

## Chapter 2

# Theoretical Explanatory Frameworks for Sustainable Behavior

In the previous chapter, the discussion focuses on the definition of sustainable behavior, underlying principles, and the background of education for sustainable development (ESD). This chapter discusses the cognitive theory which models sustainable behavior under the information-processing approach. Additionally, in this section, the most widely known social-psychology models for explaining attitudes which promote the study of sustainable behavior and the factors associated with them are shown. This provides conceptual frameworks which identify the factors explaining sustainable behavior (specifically in situations in which social dilemmas exist, as is the case for many environmental problems and their economic, social, and cultural contexts as indicated in ESD).

### 2.1 Theoretical Frameworks Which Explain Sustainable Behavior

Virtually all conceptual schemes which have been used in psychology (Chacón-Fuertes 2001) have been applied to explain pro-environmental behavior (PEB) and can be used to elucidate sustainable behavior. Some of the known explanatory frameworks are behaviorism, psychoanalysis, cognitivism, evolutionary psychology, and interdisciplinary systemic approaches, and many variations may be found within each framework.

According to Corral-Verdugo (2001), behaviorists maintain that sustainable behavior, like any behavior, is under control of both external stimuli and individual's circumstances. Behavior is activated shortly after a conditioned stimulus or after a primary reward if no conditioned stimulus exists. The core tools of operant conditioning are positive and negative reinforcers. Positive reinforcement is a consequence of a given behavior which causes that behavior to occur with greater frequency. Negative reinforcement or punishment is a consequence of a behavior which causes that behavior to occur with less frequency. A lack of any consequence following a behavior leads to the cessation of that behavior. Whenever a behavior is

inconsequential, producing neither favorable nor unfavorable consequences, it will occur with less frequency. When a previously reinforced behavior is no longer reinforced with either positive or negative reinforcement, it leads to a decline in the response. For behaviorists, no internal phenomenon significantly explains behavior because internal phenomena are intangible and subjective and therefore may not be scientifically studied.

By contrast, cognitive science indicates that internal or mental phenomena lead to behavior. People's knowledge, attitudes, or beliefs are variables which they form based on their interaction with their environment. These may be expressed in the form of ecological habits. Cognitive science is the study of the nature of intelligence and emphasizes algorithms (mathematical operations) intended to simulate human behavior on a computer (Medin et al. 2005; Von Eckardt 1996).

Psychoanalysts see the dichotomy between environmental conservation and environmental degradation as a result of a struggle between creative (Eros) and destructive (Thanatos) impulses of the human unconscious, or between biophilia (love for living systems) and death wishes. Currently, there is a high rate of degradation which would seem to indicate that Thanatos (the destructive) prevails over Eros (the creative), which conforms to Freud's pessimistic explanation of psychological mechanisms of human aggressiveness (Fromm 1973). Although psychoanalysts have offered many proposals to counter the effect of destructive impulses toward the environment, little or no research has been carried out from a psychodynamic perspective to corroborate the relevance of these proposals.

Evolutionary psychology ensures that conservation of the environment and biodiversity can be understood as a necessity for maintaining a safe, high-quality environment and the perpetuation our species. This is useful to understand as we manipulate the environment according survival needs. However, some evolutionary biologists believe that actions toward environmental conservation can be explained by reputation-based models which demonstrate an individual's genetic quality by his ability to look after him/herself (selfishness), his/her family (genetic altruism), or others in hopes of retribution (reciprocal altruism). Helping others at a small cost to oneself is a signal of genetic quality because this characteristic is costly to maintain, and only high-quality individuals can afford the cost. Some evolutionary psychologists argue that altruism evolves into a form of behavior which enables the preservation of the social group and therefore of individuals and their genes. Other evolutionists (Fromm 1973) suggest a human biophilia which is an affinity of our natural love for life and which helps sustain life.

Models which take a systemic approach, by trying to gain further inclusiveness in explaining why people behave in a pro-ecology manner, include effects of situational variables (physical and regulatory contexts) and other variables of an extra-psychological nature (Weisbuch 2000). Some variables included are individual characteristics such as age, sex, social class, income, educational level, or contextual factors such as social norms. Table 2.1 summarizes the explanatory frameworks presented above.

From the frameworks presented in Table 2.1, cognitive science (Medin et al. 2005; Von Eckardt 1996) seems to be the most useful in explaining peoples'

**Table 2.1** Explanatory theoretical frameworks for pro-environmental behavior and their fundamental elements (based on Corral-Verdugo 2001)

Theoretical framework	Fundamental elements	Explanation of PEB
Behaviorism	Operant conditioning	PEB is generated and maintained by its positive and immediate consequences
Developed by Skinner in 1938		
Cognitive psychology	Information processing variant: • Theory of planned behavior • Norm-activation theory • Habit formation • Cognitive dissonance	Individual generates sustainable provisions that are processed, stored, and used in his or her brain and mind
“Revolution of cognition” in the sixties		
Psychoanalysis	Intra-psychic apparatus	In the struggle between Eros and Thanatos (Fromm 1973), there is a predominance of the latter
Developed by Freud in 1900		
Evolutionary psychology	Genetic stress variant: • Genes and egoistic individuals • Cooperation and altruism • Altruism and SB • Egoism and SB • Biophilia hypothesis	The effect of PEB is reciprocal altruism that may become disinterested altruism or biophilia (Fromm 1973)
Based on Darwin’s postulates in 1859		
Systemic theories	Interrelated factors	PEB is a product of complex operating effects within systems of relationships between variables

behavior in relation to aspects of their environment, welfare, and material and social safety within society. Cognitive science is an interdisciplinary area with contributors from various fields, including cognitive psychology, which is a branch of psychology according to which investigates internal mental processes such as problem solving, memory, and language. The most relevant school of thought emerging from this approach is known as cognitivism, which characterizes people as dynamic information-processing systems whose internal and mental operations (beliefs, attitudes, or perceptions) might be described in computational terms. The information-processing approach will be presented in the following section.

### ***2.1.1 Information-Processing Approach***

The conceptual framework which brings some structure to the pandemonium of contemporary behavior research is cognitive science (Leahey and Harris 2001).

