

# Teaching “Paranormal vs. Zetetics” at the University Using Pseudoscience to Teach the Scientific Method

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**ABSTRACT:** The wide presence of “paranormal” and pseudo-sciences and their elevation to the status of true media stars points to the problem of diffusion of scientific culture. This true intellectual virus attacks almost all socio-professional categories (the education is not the exception of the rule). Concretely, what has to be done? The development of Zetetics, or the Art of Doubt, should be encouraged. On the basis of teaching that started at the University of Nice-Sophia Antipolis in France, this article gives a numerous examples of concrete applications of Zetetics concepts known as Facets and Effects, with the aim to open discussions that would address issues that are imperative today: the protection from pseudo-sciences and development of the critical mind.

**KEYWORDS:** Zetetics, the art of doubt, teaching, pseudo-sciences, believes, paranormal, scientific method, critical mind

Henri Broch

henri.broch@unice.fr

*Zetetics laboratory  
J. Theodor Center for the study of  
"paranormal" phenomena  
University of Nice-Sophia Antipolis,  
Faculty of Sciences,  
France*

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## 1 The state of things

At the end of this twentieth century, astrology, parapsychology, magic medicines and other claimed paranormal phenomena are fashionable. Can we understand why? And concretely what can we do in our struggle for reason? This article presents you an experiment taking place at the University of Nice in southern France; it is based on teaching the scientific method by means of pseudosciences. First of

all, we have to review the various levels of belief.

The proposition according to which “the mere fact of being in a technologically advanced society induces a rapid elimination of irrational thinking” is dead. In France, beliefs and the irrational in a broad sense are thriving much more than one could have imagined and the situation is more than alarming. We have to face a gloomy balance sheet. Better than a description or than semantic detours, here are some self-explanatory statistics.

<sup>1</sup> The present text was published in 1999/2001 on the web site of the University of Nice Sophia Antipolis.

	"Mind induced spoon bending"	"Relativistic dilation of time"
Scientifically proven, a scientific fact ?.....	68	18
Recognized as acceptable, plausible ?.....	14	18
Unlikely ?.....	15	7
Pure theoretical speculation ?.....	0	52
Completely invalidated ?.....	3	5

H. Broch 1999

**Table 1.** H. Broch inquiry, 1982-83, University of Nice. First Scientific stage (Deug A1, B1, and A2)

Table 1 shows the results of an investigation I made in 1982-83 among first cycle university students on the scientific value of metal bending by mind power compared to relativistic dilation of time (taught to these same students).

You can see that "mind induced spoon bending" is claimed to be a scientific fact by about... seven students out of ten and that for more than a half of these students dilation of time is a pure theoretical speculation! These shocking data underlined the necessity of doing something. They were not the result of some local context or of some ambiguous formulation of the questions. They were statistically significant and investigations supported by nation-wide enquiries made by professional pollsters gave the same sort of data.

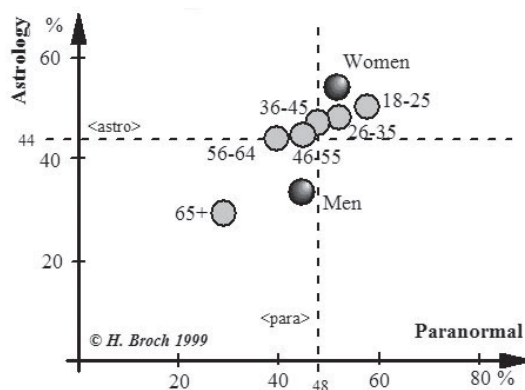
The following graphs show some interesting and somewhat surprising aspects, based on an investigation (under the conduct of two sociologists, in 1986) on the belief in astrology and in the paranormal (admitting that these two fields of study are

independent one from the other) among Frenchmen (Boy & Michelat 1986).

On the graph in Figure 1 we can see that the level of belief decreases almost continuously with ageing, and, as widely asserted previously, the men/women disparity is clearly confirmed, at least for astrology.

Contrary to what might have been thought, the level of belief in the paranormal is directly proportional to the level of education, whatever the religious persuasion may be. Those with higher scientific degrees fare slightly better concerning astrology, although their level of belief in the paranormal is superior to that of the average!

The level of belief as a function of socio-professional categories is not less eloquent. The group having the strongest belief in both astrology and the paranormal is that of the primary school teachers (noted "instructors" on the graph in Figure 3)! As one will note, the credibility of the reputed and so often debated opinion concerning beliefs



**Figure 1.** Beliefs in relation with age and sex

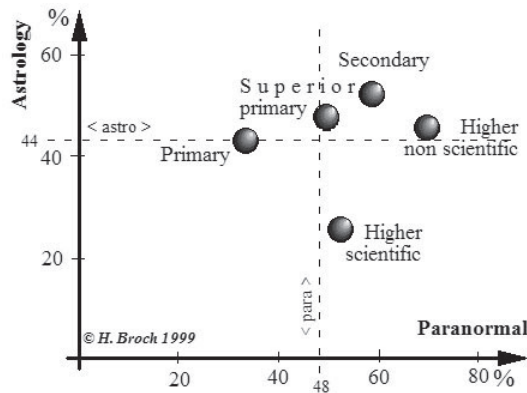


Figure 2. Beliefs in relation with level of studies

in the country vacillates as farmers are the least believing group for what concerns astrology and the paranormal. In reverse and sadly enough, professors make a group of stronger believers in the paranormal than the average French. Their belief in astrology although "low" is still close to 30%. With such teachers there is no doubt that our children and grandchildren will be able to master the technological world of next century! Summarizing, we see that, rather surprisingly, the education world, students and teachers alike are characteristically strong believers in the paranormal.

The situation has known no improvement since 1986, far from it. Its degradation has been exceptionally rapid. More recent figures reflecting this dramatic trend were presented by various participants at a conference at the City of Sciences and Industry, in Paris.<sup>2</sup> An example is given in Table 2.

One remarkable feature of this table is that while 81% of the French think that the progress of humanity is a result of the development of science, 58% believe that astrology is... a science; meaning that the answers on the development of science have to be accepted with some precaution.

