Chapter 21. When memory is erased

“One person in our lab was unable to see the effect”

Before talking about this new surprising episode, let us see first how the method of coagulation was improved a few months after the return from Cambridge. Indeed, coagulation was initially assessed with the naked eye and the effect was quantified using a semi-quantitative scale. This way of proceeding had the advantage of simplicity, but it was not very precise and one could blame its subjectivity.

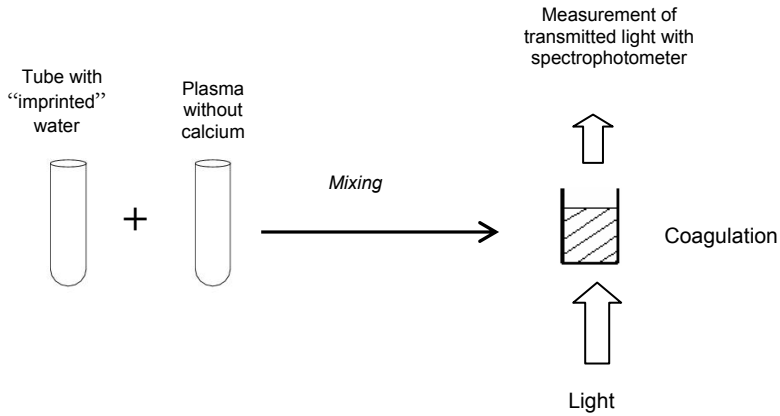


Figure 21.1. Principle of plasma coagulation measured by optical density. Water having received “anticoagulant” information (heparin) and containing calcium (which triggers coagulation) was added to plasma. Coagulation was assessed according to the quantity of light which crossed the sample: the more coagulation increased and the more light intensity decreased. A spectrophotometer (wavelength: 630 nm) measured optical density every 10 minutes.

In order to precisely measure the evolution of the coagulation with time, the technique was adapted for “96-well plates” which are well known in biology laboratories. These plastic plates have 12 rows and 8 columns of small cupules where reagents and cells are placed. The interest for the present experiment is that coagulation could be precisely quantified by an automatic

spectrophotometer. The coagulation was estimated by the measurement of the quantity of light that crossed the cupule: when the coagulation increased, the amount of light that crossed the content of the cupule decreased (Figure 21.1).

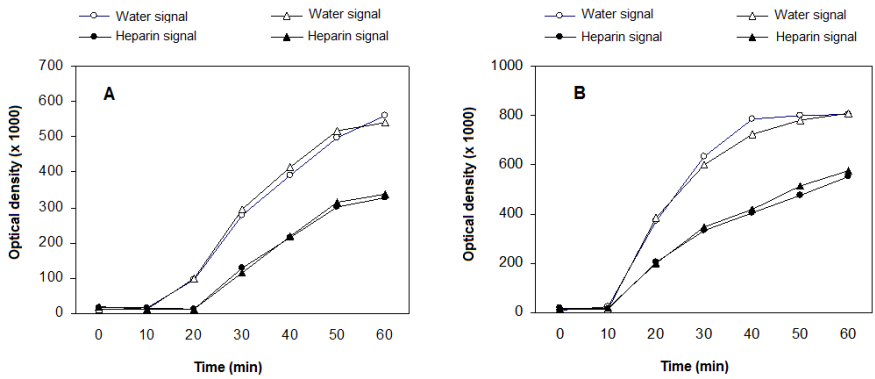


Figure 21.2. Examples of plasma coagulation experiments with digital signals. These two blind experiments were performed on October 19th (A) and October 20th, 1999 (B). The order of both "active" recordings ("digitized" heparin) and "inactive" recordings ("digitized" water) was randomly determined by the computer. The order of the blind recordings was WHHW for the experiment A and WWHH for the experiment B (W = water signal and H = heparin signal). The samples of "informed" water were added to sheep plasma in the presence of calcium. The coagulation was followed by a measurement every 10 minutes during one hour. The good repeatability of the experiment must be noted: very close values were obtained with "signals" of same nature. Moreover, each experimental point was performed in duplicate.

This simple system could consequently be easily reproduced in many laboratories and thus the principles of "digital biology" could be confirmed. Its repeatability in the hands of J. Aïssa was indeed very good (Figure 21.2).

