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FEELINGS OR METACOGNITION IN ECOLOGY

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SUMMARY

Our studies are goal-oriented. We are looking for educational methods in dealing with ecology and so changing behavior. However there is a constraint : the educational strategies we are seeking must include exhibits pertaining to the realm of museums or centers of scientific literacy. We recognize the importance of meaningful learning, not only to alter previous knowledge but as well, to change certain ways of doing things. We also believe that there is a knowledge "of" a subject and a knowledge "on" a subject; there would be several levels of cognition and at each level there is the possibility to encounter LIPH's. When, at a particular level, a pragmatic conception is counter-productive, it is only with the help of a higher level of cognition that the mind can operate "on" the inappropriate proposition.

So to furnish to the public a level of discourse that could work **on** their knowledge (either to alter it or to change habits) we first have to know what their metalearning state is like. In our study, the subject matter is related to ecology. With an adaptation of the Q-Sort technique, we have collected data from 550 people and built a list showing the most important words that people use to express their feelings (metacognition) about the St-Lawrence River and about water in general.

INTRODUCTION

What are your feelings and impressions towards water on one hand and the St-Lawrence river on the other? That was the question asked to more than 500 persons. The following will attempt to explain the reasoning behind this particular question; the answers put forth and the interpretation and use of the data collected in order to better exploit exhibits pertaining to museums with respect to the topic of water. In fact the futur museum called "La Biosphère de Montréal" has adopted water as its topic.

The Biosphere is a museal project which aim to be a wathcing and awakening center regarding the eco-system. Its principal target is water at

which we look through the landscape of the St-Lawrence river. Hence, the awakening mission follows the objective of developing the ecological thinking as a behaving and acting philosophy which help us survive in tying our destiny to the planet future. The Biosphere steering comitee has then establish a four dimensions program: emotion, knowledge, utilization and action. In short, the Biosphere wants every one of its users to become a real water protector.

In order to conceive more adequate exhibits for this futur museum, five studies have been conducted (Girault, Larose, 1992): a study about the river's pollutants conceptions; a study about conceptions regarding the treatment of water; a study on Quebecer's conceptions for depollution strategies; elaboration of conceptograms regarding the water and enveironment relations ; finally, feelings and impressions of a Montrealers public about water and the St-Lawrence river. The present paper is based on the last study mentionned above.

WATER AND THE BEAST

Do you believe in magic? You will when you have read the hamburger story. A child who eats a hamburger digests a mature tree. He who eats a cow eats its house. The thing seems so ridiculous. This is like the story of the one who after having burnt all his furniture, to heat his lodging he now has to burn his windows and doors. . These phenomenon are common in ecology. Here are some statistics. It takes 24,000 litres of water raising a cow. To produce 500 grams of beef, requires 39 times more fosil combustibile than 500 grams of soja beans (Fiels, Hurr 1985). The demand for beef is so enormous that actually they are cleaving the amazon forest to breed cattles. The impact on water and trees is even more desastrous in countries poor in electricity and countries that are contemplating raising cattles as a mean to get rich. Because in addition to the space required for pasturage, lots of trees have to be burnt to cook all this meet and it is the trees that hold all this water. If there are no more trees, there will be no more water and there will be no more beef; desert and drought. We swim in full paradox.

LEARNING THE SCIENCE OF LIVING THINGS

The beef, water and trees pernicious cycle is a good example of the sort of knowledge that we encounter while teaching ecology. Comprehending concepts regarding sciences of living things requires taking in account not only many factors but also tracking down and setting right conjectural conceptions which are deep-rooted in unshakeable beliefs. It is difficult to ask a child even an adult to observe, comprehend and accept that individual satisfactions are not always good to the society at large. It is a difficult task to ask parents to understand that their lovely children who adore hamburgers can cause such damages to the environment. The challenge in term of change to carry out in order to contain this kind of problem is enormous. There are so many factors coming into play, such as : emotions, scientific concepts, opinions, living habits, cultural backgrounds and surely many other aspects. To tackle this kind of problems, education seems to be the safest way. As most interveners in ecology say the solution to the environmental problems pass through education. Here education does not necessarily refer to going to school.

AREAS OF SCIENTIFIC LITERACY

It is useless to try to attack the school or to look for a scapegoat. We must simply admit that actual teachers do not have the necessary training to tackle problems encountered in environment. The next generation of teachers can neither be effective at the beginning of their career even with adequate training, they feel powerless with regard to the programmes often considered imposed on them; they are submerged by administrative restraints and still are under choc caused by the recent discovery at their students personality.

