A14

This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant agreement No. ERC–ADG–2015 694632).

Alessia Damonte

Configurational Explanations

Aracne editrice

ISBN 978-88-255-1888-7

I[st] edition: **Roma**, June 2021

Table of Contents

Acknowledgments

The book has taken its shape over years and experiences, during which I have built up a remarkable debt of gratitude. I owe much to my students: thank you for all your challenges. Thanks to the guests of the doctoral Summer School ReSPoS and the MeMa seminars in Milan for the many fruitful discussions on causation. Thanks to the participants to the Chess seminars in Durham, the APSA section on Mixed Methods, the PSA Method Conference, and the ecpr joint session of workshops for their comments on previous attempts to get to the point. Thanks to the Compasss community and, among them, to Airo Hino and Adrian Duşa for their kind support in the inevitable moments of bewilderment. Special thanks to Carsten Schneider, Benoit Rihoux, and Charles Ragin for their generous teaching that, long ago, initiated this all.

I gratefully acknowledge the financial support of the European Grant ERC–ADG–2015 694632.

The usual disclaimer applies.

AD
Milan, October 2019

Introduction

Among the practitioners and the students that meet it for the first time, Qualitative Comparative Analysis[1] easily arises some puzzlement. Neither its technical side nor its lexicon fits well with some conventional wisdom about methods. For instance: although QCA is portrayed as a qualitative strategy, it operates on formal models; however, its models rely on membership scores instead of probabilities and on sets instead of variables. Moreover, its algebra seems to speak more to electronic engineering than to politics, laws, or economics and may defy the statistical mindset. Instead of equivalences, it considers inequations. Its models assume compound factors instead of single ones. The model fit captures the "sufficiency" of the claim that the compound leads to the effect, and is decided in terms of "consistency". Its solutions depend on counterfactual considerations, but the counterfactuals are listed in a "truth–table", ask whether an unobserved configuration could have obtained, and are routinely decided following "directional expectations". QCA can claim explanatory import for inferences drawn without any *ceteris paribus* clause, and its findings do not necessarily improve with the number of the observations.

The ground on which QCA builds its solutions, however, is less outlandish than its technical lingo may suggest. QCA relies on logical operations based on the Boolean algebra that anybody applies when querying a search engine. Its algebraic structures can be rendered as set relationships[2] of partial or complete overlapping. That the latter can be given a causal interpretation, however, depends on a further, and sometimes neglected side of Boolean algebra — its logical nature. Logical algebras are literals linked by connectives that render the structural features of our statements about the world. These statements can be as

[1] Ragin, 1987, 2000, 2008; Schneider and Wagemann, 2012; Duşa, 2018.
[2] Stone, 1936.

complex as wished and take many shapes — comprised that of a causal account, or an explanation.

From Aristotle to the recent scholarship of mechanistic modeling, the philosophy of science has long since established that explanations are statements and "because–answers" to questions on why something is as it is. Formal logic enters the picture to ensure the "compellingness" of the causal arguments that support because–answers. Under the assumption that compellingness also depends on the structural features of the argument, formal logic narrows on the quality, quantity, and relationships of the explanatory statements. Its syntax provides both the principles of valid accounts and the yardsticks to assess their empirical import.

For ensuring validity, logic takes a toll in terms of information loss. Its formalization invites to abstract reality away unless we are left with few relevant facets. Like maps, these reductions serve a purpose, however. They contain the relevant information to recognize the phenomenon across its diverse manifestations and, were it the case, to operate on it effectively[3]. Even when inadequate, moreover, logical models can draw our attention to what is missing from an account and can be improved by filling the gaps. QCA belongs to this tradition as a technique geared to mold, test, and refine an explanatory model according to the rules of logic. Although not unique in its commitment to this rationale[4], its reliance on sets does impart a twist to its analytic operations.

A full causal argument consists of three pieces of knowledge: the observation that some phenomenon occurs; the tenet that the phenomenon arises from the flow of behavior, activities, or interactions of the individual entities of a particular class; and the bundle of conditions under which the flow obtains[5]. The "oomph" of classical explanations consists of accounting for the occurrence of the phenomenon by exposing the compelling connections that the flow establishes between certain conditions and the occurrence of the phenomenon. The flow, however, has long been taken for granted under the unproven metaphysical assumption that it followed some capacity that "inhered" to the members of the class. Just the opposite, modernity requires that the standing of any statement in science is questioned and tested before it is believed, and none of the three components of an explanation escapes the

[3] Craver and Kaplan, 2018.

