

Towards a hedonology: A science of hedonic management

Target article on hedonology

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Abstract. Animals, like humans, present behaviors and activities that do not directly relate to survival or reproduction. Like addiction, wheel running, roller coasters, and other sensation seeking activity show that there is an hedonic requirement which explains these behaviors. Based on Brown's work on hedonic management, a complete model is presented. This model, based on the double function of the human activities principle and on the central concept of action system, paves the way to a new science: hedonology. This science includes a number of branches that are briefly presented at the end of this theoretical paper.

Keywords. Hedonic management, Addiction, Hedonic sources, Brain reward system, Action system, Hedonology.

Author's rationale for soliciting multiple commentary:

In recent years the concept of addiction has raised numerous epistemological problems. Indeed, if one uses this concept to refer to more than the excessive consumption of psychoactive substances, by including also "behavioral addictions," a certain number of questions arise: Is this extension simply analogical or does it have a real (operational) scientific value? How can the criteria of addiction apply to behaviors as varied as the consumption of heroine, tobacco, alcohol, television, video game, sex, gambling, and so on? Would it still be possible to maintain a conception of addiction as a "disease"?

Further, beyond the issue of the "object" of the addiction, the problem also arises of the multiplicity of models. In Lettieri et al. (1980), which only focused on drugs, 43 theories are presented, grouped into four categories: (1) Theories of one's relationship to self; (2) Theories of one's relationship to others; (3) Theories of one's relationship to society; (4) Theories of one's relationship to nature. West's most recent inventory (West, 2001) presented 139 theories, grouped into five categories: (1) Theories that focus on conceptualization and general processes (behavioral, social, psychological, cognitive, biological); (2) Theories that focus on effects of addictive stimuli (behavioral, social, biological); (3) Theories that focus on individual susceptibility; (4) Theories that focus on environmental factors; (5) Theories that focus on recovery and relapse. The same profusion is found in Blane & Leonard (1987, theories that focus on drinking and alcoholism); Chaudron & Wilkinson (1988, theories on alcoholism); Glass (1991, varied approaches); Lowman et al. (2000, on alcohol craving).

Within the framework of Kuhn (1962)'s concept of "scientific revolution", we are confronted with a "normal" science of the addictions which accumulates the "objects"

¹ This article were submitted to *Psycoloquy* on March 2005. However, meanwhile the upload system is being redesigned, we accounted that the article submission is currently unavailable. So, regarding the importance of the article, we decided to present it in Egzagone.com database. Naturally, this paper need a lot of critics and thoughts.

of addiction, the relative concepts, the theories, in a perplexing disorder. This “normal addictological science” is in itself an epistemological anomaly, which regroups many small conceptual anomalies. It is for this reason that we argue that a new addiction paradigm is necessary.

The purpose of this article is to introduce a “paradigm shift” by calling for commentaries on the following questions:

- (1) Is there an evolutionary continuity between exploratory drives, sensation seeking, hedonic management, and addictions?
- (2) Is there a basic function, a fundamental need for regulation of the psychological and emotional states (which already appears in the animal kingdom), and is this at the root of those more specific behaviors called addictions?
- (3) Is there a conceptual continuity between substance addictions and behavioral addictions — a continuity based on the concept of “brain reward system”?
- (4) Is there a continuity between everyday hedonic management (i.e. of ordinary rather than pathological addictions) and pathological addictions?
- (5) Is it possible to consider a conceptual distinction and hierarchy between “hedonic sources” (according to the idea of brain reward) and addiction (as behaviors which use hedonic sources)?
- (6) Is it possible to consider a double function in our activities, which could be called respectively pragmatic and hedonic?
- (7) Is it possible to explain and describe addictivity as an organization of hedonic activities in a system?
- (8) Is it worthwhile to consider introducing a science that one could refer to as “hedonology” — which would be a science of hedonic management in its multiple extensions in varied fields of science (see *IX. Hedonology* section at the end of this article)?
- (9) Is it possible to conceive “hedonic psychology” (Kahneman et al., 1999) as one of the first pillars of hedonology?

We are hoping that commentators will attend not so much to the style of this article (the authors are French and their English may not be perfect), but on the substance of the article and the new ideas which it brings. For the three authors, this paper is a preliminary text about a model that will need to be empirically tested.

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I. INTRODUCTION

In Apter (1992) the author relates an experiment by Bernstein (1976) with monkeys in these terms: “A few years ago, an experiment was carried out on monkeys who were placed in a compound with a set of vertical poles for them to climb. One of the poles was constructed in such a way that the top was electrified, so that when monkeys climbed the pole they suffered an electric shock. The interesting thing is that all the groups of monkeys observed showed an *increase* in climbing behavior for that particular pole. When the power was turned off, however interest declined rapidly, demonstrating that there was nothing special about that particular pole other than its capacity to provide electric shocks. This capacity made it, presumably, a more exciting pole to explore than the others – an interpretation of the finding suggested by the experimenter himself.” (pp. 175-176).

Another strange phenomenon has been observed in laboratory animals: Wheel running. For Sherwin (1998, 1999), this is a fascinating behavior performed by a wide range of species including foxes, cats, rabbits, flying squirrels, and Tasmanian Devils. It is influenced by a plethora of internal and external causal factors. The reasons why this behavior occurs spontaneously and why it is so widespread remain unanswered – but we do know that many animals are highly motivated to run in wheels. Moreover these animals can cover unbelievable distances. In 24 hours a rat can cover 43 km, wild mouse 31 km, lemming 19 km, common fox 17 km, laboratory mouse 16 km, golden hamster 9 km. It is reported that a flying squirrel could make a nonstop run of 12 hours. Furthermore, animals prefer to run in wheels of irregular form, the complexity seeming more desirable. The behaviors are also very varied, including acrobatics, jumping on the axle, grasping at the bars, and running outside the wheel. A mouse in a square wheel can jump in the angles up to fifteen times a second.

In humans many other behaviors are known which are difficult to explain in terms of the necessities of survival or reproduction. Humans do run on a machine when they exercise (travelator). They do enjoy doing such things as seek the stress of roller coasters, by taking risks in daily life such as driving too fast, by practicing sports that are more or less extreme or dangerous, by forbidden activities, by watching spectacles (such as thrilling movies) and spectacular events (like traffic accidents), by smoking tobacco, cannabis, drinking alcohol, taking drugs, and so on (Apter, 1992).

