Configurational Theory

Configurational theorising is about transcending the qualitative-quantitative divide by formulating formal statements explaining how causally relevant conditions combine into configurations associated with the outcome of interest.

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Theory Factsheet

Proposed By: Ragin, 1989

Parent Theory: Set Theory

Related Theories: Fuzzy-Set Theory, Open Systems Theory, Set Theory, Complexity Theory

Discipline: Politics

Unit of Analysis: Individual, collective

Level: Micro-level/Macro-level

Type: Theory for Explaining and Predicting

Operationalised: Qualitatively / Quantitatively

Introduction

Configurational theorising shifts researchers' attention from the assessment of the "*net effects*" of causal variables to a more contextual understanding of the multiple possible ways in which causal conditions may combine to produce a given effect (Ragin, 2008). Configurational theorising revolves around three tenets: 1) Conjunctural causation: the effect of a single condition unfolds in combination with other conditions; 2) Equifinality: multiple configurations (or combinations) of conditions may lead to the same outcome; 3) Causal asymmetry: the causes leading to the presence of an outcome of interest may be quite different from those leading to the absence of the outcome. According to Dess et al. (1993: p. 776) "*a configuration contains relationships among elements or items representing multiple domains*". Therefore, configurational theorising moves the theoretical discourse forward because it is not confined to the study of net effects (i.e., the more X, the more Y). For example, "*linear regression examines the net effect of a variable on the outcome by holding other variables constant*" (El Sawy et al., 2010: p. 839). Configurational theorising instead studies the holistic effect stemming from a configuration (or combination) of causal conditions. QCA is probably one of the most formalised configurational, comparative methods that relies on Boolean algebra rather than linear algebra, the logic of implication rather than covariation and conjunctural causation rather than simple interaction effects (Thiem, Baumgartner & Bol, 2016).

Theory

Configurational theorising is premised on the assumption that configurations (or combinations) of causally-relevant conditions should be linked to the outcome of interest. Since the focal unit is the configuration (rather than the individual variable), it follows that a given condition may have a different effect on the outcome depending on its combination with other conditions. This notion, in turn, fits with the idea of causal complexity. It implies that a causal condition may have opposite effects depending on its combination with other conditions, so much so that the same condition may contribute to the presence of the outcome when other conditions are present, but it may actually contribute to the absence of the outcome when other conditions are absent (Ragin, 1989). As a result, "*the researcher is urged not to "specify a single causal model that fits the data best" (the standard practice using statistical techniques)*" (Ragin, 2014: p. xxii). This, in turn, will spur researchers to discover multiple causal models that involve conjunctions of three or more conditions, thus moving beyond second-order or third-order interaction terms (Schneider & Wagemann, 2012).

Configurational theorising revolves around the following six principles (Ragin, 2014):

Sets rather than variables: standard statistical techniques are based on "variables", that is, units that can take on a range of values so as to sort, rank or array observations relative to one another. Instead, configurational theorising is based on sets, that is, groupings that entail membership criteria and have classificatory consequences. For example, "male" is a set that invokes a group of individuals (i.e., male individuals) whereas "gender" is a variable. Likewise, "Swedish" is a set that invokes a particular group (e.g., the Swedish population), but "nationality" is a variable (Pappas & Woodside, 2021). By the same token, "degree of democracy" is a variable, but "democratic" invokes a set such as the group of "democratic countries." Again, it is important to reiterate that sets are not simple nominal-scale classification (e.g., democratic versus not-democratic countries) because observations (e.g., countries) can vary in the degree to which they satisfy membership criteria. For example, a country can be a full member of the set (or group) of democratic countries (scored as 1.00) while another country can be a full non-member of this very same set (scored as 0.00) and yet another country can be neither in nor out of the set of democratic countries (scored as 0.5, the point of maximum ambiguity). *Calibration rather than measurement*: standard statistical techniques are based on variables that are measured by using valid and reliable scales or indicators. Observations "are evaluated relative to one another, based on inductively derived, sample-specific statistics such as the mean and standard deviation. For example, a "high" score is well above the mean score; a "low" score, is well below the mean score. All variation in an indicator is usually treated as meaningful and taken at face value" (Ragin, 2014: p. xxiv). To this end, calibration is the process by which set membership scores are assigned to observations on the basis of external standards. For example, taking the uncalibrated variable of per-capita Gross National Product (GNP), it is possible to calculate membership in the set of rich countries by using three external standards, namely the score that would qualify a country as a full member in the set of rich countries (scored as 1.00), the score that would qualify it as a full non-member in the set of rich countries (scored as 0.00) and the cross-over point (where the country in question is scored as 0.50 because it is neither in nor out of the set of rich countries). *Qualitative outcomes instead of dependent variables*: standard statistical techniques revolve around dependent variables, so much so that "the goal of research is to explain cross-case and/or longitudinal variation in the chosen

