

# The Fish Floating Attention

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## Abstract

In this paper, we discuss the possibility to consider fish for pet therapy. After describing the known effects of a fish tank on patient's stress levels, we present the psychoanalytic implications of fish-therapy. We then describe some mythological representations of the fish in history and the concept illness and healing from the point of view of chaotic attractors and cellular automaton. We illustrate the practical applications of fish pet-therapy. We conclude with some considerations on how this technique could be inserted in the psychoanalytic practice.

## Keywords

Pet-Therapy, Zootherapy, Fish, Fish-Tank, Jungian Psychoanalysis, Cellular Automaton, Chaotic Attractors

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## 1. Introduction

When we look at an aquarium, we seem to find an unexploited source of laziness and the fish's movement seems a calm and peaceful dance. Indeed, several studies show that observing aquariums with fish reduces pressure and stress (Barker, Rasmussen, & Best, 2003; Cracknell et al., 2015; Kjellgren & Westman, 2014; Edwards, Beck, & Lim, 2014; Maple & Segura, 2015). The absence of fish in the aquarium eliminates the beneficial effects. Watching fish also reportedly reduces the weight loss in Alzheimer's disease (Edwards & Beck, 2013). Aquariums in waiting rooms of doctors and health professionals create a positive attitude between the patient and the doctor and facilitate the doctor-patient relationship. Observing aquariums reduces symptoms of children with ADHD (Attention Deficit with Hyperactivity Disorder) and diminishes the attention deficit without hyperactivity disorder in adults. The contemplation of the fish is significantly

linked to the production of endorphins (Beetz et al., 2012).

The objective of this work is to start from these observations, which corroborate our own experience of the effects of a fish tank on our patients, and to explore the reasons behind these effects. We will also try to indicate how a fish tank can be used as therapeutic aid in psychotherapy in a manner similar to what is done with other animals in classic pet-therapy.

In a previous work (Galli Carminati et al., 2013), we have expressed the hypothesis that the profound emotional connection between humans and animals can be explained based on the “collective unconscious” hypothesis formulated by the Swiss psychoanalyst C.G. Jung. According to C.G. Jung (1972), there exists a collective unconscious that includes the psychic life of our ancestors from the beginning of life on earth and that is the matrix of all conscious psychic events. The fact that human representations show remarkable similarity across individuals, cultures and ages led Jung to the hypothesis that the collective unconscious is populated with archetypes. By archetype he indicates essentially an unconscious content which is altered by its realisation in the individual mind and, when perceived, takes on the colour of the individual consciousness in which it appears (Jung, 1968).

Jung’s collective unconscious is therefore populated by “archetypes” that influence our behaviour and our psyche. The emergence of archetypes establishes a link between a given event and a “state of mind that seems “acausal”, but that responds to the hidden logic of the “Unus Mundus” (Dorn, 1602). Let’s give some examples of archetypes: the Self or “archetype of Totality”; the Sun as “*imago-Dei*”; the Divine Child, the divine trickster, a sort of malicious genius; the Great Mother bearer of life and dead; the Anima (the female component of the man) and the Animus (the male component of the woman); the Androgyne (representing the conjunction of opposites).

In the “depths” of this collective unconscious are, according to Jung, the primeval forms of life from which we originate, including the animals of the watery abyss that he calls *spinal* and which “emergence” into our consciousness signals a sudden irruption of unconscious material into our conscious mind.

Coming back to our fish tank, the depths are sources of great terror, but also, if you get used to them, of great contemplative calm, from which the inevitable path of emergence begins. This path of emergence, both literal and figurate, very “repetitive” in some respects, seems to follow simple rules but can lead to unexpected, and in some sense unavoidable, results. This phenomenon is sometimes called “emergence” (*sic!*). To clarify what we mean, let us now turn our attention at the concept of cellular automaton.

## 2. The Concept of Cellular Automaton

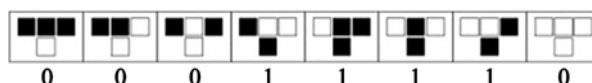
A synchronous cellular automaton (Wikipedia, 2018) consists of a regular grid of “cells” containing each a “state” chosen from a finite set and which can evolve over time. The state of a cell at time  $t + 1$  is a function of the state at time  $t$  of a

finite set of cells called its “neighbourhood”. For each new unit of time, the same rules are applied simultaneously to all cells in the grid, resulting in a state updating called parallel or synchronous (Demongeot, Goles, & Tchuente, 1985), and producing a new “generation” of cells entirely dependent on the previous generation.