Obscurantism and its sad consequences know an unprecedented diffusion. Yet in an apparent paradox the corpus of paranormal phenomena expands neither in quantity nor in quality. On the contrary its sphere is shrinking and no witches roam the skies on their broom any more. To illustrate this, the graph shows the decrease of the power of mind over matter in relation with time. The so-called "mana" was supposed to have - centuries ago - displaced the statues of Easter Island possessing a mass of many tons. Around 1850 the same power had heavy (circa one hundred kilograms) tables dancing. A

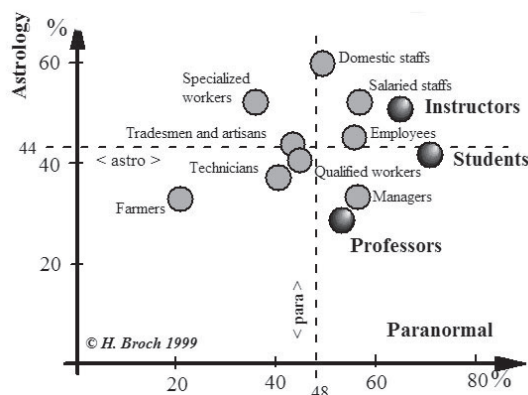


Figure 3. Beliefs in relation with profession

<sup>2</sup> "La pensée scientifique et les parasciences", Actes du Colloque de La Villette, Cité des Sciences et de l'Industrie, éditions Albin Michel 1993.

© H. Broch, 1999, according to SOPHES (paranormal population poll) 1993

For each of these sentences, can you tell me if you are: entirely in agreement, rather in agreement, rather in disagreement or totally in disagreement ?

	Agreement	%	Disagreement	without opinion
Spirits of deads people can communicate with living .....	21 (7 + 14)		76 (17 + 59)	3
Finally, the development of science entails the progress of humanity .....	81 (45 + 36)		16 (10 + 6)	3
There are realities that science will never explain .....	82 (51 + 31)		14 (8 + 6)	4
Astrology is a science .....	58 (27 + 31)		35 (15 + 20)	7
Scientists researching on telepathy waste their time .....	27 (12 + 15)		67 (32 + 35)	6

**Table2.** French people, scientific thinking and the parasciences

few decades ago the very same power could move a pan of about one kilogram. Around the seventies we are down to small objects, such as a chessman. Plummeting psychic power could nowadays displace a piece of paper of about one gram!

Psychokinesis or PK power has decreased by a factor of a million in the course of time, as the means of control get more sophisticated. This trend is found in any other type of psychic phenomena (see Figure 4).

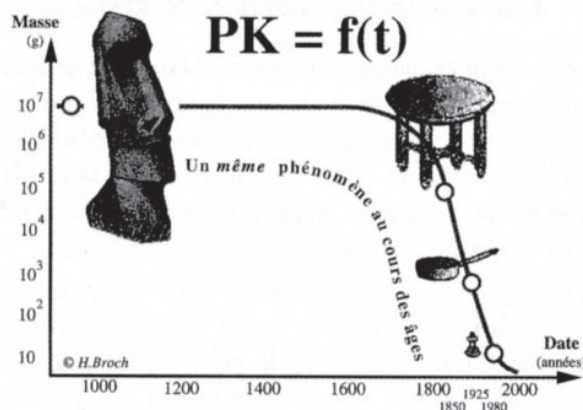
This paradoxical situation, i.e. the strong increase in belief versus the marked decrease of the number and intensity of phenomena, may easily be explained. Here are some possible explanations:

**The "electronic" media resonance effect.** The information related to psychic events is amplified in a fashion unknown to previous generations. An example: a haunted house would have remained a local event, while in the nineties the "poltergeisting" of a Belgian country house became news to both

Superchannel and the world wide diffusion of CNN.<sup>3</sup>

**Media-lies and the deontology drift.** "Media-lies" and their evil influence are well known. Characterized lies are commonplace with certain programmes devoted (or not) to the paranormal. Members of the press do not hesitate to sacrifice the truth on the altar of audience ratings. Journalists would have to think seriously about what neutrality and responsibility should be!

**The transmission belt of the... educative sphere!** Contrary to an a priori view, the teaching world is all too often the communication channel of beliefs. This is in accordance with what we know concerning the socio-professional categories and their levels of conviction. Stunning as it may seem the pupils of four classes of the first year of secondary school in a public college in the south of France were sorted out according to astrological criteria. This was done for three years until 1995



**Figure 4.** PK = f(t) graph

<sup>3</sup> It is about one case in Belgium in January 1993, and the appearance of poltergeists in Arc-Wattripont in the province Hainaut.

with the agreement of the whole pedagogic team and of the principal of the college. Another sad example is given by the French Teachers Mutual Purchase Cooperative, the CAMIF.<sup>4</sup> Its catalog of October 1986 presented to the teachers a Cheops wine maturing accelerator that is a reduced replica of the Cheops pyramid. The catalog claimed to have "officially controlled" that you obtain the equivalent of two to three years of wine maturation in only three to five weeks by the power of the pyramid being able to concentrate the "shape waves"!

**There is another reason...** The actual change in the process by which knowledge is acquired could provide a fourth explanation. The expansion of information is characterized, among others by the bloating of visual images and by immediate sensations, both detrimental to the value of the written symbol and of supported analysis. The text, the written symbol, allows detailed, constructed, critical analysis; it is available for a long time while contemporary media make much room to instantaneous images and to the brief stimuli it triggers. The couple "Written symbol + supported analysis" is replaced by the couple "Visual image + Immediate impression". This insidious and progressive replacement of reason by emotion should be studied in a global fashion, even beyond the type of thinking that supports the paranormal.

## 2 Concretely, what should be done?

The increasing diffusion of pseudo-sciences and their emergence as mediatic stars pose the problem of the efficiency of the diffusion of technical and scientific culture. The prophylaxis of pseudosciences falls under our social and our professional responsibility. In this struggle for reason, we could use the motivating means of paranormal phenomena. In this struggle for reason, it is necessary to use concepts or rules usable in practice. What would be, indeed, the interest of a solely discursive power or knowledge, with no operative capacity? With this in view, we have to be careful not to lose contact with the physical world, with reality. The role of observation, of experimentation, is fundamental.

Especially in our society where one teaches all too often the results of science instead of explaining the manner in which these results have been obtained. To be really efficient, a researcher has to have some Zetetics rules present in mind.

Zetetics is the "method used to penetrate the reason and the nature of things". Taught since the Antiquity, Zetetics is in fact the refusal of all dogmatic affirmation. I summarize the method by defining it as the "Art of Doubt" (Broch 2008a), (Broch 2008b).

