



Decision Support

## Foundation of Nomology

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### ABSTRACT

This article describes a foundation for modelling generic cognitive structures, under the heading nomology, sometimes known as the “science of the processes of the mind”. It proposes some principles and axioms that are consistent with the evidence in management systems used in business practice. It then reviews previous research about nomology in philosophy, science and the humanities. It shows that the main issue preventing the completion of the foundation of nomology has been the lack of an explanation of the relationship between the objective “nom” part as in economics and the subjective “ology” part as in psychology. It resolves this problem by showing that there are four main objective activities: proposition, perception, pull and push, and for subjective decisions the pull activity becomes redundant. It then describes tests in China and Chinese culture to validate that the results are truly generic. It proposes that nomology will be useful in providing a rigorous foundation for criteria structures in multi-criteria decision-making, and beyond into wider fields, especially those that combine subjective and objective aspects such as in conflict, inter-cultural and inter-disciplinary studies, ethics, and group decision-making.

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## 1. The challenge: to build a model of cognitive structures

The context of this article is operations research (OR), which is founded in science more than humanities, and relies on quantitative approaches more than qualitative. Recently OR has developed the important field of Multi-Criteria Decision-Making (MCDM) to enable it to deal with more general management problems where decision-makers have qualitatively different criteria. The OR approach is to build a model that reflects the essence of a problem, fit it to a context, and then apply it to a particular situation. The lack of an agreed set of rules governing the formation of cognitive structures has affected MCDM since 1980 when Von Winterfeldt (1980) wrote: “Structuring decision problems into a formal and manageable format is probably the most important step in decision analysis. Since presently no sound methodology for structuring exists, this step is still an art left to the intuition and craftsmanship of the individual analyst”. One approach is to try to convert multiple goals into a single value function. This article considers the alternative, to build a robust model of the cognitive structures that could be used for MCDM.

It asks do people share a unique set of cognitive structures across cultures and management fields. It examines a cross-section of management systems to discover if the cognitive structures that are used in practice can be explained by a set of simple decision rules. It next reviews similar previous research,

mainly under the title ‘nomology’, a ‘branch of science and philosophy concerned with the laws or principles governing the operation of the mind, especially as defined by custom or culture’ (Oxford, 2013). It considers the unresolved challenges to nomology: the relationships between dyadic and triadic systems, and between subjective and objective decisions. It develops additional rules to resolve these issues. It then considers the implications of the findings for inter-cultural research, and describes tests in collaboration with Chinese research scholars that validate the results.

## 2. Evidence of cognitive structures in management practice

This study begins by considering what are described as ‘regularities’ in practice, distinctions that people make between different aspects, criteria, goals, or constructs that might be involved in a decision. The following widely used examples have a common structure.

- (a) Hofstede analysed the HERMES cross-cultural surveys in 1968 and 1972 from over 116,000 questionnaires filled by IBM employees in 40 countries, and concluded that cultures can be categorised using four variables: Uncertainty Avoidance, Individualism, Power Distance and Masculinity (Hofstede, 1980).

- (b) Tuckman’s forming, storming, norming and performing (Tuckman, 1965) is about group dynamics: forming the group, (brain-) storming, norming by giving and receiving feedback, and performing as a group to achieve a common goal.
- (c) DMR Consulting developed the Macroscope Methodology, which is used by Fujitsu for IT Strategy and project management: Are we doing the right things? Are we doing them the right way? Are we getting them done? Are we getting the benefits? Thorp (2007) (pp. 30/31).
- (d) Walter Shewhart developed the Shewhart Cycle in the 1930s for work in statistical process control in Bell Laboratories. W. Edwards Deming extended its use to more general quality control and management in the 1950s and it became known as the Deming Wheel. The Shewhart/Deming phases: plan, do, check and act (Shewhart, 1931): are used very extensively in quality management.
- (e) Holton’s enabling elements, outcomes, motivational elements, and environmental elements (Holton, 1996) are used for evaluating training in organisations within human resource development.
- (f) Commitment, planning, action and evaluation are four phases that emerged from extensive research with members of Investors in People UK (IiP), a United Kingdom state-supported organisation that supports a national standard approach to improving training (Investors, 1996).
- (g) Innovation and learning, internal business, customer and financial are four phases of the Balanced Scorecard that was introduced so that accountants could evaluate all aspects of their business, not just the financial (Kaplan & Norton, 1992).
- (h) Fit, split, contend and transcend are four factors that drive stagnation and renewal in organisations (R. Pascale, 1990).
- (i) Kolb’s learning cycle is described as a spiral of four processes that must be present for learning to occur: concrete experience, observation and reflection, concept formation, and testing implications in new situations (Kolb, 1984).
- (j) Functional automation, cross-functional integration, process automation and process transformation are four stages in the progressive adoption of technology (Woolfe, 1993).
- (k) Prediction Action Modelling (PAM), which was developed by Toomer working with Bowen (Brugha & Bowen, 2005), describes how to learn about people’s world views to develop appropriate methods of control, and then suitable rules, leading to the management of people.

These systems show a similarity of structure despite their emergence out of practice and surveys of behaviour over a wide range of unconnected areas of business and culture. The extent of usage of these systems, and that there are many more like them, raises some questions. Could the similarity in their pattern be random, or is there intelligence behind it? How is it that groups of people from different management fields, and different languages, seem to be able to communicate with one another, to translate their constructs into the others’ language? It suggests the existence of an underlying structure driving the formation of these constructs. What might this structure be? All of these have four aspects, with the first two more uncertain, such as doing some form of planning. To build a formal system will require names for all the important constructs, and will lead to introducing ‘putting’ as a word to describe ‘what one does when one is not planning’.

The stability of this structure also suggests that there are more personal and universal examples such as body, mind, soul and spirit; fear, anxiety, guilt and resentment; and faith, hope,

**Table 1**  
Cases that illustrate the four general adjusting activities.

What	Where	(a) Hofstede	(b) Tuckman	(c) Fujitsu	(d) Shewhart/Deming	(e) Holton	(f) Investors in People UK	(g) Kaplan and Norton	(h) Pascale	(i) Kolb’s learning cycle	(j) Woolfe	(k) Prediction Action Modelling	Location	Feelings	Responses
Planning	Proposition	Uncertainty Avoidance	Forming	Are we doing the right things?	Plan	Enabling Elements	Commitment	Innovation and Learning	Fit	Concrete Experience	Functional Automation	Control	Body	Fear	Faith
	Perception	Individualism	Storming	Are we doing them the right way?	Do	Outcomes	Planning	Internal Business	Split	Observation and Reflection	Cross-Functional Integration	World Views	Mind	Anxiety	Hope
Putting	Pull	Power distance	Norming	Are we getting them done?	Check	Motivational Elements	Action	Customer	Contend	Concept Formation	Process Automation	Management of People	Soul	Guilt	Righteousness
	Push	Masculinity	Performing	Are we getting the benefits?	Act	Environmental Elements	Evaluation	Financial	Transcend	Testing Implications in New Situations	Process Transformation	Rules	Spirit	Resentment	Love

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