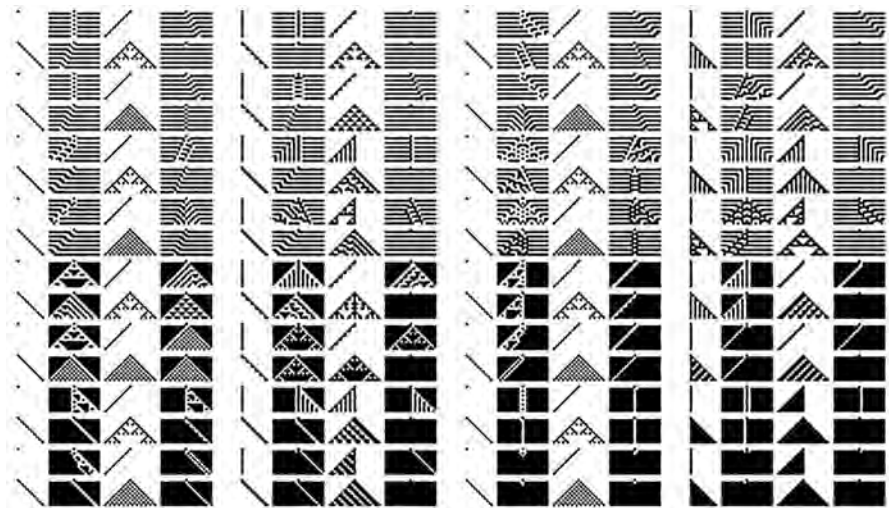
Let’s take a specific example and suppose that we have a row of squares that can be either black or white. We start from the top with an arbitrary row of cells and the next “generation” will produce a new row below the previous one. The “neighbourhood” of each new cell is composed by the three cells above it (upper left, directly above and upper right). According to these three cells we can define a rule that decides the colour of the new cell (see Figure 1) in the generated line. There are 8 ( $2^3$ ) possible combinations of three black or white cells (see again Figure 1). For each of these combinations, the new cell can be either black or white. If we establish a fixed sequence of the three cells patterns and associate a value of 1 to black and a value of 0 to white, we can fully describe each rule as a succession of 8 zeros and ones. This can be interpreted as a binary number from 00000000 to 11111111, which in the decimal base is from 0 to 255 ( $2^8 - 1$ ). So, we have a total of 256 rules, that we can simply identify by their “number”. The rule in Figure 1 would be “rule 30” (the binary number 00011110 is interpreted in the decimal base as  $0 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 16 + 8 + 4 + 2 = 30$ ).

This seems to be a simple game, but it has a profound meaning. While the basic rule of the game is very simple, there is no way to “predict” the outcome without actually “playing” the game. All combinations can be easily calculated (see Figure 2), but what is surprising is that some rules immediately “abort” or simply fill the plane with simple patterns, while others give rise to glorious patterns, see for instance “rule 90” (01011010) in Figure 3. This unexpected generation of complex patterns from simple rules is called emergence.

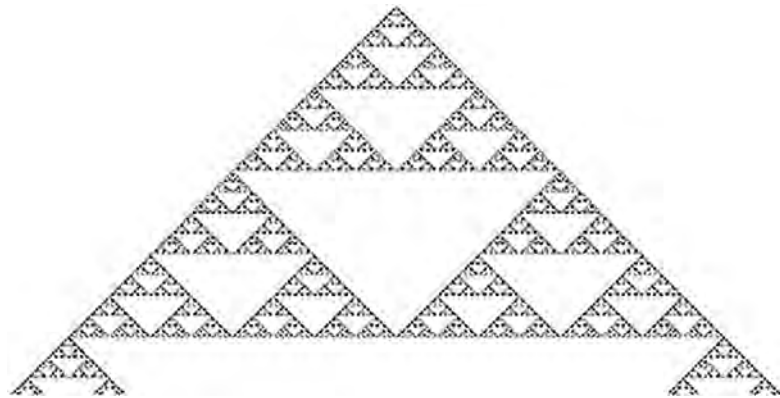
Studied in mathematics and theoretical computer science, cellular automaton are both a discrete dynamic system and a calculation model (Demongeot, Goles, & Tchuente, 1985). The cellular automaton model is remarkable for the difference between the simplicity of its definition and the complexity that certain