Coming back to Sherwin’s observations, the author considers the hundreds of scientific studies which tried to explain wheel running. Internal factors were proposed, such as the effects related to brain and glandular systems. Other internal factors were studied, especially biological factors, including genetic, hormonal factors, as well as psychological factors like learning, age and experience. A great number of external variables were also studied, like food, water, social influences and the environment. Sherwin (1999) remarks that all these studies tended to contradict each other, which does not contribute to answering the question.

For Sherwin, wheel running is universal (it appears in a great number of different species – e.g., from chick to Devil of Tasmania – and in very varied situations), enough to be regarded as a special behavior having its own internal coherence. It is initially an abnormal activity, because the wheels do not exist in nature (nor the electrified poles). This activity can even enter in conflict with the physiological and vital needs of the animal (to drink, eat, rest), endangering its health and its life.

Sherwin's assumption is that the experience of wheel running brings with it a set of stimulations having a positive reinforcement effect. He compares this with the pleasure of humans on carousels in fun fairs. Studies show that the animal is ready "to pay" a high cost to achieve this pleasure (Kavanau, 1967; Dawkins, 1990; Sherwin & Nicol, 1996). A control of the variables in the laboratory supports the idea that this activity of wheel running is self-reinforcing and depends on internal factors, directly modified by the activity itself. Wheel-running recalls the experiment by Olds and Milner (1954) on positive reinforcement produced by electrical stimulation of septal areas and other regions of rat brain. Running and exercising generate an activation of these reward systems by the release of endogenous opioids (Colt, Wardlaw, Frantz, 1981; Hawley, Butterfield, 1981; Werme, Thorén, Olson, Brene, 2000). In human beings, we also know that there are self-reinforcing behaviors such as addictions considered in their broad meaning: That is addictions with psychoactive substances and behavioral addictions (running, gambling, masturbating, video gaming, etc.).

II. EPISTEMOLOGICAL EVOLUTION

One of the objectives of this article is to show that addictions, as they are observed and studied, only represent the emerged part of the iceberg. The extensive evolution of the concept of addiction questions us as regards the processes hidden under the surface of the behaviors. This paper proposes to make a link between, on one hand, the reality of hedonic management in mammalian life and how humans, in particular, engage in hedonic management and, on the other hand, what an addiction is and how a hedonic interest becomes an addiction.

The epistemological development of the concept of addiction can be described according to three stages. In the 19th century and the beginning of the 20th, the phenomena of dependence, abusive consumption and the negative consequences of these abuses are first formalized in reference to the substances concerned (alcoholism, nicotinism, and all the "addict" term preceded by the name of the accused product: Cocaine addict, heroin addict, ...).

During the second stage, a little later, in the 20th century, one started to conceive of addictions and addictive processes as occurring without substances, i.e. the possibility arose of a behavioral addiction, based on a particular source of stimulation, such as sex, love, purchasing, gambling, etc. It thus became necessary to formalize what Goodman (1990), proposed as a "basic underlying addictive process" for all the addictions. During the last fifty years of the century, the development of works in neurobiology, the discovery of endogenous substances (Goldstein, 1976) and brain reward systems (Olds & Milner, 1954), brought serious data to support this idea of an addictive process.

Finally, some general theories of addiction (Bejerot, 1972; Peele, 1980, 1985; Dodes, 1996; Orford, 2001) and the introduction of the concept of "hedonic management" (Brown, 1997; Loonis, 1998, 1999) represent a third stage, in order to formalize the fundamental aspects of the behaviors of sensation, pleasure, excitation or sedation seeking, and the internal and external processes explaining these behaviors. Our proposition is that processes which concern an addictivity, such as salience of the activity, loss of control, tolerance, withdrawal, positive and negative reinforcements,

conditioning, as well as the long-term memory effects (relapse, reinstatement), could be explained in the frame of an *hedonic management model*.

A last but not least, epistemological reason for this ambitious model is the problem of the proliferation of theories on addictions and craving (Blane, Leonard 1987; Chaudron, Wilkinson 1988; Glass, 1991; Lowman et al., 2000; West, 2001) which makes it necessary to go beyond the sole concept of addiction (notwithstanding discussions about the very concept of addiction — Davies, 1992). An important precision is that the concept of “addiction” is here considered in its widest possible sense, to include addictions both with substances and without (behavioral addictions), addictions that are not necessarily pathological (such as drug/alcohol addictions), and also everyday kinds of addictions like watching television, telephoning friends, working, having sex, and other “normal” repetitive activities or passions. So, from our point of view, addiction can be “positive” (Glasser, 1976) and not always a “disease”.

III. PHYLOGENETIC EVOLUTION

Considered from the point of view of phylogenetic evolution, addictions appear to be fitted to an evolutionary line which starts from a first stage: “Exploratory drives”. The ceaseless process of living evolution has indeed found an advantage so that animals, that are already endowed with mobility, can explore their environment, through anticipatory aiming and the construction of a mental map. All of this allows for improvement of individual and species survival. As Hebb (1955) stated, there is a great deal of behaviors, especially in the higher animal, that is at the very best difficult to reduce to hunger, pain, sex, and maternal drives, plus learning. Even for the lower animal it has been clear for some time that we must add an exploratory drive, and presumably the motivational phenomena studied by Harlow (1953) and Butler (1953) could also be comprised under such a drive by giving it a little broader specification. The curiosity drive of Berlyne (1950), and Thompson & Solomon (1954), for example, might be considered as covering both investigatory and manipulatory activities on the one hand, and exploratory, on the other. They have shown that a rat which is offered a short, direct path to food, and a longer, variable and indirect pathway involving a search for food, will very frequently prefer the more difficult, but more *interesting* route. In other experiments it has been shown that a hungry rat placed in a new environment will explore before it eats, even if food is placed in front of it (Berlyne, Koenig, Hirota, 1966).