dependent variable" (Ragin, 2014: p. xxv). Configurational theorising instead focuses on qualitative outcomes, that is, observable changes or discontinuities. For example, instead of studying longitudinal or cross-case reduction in welfare spending, analysts should first define the concept of interest (i.e., the key features of welfare state retrenchment) and then calculate the countries' membership in the set of countries experiencing welfare state retrenchment (the outcome of interest). *Constructed populations rather than given populations*: again, standard statistical techniques use either given populations or random samples from these populations. Instead, configurational theorising entails constructing populations in the course of the investigation, by comparing both the presence and absence of the outcome of interest (i.e., positive and negative cases). *Set relations rather than correlations*: standard statistical analyses are based on correlations ("the more of X, the more of Y"). Correlational arguments are symmetric arguments ("if more X entails more Y, then less X implies less Y"). Configurational theorising on the other hand is based on asymmetric set relations. For example, "the assertion that "*the developed countries are democratic" does not require that the not-developed countries be not-democratic. There can be many not-developed countries that are democratic, and their existence does not count against the initial claim, which is asymmetric*" (Ragin, 2014: p. xxivi). Accordingly, standard statistical techniques parse matrices of bivariate correlations or their mathematical equivalents. Instead, configurational theorising uses truth tables that list different configurations of causally-relevant conditions. *Causal recipes rather than net-effects*: the standard statistical template revolves around net-effect thinking, that is, "the net effect and statistical significance of each causal variable are based on its unique (non-overlapping) contribution to explained variation in the dependent variable" (Ragin, 2014: p. xxivii). As such, configurational theorising is about how individual conditions combine to produce the outcome of interest, thus helping analysts formulate causal recipes that will lead to the outcome of interest. These recipes can be evaluated on the basis of their theoretical (i.e., consistency parameters) and empirical importance (i.e., coverage parameters). It is worth stressing that consistency and coverage (also known as parameters of fit) "are analogous to the respective assessments of significance and strength in regression" (Misangyi et al., 2017: p. 269-270).

Although conditions are oftentimes selected in a deductive manner when deploying configurational theorising (Park, Fiss & El Sawy, 2020), it is possible to evaluate such theories by looking at the extent to which theoretical expectations overlap with empirical results. While the focus of standard hypothesis testing is to reject (or fail to reject) the null hypothesis (or a similar benchmark), the focus of theory evaluation in the context of configurational theorising is to evaluate hunches derived from theory *"by creating intersections of the Boolean expression describing the theory (T) and the empirical solution (S)*" (Schneider & Wagemann, 2012: p. 305). In other words: although configurational theories sit somewhere "*midway between exploratory and hypothesis-testing research*" (Kent, 2005: p. 226), the design is not appropriate to be used for hypothesis-testing, but rather for the creation of "propositions" which determine the membership in certain configurations (i.e. pathways). The intersection of Theory (T) and empirical solution (S) describes the part of the theory that is supported by empirical evidence. In the intersection of the lack of theory (NOT T), and the empirical solution (S), empirical findings overlap with those cases not expected by theory. The result of this intersection suggests an extension of existing theories. The intersection of theory (T) and the absence of empirical solution (NOT S) captures those cases for which theory predicts the occurrence of the outcome, but which our solution fails to capture. Hence, it suggests a delimitation of existing theories. Finally, the intersection of the lack of theory (NOT T) and the absence of

empirical solution (NOT S) "*denotes a configuration of conditions that neither theory nor the empirical findings deem sufficient for the outcome*" (Schneider & Wagemann, 2012: p. 305).