**Figure 1.** Example of codification of a developmental rule for cellular automaton. Each combination of three cells “generates” a new cell below them, black or white according to a given rule. Since each cell can assume one of two states, there are  $2^3$  (8) possible states for three cells. If we establish a fixed sequence of the three cells patterns and associate the number 0 to white and 1 to black, each rule is fully described by a sequence of 8 “digits”, according to the colour of the generated cell, e.g. 00011110 in the given example. This sequence can be interpreted as a binary number that can go from 00000000 to 11111111 or, in decimal terms, from 0 to 255, giving us a total of 265 rules. The rule shown here would be “rule 30” (the binary number 00011110 is interpreted in the decimal base as  $0 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2 + 0 \times 2^0 = 16 + 8 + 4 + 2 = 30$ ).



**Figure 2.** Result of the 256 possible “laws of development” of cellular automaton.



**Figure 3.** Development of “rule 90”.

behaviours can achieve macroscopically: the evolution over time of all cells is not reduced (simply) to the local rule that defines the system. As such, it constitutes one of the standard models in the study of complex systems.

In fact, there are not many “stable” solutions in cellular automaton (see **Figure 2**). This can explain why in the living world there are solutions that repeat themselves across species: these are the only ones that work. For instance, in the dynamic systems of living things in general there are approximately 300 stable regimes (order of magnitude), corresponding to 300 functional human tissues (Demongeot et al., 2009; Demongeot, 2015). It is becoming more and more evident that one of the keys to understand the appearance of complex structures in the living world is not the presence of complex “blueprints” of the final system, but rather the perpetration via natural evolution of the few sets of simple rules at the local level that provide working solutions at the global one. “Collective intelligence” does not require intelligence of the “whole” (even ... the less intelligence seems the better, it almost looks as if the simplest solution is the best), the result of repeating “simple” mechanisms cannot be predicted, it can only be “calculated” or “observed”.

### 3. Consciousness and Emergence

Given what we (don't) know about emerging phenomena, it should not be excluded that consciousness itself (whose definition is hotly debated) is an emerging phenomenon, we could say an “emerging” structure of the mind (and indeed “structures of the mind” have always been postulated). But then ... if structures exist in the physical universe (see **Figure 4**), we can suppose the same is true for the unconscious... and consciousness. Can these structures, at same level of complexity, be the same for all living been? Remember, there are only few solutions that “work”. The archetypes can be examples of such “stable” structures that repeat themselves in all human being. And perhaps they are also present, in different but related forms, also in the animals. This is surely a very good and useful food for thought, if we want to use a bit of our personal reservoir of unexploited laziness.

Let us return now, after the depths of consciousness and the emergence of the archetypes, to the presence of an animal near us, especially in a therapeutic context. This presence could bring the patient's—and therapist's—unconscious into contact with deep layers in the collective unconscious, where our animal ancestors began their journey toward consciousness and that we still share with them. So, when we “dive” toward the lower strata of our ancestral common unconscious, we are bound to find one that is common with the living been in front of us. If that is true, all animals can be used for pet therapy... and so why not fish... but why fish, precisely? The “deepest” layers are probably the ones that have most withstood the test of time, and therefore the least “affected” by the disease. The more “primitive” animals will force us to reach more ancestral states in the therapeutic relationship.

And talking about consciousness, one word of warning: what if our cherished conscience was—according to Jung—just a parrot that repeats, without understanding, what the unconscious is telling her...? (Jung, 1963).



**Figure 4.** Example of a Conus Textile shell whose scales develop like the “laws” of cellular automaton.



#### 4. Emergence and Homeostasis

The answer to the question of emergence depends on the general concept of homeostasis, which since Claude Bernard (1865) and W.B. Cannon (1932), has a central role in the explanation of the problems of regulation in human physiology. The normal behaviour of an individual is described as stable, in the sense that any perturbation that is not too significant is quickly amortized allowing the system to return to the normal physiological state.

