

# Evaluative Feedback Spaces for Cultural Mental Models

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## ABSTRACT

**Introduction:** Feedback from either social context or personalized information can result in more effective changes in mental models and consequent behavior changes. Techniques for collecting mental models on a group or societal scale could improve communications for social change or collaborative decision making. **Method:** A social media application is being developed that will allow users to personalize a cultural model to closely match their network of beliefs regarding some event, action, or entity. A graphical *evaluative feedback space* will enable real-time views of how their model compares with socially significant groups, or exchange information that is tailored to others' mental models.

## KEYWORDS

*Practical Application; Macrocognition; Mental Models; Cognitive Social Psychology; Cultural Network Analysis.*

## INTRODUCTION

Cultural models are shared prototypical concepts drawn from distributed members of a population known as a cultural group (Sieck, Rasmussen and Smart, 2010). Sieck and colleagues developed a synthesis of multi-disciplinary techniques called Cultural Network Analysis (CNA) to model culture as networks of ideas. As formal descriptions of the knowledge possessed by members of particular groups, cultural models describe and represent how the world is understood by the members of these groups. A key premise is that cultural knowledge comprises many networks of causally-interconnected ideas. These mental models become activated within particular situations to drive thinking and decision making, and can change under suitable conditions. Cultural models could therefore be especially useful for sharing understanding among collaborative decision makers, as well as anticipating effects in communications campaigns (Sieck et al., 2010).

Amjad and Wood (2009) present a compelling example of how even weakly held beliefs can lead people down a path to extremist behavior. They found that among their college student participants, beliefs held about the acceptability of aggression toward Jews strongly predicted whether participants would be willing to join an extremist anti-Semitic organization. However, even a brief educational intervention of attending a short lecture on the positive historic relationship between Jews and Muslims caused significant changes in beliefs and a dramatic 94% reduction in the number willing to join an extremist group.

By extending the CNA method, we plan to show that, beyond the canonical cultural models, personalized cultural models of individuals can be collected that reflect an individual's own network of beliefs regarding some event, action, or entity. In this way, the responses of individuals can be viewed as specific, varied instantiations of the canonical model. As such, this extension results in a type of crowd-sourced exploratory modeling (Banks, 1992) of the canonical model. Therefore, the results can be viewed in much the same way as the frequentist formatted decision spaces demonstrated by G. L. Klein<sup>3</sup> et al. (2011) for comparing the distributions of outcomes generated by exploratory computer modeling. In addition, these individual models can be mined to identify relationships between people's beliefs and the outcomes they expect from actions or events. Such a rich set of data at the individual level should enable better understanding among collaborative decision makers, and enable effective targeted communications aimed at specific individual variations of the canonical cultural model. Collecting mental models through a widespread social media venue, and visualizing this data to enhance collaboration and targeted communication, constitute a novel synthesis of tested sociocultural research processes and new technological capabilities.

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<sup>3</sup> Both Gary A. Klein and Gary L. Klein are working in the decision making area. We distinguish the work of each by using their middle initials in citations.

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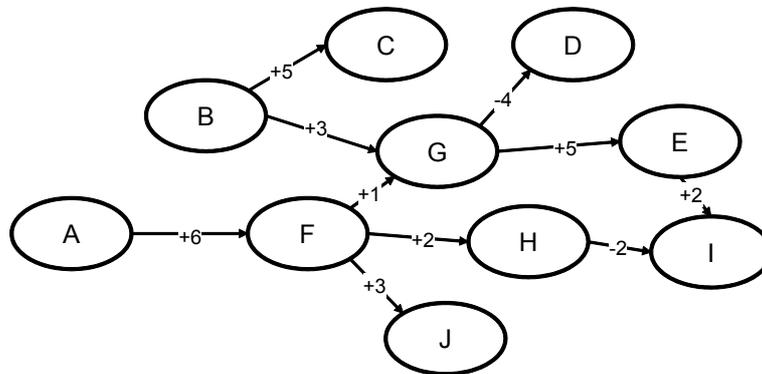
H. Chaudet, L. Pellegrin & N. Bonnardel (Eds.). *Proceedings of the 11th International Conference on Naturalistic Decision Making (NDM 2013), Marseille, France, 21-24 May 2013*. Paris, France: Arpege Science Publishing. ISBN 979-10-92329-00-1

## METHOD

As described above, we will implement a two-phase process to extend the CNA method. As a case study, we will assess the mental models of employees regarding a new corporate policy.

