GLOSSARY FOR ARCHETYPE ANALYSIS

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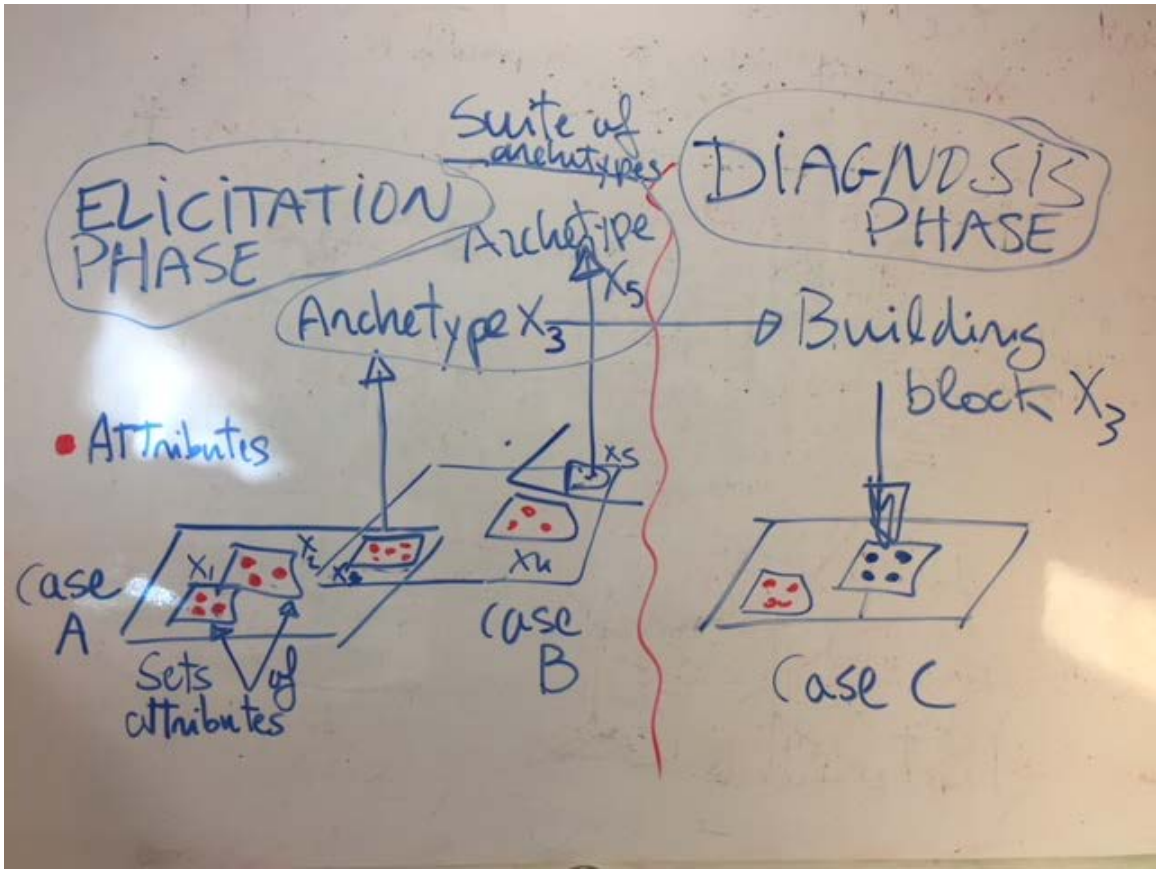
This glossary seeks to provide a consistent terminology to facilitate Archetype Analysis (ATana).

Content

1 Archetype Analysis

Archetype Analysis (ATana) is any orderly scientific procedure that produces a suite of ATs to analyze patterns that hold in a set of cases, phenomena or observations, usually heterogeneous in character. ATana typical involves two phases. First, the elicitation phase consisiting of identifying a set of cases relevant for the phenomenon under investigation, characterizing the attributes (and relationships) present in every case, abstracting combinations of attributes (and relationships) that are archetypical for that particular set of cases, and providing a theoretical rationale or explanation for the combination of attributes. Second, the abstracted combinations of attributes (and relationships), which are the archetypes proper, are used in the diagnostic phase as building blocks to diagnose the presence of identified archtypes in additional cases (Figure 1).



There is not "one" archetype analysis, but each research project may produce its particular archetype analysis which may be different from other archetype analyses. Yet, it is also possible that one archetype analysis refines, improves, replicates or (in)validates another archetype analysis. It is also possible that one archetype analysis borrows some components from another, and adds new components.

Archetype analysis is an approach (in contrast to a framework, theory or method), because it can accommodate and combine different frameworks, theories and

methods. Archetype analysis is, in principle, compatible with any method that identifies or tests patterns or configurations of attributes, such as cluster analysis or qualitative comparative analysis.