This explanation prevails today (Matthews et al. 2000). The twentieth-century emergence of the conceptual framework of information processing to explain the human cognitive process was mainly due to the rapid development of computer science and the impressive demonstration of artificial intelligence in the late 1950s and formal analysis of cognition in the 1960s. Since then, the dominant theory has been the cognitive information-processing model which Broadbent, among other contributors, put forward. These scientists viewed mental processes as computer software inside hardware, (the brain). They referred to input as information entered into a computer, its representation, computation or processing, and output as new information.

The mind–body problem, and its modern subjective expression called “consciousness,” is a topic which has been vehemently debated by philosophers for millennia and more recently by psychologists and biologists (Chacón-Fuertes 2001). The question of whether consciousness plays a role in the production of behavior, or whether it is a powerless observer of the world, and the body’s response to behavior, seems to present two competing approaches based on information processing: the symbolic system hypothesis and the connectionist assumption (Leahey and Harris 2001).

The symbolic system hypothesis establishes that the mind is like a computer program. At the core of the program is a manipulation of symbols representing the world through a set of formal rules, analysis of stimuli, and selection of responses. In its simplest form, information arises from the senses and is transformed into an internal representation, and the subject produces an answer (Matthews et al. 2000).

Meanwhile, the connectionist assumption makes no distinction between types of memory. Instead, this approach states that the architecture of cognition consists of multiple simple processing units, very similar to neurons in the interconnected network of the brain. Each unit is identical to all other units, and learning, memory, and thinking are all changing patterns of activity in the network as a whole (Laehey and Harris 2001).

By analogy, the mind represents software or sequences of instructions carried out by computers or other hardware. This software does not refer to a physical machine or hardware. At the most fundamental level, brains resemble computers in their use of binary representations. The fundamental “machine code” of computers is expressed in “zeros” and “ones,” and the neurons of the brain are either firing (“on”) or resting (“off”) (Matthews et al. 2000).

Cognitive information processing between inputs and outputs is more complex. However, the number and nature of intermediate steps depend on the particular approach. That is, the internal structure of processing or the order in which processes operate and how they feed into one another are key elements to understanding existing approaches. Two approaches have been proposed: processing systems which carry out their calculations in series or in parallel. Series models assume that each operation is carried out one step at a time; the last operation must finish before the next one in the series commences, as occurs in a conventional computer program. Parallel models, however, are comprised of multiple processors operating simultaneously. Unlike conventional computers, brains are composed of

thousands of massively interconnected simple computation units (neurons) operating simultaneously (Leahey and Harris 2001).

This difference between brains and computers brings up several reasons to doubt the validity of the hypothesis of the serial processing of human cognitive symbolic processing. First, the human brain is capable of thinking and reacting quickly; many computational stages are carried out simultaneously. Secondly, the failure of traditional artificial intelligence to simulate simpler human skills such as recognizing friends' faces, reading, writing, and moving around inside a room full of objects, despite years of work and the increasing possibilities of computers, has led many psychologists to suspect that the serial processing model of the symbolic system in the human mind is incorrect, and instead of looking at the computer as our model for the mind, they should look at the brain (Leahey and Harris 2001).

At present, there is an emerging hypothesis (Leahey and Harris 2001) which could reunite the two approaches of cognition; the human mind is a hybrid of both (Dennett 1995). It is possible that the human mind in its rational aspects is a serial performance processor, especially when thoughts are transformed into awareness. For example, when we think or write, an idea and a thought appear simultaneously. Meanwhile, more automatic and unconscious aspects of the human mind would be of a connectionist nature. Consciousness is a virtual machine installed by socialization in parallel processors in the brain. Socialization nourishes us with language. However, with language, we speak and think one thought at a time, creating a serial processing of consciousness. Humans are flexible creatures who do not change their physical nature, but rather their programs. These programs are cultures that are tailored to places and times. Learning a culture raises awareness and consciousness, and consciousness is an adaptive process because it provides the ability to reflect upon one's own actions, to think about alternatives, plan in advance, acquire general knowledge, and be a member of the society.

The computational framework has attracted a variety of criticisms. First, an assortment of philosophical issues relate to traditional questions such as the mind-body problem. Further controversies concern the experience of consciousness upon the presentation of mental states. Second, the computer metaphor may be broadly correct but unhelpful, because of the diversity of possible computational systems, constructed based on different principles, to explain any given set of data. Conversely, what computers do well—perform high-speed mathematical functions, abide by rule-governed logic—humans do poorly. And what humans do well—form generalizations, make inferences, understand complex patterns, and experience emotions—computers do poorly or not at all. Third, the computer metaphor may be appropriate to some psychological functions, but not to some of the essential attributes of humanity such as emotion, personality, creativity, and intelligence. Leaving these fundamental issues aside, cognitive models may have a surprising range of applications. Nowadays, there is a well-established link between emotional disorders and particular styles of information processing, characterized by negative self-referent cognition and irrational beliefs. Computers do not have feelings, but emotions and personality may nevertheless have a cognitive basis. Furthermore, the computer metaphor suggests undue passivity. Computers run

programs fomented by an external agent, while people pursue goals actively and flexibly within complex environments. In other words, the nature of behavior resides in the dynamic interplay between person and environment, rather than in some fixed program.

However, none of these limitations should be considered to be fundamental difficulties for the computer metaphor which has proven to be extremely useful in explaining many areas such as personality, emotional disorders, and human behavior, and has remained the only scientifically acceptable bases for conceptualizing performance (Matthews et al. 2000). Considering the information-processing approach as the conceptual framework to describe human behavior generates the question: Why the need to promote a study of human behavior in a world where the integrity of animal and plant species, as well as the welfare and material security of individuals and society in present and future human generations, is threatened?

The significance lies not only in promoting a study of sustainable behavior, but also in identifying factors which are capable of change. Psychologists and sociologists alike are exploring associated factors in order to understand and produce a model for human behavior which approximates in a transparent manner the current situation across diverse cultural environments.

The following section examines three dominant theoretical frameworks considering those factors which promote or limit individual behavior. These frameworks are instruments which can be helpful in analyzing determinants of sustainable behavior.

