

## INTRODUCTION

# History Matters



Network science has true potential to integrate the knowledge acquired in diverse fields of science. Given the ubiquity of networks in our world, the results of the theoretical and practical study of networks might help solve some of the major challenges confronting society.

—Katy Börner, Soma Sanyal, and Alessandro Vespignani,  
“Network Science” (2007)

At its most basic, network analysis examines how entities connect to other entities. These entities, commonly called nodes, can represent any number of objects: cells in a body, people, species, households, and even cities have all been the subjects of network analysis.

—Stefani Crabtree and Lewis Borck,  
“Social Networks for Archaeological Research” (2019)

Despite all disclaimers, it is only when science asks *why*, instead of simply describing *how*, that it becomes more than technology. When it asks *why*, it discovers Relativity. When it only shows *how*, it invents the atomic bomb, and then puts its hands over its eyes and says, *My God what have I done?*

—Ursula K. Le Guin,  
*The Language of the Night* (1979)



- Relational Analysis
- Relational vs. Categorical Thinking
- Research Models and Hypotheses
- Modeling the Past
- Key Points



The philosopher George Santayana famously wrote that “Those who cannot remember the past are condemned to repeat it.” Or, as the anarchist poet Peter Lamborn Wilson wrote, “Those who understand history are condemned to watch other idiots repeat it.” Joking aside, it is clear that what we experience today reflects a host of past events that still impact our lives in the present—and not necessarily in beneficial ways, as anyone encountering racial discrimination can readily attest to.

Another famous saying goes, “Rome wasn’t built in a day.” Nor did it fall in a day, even if historians can point to a moment in time and a particular event marking the formal end of the Western Roman Empire. Why this hesitation? It is far from certain what the Roman Empire was like on 4 September 476 when the “barbarian” general Odoacer removed the child emperor Romulus Augustus from the throne and declared himself king. Nor is it known whether life was all that different on the fifth of September that same year for the average person living then anywhere in Italy. Historians point to a multitude of economic, social, and possibly even climatic contingencies that cumulatively resulted in what had once been one of the dominant political forces on earth ceasing to exist in a functional sense, even if many of its institutions, ideas, and practices remain with us to this day.

It is also clear that many people care about what happened in the past, even about events as remote as the end of the Western Roman Empire, and for a variety of different reasons. For instance, some are now drawing clear links between migration and border security two millennia ago to justify their arguments for closing borders to keep modern “barbarians” outside the proverbial gates (Argote-Freyre and Bellitto 2012).

So yes, history matters. Yet let’s not be naïve when making this claim. As every good politician, cruise line operator, or museum director knows, history also sells—as anyone who has visited the Tower of London has experienced firsthand. Furthermore, if packaged well

as a marketable commodity, history can be profitable (Hofmann et al. 2021).

This is not a book, however, about history or the commercialization of archaeology. This is a book about how we can learn from history in ways that may make a difference in how each of us lives our life during our time on earth from birth to death, from the cradle to the grave. Hence in the final chapter we discuss what we consider to be the main lessons and implications of history, and how we should strive towards decolonizing its study.

The kind of history we have in mind is not timeless, but the amount of time that needs to be taken into account to learn history's lessons is not something that can be easily framed in days, years, or centuries. We will be suggesting instead that how much time is required to see history's patterns largely depends on what is the specific question about the past you are asking history to answer either for your own enlightenment or for the world's general benefit. Are the patterns we are looking for likely to have taken just a short while to develop or many centuries?

We are also going to be arguing that how history is patterned is often something that cannot be learned if all you have to work with is what people have recorded in one way or another for one reason or another. Why is this so? Often simply because nobody had realized "back then" they needed to "write this down for posterity." But another reason is perhaps less obvious. Because no one realized then what was happening or why (Holland-Lulewicz and Roberts Thompson 2021).

Hence the answers to many of the questions about history we want to ask must be pieced together from what was back then little more than "this and that." Here is why, therefore, this book is also about archaeology and the analytical sciences that are so much a part of what scholars are using nowadays to marshal evidence for or against "this or that" opinion, belief, or logical claim about how the world works and why.

More to the point, in the last half century or so, interest in using network modeling and relational analysis to study history has also grown steadily. Nowadays it is even said there has been a major new science in the making—network science—capable of radically changing our fundamental understandings of the world and how it works (Börner, Sanyal, and Vespignani 2007; Crabtree and Borck 2019; Kolaczyk 2009). How can such modeling and analysis, therefore, be used to explore the history of our relationships with one another and the impact that our species has had on the world around us?

## Relational Analysis

Thanks to cell phones, computers, and online social media services, the words *network* and *networking* are familiar to many today. So, too, at least in the academic world, is the phrase *social network analysis* (SNA).