2 Suite of Archetypes

An ATana produces more than one archetype. The set of all archetypes in an ATana is called a suite. Each single archetype in a suite can be diagnosed in multiple cases, but not all archetypes of the suite are diagnosed in a single case. A suite of archetypes can be extended when new archetypes are observed, and is therefore not necessarily exhaustive. Suite completeness depends on whether archetypes can be logically (combinatorially) or empirically exhaustive.

3 Attributes & Outcomes

Cases and archetypes are described by using a set of attributes. Synonyms for attributes can be factors, characteristics, features, quantitative variables, ordinal variables, nominal variables or factors. Every case or observation is composed of a set of attributes. Archetypes are abstracted combinations or subsets of attributes that hold in more than one case. For each case or archetype, it can be principally described whether an attribute is present there, or to which degree or level or in which sense it is present.

Outcomes

A main practical use of ATana is to understand why the outcomes of a given phenomenon differ across cases and how this cross-case understanding can inform interventions to alter undesirable outcomes. Unlike the SES framework or the Tragedy of the commons, ATana is a general approach to characterize all kind of outcomes resulting from social-ecological relationships. There can be single or multiple outcomes considered. Outcomes might be normatively justified, or stem from positive questions. Outcomes can be part of archetypes, or external to archetypes. Outcomes can be understood as explained variables (like in QCA or inferential statistics), they can be understood as evaluations, or they can be understood as components of functional relations (where outcomes and other attributes might be explananda for further outcomes and attributes).

4 Cases vs. Systems

Archetype analysis investigates a set of units of analysis, called cases (or, more generally, observations). Cases can be places, gridcells, organizations, models, institutions, actions, processes, mechanisms or systems. Each case can consist of multiple components. Systems are a set of connected components forming a complex (usually functional) whole. In contrast, AT are abstractions whose function is purely analytical: to explain typical patterns repeated across a range of cases. AT are conceptual constructs to explain why a similar outcome happens across different cases (thus under apparently different circumstances or characterized by diverse social and ecological attributes relations).

The cases are taken from a "universe of cases" that need to be specified: what kind of cases are "eligible" to be subject of the ATana. The data taken for the ATana is then usually a subset of the universe of cases.

5 Heterogeneous cases

ATana is designed to study sets of cases that are quite different in their attributes, possibly also with data gaps. Heterogeneity means more than much variation in variables. A heterogenous set of cases likely has more relevant attributes than more homogenous cases.

6 Configuration of attributes

An archetype is not described by a single attribute, but a combination of multiple attributes and their relations. This can be understood as a list of attributes or a range of values of variables. It can also be understood as a specific and more complex relation of attributes or values, e.g. through a mathematical function, Boolean formula or narrative. Relations between attributes are often, but not necessarily, defined by some form and degree of causality.

7 Theories

ATs are abstractions whose function is to explain typical patterns repeated across a range of cases (versus explaining cases or classifying them). This process of abstraction can be based on theory, or the theory of each archetype can be derived inductively. It requires that the analyst is explicit about what middle-range theory guides what/how attributes are selected what causal mechanisms are emphasized to explain why a certain outcome occurs across cases, or to classify the sets of attributes and mechanisms leading to the same outcome, or to provide a rationale for configurations of attributes.

These theoretically informed configurations or mechanisms are building blocks and can be combined with (some) other building blocks to explain either a whole case, set of cases, or larger (embedded) outcomes (one could think of a hierarchy of outcomes within an observation).

Middle-range theory

Good archetypes make a fit between theory and empirical observations. Every ATana starts with a set of ideas and principles about the alternative mechanisms that can (are needed to) explain a certain outcome. This set of ideas and principles is a "small" theory linked about an outcome or configuration of attributes. For instance, the outcome of common pool resources dynamics were explored by Ostrom et al. through a "theory" proposing that rules are the basic mechanism to explain outcome in these systems. Their IAD framework proposed a set of attributes and relations to explore the sustainability of outcomes from rule-following in common pool resource cases. Archetypes and building blocks can be created by

identifying recurrent patterns of attributes and relations in a set of common pool resource cases. We would say that these archetypes were informed by IAD "theory".

A single ATana might draw theory from multiple epistemic communities. Then, while some archetypes in the suite might only use "small theory" from one "grand theory", others might be able to combine bits from multiple "grand theories". It might also be the case that some ATs from the same suite cannot be combined because they draw from contradicting or incommensurable "grand theories".

