

Book Review

Modeling Love Dynamics by Sergio Rinaldi, Fabio Della Rossa, Fabio Dercole, Alessandra Gragnani and Pietro Landi. Singapore: World Scientific, 2016, ISBN 978-981-4696-31-9. 241 pages.

Co-evolution has a long modelling history in nonlinear dynamics, perhaps starting with the Volterra-Lotka equations (Wangersky, 1978). Actually, following their modelling point of view, love might be considered as a special case in coevolution.

In their new book *Modeling Love Dynamics*, Sergio Rinaldi and co-workers propose an interesting collection of models, reflections and directions for possible new developments. The book is well written and a pleasant reading. It can be accessed at different layers of cultural depth and technicality. This book comes after decades of work devoted by Sergio Rinaldi and his collaborators to this area of interest (Rinaldi, 1998; Rinaldi & Gragnani, 1998a, 1998b; Rinaldi, Rossa, & Dercole, 2010).

As the Authors describe it, “these models allow us to formally derive, in agreement with the basic principles of the psychology of love, how love affairs are expected to evolve from the initial state of indifference to the final romantic regime.” As they note, modelling in formal or metaphorical ways is pervasive in our everyday life. Therefore, different modelling techniques have been considered: pragmatic, conceptual, simulations or toy or minimal models.

Some models can be local, while others can be more general (in space or time). Some of them can be correlated to time series and empirical measures; others can be just simulated on computers or conceptually. The most frequently used conceptual models are composed of a finite number of ordinary differential equations (ODEs), one for each variable. In their book the authors present several conceptual models used in the last decades to describe the development of love affairs. These models have been mostly produced by Rinaldi et al. as the book does not include a systematic review of the many other scientific publications produced in the same area.

The authors clarify that some of these models are, actually, oversimplified, given the intrinsic complexity of phenomena characterizing interpersonal relationships. They usually aim to capture the involvement of an individual by means of a single variable, called feeling (or love). Thus, simple conceptual models of couple relationships are usually composed by two ODEs, one for each individual.

As the authors note, this extreme simplicity prevents a rich variety of interesting details to be considered. We might ask how can love, such a complex

stream of bio-psycho-social variables, could be clustered as a single variable? Nevertheless, this was the way a line of papers on love dynamics was started by Steven Strogatz (1988) with a now famous “mathematical recreation” on Romeo and Juliet.

This was, as he explained, just to raise the interest of his students about his teaching of differential equations. These models, based on two ODEs, deal with a simple balance in production and consumption of love.

The authors here claim that “in accordance with the basic and well established principles of the psychology of love” the “production flow” is a reaction to the expectation of care from a partner. They also declare that their “psychology of love” is formed by two components: involvement and appeal which include several relevant variables such as beauty, age, social position, wealth, etc. This is quite a remarkable step in their construction but unfortunately at this point references to “the psychology of love” are not as detailed as we would have expected. Actually, most of psychologists studying the psychology of love agree that investigators should share a common vocabulary and the same conceptual toolbox (Berscheid, 2010).

This step highlights one of the main vulnerabilities of a book project with strengths. An interdisciplinary work would perhaps have helped to build on stronger and established psychological foundations. It is unclear, therefore, how much the Authors were fully pursuing a scientific project or, as Strogatz and some of his followers considered, modelling love was just a mathematical recreation. It isn't fully clear if Rinaldi et al. are taking a strong or a soft epistemological stance in their project. They state that “the aim of this book is, in a sense, to show how the evolution of a love story can be virtually predicted from the behavioral characteristics identifying the different categories to which the individuals belong. The identification of micro-macro links of this kind has always been an important issue in the social sciences.” (p. 10). However, as they use a quantity of artistic materials (films, poems etc.) to derive their models and not real life time series, this is certainly more in the direction of a soft science approach. They seem to oscillate between a serious scientific aim of modelling the bio-psycho-physics of human bonding, while in some parts of the book they seem to follow a more playful approach a-la-Strogatz. Perhaps they acknowledge some uncertainty when they mention at times that “some psychologists may disagree with our oversimplified discussions and some mathematicians may find the presentation of some issues somewhat sloppy” (p. 18).

As we know, these are the risks of any interdisciplinary work but we are not sure if these possible vulnerabilities of their ambitious project have been addressed as expected. We might take the opportunity here to highlight again, as in the first notes, that love relations are a special case in human relations. Therefore, the authors in this book are dealing with the potentially serious project of mathematical models of human relations. Talking about love and using art or films as examples of it as they do, might make the topic more interesting for the general public. As a positive note, we might add that through different chapters

the mathematical models they use get more complex. The first part of the book is devoted to simple models, while in the second part the authors deal with complex love stories involving more than two individuals, multiple emotional dimensions or lovers influenced by the turbulence of their social environment. The book is certainly worth of attention for its potential interest in different areas of social sciences, while its core topic is now waiting for a more systematic and multidisciplinary approach.

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