Other administratives levels must support schools because the matter concerns a change in society in general rather than only human development. Museums and certain spots of scientific literacy can bring this support that education need. Although, these organizations can provide pedagogical objectives, the role of educating maintains all his requirements: learning objectives must be stated, evaluated and attainable. Museums quite often must educate but they must also entertain : education and entertainment are not always compatible. The museums task goes beyond learning of facts; they want also to sensitize and drive their public to action. And to realize this

program, museologues count, before anything else, on the impact of exhibits that they count on offering to visitors.

The pedagogic exploitation of exhibits constitutes for it only a whole research program. In this way there is for example the necessity to know: 1) what are for learning the implications that are raised by didactic settings? 2) should we also consider the necessity to adopt a theoretical frame? 3) as it is also question of witnessing the action there is a whole questioning to be engage on the existential as is. Those three themes contain assumptions that nourish the reflexion we have engaged in the present study. To facilitate the reader in his choice either to deny the ideas put forth or to accept them, it is imperative to shade some light on the concepts above mentioned.

DIDACTIC SETTINGS

The development of exhibits geared to teach concepts raise numerous questions. On the modality level of tridimensional representations only, there can be various reproductions, models, mobiles, stables, simulators, solutionners analogies, analogons, artefacts, didactic games, icones, measurement instruments, tools and mechanisms detecting phenomenons of all kind. In the development of didactic settings, some of these elements can be associated together, some can appeal to different senses, permit interactions, take in account the chronology or not, possibly be completed by other means of representation such as writing, oral, graphics, etc... We do not have yet a well structured taxonomy of various types of didactic settings and their characteristics regarding learning but we can already foresee certain organizing principles.

The designer's intuition is often satisfactory to realize astute settings with positive effects but when it comes to detect difficulties and prevent them, a theoretical framework is necessary.

A THEORY OF HUMAN COMMUNICATION

The theoretical framework developed by Watzlawick and al. (1967) remains despite the perverse effects of the "Utopia of Communication" denounced by Breton (1992), an approach very fertile for the study of human communication. Although this theory was initiated to better understand

psychological phenomenon the study of didactic objects seems to find its profit as well. On the semiological level, it is recommended to consider two ways of communication to serve as substratum to the informations between humans or to differentiate two encoding material: the digital and the analogic. To identify objects, it is possible to use something that resembles them (a drawing), or to give them a name. If the analogic has direct relation with what is represented, the digital uses a word that is arbitrary and resulting of a semantic convention.

The digital speech refers to a logical syntax very complex and more precise than the analogical speech that cultivates ambiguity. There are artificial systems, analogical and digital such as watches. The digital material more than the analogical one permits complexity, precision and abstraction.

With the analogical it is difficult even impossible to express abstract concepts. The analogical material cannot express neither negation nor the present, past or future. The material of an analogical message is very antithetical; a gift for example may be perceived as an acknowledgement, a charity, a restitution, or a mark of affection. To prevent confusion the word "analogical" has nothing to do with analogy. Analogical is in fact all the non-verbal communication. The digital is the verbal one. Without going further on this theme of semiology, the importance of these matters with respect to didactic settings is however foreseen.

Another point that concern the theory of human communication is the learning levels ; those should play an important role for a better understanding of the exploitation of didactic settings.

THE KNOWLEDGE LADDER

In relation to Bateson's works, Watzlawick (1967) introduces a conception relative to the learning which has a direct angle of incidence on the research that we will be describing in the following paragraphs. According to these authors and many others, there would exist two kinds of knowledge: "knowledge **of** things" and "a knowledge **on** the things".

To better grasp the importance of this distinction and its implication to the communication for learning purpose, let's hear the story of the frustrated dog which narrates Watzlawick. Some psychologists taught a dog how to distinguish a circle from an ellipse. A pedal bearing the effigy of a circle displays food and the other pedal doesn't. When learning was well integrated, experimenters began to modify the shapes. They rounded little by little the ellipse and flattened little by little the circle till both shapes became identical; to make a long story short the dog went crazy.

