Chapter 1
In Favor of a Model of Didactic Ergonomics

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OBJECTIVES OF THE CHAPTER

This chapter will try to answer the following questions:

- How can the complex reality of distance language learning be accounted for?
- How can former models of language learning contribute to a better understanding of distance language learning?
- How can a didactic ergonomics model give a more accurate representation of the situation?
- How does didactic ergonomics fit into current CALL research?
- What essential components does the didactic ergonomics model highlight in the computer-mediated language learning situation?

This first chapter will introduce the didactic ergonomics approach and present the related computer-mediated language learning model.

We will first consider how to tackle the problem of describing reality in all its complexity, as originally developed by Edgar Morin (1990). The initial review of theories will contribute to a better understanding of the nature of complexity and will eventually lead us to advocate a multi-referenced approach to learning. We will then proceed to define the concept of didactic ergonomics (Bertin 2000, 2001). We will show how the original didactic ergonomics model we suggest is articulated with current CALL research and how it can help bridge the gap between theoretical description and actual practice in the field.

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THEORIES OF COMPLEXITY:
AN OVERVIEW

This review will help us outline the main approaches to complexity and the way to tackle the problem of the description of reality. We will here combine theoretical and methodological references deriving from several academic disciplines to consider how each can contribute to a common conceptual framework based on the systemic and interactionist paradigms. This dual perspective will then be applied to the educational field and to the problem of ICT integration. This approach to complexity will help us better understand how the various actors of a distance language learning environment interact.

Systemics

Origin of Systemics

The systemic approach in education derives from research on the general systems theory. This theory was originally elaborated by the group of American researchers formed by the biologist Ludwig Van Bertalanffy, the economist K. Boulding, the biомathematician A. Rapoport and the physiologist R. Gérard. From the 1950’s to the 1970’s, it rapidly spread around the world and influenced new disciplines such as psychology, psycho-sociology, sociology and political sciences. According to Le Moigne (1977), another origin of systemics may be found in cognitive psychology, artificial intelligence and social psychology.

Numerous other fields such as communication and information sciences or engineering and education sciences contributed to enlarge the general systems theory up to the 1980’s. The proponents of systemics base their approach on a criticism of Cartesian rationalism, sometimes called ‘analytic perspective’ or ‘Aristotelian conception’, felt to be reductive. Their main argument (Checkland, 1981; Commoner, 1972; Fourez, 1974; Kerlinger, 1964; Le Moigne, 1977; Watzlawick, 1980) is that complex systems cannot be understood with the experimental method. This method assumes a system can be explained by the study of its isolated components. The increased complexity of our world requires a new and more appropriate approach. The influence of present technology at the local as well as the global levels constitutes a limit to the experimental method.

For Lemoigne, systemics pursue the following goals:

- further the understanding of the universe conceived as a system;
- provide a model of complexity;
- identify concepts, laws and models that can be applied to a variety of different systems;
- conceptualize artifacts or tools (Lemoigne, 1977).

Table 1 borrowed from De Rosnay (1975, p.110) compares the two types of approaches.

Lapointe summarizes the situation as follows:

*Analytic and systemic approaches are based on distinct epistemological foundations, offer different perceptions of reality, develop their own methodologies and involve objects presenting different levels of complexity*. (Lapointe, 1993, p.4)

General Systems Properties

To be recognized as such, a system should present a set of properties listed in Table 2, based on Le Moigne (1974, 1977, 1979), De Rosnay (1975), Morin (1977, 1980, 1986) and Lapointe (1993).

System Properties and Educational Technology

Let us now consider how the three systemic dimensions of the previous table can be applied to the computer-mediated learning situation.
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