Furthermore, a series of 15 blind in-house experiments were performed from June 24th to July 15th, 1999. Overall, 60 digitized biological activities were transmitted (35 "digitized water" as controls and 25 "digitized heparin"). Except for one "inversion", the success was total. Given these results, J. Benveniste tried to convince "friend" laboratories to reproduce these experiments with "digitized heparin" or with homeopathic pills of "*Heparinum* 30 CH". The method was thus standardized, meticulous protocols were drafted, frozen

plasma was sent to laboratories, visits of training were organized to explain and harmonize the methods.

But, alas, as usual when the experimental horizon of the laboratory of Clamart appeared to clear up, a "troublemaking" effect took place. J. Benveniste indeed noticed that when an experimenter other than J. Aïssa performed the experiment, the results were not as regular and sometimes were not as "expected". Thus, with Larbi Kahhak, another collaborator of J. Benveniste, the results were frequently "inverted". Nevertheless, there was generally a clearcut difference between the various samples and repeated experimental points were consistent. Nothing particularly new with these "classic" inversions.

However, a new "oddity" was observed. Indeed, a new collaborator of J. Benveniste, Soo K. Lim, worked half-time in the laboratory. When she repeated the experiments of J. Aïssa, she observed no effect: there was no difference between the "active" transmissions and the "inactive" transmissions on the kinetics of coagulation. It was neither an "inversion" nor a failing technique; it was not a transient effect either because the phenomenon took its place with its brutal simplicity in the routine of the laboratory. According to the key for reading of the team of Clamart, S. Lim "erased the electromagnetic signals".

It was all the more surprising and spectacular given that the experiment was a model of simplicity. Without any exaggeration, the experiment could be easily performed by high school students during a practical class. No need for a long habit of laboratory techniques or manual skill as it was the case for example with the Langendorff device. It only needed to mix the contents of two tubes and to take samples with a pipette.

One could obviously interpret these results another way by considering that J. Aïssa was the exception or the "anomaly" whereas S. Lim was "normal", as is an experimental "negative control". But this point of view would naturally question the reality of "digital biology". A hypothetical inhibitory effect (erasing) was called in to explain the absence of a hypothetical effect (induced by digital signal) on which "digital biology" leaned on. Figure 21.3 presents an experiment performed during this period that shows how the effect (or rather the absence of effect…) was observed.

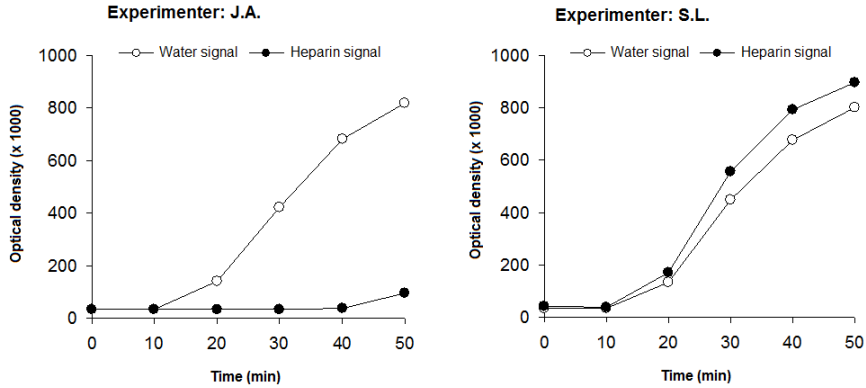


Figure 21.3. Typical example of an absence of effect with an experimenter (S.L.) while a particularly clearcut effect was noticed with another one (J.A.); note that the same reagents were used in both cases (Experiment of March 8th, 2000). The experiment was very simple and consisted in mixing "informed" water with plasma, putting down the mixture in wells with a pipette and then following the evolution of coagulation with a spectrophotometer. This discordance of results between the two experimenters was noticed in an almost systematic way during this period. It was interpreted by J. Benveniste and his team as an "erasing of the signal" by S.L.
Each value of optical density on the figures is the mean of two experimental points.

Moreover, the interpretation of this phenomenon as an "erasing of the signal" was strengthened by a series of experiments performed from November 1999 to the spring of the year 2000 when the team tried to define the characteristics of the "erasing power" of the young woman. Thus, when S. Lim performed the same experiments in parallel with J. Aïssa by using the same reagents, it turned out that the crucial step was when the tube of "informed" water was handled by S. Lim (Figure 21.4). Besides, the "erasing" of the information contained in the sample could be done at a certain distance, without direct contact. Consequently new experiments were set up to assess which materials could "protect" against this influence and to determine the physical nature of this effect. J. Benveniste and his collaborators noticed that the protection of the tubes of water by a muff of mild steel or of mumetal blocked the influence of S. Lim. On the other hand, a protection of plastic was not sufficient and samples that were not sufficiently protected lose their properties acquired during the phase of "imprinting" (Figure 21.5).