### ***2.1.2 Socio-Psychological Attitude-Behavior Models***

Contemporary scholars have built complex models of relationships among several key behavioral determinants such as experience, knowledge, beliefs,<sup>1</sup> attitudes,<sup>2</sup> and values.<sup>3</sup> Despite the diversity of specific applications of attitude-related theories,

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<sup>1</sup>According to Rokeach (1973), a belief is a simple proposition, conscious or not, which may be inferred from what a person says or does, and which may be preceded by the words "I believe that." Any belief consists of three parts: cognitive (knowledge), affective (feeling), and conative (action). The three main categories of belief are as follows: descriptive or existential (I believe that the sun rises in the east), evaluative (I believe that trees are beautiful), and prescriptive or exhortative (I believe that trees must be respected). Beliefs are formed during childhood. The set of beliefs that an individual has regarding the surrounding socio-physical reality is called a belief system.

<sup>2</sup>An attitude is a smaller set of related beliefs. It is also a comprehensive, relatively enduring belief regarding an object or situation which predisposes the person to respond in a certain way to that object or situation (Caduto 1995).

<sup>3</sup>Values are forged from sets of interrelated attitudes. Values are enduring beliefs about a certain behavior or ideal way of life which is personally or socially preferable to an alternative behavior or way of life (Caduto 1995).

they may be separated into two socio-psychological models which take into account factors which promote or limit an individual’s behavior (Kaiser et al. 2005).

The two general models are as follows: (a) theory of planned behavior (Ajzen 1991) and (b) norm-activation theory (NAT) (Schwartz 1977). While the first has its basis in deliberation based on rational choice and self-interest, the second is grounded in values and moral norms. Recently formulated, the value-belief-norm framework (VBN) (Stern et al. 1999; Stern 2000) is a generalization of the NAT.

2.1.2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) supposes that behavior is predicted by an individual’s intention to perform. In turn, intention is seen as a function of (a) a person’s attitude toward this behavior, (b) subjective norms, and (c) people’s perceived control, shaped by their estimation of their own strength to perform a behavior which can be prevented (or facilitated) by their abilities or situational factors (Armitage and Conner 2001; Kaiser et al. 2005; Montalvo 2002; Wehn 2003). Figure 2.1 outlines attitudinal relationships of sustainable behavior using the TPB model proposed by Ajzen (1991, 2001, 2005).

There is a great interest in TPB research. Harland (2001), Montalvo (2002), and Wehn (2003) found hundreds of empirical studies based on this model and its predecessor, the theory of reasoned action. Such popularity may be attributed to specificity with which instructions for applying these models were outlined by Ajzen and Fishbein in 1980 and also to the fact that these models are consistent (Harland 2001). TPB has become the most influential attitude-behavior model in socio-psychology and in environmental psychology (Kaiser et al. 2005). In fact, with respect to the environment, health care, nutrition, sports, etc., many studies have found support in (aspects of) TPB.

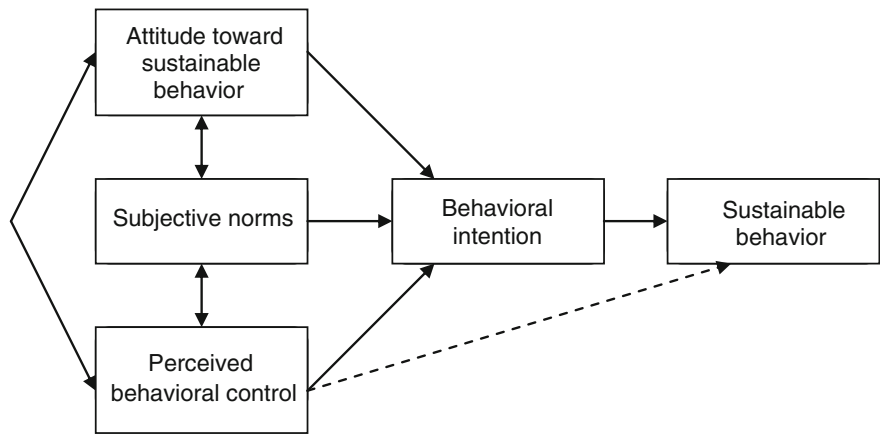


Fig. 2.1 Sustainable attitude model proposed by Ajzen (based on Montalvo 2002)

### 2.1.2.2 Norm-activation theory

The NAT ascribes a significant role to personal norms. It postulates that personal norms are intrinsically motivated self-expectations with regard to morally appropriate behavior. Personal norms, if activated, are experienced among individuals as feelings of personal obligation, of either denying or not denying the consequences of their behavioral choices regarding the welfare of others. Behavioral expectations stem from personal norms which are grounded within and across individuals, and not from social norms, in a specific social group (Stern et al. 1999; Harland 2001).

The NAT holds that activation of personal norms occurs under the influence of four situational activators and two personality trait activators. The four situational activators are (a) *awareness of need*, or the extent to which a person's attention is focused on the existence of another person or an abstract entity, such as environment, in need, (b) a person's sense of feeling *responsible* for the consequences of the behavior regarding that person's welfare, (c) *efficacy*, which refers to the extent to which persons recognize actions which might alleviate need, and (d) *ability*, or the extent to which one possesses the resources or capabilities needed to perform the action in question. Two personality traits refer to predispositional influences regarding norm activation: *awareness of consequences*, which refers to a person's receptivity for cues signaling situational needs, and *denial of responsibility*, which refers to people's inclination to deny responsibility for the consequences of their behavioral choices directed toward the welfare of others. The four situational activators and the two personality traits determine whether or not a behaviorally specific personal norm becomes activated (Harland 2001; Stern 2000).

The numerous applications of NAT in the environment domain have provided support for several of the relationships proposed in the model (Harland 2001). However, Harland (2001) and Stern (2000) indicate that several authors have noted that in these models, a decisive role has been assigned to personal norms. This view of personal norms raises the question whether the central role assigned to personal norms in NAT is justified in all cases and suggests that personal norms could play a less striking role, as in other models.