In 1993-94, I started at the University of Nice-Sophia Antipolis a Zetetics course: "Paranormal Phenomena and Scientific Methodology". This new teaching, under the patronage of the Physics Department of the University, is a transdisciplinary option proposed to any student in his or her first year in general science studies. This teaching seems to fill a need. A total of more than 1500 students have registered during these six years; thus an average of 250 per year. The teaching is composed of the course and practical work.

### 2.1 The course

The Course includes audiovisuals sessions on various themes (for a total of 26 hours by year and by student). It is divided into three parts.

First part: **Claimed "facts". Explanation and analysis of the substance**

This part concerns the analysis of the substance of the claimed facts concerning various paranormal fields. For each field of study the results of a scientific investigation on these wonders are given and analyzed.

**Astrology** or Star power. History and techniques of astrology. How can a scientific approach help in evaluating this divinatory art? Study of the claimed proofs...

**Spatial archaeology** or The Extraterrestrials in Antiquity. Egypt's pyramids, Nazca patterns, megalithic observatories, electricity and magnetism in antiquity, Mayan astronaut... Are these achievements the fruit of contacts with extraterrestrials?

**Miraculous and supernatural manifestations** or Thaumaturgy in the course of centuries. Fire-walking, liquefaction of San Gennaro's blood,<sup>5</sup> spontaneous human combustion, curse of the pharaohs, "Shroud of Turin",<sup>6</sup> fakirism, levitations,... What

4 <http://fr.wikipedia.org/wiki/CAMIF>

5 Saint Januarius is famous for the miracle of the tri-annual liquefaction of his blood (Wikipedia, May 2015).

6 The Shroud of Turin is a length of linen cloth bearing the image of a man who appears to have suffered physical trauma in a manner consistent with crucifixion (Wikipedia, May 2015).



are the results of a truly scientific investigation on all these wonders?

**Psi powers** or the sixth sense in action. Psychokinesis, radiesthesia (radionics), spiritism, Geller effect, clairvoyance, Kirlian photography, Philippine healers, magnetizers, telepathy,...<sup>7</sup> How to cope with all these phenomena? How can physics and chemistry help us?

*Second part: Claimed "facts". Reflection and analysis of the form*

In this second part I develop an approach on the same subjects but this time on the form instead of the substance. With two aspects: to cast light on the media-lies via their various "techniques" and also to show that a more mathematical way can provide important information concerning the credibility of an allegation.

**"Media-lies" and parasciences** or The defaced truth. Distortion of the thinking process and mystification of knowledge. Distorted truths: parapsychology at the university, Roswell extraterrestrial, the Benveniste "memory of water",...<sup>8</sup> Biased information? Drifting deontology?

**"Exaggerated coincidences"** or Mathematical approach to the extraordinary. Premonitory dreams, extrasensory perception, biorhythms, amazing events, paradoxes... Can the paranormal be addressed in a somewhat more mathematical way?

*Third part: Paranormal and Science. Shaping of the methodology*

This part examines general questions and is dedicated to the shaping of the methodology underlying the two first ones, to the shaping of the essential approach for a hypothesis or a result to qualify as being scientific.

**Paranormal versus Zetetics.** What are the psychosociological indicators of pseudosciences? How does the paranormal evolve? Can a unique methodology be defined? Are sciences, non-sciences and pseudosciences equal cognitive fields? What boundaries separate these fields of knowledge? How do we define a science? What criteria will

give both hypothesis and results a scientific label?

The elaboration of this teaching has needed a rather important work since for the one and only course I have created more than 1200 specific slides.

## 2.2 The directed work

The directed works are the second constituent of the Zetetics teaching (very variable in time, from 10 to 200 hours by year and by group of students, but in fact with no limit). This part covers the analysis of experiments as well as experimentations done directly "in the field" by small groups of students on a subject of their choice. The themes cover the entire field of paranormal phenomena. From Magnetism, Dowsing, Cryptozoology, Curses, Iridology, Premonitory dreams, Feng Shui, Roswell alien, Sects, Psychokinesis, Clairvoyance, UFOs, Horoscopes or the Holy Shroud to X-Files, Magic medicines, Lycanthropy, Hypnosis, Homeopathy, Bagdad batteries, Megalithic monuments, Optical illusions, Acupuncture or Out of Body Experiences, etc.<sup>9</sup> At the end of the year, the students are assessed (with individualized notation) on the complete report they make on their experimentation.

The general frame of a report is: presentation, protocol, results, analysis and conclusion. To the free choice of the students, the reports are made on various supports: paper, slides, audio or video tapes, CD-Rom, etc. Some examples of the themes:

- A group of students realized a drawing visible from the sky with the reduced techniques of the Peruvian Nazca people (and the result - something like a bird - was observed not from the sky but from a neighboring hill).
- Two girls have made a statue, a very special one: ... crying after two hours of prayers.
- Others students decided to investigate the experiments on dowsing made and published by the physicist Yves Rocard. Professor Rocard was experimenting the detection of weak magnetic fields gradients by human using a pendulum and a specially designed

7 Psychokinesis, <http://skepdic.com/telekinesis.html>; radiesthesia, <http://skepdic.com/radionics;spiritism>, <http://skepdic.com/spiritul.html>; Geller effect, <http://skepdic.com/geller.html>; clairvoyance, <http://skepdic.com/clairvoy.html>; Kirlian photography, <http://skepdic.com/kirlian.html>; Philippine healers, <http://skepdic.com/psurgery.html> and <http://www.science-et-magie.com/archives02num/sm52/5202kassagi02.html>; magnetizers, <http://skepdic.com/animalmagnetism.html>; telepathy, <http://skepdic.com/telepath.html>

8 Roswell extraterrestrial, <http://skepdic.com/roswell.html>; Benveniste "memory of water" in <http://skepdic.com/homeo.html>