The perception of the circle and ellipse corresponds to the knowledge of things or first degree knowledge. This is the sensitive knowledge. The dog has learned very quickly an important fact about those shapes they represent pleasure or pain and they play a vital force for him. This knowledge on another knowledge is a second degree knowledge: a meta-knowledge. It is even possible to imagine that the dog can say now he knows how to get the food; he is safe. This conclusion is located at a third level for this knowledge has been built from a second degree knowledge.

With human beings, this process would function the same way but without any doubt with more various levels. This process of inclusion consists to establish contexts and to give meaning to the reality we are trying to grasp. This research of meaning could be more and more pushed, even uncorked on existential problems as they are those which characterize the ecology.

THE EXISTENTIAL

We exist - this is sufficient to require us to question our past, and the direction in which we are headed. To escape the pressure of that insistant questioning, we construct an answer which we believe in. Everyone creates a personal 'reality', on the basis of their own inner structures, and from the ideas of past generations.

Within this dynamic arises our belief system, which allows us to differentiate the truth or what is real, what is false or illusory: here one ordinary articulate with few ideas and much emotion, the purpose or

meaning of life. This type of knowledge occupies the highest levels of human thinking.

Humans act in relation to premises constructed from one's first perceptions of phenomena, and these premises then determine one's interaction with the real world. When this interaction results in a conflict, it seems individuals are very capable of changing these premises, as long as they do not contradict higher level beliefs.

When an individual must change his premisses, for example of the third order, he must elaborate an higher level of beliefs.

"Nothing obliges us to propose only three orders of abstraction for man's experience of reality. In theory at least, these orders rise in infinite progression. As well, when man wants to change his third order premisses, he can only accomplish this in placing himself at a fourth level" (Watzlawichk, p. 270).

When premises at the existential belief's level are flouted a resulting distress takes hold of the individual; this dictates that it is the level at which we must now operate.

THE 'AFFECTIVE LEVEL' AND ACTION

Most recent didactic literature investigates the relation between what is now called the three knowledges: scientific knowledge, taught knowledge, and learned knowledge. To facilitate the acquisition of conceptions, it is proposed to investigate the structure of the concepts which make up these conceptions, and to address those which are either inadequate or incomplete. The techniques proposed to address misconceptions are successful in most areas of knowledge, however, when dealing with learning directly tied to ways of life, the results seem much less meaningful. Because one's personality is involved, we reach high levels in the hierarchy of learning knowledge, which contain fundamental elements of motivation, beliefs, ideology, impressions and feelings as well as logic. The network of concepts at this level is governed by rules which are most often not clear. But it seems that if one desires to change one's concepts, one must first identify them. The

concepts at this 'meta-level' belong to the 'affective level', and seem to closely determine action. They are intimately linked to our existence.

WORDS TO INDUCE ACTION

We enter into an area scarcely covered by didactic research, but where intervention psychology is successful. Here, the first postulates of our study are grounded.

Words direct and transform our existence. To begin with, take known sensations, with which we test our relation to our five senses. To clarify our experience, we compartmentalize our feelings of pleasure or sadness, and we give that 'box' a name. Like a Jack-in-the-box, the trigger of a future experience releases memories of this box, and we remember the sadness or pleasure we feel, by calling it by its emotional category. All of these names constitute our 'emotional' vocabulary. It is this vocabulary which gives motive to our acts, which motivates us, and which gives meaning to our actions.

An inherent duality exists within the process of this vocabulary formulation. On one hand, an economy of words, and on the other, because we have too many words, emotions that are disproportionate to our experience - we feel nothing or too much. Here, a vocabulary which has more nuances is important to deal with the range of emotions our environment produces.

Of the 500 000 words of the French or English language, daily vocabulary uses only 1 500 to 10 000 words. To describe emotions, there are only about 3 000 words, with 2 000 describing negative emotions and 1 000 describing positive emotions.

These figures have perhaps to be verified, and even if most of the ideas on the importance of words are in the realm of opinion, psychoanalysis or motivation promoter however, it is still possible to state that words have a real biochemical effect: galvanometers or lie detectors show this well when dealing with taboo or shameful words.

Beliefs exist in words, and can be transformed through words. Words can multiply the force of an emotion, and given their great power, they should be well chosen, especially when we realize they permit us to communicate with ourselves; words allow our emotions to live. In giving more attention to what we feel, will we be able to change our feelings themselves, as well as our actions? The idea might seem absurd, but we believe that by changing one's emotional vocabulary with respect to one's environment, one's actions will also be altered.