The second stage is the “sensation seeking” which represents an extension to the exploratory drives. As Zuckerman (1994) stated, sensory deprivation experiments showed that rodents (Kish, 1966), monkeys (Butler & Alexander, 1955), and humans (Jones, 1969) deprived of patterned or varied stimulation for any length of time developed a “drive for stimulation,” as shown by their bar-pressing for the reinforcement of external stimulation, even if that stimulation was meaningless and unrelated to primary drives. Jones’s studies with humans demonstrated that the novelty or unpredictability of such stimuli was the quality most related to their reinforcement value. Experiments with several species have shown that the need for variation in sensory stimulation is as basic as the conventional “primary” drives and it is particularly strong in primates.

Further studies on sensory deprivation in humans (Bexton, Héron & Scott, 1954; Scott, Bexton, Héron & Doan, 1959; Azima, Lemieux & Fern, 1962) show that people who are drastically deprived for long periods experience dysphoria (anxiety, depression), and a psychological and personality disorganization, all these symptoms being reversible when there is a return to a normal level of stimulation (for a review, Zubek, 1969).

Primates, humans included, derive from sensation seeking specific needs for psychological regulation, control of mood. All this is a question of “hedonic management”, the third stage, whose concept and model will be presented in this article. In the end, special and often extreme solutions (one might say also pathological) of hedonic management, can appear in humans as “addictions”.

Thus, exploratory drives, sensation seeking, hedonic management and addictions, together represent a coherent evolutionary line in the higher animals and humans, and could explain the origin and bases of not vital behaviors. The hedonic management model which is presented here attempts to radicalize the concept of addiction; our main assumption is that, at the root of addictions, there could be a general function of hedonic management which is shared by both humans and animals.

IV. THE BASIS OF HEDONIC MANAGEMENT

Wheel-running (Sherwin, 1998), electric or drug self-stimulation (Olds, Milner, 1954), curiosity, problem and sensation seeking (Zuckerman, 1994) cannot be entirely explained with alternative assumptions like energy management, learning, or other internal or external factors. The effect of positive reinforcement is the central explanation, arguing that these activities are rewards in themselves. This sustains the hypothesis of hedonic motivation as a special motivation.

Brown (1986, 1988, 1997, 2001), has introduced a body of ideas and concepts leading to a first outline of an hedonic management model. Using a phenomenological approach, Brown cites many works which show that addiction is characterized less by its object (drug, food absorption, stimulation produced by an activity) than by its lived experience. Thus, many authors have insisted on the various characteristics of the modified states of consciousness that are sought in addictions (Greaves, 1974; Weil, 1972; Peele, 1978, 1980, 1985), and it could be shown that in the core of any “excessive appetite” (Orford, 2001) lies the involved hedonic experience. It is on the basis of this experience that addictivity grows.

For Bejerot (1972, 1975), in his theory of addiction to pleasure, addiction is an “acquired emotional fixation” by learning. It is active in an intermittent or continual way, by intentional and stereotyped behaviors, and it has the characteristics and the force of natural drives, while aiming at a specific pleasure or avoidance of pain. The experience of pleasure, which is at the beginning an epiphenomenon, becomes through learning an artificial motivation, that the individual is constrained to achieve.

Brown started to design his hedonic management model on the basis of Apter (1982)’s work and in particular this passage: “... it is hardly to be wondered at that high levels of positive hedonic are not typically maintained for extended periods. To put this in everyday terms, it is not surprising that people have difficulty in remaining happy for very long.” (p. 330).

Brown (1997) then states that: “In contrast to the normal state of poorly managed uncertainty and acquired tolerance for aversive states, the core of the addictive process can easily be seen as the discovery and continuous use by the individual of relatively reliable and effective methods which enable him or her to manipulate arousal and hedonic tone in the directions he or she wants – reliably and immediately.” (p. 23).

This hedonic success is the basis for addictivity, which is found in the animal kingdom, as in the experiments of electric cerebral self-stimulation on rats (Olds & Milner, 1954), or the observations of wheel-running in animals (Sherwin, 1999). For Brown (1988): “The whole range of addictive activities, from the ingestion of substances such as alcohol, food, and legal and illegal drugs to engaging in activities such as gambling, sexual conquest or even antique buying, can all be seen as *methods for manipulating hedonic tone*.” (p. 201, italics from us).

Brown’s hedonic management model is phenomenological (emphasizing the importance of subjective experience) and functionalist, in the sense that addictive behavior and activity fulfill a function of regulation of psychological states, through the induced physiological and psychic activation effects. For the hedonic management model, the accent is put not so much on the specific means (addictions in all their variety), but on its general and fundamental process.

This is a psychological model that regards addictions as motivational phenomena, based on a social learning, and this brings into play expectations and values. Addictions are considered here “as extreme examples of a range of ordinary everyday motivational and self-management phenomena.” (Brown, 1997, p. 17). The core of the model is the “hedonic tone” variable which is manipulated by the individual in the regulation of his/her level of arousal and his/her psychological state.

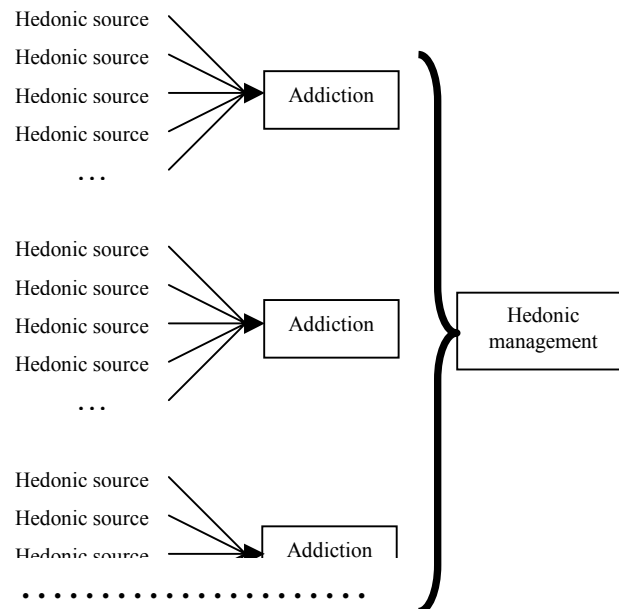
Brown (1997) develops his hedonic management model according to twelve proposals. The first one is that: “All individuals learn to manipulate their arousal, mood and experiences of subjective well-being to sustain good hedonic tone (states of relative pleasure and euphoria) for as much of the time as possible, in the normal pursuit of happiness. Some regularly reproducible feeling states become secondary goals or drives [i.e. addictions].” (p. 23). For Brown, the transformation of hedonic management into specific pathological addictions in an individual is based on a set of “vulnerabilities.” These vulnerabilities lead to an “hedonic gap” defined as “the discrepancy between the level of pain, frustration, deprivation and negative feeling that the individuals can tolerate and the level that they experience.” (ibidem, p. 24).