<b>Ponavljjanje Rokarovog eksperimenta</b>	
Predstavljeno u "L'Homme et le Milligauss," 1986, i "La Science & les Sourciers," 1989. prema Rokaru, 80% populacije ima rašljarsku reakciju	
Struja (o= uključena, n= isključena) Klatno + (=reakcija; - = nema reakcije)	
Pierrette (65 years old)	o o o o o o o o o o o o o o o o
Yves (42)	o o o o o o o o o o o o o o o o
Juñe (20)	o o o o o o o o o o o o o o o o
Andrèa (19)	o o o o o o o o o o o o o o o o
Christophe (23)	o o o o o o o o o o o o o o o o
Pierre (36)	o o o o o o o o o o o o o o o o
Catherine (42)	o o o o o o o o o o o o o o o o
Patrick (33)	o o o o o o o o o o o o o o o o
Bill (25)	o o o o o o o o o o o o o o o o
Aline (18)	o o o o o o o o o o o o o o o o
Patricia (17)	o o o o o o o o o o o o o o o o
Franco (46)	o o o o o o o o o o o o o o o o
Claudette (47)	o o o o o o o o o o o o o o o o
Céline (16)	o o o o o o o o o o o o o o o o
Stéphanie (19)	o o o o o o o o o o o o o o o o
Jean-Pierre (45)	o o o o o o o o o o o o o o o o
Françine (38)	o o o o o o o o o o o o o o o o
Laurent (19)	o o o o o o o o o o o o o o o o
Sébastien (18)	o o o o o o o o o o o o o o o o
Patricia (19)	o o o o o o o o o o o o o o o o

© H. Broch 1999

S. Pean, E. Porcaro, T. Pringot, S. Raty, P. Wainman, "Les Sourciers", SB1 izveštaj kursa zetetike školske 1994/95  
 100 uspešnih/ 200 pokušaja. Reakcija **28% sa magnetnim poljem... 27% bez magnetnog polja!**

V. Rousseau, T. El Souss, "Le Secret des Sourciers", master iz fizike, izveštaj kursa zetetike 1998/1999.  
 93 uspešna /198 pokušaja. Reakcija **30% sa magnetnim poljem... 36% bez magnetnog polja!**

**Table 3.** Duplicating Rocard’s experiment

electric sole (a sole with a small solenoid inducing a magnetic field in the heel of the subject).

Some obtained results by students having duplicated the Rocard’ experiment with the electric sole are presented in Table 3. Without entering in the detail of the results, we can see that the double blind technique (not adopted by Rocard!) leads to the conclusion that the dowsing reaction does not exist in the concerned population.

- Others students have made a non-faked video tape showing a young boy levitation and tested the public reaction when their film was projected.
- Another group examine the fakir claims concerning the nailed board (at the entrance of the room of the lab used by the Zetetics students, one can find the nailed board made by a young girl to present her

extraordinary capacities).

- In 1998-99, three students choose the study of various displacement hypothesis for the Easter Island statues. They tested the "sledge and oscillating trestle" hypothesis and the "rotation with guying rolling gait" one. They found that this last hypothesis is preferred because it needs a really small energetic expense.

A lot of other subjects have been treated by students:

- Near Death Experience: a "tremendous" report (more than 600 Megabytes!) made this year by three "Zeteticsians".
- A study on the system used in the movie Stargate to position the destination planet.
- The possibility of sub-liminal video and audio messages.

9 Dowsing, <http://skepdic.com/dowsing.html>; Cryptozoology, <http://skepdic.com/crypto.html>; Curses, <http://skepdic.com/curse.html>; Iridology, <http://skepdic.com/iridol.html>; Premonitory dreams, <http://skepdic.com/dreams.html> и <http://skepdic.com/precog.html>; Feng Shui, <http://skepdic.com/fengshui.html>; UFOs, [http://skepdic.com/ufos\\_ets.html](http://skepdic.com/ufos_ets.html); Horoscopes, <http://skepdic.com/astrology.html>; Holy Shroud, <http://skepdic.com/shroud.html>; Lycanthropy, <http://skepdic.com/lycanthr.html>; Hypnosis, <http://skepdic.com/hypnosis.html>; Homeopathy, <http://skepdic.com/homeo.html>; Bagdad batteries, [http://en.wikipedia.org/wiki/Baghdad\\_Battery](http://en.wikipedia.org/wiki/Baghdad_Battery); Optical illusions, <http://www.philosophyonline.co.uk/oldsite/tok/scepticism3.htm>; Acupuncture, <http://skepdic.com/acupuncture.html>; Out of Body Experience, <http://skepdic.com/obe.html>



Figure 5. Displacement of Easter Island statues.

- The variation of birth level versus the lunar phases.
- UFOs and various faking techniques, etc.

At the present date more than four hundred and fifty reports have been made. How to bring students to undertake such experiments? How to incite them to have a scientific approach of a given problem?

### 3 Facets and effects of zetetics

I think it is necessary to present the scientific methodology not only under an "attractive" form but also under an "easily memorizable" form. This is the specific objective of the course via the "Facets" and "Effects". The facets are numerous. Here is just a very small part of what is presented in the Zetetics course:

- Nature is reliable,
- Quantity is not quality,
- Competitive is not necessarily contradictory,
- Inference is necessary,
- The burden of proof belongs to he who declares,
- To err is human, permanent fallibility is not,
- An extraordinary allegation needs a more than ordinary proof,

- The source of information is fundamental,
- A scientific theory can be tested,
- The history of science and techniques is useful,...

The aim is to give to the students a set of facets with short chapter titles, easy to memorize. In the course, each facet is detailed and illustrated. I will just give you two examples:

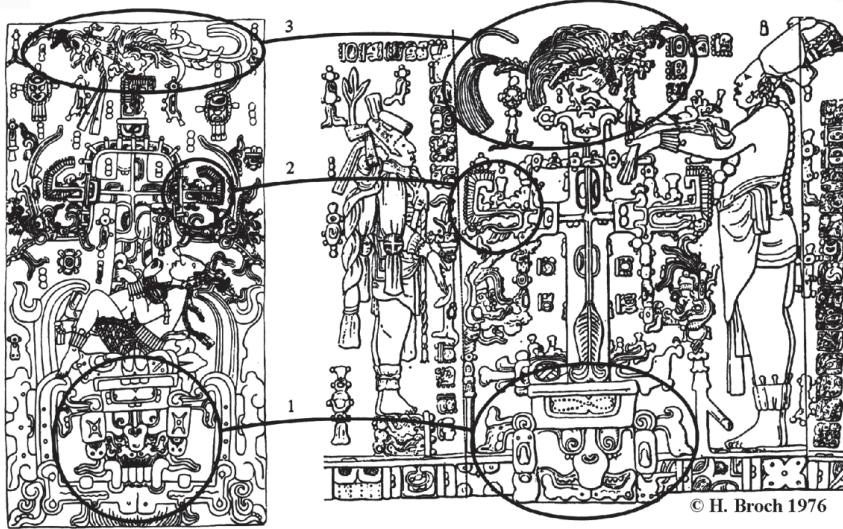
#### *The context is important*

The context - strictly local or not - has always to be taken in account. On a given subject, often the context allows the student to choose between different hypotheses or to better understand the data.