Theory Updates/Extensions

Configurational theories have recently been updated with the use of set-theoretic multi-method research (Oana, Schneider & Thomann, 2021). In other words, configurational theorising becomes stronger when researchers add within-case evidence to bolster their understanding of causality. In addition, configurational approaches can be amended by qualitative, ex post follow-up research to go into more detail, especially with regard to the identified non-predicted cases (e.g., by means of hold-out samples). Set-theoretic, multi-method research is a formalised process of identifying the best available cases for within-case process tracing in a given data set. Cases are classified as either typical, deviant or individually irrelevant. Subsequently, the best-matching pairs of cases are identified in order to perform comparative analyses mimicking the Most Similar or Most Different case study design (George & Bennett, 2005). For example, the comparison of typical cases with other typical cases may provide useful inferences about the generalisability of underlying causal mechanisms. On the other hand, the comparison of typical cases versus deviant cases may provide useful inferences about omitted conjuncts (i.e., single conditions) or conjunctions (i.e., combinations of conditions). Likewise, the comparison of typical cases with the individual irrelevant cases may provide useful inferences about the causal properties of mechanisms (Oana, Schneider & Thomann, 2021).
Another extension is Necessary Condition Analysis (NCA). Championed by Dul and colleagues, NCA is a data analysis technique based on necessity logic that can be applied either with linear algebra (as in regression) or with Boolean algebra (as in QCA) (Dul et al., 2010). Yet another extension is the study of temporal dynamics. While original formulations focused on time-related conditions, procedural variables, non-commutative sequences of conditions and the like (Fischer & Maggetti, 2017), more recent formulations have identified three distinct approaches aimed at tracking configurations over time: 1) *multiple time period, single configurational analysis*: the analyst performs one single configurational analysis by splitting cases into different time periods and then performs the analysis using a single truth table; 2) *multiple configurational analysis for different time periods*: the analyst performs multiple configurational analysis for the same sample of cases for different time periods; 3) *fuzzy-set ideal type analysis*: this approach calculates the cases' membership score in different truth table rows and identifies which cases score more than 0.5 in specific rows. *"The configuration in which a case has a membership of >0.5 is the ideal type it represents (sic) When calculating the case's ideal type for different periods in time, a researcher can analyse how cases move (or not) over time in the property space"*, that is, the truth table (Verweij & Vis, 2021: p. 105).

More recently, scholars have developed a trajectory-based configurational approach that conceptualises configurations dynamically, so that they express different development stages. Accordingly, scholars can now track qualitative variations occurring within single cases over time in order to show how cases can switch from one configuration to another configuration, thus tracking their trajectories, that is, their sequential movement over time (Pagliarin & Gerrits, 2020). Other approaches refer either to panel data or to time series. Whereas panel data approaches "*provide some diagnostic tools to assess a set-theoretic consistency and coverage both cross-sectionally and across time*" (Garcia-Castro & Ariño, 2016: p. 63), time series approaches incorporate time series variations (Hino, 2009).

Applications

Originally formulated within the Political Science and Sociology disciplines (Rihoux & Marx, 2013), the theory has been applied to other fields such as Business and Management (Harms, Kraus & Schwarz, 2009), International Relations (Ide & Mello, 2022), Sustainability (Meng, Yan & Xue, 2018), Marketing (Pappas, 2018), Education (Snelson-Powell, Grosvold & Millington, 2016) and Information Systems (Park, El Sawy & Fiss, 2017). Early publications appeared in leading Sociology journals. For example, Amenta et al. (1992) used the crisp-set version of the theory to study under what conditions the Townsend movement succeeded or failed to seek pensions for the aging population (Amenta, Carruthers & Zylan, 1992). Likewise, Roscigno and Hodson (2004) used the configurational approach in concert with quantitative methods to allow *"for the examination of unique configurations of organisational and interpersonal dynamics that either diminish or exacerbate collective and individual resistance"* (Roscigno & Hodson, 2004:p.15). Around that time, new publications appeared in the field of Business and Management, especially facilitated by the *Journal of Business Research* (Stokke, 2007) and in the area of International Business (Pajunen, 2008). Fiss (2007) argued that research on organisational configurations has been hindered by a mismatch between theories and methods, thus endorsing the configurational approach as a viable alternative (Fiss, 2007). Afterwards, Fiss (2011) complemented these early contributions by showing the relevance of the configurational approach for typology theorising and further developed the notion of core and peripheral conditions, depending on the strength of the evidence for a causal relation with the outcome of interest (Fiss, 2011). Around this time, configurational theorising was also introduced within the Information Systems field (El Sawy et al., 2010). More recently, many publications have appeared within the social sciences that draw either on quantitative data (Park, El Sawy & Fiss, 2017; Covin et al., 2020; Pappas, 2018), qualitative data (Aversa, Furnari & Haefliger, 2015;Iannacci & Cornford, 2018) or both (Mattke et al., 2021;Bouncken et al., 2020). Table 1 summarises an *exemplary* collection of such empirical contributions from different fields of research within the social sciences.