[4] e.g., Pearl, 2015; Morgan and Winship, 2015; Humphreys and Jacobs, 2015; Bennett and Checkel, 2015; van Evera, 1997; Ben–Eliyahu and Dechter, 1994.

[5] Craver and Kaplan, 2018; Salmon, 1984, 1998.

skeptical attitude. The common wisdom about methods then portrays a division of labor among the techniques and approaches that narrow on the phenomenon, the flow, and the relevant conditions as proxies of the elusive concept of generative capacity. The criteria that inform such a division of labor, however, are far from neat or unquestionable.

The portrayal that Ragin[6] invoked to justify the proposal of Qualitative Comparative Analysis is quite conventional in pitting "variable–oriented" correlational studies against "case–oriented" narratives. The contrast has been variously reformulated to emphasize the different goals, mindsets, assumptions, and pitfalls of these scholarships[7]. The contrast inevitably emphasizes some features and may result in ungenerous representations, but it clarifies the place that QCA was intended to take among the existing alternatives. From this perspective, correlations narrow on the connection between the phenomenon and selected facets related to the flow to ascertain whether it holds regardless of the background conditions, which will prove its robustness across contexts. Correlations, hence, recognize explanatory power to that which, on average, improves the probability that the phenomenon occurs: but robustness and context–insensitivity alone cannot prevent correlations from mistaking the barometer for the cause of the storm, or the shadow of the flagpole for the reason of the rising sun. Narratives, in contrast, are portrayed narrowing on one or few contexts to advance the classical claim that the explanatory power lies in the local bundle of conditions, as it is their interplay that arises or suffocates the tendency of the individuals to behave, act, and interact. Moreover, they often show how the flow in a correlational model is not the only path to the phenomenon to conclude that, eventually, models lie. However, in–depth renderings of the local intersection seldom leave us with valid accounts, as they may explain that salt dissolved in water because someone cast a spell.

QCA was designed to occupy a middle ground and combine the "best" features of the two strategies. It agrees with case–oriented analyses (hence, its "qualitative" nature) that the flow depends on the local conjunction of the right conditions — and that these "scope conditions" do the explaining. At the same time, QCA provides a solution to the relative inability of local narratives to discriminate between relevant and irrelevant conditions[8]. It tackles the problem with the rules of logic:

[6] Ragin, 1987, 2000, 2008.

[7] e.g., Goertz and Mahoney, 2012; Berg–Schlosser *et al*., 2009; Brady, 2008; Ragin, 1998; Verba, 1967.

[8] e.g., Compton *et al*., 2019.

it models all the possible variations from a rich hypothesis, then ascribes explanatory power to those bundles of conditions that survive established criteria of consistency and relevance[9].

It will be shown in the following that QCA can yield useful and credible explanatory accounts, although its solutions hold within the boundaries of the observations from which they have been drawn, pending further proofs[10]. The argument develops in light of the experience that the tools and practices of QCA are deeply engrained in the philosophical discourse on explanation and its evolution, so that, in turn, the familiarity with this discourse improves the understanding of the power and limits of the technique. Consistently, the argument proceeds vertically through the scholarship. The strategy sacrifices many details and alternative applications of QCA[11] to elucidate the rationale of its explanatory usage.

Thus, chapters one and two are intended to set the stage. The first introduces the Aristotelean definition of explanation and its relationship with the idea of *episteme* as reliable knowledge about causation. It clarifies the role that logical syllogistic structures play in connecting the sparse pieces of knowledge into valid inferences and introduces the minimal notions of categorical logic required to understand the composition and functioning of the inferential machinery. The doctrine of the four causes is then presented as the metaphysical warrant that the Aristotelean system requires to ensure that a syllogism is causal, meaningful, and sound. The second chapter widens the inferential toolbox to the alternative logic developed within the Athenian Stoic school. The chapter is intended as a discursive rough guide to the principles of the propositional logic later developed by Frege, Wittgenstein, Russell, Carnap, Quine, and Hempel, among others[12]. Chapter three accounts for the seminal moment when the modern approach to explanation took its shape around the problem of providing a firmer empirical ground to syllogistic inferences through induction.

