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International Monetary Flows of Non-Declared Origin

This dissertation is submitted to the University of Cambridge to Fulfil the Requirements for the Degree of Doctor of Philosophy

April 2008

Extrait p. 17-18 :

In the thesis are used the approach and terminology of Daniel Parrochia (*Penser les réseaux*, 2001), namely *a coherent and ordered distribution in space of a plurality of relations*. Criminal systems are examples of *self-organised criticality* because of tensions within the networks, between the networks, and between these and_the socio-legal environment. The thesis also draws on the work done, in Physics, by Gustav Robert Kirchhoff in the 19th C. in particular *the junction theorem* ("current into a junction equals current out of the junction" i.e. flow conservation in each network vertex) and *the loop equation* (also known as his circuit rules: input minus work minus dispersal equals zero). I apply Kirchhoff to criminal networks, in particular narcotic drugs organisations, but only for illustrative purposes.

Extrait p. 86-91 :

3.3. Networks

The French scholar, Daniel Parrochia, in his recent volume on networks, stipulated that a network is *A coherent and ordered distribution in space of a plurality of relations*.[1] It could be argued that criminal networks fit extremely well with this topological definition. Criminal networks are, furthermore, self-repairing and they are, I would argue, prime examples of *self-organised criticality*.[2] For instance, consider the super-abundance of possible neural pathways from a given point to another given point, which was developed by the US military to ensure information and communications survival after a hostile, military attack on the United States and that led to the development of the Internet. This state of affairs can, *mutatis mutandis,* be used to describe criminal networks, their national and international modes of co-operation, the functioning of money laundering structures, and, perhaps, the operation of terrorist networks. It is argued in the following that criminal networks are *self-organised critical systems* because of the tension between the elements in the system itself, between the system and similar systems, and between the system and its legal and socio-political environment. As I show below, it is clear that a minor event can have a major local or even global effect, which lends emphasis to my postulate that such systems are in a critical state. This intrinsic state of affairs is exacerbated by the lack of an external conflict

[1] "Relations" translates the French *liaisons*. Daniel Parrochia, "La rationalité réticulaire", *in* Daniel Parrochia (ed.) (2001, 13)

[2] This concept is described in *Introduction*, under "Methodological Considerations" and is exemplified and further discussed in section 3.4.

resolution mechanism; nevertheless, the magnitude of the disturbance will be absorbed by the self-repairing property, which characterises such systems. In this respect and, I believe in other respects, too, it is more helpful to compare criminal networks with organic, self-repairing, horizontally organised organisms rather than with the vertical command structures, which are most often taken as their paragon.

Network theory has identified two laws, which obtain and that apply to the rheological aspects of networks, i.e. they are conditions for the flow within networks, sc. *Kirchhoff's First* and *Kirchhoff's Second Law* of networks, known, respectively, as the *junction theorem* and *the loop equation*.[3] Kirchhoff's First Law, the junction theorem, states that the sum of the currents into a specific junction in the circuit equals the sum of the currents out of the same junction; in other words, it postulates flow conservation in each network vertex. The Second Theorem in a very simplified form states that "All the energy imparted by the energy sources to the charged particles that carry the current is just equivalent to that lost by the charge carriers in useful work and heat dissipation around each loop of the circuit".[4] The crucial question, on this background, is if, when attempting to apply network theory to organised crime, the two Kirchhoff laws apply, albeit "metaphorically", since Kirchhoff is applied to electricity flows, while I am attempting to apply them to social networks. As far as the first law is concerned, this will quite obviously depend on the definition within organised crime theory of "vertex", which in its normal acceptation is taken to mean an apex or the high point of something; in flow theory, rheology, this high point is understood to mean the junction.

It should be stressed that Kirchhoff's theorems are here being applied to criminal networks engaged in illicit traffic by way of an analogy. It is argued, however, with reference to Peter Geach's wise words placed as a vignette at the beginning of this chapter, that the analogical extension of the concept of *network* has not been carried too far. Nevertheless, the photography, which as an illustration is incorporated in the title page to chapter 2 (funds seized, 11 August 2007, Mexico), vividly illustrates the network theory here exposed. The—from the point of view of the traffickers—embarrassing presence of these funds demonstrates that one of the vertices in the network, the money laundering or in general the financial engineering function, did not work efficiently. The malfunctioning, from a criminal point of view, is due to a violation of Kirchhoff's First Law, the junction theorem, which states that the sum of the currents into a specific junction in the circuit equals the sum of the currents out of the same junction; in other words, it postulates flow

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[3] Gustav Robert Kirchhoff (1824-1887), German physicist.