Table 1: Collection of empirical contributions

Paper	Area	Main argument	Implications
Amenta et al. (1992)	Sociology	It analyses under what conditions the Townsend movement (a social movement) succeeded in its effort of seeking pensions for the aging population.	It empirically demonstrates that there are multiple paths (or configurations) leading to both positive and negative outcomes
Aversa et al. (2015)	Business	It investigates business model configurations associated with high and low performance of Formula One racing teams in a longitudinal fashion.	It discovers two business model configurations associated with high performance that either revolve around selling technology to competitors or developing and trading human resources with competitors. It also argues that capability-enhancing complementarities are the engine that drives these two

			business model configurations.
Bouncken et al. (2020)	Management (Strategy)	It aims to inform research about configurations of above average value capture from coopetition (i.e. the simultaneous competition and collaboration between two firms).	It empirically identifies configurations of consistently high and low firm-level value capture of small and medium-sized enterprises
Covin et al. (2016)	Management (Marketing/Innovation)	It argues that the configurational approach has not been used before in the context of innovation.	It empirically demonstrates that family and non-family firms have different combinations of marketing-related resources, leading to innovation success.
Covin et al. (2020)	Management (Entrepreneurship)	It shows that the configurational approach can also be deployed in an intra-organizational (i.e. employee) setting.	It empirically demonstrates that different configurations of individual (i.e. employee) factors can lead to (team) success.
Crilly et al. (2012)	Management	It investigates how firms facing identical pressures decouple their policy from practice in different ways and for different reasons	It uses fsQCA to reveal multiple equifinal configurations representing different ways of decoupling
Fiss (2011)	Management	It shows the relevance of the configurational approach for typology theorising by empirically investigating configurations based on Miles and Snow's framework.	It develops a midrange theory of causal processes based on the notion of core and peripheral conditions.
Greckhamer (2011)	Organisation Studies	It applies fsQCA to analyse country-level data encompassing four occupational groups (cleaners, secretaries, mid-	It shows configurations of cultural dimensions, development, and welfare state that are sufficient for a high compensation level and

		level managers, and senior managers) from 44 countries	compensation inequality among these four occupations. It develops implications for cross-cultural research on compensation.
Iannacci and Cornford (2018)	Information Systems	It investigates success across multiple cases of information systems adopted for monitoring the disbursement and use of resources within the European Social Fund context.	It develops a typological theory of monitoring systems success that reveals overlapping typologies rather than exclusive typologies of cases.
Kraus et al. (2016)	Management (International Business)	It argues that the internationalisation success of family firms depends on the respective configuration of external resources (external ownership, presence of a non-family CEO, presence of non-family members on the advisory board, and international networks)	It identifies the optimal configurations of external (nonfamily) resources that allow family firms to internationalise successfully and explores the differences between different kinds of family firms with regards to their amount of familiness.
Mattke et al. (2021)	Information Systems	It combines qualitative data with configurational theorising to discover how configurations of bitcoin-specific motivations explain bitcoin investment.	It discloses non-trivial investment motivation configurations that lay the groundwork for future studies of the role of cryptocurrencies in society.
Meuer et al. (2015)	Research policy	It draws on a novel combination of configurational and econometric analysis to analyse 384 Swiss firms	It identifies five co-existing innovation systems: two generic innovation systems, the autarkic and the knowledge-internalisation; one regional innovation system, the protected hierarchy; and two sectoral innovation systems, the public sciences and organised learning.

Pajunen (2008)	Business	It analyses how and why countries with different degrees of membership in different institutional constraints either attract or do not attract Foreign Direct Investments (FDI).	It shows that attracting FDI results from a combination of institutional conditions rather than single institutional factors, thus shedding new light on conflicting findings from the literature.
Pappas (2018)	Marketing	It uses fsQCA to show how trust in online vendors, privacy, emotions and experience combine to predict consumers' purchase intentions	It extends existing theories by showing how trust, privacy, emotions and experience combine to increase or mitigate intention to purchase. None of the examined factors are indispensable to explain purchase intentions.
Park et al. (2017)	Information Systems	It examines how IT's effect on agility is embedded in a configuration of organisational and environmental elements.	It discovers equifinal pathways to organisational agility within specific boundary conditions that determine the role that business intelligence and communication technologies play in achieving organisational agility.
Roscigno and Hodson (2004)	Sociology	It uses the configurational approach in concert with quantitative methods to allow *"for the examination of unique configurations of organisational and interpersonal dynamics that either diminish or exacerbate collective and individual resistance"*.	It shows that the configurational approach instils theoretical rigour in choosing variables that specify "potentially complex, conditional configurations."
Schneider et al. (2010)	Management (International Business)	It examines through fsQCA how institutional configurations, not single institutions, provide high tech companies with	It shows via country-level data for 19 OECD economies in the period 1990 to 2003 above all that a high proportion of university