### 2.1.2.3 Value-Belief-Norm Theory

The VBN theory unites the value theory, the norm-activation theory, and the perspective of new ecological paradigm<sup>4</sup> (NEP) through a causal chain of five variables which guide an individual toward behavior: The first latent factor is Schwartz's (1977) set of personal values (altruism, selfishness), traditionalism, and openness to change values; the second factor is the NEP (Dunlap and van Liere 1978; Dunlap et al. 2000); the third and fourth factors take into account the two elements of

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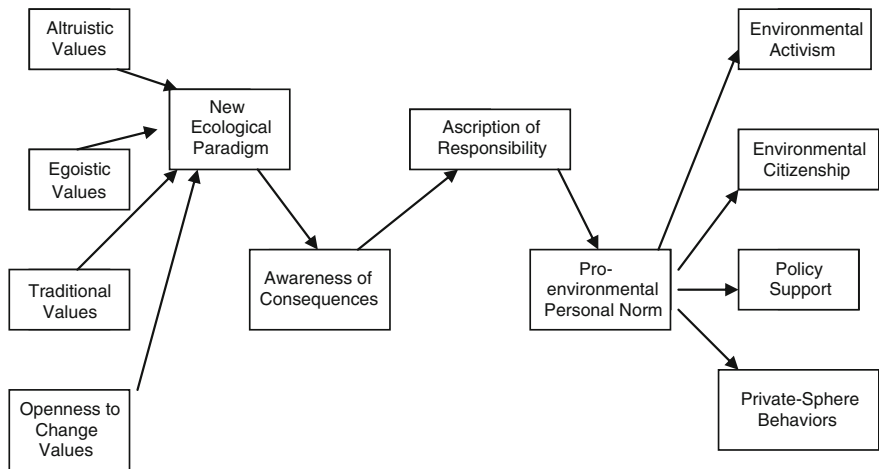
<sup>4</sup>NEP states that human beings are part of natural world and subject to the same rules which govern nature, such as the interdependence of species (Dunlap and van Liere 1978; Dunlap et al. 2000).



the NAT regarding moral norms, awareness of consequences (AC), and ascription of responsibility (AR) with respect to general conditions of the biophysical environment; and the fifth element includes personal norms for pro-environmental action. This model explains environmental activism, environmental citizenship, support for policies, and behavior in private sphere (Stern et al. 1999; Stern 2000). Previous authors’ works support the rationale and empirical causal ordering of factors.

The causal chain starts with central elements, such as relatively stable personality, and belief structures and moves toward beliefs more focused on environment–human relationships, its consequences, and individual responsibility to take corrective actions. Stern (2000) hypothesizes that each variable in the chain directly affects nearby variables and can also directly affect variables which appear later in the chain. Personal norms leading to pro-environmental actions are activated by individuals’ belief that environmental conditions threaten things which they value and that they can act to reduce the threat. These norms create a general predisposition which affects many types of behaviors carried out with pro-environmental intention. Additionally, specific personal behavioral norms and social-psychological factors can affect individuals’ pro-environmental behavior. Figure 2.2 shows the diagram proposed by Stern et al. (1999).

Stern (2000) recommends that studies which examine only attitudinal factors probably find effects in an inconsistent manner, because effects are contingent on abilities and contexts. Studies which examine only contextual variables such as material incentives, social norms, or the introduction of new technologies may find effects which depend on people’s attitudes or beliefs, although the model attributes these effects to other causes. Studies of simple variables demonstrate that a particular theoretical framework has explanatory strength, but they do not contribute much to the comprehensive understanding of individual behaviors which are environmentally significant which are needed to change people’s actions.



**Fig. 2.2** Schematic model of variables in the value-belief-norm theory (based on Stern et al. 1999)

Harland (2001) and Stern (2000) consider that the NAT is an effective tool because they found the attitudinal component to be superior to the normative component in determining the willingness of behavior. This may have been caused by the fact that the normative component of the model is not moderate. On the other hand, Kaiser et al. (2005) compare TPB and VBN: TPB more fully explains proportion of explained variance. More importantly, the adjusted statistics reveal that only TPB appropriately represents the relationships among its concepts, whereas the VBN model does not.

So, which social-psychology model is to be used to determine factors which foster sustainable behavior? Should we accept a model which focuses on rational choice and individual self-interest but which denies moral considerations, or a model based on values and moral norms through its generalization? What philosophical point of view should be considered in morally relevant situations in which social dilemmas are presented—that is, when one's self-interest and the interest of others are contradictory, when there is a tension between individual and collective rationality (social dilemmas; Kollock 1998).

The undertakings of the Decade of Education for Sustainable Development (UNESCO 2004, 2005, 2012) involve social dilemmas: poverty reduction, gender equality, health promotion, environmental protection and conservation, rural transformation, human rights, intercultural understanding and peace, sustainable production and consumption, natural and cultural diversity, and communication and information technology. Several authors (Axelrod 1984, 2004; Felkins 1995; Kollock 1998; Macy et al. 2002; Santos et al. 2006) have analyzed the dynamics of social dilemmas. In general, they point out that agent-based models or models “from the bottom-up” assume the pre-existence of a very different world in which decision-making is equitably distributed on a global scale, where decision-making is locally organized, stemming from multiple local interactions among autonomous interdependent actors. These authors recommend research on the expectations and effects of generalized reciprocity within groups, the transformation of incentive structures, and a greater focus on heterogeneous dynamic models in understanding social dilemmas.

The current study uses a model adapted from the VBN, because the TPB denies moral considerations, and the VBN is a generalization of the NAT. Additionally, Kaiser et al. (2005) and Corral-Verdugo (2001) indicate that on average, 40 % of behavioral variances are predicted by psychological variables. In other words, 60 % of behavioral variance still remains unpredictable. The field of behavioral change requires synthetic theories or models which incorporate other variables and which explain relationships among these new variables, which are used to explain one or more types of behavior.

The following section presents conceptual frameworks considered in this investigation to determine personal and situational variables which influence the behavior of key individuals in higher educational institutions which foster education for sustainability within their professional activities: teaching, research, outreach, and campus management. Secondly, the proposed model which illustrates relations among personality and contextual factors which explain such behavior is presented.