[4] "Kirchhoff's circuit rules". Encyclopaedia Britannica (2007).

conservation in each network vertex. In this case, malfunctioning has occasioned the accrual of funds in a way one might compare with the use of a gardening hose. If the input (from the tap) is larger than the outflow (from the nozzle), the water will, by necessity accumulate inside the plastic hose—until an eventual puncture. Metaphorically[8] the inputs (the tap) are the funds created by the illicit traffic in narcotic drugs; the hose is the criminal network; and the nozzle the money laundering or financial engineering function.

Box 3. 2. Criminal Networks and *Kirchhoff's Theorems*

$$(C_{nx} \times Q_{nx}) - L_{nx} - F_{dep.nx} - F_{dis.nx} = 0$$

where

C_{nx}: cost of "product" (e.g. drugs or humans) at the point of entry into network n_x

Q_{nx}: Q_{nx}: mark-up quotient in network n_x, i.e. (cost of purchase + transaction cost + profit) / (cost of purchase + transaction cost)

L_{nx}: product lost (at cost) in network n_x

$F_{dep.nx}$: funds deposited by network n_x

$F_{dis.n}$: fund disbursed by network n_x

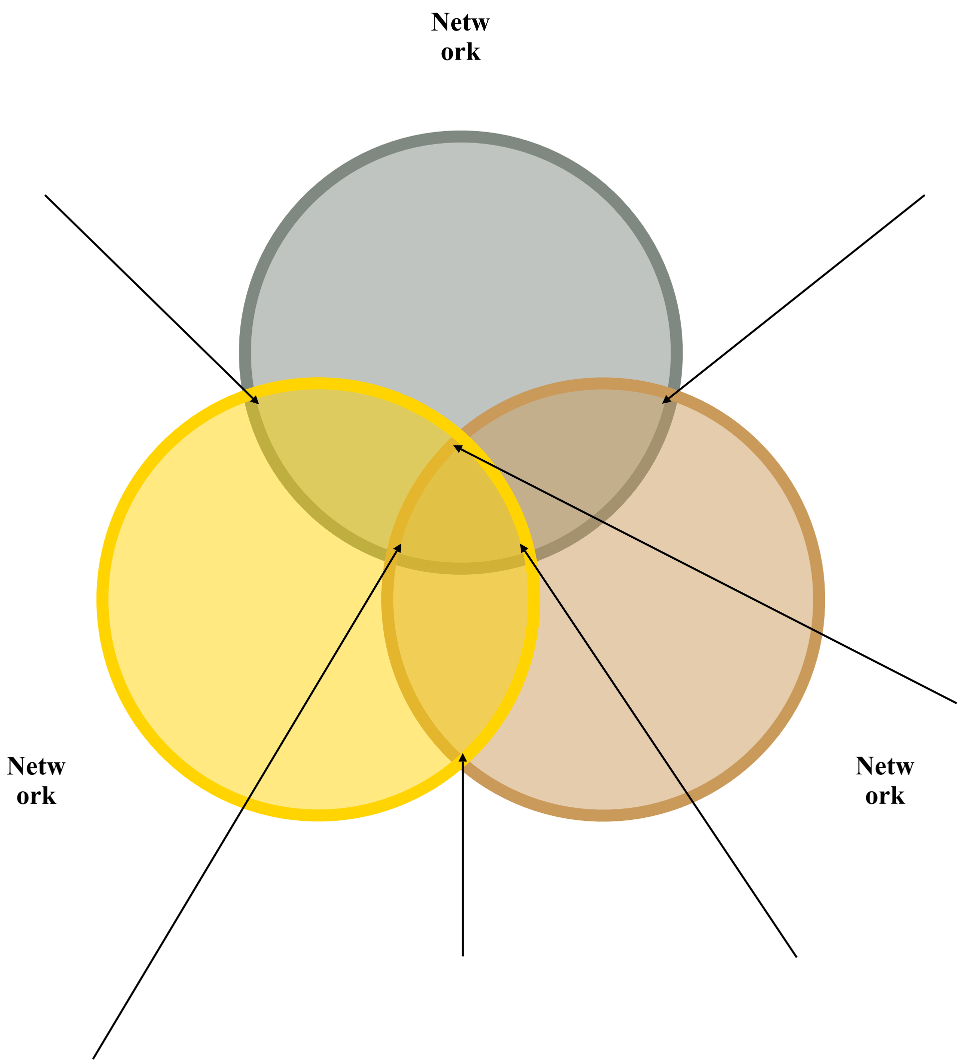
Note that n_x is just one of the networks making up the overall network, *n*.