		institutional capital for successful internationalisation.	graduates and a large stock market are complementary institutions leading to high internationalisation success.
Snelson-Powell et al. (2016)	Education	It deploys fsQCA to examine the key organizational and strategic conditions under which business schools decouple their sustainability policies from their practices.	It find evidence that suggests that tight coupling is associated with small, prestigious business schools and that decoupling is associated with business schools that are large, wealthy, or lacking in expertise. It develops implications for business school legitimacy and institutional theory accordingly.
Stokke (2007)	Business	It applies the configurational approach as a strategy for improving the effectiveness of international regimes for resource management	It shows that this approach fits particularly well with small-to-intermediate samples where the number of cases is simultaneously too large for conventional qualitative methods and too small to support statistical procedures.
Wu et al. (2014)	Business	It applies both fsQCA and csQCA to test propositions from complexity theory in the context of customer assessments of services for beauty salon and spa treatments	It advances a nuanced theory of how customers' service evaluations relate to their assessments of overall service quality and intentions to use the service.

Limitations

Configurational theorising has raised several concerns that researchers should be aware of (Park & Mithas, 2020). In particular, researchers should be aware of ongoing concerns about the discovery of causal processes, the robustness of results under different assumptions, the ability to support theoretical exploration and testing of causal relationships and the ability to handle large samples and coarse-grained data. Some studies have argued that configurational theorising is designed in such a way to be sensitive to changes in consistency, frequency and calibration thresholds (Rutten, 2022). Accordingly, these scholars have advocated either a return to the cases (when dealing with a

small sample size) or a return to the data (when dealing with a large sample size) to check the robustness of the original findings. A closely related issue is the issue of endogeneity (Meuer & Fiss, 2020). In particular, configurational theorising has been criticised with regard to the issue of omitted causal variables and invalid inferences. While this issue can be addressed when the number of cases (or observations) is relatively small, it is quite daunting in the context of a large number of cases (or observations), where researchers do not have in-depth case knowledge to ascertain the validity of their causal inferences. Nevertheless, procedures have recently been formulated for identifying the best available cases for within-case process tracing, even in the presence of large samples. Cases can be classified as either *typical*, *deviant* or *individually irrelevant*. Subsequently, the best-matching pairs of cases are identified in order to perform comparative analyses mimicking the Most Similar or Most Different case study design (George & Bennett, 2005). Despite recent developments with regard to the study of temporal dynamics, another criticism is the lack of a compelling approach for fully capturing the potential of temporal theorising and time-series configurational analysis (Meuer & Fiss, 2020). Hence, configurational theorising is so far still mostly silent on issues about configurational change and configurational process theories (Rihoux & Ragin, 2009).

In addition, configurational theorising has attracted criticism with regard to its relation to complexity theory. For example, it is not clear whether, and to what extent, the three pillars of conjunctural causation, equifinality and asymmetric causality closely correspond to propositions underlying systems theory and complexity theory (Meuer & Fiss, 2020). Another issue that has attracted significant criticism pertains to the solution being chosen. Although core texts have advocated choosing the intermediate solution (Ragin, 2008; Schneider & Wagemann, 2012), some scholars have recently voiced criticism of the intermediate solution by advocating a more parsimonious solution (Thiem, 2022). “This debate is in progress and reflects several inconclusive aspects of the current state of the art. In particular, it is characterised by the use of different criteria for evaluating the solution types, implicitness about these criteria and the required background assumptions for drawing causal inferences, and/or, more fundamentally, different analytical goals” used in the context of configurational theorising (Haesebrouck & Thomann, 2022: p. 2).

