Chapter 8
Discrete Event Modeling and Simulation of the Mythical Thought Morphodynamics Involved in Claude Levi Strauss Structural Analysis

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ABSTRACT

In this chapter the authors present an exploration into the potential benefits of deploying structuralism analysis in the framework of human and social sciences using computer science modeling and simulation concepts and tools. They describe in detail in this chapter object oriented modeling and simulation software allowing the analysis of folktales. This software is based on the DEVS (Discrete Event System specification) formalism in order to both propose the modeling of a given myth issued from the oral literature of a given culture and the simulation of the corresponding myth transformations as described by Claude Levi Strauss when he dealt with mythical thought. The resulting software has been realized using the PythonDEVS kernel. The validation of the implemented software is performed on a set of folktales issued from corsican mythology and a set of myths from South and North America taken from Claude Levi Strauss's Mythologiques book series.

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INTRODUCTION

We present in this chapter an exploration into the potential benefits of deploying structuralism analysis in the framework of human and social sciences using computer science modeling and simulation concepts and tools. Beyond the search for technical tools for the human and social sciences, the proposed study envisions to deal with two major epistemological problems using modeling schemes derived from computer science: (i) the problem of deploying a structuralism approach for cultural artifacts analysis and (ii) the problem of folktale generative process according to mythical thought (see key terms and definitions section) (Levi Strauss, 1955; Levi Strauss, 1963; Levi Strauss, 1966).

The most original point in the presented work is that it investigates a still unexplored field at the junction between culture and information technology: we propose to develop a software approach in order to analyze a set of myths or folktales belonging to a given geographical zone according to the concepts developed by Claude Levi Strauss in the framework of structural anthropology (Levi Strauss, 1955; Levi Strauss, 1963).

There are several reasons which justify the definition of a software approach for solving such kind of problem. The use of a computational approach in order to perform a structural analysis of myths will allow the analysis of a great number of tales belonging to a given culture which could be difficult to do manually. Furthermore since the resulting software will be a generic one, it will be possible to take into account a set of completely different cultures. Finally a formal approach based on a mathematical basis could be used to propose the validation of hypothesis set up by researchers in anthropology. The simulation feature of such an approach will allow an automatic validation of the set of hypothesis.

Several generic tools allowing the execution of modeling and simulation of complex systems have been developed in different applications dealing with industrial processes modeling. We can classify them according to three categories: (i) industrial tools whose main representative tool is Matlab/Simullink; (ii) modeling languages (whose main representative language is Modelica) allowing the simulation of systems containing mechanical, electrical, electronic, hydraulic, thermal, control, electric power or process-oriented subcomponents; (iii) DEVS (Discrete EVent Specification: see key terms and definitions section) tools allowing the modeling and simulation of complex systems:

1. Matlab/Simullink (Dabney & Harman, 2001) is a commercial tool used in numerous scientific domains. This simulation tool is very efficient and simple to use because it is based on a modular and graphic definition of models.
2. Modelica (Tiller, 2001) is an object oriented language which allows the modeling of complex large systems. It has been developed for multi-domain modeling (robotics, automatic, aerospatial applications).
3. The DEVS (Discrete Event Specification) formalism (Zeigler, 1996) defined in 1976 by Prof. B.P. Zeigler has led to a set of software developments allowing to both implement DEVS model and simulate them according to B. P. Zeigler's theory (Zeigler, 1990). Because the efficiency of B.P. Zeigler's theory, DEVS modeling and simulation toolkits have been implemented in order to deal with complex systems. We may mention a non-exhaustive list of tools which enable modeling and simulation based on the DEVS formalism: ADEVS (Naturo,1996), DEVS/HLA(Saroughian & Zeigler, 1998), DEVSJAVA(Saroughian & Zeigler, 2000), JDEVS (Filippi & Bisgambiglia,2004), PythonDEVS (Bolduc & Vangheluwe, 2001), CD++ (Wainer, 2002), VLE (Ramat & Preux, 2003), DEVS-Scheme (Zeigler & Kim, 1995), DEVSC++ (Zeigler, Moon & Kim,2001).