#### **An example:**

After four excavation campaigns in the "Temple of Inscriptions" of the Mayan archaeological site in Palenque, Mexico, the archaeologist Alberto Ruz Lhuillier discovered in 1952 an internal crypt containing a sarcophagus with a cover formed by a limestone mass of about six tons. This cover was sculpted and many magazines (and among the first the Italian "Domenica del Corriere" in 1967) have claimed that the sculpture represents a Mayan astronaut piloting a spaceship. In fact, if we apply the facet "The context is important", the solution is easy.





**Figure 6.** Temple of Inscriptions (left) / Temple of the Cross (right)

It is sufficient to compare the "Mayan astronaut" with a figure existing in the neighboring "Temple of the Cross" in the same Palenque.

In Figure 6, with 1, I have encircled the mask of the "earth monster", symbol of death, with 2, a part of the Mayan sacred plant: the maize, the corn (or maybe the Mayan sacred tree: the ceiba), with 3, the "quetzal", the sacred bird of the Mayan, symbol of the sun, symbol of life. So the context gives the solution to the student: the astronaut is a dead or sacrificed person on the altar, giving his life for the prosperity of the community.

**Alternative is fruitful**

One of the most powerful tools we have is the alternative. This consist simply to ask the question: "Is there another explanation which give an identical result, in the same conditions and with the same characteristics?" Confronted to a phenomenon claimed as paranormal, the student could discover that the same result can be obtained by normal means. In this case, the natural method is supported and the psychic or supernatural hypothesis becomes superfluous.

To illustrate this facet of Zetetics, we can shed some light on a few miracles:

- The San Gennaro blood liquefaction is observed more or less each year in the Italian town of Naples and the archbishop-cardinal presents the monstrance containing

the miraculous phial. Since twenty years I have manufactured a lot of miraculous phials presenting all the characteristics (see Figure 7). For example, the miracle can be easily obtained by a mixture of Spermaceti (Sperm whale oil) with the dye of Alkanna Tinctoria (Orcanette) extracted by sulfuric ether (another historical recipe does not need this last compound). Orcanette is a common plant in the Mediterranean world and the dried roots contain the dye. The change solid-liquid is obtained by a rise in temperature.<sup>10</sup>

- The "Shroud of Turin" always presented as "not made by human hands", and which has been - historically and physically - proved to originate from France and the fourteen century, was probably made by a simple technique of dabbing that everybody can use on a bas relief.

With the same medieval ingredients, I have reproduced dozens of "Shrouds" without problem and with all the characteristics attributed to the Holy one), including the three-dimensional effect; that is the reconstitution, by computer analysis, of the relief once contained in the linen (see Figures 8 and 9.<sup>11</sup>

- The mystery of temples of antique times. We are in the first century before our



Figure 7. San Gennaro's blood

era. Imagine the priest lighting the fire on the altar in front of the chapel and the doors opening without apparent human intervention; thus logically by the intervention of the god. What is the alternative? The physicist Heron of Alexandria - more than two thousand years ago - explains us that we have to look for in the basement of the temple (Figure 10). Here is the astute mechanism hidden under the feet of the pilgrims.

The fire causes the dilation of the air in the altar. Its consequence is the filling of a container by water. This container moves down and, by means of ropes and pulley, causes

the opening of the doors of the temple. You can note on the diagram that the Ancients were ingenious enough to create a reversible mechanism. When the priest extinguishes the fire, the doors close themselves!<sup>13</sup>

Obviously, we are not restricted to the sole field of miracles to explain to the students the importance of the saying "Alternative is fruitful". For example, when media and TV are insistently publicizing the psi powers of a motorcyclist medium who is able to drive his bike while being blinded by adhesive plaster, cotton, blindfold and a large hood... it is sufficient that I drive my car - with no problem - while being blinded in the same fashion, to be able to demonstrate to the students the



Figure 8. Shroud making<sup>12</sup>



Figure 9. Shroud linen

10 By the way, the thixotropic substance hypothesis sometimes presented - since a letter published in 1991 in "Nature" - by media as a novelty is in fact... an old one and does not explain the whole San Gennaro miracle characteristics.

11 By the way, the first to give the "making process" and to realize the experiment on a bas relief was the Frenchman M. Clément, fellow of the "Société Nationale des Beaux Arts", at the very beginning of the 20th century.

12 The here presented bas relief was done by the Zetetics student Thibaut Médard de Chardon.

13 Heron of Alexandria's writings gives us the solution concerning a lot of "mysteries". For other fantastic examples, see my book "Au Cœur de l'Extra - Ordinaire" (Broch 2012).

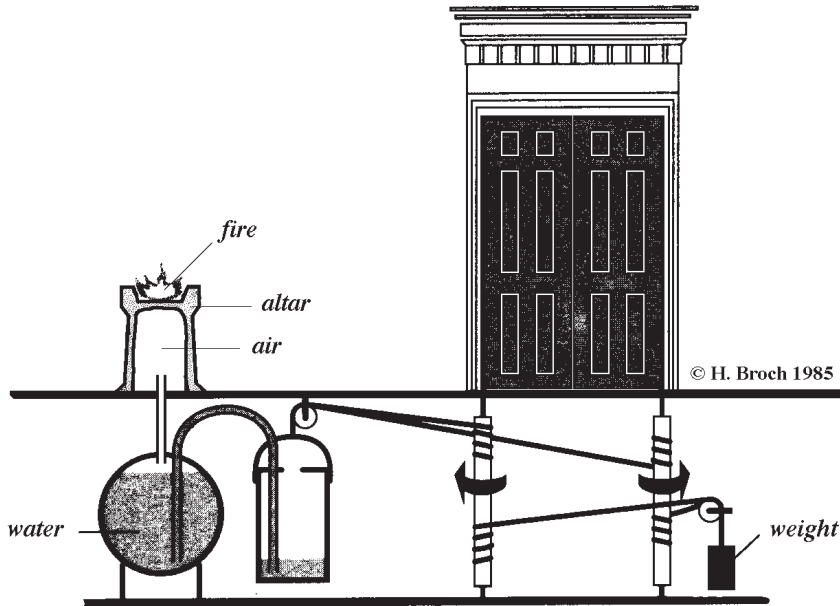


Figure 10. Heron's Doors of temple

importance of the alternative. Here, the important fact is to do the experiment concretely.