Concepts

Calibration (Concept): Process in which set membership scores are assigned to cases. Calibration can be based on the direct method (i.e., a logit function revolving around the three qualitative anchors 0, 0.5 and 1 assigned by researchers) and the indirect method (i.e., a semi-automatic procedure establishing a fractional logic model between the preliminary fuzzy-set membership scores assigned by researchers) (Schneider & Wagemann, 2012)

Causal Condition (Independent): Factor which is used to explain the outcome. This factor can be either necessary (if the outcome cannot occur in the absence of the condition, that is, the condition is a superset of the outcome) or sufficient (if the condition or combination of conditions is a subset of the outcome, that is, whenever the condition is present, the outcome is also present even though the outcome can occur in the absence of this condition) (Schneider & Wagemann, 2012)

Configuration (Independent): Combination of conditions which describes a group of empirically observed or hypothetical cases (Schneider & Wagemann, 2012)

Conjunctural Causation (Independent/Dependent): Situation in which the effect of a single condition unfolds in combination with precisely specified other conditions (Schneider & Wagemann, 2012)

Causal Asymmetry (Concept): Causes leading to the presence of an outcome of interest may be quite different from those leading to the absence of the outcome (Fiss, 2011)

Consistency Sufficiency/Consistency Necessity (Concept): Consistency sufficiency expresses the percentage of cases' set-membership scores in two sets that is in line with the statement that one of the two sets is a subset of the other. Consistency necessity on the other hand expresses the percentage of cases' set-membership scores in two sets that is in line with the statement that one of the two sets is a superset of the other (Schneider & Wagemann, 2012)

Coverage Necessity/Coverage Sufficiency (Concept): Coverage necessity is better understood in terms of the relevance and trivialness of a necessary condition. Coverage sufficiency expresses how much of the outcome overlaps with and, therefore, is covered by the sufficient condition (Schneider & Wagemann, 2012)

Equifinality (Concept): Multiple configurations of conditions leading to the same outcome. Hence, the final outcome may be reached from different initial conditions and in different ways. (Schneider, 2012)

Fuzzy Set (Concept): Set which allows for partial membership, in addition to full membership (1) and full non-memberships (0). Crisp Sets can be perceived as special cases of Fuzzy Sets because they allow only for full membership (1) and full non-membership (0) (Schneider & Wagemann, 2012)

Outcome (Dependent): Variable to be explained by the configurations of conditions (Rihoux & Ragin, 2009)

QCA (Concept): One of the most formalized set-theoretic methods based on formal logic and Boolean algebra in the analysis of truth tables. QCA aims at establishing necessary or sufficient conditions, integrating parameters of fit (i.e., consistency and coverage). QCA has three variants (i.e., crisp-set QCA, fuzzy-set QCA and multi-value QCA) that can be integrated under the generalized-set QCA (gsQCA). (Schneider & Wagemann, 2012)

Parsimonious, Intermediate and Complex Solution (Concept): Solutions derived from the minimisation process, that is, the process aimed at reducing complex expressions into a minimal formula. Each solution refers to the result or end product of a truth table analysis. Each solution usually consists of several configurations of conditions joined by logical OR. Depending on the search strategies deployed for retrieving remainders to include in the truth table analysis to minimize away redundant conditions, three solutions can be identified, namely, the Parsimonious, Intermediate and Complex (aka Conservative) solutions. The Parsimonious solution is the solution derived with the aid of remainders without any evaluation of their plausibility. The Intermediate solution is the solution derived with the aid of only those remainders that are consistent with the researcher's theoretical and substantive knowledge. The Complex solution is the solution derived without the aid of any remainders. Although there is a debate in the literature between a pro-intermediate

versus a pro-parsimonious solution type, researchers advocating the Intermediate solution now distinguish those attributes among the reported solution that are core from those that are contributing (or peripheral) conditions (Misangyi et al., 2017)

Remainders (Concept): Configurations that lack empirical instances. Usually, truth tables display rows (or configurations) without enough empirical evidence because the number of cases travelling along these rows (or configurations) falls below the minimum (frequency) thresholds defined by researchers according to standards of good practice. Among researchers, it has now become conventional to report the results obtained with the aid of remainders through a process called “counterfactual analysis”, which entails conjecturing the effect that an unobserved configuration of conditions would exhibit if it did exist. (Rihoux & Ragin, 2009)

Solution Formula (Concept): A statement about one or multiple combinations of conditions joined by logical AND (*). It may refer to a single configuration or several configurations joined by logical OR (+) (Rihoux & Ragin, 2009)

Truth Table (Concept): This contains the empirical evidence gathered by the researcher by sorting cases into one of the 2k logically possible combinations, aka truth table rows, of k conditions. Each row linked to the outcome can be interpreted as a statement of sufficiency (Schneider & Wagemann, 2012)

Variants (Concept): QCA Variants (Schneider & Wagemann, 2012)

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