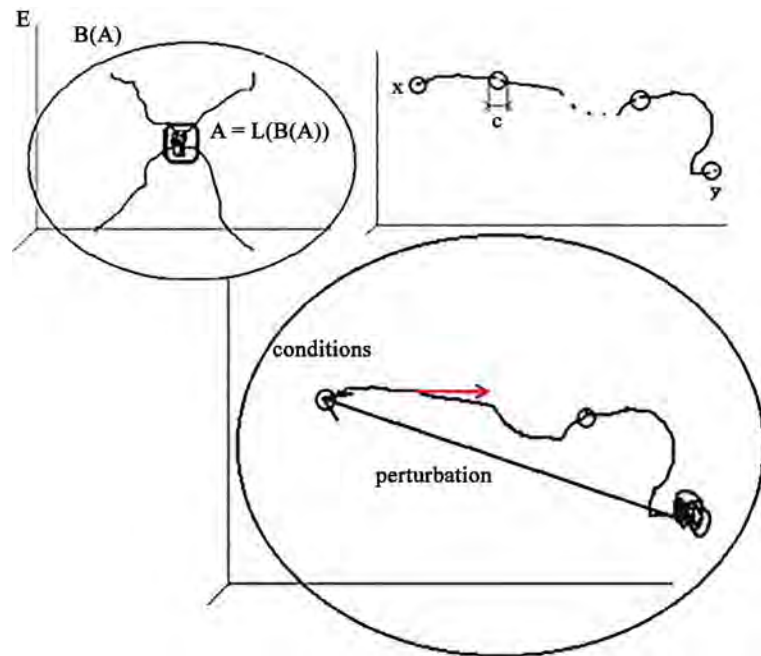
Let's take the example of blood sugar level: normality is 1 g per litre of blood. The absorption of 100 g of sugar is followed by a spike in blood sugar, followed by normalization (return to normal state), due to metabolic (glycolysis) and endocrine (insulin) regulation. Regular daily intake of 200 g of sugar leads to pathological condition of type II diabetes (the risk increasing with age), where the blood sugar will oscillate between 1.5 and 3 g/l: the complications of this chronic disease are many, but it will not cause immediate death.

We are talking about a change of stable (or attractor—see below) behaviour, leading from a physiological (normal) situation to one of pathological “survival” (type II diabetes). The return to normal operation can be obtained, at the onset of illness, via an appropriate diet, then via treatment with oral antidiabetics (in chronic diabetes), and finally with insulin injections (in the severe terminal stage). Each time, the treatment helps to cross a critical threshold “pushing back” the system into the basin of attraction of the physiological regime where the regulation due to the homeostasis of Claude Bernard works alone and a momentarily “healed” state appears; in this sense, and in this sense only, we can speak of healing by an emerging dynamic in the complex system of metabolic and endocrine regulation of sugars in humans!

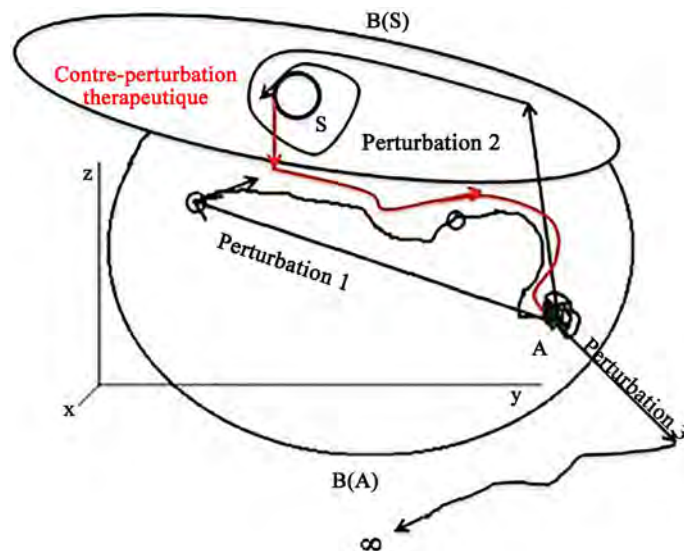
On the other hand, the sudden absorption of one kilogram of sugar can cause death, because it overwhelms the metabolic and endocrine regulation capabilities of the individual: we can then say that we entered a lethal regime (leading to death), where the attractor (or the dynamic regime, here stationary) is characterized by the increase, beyond a certain threshold, of a specific variable (blood sugar) and the collapse of all other physiological variables, situation characteristic of the pre-mortem state.