V. A PLETHORA OF SOLUTIONS

The scientific literature on addictions faces us with an increasing number of behaviors. To the addictions with psychoactive substances, are added the multitude of behavioral addictions, based on various sources of stimulation. First, one must make a distinction between addictive hedonic sources (stimulations) and addictions themselves. The hierarchy of concepts is presented in Figure 1. For each individual, hedonic management relates to addictions of all kinds (chemical and behavioral) and with different degrees of severity that can vary in time. Then, each type of addiction, considered as a behavioral unit, uses a certain number of hedonic sources. For instance sexuality, sometimes as hedonic means, sometimes as addiction (Carnes, 1983), can add

the following to its obvious somatic base: psychoactive substances, erotic fantasies, pornographic material, social relation, particular and titillating contexts, which each represent a hedonic source (or a set of hedonic sources). Then, sexuality represents one type of hedonic management to set among others, such as food intake, work, leisure, and so on.

Figure 1: Hierarchy of hedonic source, addiction, and hedonic management concepts.



The kind of epistemological shift which consists in giving up the narrow concept of addiction, to conceive a general addictive process, applied to an infinity of hedonic sources, naturally leads to the need for developing a “general theory of addiction” (Loonis, 1999; Brown, 2001), not only as a simple rational regrouping of the multiple addictions, but as a model which would describe the psychological, cognitive, behavioral, even social, processes governing hedonic management. So, it is possible to classify the hedonic sources in seven categories related to the different ways of stimulating the brain reward system (Table I).

This classification is not yet perfect, but it is a first step. It is important to read this table with Figure 1 in mind. So, most examples of addiction can be dispersed along several rows. This is the case with sexuality, as explained above. For instance, let us consider video gaming. At base, this activity, which often can turn into addiction, is composed of exogenous psychic stimulation (the stream of images and sounds from the console). However, one can also consider motor stimulation bound to the movements of hands and fingers on the joystick, mouse or keyboard. Possibly, an autonomic mental activity, such as musing, can appear. With certain games, somatic aspects should also be envisaged, a kind of arousal which is probably sexual. Video games are also socially shared and the players can play together and meet to speak about their passion and about their successes or defeats, to exchange tricks and solutions. As far as we are aware, there is no work on this topic, but one can suppose that video games can mix sexual activity (masturbation) or consumption of psychoactives substances. Apter

(1992) has described many of these kinds of “hedonic synergies” which conjugate several sources of pleasure.

Table I : Seven categories of hedonic sources, their brain implications, and examples of addictions.

#	Hedonic source	Brain implication	Examples of addictions
1	Psychopharmacological stimulation	Psychoactive substances are acting on the brain reward system.	Narcotics, intoxicants, exciting minor and major stimulants, sedative and hallucinogens, whose addictivity lies in the direct attack of the cerebral systems.
2	Endogenous psychic stimulation	Thoughts are acting on the brain reward system.	Daydreams, fantasies, erotic fantasies, intellectual thoughts, counter-phobic fights, psychic obsessions, depressive rehearsal, whose addictivity appears through physiological repercussions of psychic activity, for example, rehearsal of an erotic fantasy for purposes of sexual arousal; to dream that one wins with the lotto for the pleasure and the relaxation that this daydream furnishes.
3	Exogenous psychic stimulation	Information contents are acting on the brain reward system.	Distractions, gaming, activities of labor or communication, whose addictivity comes from the physiological and psychic repercussions of cognitive and emotional activity attached to this type of stimulation, for example to work, study, telephone.
4	Somatic stimulation	Sensations are acting on the brain reward system.	Sexuality, food behavioral troubles, self-offensive behaviors, whose addictivity is attached to the psychic consequences of physiological stimulation, for example, post-orgasmic ecstasy, mental confusion produced by boulimic binge, bites that the socially deprived deep mentally deficient inflicts to him/herself.
5	Motor stimulation	Motor activities are acting on the brain reward system.	Intense physical exercises, sports with sensation, troubles of the impulses, whose addictivity comes equally from the psychic repercussions of physiological stimulation and other elements relating to cognition and stress, for example, euphoria of the long-distance runner, that of bungee jumping, of parachuting.
6	Social stimulation	Social relationships are acting on the brain reward system.	Couple loving experience, fusional family, group and sect, whose addictivity is attached to various psychic, cognitive, emotional and physiological stimulation that the human relations get, for example, the anaclitic couple, the incestual family, the sectarian way of life, the party between friends.
7	Contextual stimulation	Contextual scenes are acting on the brain reward system	Disinhibited activities, risk taking, transgressions, whose addictivity is related to the physiological and psychic repercussions that certain extreme contexts get, by their unusual, risky, non-normative characteristics. For example, carnival, shoplifting, collective rape, pedophilia, and other sexual transgressions using a specific context.

Here, it is interesting to think in terms of the Piagetian concept of “scene”. In this respect, every addiction may be said to consist of a scene which groups together a set of hedonic sources. This model makes our vision of addictions more complex. For instance, alcoholism cannot be reduced to a simple abusive consumption of alcohol. Rather, it is necessary to take into account the complete alcoholism scene, because it is

to this scene that the alcoholic is addicted, not only to alcohol. In Table II one finds four examples of scene (sex addiction, drug addiction, gambling, and workaholism). For each example the possible hedonic sources are indicated that are able to compose the addictive scene.

Table II : The different hedonic sources composing the scene of four addictions (sex addiction, drug addiction, gambling, and workaholism).