THESIS

The thesis proposed by the present study holds that a didactic treatment, which uses ecology as its subject, should structure a discourse which would allow individuals to influence their emotional vocabulary. If this vocabulary includes inadequate concepts in the sense that they trigger either very weak or too strong emotions, or if concepts which allow one to appreciate important nuances are absent, we find ourselves in a LIPH' S situation of an emotional nature .

The solution concisely put: change words to change emotions to change actions. Methodologically, we believe one of the first tasks is to investigate the emotional vocabulary used by the public with respect to ecological material. Taking advantage of an opportunity offered by the Montreal Biosphere, solely in relation to water and the St-Lawrence river, we began a study to collect the major elements of an emotional vocabulary.

THE QUESTION

Rather than question subjects orally or by questionnaire, the study invited people to write down on a piece of paper, their sentiments and impressions from their experiences with water and the St-Lawrence river. Subjects were asked to write ten words which best represented their emotions in order from most important to least. The wording of the question is as follows: **"Give ten words which best express your impressions or your sentiments with respect to water. Number them in importance from most to least."** A second question on another sheet asked for the same response but with respect to the St-Lawrence river.

THE RESPONDENTS

The group of respondents started with two classes of future teachers for elementary school. These two classes totaled 70 people altogether. We asked each individual to solicit the participation of 5 friends. In this way, we received almost 350 responses to our initial study. In a subsequent moment other students were approached with the same methodology. The respondents are living in the territory of the Montreal Urban community.

The complete study totaled 550 respondents. One sixth of these individuals were composed of future elementary school teachers who are likely to visit the Biosphere with a class of students. We did not attempt to precisely define a population or a representative sample of people, this is rather a first sample of words we hope to arrange.

Besides, table 1 indicates that respondents are primarily female students under the age of twenty-four. (Individuals responded to two questions and if the totals are different it is the result of spoilt questionnaires).

		Water		River	
Respondants		532	%	476	%
Sex	Women	339	0.64	310	0.65
	Men	193	0.36	166	0.35
Age	- 18	136	0.26	90	0.19
	18 to 24	185	0.35	175	0.37
	25 to 40	115	0.22	113	0.24
	+ 40	96	0.18	98	0.21
Activity	Student	280	0.53	223	0.47
	Laborer	46	0.09	45	0.09
	Technician	27	0.05	23	0.05
	Sales-Clerk	41	0.08	36	0.08
	Prof-Adm.	96	0.18	102	0.21
	Misc.	15	0.03	16	0.03
	Words entered	5316		4732	
Words diff.	1009		1127		

Table 1 : Data collected

USING THE DATA

Data from the questionnaire were subjected to the Q-sort technique. Q-sort is a process of grouping data to mark preferential responses, that is, those with greatest importance. It is both a methodology of a specific paradigm in human sciences research, and a technique which resembles psychometry and statistics processes.

Q-Sort, as structured by Stephenson (1953), unites a group of subjects with the same ideas or propositions. For example in ten

divisions, from the most important element to the least important. One subject orders elements (a,b,c,d), as (c,ab,d), while a second subject orders them as (b,d,c,a). Specifically, the weighting of each element is proportional to the level it occupies: 10 points for the first level and 1 for the tenth. The following table orders 10 elements from most important to least, and represents the first treatment of base data. Rather than limit the choice of answers to a predetermined list, we allowed unlimited possibilities, to avoid introducing a bias in the investigation.

Table 3 presents the frequency for the first 15 words for each of the 10 levels in which they were ordered as indicated in table 2. The total for each word corresponds to the weighting given to one word in relation to others. Tables 4 and 5 show the proportion of respondents of each sex.

	Most important					Less important				
Rank of elements	1	2	3	4	5	6	7	8	9	10
Score for each position	10	9	8	7	6	5	4	3	2	1
number of the same element registered	65	17	11	15	7	6	6	5	5	7
total	650	153	88	105	42	30	24	15	10	7