The first phase is a customization of the CNA methods, as described by Sieck et al (2010). In this phase we will determine existing cultural models by interviewing a representative cohort of individuals to obtain and validate a set of cultural models regarding their expectations of a new corporate policy. Guidance for these interviews will be based on a set of employee issues that the corporate policy makers want to better understand. Interviewers will then elicit “critical incidents” from each individual in the cohort in terms of issue-related tasks or work conditions that the interviewees believe will be affected by the policy. Based on these incidents, interviewers can engage in more abstract discussions with each individual regarding the causal chain the interviewee believes will lead to those effects. Coding of the interviews will be done by two independent coders and then validated by the analysis team. From these coded interviews, the analysis team will identify the cultural models shared by cultural groups within the cohort. We plan to represent these cultural models as directed acyclic graphs (DAGs), although the exact form will be dependent upon the actual models derived from the interviews.

In the second phase, these cultural models can then be used as a basis for a computer-automated survey of a broader sampling of the corporate population. Using visualizations of these cultural models, such as a DAG, individuals can select a cultural model that comes closest to matching their network of beliefs, similar to the Nearest Neighbor technique used by G. A. Klein and Militello (2001). For their selected model, individuals can assign personal values to any or all of the edges connecting the vertices in the DAG representation of the cultural model, as illustrated in Figure 1. The sign of the numbers indicates whether the association between the vertices is positive or negative, and the value indicates the strength of the association. The alphabetic labels of the vertices are just arbitrary substitutions for what will be in actual use labels for real-world states or actions.



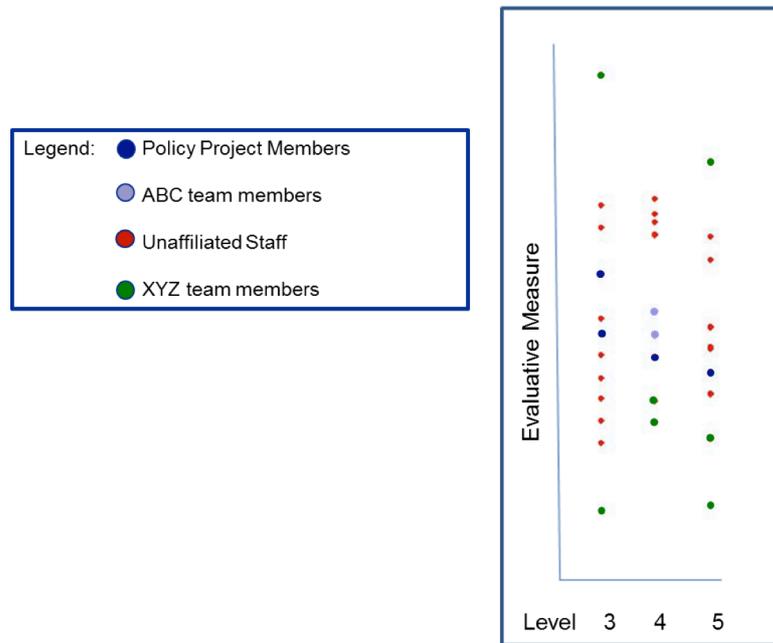
**Figure 4.** Example individual evaluated DAG representation of a generic cultural model

When the cultural models are so evaluated by the population of individuals, a number of analyses and functions become possible. For instance, the distance between different individuals can be calculated with regard to the values they assigned to any subset of  $n$  edges. Based upon this calculation, an evaluative feedback space can be generated that allows an individual to see their relationship to the members of significant social groups who have also evaluated the edges of the model, such as the different employee seniority levels (e.g., 3, 4 or 5) in the evaluative feedback space illustrated in Figure 2. Notice that on the evaluative measure, models of members of XYZ team differ substantially across seniority levels. Within seniority levels 3 and 5 there are even greater differences among the XYZ team members.

The evaluative feedback system will be able to maintain permanent anonymous links between individuals and their models. These links will allow corporate communications to send messages directly to individuals while maintaining anonymity. For example, anonymous individuals can be selected by cultural model, any combination of edge evaluations, or social group (e.g. team or seniority) to receive specific messages crafted to address their beliefs. In this way, messages can be tailored to address individual beliefs without identifying specific individuals. In addition, it is possible to perform a controlled evaluation of the effectiveness of different messages. Variations on messages can even be sent to subgroups to compare their effects on beliefs expressed in the models.

## DISCUSSION

This poster will describe a prototype of the evaluative feedback space system and discuss results from its initial use in support of a corporate policy initiative.



**Figure 5.** An evaluative feedback space showing individual mental model evaluations by project group and seniority level

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