Hedonic sources ↓	Means of hedonic management (addictions)			
	sex addiction	drug addiction	gambling	workaholism
Psychopharmacological stimulation	cannabis, hallucinogenics, Viagra®	all psychoactive substances	prescribed drug against anxiety	prescribed drug for stimulation
Endogenous psychic stimulation	erotic fantasies	fantasies of grandeur	fantasies of wealth	fantasies of success
Exogenous psychic stimulation	pornography	television	stimulations from slot machines	Professional information
Somatic stimulation	all sexual activity	sexuality	physiological arousal	stress sensation
Motor stimulation	sexual compulsions	drug addict ritual	gambler ritual	work routine
Social stimulation	anaclitic couple	drug addict social life	gambler social life	work colleagues, customers
Contextual stimulation	contexts of transgression	contexts of high sensation seeking	contexts of frauds	contexts of power

Returning to Table I, only the “Hedonic sources” column gets closer to the scientific criterion of exhaustiveness (but it is obviously perfectible), the basic assumption being that the common denominator of all the hedonic sources is their action on the brain reward system (Table I, 3rd column). A hedonic source can be defined as: A means of stimulation able to produce a hedonic effect in the organism which receives this stimulation (Loonis, 2002b). The notion of links between hedonic sources and the brain reward system are supported by certain hypothesis from neurobiology (for example, see Kelley, Berridge, 2002; Wise, 2002; Berridge, 2003; Berridge, Robinson, 2003). A model of seven categories of hedonic sources can be presented so (Loonis, 2000a):

- **Psychopharmacological sources:** A psychoactive substance is consumed and it has a direct psychopharmacological effect by way of the brain reward system (for example, the hedonic effects of nicotine or THC).

- **Endogenous psychic sources:** The brain produces mental contents from the memory, contents which it can simply restore or combine in original creations, to produce an effect on the brain reward system (for example, the hedonic effects of the daydream “I get a big win at the bingo, then...” or of a pedophilic pornographic fantasy).

- **Exogenous psychic sources:** Sources of external cognitive and emotional information directly stimulate the brain reward system and maintain at the same time memory for

the subsequent use from the endogenous psychic sources (for example, the hedonic effects of a love novel, an erotic film, a warm phone talk, a stream of information brought by working activity which protects from boredom).

- **Somatic sources:** Somatic sensations stimulate the brain reward system (for example, the hedonic effects of sexual sensations, sensations linked to food consumption, sensations linked to self-mutilations).

- **Motor sources:** Kinaesthetic sensations linked to motor activity stimulate the brain reward system (for example, the hedonic effects of the sensations that arise from running, or from autistic rocking, linked to the physiological effects produced by a jump into the void, or to the rehearsal of movements on a video game joystick).

- **Social sources:** Exogenous psychic (information), somatic, motor, and contextual stimulation, from a social relationship, stimulate the brain reward system (for example, the hedonic effects of certain phases of a friendship or the life of a couple, the effects linked to group emulation, as for football team supporters in a stadium).

- **Contextual sources:** Exogenous psychic (information), somatic, motor, and social stimulation, from a special contexts, stimulate the brain reward system (for example, the hedonic effects of being in a night club where social codes are transformed to create a particular context, the hedonic effects of a transgression context of sex harassment at work — for the author, not the victim!).

It is challenging to produce a classification that is truly exhaustive. From psychopharmacological to motor sources, the categories look simple, unequivocal and exhaustive. But social and contextual sources seem composite rather than simple. Again, the examples within parentheses are not exclusive to a class, there are hedonic solutions, eventually blatant addictions. Let's take the scene of "listening music". First, listening to music can be experienced in various contexts. It is not the same thing to listen to "techno" music in a rave party, a concert of classical music in the municipal opera, and Pink Floyd in the bath at home. Then, music involves different sources of stimulation. For example, a brass band, a live symphony orchestra, the woofer of a sound-system, provoke certain somatic sensations in the stomach, chest, and the inner ear organ of balance. Music acts with its melody, rhythm, intensity, according to the different instruments used, etc. It also hedonically acts by what it evokes, in the manner of a speech, releasing imaginary mental images and, naturally, feelings. So, the hedonic experience of music consists of a scene of stimulation which could take place in practically each of the seven categories of hedonic sources (for example, to listen to Carl Orff's *Carmina Burana* in public, with the chorus-singers within ten meters of oneself and to listen to it on a hi-fi set at home, in the solitude of the sitting room, are totally different hedonic experiences, because the scenes are totally different, although it is in both cases about "music"). (For more arguments concerning hedonic scenes see Michael Kubovy's (1999) chapter "On the pleasure of mind".)

Since this classification presents so many difficulties, why pursue it? The answer is that, imperfect it is, this classification is perfectible and interesting. It is in brief "heuristic." Faced with the plethora of "addictions" (especially behavioral) which invade the very official and serious "scientific literature," one should feel an intellectual malaise. There is there an accumulation of anomalies and *ad hoc* hypotheses which would have made Thomas Kuhn (1962) say that a paradigm shift is necessary. It is this paradigm shift that

we wish to introduce with this imperfect classification and the model of hedonic management.

VI. DOUBLE FUNCTION PRINCIPLE

To pass from particular addictions, to a general addictivity (or addictiveness) principle, which would use an indefinite number of hedonic sources, implies that a very great number of activities, if not every activity, can serve the management of our psychological states. In this sense, hedonic management is defined as: “All that does a human being, every day and at every moment, to control his mood and more generally to control his psychological states.” (Loonis, 1999).

The fact that any activity can be used for hedonic management and can be the subject of a passion that more or less nourishes and invades the life of the individual, brings us to a beautiful paradox. The problem is that the majority of human activities are known to be simply adaptive (pragmatic), whereas others seem on the contrary exclusively intended for hedony.

Let us take the case of work. First it is a very pragmatic activity, intended for social and economic purposes. The worker does not at first see the hedonic virtues of work and each person, moreover, feverishly awaits the weekend or the vacations. However, the unemployed person or retired, depressed because without work, suggests that there is a hedonic function in working, and that it is a source of multiple stimulation (intellectual, emotional, social, etc). The same point can be made about workaholism and its psychological regulation function. (The argument that depression is linked to the decrease of income does not substitute for our explanation in terms of a lack of working stimulation. It adds to it. Further, the decrease of income has an effect on leisure, another important hedonic source especially when out of work).