In recent years, a small and widely dispersed academic community of archaeologists and historians has been encouraged by the growing popularity of network analysis in the sciences to work together toward the ambitious goal of reconstructing history and human relationships in the past (Brughmans and Peeples 2018; Crabtree, Dunne, and Wood 2021). Although these efforts have been promising, it remains uncertain how successful such undertakings can be (Mills 2017; Pálsson 2021; Peeples 2019). Social relationships rarely leave unambiguous material traces. Connecting archaeological observations with social realities has never been simple. Nor are the research tactics of SNA easy to use when those whom you are studying and writing about are not around to watch, listen to, and survey (Carrington, Scott, and Wasserman 2005).

❖ **network** ['net-,wɜrk] *noun*: a group or system of interconnected people or things. There are differing specific definitions of the word network as a noun depending on the kind of network being discussed (Kolaczyk 2009: 3–10). For instance: graph neural networks (Zhou et al. 2020), computer networks (Chowdhury, Kabir, and Boutaba 2010), and social networks (Sekara, Stopczynski, and Lehmann 2016).

This book, therefore, is an introduction to an alternative strategy for using relational analysis in archaeology and other historical sciences. Instead of reconstructing social ties as the principal goal, we will show you how relational thinking can be used to develop testable hypotheses about covariation and causal patterning in the past. While the hypotheses considered can, of course, be about how particular types of social relationships may have been instrumental in the past, they need not be. Using a modeling strategy that we call *dynamic relational analysis* (DYRA), they can also be about relationships—*causal contingencies*—of many forms among people, places, and things.

Since both SNA and DYRA have strengths as well as weaknesses, we start off Chapter 1 in this book by comparing how these two alternative ways of modeling the world differ in their basic assumptions about how

the world works. However, we want to emphasize that both of these research strategies share something vitally important in common. They are alike in how they try to cultivate the unconventional way of thinking about things called *relational thinking*.

## Relational vs. Categorical Thinking

We have written this book for three reasons. First, we show how to use DYRA to explore, model, and try to understand the complex global history of our species. Reduced to bare bones, relational analysis is a way of understanding the world around us—a way called *relational thinking*—that is liberating but challenging (de Nooy 2003; Kosiba 2019; Sanger 2021: 743–46). Why? Because relational thinking is largely counterintuitive to how the human brain evolved over millions of years to become our primary way of navigating how we experience things and events in the world we live in.

Although a full explanation would be a lengthy one, briefly stated here is the reasoning behind why we see relational thinking as basically counter to how we all normally deal with things and events. Evolution has given each of us a brain that is remarkably large and flexible in how it handles life's demands (Terrell and Terrell 2020). Thus equipped, each of us is not only able to meet—more or less successfully—what life throws at us. We are also clever enough—and socially skilled enough—to be able to dumb down the world we live in. Why? To make what we must deal with as predictable and generally as benevolent as humanly possible. However, none of us is omnipotent or truly omniscient. The old chestnut “my brain is full” may be a comic expression, but there are metabolic and practical limits to what a human brain can do (Simon 1978). Therefore, in the interests of efficiency and speed, it is not surprising that our brains as biologically constructed survival tools favor *categorical thinking* (Lupyan and Bergen 2016: 411–12; Michel and Peters 2021; Monod 1971: 154; Tse 2013).

❖ **categorical** [ˌkədə'gôrək(ə)] *adjective*: unambiguously explicit and direct.

**category** ['katæg(ə)ri] *noun*: a class or division of people or things regarded as having particular shared characteristics.

**relational** [rɪˈleɪʃ(ə)n(ə)l] *adjective*: concerning the way in which two or more people or things are connected.

What is this conventional way of thinking about the world and our place in it? As magnificent as it is, the human brain is predisposed to accept without too much bother that if something looks like a duck, swims like a duck, and quacks like a duck, then it probably is a duck (Allport 1954; Chatteraj et al. 2021; Michel and Peters 2021; Schurgin 2018).

Saying this somewhat more formally, if something comes across to us as seemingly the same as something we have already experienced, we are predisposed to believe “this is just that again” despite the fact that in reality it may not be “just another one of those.” Often such pragmatic thinking is good enough—especially when we have deliberately dumbed down the world to make things we come across in life more *alike*, more *the same* than they might otherwise be. Yet such thinking can also make it easy for us to make mistakes, to miss the fact that something really is not the same kind of thing or event (Allport 1954: 170–74).

There is no denying that categorical thinking can be an efficient and practical way of dealing with the world and everyday events. However, as we will be emphasizing repeatedly in this book, we live in a world that is *relational*, not categorical. Despite what common sense may tell us, things do not really exist first and foremost all on their own, and only later may become connected with, linked to, tied to, dependent on, etc. other similarly “disconnected” things. More often than not, things are the way they are because they are connected with, linked to, etc., other things.