[9] Ragin, 1987, 1999, 2008; Quine, 1952; Verba, 1967; Walker and Cohen, 1985; Salmon, 1998; Cartwright, 1999.

[10] However, see Blair *et al*., 2019.

[11] e.g., Hino, 2009; García–Castro and Arino, 2016; Blatter and Haverland, 2012; Schneider and Rohlfing, 2013; Rohlfing and Schneider, 2013; Baumgartner, 2013; Baumgartner and Thiem, 2015; Goertz, 2017.

[12] All the notions of propositional logic in use in QCA will nevertheless be systematically presented in Part II.

After a short tribute to Hume, the chapter enters into some details of Mill's contribution, for many reasons. The *System of Logic* brings explanation on the terrain of modern methodology and tackles several of the problems that will later animate the debate in the philosophy and social sciences. Ragin's idea that QCA is better suited to render "chemical causation" instead of the usual physical chain of events explicitly borrows from the distinction established by Mill when reasoning on the plausible shapes of causation. The same holds of the tenet that the "empirical laws of the effect" are a complex interplay of causes, conditions, and obstructions — or the preference for counterfactual eliminative proofs to ascertain the causal import of a factor. The section also calls for attention to Mill's particular understanding of explanation as the self–standing attempts at "resolving" some actual or hypothetical regular association into equivalent relationships.

Although often neglected, Mill's "modes of explanation" have particular importance for the social sciences as they properly apply to those units that are too complex to undergo experimentation, like societies or policy decisions. Their validity does not require any previous "law–like" knowledge, as their standing is established in the inference by the evidence that supports them. In short, Mill's modes posit explanation between induction and deduction, where Quine, then Ragin, will later operate. Hempel's rendering is addressed in the last parts of the chapter. The portrayal focuses on a mature version of the "covering law model" that popularized the identity of explanation and prediction based on the principle of expectability. The mature version emphasizes that general law–like statements may provide a weak explanatory basis unless the conditions are brought into the picture under which the law–like statement holds. With Carnap, this version considers that the general statement asserts the capacity or disposition of something to contribute to the occurrence of the effect. Conditions are required as the "contrast agent" that reveals the capacity while accounting for its unleashing. Hempel also identifies the strategy of validation that suits sentences under different quantifiers, and adds "observational reports" to each strategy so to avoid the shortcomings of the naïve approach to validation — which casts light on the use of the truth table in QCA.

The concluding section outlines the contemporary mechanistic approaches to explanation as the last influential proposal offered by Salmon, Woodward, and the stream of mechanistic modelers in response to the covering law model. The proposal integrates knowledge of causal processes and knowledge of causal structures into a single,

conceptually consistent picture — dubbed "mechanism" — to account for the occurrence or the non–occurrence of a phenomenon. The conclusion of the chapters and Part I reports Craver and Kaplan's current recommendations about the suitable level of abstraction in modeling a mechanism, and the reasons that suggest locating it somewhere between the two poles of phenomenological descriptions and bare functional sketches[13].

Against this backdrop, Part II presents QCA as a technique for modeling the structural part of a mechanism to an outcome around the assumption of a particular underlying process that remains unobserved. Chapter five clarifies that the contribution of QCA consists of specifying the "black box" — Mackie's "machine", Cartwright's "nomological machine"[14], or Walker and Cohen's "scope statements" — within which the flow can emerge and unfold until the outcome. The chapter identifies the analytic capability of QCA in modeling and testing a "machine" as a complete bundle of relevant conditions to the occurrence of the effect. Chapter six addresses the problem of how to learn from the previous literature, then how to select conditions to render a machine. Chapter seven recalls the part of propositional logic in use in QCA, and clarifies the relationship between set–theoretical and logical constructs. Chapter eight addresses the delicate operation of classifying cases as instances of a configuration with the support of set theory and measurement operations. Chapter nine summarizes the protocol, and opens to Part III.