Food consumption is also pragmatic at base: to sustain the soma. However, tasty little dishes, sophisticated recipes, going out to a restaurant, but still snacking, bulimia, anorexia, all show that the food function has a hedonic function as well.

Sexuality, yet a primary drive that some would like to make us believe that it concerns only the pragmatic aspect of reproduction. Already, in our very close cousins the bonobos (a species of chimpanzees), permanent sexual activity serves psychological and social regulation. A fortiori, in human beings, masturbation (solitary or not), erotic fantasies, pornography, perversions, attest of an eminently hedonic dimension of human sexuality.

Work, food, sexuality, and also sports, artistic, cultural, communication, distraction, social activities, and so on, also have, in varied proportions, this double function: adaptive and hedonic. Even taking drugs or alcohol, which is primarily hedonic, has a residue of adaptation to the ruined physiology of the drug-addict or alcoholic, and to the narrow social and economic world of drug and alcohol.

All this leads us to state the *double function of human activities principle*: “All human activities fulfill two functions: A pragmatic function of adaptation to the world and an hedonic function of adaptation to oneself.” (Loonis, 1999). It is within the framework of this second function that hedonic management takes place, which can lead to its excessive forms, addictions. Since there is a multitude of hedonic activities, we can no

longer formalize addictivity (the set of addictive symptoms such as withdrawal, tolerance, and loss of control) in terms of certain special activities (e.g. taking drugs, gambling, masturbating). It is therefore necessary to understand what we can henceforth define as an addictivity.

VII. ACTION SYSTEM

The double function principle requires us from now on to use two terms to designate the same activity. The pragmatic face of the activity will always be named “activity”, while its hedonic face will be named “action.” For example, the *activity* of eating is used for physiological survival, whereas the *action* of eating is used to control one’s mood, to have pleasure. Thus, the “means (or processes) of hedonic management” that the individual uses, consists of three elements: (i) a pragmatic activity; (ii) an action of hedonic management in parallel; and (iii) an hedonic source implemented by the means. On this basis, two arguments can be brought to bear to help in the construction of a new concept.

The first element comes from studies of time budget and time allocation (by example: Sorokin, Berger, 1939; Becker, 1975; Szalai et al., 1972; Robinson, 1977; Munroe et al., 1983), and above all works in social psychology which developed the concept of “activity system” (Curie, Hajjar, Marquié, Roques, 1990): Our activities are not organized anyhow, they form between them a system, which obeys laws, which is constraining for the individual and which gives a direction and a meaning to his/her activities.

The second element which enables us to advance in the development of an hedonic management model, beyond Brown’s model, is the set of Brown’s intuitions about the organization of hedonic actions. Because if there is an activity system, in parallel, there must also be an “action system of hedonic management” and this is the new concept we are proposing here.

To summarize in three points: (i) all human activities are susceptible to serve hedonic management (regulation of mood, and of psychological states); (ii) it is the hedonic function of the activities which is used for this purpose; (iii) all the *actions* of hedonic management in an individual form an *action system*, i.e. the particular and dynamic organization of the actions is explanatory of addictivity (salience, tolerance, withdrawal, lost of control...). In other words, the question is how the ordinary means of hedonic management of everyday life can be transformed into pathological passions, into severe addictions, with the phenomena of withdrawal, tolerance, craving, loss of control, secondary suffering, and negative consequences in the long run.

In order to explain the addictivity of the action system, and to pass from the model to experimental hypothesis, we had to understand and test the variables that could account for the functioning of this system. These variables are largely those suggested to us by Brown’s intuitions. Besides dysphoria (negative hedonic tone), which is the “state” variable (psychological state and hedonic tone), three functioning variables could be defined.

Saliency

The first is “saliency”, that Brown (1997) defines as follows: “The addictive activity becomes the most important thing in the person’s life and dominates thinking (preoccupations and cognitive distortions), feeling (cravings), and behavior (deterioration of socialized behavior).” (p. 43). In an addictive action system “there is a tendency towards stable use of just one or two major techniques.” (ibidem, p. 28). And Brown stresses: “[individuals] are not aware of the extent to which their rewards and satisfactions have become concentrated on a single activity.” (ibidem, p. 29). In conclusion, the “saliency” variable can be defined as follows: The force of the over-investment of a particular hedonic action (which corresponds to an addictive activity) compared to the other actions.

Variety

The second variable of the action system is “variety”. Brown (1997) explains that “personal predisposing vulnerabilities to addiction narrow the range of easily accessible rewarding activities.” (p. 26). In the process of an established addiction, “the addictive activity virtually becomes the sole source of reward.” (ibidem, p. 45). The “variety” variable in the action system is defined as the width of range of the hedonic actions available in the system. (Two varieties must be distinguished: First, “offered variety” as the hedonic sources available in the environment, and the “chosen variety” as the sources that the individual selects following his/her *hedonic skills* — another important variable).

Vicariousness

When an addiction is initiated, Brown (1997) says there is a change in “the preference hierarchy of the repertoire of easily accessible activities.” (p. 27). This hierarchy of actions means that they do not all have the same value in terms of preference and choice. These differences in hedonic value must play a significant role in the possibilities of substitution between actions. So “vicariousness” can be defined as the possibility for the individual to substitute such significant actions for other actions, if the first become impossible. Vicariousness is a measure of the flexibility of functioning of the individual in the frame of his/her hedonic management action system.

Addictivity, as a descriptive composite variable of the hedonic management action system, is seen on a continuum between a weak addictivity (for example, everyday life controlled addictions) and a strong addictivity (for instance, pathological addictions), this addictivity being operationalized, from appropriate assessment instruments, as levels of saliency, variety and vicariousness of the action system. The three variables co-vary to give to the hedonic system its level of addictivity (Tab. III).

Table III: Extreme values of the three operational variables of a hedonic management action system.