## 2.2 How to Identify a Model for Sustainable Behavior

Prediction of sustainable behavior is not simple. It appears to involve a number of variables, none of which is likely to operate without interacting with others. Therefore, the development of a model is a difficult task. Several authors in social psychology (Blamey 1998; Corral-Verdugo and Pinheiro 2004; Harland 2001; Hines et al. 1988/1987; Stern 2000) have used (one of several/a set of) viable attitude-behavior models as a means to identify factors which lead to a change in sustainable behavior, or initially pro-environmental behavior.

Some of the models include familiar theories, such as TPB (Kaiser 1998; Wehn 2003; Montalvo 2006, 2002) and NAT (Arbuthnot 1977; Hopper and Nielsen 1991). Some models also consider organizational factors (Shriberg 2002), personal abilities (Allen and Ferrand 1999), context (Corraliza and Berenguer 2000), and habits (Collins 2001), which are other characteristics suitable for explaining behaviors which frequently have significant impacts through non-attitudinal factors. Identification of advantages and disadvantages of behavior seems to be a straightforward way of detecting these determinants (Harland 2001). However, the identification process is complicated because salient advantages and disadvantages of behavior seem to depend on the perspective from which they are evaluated.

For example, what brings a teacher to introduce in his/her course the values of sustainable development? What motivates students to dispose waste in proper containers? What guides a researcher to develop a project to solve local social problems? What makes staff buy more environmentally friendly goods in order to reduce environmental impact? What guides authorities of higher educational institutions to implement policies to improve the sustainability of their operations or educational context?

The above questions, it would seem then that efforts to explain advantages and disadvantages of behavior need to focus on various factors, such as beliefs, attitudes, motives, and abilities of individuals' to perform, social pressure exerted, moral values at election of acting, individuals' decisions on short- or long-term, socio-demographic conditions, and contextual influences which foster or impede a particular behavior. As well as areas where we want to influence people's behavior and the conceptual framework where contemporary behavioral investigation is based on.

### *2.2.1 Factors Explaining Sustainable Behavior*

The appropriate question concerning sustainable behavior is: What factors are important to foster it and why? In order to prepare the proposed model, a number of conceptual frameworks were researched which provide important considerations in identifying psychological, situational, and contextual factors explaining behavior.

The first theoretical framework is the meta-analysis from Hines et al. (1987) which addresses responsible environmental behavior. This study remains a benchmark for conclusions on behavioral variables.

The second model, the value-belief-norm (Stern et al. 1999) framework, states that, according to values, behavior may be predicted. This model offers an array of five causal factors which determine actions toward social movements.

Thirdly, the theory of multiple intelligences (TMI), developed by Howard Gardner in 1983 and updated in 1993, establishes seven skills (linguistic, logical-mathematical, musical, spatial, body-kinesthetic, and interpersonal and intrapersonal intelligence) which human beings perform in any culture in which they live and grow up. TMI is developed under a distributed vision, that is, inherent to individuals and artifacts that surround them.

The fourth and final theory consists of five psychological dimensions proposed by Corral-Verdugo and Pinheiro (2004) to achieve sustainable actions: effectiveness, deliberation, anticipation, solidarity, and austerity.

The author of this study considers that the norm-activation framework may be a structural descriptive model that aims to gain understanding of the predispositional factors by looking at the structural relationship of the possible determinants of behavior. So, the elements drawn from the conceptual frameworks presented, the psychological and situational variables, causal arrangement of factors which determine an action in favor of the common good, personal skills applied in any culture, and the ideas behind sustainable actions are all part of the notion of sustainability in human behavior.

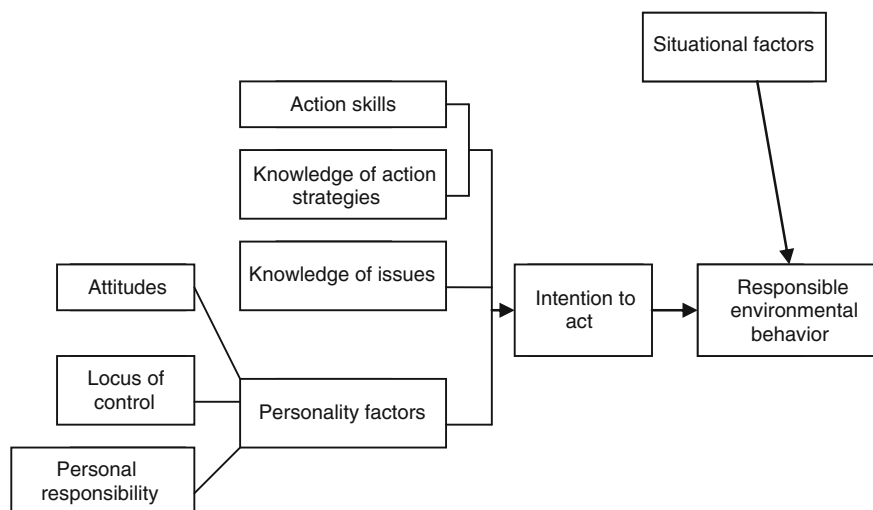
### 2.2.1.1 Hines, Hungerford, and Tomera's Model

The model proposed by Hines et al. (1988/1987) identifies four factors which explain elements of willingness to perform an individual process: (1) recognition of the problem as a prerequisite for action, (2) knowledge of the courses of action which are available and most effective in a given situation, (3) the ability to implement strategies of action items, and (4) appropriate knowledge. These factors allow individuals to take action.

Abilities alone are not sufficient to lead to action. In addition, an individual must possess a desire to act. One's desire to act appears to be affected by a host of personality factors. These include locus of control,<sup>5</sup> attitudes, and personal responsibility. Thus, an individual with an internal locus of control, with positive attitudes toward the environment and toward taking action, and with a sense of obligation toward the environment will likely develop a desire to take action.

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<sup>5</sup>The locus of control represents an individual's perception of whether he/she has the skills to provoke changes through his/her own behavior. External locus of control refers to concepts based on the belief of some individuals do not intend to provoke change, because they attribute change to randomness or other powerful forces (God, government, and father). In the internal locus of control, on the other hand, individuals believe that their activities will likely have an impact.



