Formalization of Political Analysis: Matrix of Possible States and strategy

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Glossary

Course of action: ¿election or design?

When the individual takes action, it is possible to change the world from a state to another and can be made by knowing the accessible states (alternatives) from the current state and the actions which produce each one (agencies). The Rational Choice Theory claims these questions and the problem is, thus, just about election and planning a strategy which maximises one's preferences. However, when the individual knows nothing about the possible states and the actions which lead to them, the problem is discovering and designing these states and agencies, prospective issue.

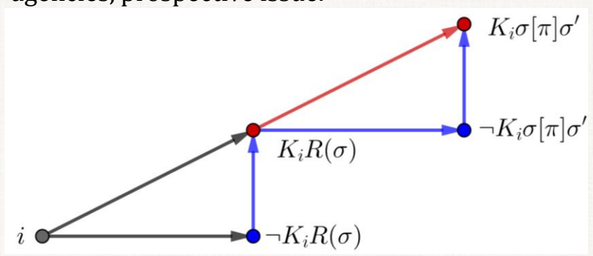

Figure. 1. Sequence of design and election problems

In order to address this problem, I propose an axiomatic system for make formal inferences about prospective and strategy through a irregular matrix of possible states by including the modal logic to Rational Choice Theory.

Modal logic in political science

Formalizing the social reality by means of mathematics and mathematical logic implies conceiving it as isomorphic to the numerical structures of algebra and calculus, On the other hand, applying the modal logic allows address the reality as configurations of possible, necessary, deontic, epistemic conditions, that is, as dynamical and diverse structure.
This research includes elements of Ragin's Qualitative Analysis Comparative (QCA) (2008) and the Elster's operator of Political Possibility (1978).

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Matrix of Possible States

Let a irregular matrix constituted by

1.1. **Conditions** $x \in \sigma$

1.2. **States** $\sigma = \{x_1, x_2, \dots, x_n\}$

a) which create an accessibility relation to their subsequent and possible states σ'

b) whose conditions x are present or absent.

c) belong to **a time** τ **and has an utility** μ for an actor *i*.

These are denoted as σ_μ^τ.

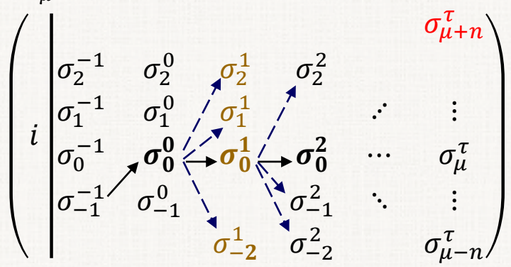

Figure 2. Matrix of Possible States; biography until σ_0^2

1.2.1 σ **initial** $\leftrightarrow \tau = 0 \wedge \mu = 0$. In this state the actor propose himself achieve a state.

1.2.2. σ **final**: it is the maximal state but is not accessible from initial state.

1.2.3. σ''' **counterfactual:** state which can be achieved in the previous situation. It is useful for evaluate one's actions according to the interaction with the opponent actor.

2.1. An **accessibility relation** between a state σ' and a state σ, denoted as $\sigma R \sigma'$.

2.2. A *i*'**situation** which is a set of accesible states from any σ. This is denoted as $\boldsymbol{R(\sigma)}$.

a)Can be created, like primitive way, through the configuration of the conditions valuations of current state σ.

b)The accesible states are **hierarchical** based on their utility in a rational and consistent order.

c)The situations **are not identical**, $R(\sigma_\mu^\tau) \neq R(\sigma_{\mu\pm n}^{\tau\pm 1})$.

3.1. An **agency** of an actor *i* is denoted as $\boldsymbol{\pi}$

- Which occur in a state σ $\sigma[\pi]$
- Which intends achieve a state σ' $(\sigma[\pi_i]\sigma')$
- Whose effect is a state σ'' $(\sigma[\pi_i]\sigma') \rightarrow \sigma''$
- Without it , it would have been the state σ''' $(\sigma[\pi_i]\sigma') \rightarrow (\sigma''|\sigma''')$

3.2. An agency has the **effects**

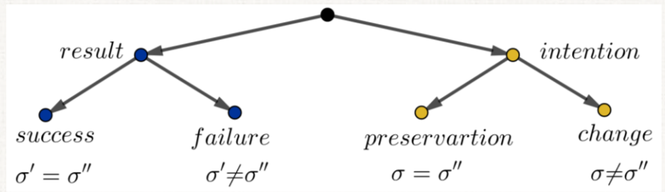

Figure 3. Agency effects.

3.3. **History**: descriptive sequence of state transitions given to some agencies. **Biography**: history which includes situations for make inferences about prospective and strategy.

4.1-2. **Possible conditions** $\Diamond x$ and **necessary conditions** $\Box x$.

4.3-4. **Necessity relations** $x - N \rightarrow y$ and **sufficiency relations** $x - S \rightarrow y$.

The matrix can work with **the modal axiomatic system K** by considering each operator ($\Diamond$,$\Box$) as indicator of a situation and as referent for the actions, thus, the iterative modalities are indicators of two or more situations.

The equifinality indicates the existence of multiple histories to achieve the final σ. The counterfinality supposes the existence of a maximal state whose utility is greater than the final state but with smaller duration. Thus the strategy would consist in the creation of the situation as following: designing the possible states according to possible and necessary conditions; ordering them according to their utility;designing the actions that leads to then based on the counterfinality and equifinality.

Conclusions

Given to the previous axiomatic system, it is possible to: formally address the problem about the design of the courses of action; create a strategy in terms of satisfaction, as claimed by Simon (1967), rather than that of optimization; experiment with the modal systems M, B y S5 and verify whether their theorems are applicable to context of strategic prospective; integrate the deontic, epistemic and tensional logic.

The research is still in development.

References

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