Variables	System level of addictivity	
	Weak addictivity	Strong addictivity
Saliency	Weak saliency, no hedonic management action is privileged compared to the others.	Strong saliency, a hedonic management action is over-invested and invades everyday life.
Variety	Strong variety, a broad range of hedonic management actions is available in the life of individual.	Weak variety, there is reduction of the range of easily accessible hedonic management actions.
Vicariousness	High vicariousness, the individual can easily substitute hedonic management action by another.	Low vicariousness, it is very difficult, even impossible, for the individual to replace a failing over-invested hedonic management action by another.

IX. EMPIRICAL EVIDENCE

A preliminary study (Loonis, Apter, Sztulman, 2001) was carried out comparing 31 drug addicts with 29 control subjects in terms of action system variables. To measure these variables, a new instrument was built, the *Activity-System Drawing Test*. The study also used the *Telic Dominance Scale* to measure the frequency of paratelic dominance (from *Reversal Theory* – Apter, 1982, 2001). Dysphoria was measured with *BATE* (anxiety), *IDA-13* (depression), *SEI* (self-esteem), and *TAS-20* (alexithymia) instruments. Strongly significant differences were found between groups for both action system variables and dysphoria. This supports the idea that addictions emerge from systemic properties of action systems.

These first results show that addicted subjects have an organization of their action system which differs from control subjects, with certain actions being highly salient, at the expense of other actions, organization in which the replacement of one action by another is difficult.

Other empirical and experimental studies are obviously necessary in order to make the hedonological model something else than a speculation.

IX. HEDONOLOGY

The growing field of studies on addictions (with and without substances) raises a serious epistemological problem: Up to what point is this expansion of the concept of addiction metaphorical or real? The scientific literature offers a very wide range of more or less pathological behaviors, which are regarded as addictions on the basis of certain criteria defining the addictivity (like tolerance, loss of control, withdrawal and relapse). It then becomes necessary to build a general theory of addiction, that can unify this diversity and this expansion under common principles and laws. This is not the first time that a “general theory of addiction” has been presented (for example: Bejerot, 1972; Peele, 1980, 1985; Goodman, 1990; Orford, 2001; Brown, 1997; and for a review: Lettieri et al., 1980; Glass, 1991; Lowman et al., 2000; West, 2001). But, this is the first time that a general model proposes a change of paradigm, considering the three

conceptual levels of: (i) Hedonic sources, (ii) addictions, and (iii) hedonic management; the heuristic classification of hedonic sources in seven classes according to the different ways of stimulating the brain reward system; the principle of a double function of the activities (pragmatic as “activity” and hedonic as “action”); and finally, the concept of “action system” which offers an interesting vision of addictivity, through the variation of three measurable variables: “Saliency”, “variety”, and “vicariousness.” Moreover, a “Hedonic Psychology” (Kahneman et al., 1999) is becoming a fertile ground for this general model.

From this general model it is possible to imagine a hedonic management science, a “hedonology”, as a formalized system of knowledge which could break up into several branches relating to various theoretical and practical fields where hedonology can find applications. These fields could give rise to many research programs. Some examples:

Animal hedonology

It studies how animals other than humans engage in hedonic management. Higher animals, in particular the mammals and more especially the primates, are subjected to psychological states (even states that are incomparably less complex than human ones). These states over-determine their primary drives and generate special motivations reserved for hedony. These motivations concern exploratory drives and sensation seeking, but also, for many animals, the apparent research of “psychological” states, of inner, positive and special mood (“masturbation” and “homosexuality” in animals being remarkable examples — Judson, 2002). This is inherited by humans.

Cultural hedonology

The hedonic management action systems are built on the hedonic means chosen and encouraged by a given culture. These choices are themselves dependent on the hedonic resources and the levels of economic and technological development of this culture. Within the framework of a cultural hedonology, it is possible to study and compare hedonic systems of various cultures, in order to understand their differences and specificity. These studies could help us to understand the evolution of these hedonic systems when individuals have to give up their traditional hedonic system to adopt a new one. This transition always represents a crisis for individuals, because of the failure of their hedonic skills and the mental suffering which results from it. Such crises occur, for example, when individuals must move into another culture, in which they lose their usual hedonic means and do not know or cannot quickly use the means offered by the culture of welcome. Often, emigrated individuals from the same culture try to reconstitute a protected hedonic nucleus, which is the ghetto. Another example, more dramatic, is the invasion, colonization, and the destruction of a culture by another having higher economic and technological means. In this case, the colonized populations quickly lose all their cultural references in matter of hedony and succumb to the invaders’ hedonic means, which they cannot manage and control. The changes of cultural milieu or the destruction of a culture, often involve a salient adjustment of the hedonic management action systems, with the appearance of pathological addictions (drug-addiction, alcoholism, delinquency, violence, etc).

Comparative hedonology

Differential or comparative hedonology, analyzes, describes and evaluates the differences between the various hedonic management systems, according to certain characteristics of more or less wide groups of individuals. Gender, age, economic and instruction levels, social, ethnic, cultural, professional belongings, etc, can contribute to differentiate hedonic management systems. Longitudinal studies can also be considered in order to understand the evolution of hedonic management according to age or according to the changing of situation, context (for example, how hedonic management of an alcoholic or of a drug addict, evolves when he passes from addiction to weaning, then to postcure and finally goes home).

Economical hedonology

Hedonic management is largely dependent on the economic means of the individual. This economy of hedonic management will depend on age classes, social classes, male or female, etc. However, economy is never a deciding factor in matter of hedony. Other factors come into play, such as culture, hedonic skills and inertia of the action systems. For example, a lot of people who suddenly make a fortune, are unable to adopt the style of hedonic management reserved for rich people. And in spite of their new economic capacity, these people remain with the usual hedonic means, that they know and perfectly control.

Experimental hedonology

Experimental hedonology consists in placing animals or voluntary human beings, under perfectly controlled conditions, in order to be able to study precisely the mechanisms which govern hedonic management. Experimental protocols make it possible to control such parameters as the offered variety of the hedonic sources, hedonic sources themselves, and their nature, according to produced levels of arousal, the hierarchy of the hedonic choices of the individuals. The experimental approach also make it possible to control the characteristics of the studied populations, and thus to compare the ages, genders, types of personality, pathological and normal people, etc. Experimental hedonology fits too with the works of “Hedonic Psychology”, about subjective-objective well-being and happiness, emotion, mood, hedonic judgments, and other processes (Kahneman et al., 1999).