**Fig. 2.3** The proposed model of responsible environmental behavior (based on Hines et al. 1988/1987)

One remaining category exists which can interrupt this pathway to action: (5) situational factors. Situational factors such as economic constraints, social pressures, and opportunities to choose different actions may enter into the picture and serve either to counteract or to strengthen the variables in the model. For example, if an individual has the cognitive ability, desire, and opportunity to help stop pollution by contributing to a local toxic waste fund, but simply cannot afford to do so, that person will not engage in the environmental action, and in this instance, the model's main pathway will not be followed. Situational factors include age, income, education, and gender. Figure 2.3 presents the model's factors.

This model indicates several areas which are amenable to change by the efforts of environmental educators. The knowledge and skill components, and perhaps the personality components of the model, may be affected through the efforts of educators. Approaches which address both affective and cognitive experiences and which provide individuals with opportunities to develop and practice those skills necessary for environmental action must be developed and implemented in educational systems.

### 2.2.1.2 Theoretical Framework by Stern et al.

The theoretical framework proposed by Stern et al. (1999), the so-called value-belief-norm theory, explains political activism which is essential to the success of social movements, which seek collective well-being. In some cases, the benefit is distributed among a small and easily identifiable group, but in others, collective benefits are often provided on a local, national, and global scale. This suggests that

although some individuals may expect enough personal gain to justify working toward the collective good on egotistical grounds, most are also motivated by a broader, altruistic concern, a willingness to take action even in the face of the “Free Rider Problem” as explained in the “The Tragedy of the Commons”<sup>6</sup> (Hardin 1968), “Voter’s Paradox”<sup>7</sup> (Felkins 1995), or “Prisoner’s Dilemma”<sup>8</sup> (Poundstone 1992; Axelrod 1984, 2004).

Stern et al. (1999) find that in the USA, many social movements, including the environmental movement, advocate the public good with reference to altruistic values. Such movements work to activate personal norms tied to those values. It is also possible, however, for a social movement to try to activate personal norms based on other types of values. For example, some conservative social movements, which see traditional values of duty, family loyalty, and the like as essential for providing public benefit such as social order, refer to these values in attempting to activate feelings of personal obligation to support the movement’s objectives.

Stern et al. (1999) propose that norm-based action flow from three factors: (a) acceptance of particular personal values, the personal belief that everything important according to those values is under threat, (b) the belief that actions initiated by the individual can help alleviate the threat, and (c) the belief that these actions will restore the values under threat.

Each of these three factors involves a generalization of Schwartz’s theory (1977): (1) The original theory presumes altruistic values exist. The revised, broadened theory holds that personal norms may have roots in other values as well as in altruistic values and those levels of altruism and other relevant values may vary across individuals. (2) The original theory emphasizes awareness of adverse consequences of events for other people; the broadened theory emphasizes threats to whatever objects are the focus of the values that underlie the norm. (3) Norm activation depends on ascription of responsibility to oneself for the undesirable consequences to others; the broadened theory emphasizes beliefs regarding responsibility for causing undesirable effects or the ability to alleviate threats to any valued object.

In expanding the range of valued objects to be given theoretical consideration, Stern et al. (1999) adopt the typology of value developed by S.H. Schwartz (Schwartz and Blisky 1987, 1990; Schwartz 1994; Schwartz and Huisman 1995;

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<sup>6</sup>The Tragedy of the Commons describes conflicts between individual and group interest through an example of a common pasture shared by the local community with free access and no restrictions. Every individual realizes that his interest is best served by bringing as many cattle as possible to the pasture although the fodder is limited and it is obvious that if everyone does so, the common goods will be completely exhausted.

<sup>7</sup>The Voter’s Paradox describes conflicts between individual and group interest in situations where, for instance, a person votes or volunteers in situations where collective action is involved, and people really cooperate, but they do (so) by self-interest.

<sup>8</sup>The Prisoner’s Dilemma describes a model of cooperation between two or more individuals (or corporations, or countries) in ordinary life in which, in many cases, it would be personally worthwhile for each individual to not cooperate with the others (better to desert).

Schwartz and Boehnke 2004). It is worthy to stress some general considerations under value conceptual framework.

### Universal Aspects of Human Values

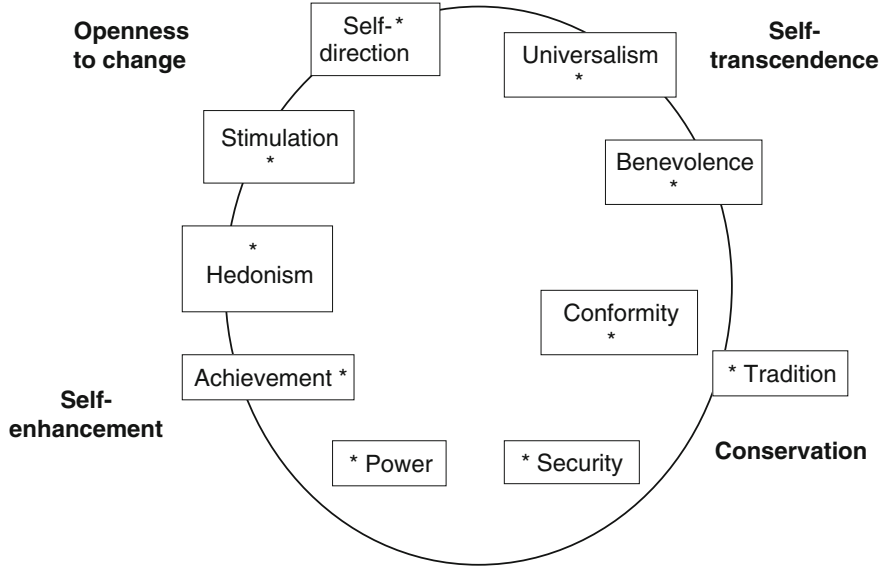
Values are forged from sets of interrelated attitudes. Values are enduring beliefs about a certain behavior or ideal way of life which is personally or socially preferable to an alternative behavior or way of life (Caduto 1995). According to Caduto (1995), values associated with a particular behavior are called instrumental values (e.g., honesty, respect for the environment) and those involving ideal ways of life are called final values (e.g., peace in the world, environmental quality).

