Leibniz Institute of Agricultural Development in Transition Economies

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The Basics of Integrative Propositional Analysis

Traditional methods for evaluating conceptual systems (e.g. theories and models) have generally focused on the quality and/or quantity of data used in creating them. While necessary and useful, that approach is insufficient. It has not led to the development of theories and models that are highly useful within the humanities or the social/behavioral sciences. As a result, we have been unable to effectively understand or resolve serious social problems such as organizational change, economic development, poverty, and so on.

Working within cognitive science, Integrative Propositional Analysis (IPA) is an emerging method for rigorously and objectively evaluating the potential usefulness of conceptual systems such as theories and policy models. Where past scholarly practice has focused on empirical approaches (the *correspondence* between concepts and reality), IPA is focused on the *coherence* between concepts. Its philosophical base includes the idea of the dialectic (e.g., Hegel) and the idea that the various branches of the dialectic structure may be understood in relationship to each other (e.g., Nietzsche).

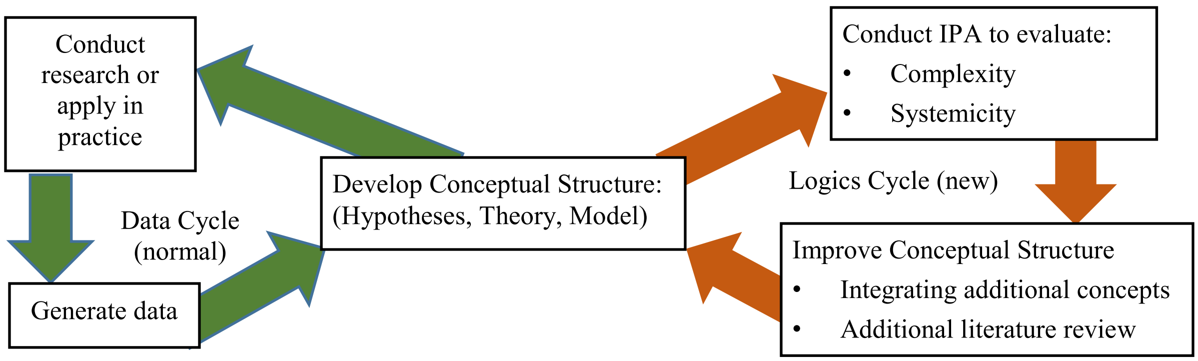
Building on insights from systems thinking (e.g., cybernetics and complexity theory), we may assume that we live in a world of systems (physical, ecological, social, etc.). The IPA perspective suggests that such a world would be best understood and engaged by theories and models that are themselves systemic. This perspective is supported by the research stream associated with Integrative Complexity, which shows how persons and teams holding more complex and more integrated conceptual structures are more likely to be successful.

In short, IPA is a method for evaluating the conceptual *structure* of theories and models. Those that are more complex and more systemic can be expected to be more useful in practical application. For a more detailed explanation, please see "The science of conceptual systems: A progress report" by S. E. Wallis, in *Foundations of Science* (in press, available on request). Importantly, IPA provides a set of rules for indicating objective directions for improving theories and models.

In this handout, you will learn:

- The place of IPA within a typical stream of research
- The basics of how to use IPA for analyzing conceptual systems (e.g. theories and policy models)
- Some uses and benefits of IPA for accelerating the improvement of theories and models for practical application.

IPA's Place in a Typical Research Stream



The Basics of Using IPA to Evaluate Theories and Policy Models

The "data" or subject for an IPA evaluation consist of any theory or model that is of interest to the researcher. IPA is focused on propositions within the theory indicating causal relationships between two or more concepts. Therefore, IPA may be (and has been) used to analyze theories from the natural sciences as well as the humanities and social/behavioral sciences.

For larger studies, a researcher may choose to evaluate multiple theories chosen at random. Or, for smaller studies, a researcher may simply want to evaluate his or her own theory. Generally, one "threshold" test for the face validity of a theory is to ask if that theory has been published in an academic journal or other peer-reviewed publication. IPA has also been used to evaluate policy models that have been published or presented in political speeches. So, there are many sources of useful subjects for analysis.

The core of IPA is reached by following these six steps.

1. **Identify propositions** within one or more conceptual systems (models, etc.)
2. **Diagram** those propositions with one box for each concept and arrows indicating directions of *causal* effects
3. **Find overlaps** between causal concepts to eliminate redundancies and link concepts within and between propositions
4. Identify the **total number** of concepts (to find the Complexity)
5. Identify **concatenated** concepts
6. **Divide** the number of concatenated concepts by the total number of concepts in the model (to find the Systemicity)

Here is an abstract example:

Step #1 – Identify propositions within one or more conceptual systems (models, etc.)