## Research Models and Hypotheses

The second reason we decided to write this book is more conventional. We do not believe the currently available networks toolkit adds up to an entirely new science in its own right. But we agree with others that there is now a suite of well-developed methods and procedures for doing relational analysis that can be used productively to study the past.

In the chapters that follow, we will be arguing, however, that these tools are best used to turn our ideas and propositions about the past into useful models (see Chapter 4) and research hypotheses (Chapter 5). Why do we say this? Because modeling the past in this way can help you see more clearly not only what you believe you already know, but

**Table 0.1.** Categorical vs. Relational Thinking.

<p style="text-align: center;"><b>Categorical Words</b></p> <p style="text-align: center;">kind, type, size, density, family, group, community, village, tribe, city, state, nation, empire . . .</p>	<p style="text-align: center;"><b>Relational Words</b></p> <p style="text-align: center;">relational, contingent, situational, circumstantial, consequential, adaptive, intentional, purposeful . . .</p>
<p style="text-align: center;"><b>Categorical Concepts</b></p> <p style="text-align: center;">individual, population, region, isolation, network structure, migration, admixture . . .</p>	<p style="text-align: center;"><b>Relational Concepts</b></p> <p style="text-align: center;">contingency, link, tie, relationship, event, agency, learning, mobility, collaboration, competition, adaptation, cost, benefit, risk, innovation . . .</p>

also what you do not as yet know—and therefore, what you still need to find out about the human past and the role that our species has played in shaping the world we live in.

❖ **model** ['mädl] *verb*: devise a representation, especially a mathematical one (of a phenomenon or system).

For this reason, we think it is unfortunate that network modeling today is commonly seen as a specialized type of data analysis. Initially we thought of calling what we offer you in this book “dynamic relational modeling.” However, upon reflection, we elected instead to continue using the usual term “analysis.” We want to acknowledge in this way that while developing the ideas and methods described in this book, we have drawn on many of the same analytical precedents that are now also part of modern network modeling in general, and SNA in particular (see Chapter 1).

## Modeling the Past

Third, as we discuss in some detail in Chapter 1, contemporary SNA has adopted an intentionally narrow outlook on what is worth studying using the methods and statistical tools of modern relational analysis. In the words of Stanley Wasserman and Katherine Faust, two of the foremost authors in this field: “the methods of social network analysis

Modeling the Past

Archaeology, History, and Dynamic Networks

John Terrell, Mark Goltko, Helen Dawson, and Marc Kissel

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provide formal statements about social properties and processes” (Wasserman and Faust 1994: 11). We have found this research focus on social relationships to be not only limiting but often also unhelpful. As human beings, we may like to believe we are the masters of our fate, but one of the reasons for studying history is to unravel why things happen that are, in fact, not under our control, and why our intentions can backfire and take us down paths that we should have avoided.

We also believe the study of history is not just about documenting what happened in the past, but also about figuring out why things happened the way they evidently did. Yet we have worked as archaeologists and anthropologists long enough to know all too well, for instance, that the biologist and Nobel Laureate François Jacob was being more than just metaphysical or mysterious when he titled his popular book about science and evolution *The Possible and The Actual* (1982). If the word “actual” is another way of saying “true” or “existing in fact,” then the best that any of us can hope to do regardless of our training is to pin down as well as we can what may be the most likely, the most plausible, explanations for what we are finding. But rarely, if ever, what is certifiably the true and actual explanation.

When you read Jacob’s short and delightful book, you soon learn that the word “possible” in his title refers to how the human mind tries to decide what can or cannot be possibly true in the real world. “Whether in a social group or in an individual, human life always involves a continuous dialogue between the possible and the actual. A subtle mixture of belief, knowledge, and imagination builds before us an ever changing picture of the possible” (1982: vii–viii).

Without claiming to be as eloquent as François Jacob, we have written this book as a guide to using the logic and strategies of relational thinking to craft and then evaluate possible answers—or as we like to call them, *plausible models*—to fundamental questions of *How?* and *Why?* in the study of history.



## Key Points

1. This is a book on how to use dynamic relational analysis (DYRA) to explore, model, and understand the complex global history of our species.



2. We live in a world that is relational, not categorical. Things do not simply exist all on their own, and only later become connected with, linked to, tied to, dependent on, etc. other similarly disconnected things. More often than not, things are the way they are because they are connected with, linked to, etc. other things.
3. The methods and procedures of dynamic relational analysis can be used to turn our ideas, assumptions, and working historical models into testable research hypotheses.