Table 2 : Exemple of statistic treatment for the word Life

THE ANSWER

WATER	RIVER
life 65 17 11 15 7 6 6 5 5 7 = 1124	pollution 177 49 37 25 17 17 13 10 12 11 = 2986
pollution 18 9 13 15 10 9 14 17 16 19 = 733	ships 13 22 28 23 18 29 21 17 20 9 = 1150
drink 37 9 13 7 6 3 7 3 6 3 = 707	fish 4 21 22 23 8 14 7 12 13 2 = 776
refreshing 14 17 18 9 9 11 11 9 3 6 = 692	dirty 21 20 4 6 8 3 3 4 8 3 = 570
cleanliness 7 16 16 9 16 10 14 9 9 6 = 658	transportation 12 9 15 14 9 7 8 4 3 3 = 561
fish 7 11 12 12 12 14 14 9 6 10 = 596	greatness 15 18 9 8 6 5 6 6 3 6 = 555
purity 16 17 14 9 8 6 3 3 2 3 = 594	bridges 3 5 8 7 9 9 17 13 7 12 = 420
rain 2 6 13 10 13 13 15 18 16 8 = 545	fishing 2 9 5 13 6 8 13 9 7 7 = 408
calm 8 10 11 8 11 9 4 6 3 8 = 473	beauty 6 9 5 6 11 10 5 5 6 4 = 390
wash 6 18 11 4 6 7 4 6 10 8 = 471	navigation 4 8 10 7 3 5 6 2 2 1 = 319
thirst 12 9 8 9 6 4 5 0 2 3 = 411	garbage 4 3 9 9 4 6 6 4 6 3 = 307
chilliness 7 8 8 11 7 4 5 5 4 3 = 391	water 13 4 1 5 5 5 2 3 5 6 = 297
relaxation 6 8 9 12 5 4 1 1 7 4 = 363	seaway 8 6 5 3 6 3 5 1 2 4 = 277
electricity 3 4 11 2 10 6 7 2 4 7 = 307	ports 2 4 6 4 6 5 2 13 11 6 = 268
sea 5 1 3 6 10 7 10 7 11 3 = 306	majesty 11 10 1 2 4 1 1 1 4 1 = 267

Table 3 : List of the 15 words with the highest scores

WATER	WOME N	%	MEN	%
LIFE	96	0.28	48	0.25
POLLUTI ON	89	0.26	51	0.26
DRINK	57	0.17	37	0.19
REFRES HING	72	0.21	35	0.18
CLEANL INESS	86	0.25	26	0.13
FISH	66	0.19	26	0.13
PURITY	54	0.16	27	0.14
RAIN	65	0.19	49	0.25
CALM	64	0.19	14	0.07
WASH	51	0.15	29	0.15
THIRST	31	0.09	27	0.14
CHILLIN ESS	42	0.12	20	0.10
RELAXA TION	42	0.12	15	0.08
ELECTRI CITY	33	0.10	23	0.12
SEA	39	0.12	24	0.12

Table 4 : Women-Men answer ratio for Water

RIVER	WOME N	%	MEN	%
POLLUTI ON	248	0.80	120	0.72
SHIPS	131	0.42	69	0.42
FISHES	78	0.25	48	0.29
DIRTY	55	0.18	25	0.15
TRANSP ORT	61	0.20	23	0.14
GREATN ESS	59	0.19	23	0.14
BRIDGES	48	0.15	42	0.25
FISHING	51	0.16	28	0.17
BEAUTY	49	0.16	18	0.11
NAVIGAT ION	26	0.08	22	0.13
GARBAG E	40	0.13	14	0.08
WATER	34	0.11	15	0.09
SEAWAY	29	0.09	14	0.08
HARBOR	44	0.14	15	0.09
MAJESTY	21	0.07	15	0.09

Table 5 : Women-Men answer ratio for the St-Lawrence river

INTERPRETATION

Results of a study such as ours are difficult to interpret. If we limit ourselves to the given data, we are forced to conclude the majority of respondents have, in a preponderant manner, impressions and sentiments of "life, pollution, boats, drinking and fish". With less importance they also have impressions of freshness, cleanliness, dirtiness, majesty, purity, calmness and beauty.

Interestingly, despite the importance with which the media treats issues dealing with water, respondents were not worried, deceived or suspicious. They did not have an impression of wastefulness or of immanent disaster. In the same way, with respect to the St-Lawrence river, respondents were not deceived, disgusted, bored, unhappy or sad.

In fact, it was not the result expected.. Perhaps people do not really have words to describe how they feel. Or perhaps they do not feel anything, as they do not have words which would make them aware. When we do have impressions or sentiments of boats, fish, or electricity, things are really going bad! But we can not jump to conclusions. Most people are hesitant to show their emotional side, and when they do, it is often behind several layers which protect them and obscure the truth. They do not easily divulge what they love or hate, but when they do it is usually in three phases (Gordon, 1961): (1) the individual relates a description of facts, (2) then of impressions, and finally (3) the individual expresses their deep emotions. The current study can take this process into account.