If we want to mathematize “ad minima” this model, we can use a language a little more formally developed (for an even more formalized presentation, one can refer to Demongeot & Demetrius, 2015). **Figure 5** and **Figure 6** help us to understand the definition of an attractor  $A$  and its basin of attraction  $B(A)$ . If the perturbation (described above through the example of blood sugar) does not stay within  $A$ , it can:

- 1) Either stay in  $B(A)$  (perturbation 1 in **Figure 6**),
- 2) Or leave  $B(A)$ , but go into the basin  $B(S)$  of a survival attractor  $S$  (which corresponds to non-fatal pathological behaviour—type II diabetes in the example above), stationary or periodic, of an organism suffering from disease (perturbation 2 in **Figure 6**),



**Figure 5.** Top left, basin  $B(A)$  of attractor  $A$  is the set of initial conditions  $x$  such that the trajectory resulting from  $x$  ends its life in  $A$ . Top right, trajectory starting its life with initial condition  $x$ , in the space of possible 3-dimensional states  $E$ , and ending it in the limit set of  $x$ , denoted  $L(x)$ . The limit set of  $C$ , denoted  $L(C)$ , is the union of all the  $L(x)$ , for  $x$  belonging to  $C$ . An essential condition for set  $A$  to be an attractor is that  $L(B(A))$  (the limit set of  $B(A)$ ) is exactly equal to  $A$ . At the bottom, a perturbation resulting from a point of  $A$  and remaining in  $B(A)$  will join  $A$  after a more or less long time (Red Arrow).



**Figure 6.** Different perturbations of attractor  $A$ : 1) perturbation 1 remains in  $B(A)$  and the trajectory then returns to  $A$ , 2) perturbation 2 goes to  $B(S)$  and a “therapeutic” counter-perturbation of  $S$  going in can correct it, 3) perturbation 3 goes to infinity, by collapse of two state variables ( $y$  and  $z$ ) and accumulation of the third ( $x$ ).

3) Or escape to infinity, such a trajectory being called a lethal trajectory (perturbation 3 in **Figure 6**), leading to the death of the subject.

Therapy consists in bringing the system back just past the border between B(S) and B(A), on the side of A (therapeutic counter-perturbation). Then, by definition of homeostasis and of the notion of basin, the system will automatically return to its previous regime, namely the physiological homeostatic A attractor. Crossing the boundaries of basins of attraction makes perform a “quantum” leap into the (finite) set of attractors. It is clear from the **Figure 6** that perturbation 3 is usually lethal and can no longer be corrected if it has strayed too far from B(A), by a realistic therapeutic counter-perturbation.

## 5. The Fish Emerging from the Depths

Our fish is the being that lives below the surface, the very symbol of the unconscious. Water is the universal symbol of the source of life, but what is life for the fish is fatal for us. To observe fish is to observe the evolution of our thoughts hidden and repressed in their back and forth between the depths of the unconscious and the surface of consciousness. Here comes to our mind the definition of the *spinal animal* given by Jung: “[...] a cold-blooded animal, a vertebrate that embodies the lower psyche (in another passage he freely associates the spinal animal and the spinal psyche), the dark psyche, the unconscious, which is rare, incomprehensible, monstrous, the deep that can emerge in us, enemy of our own self, capable of making us, for example, fatally ill.” (Jung, 1975: p.195).

The fish of the depths surprise and terrorize us because, as happens with the unconscious, the deeper we go, the more monstrous the creatures are and indeed, deep-sea fish seem to be the product of. and at the same time, the inspiration for our nightmares (see **Figure 7**).

Fish are the only animals that can move and stop as they please in a three-dimensional space. The weightlessness and timelessness, I would say almost outworldliness, of their movements send us back to an interior universe beyond space and time, where we meet with our old memories and operate the work of mourning and reparation. Fish present us with different and contradictory perspectives of the same reality.



**Figure 7.** A fish of the depths.



Fish are also a powerful source of life and vitality. All the cosmogonies in the world teach that the first beings were born from the primordial waters. “The symbol of the fish... is the nourishing influence of unconscious contents, which maintain the vitality of the consciousness by a continual influx of energy.” (Jung, 1968: paragraph 248). The “inexhaustible” spiritual food that Christ gives to the faithful is made of loaves and fish, and the ichthus (from ancient Greek  $\text{ἰχθύς}$ —*ikhthús*) is the symbol of recognition for the first Christians.

The man-fish is one of the most common myths, in all declinations of good and evil (see **Figure 8**).