The preceding examples are all based on tricks that the alternative renders clear, but there are "miraculous" phenomena that do not need tricks. In those cases, the fruitfulness of the alternative will be to allow the student to say: "Yes, the phenomenon is true but it is not necessary to appeal to a miracle; we can give a natural explanation".

Firewalking is an example.

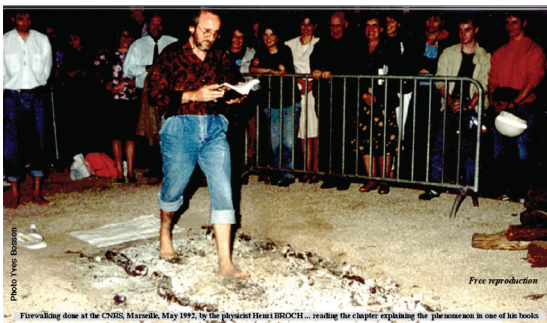


Figure 11. Firewaking experiment

Figure 11 shows one experiment I did at the C.N.R.S. (the French National Science Foundation) in Marseille in 1992. The phenomenon seems

miraculous or, at least, a feat necessitating an extraordinary mind control as the one claimed for the Tibetan lamas in the best movies! In fact the "miracle" is due to physics laws and mainly to the weak heat capacity of wood and its equally weak thermal conductivity. Of course I have done this demonstration.... reading the chapter of my book that explains physically the phenomenon.

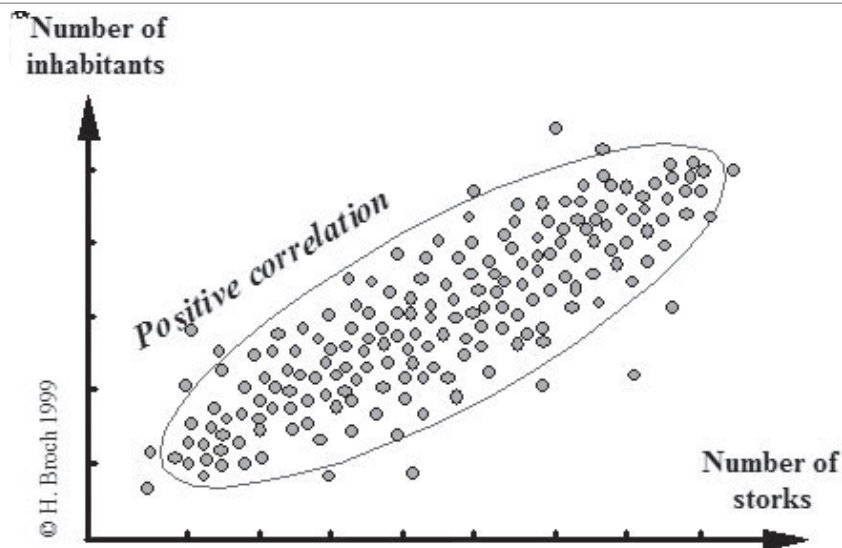
Everybody can do firewalking with a minor burns risk. But be cautious and read carefully: a "minor risk of burns" is not a "risk of minor burns"!

Some facets of Zetetics are especially important and efficient in the paranormal field and for this reason I present them to the students under the vocabulary of "Effect..." and a name allowing a better memorization. The "Escalation effect", the "Bi-standard effect", the "Rivulet effect", the "Biped effect", the "Snow Ball effect", the "Hoop effect", etc. For example,

- The "H'mm effect" is the "principle of insufficient foundation" or "principle of indifference".
- The "Well effect" is something like the "Barnum effect"<sup>14</sup> in psychology.
- The "Impact effect" is the use of connotation of words.

<sup>14</sup> The Barnum is the observation that individuals will give high accuracy ratings to descriptions of their personality that supposedly are tailored specifically for them, but are in fact vague and general enough to apply to a wide range of people (Wikipedia, May 2015).





**Figure 12.** The number of inhabitants in urban centers increases proportionally with the number of storks

I will just give you two examples of the presentation of effects in the Zetetics course.

### **The Stork effect**

The Stork effect is the confusion between correlation and causality. By inquiring in Alsace, a region of France, we obtain - concerning the urban centers - a graph clearly showing that when the number of storks increases, the number of inhabitants increases also (see Figure 12). There exists effectively a positive correlation between these two variables. This is an experimental fact.

But we are not obliged to conclude that... we have the scientific proof that storks deliver babies! Every student will laugh loudly in this case but at once I shows that the Stork Effect is often present in various paranormal fields.

As an example: the "April Moon" whose light is claimed to have the property to redden the young shoots. Effectively, at this period of the year, if you see the Moon your growing vegetables and other plants may have some "problems" and redden. Here is an explanation for this real correlation but false causality. When the weather is fine, without clouds, you see the Moon. During the night, the heat can be evacuated towards space and the temperature may decrease sufficiently for the plants to be reddened. In the other weather case, the sky is cloudy. You don't see the Moon (it is always present but

you can't see it). During the night, the heat is retained between clouds and earth. In this case, it is almost impossible for the temperature to really go down seriously. Your plants will not be reddened. Conclusion: the April Moon is only a weather indicator and its light has no power to redden plants. A correlation is not necessarily a causality.

### **The Doormat effect**

Beyond the importance of the "weight" of words (the Impact effect), it is equally necessary to incite the students to be cautious on the choice of the words used. This is the base of the curiously named... "Doormat effect". This effect consists in using a word to designate another thing that this very word indicates. With all the consequences in the possible implications...

- Typical descriptions of spiritism sessions claim that the medium was controlled by a bailiff who puts his hands and feet on the medium's hands and feet. In consequence, some people will say: "It is impossible for you, scientists, to explain that under this tight control the medium was able to produce paranormal phenomena". In the typical case, the medium and the bailiff are sitting at a table. You can add under the table a piece of chalk and a slate or suspend to the table a small bell.



