

Sur les travaux mathématiques d'Elie Bernard-Weil

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**Moulin d'Andé,
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Elie Bernard-Weil



photo transmise par Mme Huguette Weil

Elie Bernard-Weil



Elie au Moulin d'Andé en mai 2006

Elie au colloque “Artisans de la Paix”, 2005-2006

Elie BERNARD-WEIL, endocrinologue et psychiatre.

Le schéma dynamique de la science des systèmes qu'il a créé, a été l'objet premier de sa recherche : la bipolarité de tous les systèmes biologiques et la possibilité de les corriger par des bipolarités thérapeutiques. Ce qui veut dire qu'il s'est engagé dès l'Internat dans l'étude de ce qu'il a appelé plus tard les systèmes ago-antagonistes.

Ancien Chef de clinique à la Faculté, il a travaillé au confluent de la clinique, de l'expérimentation, de la biomathématique et de l'épistémologie, ce qui l'a amené à définir les principes des thérapeutiques “paradoxaux” et à en proposer quelques exemples. Il est aussi Docteur ès Sciences en mathématiques, a été nommé Professeur au Collège hospitalier Pitié-Salpêtrière et élu Président d'Honneur du Comité “Systémique et Cognition” de l'AFCET, lieu de la confrontation des disciplines les plus diverses.

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ORIGINAL

EVALUATION OF AN ANTIDIURETIC EFFECT IN CANCER

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Hôpital de la Pitié, Paris*

E. Bernard-Weil, Gilbert-Dreyfus, M. David, M. Sachs, J. Sebaoun,
The Lancet, volume 290, p. 324-326, août 1967.

Couple ago-antagoniste

**Analogical Study of a Model for the Regulation of
Ago-Antagonistic Couples. Application
to Adrenal-Postpituitary Interrelationships**

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Communicated by R. Lattès

E. Bernard-Weil, M. Duvelleroy, J. Droulez.
Mathematical Biosciences, volume 27, p. 333-348, 1975.

Couple ago-antagoniste (*ii*)

MATHEMATICAL MODEL AND FUNDAMENTALS OF SIMULATION

The mathematical model which gave rise to the simulation processes was the following one:

$$\begin{aligned}\frac{dx}{dt} &= k_1(x-y) + k_2(x-y)^2 + c_1(x+y-m) + c_2(x+y-m)^2, \\ \frac{dy}{dt} &= k_3(x-y) + k_4(x-y)^2 + c_3(x+y-m) + c_4(x+y-m)^2,\end{aligned}\quad (1)$$

with $k_1, k_2, k_3, k_4, c_1, c_2, c_3, c_4$ and m constants. It was in fact a combination of two previously studied models, one corresponding to the so-called "cross" regulation system [control of $(x-y)$], the other to the so-called "parallel" regulation system [control of $(x+y-m)$]:

Dynamique des systèmes du couple ago-antagoniste (x, y).

Couple ago-antagoniste (iii)

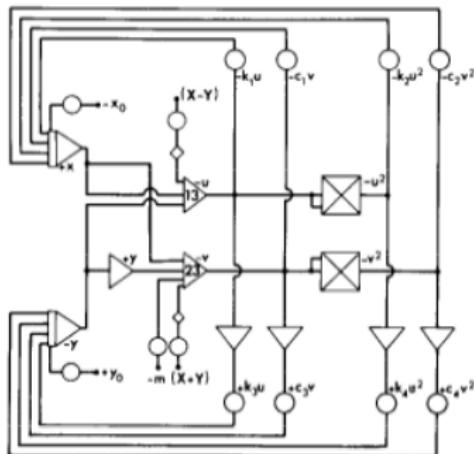


FIG. 1. Analog setup for Eq. (1).

Représentation analogique de la mise en œuvre
de la résolution du système différentiel

Couple ago-antagoniste (iv)

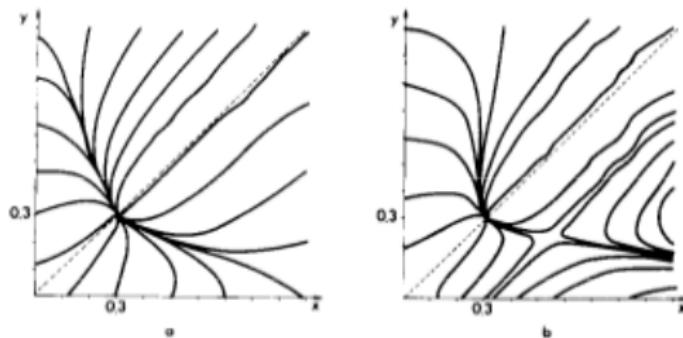


FIG. 2. Stability of the model according to the parameter values (cf. pot values in the Appendix). Both models are efficient for the control of x and y ($x_{\infty} = y_{\infty}$, $x_{\infty} + y_{\infty} - m = 0$ with $x > 0$, $y > 0$, $m = 0.600$). But the first one alone plays its role for all the initial conditions used.

Portrait de phase de la solution du système différentiel

Couple ago-antagoniste (v)

AGO-ANTAGONISTIC COUPLES

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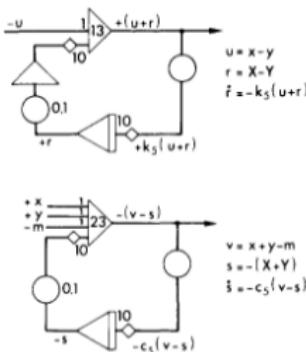


FIG. 3. Added analog setups for the self-correction of an imbalance ($x \neq y$ and/or $x + y - m \neq 0$). From r and s , it is possible to establish the values of $X(t)$ and $Y(t)$ which are the system inputs we must use to correct such an imbalance. The added setups would be then suppressed and X and Y produced with other appropriate setups (cf. text). Recall that the balance is not defined in these conditions by $x = y$ and $x + y - m = 0$, but by the Eqs. (5) and (6).