8 Common vocabulary of attributes

While cases and archetypes are described by attributes, it is not required that every case or archetype is characterized by the same set of attributes. This is different to, for example, standard inferential statistics or QCA, where all data points in a sample need to have complete data in all attributes from the model. So, while some cases/archetypes draw on specific attributes, others will do so on others. This can mean two things: (i) there are data gaps, (ii) more importantly: some attributes are irrelevant for cases/archetypes.

In the extreme situation, however, if every archetype/case is described by a very particular set of attributes that does not overlap with the attributes of any other archetype in the suite, we do not obtain an archetype analysis. Instead, there need to be at least an overlapping list of attributes and a common vocabulary across cases that is used for one complete ATana. In each ATana, all archetypes/cases use only attributes from this list (the 'common vocabulary') which is defined for this ATana. Each attribute in the vocabulary shall be used multiple times (although not always).

9 Building-block

Importantly, ATs are building blocks: they do not explain whole observations (this would be the goal of systems' representations), and therefore AT do not aim at completely representing a system or case. In other words, archetypes describe or explain components that occur within a case, but not complete cases. Because archetypes can be used as building blocks, it is required that a suite of them can coherently be combined to analyse a particular case. Drawing from a common vocabulary of attributes is one pre-condition for that. It also requires that the theoretical/epistemic background is not utterly incompatible between any pair of archetypes.

10 Diagnosing archetypes / An Archetype holds in a case

Archetypes are elicited from a suite of cases and are used as building blocks to diagnose new cases. Diagnosing that a building block holds in a new case means that it can be (positively) validated that the theory and configuration of attributes characterizing this archetype are present in a specific case. How this is established depends on the (empirical) methods chosen in the ATana.

When it can be justified that a particular archetype is associated with a case or observation, it can be said the this archetype holds in the case. This is usually the case if some component(s) of the case fit to the characterization of this archetype. Alternative formulations are that the archetype manifests, is observed in, or diagnoses the case. All cases where a specific archetype holds are it's domain of validity.

11 Validity

What components of an archetype analysis can be subject to validity, i.e. can be falsified?

- Internal validity: Statements that one AT holds in a specific case can be validated according to the standards of the empirical methods used in an ATana.
- External validity: Implications of an ATana, e.g. for outcome attributes external to the ATana, can be validated with other methods/approaches/data that relate to the implications.
- Quality criteria, e.g. whether an ATana follows specified recommendations, protocols, or general criteria of good scientific practice.

12 Domain of validity

The domain of validity is the set of cases in which an archetype holds. The larger the domain of validity, the higher generalizability and transferability of the archetype.

13 Archetype

There are now several definitions, e.g.

"Each AT functions as a building-block that can be used to explain phenomena in particular cases. Thus, each AT is characterized by (i) a configuration of attributes, (ii) a theory that explains the relation between the attributes, and (iii) the set of cases where it holds (called the domain of validity)." (Eisenack et al. 2018)

"Archetypes […] are defined as recurrent conditions that shape the relation between socio-ecological systems and environmental as well as socio-economic stresses, …" (Sietz *et al* 2011, Sietz *et al* 2012, Kok *et al* 2016, Sietz *et al* 2017).

"...aggregate functionally similar processes to typical patterns which structure the understanding of underlying processes and provide insights into strategies that foster sustainable development." (Jäger et al. 2007; Manuel-Navarrete et al. 2007)

14 Archetype vs. Patterns

Archetypes are patterns of social and ecological attributes, and their relationships. In this view, AT is a particular kind of patterns. The term 'pattern' is more vague and it does not refer to any specific research approach. ATana, on the contrary, is a research approach.

15 Archetype vs. Type

Archetypes aim at providing more than a classification or typology. ATana identifies patterns that are re-appearting and supplied with theory.

16 Components

Cases or observations can be considered to contain multiple components. These components can be processes, models, mechanisms or causal relations. Each component can be characterized by a set of relations that link attributes. An ATana does not classify cases, but components, i.e. parts of cases. Thus, multiple archetypes can manifest in one case if there are multiple components, each associated with another archetype.

17 Level of abstraction

The result of an ATana depends on the chosen level of abstraction of the attributes and cases.

Level of abstration of cases can mean different things: spatial resolution (plot/place/gridcell/region/continent etc.), functional boundaries (e.g. employee/unit/firm/sector), institutional level (e.g. municipality/county/province/country etc.), temporal resolution (day/month/year/decade), and others.

Also the level of abstraction of attributes can mean different things among spatial and temporal resolution, aggregation (e.g. daily average/yearly average; firm-level /national-level/sector-level data), or conceptual abstraction (e.g. actors: human individual/employee/profession/lawyer/specialization/experience; or institutions: governmental policy/market based/emissions trading/emissions trading with grandfathering).

18 Scaling, super- and sub-archetypes

A basic characteristic of building blocks is that they are scalable through combination with other building blocks described at higher levels of abstraction.