It can obviously be argued that the equation in box 3.2 is trivial and it is, indeed. All it says is "money in minus money spent minus money invested equals zero". But is that not exactly what Kirchhoff's Second Theorem states, sc. that the energy in an electric system used for useful work plus the energy lost to heat dispersion equals the initial energy injected into the system. Therefore, however trivial the equation in box 3.2 and Kirchhoff's Second Theorem may be, the analogy between the two is clear. As noted above, the analogy with Kirchhoff's First Theorem very much depends on one's definition of vertex or junction.

Inside each criminal network, n_x, of the larger criminal network, *n*, there are a number of circuits, for example an enforcement group, a counter-surveillance group, etc. Although these very much are part of the criminal organisation, from a network point of view, it may be better to assign their expenditures to $F_{dis.nx}$, funds distributed by network n_x rather than to consider them circuits making up the individual network. In this sense they become the equivalent of "heat lost to dispersion" in Kirchhoff's Second Theorem.

In figure 3.3, individual circles represent networks, e.g. n_y. n_x, and n_z. Each network is *acephalous*. The points, where the perimeters of the circles intersect with each other, are called *nodes*; they are indicated by arrows in the figure and I argue that

Figure 3. 3. Networks. *Olympic Rings* Representation



they are polycephalous. Below, I shall argue the point that the networks are in a state of self-organised criticality and that they are self-repairing.

The polycephalous nodes consist not of so-called *kingpins* but of information and—to a certain degree—of power brokers and agents, i.e. of those agents, who manipulate information rather than product (drugs, humans, organs …). The acephalous part of each circle consists of national "groups"; these are not hierarchically organised but operate in a fluid, almost "biological" manner, forming and dissolving relationships, following their best interests in the circumstances prevailing at that particular moment. Only at the nodes, e.g. where a local distribution network needs to enter into contact with a transportation structure, a money laundering structure, or a lobbying (corruption) structure, i.e. when the individual rings form nodes, does one see an aggregation of information and the nodes become polycephalous, albeit often—*inter alia* for security reasons—only for the time necessary to execute the required illegal or illicit operation.

For the sake of clarity and precision, it should be stressed that strict network theory demands *miscibility*, i.e. that the flows are indiscriminate and, therefore, that they can pass through any circuit.[5] This will only very rarely obtain in a societal context. For instance, in respect of drug trafficking miscibility may be an obtainable goal in most of the sub-networks, as disparate flow forms can all be transformed into one, sc. currency; in some, however, e.g. the lobbying or corruption sub-network, this is not the case.

Parrochia also introduces the two concepts, *The Theorem of Compatible Flow* and *The Theorem of Maximum Flow*. The former states, according to Parrochia, that a necessary and sufficient condition for the existence of a flow is that the capacity of the exit vertex is equal or superior to the capacity of the entry vertex. He defines *The Theorem of Maximum Flow* as the flow that saturates the vertex with the smallest capacity.[6] The first theorem, the Theorem of Compatible Flow, as defined by Parrochia, fits organised crime admirably: indeed, a flow in this context can only exist if the outlet capacity is equal to or larger than the input capacity. This formulation sounds very learned, but if one were to consider flows of water instead of flows of electricity,

this point of this theorem becomes clear. If one were to pump more water into a plastic hose than could be discharged from the aperture of the hose, the sink, the result would initially be a swallowing of the hose, in order to store the excess water, and then, once the plastic material could no longer expand, a rupture. The theorem is of particular interest when seen in conjunction with the complementary *Theorem of Maximum Flow*. This rheological theorem has deep applications in the study of organised crime theory, as it states that one should not increase input beyond the capacity

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[5] Parrochia (2001, 18).

[6] *Loc. cit.* Prof. Imre Leader of Trinity College, University of Cambridge, has drawn my attention to the fact that this theorem is more commonly defined in a different manner. For the purpose of the present discussion, Parrochia's definition, even if perhaps idiosyncratic, has been retained.

of the smallest intermediary or, of the final vertex in the system. On the one hand, in the case of drug trafficking, for example, a violation of this theorem would lead to saturation of the drug marketplace, lowering of the quotient, i.e. the profit mark-up, and would, possibly, entail a deterioration of discipline in the marketplace. On the other hand, seizures of very large quantities of cash in the homes of drug dealers prove this point since it shows that the input of cash into a given network, n_x, a sub-network of the overall network, n, exceeds the capacity of at least one of the vertices of the network, sc. the vertex of the money laundering structure. A central part of complexity studies is the concept of self-organising criticality; one should recall that network theory is seen as a part of complexity studies.