When the lights were turned off (maybe because the eyes of the spirits are very sensitive) some extraordinary phenomena arrived: the chalk is moving and writing a spirit message on the slate, or the small bell ringing. But maybe we are facing a Doormat effect? Here is a possible explanation. The bailiff controlled in fact only the shoes of the medium, not his feet (this was clearly demonstrated by Houdini - in the role of a medium - and a scientist in the role of the bailiff). A steel shell inside the tip of the shoe allows the medium to free his foot without being noticed by the bailiff. A sock with the extremity clipped off leaves total agility to the toes to seize the piece of chalk, to ring the bell or to do every and any thing you wish.

- Another example: In 1989, the daily "Nice-Matin" gave a very large article to the fabulous prediction of a medium. This article explained that a medium has predicted more than twenty four hours in advance the six winning numbers of the French Lotto; and that this incredible feat was established by an affidavit made by a bailiff. However this is solely a... double Doormat effect. And of this, I'm sure since the medium in question is... myself! Here is my recipe to do this miracle:
- Take an empty envelope; close it without sealing it; stick your stamp; place an adhesive label removable with no trace (such as the yellow "Post-it"); write on this label your own name and address. Post this envelope that will be returned to you in one or two days.
- Remove then the adhesive label and write in place name and address of the newspaper; sit in front of your TV and listen to the results of the Lotto; make a letter of prediction with some hesitation (it seems more serious !) on the numbers and finally give all the winning Lotto numbers you have just discovered on the TV. Date the letter from the same day of the obliterated stamp and slip it in the envelope. Seal the envelope (if you want, you can write - as I done - across the envelope "Extra sensory

perception experiment. Please open solely in presence of a bailiff") and leave joyfully your home to put it directly in the letterbox of the newspaper.

- Conclusion: the postal seal does not attest the date of the sending of the letter. But only the date at which the envelope (the envelope not the letter, first Doormat effect) has been postmarked (postmarked but not sent, second Doormat effect).

What is the origin of the curious name for this effect? Imagine the situation. You are entering a house. Beside the doormat you read the notice "Es-suyez vos pieds SVP"<sup>15</sup>. I just ask a question: Who has ever removed his shoes and socks?

The Doormat effect is very efficient in paranormal fields because we often use it - rightly - in the daily life and so we don't remark it any more.

## 4 Conclusion

As a conclusion, I just want to give you some information on how the course was received and what are the results. Here are some data after six years of the Zetetics course (Figure 13).

More than 1500 students have registered, of which about 28% have quitted almost immediately or in the course of the year. So we have 1091 students presenting the examination and, of this number, 845 have succeeded. Thus leading to 77% successes if we consider the students presenting the final exam; or 55% versus the original registered students' number.

What about the efficacy of the course? And what about its impact? I think it is too soon to draw conclusions or try to determine the real impact of such a course. May be the "relaxation time" is about ten years; the time for the students to be really involved in the active life and to intervene in various fields, media, associations,... hopefully diffusing the methodology they have learnt and - who knows ? - memorized.

Time has to be taken in account. The fallout of such teaching may be delayed. As an example one of my former Zetetics students (who, by the way, had four years ago set up a "Gellerian" Hertzian dental receptor) has decided to reinvestigate Rocard alleged dowsing experiments. This work was

<sup>15</sup> Please, wipe your feet.

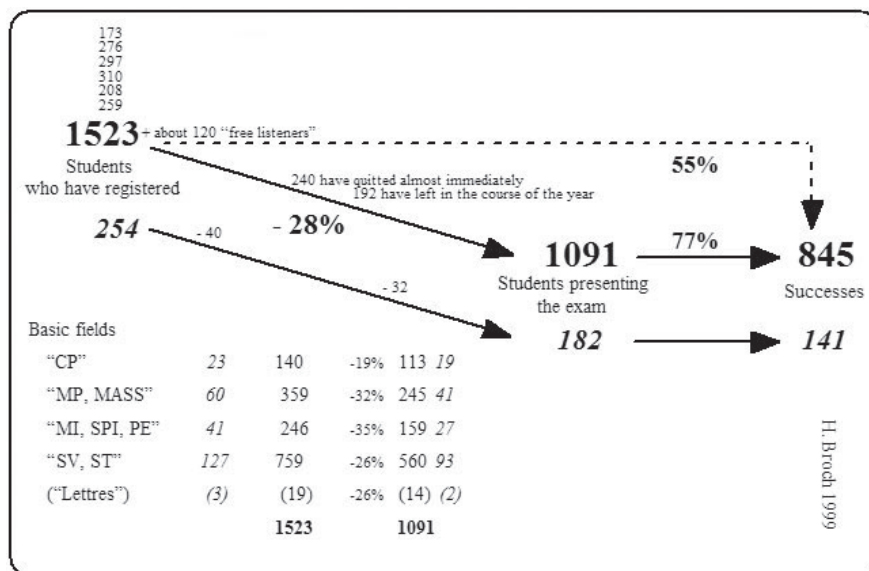


Figure 13. The Zetetics course after six years – average per year (CP means Chemistry & Physics; MP: Mathematics & Physics; MASS: Mathematics Applied in the Social Sciences; MI: Mathematics & Computer science; SPI: Engineering & Physical Sciences; PE: Physics & Electronics; SV: Biological Sciences; ST: Earth Sciences; Lettres: Arts)