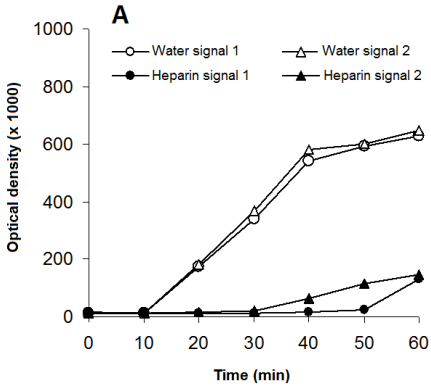
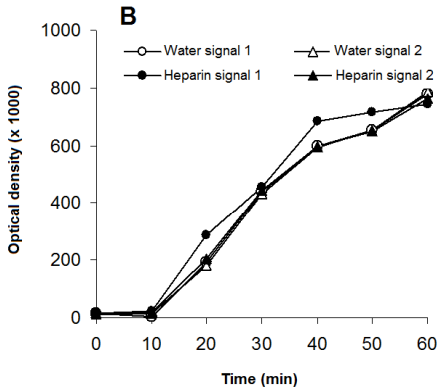


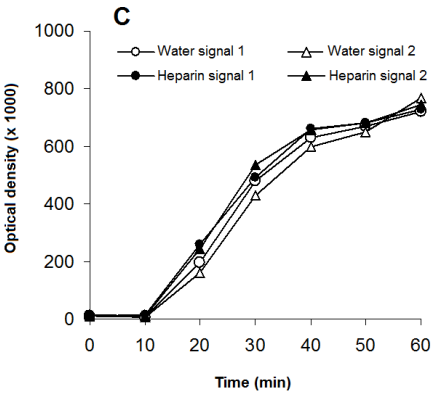
Figure 21.4. Evidence of the "eraser effect" (Experiment of November 4th, 1999).

These 3 experiments were successively performed to specify at which moment the erasing of the "digital signal" occurred. For these 3 experiments, J.A. prepared the materials as well as the "imprinting" of naive water by digital signals ("heparin signal" for 2 samples and "water signal" as control for 2 samples).



A. Firstly J.A. performed the experiment by mixing and distributing the samples in wells. During this time, S.L. remained at a distance (experiment A).

B. Secondly, S.L. was allowed to take the "informed" samples and performed the experiment by mixing and distributing the samples in wells (experiment B).



C. Thirdly, J.A. took the "informed" samples *which had been touched by S.L.* and performed the mixing and distribution of the samples in wells (experience C).

One observed that if the tube which was supposed to contain the "heparin signal" had been touched by S.L. (experience B and C), the results corresponding to "heparin signal" were comparable to those of "water signal". The conclusion of this experiment by Benveniste's team was that S.L. "erased information in informed samples".

