

love dynamics

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1 Introduction

2 Secure-secure interpersonal relationship model

We start with the model given in [1] that describes the interpersonal relationship between two secure individuals in terms of the amount of affection of each of the involved. This statement is formed by three great processes: oblivion O_i , return R_i and instinct I_i which promotes changes in the amount of individual's affection feelings represented by x_i and $i = 1, 2$, that is,

$$x_1' = O_1 + R_1 + I_1, \quad (1)$$

$$x_2' = O_2 + R_2 + I_2, \quad (2)$$

where functions x_i are derivated respect to time t . When $x_i > 0$, means the i -individual possesses a positive amount of affection that could be love, appreciation, esteem, affection, or companionship. On the other hand, when $x_i < 0$ represents a negative amount of affection, namely envy, hatred, and contempt.

The oblivion function is $O_i(x_i) = -\alpha_i x_i$, reflecting an exponential decay in the i -individual's affection feelings assuming the absence of the partner x_2 and α_i is the oblivion coefficient. The instinct functions are constant, $I_i = \gamma_i A_j$, where A_j is an attractive characteristic of the j -individual (health, social status, cultural background, education level, social skills, etc.) and the coefficient γ_i represents the value that the i -individual gives to A_j . Along this work, $A_j \geq 0$, a quantity corresponding to the level of way living on this human characteristic and γ_i indicates if this attractive characteristic counts for or against to increase the affection in i -person. The return function $R_i(x_j)$ describes the reaction of the i -person to the affection given by the j -person and qualitatively is a monotone increasing sigmoidal function satisfying $R_i(0) = 0$, with an upper and lower bounds.

Unlike [1, 2], we propose in this work a simpler return function which allows us a better algebraic manipulation and a deeper analytic treatment, and it is given by

$$R_i(x_j) = \frac{\delta x_j}{\beta + |x_j|},$$