According to Pereira de Gómez (1997), values are classified into *physical* (e.g., health, physical ability, and self-awareness), *intellectual* (e.g., attitude toward scientific knowledge, thought, and critical consciousness (criticism)), *aesthetic* (e.g., sense of beauty, respect for different artistic expressions), *ethical* (e.g., honesty, kindness, truth, justice, tolerance), *socio-emotional* (e.g., sense of belonging, awareness of others, solidarity, democracy, brotherhood, service), *religious* (e.g., knowledge of one's mission and living accordingly, recognition of one's limitations or deference to a higher power), and *liberty* (e.g., convictions, capacity to analyze, openness to pluralism, human rights).

According to Schwartz (1994), values have five conceptual aspects: A value is a belief pertaining to desirable end state or modes of conduct, that transcends specific situations, guides selection or evaluation of behavior, people, and events, and is ordered according to importance relative to other values to form a system of value priorities.

Implicit in this definition of values as goals is that (1) they serve the interest of some social entity, (2) they can motivate action (giving it direction and emotional intensity), (3) they function as standards for judging and justifying action, and (4) they are acquired both through socialization to dominant group values and through the unique learning experiences of individuals.

In order to cope with reality in a social context, groups and individuals cognitively transform the necessities inherent in human existence and express them in the language of specific values about which they can then communicate. Specifically, values represent, in the form of conscious goals, responses to three universal requirements with which all individuals and societies must cope: (1) needs of individuals as biological organisms, (2) requisites of coordinated social interaction, and (3) requirements for the smooth functioning and survival of groups. Ten motivationally distinct types of values were derived, evaluated, and confirmed to be recognized within and across cultures: power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. The ten value types (see Appendix A) are grouped in a semicircular structure under four categories: self-enhancement, openness to change, self-transcendence, and conservation. Figure 2.4 depicts the complete pattern of relations among values postulated by the theory.



**Fig. 2.4** Theoretical model of relations among 10 motivational types of values (based on Schwartz and Boehnke 2004)

The most important feature of value theory is the structure of dynamic relationships among 10 values. According to the theory, expressive actions of any value have practical, psychological, and social consequences which may create conflict or be compatible with the search for other values. For example, actions which express values of hedonism are likely to be in conflict with those which express values of tradition, or acting on values of self-direction is likely to conflict with values of conformity. On the other hand, values of hedonism are compatible with values of self-direction; values of tradition are compatible with values of conformity. Schwartz’s (1994) study in 44 countries and his study conducted in 2004 in 27 countries reveal systemic associations of many behaviors, attitudes, and personality variables with priorities for these values. The circular arrangement of values represents a continuous motivational. The closer the two values are in any direction around the circle, the greater the similarity of their underlying motivations.

The ten types of values are listed in the first column of Table 2.2, each defined in terms of the central goal of that category of values. The second column lists 45 specific values as primary examples representing each type.

The theory sustains that there are 10 core values identifiable in all societies, and these values can be arranged to form a semicircular structure based on inherent conflicts or compatibility between the motivational goals implicit to these values.

The conceptual framework proposed by Stern et al. (1999) states that behavior may be predicted according to one’s values. This model offers an array of five causal factors which determine actions toward social movements. Also, it extends



**Table 2.2** Motivational types of values (based on Schwartz 1994; Schwartz and Boehnke 2004)

Definition	Example of values
Power	Social power, control over others, dominance Health Authority, the right to lead or command Preserving public image
Achievement	Ambitious, wealth, material possessions, money Influential, having an impact on people or events Capable Successful
Hedonism	Pleasure Enjoying life Self-indulgent
Stimulation	An exciting life, stimulating experiences A varied life, filled with challenge, novelty, and change Daring
Self-direction	Freedom Creativity Independent Choosing own goals Curious, interested in everything, exploring
Universalism	Equality, equal opportunities for all A world of peace, free of war and conflict Unity with nature, fitting into nature Social justice, correcting injustice, care of the weak Broad-minded Preventing and protecting pollution, conserving natural resources A world of beauty
Benevolence	Responsible Loyal, true friendship, faithful to friends Honest, genuine, sincere Amiable Forgiving, willing to pardon others
Tradition	Respecting the earth, harmony with other species Moderate Humble Accepting portion in life Devote
Conformity	Politeness Self-discipline, self-restrain, resistance to temptations Honoring parents and elders, showing respect Obedient, dutiful, meeting obligations
Security	Social order National security Reciprocation of favors Family security, safety for loved ones Clean

considerations of the activation of moral norms not only to environmental issues, but also to economic, social, and cultural issues implicit in the concept of sustainability.

### 2.2.1.3 Howard Gardner's Theoretical Framework

The TMI points out the theoretical framework in relation to the range of skills deployed by human beings across all cultures. Gardner (2001) states that human cognition according to Piaget's concepts (Pansza 1999; Salles 1999) or actual cognitive science must include a repertoire of skills more universal and more comprehensive than they are now.

In order to formulate the TMI, Gardner (2001) reviewed the literature using eight criteria or "signs" to define intelligence: (1) potential isolation from due to brain damage, (2) the existence of idiot savants, prodigies, and other exceptional individuals, (3) an identifiable core operation or set of mental operations, (4) an individual's distinctive development history, along with a definable set of "end-state" performances, (5) an evolutionary history and evolutionary plausibility, (6) support from experimental psychological tasks, (7) support from psychometric findings, and (8) the individual's ability to decode a symbolic system. Howard Gardner views intelligence as the capacity to solve problems or fashion products which are valued in one or more cultural settings. This definition tells us nothing about the sources of such capabilities or the means of measuring them. Perhaps many of these skills do not lend themselves to measurement by verbal methods which largely depend on a combination of logic and language skills.