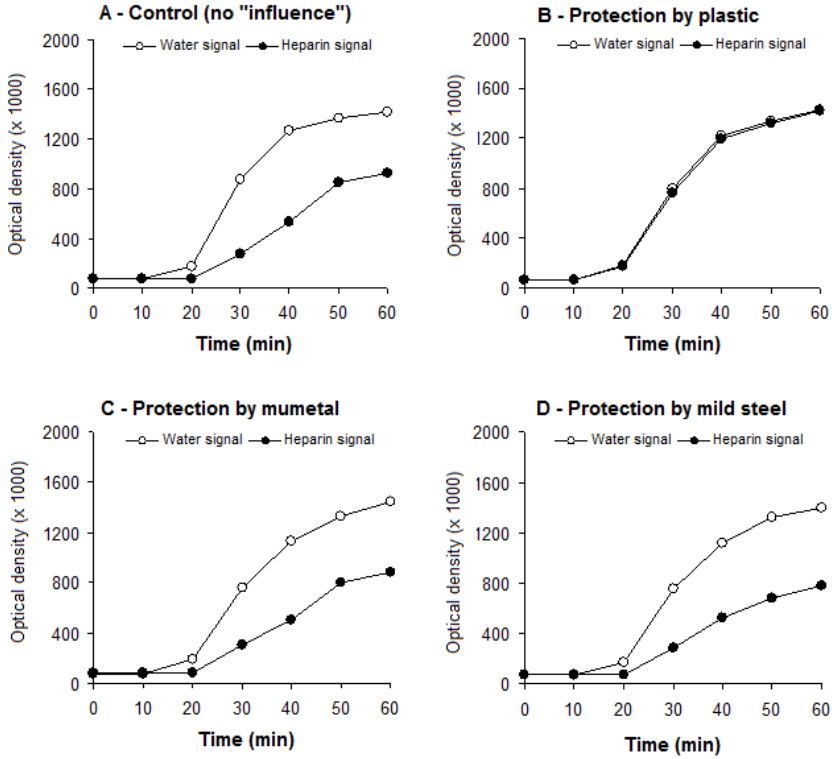


Figure 21.5. Assessment of materials protecting from the "eraser effect" (Experiment of December 20th, 1999). The purpose of this experiment was to assess which materials could block the "negative influence" of S. Lim on the experiments of digital biology. Tubes containing "informed water" were placed in muffs of different materials (plastic, mumetal, mild steel) handled by S.L. Results were as if mumetal and mild steel – and not plastic – were able to block the "negative influence" of S.L.

Previous experiments had shown that homeopathic pills of "*Heparinum* 30 CH" dissolved in water had also a specific inhibitory effect in this *in vitro* coagulation model. Thus, tubes of "*Heparinum* 30 CH" were bought in a pharmacy and the "eraser power" of S. Lim was also demonstrated! It was a discovery that would be of interest the homeopaths and the manufacturers of homeopathic pills if it turned out that some pharmacists – and probably some patients – were also "erasers" of granules…

But, for the moment, the interests of the homeopathy manufactures were not the concern of J. Benveniste. His main purpose was to confirm the effects

of digital biology and the last experiments intended to understand the problem of the "erasing" of the signals made him lose several months. For an experiment which seemed at first sight particularly simple to implement and consequently to reproduce by other laboratories, it was very irritating. In a letter which he planed to send to the researchers wishing to reproduce the experiment), J. Benveniste, having explained the method, recognized this problem:

> "At this point, you must be informed of an important event. In the last six months we have been confronted to a difficulty: one person in our lab was unable to see the effect of the heparin signal which was nevertheless routinely reproduced blind by another operator. An extensive study of this phenomenon has shown that this person was able to erase the electromagnetic signal carried by water up to one meter. This influence is electromagnetic in nature since it is blocked by mumetal, iron, but not plastic or aluminium. The coagulation process by itself remains unperturbed. We have detected the presence of such operator in an external lab, where 8 out of 10 experiments were positive, the 2 negative ones occurring when this person was present in the lab. No other "signal eraser" has been spotted among a dozen lab workers or visitors. [...] This means that in case such phenomenon would occur in one of the participating laboratories, we have set up a protocol able to detect it."

A robot in Clamart

Faced with this "negative influence", J. Benveniste decided to automate the method so that the operator had only minimal contact with the experimental system. It would be ideal if the experimenter had to only push a button to launch the experiment and finally got printed results. Once again, it was an unexpected obstacle that forced J. Benveniste to make a new technological jump intended to avoid a supposed artefact or a "strange effect".

At the end of March 2000, J. Benveniste and D. Guillonnet went to a "Laboratory exhibition" in Paris. The specifications required to find a robot analyzer capable of distributing the various reagents, "imprinting" the solutions with the electromagnetic signals and making the measures of optical density without human intervention. A robot analyzer was acquired a short time later and was installed early April 2000. Gradually, it was equipped to allow experiments of "digital biology" and to measure coagulation. An articulated arm took the sample to be "imprinted", placed it in the electric coil which "played"

the active or inactive signal according to a random order, added plasma and did the measurement of optical density at various time points. It was only at the end of the experiment that the operator knew the results recorded in the computer file (Figure 21.1).