The mermaid (see **Figure 9**), where the fish is half-woman, retains a connotation of deep terror, fear of the feminine power of seduction that, in the case of sailors, will cost them their lives, by becoming the meal of these sea monsters. Cannibalism is the fantasy behind this monstrous meal, like the vagina that eats the imprudent penis, while the sirens eat/castrate the whole man. This myth is like the work of Eros, the most terrible of all gods, since he does not harm your body, but steals your mind. In the myth of the sirens, the ineluctability and cruelty of this act requires a primeval cold-blooded half fish creature.



**Figure 8.** Examples of man-fish creatures.



**Figure 9.** The mermaid, half fish and half woman. (Drawing by Giuliana Galli Carminati, Mass Storage, 1998).

The fish is often present in sacred writings or in mythology. Jonah and the whale—of course the whale is not a fish, but we are going to ignore this subtlety. The journey in the whale is the very symbol of the initiatory journey of individuation. Thanks to the “fish” the man can travel to the abyss and find new life. The sign of Jonah is the announcement of the new covenant between God and the men born by Christ. The Leviathan swallows the souls who cannot any longer access redemption and resurrection due to the original sin; they return to primitive chaos and will then be embodied in a new cosmic cycle.

In Indian theogony, the fish god is the link between the celestial wisdom and the humans: the fish god learns the secrets of Yoga from Shiva and Parvati; sprayed with water by Shiva, he becomes Matsyendra (the God of fish), and he spreads the wisdom of Yoga among humans. In Jewish religion, Sages say that the fish that swim in the water represent the scholars that study the inner dimension of the Torah: they get scales (as a spiritual armour) and fins (as a mean to innovate and “fly”). The Sages use the same Hebraic word (*shat*) to describe both the “flight” of birds in the sky and the “swimming” of fish in the sea. Both are living in a harmonious primitive equilibrium in their own physical and social medium. In ancient astrology, Pisces are known to be creative, empathetic and intuitive, “flying” driven by their emotions as the irrational type of the enneagram psychology.

The fish is the God who becomes man: in Christian iconography the fish is the symbol of “redemption”. Christ is “fisherman of souls”. The birth of Christ corresponds to the start of the astrological age of Pisces, which will end in 2160. It corresponds at the period during which the vernal point is, at the time of the spring equinox, in the sign of Pisces. In the chapter of his autobiography “Belated thoughts”, Jung recalls this position of the Age of Pisces, before the Age of Aquarius. The god who became man was therefore born a fish and was sacrificed as a scapegoat (ram): he had fishermen for disciples and wanted to make them fishermen of men. He fed the multitude with miraculously multiplying fish, and it itself is eaten like a fish (“Holy food”); his followers are the little fish of the beginning of the Christian era, the “pisciculi” (Jung, 1979).

Beyond being the link between the human and the divine, the fish is the link between the individual and the social, between the individual and the group. The fish illustrates the coming and going between collective and personal—all fish are identical. There follows a synchronicity between patient and therapist who, faced with fish, are put at the same level. It’s not “the therapist’s dog” facing the patient, but the fish, “everyone’s fish”.

But let’s go back to our discussion about emergence. In its etymological meaning it relates depth, oceans, archetypes, ancestral creatures and, yes, fish. We also hypothesized that consciousness, as one of the structures of the mind, is an emergence of nature. Is healing also an emergent effect of nature?

As Socrates said through Plato’s pen, the torpedo fish throws its interlocutor into narcosis, and numbs him to better free him from its certainties in a primor-

dial philosophical maieutic. Following this example, let's numb ourselves in front of the therapeutic aquarium...

The secret of Aristotle's Secrets (Demongeot, Jelassi & Taramasco, 2018)—who first tries to quantify the healing process—has been illustrated in the Breviary of the Nobles (dedicated to the education of young aristocrats) by Alain Chartier (1422), see Figure 10; Rice (1954: pp. 54-97). The secret is transmitted in the form of a fish, against a subliminal aqueduct background, to an androgynous cleric.

## 6. The Fish in the Pet-Therapy Practice

How to transpose this somatic logic of physiological attractor to psychotherapy in front of a fish tank? Let's first observe that the therapist's work is almost invariably the quest to find a new viable and stable homeostasis.

When the subject and the situation are stressful or painful, the patient's gaze turns to the fish as if in search of ancestral peace. The fish is, or seems, indifferent to looks, so it can "absorb" the projections of the patient. When the aquarium is in the psychoanalyst's office, the observation of fish is a powerful stimulus to "move" thought into an abstract space that facilitates associations.