A is true because etc., etc., etc., Also, in my opinion, more B causes more C, for example etc., etc., etc. Therefore, people should etc., etc., etc., because we are not sure about how F might relate to A; nevertheless, we believe that more C causes less D. In some circles, it is generally accepted that more E causes more D this does not mean etc., etc., etc.,.

Step #2 – Diagram those propositions with one box for each concept and arrows indicating directions of *causal* effects

<u>Text</u>

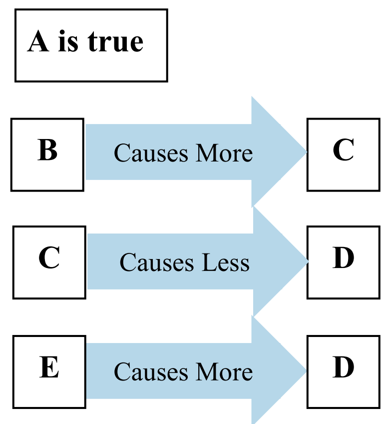
<u>Diagram</u>

Proposition #1: A is true

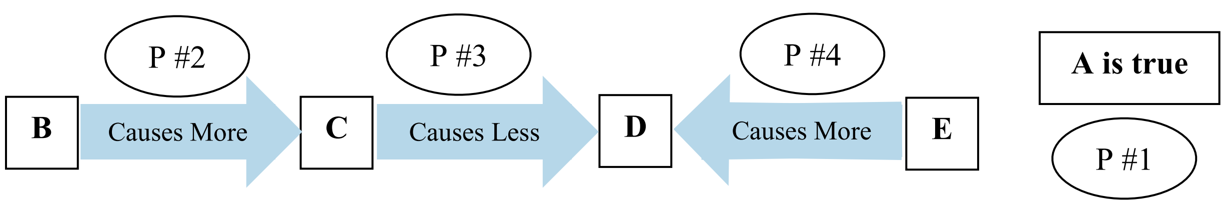
Proposition #2: More B causes more C

Proposition #3: More C causes less D

Proposition #4: More E causes more D



Step #3 – Find overlaps between causal concepts to eliminate redundancies and link concepts within and between propositions.



Step #4 – Identify the **total number** of concepts (to find the Complexity)

From the immediately above figure, each concept is in one box. And, there are five boxes. So, the Complexity of the model is C = 5.

Step #5 – Identify **concatenated** concepts

From the figure immediately above, there is one concatenated concept (D). It is concatenated because it has two causal arrows pointing towards it (more causal arrows would also be acceptable –– two is the minimum).

Step #6 – Divide the number of concatenated concepts by the total number of concepts in the model (to find the Systemicity)

Because there is one concatenated concept divided by five total concepts, the Systemicity of the model is S = 0.20 (this hints at a 20% chance of successfully achieving stated goals for policy).

Some hints, uses, and benefits of IPA for improving theories and models for practical application.

It is important to use the author's own words when evaluating theory. Otherwise, one may slip into an accidental misrepresentation of the conceptual system. It is also good to use complete theories rather than "cherry picking." Of course, inferences should be kept to a minimum.

Complexity is a weak indicator for the usefulness of the theory. Systemicity is a measure of the theory's internal coherence –- a stronger indicator for the potential usefulness in practical application. Of course, the theory should also be evaluated for the correspondence between the concepts and empirical data. When the Systemicity is 1.0, the theory is amenable to algebraic manipulation and is expected to be highly effective in practical application. Policy models and theories of the social/behavioral sciences typically have a Complexity under 20 and a Systemicity under 0.30. This provides a new explanation for why we are unable to understand and resolve the wickedly complex problems of the world.

IPA provides a new view for improving theoretical models. Generally, we ask:

- What concepts might be added to increase the Complexity?
- What concepts might be causally connected to increase the Systemicity?
- What empirical research might identify additional concepts and causal connections?
- Who might be brought in as collaborators to create a more comprehensive model?

IPA is also useful for:

- Integrating multiple perspectives among stakeholders
- Accelerating the advancement of science and the improvement of policy
- Choosing between policy models for implementation
- Coordinating research efforts within and between disciplines and departments
- Reducing the chance of making fundamental attribution errors
- Playing as a game (ASK MATT) to improve understanding in classrooms

Some Practical Applications of Integrative Propositional Analysis

1. Evaluation of existing conceptual system (policy model, law, theory, etc.) to determine its Systemicity (potential for achieving the goals stated in its text).
2. Application periodically during creation and/or evolution of the policy model to maintain its highest level of Systemicity (potential for success).
3. Remediation of existing conceptual systems that failed to achieve their goals and/or caused undesirable unanticipated consequences.

For additional resources and information, please visit:
http://projectfast.org ~ http://scipolicy.org ~ http://meaningfulevidence.com ~ http://www.cies.org