DISCUSSION

This study raises interrogations as to the effectiveness of the question given to respondents, and the collection of data. Perhaps we should have begun with interviews, which would have had the effect of gaining respondents' confidence. Perhaps the students doing the field work were not trained enough in the collection of data. Regardless, the current results suggest further studies, with clearer limits. For example, as our premise investigated the large role of beliefs, ideology, and opinion to determine fundamental values, we should have noted the importance of these limits.

Many authors, including Ferrey (1992), propose the arrival of a new ecological realm. This movement shows several of its own tendencies. There are those who place humans at the center of their theories, and consider the environment with respect to the well-being of human: this is an 'environmentalist' concept. Others believe animals and humans are equal with respect to their capacity for suffering. Finally, there are those who believe the eco-system or 'biosphere' itself is at the center, and at a higher position than mankind, which should disappear if it continues in of destructive actions (Lovelock, 1989).

Individuals are implicated in various degrees within these tendencies. For many people, it does not make sense to consider mountains, trees, or animals as people with feelings. Descartes taught us

there is no soul in nature; it has been a long time since it last spoke. Now, why have feelings for a machine? For some individuals our question on their sentiments for water, or a river, had as much sense as asking them how they felt about their radio or the vacuum cleaner.

Our occidental culture, religion, democracy, economics and intelligentsia pull us away from nature, and here we consider it as a person! In fact, there exists an ecological movement whose leaders do not find it strange to give trees and rivers 'rights' as per their natural contract (Serres 1990), as mankind has his social contract.

All these beliefs have both advantages and disadvantages. Instead of taking a position on these beliefs, we follow Maurice (1987), whose work urges us to change lifestyles but within the limits of an active democracy. One can make one's choice from the continuing evolution of contemporary sensibilities.

This evolution of sensibilities coincides with the objectives of our study, and our initial intuition was reinforced by the results we obtained, even if they do seem insignificant.

In the application of our study, with these first impressions 'of' things people feel, the museum designer can compose strategies 'on' simple words such as life, pollution, or boats, and help to construct a meta-language of happiness, vigilance and liberty.

CONCLUSION

The goal of this paper is to seek informations to conceive museum means with which to influence the behavior of individuals, specifically behavior considered menacing towards nature. Religion, politics and the media also deal with these issues but this study stand on the side of educational research to propose solutions.

Following the same trend of previous studies on education, this investigation also deals with the "didactic's triangle", that is content, instruction and learning. First we begin by calling attention to the paradoxical quality of ecological concepts, and their direct relation to ideology

and beliefs. Secondly, in dealing with instruction, we underline the importance of an analytical filter to better exploit the property of didactic displays. Thirdly, with respect to learning, we are interested in conceptual levels or hierarchies. Here we borrow a major concept from human communication theory, in proposing that in order to change one level of learning, one must place themselves at a higher level. A modification of those structures is needed when a limited or inappropriate propositional hierarchy is discovered. In rising on the "ladder" of the knowledge system, we arrive at "misty" levels of emotions and sentiments. Here we assume that to change actions related to the health of nature there is also something to be change on the affective level of individuals. What must be change are the words to express feelings and emotions. Therefore, the composition or the state of that former level must be known to show what is missing or not wanted. Consequently, the present study undertakes the gathering of emotional vocabulary of a specific group of individuals, with respect to water and the St-Laurence river. The results of the inquiry show an ambiguous set of components for an emotional vocabulary, The first 15 important words of the emotional vocabulary do not reflect sensible responses. In terms of sensations, this list of word is rather cold. If the words help to feel things then water is not so evocative for our population which consequently dont pay attention to it..

It is too soon to conclude that we have a theory supported by experience. We believe it is necessary to repeat this study, in order to confirm our results or to further other and relevant informations. Practically however, we believe that the results of this study have justified and enriched the emotional guidelines established by the project leaders of the Biosphere. Numerous tangents in the exploration of these guidelines have been proposed by this study. Finally, we should mention that results from European respondents still remain to be analyzed. The comparative study of emotional vocabularies from various cultures would perhaps allow one to distinguish distinctive modes with respect to ecology, and thereby give clues as to teaching strategies.

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