving political history. Longue durée analysis is most closely associated with environmental, economic, and demographic analysis. It often uses panel data to visualize trends. *See also* cliometrics and Annales historians.

Macro-causal analysis involves the arguably most widely used of the three strands of CHA. It employs bounded history and explains cross-sectional, differences in outcomes in terms of complex, long causal chains. It uses history to elongate causal chains and to draw attention to causal effects of sequencing, timing, tempo, and duration that are typically overlooked in explanations with a shorter time horizon. Macro-causal analysis' attention to these elements of physical time also involves a shift from linear to historical notions of causality. *See also* linear causality, and historical causality.

Memory politics refers to a literature studying the political struggles involved over how to commemorate past historical events. It focuses particularly on the politics accompanying the erection of public monuments, celebration of public holidays, acknowledging past atrocities, and agreeing on the content of school history textbooks. Memory politics is only loosely associated with CHA because it uses the political construction of history as is object

of analysis rather than using the methodological construction of history as a tool of analysis. Memory politics also is referred to as chronopolitics. (Bernhard and Kubik 2014; Dixon 2018)

Mis-calibration refers to the failure to update the attributes of an indicator so that the indicator accounts for qualitative, historical changes. The composition of the Down Jones index is periodically updated to account for the mergers or bankruptcies of corporations or the changing important of different sectors of the economy. *See also* re-norming.

Monochronic time refers to conceptualization of historical change as unfolding as a single, rather than multiple concurrent processes. Periodizations rest on mono-chronic notions of time because they treat historical change as a single process and truncate it into alternations between continuities and discontinuities. The same goes for path dependent arguments that split historical change into critical junctures and periods of increasing returns. *See also* polychronic time. (The term was coined by E. T. Hall 1984, 112–14; Thelen 2003, 222)

Multichronic time see polychronic time.

Multi-finality refers to situation in which identical causal factors do not produce identical outcomes across cases. The term is associated with qualitative comparative analysis that departs from the frequentist notion of unit homogeneity under which the same causal

Near misses involve a range of likely but empirically unrealized outcomes. They include near miss events, near miss cases, negative cases, and counterfactual cases. Scholars frequently overlook near misses because they are more interested in political victories that brought about actual historical change. But near misses play an important methodological role because they counter our propensity to read history backwards and advance explanations that are overly deterministic. *See also* reading history backwards.

Ontological triage: Ontological triage is a corollary of historical thinking. It foregrounds causal factors and temporal processes that theories or methodologies background by stipulating more restrictive ontological conditions, that is, by freezing either history or geography. The objective of foreground such overlooked causal factors is to look for confounders that limit the external validity of test results or update existing theories. Ontological triage is CHA equivalent to robustness checks in variance-based analysis.

Orthodoxy is a loose umbrella term to describe methodologies that are formalized, operate under restrictive ontological assumptions, and primarily are interested in the technicalities of causal inference. It is closely associated with experimentalists and various statistical methods. In economics, orthodoxy is also linked to formal modeling associated with neo-classical economics and serves to differentiate this strand of economics from more heterodox approaches like Austrian economics, economic sociology, or economic history. *See also* heterodoxy.

Periodization is a key element to describe historical patterns of change. Periodizations lump events into periods of continuity and discontinuity. They conceptualize change as a monochronic process and differentiate between time intervals of change and non-change. Their monochronic and episodic treatment of change is less differentiated than multi chronic intercurrence pattens. *See also* intercurrence, stages, and developmental typologies. (Jordheim 2012; Kersh 2005; McKeown 2007)

Persistence arguments are closely linked to path dependencies to explain causal effects that extend over long-term, multiple historical periods. Persistence arguments are particularly popular in economics to demonstrate how the past shapes the present. They frequently are

associated with cultural, racial, or institutional legacies that persist over long time periods. Persistence arguments are valid to the extent that they identify and empirically demonstrate so-called reproduction mechanisms associated with path dependent arguments. They often invoke path dependencies without actually empirically demonstrating their reproduction mechanisms. They consequently simply freeze history and devolve into historical tourism. *See also* historical tourism, functionalism, and path dependency.