Réglage analogique de la loi de commande

Couple ago-antagoniste (*vi*)

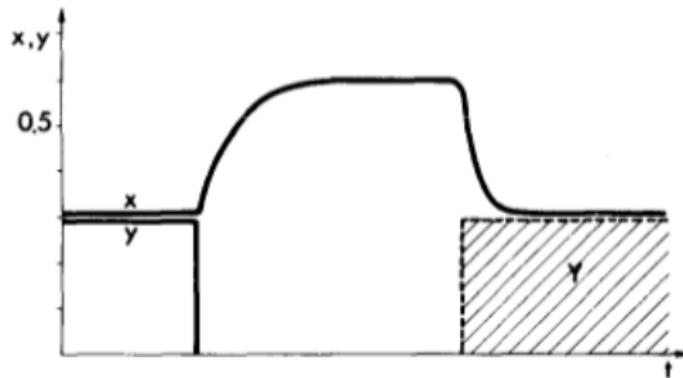


FIG. 5. Physiological model: after suppression of y (adrenalectomy), x (vasopressin) increases. The addition of Y (adrenocortical therapy) led x to return to its initial value.

Evolution ago-antagoniste typique ; l'évolution couplée de la vasopressine et de l'adrénalectomie n'est pas du tout intuitive !

Couple ago-antagoniste (*vii*)

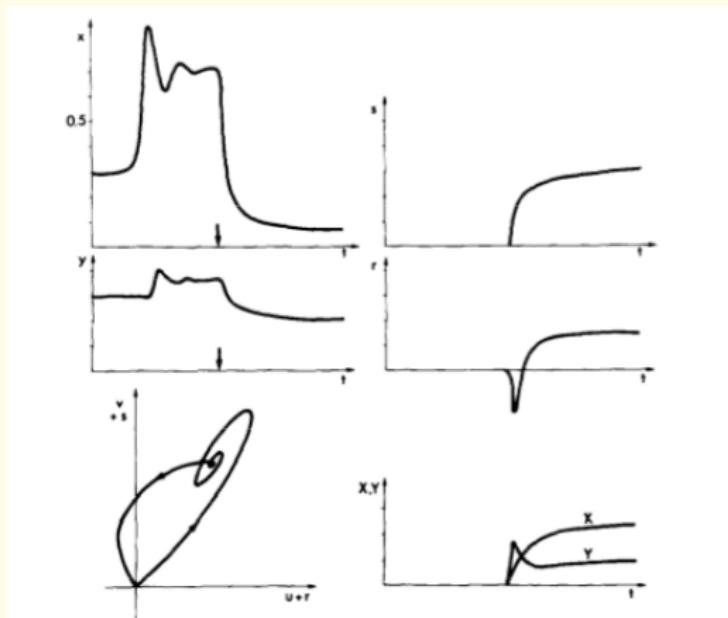


FIG. 12. Pathological model: the addition of corrective assemblies (cf. Fig. 3) permitted finding the values of $X(t)$ and $Y(t)$ which can counterbalance the effects of the disequilibrium shown in Fig. 11, according to Eq. (7). The assemblies begin to act at the time indicated by the arrow. Variations of x and y [and of $u+r$ and $v+s$ ($u=x-y$, $r=X-Y$, $c=x+y-m$, $s=X+Y$) in phase-plane representation] under the influence of these new inputs demonstrated that the desired results were obtained. Therapeutic implications of such a strategy have been explored.

modèle pathologique

Couple ago-antagoniste (*viii*)

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ESSAYS & COMMENTARIES

Transcendence, an Essential Concept for System and Complexity Sciences to Spread Out

This article requires the advantages gained by complexity and system sciences when taking into account the concept of transcendence with that of immanence. A special branch of systems sciences using the so-called model for the regulation of agonic antagonistic couples seems to be well suited to this purpose. The main objective is to bring new solutions concerning the conceptualization of complexity and to propose control strategies for unlabeled complex systems based on this type of modeling.

Immanence at the Expense of Transcendence?

Quand aucun transcendence n'existe pas, le sentiment le plus secret et le plus poignant devient que le système, toutefois, n'a pas pour vocation d'assurer l'immortalité. (Makoto Matsuura (1995) as quoted in the book *Immanence and Transcendence* (1998). The main idea is that the essential idea and most poignant feeling is the following: how not to think of the essential!)

RÉF. BERNARD-MILL

INTRODUCTION

System today, including system sciences, has as a general rule chosen the immanence concept at the expense of that of transcendence. A moment of the past, when the systems sciences were still in their infancy, it was thought that these choices had been built from the notions of pairs or couples, for instance, the part-whole pair or tangled hierarchy! Nevertheless, a prevalent and common tendency of all the researches in the field of systems sciences seems to be to be almost devoid of all consideration as a basic compact of the human mind today. For instance, the fact that the system's evolution could be observed by the concept of a task to be performed, by what has been called a "blueprint" has gradually been left aside. In other words, a ready and explicable unfolding would be sufficient to explain those phenomena.

In this article, we will first recall some remarks concerning the concepts of self-organization and emergence, which remains a valid statement, provided they are

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au Moulin d'Andé en juin 2008

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