Based on this definition, and relying on a range of the above criteria and prerequisites, Gardner initially formulated a list of seven types of intelligence: (1) linguistic, (2) logical-mathematical, (3) musical, (4) spatial, (5) body-kineshetic, (6) personal intelligence directed toward others (inter), and (7) personal intelligence directed toward oneself (intra). The TMI (Gardner 2001) establishes seven skills which human beings perform in any culture in which they live and grow up. TMI is developed under a distributed vision, that is, inherent to individuals and artifacts that surround them. In other words, intelligence does not end with the skin, but rather encompasses tools (paper, pencil, and computer), documentary memory (contained in files, notebooks, and diaries), and a network of acquaintances (coworkers, colleagues, and other persons to whom one communicates by telephone or electronically). In addition, Gardner considers how skills may be put to use in a diverse range of educational settings (Gaxiola 2005).

Gardner claims that the seven types of intelligence rarely operate independently. They are used simultaneously and tend to complement each other as people develop skills or solve problems. Human beings are organisms who possess a basic, uniquely blended set of intelligences. These intelligences are amoral—they may be put to constructive or destructive use. However, leaders, or people with skills which cross boundaries among intelligences, can affect other people emotionally, socially,

and cognitively. They link individuals from different intellectual trends, scopes (disciplines, professions), and fields (people, institutions, award mechanisms, and everything which makes it possible to judge the quality of staff performance in a large enterprise).

Table 2.3 shows the relationships among seven types of intelligence identified by Gardner: linguistic, logical-mathematical, musical, spatial, body-kinesthetic, interpersonal, and intrapersonal. The table also presents their channel of access in humans and their neural representation (from a descriptive process) and examples of the most representative profile of what type of people exhibit for each type of intelligence.

Applying this theory to educational contexts, several criticisms arise with respect to Howard Gardner's conceptualization of multiple intelligences. However, this theory holds that (1) multiple intelligences act on a value system whereby students with a diversity of abilities can learn and succeed; (2) that learning is exciting and that hard work by teachers is necessary; (3) that the exchange of constructive suggestions and formal and informal ideas embedded in the curriculum and the evaluation of educational activities are valid for the students, as well as for the broader culture; (4) that the arts may be employed in order to develop people's abilities and comprehension within and across disciplines; and (5) that multiple intelligences are means to fostering high-quality student work. These features are highly pursued in education for sustainability.

#### 2.2.1.4 Psychological Dimensions by Corral-Verdugo and Pinheiro

With respect to psychological factors which affect or are affected by the interaction between the individual and the environment and the lack of clarity in dimensions behind the definition proposed for sustainable behavior (see Chap. 1), and with the goal of complying with that idea, given that individual and group behaviors involve social, political, economic, and environmental impacts, the author of this study uses psychological dimensions reported by Corral-Verdugo and Pinheiro (2004).

According to Corral-Verdugo (2010) and Corral-Verdugo and Pinheiro (2004), sustainable behavior should meet at least five psychological features: (1) effectiveness, (2) deliberation, (3) anticipation, (4) solidarity, and (5) austerity. Effectiveness implies swift reaction to requests or demands of the physical or social environment, while deliberation means that behavior must occur with the specific intent of caring and promoting the welfare of humans and other organisms in the environment. Anticipation means that even if one performs a behavior in the current moment, the individual temporarily separates him/herself and projects the action to the future, which is the time to which the current behavior is directed. Solidarity is expressed as the sum of altruistic tendencies and actions deployed in response to concern for others. Finally, austerity raises the need to lead a lifestyle in which consumption of goods and natural resources is limited to that which is necessary, avoiding wastefulness.

**Table 2.3** Relationships among types of intelligences and their neuronal representation (based on Gardner 2001)

Kind of intelligence	Channel of access	Neuronal representation	Performance profile
Linguistic intelligence (involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. This intelligence includes the ability to effectively use language to express oneself rhetorically or poetically, and language as a means to recall information)	Oral-auditory tract	Left temporal lobe	Poets, writers, politicians, lawyers, speakers
Musical intelligence (involves skill in the composition, performance, and appreciation of musical patterns. It encompasses the capacity to recognize and compose musical pitches, tones, and rhythms)	Oral-auditory tract	Right hemisphere. Back portions of right brain	Musicians, composers
Logical-mathematical intelligence (consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically, and entails the ability to detect patterns, reason deductively, and think logically)	Visual	Both hemispheres: Left hemisphere has the ability to read and produce mathematical signs, while right hemisphere seems to understand relationships and numerical concepts	Scientists, mathematicians
Spatial intelligence (involves the potential to recognize and maneuver in open spaces and confined areas)	Spatial visual	Back portions of right hemisphere	Sculptors, mathematicians, topologists

(continued)

**Table 2.3** (continued)

Kind of intelligence	Channel of access	Neuronal representation	Performance profile
Body-kinesthetic intelligence (entails the potential of using one's whole body or parts of the body to solve problems. It is the ability to use mental aptitudes to coordinate bodily movements)	Visual	Cerebral cortex, thalamus, basal ganglia	Dancers, swimmers, gymnasts
Inter-personal intelligence (concerned with the capacity to understand the intentions, motivations, and desires of others. It allows people to work effectively with others)	Symbolization provided by culture as rituals and religious and mythical systems	Frontal cortex. Front lobes were networks of nerve representing internal environment of individuals converge (feelings, motivations, and subjective knowledge) with the system representing external environment: vision, sounds, tastes, and customs transmitted through the senses	Educators, salespeople, counselors, religious leaders, artists
Intra-personal intelligence (entails the capacity to understand oneself, to appreciate one's feelings, fears, and motivations)			Magicians, warriors, shamans, fortune-tellers

The requirements for sustainability include challenges imposed by the environment (lack of resources, climatic adversity, environmental and social opportunities), and regulatory requirements of social groups (conventions, rules and laws for environmental protection, rules of solidarity, public policies). In addition, individual dispositions (attitudes, beliefs, perceptions, and values) generate conditions in individuals which lead them to act responsibly toward themselves, the environment, and fellow humans.

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<http://www.springer.com/978-3-319-19392-2>

Exploring Sustainable Behavior Structure in Higher  
Education

A Socio-Psychology Confirmatory Approach

Juárez-Nájera, M.

2015, XXIII, 136 p. 13 illus., Hardcover

ISBN: 978-3-319-19392-2