Polychronic time refers to conceptualizations of historical change as unfolding in multiple concurrent and interacting processes rather than a single process. These interactions are referred to as intercurrences. The Annales historians were the first to employ polychronic time. Historical institutionalist also emphasized polychronic in their critique of the monochronic notions of time employed by path dependent arguments. Path dependent arguments stipulate a single process marked by alternations between so-called critical junctions and path dependencies. Poly-chronic time also is referred as bounded change or entangled history. See intercurrences, Annales historians, monochronic time. (The term was coined by E. T. Hall 1984, 112–14; Thelen 2003, 222)

Re-norming involves updating indicators in which the scores are linked to percentile distributions within a given population. In IQ tests, for example, test takers in the fiftieth percentile, those exactly at the median, get a score of exactly 100. However, the indicator is re-normed after significant shifts in the number of test takers who receive higher scores over time. Such a shift means that a score 100 is no longer representing the median aptitude of test takers. Re-norming re-establishes this link but in the process obscures that scores are no longer fully comparable because they have been normed differently and that numerical scores mask important, underlying qualitative changes. *See also* recalibration.

Reading history backward involves the common practice to link historical antecedent with a known outcome without paying attention to alternative, just as equally plausible historical paths. This inattention to such alternative paths produces historical accounts that often are overly deterministic. Such deterministic accounts also are linked to historical tourism and stage models. *See also* historical tourism and stage models. (Møller 2021)

Reading history forward avoids the biasing effects of reading history backwards. History can be read forward to the extent that scholars pay close attention to the perspectives of actors contemporaneous of the phenomenon being studied. Such actors did not have knowledge about the outcome and their perspective offers the chance to read history forward. Reading history forward also involves paying close attention to near misses, that is, events in which the final outcome failed to materialize. Such near misses provide insights into alternative potential outcomes and counter deterministic explanations that result from reading history backwards. *See also* near misses and reading history backwards.

Sequencing compares the temporal order of two or more causal factors across multiple cases. It makes an ordinal before and after distinction. It establishes whether the causal factors follow the same order in all cases, whether their order is reversed in some cases, or whether causal factors occur simultaneously. Sequencing is different from timing which focuses on early/late temporal differentiation. Sequencing is an element of physical time and non-linear, historical causation.

Serial comparisons explore ordinal and interval variations in degrees across temporal and often also geographic units of analysis. They rest on assumption of frozen geography but unfrozen history. They describe these variations through the analysis of trends that

frequently are readily visualized. *See also* cross-sectional, contextual, and historical comparisons.

Serial history is together with cyclical, bounded, and eventful history one of the four types of history. It draws on notions of natural history where change unfolds glacially and involves long-term secular trends. It is closely associated with time series data and conceptualizes historical change as trendlines that can be easily visualized. See also cyclical, bounded, and eventful history.

Specificity is an attribute of testable hypotheses that increase their probative value. Specific hypotheses make predictions that are more granular and thus more difficult to prove. Specificity is determined by granularity, temporal proximity, and level of analysis at which predictions are made. Together with uniqueness, specificity determines the strength of a test.

Stages refer to recurring elements that are fixed across cases and independent of historical contexts. Stage models like modernization theory often extrapolate stages from the experiences of Western or early adopter cases and then stipulate that subsequent cases follow the same stages. Such uses of stage models are deeply ahistorical and Western centric and recast periodizations as history independent stages. Stage models thus are mostly appropriate to capture history-independent processes like life cycles. *See also* developmental typology and periods. (Chakrabarty 2000; McKeown 2007; Thornton 2001)

Stock indicators capture secular trends over long time periods. Economic indicators like the GDP or the Dow Jones capture attributes that can be stockpiled over time. This stockpiling involves an additive, slow, and incremental process with no upper limits. Stock indicators are better suited than flow indicators to describe long-term secular, historical trends. *See also* flow indicators.

Teleology refers the directionality of historical time that is overly deterministic and theoretically constructed rather than empirically observed. Teleology stipulates that either serial or eventful history follow a pre-determined path towards a particular historical end point (i.e. the telos). Teleological history is very deterministic and thus linked to historical tourism, that is, an ahistorical notion of history. Functionalist and evolutionary accounts often overlap with teleological history. *See also* historical tourism and directionality.

Tempo measures the rate at which a particular phenomenon changes and thus allows *slow/fast* or *acceleration* differentiations. Tempo is an element of physical time and non-linear causation.

Temporality is used in two ways. It is used broadly as an umbrella term for anything related to time (i.e. elements of physical time, historical time, history more broadly). It also is used more narrowly as a synonymous for historical time. Scholars differentiate between cyclical, bounded, serial, or eventful temporalities, that is as different types of historical time.