Developmental hedonology

The aim of genetic or developmental hedonology is to study the genesis and the construction of hedonic management action systems. From birth, the hedonic system is developing, initially being supported by the action system of the adults who care for their infants. Moreover, to care for a baby does not only consist in nourishing, changing, and looking after him/her. The baby can develop harmoniously only if he/she is greatly “nourished” *hedonicly* speaking. This is the reason why it is necessary to speak to him/her, to be interested in him/her, to make him/her play, to stimulate him/her, in short, to avoid any too prolonged stimulation deprivation for the child. Later, the young child will still need partial support for his/her hedonic system, support that he/she still

will find next to the adults who offer schooling, leisure, cultural activities, and the educational designs which direct hedony according to ambient models. The growing adolescent becomes more and more autonomous in matter of hedonic management. However, autonomy is never complete, because models remain active a long time to guide hedonic choices; and these choices themselves, relate to a more or less narrow range of hedonic means offered by culture, society and individuals' economic capacities. Genetic hedonology can still study the hedonic management of adults and of old people (gerontologic hedonology).

Historical hedonology

Historical hedonology proposes to study the hedonic characteristics and the evolution of the means and systems during the various times that have marked the historical course of humanity. The modes of hedonic management are dependent on the technological means, on the overall economic level, religious beliefs, cultural and usual systems, the changes and transformations in the course of time. These factors affect the way people choose and organize their hedonic management actions. The great hedonic management systems, considered on the level of a nation or a People, will undergo deep changes according to historical circumstances which mark this nation or this People (opulence periods related to the conquests, periods of recession, external wars or internal political conflicts, revolution and post-revolution, invasion and subjection under the pressure of another People, followed by the great advents of a new dynasty, of a tyrant, a restoration, an ecological, climatic, industrial disaster, etc).

Human hedonology

Human hedonology centers its study on human beings and their hedonic management means and systems. It can use experimental means, such as sensory deprivation, within the limits of ethics and prudence; it can also use quasi experimental means in, for example, to compare groups through their behavioral answers to questionnaires, and scales concerning their hedonic management. Human hedonology can also use broader investigations concerning the hedonic management of significant groups and populations. Human hedonology is at the core of general hedonology, building its models from various currents of hedonology.

Pathological hedonology

Pathological hedonology is a branch of human hedonology centered on the means, systems and organizations of hedonic management presenting a pathological character, for the individual, or for the group or the society to which it belongs. All the extreme means of hedonic management are studied (abusive consumption of psychoactives substances, pathological gambling, compulsive purchases, compulsion and sexual delinquencies, risk-taking, high and destructive sensation seeking, repeated suicide attempts, addictions to work, erotic fantasies, communications, sociality, etc). Pathological hedonology also studies and recognizes addictive and hedonic management dimensions of some psychopathological troubles like counter-phobic fights, obsessive compulsive disorders, and impulsion disorders, depressive rehearsal,

all the mechanisms of defense when they take an invading and compulsive turning, as well as certain massive delirious formations, stereotypes in autism, self-mutilations, etc. Pathological hedonology can sometimes use certain animal models (as in psychotropic consumption, self-stimulation, deafferentations), in order to test assumptions that ethics would not allow us to test in human subjects.

Philosophical hedonology

The study of man's connections with pleasure and happiness is at the heart of all the religious and philosophic systems, since man exists and thinks about his condition. Every thought system has tried to bring theoretical and practical answers, often dichotomized in terms of satisfaction or renunciation. Hedonic management is in the center of the problem of the human condition. Also, philosophical hedonology aims to historically study systems and faiths in the matter of hedonic management and to draw new syntheses from its analyses. Then, from this hedonological knowledge, to look for a hedonic rationality being able to find applications in current human problems (problems of the sharing of resources, globalization, conflicts, etc.).

Political hedonology

Panem et circenses, bread and circus, such are the words of contempt that the Latin poet Juvenal (1st century) addressed in his *Satires*, to the Romans unable to have other interests than free distributions of corn and circus games. Very early human groups were brought to manage collective hedony, starting from the shared resources of a People (their own resources, slave system, spoils of the conquests). This collective hedonic management, which takes form of a the Welfare State, of harmonious management of taxes, rights granted to certain social, professional, categories, etc, is the object of study of political hedonology (it relates to an ecology of hedonic action — Loonis, 1998).

Psychological hedonology

Psychological hedonology studies the psychological mechanisms which govern hedonic management. It can be the subject matter, according to various currents of scientific psychology, of an approach in terms of drives and defenses and of libido economy; of a dynamic approach studying the solutions of psychic hedony which the mechanisms of defense represent; of a cognitive-behavioral approach studying the psychic, conscious or unconscious mechanisms, which allow the implementation of hedonic solutions (metamotivational orientations and psychological frames — Apter's Reversal Theory), various choices of psychic formations, like positive thoughts, happy daydreams, erotic fantasies, etc). Psychological hedonology constitutes the core of human hedonology.

Social hedonology

The necessity of sharing wealth and resources (which are hedonic sources), within a society on the basis of selfishness, results in a heterogeneity of hedonic distribution. Social hedonology studies this disparity and the conflicts which occur between social

groups to reach the hedonic sources (an ecology of hedonic action). Social hedonology also takes into account more abstract elements (like values, beliefs, statutes and roles), which have a considerable influence on hedonic choices: social claims, acts of forced or prohibited appropriation, or hedonic renunciations and resignations.

X. CONCLUSION

“Why so late in coming?” is the question to ask about hedonology. The advent of a general science of happiness or pleasure is late in the development of the social sciences, because humanity runs the risk of a new vexation vis-a-vis the constraints this science will reveal. For the moment, our love stories, our professional ambitions, just like our wars and our crimes, are comfortably justified by a plethora of *ad hoc* theories. One likes to see our existential pursuits based on high and noble feelings or pragmatic goals: love, adaptation, patriotism, revenge on the society, etc. But it would be terrible if we must collectively accept the idea that, finally, all these theories are only a façade to hide the central motivation of our existences: To satisfy from moment to moment our selfish need for psychological pleasure.

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