In the last Part, a configurational model is developed around the accounts of the social mechanism of corruption that is fueled by the perception that the policymaking system is illegitimately biased. The configurational model, then, includes the policy levers and pulleys that can be deployed to block the unfolding of the social mechanism. The protocol is therefore applied to test the hypothesis that the differences in the perception of corruption can be explained by the differences in the perceived effectiveness of the constraints that ensure the government is accountable to the citizens. The conclusions summarize the features of a configurational explanatory model and discuss its limits.

[13] Craver and Kaplan, 2018.
[14] Cartwright, 1989, 1999; Mackie, 1974, 1977; Walker and Cohen, 1985.

Part I

THE BROADER PICTURE

Chapter I

Explanations as Deductions

The Western philosophy of science owes the demanding equation of deductive reasoning, scientific knowledge, and causal explanations to Aristotle[1]. In his *Physics*[2], he defines knowledge as the *episteme* that follows from a proper response to a why–questions. The episteme, to him, arises from a "syllogism", that is

> a discourse in which, certain things being stated, something other than what is stated follows of necessity from their being so. I mean by the last phrase that it follows because of them, and by this, that no further term is required in order to make the consequence necessary[3].

The definition highlights two essential features. First, the hybrid nature of explanation: it is an argument and, as such, is composed of sentences; at the same time, its sentences are statements about the world. Second, its compellingness. An explanation orders and connects statements so that the last appears as an inevitable consequence of the previous ones. As a whole, moreover, the argument is self–standing, as it contains every information required to get to the conclusion. It does not aim to yield new knowledge but to organize the existing one and illuminate unnoticed connections.

The Aristotelean definition entails a bold assumption: the sentences about the world do mirror the world itself, and the rules of compelling arguments reflect the rules that govern the relationship among phenomena in the world. From time to time, the mirroring assumption will be debated, exploited to impose specific worldviews, repudiated as void of any cogency, elaborated upon, and problematized. In no case, however, the Aristotelean machinery that embeds this assumption went disregarded. The reason for such an enduring legacy lies in the unquestionable merit of the *Organon*, which first set the ground for logic as a formal language.

[1] See Corcoran, 1974; Barnes, 1991; Harari, 2004; Malink, 2013; Bronstein, 2016.
[2] Aristotle, *Physics*, 194b16–195a3.
[3] Aristotle, *Prior Analytics*, 24b18–20.

1.1. The Shape of a Statement

The strength of an explanation originates from the formal features of the statements that compose it, and on the structure of their connection. The formal part of the syllogistic system is introduced in *Categories* and *On Interpretation*. The system builds on the assumption that we can formulate either true or false sentences about the world. Their truth, in turn, depends on whether the sentence corresponds to the empirical state of the world "in one of the divisions of time"[4]. Thus, to Aristotle, the statement that Socrates is sitting is true unless Socrates gets up, at which point the assertion becomes false. The change in the "truth value" of a sentence, then, depends on the change in the state of the actual thing, and in its misalignment with the corresponding state of the world[5].

The Aristotelian sentences are the most elementary part of the discourse that cannot be further divided without losing the capacity to bear a truth value. They always include a property or attribute (*katēgoroumenon*) that takes the place of the predicate *P* and a subject *S* (*hupokeimenon*) of which *P* is predicated (*katēgoreitai*). Besides, all these statements can vary along two dimensions: their quality and their number.

The *quality* of a sentence is decided by its predicate, that is, by whether the property is affirmed or negated. An *affirmative* sentence predicates *P* of *S* and takes the form "*S* is *P*". A *negative* sentence predicates not–*P* of *S* and takes the form "*S* is not–*P*". The relationship between affirmative and negative sentences is assumed to be exclusive: "It is evident that a single affirmation has a single negation. For the negation must deny the same thing as the affirmation affirmed, and of the same thing"[6].

The quantity of a sentence, instead, depends on the subject and determines the *number* of a categorical sentence. When the subject refers to one or few entities of a class, the sentence is *particular*; when it covers a whole class, the sentence becomes *universal*: "I call universal that which is by its nature predicated of a number of things, and particular that which is not; man, for instance, is a universal, Callias a particular"[7].

[4] Aristotle, *On Interpretation*, 17a20–17a24.
[5] Aristotle, *Categories*, 4a21–4b19.
[6] Aristotle, *On Interpretation*, 17b38–18a7.
[7] Aristotle, *On Interpretation*, 17a37–17b16.