Probably the fish is not so "indifferent", but, in an element which is not ours, he breathes otherwise, literally and figuratively, and can take, or cannot help taking, a distance from we who breathe together another air, or, what is more precise, who breathe an air that passes for fish through a dilution with water and this puts a distance, a filter, and reassures.

In a previous work, we described group therapies in which the aquatic means had all its importance: we worked, in this approach, on the sensory stimulation of autistic patients by contact with water. We also used acoustic stimulation with a frequency profile close to that heard by the fetus in the amniotic fluids, inside



Figure 10. Breviary of the Nobles by Alain Chartier.

the uterus, the resulting “music” having a soothing effect (Boisbourdin, 2017). Sensory stimulation was carried out gradually by the person’s contact with the water and then by the change of position (usually from a vertical position to a horizontal position) and finally by listening to the music in this particular setting (Galli Carminati et al., 2004).

In therapy, much has been said and written about the therapeutic method, about different schools, about different strategies. We believe that what is important in therapy is the therapist’s withdrawal. The great difficulty for the therapist is avoid intervening too much, or rather, while intervening when it is necessary to concretely support the patient. This also involves allowing emptiness, silences, pauses where nothing happens and nothing is important: a re-winding going back to the mother-child dyad, in short, in all its splendour of muffled noises and calm, when you just had to breathe, eat and pee/pop, when there was nothing but the quiet presence of the creative being, of the creative creature, the return to the attractor of primitive homeostasis, in short...

We are not advocating quiet life versus hectic modern life. This agitation, to be honest, pleases us enough, in it we find a reward, if we do not exaggerate. But if, for some reason or another, we have not experienced that old calm of infancy, the mother-child dyad, we lack a primary original frame of reference, to the point of preventing us from moving on in life, hindering us to welcome the *next step*, the introduction of the third, facing it with attack and/or seduction. Only then we will be able to turn away from the parenting couple to look elsewhere for a social life, a new partnership and restart the vital cycle, or not, if such is not our destiny, in a word, to constitute ourselves as adults.

This is the calm, the perception of the uselessness of everything, that the fish can help us to achieve, in simulacrum, because for them that calm is their real life, but for us, it is a glimpse of a remote and primeval life, absolutely necessary... and sometimes irreparably lost.

Let us not forget that, even before the mother-child dyad, we were “inside” the creative creature, precisely like a fish in a fluid. Our very first sensations are those of a fish swimming in our mother’s waters. We therefore come, like all living beings, from the primordial mother/sea. It is not wrong to think that when the constitutive dyad could not be *sufficiently constitutive*, we remain moored to it in the hope (or illusion), finally, to have the psychic energy to move on “to the next step”: inclusion of the third element, attack and/or seduction, consideration of the social world, fluid expression of words, and so on.

We believe that the presence of a simulacrum of ourselves preceding the mother-(born) child dyad, that is ourselves “inside” the mother, may help us “fill the gap” and finally “take off”.

Certainly, if you tell a patient who is struggling with a difficult situation at work, without companion or in a complex and problematic couple relationship, plagued by a distorted vision of his own body, perfectionist to the limit of martyrdom, that by looking at the fish in your aquarium, he will find the calm of

pre-dyadic life with his mother, and through this he may find healing, you risk to receive a few choice words back.

Indeed, we think that sometimes the healing process needs a lot of discretion, and the therapist should work in the secret and take the time it takes to approach and gain the confidence of the suffering person. Our presence of therapists is just a safeguard, in the noble mean of guardian of security, allowing the patient to be patient, in the sense of patience, while waiting for his/her psyche to reconnect with a past distant in memory and in time.

## 7. Conclusion

Pet therapy with an aquarium is a pet therapy that does not say its name, since in a way the patient does not really know he is on animal therapy, although he can clearly see the dancing fish in front of him. He does not go with the therapist for a walk with a dog, does not ride a horse, neither he cuddles the cat, the rabbit, or other critters...

With fish, we are at the height of passivity: the patient watches, the fish lives. In the mother-child dyad, the mother watches, the child lives. Funny role reversal, in this pre-dyadic posture, because the patient is the fish looking at himself, under the gaze of the therapist.

Without forgetting, as therapists (and psychoanalysts) that ingratitude is part of the healing: by removing our patients, at least temporarily, from their suffering, our patient will remove their selves sooner or later from us, as we have become by now troublesome witnesses...

On these last three small points, we stop. Reading too, like healing, needs secret.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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