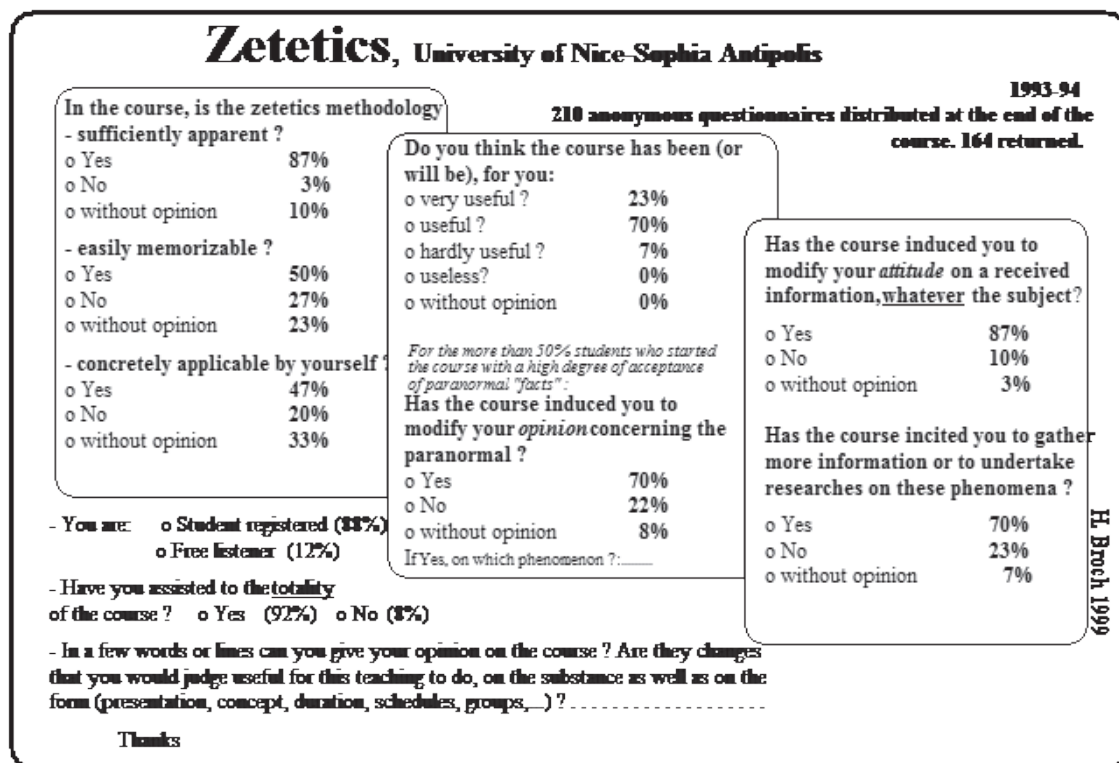


Table 4. Efficiency of teaching Zetetics during the first year.

Z Présentation	Laboratoire Accès	Zététique ? Actions	Enseignement Communiqués	Documentation Direction
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## *Laboratoire de Zététique*

Faculté des Sciences, Nice



Un petit clin d'œil à StarWars TSG (et à la 20th century Fox) et... *Une chandelle dans les ténèbres* est le titre d'une collection d'ouvrages zététiques aux éditions [Book-e-Book](#)

Un objectif : la diffusion de la méthodologie scientifique, la **Zététique**, auprès d'un large public  
 Un support (... particulièrement motivant !) : les phénomènes "paranormaux"

Directeur : Professeur [Henri BROCH](#)

**Figure 14.** Zetetics lab web site

done within the frame of a Master's in Physics. He is now spreading a critical, zetetic, approach of dowsing and magnetic fields among his colleagues, students as well as teachers in Physics!

Thanks to anonymous questionnaires distributed at the end of the course, an impression was obtained on the efficiency of this teaching. The purpose being to help improve both its substance and its form. Table 4 shows data obtained at the end of the first year of the teaching, in June 1994.

We observe that more than nine students out of ten (93%) think that the course has been (or will be) useful or very useful to them. This is truly encouraging for the teacher to pursue the same line of action! While more than 50% of the students have, at the beginning of the course, a strong belief in the "facts" evidencing the paranormal, we observe a clear change as 70% of these students have modified their opinion on this matter.

And what, to me, is more important is that, on the total, quasi nine out of ten (87%) declared that the course has induced them to modify their attitude on received information, whatever the subject. Of course, it's important to confirm these results by other polls and in particular by questionnaires distributed to the same persons some years after the course (but this is not easy!).

Another very recent fallout of the course stems from the creation of the first Zetetics Laboratory in a French - and elsewhere? - university. The lab was created recently, in 1998, thanks to the grant of our Belgian colleague Jacques Theodor. The explicit objectives are: the analysis of "paranormal" phenomena as well as prophylactic measures vis-à-vis the pseudo-sciences and diffusion of scientific methodology. The lab is at the disposal of any of our university researchers intending to invest him or herself in this field.

Among other things, the lab web site (<http://www.unice.fr/zetétique/>) describes the Zetetics teaching program and presents the international Challenge offering a 200,000 Euros prize to any person who can prove a paranormal phenomenon. The lab web site will make also some of the students' works available to the public as "Z-Files". Obviously, Z for Zetetics.

Just a few words to conclude. Science is a self-corrective process of discovery. Hence contrary to all dogma and all parasciences. Paradoxically, pseudosciences have a very positive (yes: positive) role to play in the discourse on scientific methodology. While they have a null performance power (that is: no progress can be attributed to them), yet - by the example of their absurdity - pseudosciences

could lead to the consolidation of reason and a wider diffusion of the scientific method.

Using these motivating means, we have to insist on the fact that it is legitimate to be interested in a-normal and para-normal phenomena and that nobody has the right to outlaw their seductions. But we have also to insist that **the right to dream has a counterpart: the duty of vigilance.**

## Endnotes

A shortened version of the present text was published in *The Skeptical Inquirer* ("Save Our Science. The struggle for reason at the University", vol. 24, N° 3, May/June 2000, p. 34-39) announcing the full text in the Proceedings of the 10<sup>th</sup> European Skeptics Congress, Maastricht 1999. These Proceedings were in fact never published. So, here is the complete text of the lecture.

By the year 2000-01, the Zetetics teaching was no more an optional one. It's now, in part, a compulsory one and the total of registered students (after 8 years) is superior to 2400. For details, see the pages <http://sites.unice.fr/site/broch/enseignement.html>.

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## Note (D. Vitas)

Dissemination of pseudoscientific "theories" in the Serbian Society is in full swing in last three decades, which includes the development of a specific market whose value is difficult to estimate, but which cannot be neglected according to particular cases that became publicly known. Astrologists, numerologists, various variants of alternative medications, magicians and witches have entered all media. On the other hand, the space for the critical analysis of these "acknowledged methods"<sup>15</sup> is very limited. In this way, a person with the superficial knowledge in science in general and scientific methods can easily become a victim of her/his own deceits. It is enough to mention the recent passionate denial of the necessity of MMR vaccines or the enormous popularity of the Michael Drosnin's book "The Bible Code" in Serbia. With a little effort everyone can find sources of such deceits. To that end, the prof. Broch's article, which is not known to wider audience, represents a step to popularization of critical thinking and development of the "Art of Doubt".

Henri Broch (2008b) *"Comment déjouer les pièges de l'information ou les règles d'or de la zététique"*, collection "Une chandelle dans les ténèbres" N°2, éditions Book-e-Book, <http://book-e-book.com/>

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16 See about *Astro Fest* in the „Mixer House“, daily newspaper *Politika*, 15 May 2015, page 18.