Temporal broadening is a strategy employed by macro-causal analysis to elongate the time horizon of causal pathways and outcomes. Its goal is to explore causal factors and outcomes that deviate from short/short explanations and rest on linear causality. See temporal construction of explanations. (The term was coined by Singh Grewal 2014)

Temporal construction of explanations: Paul Pierson pointed out that explanations differ in the time horizon of their antecedent causal factors as well as outcomes. He differentiated between explanations where both were short (i.e. tornado), where both were long (i.e. global warming), where outcome was short but causes long (i.e. earthquake), and outcomes

long but causes short (i.e. meteorites and extinction of dinosaurs). Short/short explanations typically employ linear notions of causality and operated under assumptions of temporal homogeneity. The other three temporal structures operate under assumptions of temporal heterogeneity and employ historical notions of causality. (Pierson 2003)

Temporal heterogeneity is used as a synonym for change to describe the mutating and changing nature of historical contexts. It establishes a terminological analogy between historical and geographic particularities. I prefer to use mutability or change instead of temporal heterogeneity to accentuate the non-static, non-recurring qualities of historical contexts that set them apart from the static and categorical differences observed across different geographic contexts. Temporal heterogeneity also challenges the notion that causal effects are unaffected by the temporal order with which they unfold. It points out that sequencing, timing, tempo, and duration involve variations in either the temporal order or temporal dynamic in which causal factors unfold. Temporal heterogeneity thus directly challenges linear notions of causality and favors historical notion of causality. Temporal heterogeneity also recognizes that social phenomena are moving objects that qualitatively change through time and thus are subject to historical transformations. *See also* freezing history, physical time.

Test strength assesses the confidence that can be derived from a test based on the specificity and uniqueness of the empirical implications derived from the hypotheses pitted against each other. Test strength counters the ad hoc selection of hypotheses. The strength of tests also tends to improve over multiple research cycles as more theories are articulated and individual theories are updated and refined. *See also* specificity and uniqueness.

Theorizing refers to construction and alternation among different frameworks for analyzing social reality. Theories stipulate different ontological assumptions about the frozenness of history and geography as well as identify different explanatory frames. These frames include environmental factors, socio-economic or institutional structures, historical factors, ideas, contingencies, or human agency. Theorizing centers around alternating among different theoretical frames to de-complexify social reality to make it legible and amenable to different causal inference strategies. It also centers around re-complexifying social reality to validate interim test results against different ontological worlds and different explanatory factors. This pivoting among different theoretical worlds serves assess the internal and external validity of test results and assess the confidence that they also provide valid answers.

Timing compares the dates of singular, qualitatively equivalent events across multiple cases and makes an ordinal distinction between cases in which those events occur early/late relative to each other. Timing thus benchmarks the analysis to the first occurrence of a particular phenomenon and then differentiates later occurrences of similar events in terms of how proximate or distal in time they took place relative to the first case. Timing is an element of physical time and non-linear, historical causation.

Trends refer to descriptions of change typically using time series data that can be readily visualized using trend lines and a multitude of other graphs. They are linked to serial history and offer a thin description of change that is best suited to describe long-term changes over multiple cases. Trends are classified as either being random walks (i.e. trendless), cyclical, seasonal or secular. They also can vary in their tempo and thus be S-shaped (slow start and finish with fast middle).

Uniqueness is an attribute of test configurations that increase the probative value of test results. Uniqueness assesses the extent to which two or more hypotheses pitted against each other make unique predictions that do not overlap. Unique predictions increase confidence in test results because they not merely confirm one theory but also simultaneously disconfirm a competing theory.

Unit homogeneity is, together with conditional independence, one of the key ontological assumptions of statistical analysis. It stipulates that the units of analysis used to gather evidence are, despite their geographic differences, sufficiently uniform so that we can infer from aggregate causal effects, that have been observed across all cases, the workings of uniform causal mechanisms that are present in each case. It permits ignoring zip codes and geographic particularities by assuming homogeneity across the units of analysis being studied. *See also* conditional independence.

Variance-based analysis is an umbrella term for methodologies employing experimental and statistical research designs. It analyzes social phenomena through variables and thus tracks them either through cross-sectional variations or longitudinal trends. It also is closely associate with linear notions of causality, like the potential outcomes model or average treatment effects and with the ontological assumptions of conditional independence and unit homogeneity. Variance-based analysis thus employs a more frozen conceptualizations of history and geography by emphasizing the historical and geographic boundary conditions of its findings.

Whiggish history: See teleology.

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