

## Chapter 4

# The Simulation Presented in the ODD Protocol

### INTRODUCTION

It seems that small differences in inputs can become enormous differences in output. This phenomenon is referred to by James Gleick (1988, p. 8) as a “sensitive dependence on initial conditions.” These are problems that defy explanation by traditional top-down theories of social reality because the top-down theories tend to operate in a linear paradigm. The difficulty in utilizing statistical tools, even those as advanced as structural equation modeling, which subsumes path analysis, OLS regression, ANOVA, and others is that it is extremely difficult to test the interaction among latent variables. The results from agent based models allow for addressing system aspects that these other models have not; such as transient, nonequilibrium conditions and dependence on initial conditions, which is the intent of this study (North & Macal, 2007).

### THE ODD PROTOCOL

Verification testing of this model was conducted by observing the outputs of the model at the extremes of the simulation to ensure that the results moved in predicted directions. Validation of the model involved comparisons of the model outcomes to a series of case studies involving counterinsurgency operations and the delivery of development aid. The case studies utilized included:

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- Police in the lead with military support or vice versa (Sepp, 2004).
- The timing of development aid delivery vis-à-vis the stage of the counterinsurgency campaign – either early or late (Barlow, 2010).
- The integration of local population into security forces – either high or low (Barton, 2010; Megahan, 2010; Sepp, 2004).
- The level of local population inclusion in development aid delivery – either high or low (Brinkerhoff, 2010; Guttieri, 2010; Pimbo, 2010).
- The level of local institutional development - either high or low (Brinkerhoff 2010; Pandya, 2010; Sepp, 2004; von Hippel, 2010).
- The level of security from violence - either high or low (Guttieri, 2010; Sepp, 2004).
- The level of local population cooperation with counterinsurgency forces vis-à-vis the insurgents - either high or low (Galula, 1964).
- The level of coordination with government agencies – either high or low (Curry, 2010; Szayna, et al., 2009).
- The propensity to operate independently from other organizations either NGO or governmental - either high or low (Curry 2010).
- The religious affiliation of the NGO – either affiliated with the local religious majority, minority, or secular (de Haan, 2009; Flanigan, 2010).

The case studies also informed the initial settings and ranges of the model variables in the simulation.

## **Purpose**

This study tests two hypotheses. First, that a high level of coordination between military and NGO operations, and the subsequent positive affect engendered in the population, can be a force multiplier in the effort to bring stability to a strife torn region. The second hypothesis being that a “surge” of Western personnel, either military or a combination of military and support personnel, will have a positive impact on security and therefore increase the positive affect engendered in the population by the Western intervention. The research question is: “Does the positive affect generated by a high level of coordination between military and NGO activities have a force multiplying (nonlinear) effect?” and “What is the impact of a surge in the numbers of international forces in the region?” Further conditions examined are: “Does the level of violence present in the area of operations, or the levels of legitimacy of the indigenous government have an impact on the levels of effectiveness – if any – derived from this military-NGO coordination?”

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