Figure 21.1. Overview of the robot analyzer intended to automatically perform a complete experiment of transmission without human intervention. The "transmission" of the digital signal was made by the mobile arm of the robot which placed the tube of water to be "informed" in an electromagnetic coil. The "imprinted" water was then mixed with plasma. Coagulation was quantified by measurement of optical density at regular intervals by the spectrophotometer visible on the left of the device. The data transmitted to the adjacent computer and the operator knew all the results including the random choice of the different "signals" only when the experiment was finished. The only steps that required human intervention were starting the device and adding reagents and consumables. The different steps performed by the robot are precisely described in the legend of Figure 23.3 of Chapter 23 *(Photo Digibio)*.

The development was rather long because it was necessary to adapt the robot analyzer to the requirements of digital biology, but it was finally a success. The successive steps previously done by the experimenter were performed by the arm of the robot in a fascinating ballet. The role of the experimenter was simply to verify at the beginning of the experiment that consumables (tubes, single-use pipette tips) and the various reagents were in sufficient amounts and placed in the precise place where the robot expected to find them. It was thus a very important step because many of the previous arguments of the "skeptics" can be swept away. Indeed, the role of the experimenter was considerably reduced, all experiments were blind and no contamination was possible because

there was no manipulation of anticoagulant at "classic" dose inside the robot. The role of the experimenter was literally reduced to that of "push-button".

"We identified 104 blind heparin signals and 104 signals controls"

In the Digibio's newsletter of January 2001, J. Benveniste and D. Guillonnet could then summarize the various stages of the development of the robot:

> "For two years, we have a new method of detection of the biological signals recorded on computer. In brief, the coagulation of plasma is slowed down when it is mixed with water previously exposed to the signal of the anticoagulant heparin; the signal was recorded at usual concentration or at high dilution. Here is a summary of the experiment:
> 1) Water containing calcium (Ca^{2+}) is exposed to a digital recording of heparin (or control which is either heparin/protamine [1] or water).
> 2) Water-Ca^{2+}, mixed in decalcified plasma is distributed in 96-well microplates.
> 3) Coagulation is measured with a spectrophotometer and expressed in Optical Density."

They specified that this effect was also observed "with high dilution of the initial molecule […] or with homeopathic pills (*Heparinum* 30 CH) dissolved in water". As previously underscored, the link with high dilutions and homeopathy was thus not lost.

They continued:

> "During the first experiments in January 1999, the coagulation was estimated by a visual inspection of the tubes. Since then, we modified numerous technical points to improve reproducibility and reliability. The current method allows precise measurement through a spectrophotometer. These experiments were performed hundreds of times in our laboratory and successfully reproduced in 18 out of 20 in an external laboratory (6 successful blind experiments out of 7)."

But, as they prudently recognized, these attempts of reproduction were not completely satisfactory because of "unwanted effects of human factors" and they explained how they managed the development of a robot:

> "However, our attempts of reproduction in four other laboratories gave mixed results. We then understood the difficulty to "export"

> an unconventional biological method. Furthermore, the interpersonal variations of the operators as well as their inclination "to improve" the technique could explain these erratic results. We thus decided to automate this technique in order to eliminate the unwanted effects of the human factors. The robot has been functional in our laboratory since early October 2000. "Functional" means that the experimenter, having defrosted and centrifuged the decalcified sheep plasma kept at -20°C, places it in tube racks with water-Ca^{2+} intended to be "informed" and empty tubes. Once the program has started, the data are displayed on the screen 90 minutes later. The operator intervenes again only after three experiments (including four signals for each) to put back empty tubes in the rack. A few weeks were still necessary to finalize the machine, to build additional parts and to understand the conditions of reproducibility of the experiments. Since then, we obtained positive results in approximately 90% of experiments. As an example, between November 15th and 24th, 2000, we identified in a blind manner 104 heparin signals and 104 control signals. Twelve heparin signals were ineffective, because of mechanical problems of the machine and not reactive plasma."

To conclude, they announced that a robot would be installed in another laboratory to reproduce these surprising results:

> "Thanks to two generous donors, we were able to build the second robot, which is installed in an external laboratory the researchers of which are going to perform experiments within next weeks. A machine will be sent to a foreign laboratory, probably in Great Britain or in the United States (both if we find funds, approximately $40 000), to reproduce these experiments in a totally independent way."

Was a robot going to work outside the laboratory of J. Benveniste? What results have been achieved? Will J. Benveniste and his team finally free themselves from these diverse strange effects which perturbed the experiments?

Notes of end of chapter

[1] Protamine is an inhibitor of heparin (antidote). Consequently, a mixture of heparin and protamine has no effect on coagulation; it was also the case for its "digital signal".